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APLODONTID RODENTS (MAMMALIA) FROM THE ORELLAN (EARLY OLIGOCENE) CANYON FERRY FAUNA OF MONTANA

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ABSTRACT

Four species of prosciurine aplodontids are recognized from the Orellan horizon of the Canyon Ferry Reservoir area of Montana, three species of *Prosciurus* (*P. relictus*, *P.* sp., cf. *P. albiclivus*, *Prosciurus* sp.) and a new species of *Dakotallomys*, *D. whitei*. The recognition of these species greatly increases the diversity of aplodontids from the Canyon Ferry fauna. The aplodontid fauna from Canyon Ferry is closest to that from the northern-most Great Plains (North and South Dakota).

INTRODUCTION

In his report of the mammalian fauna from Canyon Ferry Reservoir area of Montana, White (1954) identified only two specimens of aplodontid rodents; both from the same locality within the Orellan horizon. He referred the specimens to *Prosciurus* cf. *relictus*. Since that time, additional material of aplodontids has been collected from the same locality and horizon. This new material represents several more species of prosciurine aplodontids. All of the specimens described herein are from locality 24LC15 (White, 1954:397), Dunbar Creek Formation, Lewis and Clark County, Montana. This locality is Orellan in age.

Dental terminology used follows that of Wood and Wilson (1936) as modified by Rensberger (1975). Upper teeth are noted by capital letters, lower teeth by lower-case letters. Institutional abbreviation: USNM, National Museum of Natural History, Smithsonian Institution.

SYSTEMATIC PALEONTOLOGY

Family Aplodotidae Brandt, 1855
Subfamily Prosciurinae Wilson, 1949
Proscurus Matthew, 1903
Prosciurus relictus (Cope, 1873)
(Figures 1A, 2A)

Referred Specimens—USNM 18857, mandible with p4-m3; USNM 18858, mandible with i1 and p4-m1; USNM 19939, mandible with p4-m3.

Discussion—The two specimens originally referred by While (1954) to *Prosciurus* cf. *relictus* and an additional specimen, USNM 19939, do not differ in morphology or size from specimens referred elsewhere to *P. relictus* (Wood, 1937:168; Galbreath, 1953:table 6; Korth, 1989:table 1), and therefore can be referred to the latter without question.

Prosciurus sp., cf. *P. albiclivus* Korth, 1994
(Figures 1B, 2B)

Referred Specimen—USNM 20517, partial left mandible with m1-m2.

Description—The morphology of the mandible does not differ from other species of the genus. The two lower molars, similarly, follow the pattern of other species (Wood, 1937; Korth 1989), with some minor variations. The m1 and m2 are nearly equal in size, and slightly longer than wide (m2 is commonly wider than long in other species). The anterior width of m1 is slightly less than in m2, making the trigonid slightly narrower in m1. The posterior arm of the protoconid reaches the base of the metaconid on m1 (=metalphulid II), enclosing the trigonid basin posteriorly. On m2, the trigonid is wider and the posterior arm of the protoconid is shorter, leaving the trigonid open posteriorly. On both molars there is a minute swelling at the posterior end of the metastylid crest, separated from the metastylid by a narrow valley. On m1 there is a small cuspule posterobuccal to the protoconid (?protostylid). On m2, a similarly sized cuspule is just anterior to the entocond. These cuspules have not been reported in any other species of *Prosciurus*.

Discussion—The general morphology of the mandible and cheek teeth of USNM 20517 is that of *Prosciurus*, so it is clearly referable to that genus. The accessory cuspules on the molars are not duplicated in any other species of the genus. Because these cuspules

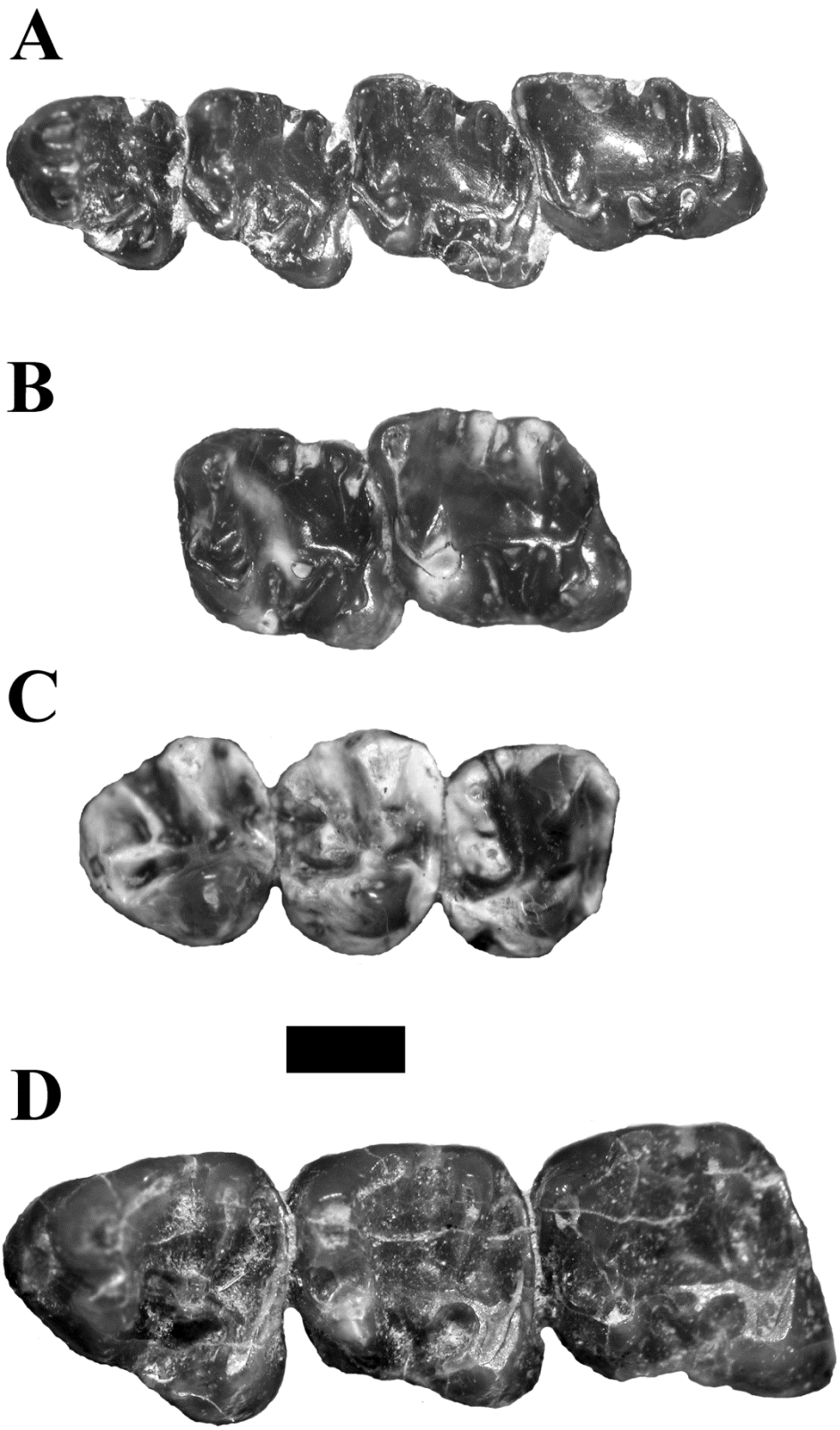

FIGURE 1. Cheek teeth of *Prosciurus* and *Dakotallomys* from Canyon Ferry, Montana. A, *P. relictus*, USNM 18857, left p4-m3. B, *P.* sp., cf. *P. albiclivus*, USNM 20517, left m1-m2. C, *Prosciurus* sp., USNM 20516, left M1-M3. D, *D. whitei*, USNM 19938, left p4-m2. Bar scale = 1 mm.

are not consistent on both of the molars, they are considered as variants that are not diagnostic.

In size, the molars of USNM 20517 are larger than those reported for *Prosciurus relictus* (Wood, 1937:168; Galbreath, 1953:table 6; Korth, 1989:table 1) and smaller than those of *P. magnus* (Korth, 1989:404; Korth, 2009:91). The only named species of *Prosciurus* that is equivalent in size is *P. albiclivus* from the Orellan of Nebraska and North Dakota (Korth, 1994:table 1). However, *P. albiclivus* is known only from upper dentitions, so a direct comparison cannot be made. The Canyon Ferry specimen is here tentatively referred to as *Prosciurus* sp., cf. *P. albiclivus* until comparative material is discovered.

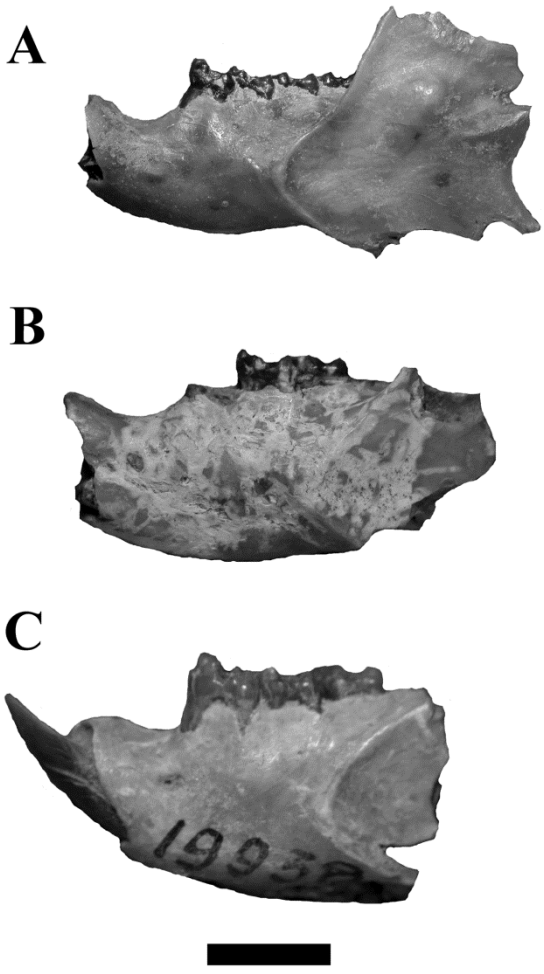

FIGURE 2. Lateral view of mandibles of *Prosciurus* and *Dakotallomys* from Canyon Ferry, Montana. A, *P. relictus*, USNM 18857. B, *P.* sp., cf. *P. albiclivus*, USNM 20517. C, *D. whitei*, USNM 19938. Bar scale = 5 mm.

Prosciurus sp.
(Figure 1C)

Referred Specimen—USNM 20516, right maxillary fragment with M1-M3.

Description—The anterior cingulum of M1 runs for nearly the entire width of the tooth, ending buccally in a minute parastyle and lingually in a small cuspule anterior to the apex of the protocone. The protoloph is complete from the paracone to protocone and contains a large protoconule, approximately half the size of the major cusps. A distinct protocone crest extends buccally from the protocone into the valley between the anterior cingulum and the protoloph. A small mesostyle is present along the buccal margin of the tooth between the paracone and metacone, separated from each by a deep, narrow valley. The hypocone is in the posterolingual corner of the tooth and is attached anteriorly to the protocone. The hypocone is the smallest of the major cusps. The metaloph ends lingually at the metaconule and is not continuous with the protocone. The metaconule is doubled, the buccal cusp being much smaller than the lingual one. The metacone is in the posterobuccal corner of the tooth and is anteroposteriorly compressed. A posterior cingulum runs the entire width of the tooth from the hypocone to the metacone.

M1 and M2 are nearly identical in occlusal morphology. The only variation between M2 and M1 is on the metaloph. M1 has a second, smaller metaconule, but on M2 there is a short, anteriorly running lophule that originates along the metaloph between the metacone and metaconule.

M3 is longer than M1 and M2. The anterior cingulum, protocone, paracone and protoloph are similar to those of the anterior molars but the protoconule is reduced in size. M3 is expanded posteriorly and the metacone and hypocone are reduced to lophs. The metaloph runs lingually from the posterobuccal corner of the tooth for about half the width of the tooth, then joins an anteroposteriorly directed loph that runs from the center of the posterior margin of the tooth. The anteroposterior loph continues anteriorly and ultimately fuses with a short buccally directed loph that originates from the protocone. This system of lophs isolates three different valleys on the center and posterior half of the tooth. The posterior cingulum wraps around the entire posterior margin of the tooth. A minute mesostyle is also present.

Discussion—In its overall morphology, USNM 20516 is clearly referable to *Prosciurus* but cannot be referred to the other species from Canyon Ferry due to its smaller size (Table 1). The molars of USNM 20516 are within the range of those of *Prosciurus parvus*

TABLE 1. Dental measurements of *Prosciurus* and *Dakotallomys* from Canyon Ferry, Montana. Abbreviations: L, anteroposterior length; W, transverse width. Measurements in mm.

	USNM #	p4L	p4W	m1L	m1W	m2L	m2W	m3L	m3W	p4-m3
P. relictus	19939	1.75	1.71	1.61	1.68	1.79	1.70	2.17	1.60	7.69
P. relictus	18858	1.79	1.71	1.77	1.68					
P. relictus	18857	1.55	1.62	1.57	1.64	1.68	1.69	2.02	1.67	7.19
P. cf. *albiclivus*	20517			1.99	1.97	2.08	2.01			8.90
D. whitei	19938	2.55	2.56	2.36	2.45	2.56	2.56			
				M1L	M1W	M2L	M2W	M3L	M3W	
Prosciurus sp.	20516			1.58	2.21	1.55	2.16	1.81	2.00	

(Korth, 1989:table 2) and smaller than those of *P. relictus*. However, the upper molars of the Canyon Ferry specimen differ greatly from those of *P. parvus* in having a protoconule as large as the metaconule on M1 and M2 (reduced or absent in *P. parvus*) and having a doubled or more complex metaconule (single in *P. parvus*). These features are more typical of the Chadronian *P. vetustus* (Matthew, 1903:fig. 9; Wood, 1937:fig. 8). However, USNM 20516 is smaller than any specimens of *P. vetustus* (Wood, 1937:167; Black, 1965:67) and the accessory lophule in the central basin of M2 along the metaloph is unreported in *P. vetustus*. The larger protoconule and doubled metaconule appear to be primitive morphologies for prosciurines (see Emry and Korth, 1989:3-4) retained by this specimen.

Dakotallomys Tedrow and Korth, 1999
Dakotallomys whitei n. sp.
(Figure 1D, 2C)

Type and Only Specimen—USNM 19938, left mandible with i1 and p4-m2.

Horizon and Locality—Canyon Ferry area, Dunbar Creek Formation, Lewis and Clark County, Montana.

Age—Orellan (early Oligocene).

Diagnosis—Similar in size to *D. lillegraveni*, smaller than *D. pelycomyoides*; m1 and m2 equal in width and length (longer than wide in other species); basal cingulid present on cheek teeth on lingual as well as buccal side of the tooth; p4 longer than m1 (subequal to, or shorter in other species); large anteroconid on anterior cingulid of p4; low lophule extending posteriorly from metalophulid II into central basin on m1 and m2; ectostylid present and buccal mesolophid lacking on lower cheek teeth (as in *D. pelycomyoides*).

Etymology—Patronym for T. E. White who collected the type specimen and first described the fauna from Canyon Ferry.

Description—The mandible is deep and robust as in other species of the genus. The diastema is shallow and short (less than half the alveolar length of the lower cheek teeth). The dorsal margin of the diastema is a sharp ridge. The mental foramen is situated just above the dorsoventral midline of the mandible, just anterior to the anterior root of p4, below the posterior end of the diastema.

The lower incisor is gently convex on the anterior enamel surface. In cross-section, the incisor is widest just posterior to the anterior enamel surface. The cheek teeth consist of round, robust cusps. The p4 is slightly larger in both length and width compared to m1. The trigonid is narrower than the talonid. The trigonid consists of the metaconid and paraconid that are positioned close to one another and connected posteriorly by the metalophulid II. The trigonid is open anteriorly. A distinct anteroconid is present at the center of the anterior margin of the tooth. A cingluid along the base of the tooth wraps around the anterior end of the tooth from the buccal margin of the prototonid to the lingual edge of the metaconid. A large mesostylid is present along the lingual side of the tooth, strongly connected to the metaconid via the metastylid crest. The ectolophid is continuous from the protoconid to the hypoconid with a small mesoconid at its center. The entoconid is large and anteroposteriorly compressed. The hypolophid extends buccally from the entoconid, connecting to the ectolophid at the mesoconid. The hypoconid is also anteroposteriorly compressed. There is a small but distinct ectostylid along the buccal side of the tooth just anterior to the hypoconid along the anterior slope of that cusp. The posterior cingulid is continuous from the hypoconid to the posterior side of the entoconid.

The m1 is more nearly rectangular than p4, with the trigonid being nearly as wide as the talonid. The metaconid and protoconid are connected anteriorly by the metalophulid I and posteriorly by the metalophulid II, enclosing a nearly circular trigonid basin. A cingulid is present at the base of the metaconid on the lingual side of the tooth, and on the buccal side of the protoconid. The remainder of the tooth is similar to that of p4 except that the hypolophid joins the ectolophid just posterior to the mesoconid.

The m2 is nearly identical to m1 except that the trigonid is wider and the metalophulid II is not complete, ending just short of the metaconid, leaving a small, narrow valley open on the posterior side of the trigonid. All other morphologies are as in p4 and m1.

Discussion—USNM 19938 is referable to *Dakotallomys* based on its robust cusps and basal cingulid on the lower molars (Tedrow and Korth, 1997). *D. whitei* differs from the other species of the genus in having a basal cingulid on the lingual as well as the buccal sides of the lower cheek teeth and having m1 and m2 nearly equal in width and length, not longer than wide as in other species. *D. whitei* also differs from the Orellan *D. lillegraveni* in having ectostylids on the lower cheek teeth and lacking a buccal mesolophid. *D. whitei* most closely approaches the Whitneyan *D. pelycomyoides* in occlusal morphology but is slightly smaller (Tabrum and Korth, 1997:table 1). The short diastema of *D. whitei* is also present in *D. pelycomyoides*.

CONCLUSIONS

White (1954) noted only two specimens of *Prosciurus* cf. *relictus* from the Canyon Ferry Reservoir fauna, both from the Orellan. The additional specimens collected later by White and field crews are clearly referable to several different species of prosciurine aplodontids, increasing the diversity of the aplodontid fauna from this area to two genera and four species

Prosciurus relictus is the most common species of the genus, having been reported from nearly all known Orellan faunas from North America (see Flynn and Jacobs, 2008:380). *Prosciurus albiclivus* is previously only known from North Dakota and Nebraska (Korth, 1994), and *Dakotallomys* is only known from South Dakota (Tedrow and Korth, 1997). Compared to other Orellan faunas, the aplodontid species from Canyon Ferry are closest to faunas from the northern Great Plains: North and South Dakota.

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