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Emanuel County Junior College

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CARNIVORES OF THE RAILWAY QUARRIES LOCAL FAUNA

Robert L. Evander

Emanuel County Junior College
Swainsboro, Georgia 30401

The Railway Quarries Local Fauna preserves eleven distinct species of carnivores distributed among five families. This carnivore fauna is dominated by canids, which are represented by six species. *Tomarctus* near *T. euthos* and *Aelurodon ferox* are the most abundantly represented carnivores at the site; both are canids. *A. platyrhinus* Barbour and Cook and *A. marshi* (Thorpe) are recognized as junior synonyms of *Aelurodon ferox* Leidy. *A. ferox* is more abundantly represented in the Railway Quarries Local Fauna than at any other known site.

† † †

INTRODUCTION

The Railway Quarries Local Fauna consists of three quarry sites located in the type section of the Valentine Formation. Railway Quarry "A", designated as University of Nebraska State Museum Collecting Locality Cr-12, is the largest of the Railway Quarries, having produced over 2,000 specimens. Railway Quarry "B", designated University of Nebraska State Museum Collecting Locality Cr-13, has produced nearly 400 specimens. West Valentine Quarry, designated University of Nebraska State Museum Collecting Locality Cr-114, has yielded fewer than 50 specimens. All three quarries are geographically contiguous, being located in the NE¼, Sec. 17, T. 33 N., R. 27 W., in Cherry County, Nebraska. They occur in channel sand located approximately 30 m above the base of the Valentine Formation. These channel sands are clearly referable to the Crookston Bridge Member of the Valentine Formation (Skinner and Johnson, 1984).

The Railway Quarries formed the principal basis for the Niobrara River Fauna of Stirton and McGrew (1935) and were

listed as one of the key Tertiary vertebrate localities in North America by Wood *et al.* (1941). Despite this prominence, a complete faunal description is only beginning to emerge (Evander, 1978; Holman and Sullivan, 1981). This is the first of a series of papers that will describe the mammals represented at the Railway Quarries.

The major repository for collections from the Railway Quarries is the University of Nebraska State Museum. However, important supporting collections exist at the University of California Museum of Paleontology and the Frick Collection at the American Museum of Natural History. In this report upon the carnivores, I have relied heavily upon these supporting collections. Therefore, I feel that it is appropriate here to detail the history of the development of the quarry sites by each of these institutions, and in the process to elucidate the various designations that apply to each of the sites.

Railway Quarry "A", designated as University of Nebraska State Museum Collecting Locality Cr-12, was discovered by A.C. Whitford and J. B. Burnett of the University of Nebraska on August 11, 1915. Before the 1915 field season ended, Whitford and Burnett procured a small but representative collection from the site, which they called the "Valentine locality". Visits to the site by University of Nebraska field parties in 1916 produced few specimens, and further visits were discontinued. The locality was rediscovered by P. O. McGrew on July 12, 1930. University of Nebraska State Museum field parties made extensive excavations at the quarry in 1930, 1931, and 1933. The 1933 season was conducted in cooperation with the University of California Museum of Paleontology, which designates the site V-3307. R. A. Stirton, of the University of

California, first suggested the present name, Railway Quarry "A", for the site. Railway Quarry "A" was last worked in 1935 by Morris F. Skinner and party from the Frick Laboratory at the American Museum of Natural History. The quarry was known to the Frick Laboratory as Railway Quarry "A", which is abbreviated in their records as "R.R.Q.A."

Railway Quarry "B" has a long but checkered history. The site (University of Nebraska State Museum Collecting Locality Cr-13) was first noted by F. W. Johnson in 1931. However, the University of Nebraska collected there only sporadically, and then sometimes in cooperation with other museums: the University of California Museum of Paleontology, which designates the site as Railway Quarry "B1" and part of collecting locality V-77035; the Carnegie Museum, which designates the site as locality number 999998; and the Frick Laboratory at the American Museum of Natural History, which designates the site as part of Prospecting Locality 240. Most specimens from Railway Quarry "B" were acquired by surface prospecting. The first serious excavations were made at this site in 1977. Railway Quarry "B" is the only Railway Quarry site that has been actively worked within the last 40 years.

West Valentine Quarry was discovered by M. G. Richmond and Oscar E. Hans in 1916, while on an unproductive visit to Railway Quarry "A". Richmond located the site rather imprecisely in his field notes, so that when activity in the area resumed in the 1930's, it was not apparent that West Valentine Quarry was distinct from Railway Quarry "B". Recently, however, archivist Rebecca Monke of the University of Nebraska State Museum discovered a photograph of the quarry site taken by Richmond in 1916. The photograph places West Valentine Quarry on a small hill approximately 60 m west of Railway Quarry "B". Subsequently, this site was designated as University of Nebraska State Museum Collecting Locality Cr-114. Other than the Richmond and Hans collection of 1916, only a few specimens collected by R. A. Stirton and Nate Greer of the University of California Museum of Paleontology can be definitely allocated to West Valentine Quarry. Stirton's field notes designate this site as Railway Quarry "B2". Together with Stirton's Railway Quarry "B1", this site forms University of California Museum of Paleontology Collecting Locality V-77035.

ACKNOWLEDGMENTS

This paper was originally part of a master's thesis submitted to the University of Nebraska-Lincoln. M. R. Voorhies and R. M. Hunt served as thesis advisors. The manuscript underwent extensive taxonomic revision in 1978 under the counsel of Beryl Taylor, then at the American Museum of Natural History. Since that time, the manuscript has languished beneath the press of more urgent priorities, until rescued from obscurity by F. Walker Johnson, volunteer at the American Museum of Natural History. R. H. Tedford provided the final impetus to publication. My special thanks go to Mark Wagner and Raymond Gooris, volunteer illustrators at the American Museum

of Natural History. Both gave generously of their artistic talents, and thereby lent this paper a quality that otherwise would have been wanting. Without their efforts, this publication would not have been possible.

I thank Barbara Waters of the University of California Museum of Paleontology, M. R. Voorhies of the University of Nebraska State Museum, and R. J. Emry of the National Museum of Natural History for the loan of specimens.

ABBREVIATIONS

- F:AM Frick Collection, American Museum of Natural History
UCMP University of California Museum of Paleontology
UNSM University of Nebraska State Museum

SYSTEMATICS

ORDER CARNIVORA

Family Canidae

Leptocyon vafer (Leidy, 1858)

Figures 1, 8a; Tables 1,2

Referred Specimens. From Railway Quarry "A": UNSM 76,608, left ramus with M_2 , alveoli for C, P_1 - M_1 , M_3 ; UNSM 76,611, right ulna lacking capitulum; UNSM 76,612, distal three-fourths of right femur. From Railway Quarry "B": UNSM 76,609, left M^1 ; UNSM 76,610, partial right M^1 ; UCMP 124,378, left ? P_4 .

Description. Small, slender-jawed canid. Alveolus for canine disproportionately large for slender jaw. Premolars widely spaced. P_1 single-rooted, P_2 - P_4 double-rooted. M_1 double-rooted, much expanded anteroposteriorly. M_2 double-rooted, with small paraconid, small anterolabial cingulid, subequal metaconid and protoconid. Talonid of M_2 with hypoconid larger than entoconid. M_3 small, single-rooted. Mental foramina below P_1 and P_3 . M^1 with strong styler shelf across entire labial side of tooth, small parastyle anterolabial to paracone, paracone slightly larger than metacone, hypocone placed lingually and posteriorly, hypocone larger than protocone, which is in turn larger than small metaconule. The combination of small size, widely-spaced premolar series, and small paraconid on the M_2 suggest *Leptocyon*. The type of the only described species, *L. vafer* (Leidy), differs little from UNSM 76,608 in either size or shape. Postcranial elements were assigned to *Leptocyon vafer* upon the basis of their small size.

Tomarctus near *T. euthos* (McGrew, 1935)

Figures 2, 7b, 8b; Tables 1,2

Referred Specimens. From Railway Quarry "A": UNSM 25,881, partial right maxilla with P^4 - M^1 ; UNSM 25,882, partial right maxilla with P^3 - M^2 ; UNSM 25,884, right ramus with P_4 - M_2 ; UNSM 25,885, left ramus with P_4 , broken P_2 - P_3 , M_1 - M_2 ; UNSM 25,886, left ramus with P_3 - P_4 , alveoli for M_1 - M_3 ; UNSM 76,515, partial skull; UNSM 76,516, left humerus; UNSM 76,517, left talus; UNSM 76,518, left metacarpal II; F:AM

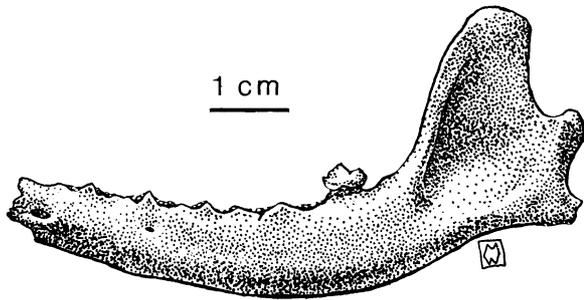


FIGURE 1. *Leptocyon vafer*.—Lateral aspect of UNSM 76,608, left ramus with M_2 , alveoli for C, P_1 - M_1 , M_3 ; from Railway Quarry "A".

61,066, right ramus with C, P_2 - M_2 , alveoli for P_1 , M_3 ; UCMP 29,926, left ramus with M_1 , alveoli for M_2 , M_3 . From Railway Quarry "B": UNSM 76,614, partial left maxilla with M^1 - M^2 , broken P^4 .

Description. Medium-sized canid. Premolar dentition sharply graded and crowded (the ratio of premolar length to molar length in UNSM 25,584 is 0.88), but the premolars are not set obliquely in the jaw. P_1 single-rooted, P_2 - P_4 double-rooted. P_2 with slight cingular swelling anteriorly, posterior accessory cuspid, and posterior cingulid. P_3 and P_4 with slight cingular swellings anteriorly, posterior accessory cuspids, and posterior stylids. M_1 with robust paraconid blade, distinct carnassial notch, moderately strong metaconid. Talonid of M_1 approximately one-third of tooth, trenchant, with hypoconid subequal to entoconid. M_2 with small paraconid, anterolabial cingulid, metaconid subequal to protoconid, trenchant talonid. M_3 small, single-rooted. A single mental foramen is located labially on the ramus below P_2 . P^3 with anterolingual accessory cusp, stepped posteriorly. P^4 with anterior ridge nearly obliterating a weak parastyle, a less-distinct anterolingual ridge connects paracone to protocone. P^4 with deep carnassial notch, robust metacone. M^1 tending to be subquadrate, with large hypocone subequal to protocone. M^1 with strong labial cingulum, paracone larger than metacone, protocone subequal to metaconule. M^2 small, with posteriorly rotated hypocone, distinct protocone, small or absent metaconule.

The large trigonids and trenchant talonids (Matthew, 1924), anterolabial cingulum of M^2 (Merriam, 1913), and weak parastyle on P^4 (Vanderhoof and Gregory, 1940) combine to indicate a canid of the genus *Tomarctus*. Direct comparison with the holotypes of the other species of this genus establishes that the most distinctive feature of the Railway Quarries species is the sharply graded premolar series. This character is shared only by *T. euthos* (McGrew) and *T. paulus* Henshaw among

described species of the genus. Whereas several points of specific distinction exist between *T. paulus* and the Railway Quarry species (greater hypsodonty, the peculiar anteriorly placed protocone, and smaller size of *T. paulus*), only size can be used to distinguish *T. euthos* from the Railway Quarry species (the Railway Quarry specimens being slightly smaller than the type of *T. euthos*). *Tomarctus temerarius*, Leidy's species from the "sands of the Niobrara" (Leidy, 1869: 368), although represented by very incomplete type material, is distinct from the Railway Quarries species in the possession of a low hypoconulid on the M_1 and by smaller size.

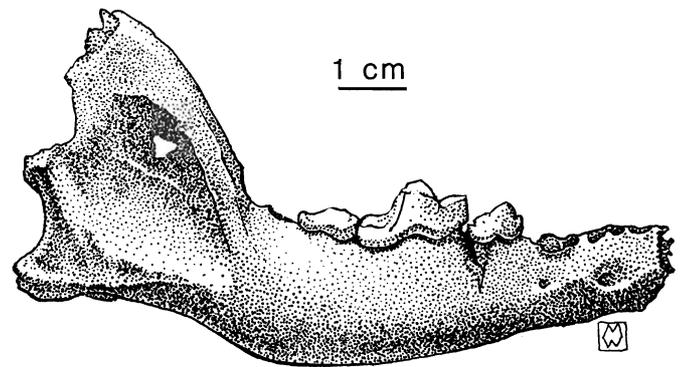


FIGURE 2. *Tomarctus* near *T. euthos*.—Lateral aspect of UNSM 25,884, right ramus with P_4 - M_2 ; from Railway Quarry "A".

Carpocyon cuspidatus (Thorpe, 1922)

Figures 3, 7c, 8c; Tables 1, 2

Referred Specimens. From Railway Quarry "A": UNSM 25,834, right maxilla with P^3 - M^2 ; UNSM 25,883, partial skull with left P^4 - M^2 ; UNSM 76,613, left ramus with M_1 - M_2 , broken P_4 , alveoli for C- P_3 .

Description. Medium-sized canid with robust, low-crowned dentition. Lower premolar dentition abbreviated and crowded (ratio of premolar length to molar length is 0.76), but not set obliquely in jaw. P_1 single-rooted, P_2 - P_4 double-rooted. M_1 with robust paraconid blade, deep carnassial notch, moderately developed metaconid, and trenchant talonid. Talonid of M_1 making up fully one-third of tooth. M_2 elongate, with small paraconid, distinct anterolabial cingulid; subequal protoconid and metaconid; large, well-worn talonid. M_3 single-rooted, small. Two mental foramina present, a larger beneath P_2 and a smaller beneath P_3 . In the upper dentition, P^3 with hint of anterior cingulum, small anterolingual accessory cusplule, strong posterior accessory cusplule, and small posterior cingular cusplule. P^4 small; with modest parastyle; bulbous protocone placed anteriorly; lingual cingulum posterior to protocone; indistinct

carnassial notch; and well-developed, but short paracone-metacone blade. P⁴ protocone lacking crests to either paracone or parastyle. M¹ fully quadrate, wider than long, with anterior and labial cingula, weak parastyle, paracone slightly larger than metacone, protocone subequal to metaconule, broad hypocone stretching across lingual border of tooth. M² large, with labial cingulum, paracone larger than metacone, protocone larger than metaconule, posteriorly placed hypocone. M³ wanting. Zygomatic arch strong, deep, lacking postorbital process. Skull with frontal and sagittal crests very pronounced, square-topped occipital crest.

The maxilla from the Railway Quarries matches closely the type of *Carpocyon cuspidatus* Thorpe (Webb, 1969b). The lower dentition of *Carpocyon* has not previously been described. UNSM 76,613 is referred here on the basis of its appropriate size and crushing specializations, which are similar to those displayed in the upper dentition. The shortened M₁ shearing blade and the enlarged talonids on M₁ and M₂ are considered as crushing specializations in the lower jaw of *Carpocyon*. It is not possible to test occlusion between the two specimens from the Railway Quarries because they come from the opposite sides of the jaw, but it is clear that the short P⁴ shearing blade matches the short M₁ paraconid-protoconid blade, whereas the large talonids on the M₂ and M₃ would occlude with the lingual crushing platforms of M¹ and M².

with distinct anterior blade and less distinct posterolingual blade. P₁ single-rooted, P₂-P₄ double-rooted. P₁ simple, with single bulbous major cusp placed anteriorly, a weakly-developed anterior accessory cuspid is also present. P₂-P₄ with anterior accessory cuspid, posterior accessory cuspid and posterior stylids, all these features being better developed in the more posterior teeth. Canine-P₁, P₁-P₂ and P₂-P₃ diastemata approximately as long as anterior-posterior diameter of P₁; diastema between P₃ and P₄ only half as long. M₁ with abbreviated trigonoid; elongate, trenchant talonid; strong metaconid; weak metastylid. Moderately-developed accessory cuspid located posterolabial to protoconid. M₂ with very prominent labial cingulid located lateral to trigonoid, robust metaconid, weakly developed protoconid and paraconid. M₂ talonid broad, nearly bicuspid, with hypoconulid nearly subsumed in posterior cingular crest. M₃ a small, generally flat tooth with a single robust cusp (? metaconid) placed centrally on the lingual side. Ramus tapers anteriorly. Two mental foramina are placed below the diastema between P₁ and P₂, and beneath P₃.

The unusual labial accessory cuspid on M₁ and the widely spaced premolar series indicate the genus *Cynarctus*. Within *Cynarctus*, only *C. saxatilis* Matthew approaches the large size of the Railway Quarries species.

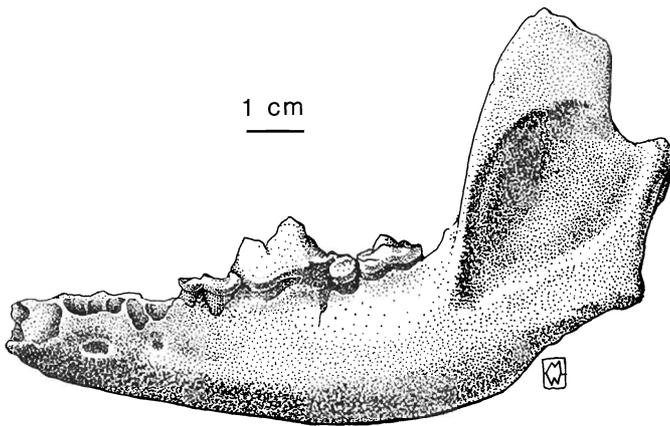


FIGURE 3. *Carpocyon cuspidatus*.—Lateral aspect of UNSM 76,613, left ramus with M₁-M₂, broken P₄, alveoli for C-P₃; from Railway Quarry "A".

Cynarctus saxatilis Matthew, 1902

Figures 4, 7d; Table 1

Referred Specimens. From Railway Quarry "A": UCMP 29,891, left ramus with C-M₃. From Railway Quarry "B": UCMP 124,377, partial right ramus with M₁.

Description. Medium-sized canid with long, slender ramus and widely spaced premolars. Canine round in cross section,

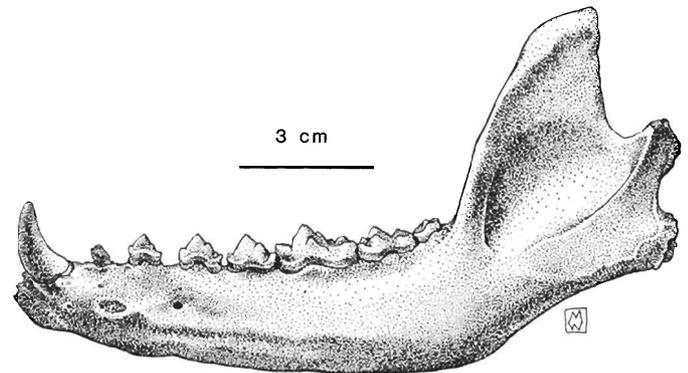


FIGURE 4. *Cynarctus saxatilis*.—Lateral aspect of UCMP 29,891, left ramus with C-M₃; from Railway Quarry "A".

Strobodon stirtoni (Webb, 1969a)

Figures 5, 7e, 8e; Table 2

Referred Specimens. From Railway Quarry "A": UNSM 76,620, right ramus with C erupting, broken M₁, unerupted M₃, alveoli for P₁-P₄, M₂ (UNSM 76,620 belongs to an adolescent, M₁ is fully erupted but unworn, the alveolus for M₂ indicates that M₂ was in place, and M₃ is present in the crypt). From Railway Quarry "B": UCMP 63,657, right maxilla with P₂-M₂, alveolus for P¹ and partial alveolus for C.

Description. Large canid. Lower premolar dentition crowded, with P₂ and P₃ set obliquely in the jaw. P₁ single-

rooted, alveolus for P_1 small (especially in comparison with UNSM 26,020, described below as *Aelurodon ferox* Leidy). P_3 - M_2 double-rooted. M_1 elongate, fragment of M_1 suggests a moderately robust tooth. M_1 with weak metaconid, trenchant talonid with hypoconid larger than entoconid. M_2 approximately one-third length of M_1 . M_3 small, simple. Upper premolars crowded anteriorly. P^1 single-rooted, position of the alveolus in the maxilla suggests that this tooth was set obliquely in the jaw. Comparison with the alveolus of P^1 in specimens of *Aelurodon ferox* demonstrates a much smaller alveolus in *Strobodon stirtoni*. Double-rooted P^2 and P^3 with single anterior accessory cusplule and two posterior accessory cusplules, in addition to a cingular cusplule posteriorly. P^4 elongate, moderately robust. P^4 parastyle robust, protocone small, placed anteriorly, with weak paracone-protocone crest. Robust paracone-metacone blade, indistinct cingulum labial to the blade. M^1 subtriangular, with large paracone, less-developed metacone, and low protocone and metaconule. Weak parastyle present. Strong hypocone rotated posteriorly to a position behind metaconule. M^2 quite small and elongate transversely. M^2 with low, bulbous paracone and small metacone labially, indistinct protocone lingually.

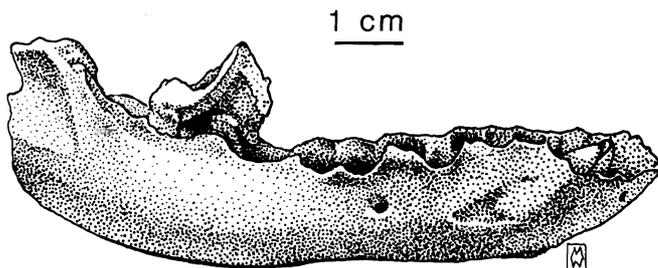


FIGURE 5. *Strobodon stirtoni*.—Lateral aspect of UNSM 76,620, right ramus with C erupting, broken M_1 , unerupted M_3 , alveoli for P_1 - P_4 , M_2 ; from Railway Quarry "A".

Aelurodon ferox Leidy, 1858

Figures 6, 7f, 8f; Tables 1,2

Referred Specimens. From Railway Quarry "A": UNSM 1,093, skull, lacking only right canine from dentition; UNSM 25,931, right M^1 and associated right I^3 ; UNSM 26,020, right ramus with C, P_2 - M_1 , alveoli for P_1 , M_2 - M_3 ; UNSM 76,621, palate with right I^3 , C, P^2 , P^4 - M^2 , alveoli for I^1 - I^2 , P^1 , P^3 , and left C, P^2 , P^4 - M^2 , alveoli for I^1 - I^3 , P^1 , P^3 ; UNSM 76,622, partial left ramus with C- P_3 ; UNSM 76,623, broken right P^4 ; UNSM 76,624, left humerus; UNSM 76,625, left ulna; UNSM 76,626, proximal right ulna; UNSM 76,627, distal left humerus; UNSM 76,628, proximal left femur; UNSM 76,629, distal left tibia; UNSM 76,630, left calcaneum; UNSM 76,631, right calca-

neum; UNSM 76,632, right metatarsal III; UNSM 76,633, right metacarpal III; UNSM 76,634, left metacarpal IV; UNSM 76,635, right metacarpal II; UNSM 76,636, right metatarsal II; UNSM 76,637, ungual phalanx; F:AM 61,742, left ramus with C, P_2 - M_2 , alveoli for P_1 , M_3 ; F:AM 61,743, left ramus with P_4 - M_2 , alveoli for C- P_3 , M_3 ; F:AM 61,745, partial left maxilla with P^3 - M^2 . From Railway Quarry "B": UCMP 33,188, partial right maxilla with P^3 , broken P^4 .

Description. Large canid with wide, abbreviated rostrum. Dentition robust. Lower canine round, with slight anterior and posterolingual blades. P_1 bulbous, with single large root, posterior accessory cusplid, and posterior stylid. P_2 - P_4 double-rooted, with anterior accessory cusplid, posterior accessory cusplid, and posterior stylid, tending to possess strong posterior cingulids. M_1 moderately tall-crowned, with heavy paraconid blade, deep carnassial notch, strong metaconid, bulbous talonid with entoconid subequal to hypoconid. M_2 double-rooted, appearing to be nearer half than one-third the length of M_1 . M_3 small, single-rooted. Ramus with ventral border subparallel to dorsal border, terminating anteriorly in a distinct chin. Two or three mental foramina present, the largest between the roots of P_1 and P_2 , another below P_3 . I^1 - I^2 tricusplate, spatulate. I^3 large and complex, with small lingual accessory cusplid, large anterolingual cusplid, and three posterolabial accessory cusplids. Upper canine with moderately pronounced anterior and posterior blades. P^1 single-rooted, P^2 - P^4 double-rooted. P^1 - P^3 with anterior accessory cusplid, posterior accessory cusplid, and posterior style. P^4 with strong parastyle, small protocone placed anteriorly, deep carnassial notch, robust protocone-metacone blade, internal cingulum posterior to protocone. Weak protoconal-paraconal ridge present in all four P^4 s that possess protocones. M^1 triangular, sometimes elongate transversely. M^1 with weak parastyle; discontinuous labial cingulum; slight anterior cingulum; paracone slightly larger than metacone; low protocone; indistinct metaconule; broad, bulbous hypocone. M^2 subquadrate, sometimes elongate transversely. M^2 with bulbous paracone and metacone, low ridge in position of protocone, cingular shelf lingually. Palate wide, abbreviated anteroposteriorly. Zygomatic arches flaring posteriorly, with postorbital processes. Frontal, sagittal, and occipital crests present, the latter two being very pronounced. Postcranial material is referred to this species by comparison with UNSM 46,815, an articulated specimen of *Aelurodon taxoides* Hatcher from the upper part of the Valentine Formation of Antelope County, Nebraska.

Discussion. The species *Aelurodon ferox* was erected in 1858 by Joseph Leidy upon the basis of a single upper carnassial collected by F.V. Hayden in 1857 from "the sands of the Niobrara River" (Leidy, 1869: 68-69). The specimen is barely adequate as a type, and several attempts to expand the species concept to include additional material have failed (Vanderhoof and Gregory, 1940; McGrew, 1944; and Mawby, 1964). Despite these problems with the type species, the genus *Aelurodon* continued to grow by the addition of referred species. In 1944, P. O. McGrew divided the species then referable to

Aelurodon into two informal taxa, an *A. saevus* group and an *A. taxoides* group, each believed to be of generic rank. But McGrew hesitated to name each of these genera, undoubtedly because he was unable to assign the species *A. ferox* to either of the two groups.

Recently, Jon Baskin (1980) made a significant breakthrough on this problem by defining morphologic characters that distinguish the P⁴ of McGrew's *A. saevus* group from that of McGrew's *A. taxoides* group. Baskin's keen observations allow a restriction of the taxon *Aelurodon* to the *A. taxoides* group of McGrew, and a reallocation of the species in the *A. saevus* group to the genus *Epicyon*. Because of Baskin's efforts, for the first time in 40 years, the genus *Aelurodon* possesses a morphologic meaning and a taxonomic identity.

The genus *Aelurodon*, as characterized by Baskin, contains the following named species: *A. ferox* Leidy, *A. wheelerianus* (Cope), *A. taxoides* Hatcher, *A. platyrhinus* Barbour and Cook, and *A. marshi* (Thorpe). Nominally, the Railway Quarries species of *Aelurodon* belongs to the species *A. platyrhinus*, as the hypodigm contains the holotype of that species. Vanderhoof and Gregory (1940) suggested that *A. platyrhinus* was a junior synonym of *A. taxoides*, and Baskin (1980) agreed. However, direct comparison between the lower jaws from the Railway Quarries and the holotype of *A. taxoides* reveals the following distinctions:

1. The specimens from the Railway Quarries are considerably smaller than the type of *A. taxoides*, the differences being 20 to 30% in most linear measurements.
2. The Railway Quarries specimens are generally less robust than the type of *A. taxoides*. This difference is particularly noticeable on the M₂, which is relatively elongate in the Railway Quarries specimens, but is broad in the type of *A. taxoides*.
3. The P₄ is much elongated in *A. taxoides* relative to the Railway Quarries specimens, even when scaling factors are eliminated. The P₄ has a mean length of 1.51 cm in the Railway Quarry population, in the holotype of *A. taxoides* this measurement is 2.07 cm.

On the basis of size alone, synonymy between *A. platyrhinus* and *A. taxoides* seems unlikely. Rather, a synonymy between *A. platyrhinus* and *A. ferox* is favored, as the type specimen of *A. ferox* falls within the range of variation demonstrated by the sample of *Aelurodon* from the Railway Quarries.

The question of broader synonymy between *A. ferox* and *A. wheelerianus* is not within the scope of this paper, as the type specimen of *A. wheelerianus* is currently lost (R. J. Emry, personal communication, 1981) and designation of a neotype is necessary. I consider *A. marshi* to be a junior synonym of *A. ferox*, as its type falls close to the Railway Quarry specimens in size and shape.

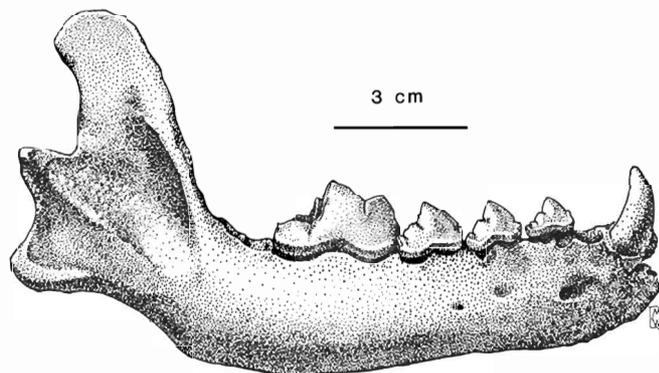


FIGURE 6. *Aelurodon ferox*.—Lateral aspect of UNSM 26,020, right ramus with C, P₂-M₁, alveoli for P₁, M₂-M₃; from Railway Quarry "A".

?Family Amphicyonidae

Genus and species indeterminate

Referred Specimen. From Railway Quarry "A": UNSM 76,638, right femur lacking head.

Description. Large carnivore, femur measuring 34.1 cm from condyles to trochanter. Femur with moderately pocketed trochanteric fossa, square notch at base of intercondyloid fossa, without pronounced expansion of epicondyles. Amphicyonids and hemicyonine ursids are the only terrestrial middle Miocene carnivores known to reach this large size. The femur of hemicyonine ursids is unknown (Frick, 1926). This femur does compare favorably with amphicyonid femora illustrated by Ginsburg (1961).

Family Felidae

Genus and species indeterminate

Referred Specimen. From Railway Quarry "A": UNSM 76,641, partial left maxilla with P³ and broken P⁴.

Description. Large carnivore, P³ measuring 1.13 cm in length, 0.59 cm in width. Dentition tall-crowned, transversely compressed. P³ with posterior accessory cusp and posterior styler cusp. P⁴ with weak parastyle placed far anteriorly and tall protocone. P⁴ broken at carnassial notch. This specimen has considerably taller crowns than any of the large dogs in the fauna. The combination of tall crowns and transversely compressed dentition suggest the shearing specialization of the felids.

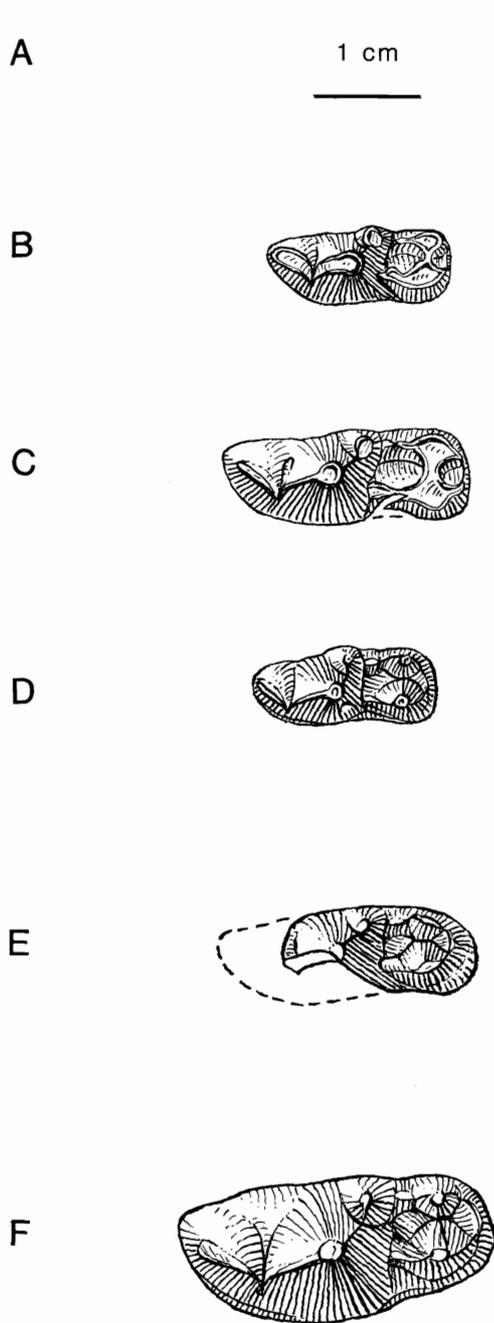


FIGURE 7. Comparative occlusal views of lower carnassials (M_1 's) of canids from the Railway Quarries. A. Scale; B. *Tomarctus* near *T. euthos*, UNSM 25,884 (reversed); C. *Carpocyon cuspidatus*, UNSM 76,613; D. *Cynarctus saxatilis*, UCMP 29,891; E. *Strobodon stirtoni*, UNSM 76,620 (reversed); and F. *Aelurodon ferox*, UNSM 26,020 (reversed). All from Railway Quarry "A".

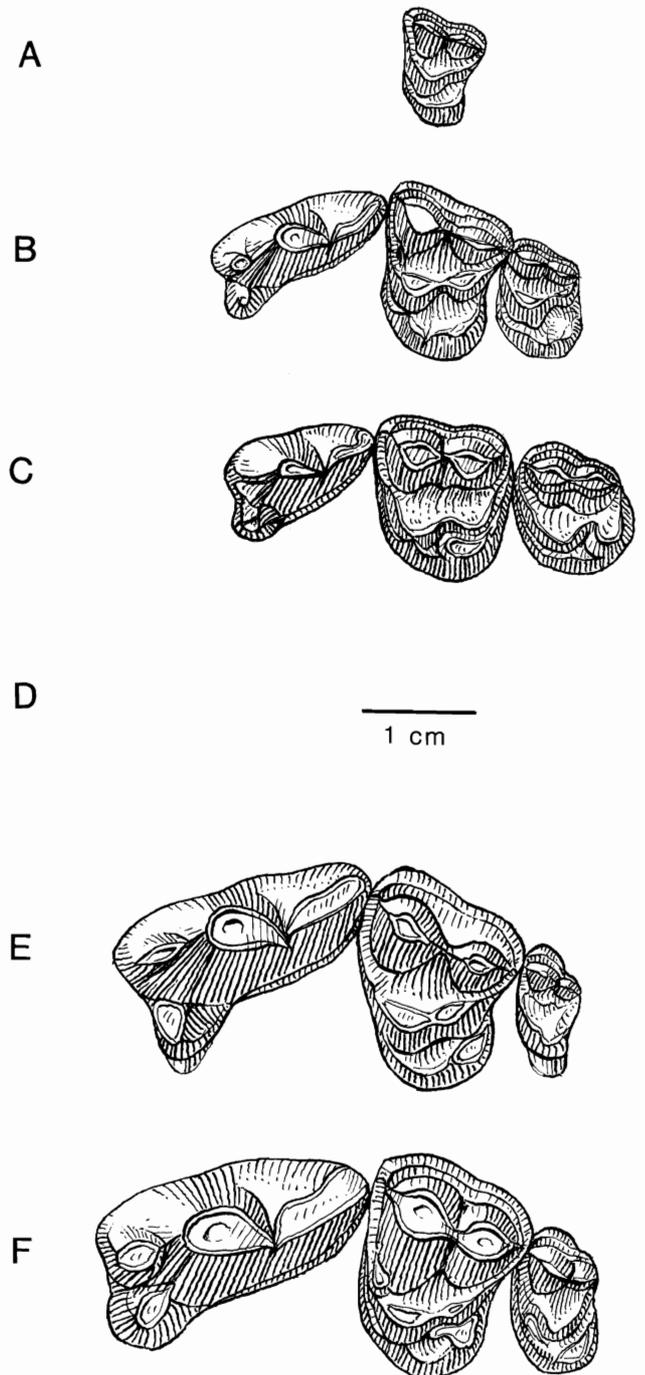


FIGURE 8. Comparative occlusal views of upper cheek teeth (P^4 - M^2 's except for A, which is M^1 only) of canids from the Railway Quarries. A. *Leptocyon vafer*, UNSM 76,609, from Railway Quarry "B"; B. *Tomarctus* near *T. euthos*, UNSM 25,882 (reversed), from Railway Quarry "A"; C. *Carpocyon cuspidatus*, UNSM 25,834 (reversed), from Railway Quarry "A"; D. Scale; E. *Strobodon stirtoni*, UCMP 63,657 (reversed), from Railway Quarry "B"; and F. *Aelurodon ferox*, UNSM 76,621, from Railway Quarry "A".

Family Procyonidae

Bassariscus parvus Hall, 1927

Referred Specimen. From Railway Quarry "A": UNSM 25,466, left ramus with P₄-M₂, alveoli for P₁, P₃.

Description. Small carnivore. P₁ single-rooted, P₃ double-rooted. Short diastema between P₁ and P₃ (here interpreted as the pathologic absence of P₂). P₄ with slight styler swelling anteriorly, swelling not distinctive enough to be termed a cingulid. Well-developed posterolingual accessory cuspid, posterior styler cuspid. M₁ retaining primitive tribosphenic pattern; but tall-crowned; with paraconid shearing blade and metaconid approximately three-fourths as tall as protoconid, distinct carnassial notch; and basined talonid with hypoconulid, entoconid, and strong hypoconid. M₂ smaller than M₁; with low paraconid; subequal metaconid and protoconid; long, narrow talonid lacking entoconid. Field records indicate that UNSM 25,466 comes from Railway Quarry "A", Cr-12. The University of Nebraska State Museum Accession Catalogue qualifies the provenience of this specimen, noting that it was collected by George Bunnell "near Cr-12". As the source of this qualification is unknown, I have followed the field records in allocating this specimen to the Railway Quarries.

Comparison of UNSM 25,466 with the ramus of the living *Bassariscus astutus* (Lichtenstein, 1830), UNSM ZM675, reveals no distinctions of generic rank. The Railway Quarries specimen conforms to the specific diagnosis of *B. parvus* Hall as set forth by Hall (1927) and amplified by Gregory and Downs (1951).

Family Mustelidae

Leptarctus cf. bozemanensis (Dorr, 1954)

Referred Specimen. From Railway Quarry "A": UNSM 25,467, partial left ramus with C, P₄, roots of P₁ and P₂, alveolus for P₃.

Description. Small carnivore with very robust lower jaw. Canine heavy. P₁-P₂ single-rooted, P₃-P₄ double-rooted. P₄ bulbous, with strong posterolabial accessory cuspid and nearly continuous cingulid encircling the tooth. Cingulid expanded posterolingually. P₄ measuring 5.4 mm in length, 3.5 mm in width. Premolar dentition crowded. Short diastema between C and P₁. Mental foramen located anteriorly. This small, deep, robust ramus suggests *Leptarctus*. Based on direct comparison, the Railway Quarries specimen is found to be larger and deeper jawed than the specimens referred to *L. primus* by Matthew (1924). The Railway Quarries specimen compares more favorably with *L. bozemanensis* (Dorr, 1954).

Genus and species indeterminate

Figure 9

Referred Specimen. From Railway Quarry "A": UNSM 76,640, left ramus with P₃-P₄, alveoli for P₂, M₁-M₂, partial alveolus for C.

Description. Small carnivore. P₂ with two small roots, set obliquely in jaw between C and P₃. P₃-P₄ double-rooted and heavily worn, but remaining portions of these teeth suggest a robust dentition. P₃-P₄ with wide posterior cingulid, P₄ with posterior circular styloid. Alveolus of M₁ suggests an elongate tooth, perhaps 12-14 mm in length. M₂ single-rooted, small. Ramus robust, not deep, with ventral border paralleling dorsal border. Three small mental foramina present beneath P₂-P₃. The small size; large carnassial; and crowded, reduced dentition all suggest a mustelid. Comparisons with mustelids at the University of Nebraska State Museum and the American Museum of Natural History yield no evidence to the affinities of this specimen.

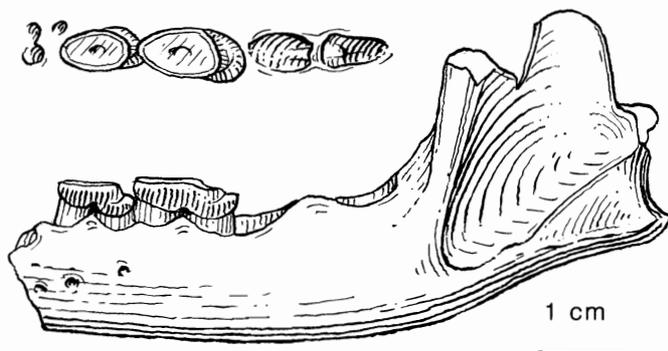


FIGURE 9. Indeterminate mustelid.—Lateral and occlusal aspects of UNSM 76,640, left ramus with P₃-P₄, alveoli for P₂, M₁; from Railway Quarry "A".

TABLE 1.—Measurements of canid lower teeth

	P ₁	P ₂	P ₃	P ₄	M ₁	M ₂	M ₃
<i>Leptocyon vafer</i>							
UNSM 76,608						0.59 × 0.35	
<i>Tomarctus near T. euthos</i>							
UNSM 25,884				0.94 × 0.51	1.76 × 0.69	0.95 × 0.62	
UNSM 25,885				0.96 × 0.49	1.80 × 0.77		
UNSM 25,886			0.87 × 0.40	0.99 × 0.50			
UCMP 29,926					1.92 × 0.75		
F:AM 61,066		0.60 × 0.39	0.70 × 0.43	0.91 × 0.53	1.71 × 0.80	0.89 × 0.57	
<i>Carpocyon cuspidatus</i>							
UNSM 76,613				1.18 × 0.64	2.23 × 0.93	1.29 × 0.82	
<i>Cynarctus saxatilis</i>							
UCMP 29,891	0.44 × 0.29	0.75 × 0.40	0.88 × 0.43	1.01 × 0.56	1.66 × 0.69	1.13 × 0.75	0.63 × 0.55
UCMP 124,377					1.66 × 0.70		
<i>Aelurodon ferox</i>							
UNSM 26,020		1.17 × 0.92	1.36 × 0.81	1.60 × 0.93	2.89 × 1.23		
UNSM 76,622	0.77 × 0.63	1.09 × 0.73	1.42 × 0.77				
F:AM 61,742		1.04 × 0.68	1.23 × 0.76	1.48 × 0.88	2.55 × 1.10	1.18 × 0.78	
F:AM 61,743				1.50 × 0.85	2.70 × 1.12	1.20 × 0.78	

Anteroposterior diameter × transverse diameter. All measurements in centimeters (cm).

TABLE 2.—Measurements of canid upper teeth

	P ¹	P ²	P ³	P ⁴	M ¹	M ²
<i>Leptocyon vafer</i>						
UNSM 76,609					0.81 × 0.98	
<i>Tomarctus near T. euthos</i>						
UNSM 25,881				1.55 × 0.89	1.21 × 1.33	
UNSM 25,882			0.88 × 0.44	1.68 × 0.91	1.25 × 1.52	1.18 × 0.83
UNSM 76,614				1.65 × 0.82	1.24 × 1.50	1.18 × 0.89
<i>Carpocyon cuspidatus</i>						
UNSM 25,834			0.98 × 0.51	1.53 × 0.98	1.25 × 1.43	1.29 × 1.03
UNSM 25,883				1.72 × 1.01	1.35 × 1.55	1.18 × 0.86
<i>Strobodon stirtoni</i>						
UCMP 63,657		1.12 × 0.59	1.34 × 0.69	2.46 × 1.37	1.50 × 1.66	0.59 × 0.99
<i>Aelurodon ferox</i>						
UNSM 10,931	0.75 × 0.61	1.37 × 0.73	1.58 × 0.90	2.78 × 1.38	1.78 × 2.19	0.88 × 1.44
" r	0.73 × 0.61	1.35 × 0.75	1.57 × 0.91	2.77 × 1.47	1.77 × 2.23	0.90 × 1.43
UNSM 25,931					1.64 × 1.99	
UNSM 76,621		1.38 × 0.73		2.68 × 1.50	1.70 × 1.92	0.77 × 1.30
" r		1.37 × 0.75		2.66 × 1.53	1.58 × 1.94	0.81 × 1.34
F:AM 61,745			1.63 × 0.85	2.61 × 1.42	1.62 × 1.94	0.77 × 1.31
UCMP 33,188			1.62 × 0.83			

Anteroposterior diameter × transverse diameter.
All measurements in centimeters (cm).

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