Merychoerinae
A New Subfamily of Oreodonts

BY C. BERTRAND SCHULTZ AND CHARLES H. FALKENBACH

BULLETIN
OF
THE AMERICAN MUSEUM OF NATURAL HISTORY

New York
Issued October 23, 1940
Article V.—MERYCOCHOERINÆ
A NEW SUBFAMILY OF OREODONTS

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2 Assistant Director of the University of Nebraska State Museum.
3 Field Associate of the Frick Laboratory, American Museum of Natural History.
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INTRODUCTION

The present paper deals with two closely related genera of oreodonts, *Brachycrus* Matthew (= *Pronomotherium* Douglass) and *Merycochoerus* Leidy, which are here included under the new subfamily, Merycochoerinae. The Merycoidotidontidae (Thorpe, 1923) [= Oreodontidae (Leidy, 1869)] have been divided by the present writers into five or more subfamilies—the Merycochoerinae, Ticholectinae, Promerycochoerinae, Eaporeodontinae, and Leptaurenchinae. Each subfamily is to be treated separately in a series of forthcoming papers,¹ which will be followed by a detailed summary of the phylogeny and stratigraphic distribution of the entire family.

Since 1934 the writers have been engaged in a comprehensive study of the oreodonts as part of the research program of the Frick Laboratory, American Museum of Natural History, and the University of Nebraska State Museum. The large collections of oreodont material in these institutions are being used as a basis for this work. Where previously described material has lacked sufficient stratigraphic data or was not complete enough for definite comparison, field work has been carried on in the type areas. In the case of the Merycochoerinae all of the type localities of the twelve species and three varieties have been investigated. The visits to some of these regions have yielded many choice specimens and also a quantity of much-needed geological data.

A total of nine hundred and twenty-nine numbered skulls, mandibular rami, and skeletal elements is here listed or described under *Brachycrus* and *Merycochoerus*. Forty-nine of these specimens, representing ten species and two varieties of *Brachycrus* (of which two species and two varieties are new) and two species and three² varieties of *Merycochoerus* are illustrated in detail in eighteen text-figures. In several cases type material is refigured to supplement existing illustrations. The shaded drawings are reproduced at one-half, and the outline drawings at one-third natural size.

The figures of *Brachycrus* demonstrate specific differences in size, shape, and proportions of the skulls, mandibular rami, and skeletal elements. Noteworthy are the variations in the height of the superior border of the maxillae, the inclination of the nasals, the size of the dental series, and the position of the angle of the mandible. The consistent generic characters shown are: the greatly retracted nasals, the facial cavity above the dental series, and the infraorbital foramina placed within the cavity, instead of on the side of the face as in *Merycochoerus*. Three stages of development of the *Brachycrus* skull are illustrated by one adult and two immature specimens which were found in the same quarry.

The *Merycochoerus* illustrations show specific and individual variation in the size and form of the skulls, mandibular rami, and skeletal elements. The height of the premaxillae and the position of the nasals relative to the infraorbital foramina are useful specific characters.

¹ Much of the research work concerning the remaining subfamilies has been completed and manuscript partially prepared.
² Two geographic varieties are included in this count.

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The writers wish to acknowledge their appreciation to: Mr. Childs Frick and Dr. Erwin H. Barbour for the privilege of carrying on the studies and for helpful suggestions in the preparation of the manuscript; Mr. Charles W. Gilmore and Dr. C. Lewis Gazin of the United States National Museum, Mr. J. LeRoy Kay of the Carnegie Museum, and Dr. Walter Granger of the American Museum of Natural History for the loan of specimens of *Brachycrus* and *Merycochoerus*; Dr. William K. Gregory of the American Museum of Natural History for a reading of the manuscript; Mr. Thompson M. Stout of the University of Nebraska for cooperation in stratigraphic studies; Mr. Ralph Mefferd of the Frick Laboratory for the illustrations, which he has carefully drawn under the supervision of Miss Hazel de Berard; Miss Jannette May Lucas of the Osborn Library for aid with references; Mr. Sydney E. Helprin of the Frick Laboratory for assisting in the editing of the manuscript; and Mrs. C. Bertrand Schultz for help in preparing the manuscript.

Thanks are also due: members of the Frick Laboratory, especially Messrs. Floyd Blair, Joseph Rooney, Charles Hoffman, and Frank Miller, for the preparation and care of the oreodont collection; and Messrs. Henry Reider, Frank Bell, and Robert Wolfe for supervising the preparation of the University of Nebraska specimens.

(1) *Merycochoerinae*, new subfamily

**DESCRIPTION**

Includes two genera, *Brachycrus* and *Merycochoerus*; medium to large size forms; skulls brachycephalic; cranial region foreshortened; nasals considerably retracted; tympanic bullae small; teeth large, and brachyodont to moderately hypsodont.

**Distinctive Characters of Brachycrus and Merycochoerus**

*Brachycrus* (p. 218)

- Nasals light and greatly retracted.
- Pronounced facial cavity.
- Infraorbital foramina above region of M².
- Supraoccipital wings incorporated in fan-shaped occipital region.
- Superior border of maxillae with gradual rise to nasals.
- Inferior border of mandibular ramus concave, with great depth of the posterior portion.
- Dentition moderately hypsodont.
- Limbs comparatively light.

*Merycochoerus* (p. 277)

- Nasals robust and retracted.
- No facial cavity.
- Infraorbital foramina above region of M¹.
- Supraoccipital wings produced beyond fan-shaped occipital region.
- Superior border of maxillae with abrupt rise to nasals.
- Inferior border of mandibular ramus comparatively straight.
- Dentition brachyodont.
- Limbs comparatively robust.
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<tr>
<th>Size Group</th>
<th>Species</th>
<th>Wyoming</th>
<th>Nebraska</th>
<th>N. M.</th>
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<th>Nebraska</th>
<th>Montana</th>
<th>Nebraska</th>
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* Deposits ranging in age from lower to upper Hemingford are represented in the Sand Canyon locality.

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I. BRACHYCRUS MATTHEW


GENOTYPE.—Brachycrus rusticus (Leidy).

GENERIC CHARACTERS

SKULL.—Medium to large size; mesocephalic to brachycephalic; occiput fan-shaped; brain case moderately inflated, with a great foreshortening of the posterior portion of the skull; deep facial cavity anterior of the orbit and extending to above the median premolar region; nasals\(^1\) greatly shortened; infraorbital foramina above M\(^2\); premaxillae united for a long distance and forming a spout-shaped depression which is concave transversely and convex longitudinally; posterior palate moderately extended to pterygoid region; postglenoid process compressed anteroposteriorly and extended downward as in examples of Merycochoerus; bullæ small and cylindrical.

MANDIBLE.—Medium to heavy; contour of inferior border descends gradually to a point below either M\(_2\) or M\(_3\) and then sharply downward to a maximum depth at the angle posterior to M\(_3\) (tendency for inferior border outline to be concave); tendency to have a tuberosity on posterior border of symphysis.

DENTITION.—I\(_1\)–M\(_3\), P\(_1\) caniniform; tendency to be hypsodont; anterior premolars slightly crowded; M\(^3\) with or without split heel.

LIMBS.—Medium to heavy; great variation in length and width.

MEASUREMENTS.—Tables I and II.

DISCUSSION

Brachycrus rusticus (Leidy), the genotypic species, has long been a questionable form and its affinities to the other orendonts have not been thoroughly understood, chiefly because of the fragmentary type material and insufficient stratigraphic information. The type specimens are in the United States National Museum and were collected by Dr. F. V. Hayden in the Sweetwater River area near Devil's Gate, Wyoming. These remains, although incomplete, can readily be referred to the same genus as the Carnegie Museum material from Montana upon which Douglass\(^3\) based his description of Pronomotherium laticeps. In order to obtain more complete specimens of "M." rusticus and definitely establish this synonymy, the Sweetwater River locality was visited in 1937 and 1938 by Frick Laboratory field parties consisting of Nelson J.

\(^1\) The nasal bones, which are rarely preserved in specimens referred to this genus, show some variation as to length, shape, and degree of inclination. The extremely short nasals and the deep facial cavity strongly suggest that animals belonging to this genus possessed a large snout or proboscis, perhaps similar to that of the Recent tapir.

\(^2\) Thorpe (1937, Mem. Peabody Mus., III, Pt. 4, p. 160) questioned the presence of three inferior incisors in this genus. All three incisors, however, are present in various examples in the F:A:M. collection, as illustrated in the figured specimens, 34492, 36195, and 34492. Figures 4, 6, 8.

\(^3\) Douglass, Earl, 1907, op. cit., p. 94.
Vaughan, John Lynch, and Charles H. Falkenbach. The new material secured at this time includes a skull more complete than the holotype, a partial skull of a second individual, and a mandible of a third. These remains definitely demonstrate that the characters of *Brachycrus* and *"Pronomotherium"* are identical.

The name of *Brachycrus* was proposed by Matthew\(^1\) as a subgenus of *Merycochoerus*. *"Merycochoerus rusticus"* of Wyoming was designated as the subgenotype. Matthew\(^2\) provisionally referred certain unrelated specimens\(^3\) from northeastern Colorado to *"M." rusticus*, and based additional characters of the species on this material. Matthew and Cook\(^4\) described material from the *"Upper Snake Creek,"* similar to the Colorado material, under the name of *Merychys (Metoreodon) profectus*.

Palmer\(^5\) included *"Brachycrus Matthew, 1901"* in his list of genera and subgenera of Agriocheridae, and accepted *"Merycochoerus rusticus"* as the type species and *"Sweetwater River, Wyoming"* as the type locality.

Douglass\(^6\) in describing the genus *"Pronomotherium,"* stated:

> "The specimen of *Pronomotherium (P. laticeps)* is apparently much more like *Merycochoerus*\(^7\) rusticus* than *Merycochoerus proprius*. The symphysis of the premaxillaries, the concavities of the sides of the face, the way the infraorbital foramen opens, the sudden widening of the skull at the anterior of the zygomatic arches, the reduction in size of the incisors, and the form of the chin and other portions of the mandible are much the same in both, yet there are slight differences in all of these... It may be that *Merycochoerus rusticus* belongs to the same genus as *Pronomotherium laticeps*, but it is still very doubtful as the type of the former is so incomplete."

The present writers have compared the genoholotypes of *"P." laticeps* Douglass and *Brachycrus rusticus* (Leidy) with the additional material of *B. rusticus* from the type locality in Wyoming and are convinced that the two forms belong to one genus. Since *Brachycrus* has priority of name over *"Pronomotherium,"* according to the *"International Rules of Zoological Nomenclature,"* it should stand as the preferred name. Douglass\(^8\) pointed out the differences between *"Pronomotherium" laticeps* and *"Merycochoerus" rusticus* but these dissimilarities are considered by the writers as being of specific rather than generic value.

Loomis\(^9\) treated *Brachycrus rusticus* as a species of *Ticholeptus*, apparently basing this conclusion on the characters of some Colorado material which

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\(^1\) Matthew, W. D., 1901, op. cit., p. 397.
\(^2\) Matthew, W. D., 1901, op. cit., p. 412.
\(^3\) These specimens (American Museum 9050, 9056, 9115a, and 9049) are distinct from the holotype of *"M." rusticus* and have been identified as belonging to a different genus. No material referable to *Brachycrus* has been reported from northeastern Colorado.
\(^6\) Douglass, Earl, 1907, op. cit., p. 96.
\(^7\) Douglass, Earl, 1907, ibid., p. 96.
Matthew\textsuperscript{1} had "provisionally" referred to \textit{B. rusticus}. The Colorado specimens, however, definitely do not belong to the genus \textit{Brachycrus} and are included by the present writers under the subfamily Ticholeptinae. Thorpe\textsuperscript{2} accepted the identification of Loomis and also considered \textit{Brachycrus} a synonym of \textit{Ticholeptus}.

**DISTRIBUTION**

Remains of \textit{Brachycrus} are widely distributed in the western United States. Ten species and two varieties are here recognized from the Miocene of California, Montana, Nebraska, New Mexico, and Wyoming.\textsuperscript{3} The genus is best represented from the upper deposits ("Sheep Creek" and "Lower Snake Creek") of the Hemingford\textsuperscript{4} group in Sioux County, Nebraska. The writers agree with the following statement of Matthew\textsuperscript{5} concerning the relationship of the Sheep Creek and "Snake Creek":

"The relations between the 'Snake Creek' and 'Sheep Creek' beds had not been clearly understood. The former appeared when first examined to be a distinct and later formation overlying the eroded surfaces of the latter. A more careful study of the quarry cuts and faunas makes it necessary to modify the conclusion to some extent, the two representing different facies of the same formation or sequence of strata, in part contemporaneous, rather than two distinct formations."

Studies of the mammalian remains by several writers\textsuperscript{6} tend to show that two distinct faunal horizons are present within the Sheep Creek formation. The collection of \textit{Brachycrus} material from the Sioux County area verifies this. Although the writers consider the "Lower Snake Creek" as a part of the Sheep Creek formation, the names used by Matthew\textsuperscript{5} will be retained for convenience in the present paper. The term "Sheep Creek" is used to designate the quarries of Stonehouse Draw and their equivalents.

\textsuperscript{1} Matthew, W. D., 1901, op. cit., p. 412, Figs. 27-28.

\textsuperscript{2} Thorpe, M. R., 1937, Mem. Peabody Mus., III, Pt. 4, p. 194, Figs. 142-143; Pl. xxviii, Figs. 1-2; Pl. xlvii, Fig. 1.

\textsuperscript{3} Gazin (1932, Carn. Inst. Wash. Publ. No. 418, p. 81, Fig. 15a) reported the occurrence of a mandibular fragment of an oreodont from the Miocene of Malheur County, Oregon, and referred it to "\textit{Ticholeptus} sp." Thorpe (1937, op. cit., p. 170), however, listed this specimen under "\textit{Pronomotherium} species." The present writers agree with the identification of Gazin and therefore the Oregon example is not included under \textit{Brachycrus}.

\textsuperscript{4} Simpson (1932, Bull. Fla. State Geol. Surv., No. 10, p. 34) mentioned "an upper canine of a fairly large oreodont, about the size of \textit{Pronomotherium siouense}," from the Miocene of Florida. He did not, however, definitely refer it to this genus. Thorpe (1938, op. cit., p. 170) considered the tooth as belonging to the \textit{Siouesia}.


\textsuperscript{7} Matthew, W. D., 1924, ibid., p. 65; Frick, Childs, 1937, Bull. Amer. Mus. Nat. Hist., LXIX, pp. 117, 123, 131, etc.

\textsuperscript{8} Matthew, W. D., 1924, op. cit., pp. 61-73.
All of the collecting localities from which *Brachycrus* has been reported have been visited by one or both of the writers, and the geology studied. Additional stratigraphic evidence, as well as an abundance of fossil material, has been gathered since 1926 for the Frick Laboratory by the following party leaders and their associates: Joseph Rak in the Barstow area of California; Joseph Rak and John C. Blick in the Santa Fé area of New Mexico; Jack Wilson in Sioux County, Nebraska; Ted Galusha in Dawes County, Nebraska; and Charles H. Falkenbach in Wyoming and Montana.

The geological history of the Tertiary of Montana is still not thoroughly understood. Four species of *Brachycrus* have been described from a small area in Montana, namely, *B. altiramus*, *B. elrodi*, and *B. madisonius* from the Lower Madison Valley, and *B. laticeps* from east of New Chicago. The type specimens of *B. altiramus* and *B. laticeps* are quite complete and in each case the holotypes consist of a skull and associated lower dentition. The type descriptions of *B. elrodi* and *B. madisonius* were based on fragmentary mandibular rami which have characters that seem specifically distinct from each other and from the more completely known forms. The small heel on M₃ and the point of descent of the angle of the inferior border of the ramus of *B. elrodi*, and the shortened premolar region of *B. madisonius* differ from other described species. The two last-mentioned species, however, will remain questionable until more complete material is available for study.
SUMMARY OF SPECIES AND TYPES

Ten species and two varieties of *Brachycrus* from eight Miocene localities are here recorded:

From California, one species and one variety:

(1) *Brachycrus buwaldi* (Merriam), 1919, from the Barstow area, San Bernardino County, California.

**HOLOTYPE.**—Portions of skull, U.C.21350.1

(1a) *Brachycrus buwaldi* barstowensis, new variety, from the Barstow area, San Bernardino County, California.

**HOLOTYPE.**—Anterior portion of skull, F:A.M.42402. [Figure 9.]

From Montana, four species:

(2) *Brachycrus altiramus* (Douglass), 1901, from the lower Madison Valley, Gallatin County, Montana.

**HOLOTYPE.**—Partial skull, A.M.9746, and right mandibular ramus, C.M.759.2

*Figure 1* (in part).

(3) *Brachycrus elrodi* (Douglass), 1901, from the lower Madison Valley, Gallatin County, Montana.

**HOLOTYPE.**—Posterior portion of mandibular ramus, C.M.818. [Figure 9.]

(4) *Brachycrus madisonius* (Douglass), 1901, from the lower Madison Valley, Gallatin County, Montana.

**HOLOTYPE.**—Anterior portion of right mandibular ramus, C.M.800. [Figure 9.]

(5) *Brachycrus laticeps* (Douglass), 1900, from east of New Chicago, Granite County, Montana.

**HOLOTYPE.**—Skull and mandible, C.M.796. [Figure 1 (in part).]

From Nebraska, two species and one variety:

(6) *Brachycrus siouense* (Sinclair), 1915, from the Sheep Creek-Snake Creek locality, Sioux County, Nebraska, and referred remains from Dawes County, Nebraska.

**HOLOTYPE.**—Right mandibular ramus, P.U.12057.

(7) *Brachycrus wilsoni*, new species, from the Sheep Creek-Snake Creek locality, Sioux County, and referred remains from Dawes County, Nebraska.

**HOLOTYPE.**—Skull, F:A.M.34202. [Figures 1, 7, 11.]

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2 The skull and mandibular ramus are of one individual, see *B. altiramus*, page 229.
(7a) *Brachycrus wilsoni longensis*, new variety, from the Sheep Creek-Snake Creek locality, Sioux County, Nebraska.

**Holotype.**—Anterior portion of skull, F:A.M.33574. *Figure 9.*

From Wyoming, three species:

(8) *Brachycrus rusticus* (Leidy), 1870, genotype, from the Sweetwater River area, near Devil’s Gate, and referred remains from Fremont County, Wyoming.

**Genoholotype.**—Anterior portion of skull and partial mandible, N.M.145. *Figure 2.*

(9) *Brachycrus sweetwaterensis*, new species, from the Sweetwater River area, Natrona County, and referred remains from Fremont County, Wyoming.

**Holotype.**—Skull, F:A.M.34498. *Figures 1, 5.*

(10) *Brachycrus vaughani*, new species, from the Sweetwater River area, Fremont County, and referred remains from Natrona County, Wyoming.

**Holotype.**—Skull, mandible, and skeletal parts, F:A.M.34492. *Figures 1, 4, 10.*

From New Mexico:

(11) *Brachycrus*, species undetermined, from the Skull Ridge area, Santa Fé County, New Mexico.

**Detailed Lists of Types, Referred Specimens, and Synonymy**

*Brachycrus*, total available specimens, 794

(1) *Brachycrus buwaldi* (Merriam)

From the Miocene Deposits, North of Barstow, San Bernardino County, California

*Mericochoerus buwaldi* MERRIAM, Thorpe, 1937, Mem. Peabody Mus., III, Pt. 4, p. 152, Fig. 112.

**Specific Characters**

Skull. — Approximately same length as that of *B. laticeps*, but not as wide; about same length and width as that of *B. siouense*, but decidedly more robust; malar heavy, but not exceptionally deep; posterior pillar of orbit massive; point of contact of nasal (known from posterior portion only) and frontal about same position as in *B. siouense*, with nasals also produced upward as in that species; muzzle robust; superior border of the maxilla massive; glenoid surface wide (anteroposteriorly) in comparison with *B. siouense*; occipital condyle extremely light; foramen magnum wide.
MANDIBLE.—Slightly larger and heavier than examples of B. siouense.

DENTITION.—Superior and inferior series longer than average series of B. siouense.

LIMBS.—Approximate length of B. siouense, but definitely heavier.

MEASUREMENTS.—Tables I and II.

DISCUSSION

The robust nature of the skull, mandible, and skeletal elements characterizes this species. The occipital condyles are extremely small for the size of the skull. The holotype is indistinguishable from the corresponding portions of the skull, F:AM.34467, Figure 8.

Brachycrus remains in the Barstow area are recorded only from the Green Hills horizon or Second Division which underlies the later deposits including the "Hemicyon Stratum" of the First Division.¹

One hundred and seven specimens are here recorded:

<table>
<thead>
<tr>
<th>HOLOTYPE.</th>
<th>Referred.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portion of skull with I²-P¹ rt.³ and P²-M¹</td>
<td>(w)³</td>
</tr>
</tbody>
</table>

From U.C. collecting locality 2057, Barstow syncline, San Bernardino County, California. Figured by Merriam, 1919, Fig. 84; Thorpe, 1937, Fig. 112.

REFFERED.—

(A) FROM TYPE LOCALITY:

Partial skull with P⁴-M³ and partial mandible with M₃.............. (w) 21485
Partial mandible with P₁-P₄................................................... (w) 21345

The holotype and the above referred material were collected by the University of California field parties in 1911 and 1913.

(A') FROM TYPE AREA (collected by Joseph Rak, Jack Wilson, Carl Long, Charles H. Falkenbach, and associates, 1926–1937):

From Steepside Quarry:

TWO SKULLS

Skull with I¹-I² alv. and I¹-M³, lacking anterior of nasals. Figures 1, 8......................... (w+) 34467
Skull, crushed, with C/-M³ (P¹ alv.), lacking nasals and occipital region.......................... (w+++) 34466

TWO MANDIBULAR SPECIMENS

Two right rami with
P₁-M₁....................................................... (w+) 42404
P₁-M₁....................................................... (w) 42405

² Abbreviations used in descriptions: rt. = root or roots; alv. = alveolus or alveoli; br. = broken; erupt. = erupting.
³ Stage of wear of teeth: (i) = immature; (m) = mature; (w) = worn.
From Ness Quarry:

**SKULL**

Skull, crushed, with I\(^1\)-I\(^2\) alv. and I\(^1\)-M\(^2\), lacking nasals ........................ (w) 42372

From Green Hills:

**THREE SKULLS**

Skull, crushed, with P\(^1\)-M\(^2\) ........................................ (w+) 42373

Partial skull, crushed, with C\(\sim\)-P\(^1\) br. and P\(^2\)-M\(^2\) ................................ (w+) 42374

Immature skull, crushed, with I\(^1\)-I\(^2\) rt. and C\(\sim\)(br.)-dP\(^2\)-M\(^3\), lacking nasals ........................... (i) 42375

**TWENTY PARTIAL SKULLS**

Twenty anterior portions of skulls with

<table>
<thead>
<tr>
<th>Skull Type</th>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>C(\sim)-M(^3) (P(^1) br.)</td>
<td>(w+) 34459</td>
<td></td>
</tr>
<tr>
<td>C(\sim)-M(^4)</td>
<td>(w+) 34465</td>
<td></td>
</tr>
<tr>
<td>P(^4)-M(^2)</td>
<td>(w+) 42376</td>
<td></td>
</tr>
<tr>
<td>C(\sim)-M(^2) (P(^1) alv.)</td>
<td>(w+) 42377</td>
<td></td>
</tr>
<tr>
<td>C(\sim)-M(^3)</td>
<td>(w+) 42376</td>
<td></td>
</tr>
<tr>
<td>C(\sim)-M(^4)</td>
<td>(w+) 42377</td>
<td></td>
</tr>
<tr>
<td>C(\sim)-M(^5) (P(^1) br. rt.)</td>
<td>(w+) 42380</td>
<td></td>
</tr>
<tr>
<td>I(^1)-M(^2)</td>
<td>(w+) 42381</td>
<td></td>
</tr>
<tr>
<td>I(^1)(rt.)-M(^3) (I(^2) alv.)</td>
<td>(w+) 42382</td>
<td></td>
</tr>
<tr>
<td>I(^2)-M(^3)</td>
<td>(w+) 42383</td>
<td></td>
</tr>
<tr>
<td>I(^1)-M(^4)(br.)</td>
<td>(w+) 42384</td>
<td></td>
</tr>
<tr>
<td>C(\sim)-M(^4)</td>
<td>(w+) 42385</td>
<td></td>
</tr>
<tr>
<td>P(^4)-M(^2)</td>
<td>(w+) 42386</td>
<td></td>
</tr>
<tr>
<td>C(\sim)-M(^3) (P(^1) alv.)</td>
<td>(w+) 42387</td>
<td></td>
</tr>
<tr>
<td>C(\sim)-M(^2)</td>
<td>(w+) 42388</td>
<td></td>
</tr>
<tr>
<td>C(\sim)-M(^4)</td>
<td>(w+) 42389</td>
<td></td>
</tr>
<tr>
<td>I(^2)-M(^4)</td>
<td>(w+) 42390</td>
<td></td>
</tr>
<tr>
<td>I(^1)-M(^5)</td>
<td>(w+) 42391</td>
<td></td>
</tr>
<tr>
<td>P(^2)-M(^3)</td>
<td>(w+) 42392</td>
<td></td>
</tr>
<tr>
<td>Immature, I(^1)-dP(^2)-M(^3)</td>
<td>(i) 42393</td>
<td></td>
</tr>
</tbody>
</table>

**SEVENTEEN MAXILLAE**

Nine right maxillae with

<table>
<thead>
<tr>
<th>Maxilla Type</th>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>C(\sim)-P(^1) rt. and P(^2)-P(^4)</td>
<td>(w) 34463</td>
<td></td>
</tr>
<tr>
<td>P(^4)-M(^2)</td>
<td>(w+) 34469</td>
<td></td>
</tr>
<tr>
<td>M(^1)-M(^4)(br.)</td>
<td>(w+) 34470</td>
<td></td>
</tr>
<tr>
<td>M(^1)-M(^5)</td>
<td>(w+) 34471</td>
<td></td>
</tr>
<tr>
<td>P(^2)-M(^3)</td>
<td>(w) 42397</td>
<td></td>
</tr>
<tr>
<td>P(^4)-M(^2)(br.)</td>
<td>(w+) 42398</td>
<td></td>
</tr>
<tr>
<td>P(^2)-M(^3)</td>
<td>(w+) 42399</td>
<td></td>
</tr>
<tr>
<td>P(^4)-M(^3) and left maxilla fragment with P(^4)-M(^1)</td>
<td>(w+) 42400</td>
<td></td>
</tr>
<tr>
<td>I(^1)-I(^2) and C(\sim)-dP(^2)-M(^1)</td>
<td>(i) 42401</td>
<td></td>
</tr>
</tbody>
</table>
Eight left maxillae with
P₂(br.)—M¹ ........................................... (w) 34458
C/(rt.)—M³ (P¹ alv.) ................................. (w++) 34460
P¹—M¹ .................................................. (w++) 34461
P²(br.)—M² (M²—M² br.) ............................ (w) 34468
C/—P¹ rt. and P²—M¹(rt.) .......................... (w+) 34472
C/—M² .................................................. (w) 42394
P²—M² .................................................. (w) 42395
P²—M²(br.) .............................................. (w++) 42396

FIFTY-FOUR MANDIBULAR SPECIMENS

Sixteen mandibles with
I₁—M₃  Figure 8 ........................................ (w++) 34462
I₁—P₁ rt. and P₁—M₃ .................................. (w++) 34433
I₁—M₁ ..................................................... (w++) 34434
P₁—M₁ ..................................................... (w++) 34435
I₁(alv.) and I₂—M₃ (I₂ alv.) ......................... (w++) 34437
P₁(rt.)—M₂ .............................................. (w++) 34444
P₁—M₂ ..................................................... (w++) 34445
P₁—P₄ ..................................................... (w++) 34446
P₁—M₄ ..................................................... (w++) 42340
P₁—P₂ rt. and P₁—M₃ ................................ (w++) 42341
/C(br.)—M₃ .............................................. (w++) 42342
I₁—I₂ rt. and /C—M₂ (/C—P₁ br.) ................. (w++) 42343
I₄—M₄ ..................................................... (w++) 42344
P₂—M₄ ..................................................... (w++) 42345
P₁—M₄ ..................................................... (w++) 42346
P₁—M₄ ..................................................... (w++) 42352

Twenty-one right rami with
/C(br.)—M₃ (M₁ alv.) ................................ (w++) 34436
P₂(rt.)—M₃ .............................................. (w++) 34440
P₁—M₃ ..................................................... (w++) 34441
P₁—M₃ ..................................................... (m) 34442
P₁—M₃(br.)—M₃ ........................................ (w++) 34448
P₁—P₂ br. and P₁—M₃ ................................ (w++) 42345
/C—P₂ alv. and P₁—M₃ ................................ (w++) 42353
P₁—M₄ ..................................................... (w++) 34454
P₁—M₄(br.) .............................................. (w++) 34457
I₁—I₂ rt. and I₂—M₂ ................................ (w++) 42347
M₁—M₃(br.) ............................................. (w++) 42348
P₁—M₃ ..................................................... (w++) 42349
P₁—M₃ ..................................................... (w++) 42350
P₁—M₃(P₂ br.) ......................................... (w++) 42351
P₁—M₃(br.) .............................................. (w++) 42353
/C—M₃ (P₂ alv.) ....................................... (w++) 42354
/C(rt.)—M₃ ............................................. (w++) 42355
/C—M₃ ..................................................... (w++) 42356

Three immature with
I₁—P₁(rt.)—dP₁—M₃(br.) ................................ (i) 42369
I₁—dP₁—M₃(br.) ......................................... (i) 42370
I₁—dP₁—M₂ ............................................. (i) 42371
Seventeen left rami with

\[ P_1(\text{br.}) - M_3 \ (P_2 - M_1 \ \text{br.}) \]
\[ P_1 - P_3 \ \text{rt. and} \ P_4 - M_3 \]
\[ M_1 - M_2 \]
\[ /C - M_4 \]
\[ /C(\text{rt.}) - M_3(\text{br.}) \]
\[ P_1 - M_3(\text{br.}) \ (P_2 \ \text{rt.}) \]
\[ P_3(\text{alv.}) - M_3(\text{br.}) \ (P_4 \ \text{br.}) \]
\[ P_1(\text{rt.}) - M_3 \]
\[ P_3 - M_3 \]
\[ P_4 - M_1(\text{br.}) \]
\[ /C - P_2 \ \text{rt. and} \ P_4 - M_4 \]
\[ P_2(\text{rt.}) - M_3 \]
\[ /C(\text{rt.}) - M_3(\text{br.}) \]
\[ P_5(\text{br.}) - M_3(\text{br.}) \]
\[ I_3 - P_1 \ \text{br. and} \ P_1 - M_5 \]
\[ P_1 - M_4 \]
\[ P_1 - M_4 \]

\[ \text{F: A.M.} \]
\[ 34438 \]
\[ 34439 \]
\[ 34443 \]
\[ 34449 \]
\[ 34455 \]
\[ 42357 \]
\[ 42358 \]
\[ 42359 \]
\[ 42360 \]
\[ 42361 \]
\[ 42362 \]
\[ 42363 \]
\[ 42364 \]
\[ 42365 \]
\[ 42366 \]
\[ 42367 \]
\[ 42368 \]

\[ \text{FIVE LIMB ELEMENTS} \]

- \text{Radius} ........................................ 42406
- \text{Tibia.}  \text{Figure 10} ............................ 42333
- \text{Partial tibia} ..................................... 42407
- \text{Metacarpal III.}  \text{Figure 10} .......................... 42335
- \text{Metatarsal III.}  \text{Figure 10} .......................... 42334

\[ (1a) \text{ Brachycrus buwaldi barstowensis,}^1 \text{ new variety} \]

From the Miocene Deposits, North of Barstow, San Bernardino County, California

\textit{VARIETAL DESCRIPTION}

\textit{SKULL.}—Smaller and less robust than \textit{B. buwaldi}. (Known from anterior portion only.)

\textit{MANDIBLE.}—Lighter construction and smaller than \textit{B. buwaldi}. (Known from referred specimens only.)

\textit{DENTITION.}—Superior and inferior series shorter and of lighter construction than those of \textit{B. buwaldi}, molar series of about same length, premolar series shorter; premolars smaller and more crowded than those of \textit{B. buwaldi}.

\textit{LIMBS.}—Unknown.

\textit{MEASUREMENTS.}—Table I.

\textit{DISCUSSION}

The available material of this new variety of \textit{Brachycrus}, although incomplete, definitely demonstrates the existence of a smaller form than the typical \textit{B. buwaldi} of the Barstow area.

\[ ^1 \text{Named after the Barstow deposits, near Barstow, California.} \]
The holotype and the referred specimens were collected by Joseph Rak and associates, 1923–1928.

Six specimens are here recorded:

**HOLOTYPE.**—Anterior portion of skull with I¹–I¹ rt. and C/(br.)–M¹. (w+)

F:A.M. 42402 From Green Hills, Barstow area, San Bernardino County, California. *Figure 9.*

**REFERRED FROM TYPE LOCALITY.**—

- Anterior portion of skull with C–M¹. ........... (w+) 42403
- Portions of skull with I¹–P² and M³ (I² alb.) .... (w+) 34451
- Right mandibular ramus with M₁(br.)–M₄ ......... (w+) 34450A
- Left mandibular ramus with /C–M₃. *Figure 9.* (w+) 34450

It is possible that specimens F:A.M.34450, 34450A and 34451 are of one individual, since the stage of wear of the teeth and the fossilization are the same.

- Left ramus with /C–P₃ rt. and P₃–M₃ ............... (w⁺⁺) 42362

(2) *Brachycrus altiramus* (Douglass)

From the Miocene Deposits of the Lower Madison Valley of Montana

*Merycochoerus altiramus* Douglass, 1901, Amer. Jour. Sci., (4), XI, p. 73, Fig. 1.

*Merycochoerus altiramis* (Douglass), Trouessart, 1905, Quinquinae Supplementum of 1898, p. 669.


*Pronomotherium altiramis* (Douglass), Matthew, 1909, Bull. 361, U. S. Geol. Surv., p. 117.


**SPECIFIC CHARACTERS**

**SKULL.**—Largest known of the genus; decidedly longer, but approximately same width as that of *B. laticeps*; squamosal portion of the zygomatic arch massive; postglenoid process very large; palate slightly narrower than in examples of *B. laticeps*; condyles massive.

**MANDIBLE.**—Longest and deepest known of the genus; beginning of the descent of the angle of the inferior border more posteriorly located than in *B. laticeps*.

**DENTITION.**—Largest and longest known series of the genus; small diastema between P¹ and P²; P₂ set obliquely in ramus; heel of M₃ like that of *B. laticeps* and larger than in *B. elrodi*.

**LIMBS.**—Unknown.

**MEASUREMENTS.**—Table I.
DISCUSSION

This species is known only from a right ramus, C.M.759, and a skull, A.M. 9746. Although the skull was not found until a year after the jaw was described and the species established, the specimens appear to belong to one individual. Douglass\(^1\) reported that the ramus was found "in a bed or pocket of sand at the base of the Loup Fork beds of the Lower Madison Valley in Montana, in 1895." In 1902, an expedition of the American Museum of Natural History, under the direction of W. D. Matthew, found the skull at the same site. Douglass\(^2\) considered the skull and ramus as of the same individual. The ramus was loaned to the present writers in 1936 and was studied with the skull in the American Museum. The observations of Douglass appear to be correct and both specimens, therefore, are listed below as part of the holotype.

**HOLOTYPE.**—Skull with C/-M\(^3\) (lacking nasal region and premaxillae), and right ramus with /C–M\(_r\). (w+)

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.M.9746</td>
<td>From lower Madison Valley, Gallatin County, Montana; skull collected by W. D. Matthew and associates, 1902; ramus collected by Earl Douglass, 1895.</td>
</tr>
<tr>
<td>C.M.759</td>
<td></td>
</tr>
</tbody>
</table>

Figured by Douglass, 1901, Fig. 1; 1907, Figs. 8–9; Thorpe, 1925, Fig. 5; 1937, Figs. 4, 114–116. *Figure 1* (in part).

(3) **Brachycrus elrodi** (Douglass)

From the Miocene Deposits of the Lower Madison Valley of Montana

*Merycochoerus elrodi* **DOUGLASS**, 1901, Amer. Jour. Sci., (4), XI, p. 78, Fig. 3.

*Pronomotherium elrodi* (DOUGLASS), **THORPE**, 1937, Mem. Peabody Mus., III, Pt. 4, p. 164, Fig. 117; Pl. xxiv, Fig. 4.

**SPECIFIC CHARACTERS**

**SKULL.**—Unknown.

**MANDIBLE.**—Known only from jaw fragment containing M\(_2\) and M\(_3\); approximate size of *B. laticeps*; descent of the angle of inferior border more posterior than in that species.

**DENTITION.**—Small heel on M\(_3\), which results in a small M\(_3\); M\(_3\) in *B. laticeps* is larger.

**LIMBS.**—Unknown.

**MEASUREMENTS.**—Table I.

---

\(^1\) Douglass, Earl, 1907, op. cit., p. 817.

\(^2\) Idem., p. 817.
Discussion

Douglass\(^1\) stressed the importance of the depth and the lightness of the inferior border of the ramus. A study of a large collection of mandibular rami of *B. siouense* from one quarry (Echo Quarry, Sioux County, Nebraska) demonstrates considerable individual variation of the inferior border. The position of the angle, however, is quite constant.

Thorpe\(^2\) stated that *B. elrodi* was close to *B. madisonius*. The present writers, however, find that the M\(_2\) and the anterior lobe of M\(_3\), which are the only corresponding teeth present in the two forms, are decidedly larger in *B. elrodi*. The dentition present in *B. madisonius* is closer to that of *B. siouense*, while *B. elrodi* approaches the size of *B. laticeps*.

**Holotype.**—Posterior portion of left ramus with M\(_2\)–M\(_3\), br. (w) C.M.818 From lower Madison Valley, Gallatin County, Montana; collected by Earl Douglass. Figured by Douglass, 1901, Fig. 3; Thorpe, 1937, Fig. 117; Pl. xxiv, Fig. 4. *Figure 9.*

(4) *Brachycrus madisonius* (Douglass)

From the Miocene Deposits of the Lower Madison Valley of Montana

*Merycochoerus madisonius* Douglass, 1901, Amer. Jour. Sci., (4), XI, p. 75, Fig. 2.


**Specific Characters**

**Skull.**—Unknown.

**Mandible.**—Heavy construction; symphysial surface wide.

**Dentition.**—Superior dentition known only from referred M\(^1\)–M\(^3\), which approach those of *B. siouense* in size; inferior series decidedly smaller in length than in *B. elrodi*; length of premolar series compares favorably with some very well-worn examples of *B. siouense*.

**Lims.**—Unknown.

**Measurements.**—Table I.

---

1 Douglass, Earl, 1901, op. cit., p. 78.

Discussion

Various authors have stressed the importance of the massive inferior ramal border of the holotype. As mentioned on page 230, under B. elrodi, the large collection of mandibular rami of B. siouense definitely shows that this characteristic is an individual rather than a specific variation.

Two specimens are here recorded:

**Holotype.**—Partial right ramus with P1–P4, rt. and M1–M3 (br.) (w+). C.M.800 From lower Madison Valley, Gallatin County, Montana; collected by Earl Douglass. Figured by Douglass, 1901, Fig. 2; Thorpe, 1937, Figs. 2, 119; Pl. xxiv, Fig. 5. *Figure 9.*

**Refereed.**—Partial maxilla with M1–M3. C.M.819 (w++) Collected by Earl Douglass, 1896. *Figure 9.*

(5) **Brachycrus laticeps** (Douglass)

From the Miocene Deposits East of New Chicago, Montana


**Specific Characters**

**Skull.**—Brachycephalic; intermediate in size between those of *B. altiramus* and *B. siouense*; squamosal portion of the zygomatic arch not extended as far forward as in *B. altiramus*; nasals similar to those of *B. siouense*, i.e., short, comparatively heavy, and produced upward; occipital condyles heavy.

**Mandible.**—Robust; angle of inferior border deep and begins to descend sharply below the posterior portion of M2.

**Dentition.**—Comparatively light construction; intermediate in length between that of *B. altiramus* and *B. siouense*; heel of M3 decidedly heavier and larger than the holotype of *B. elrodi*.

**Limbs.**—Medium heavy construction (known only from fragments).

**Measurements.**—Table I.

**Discussion**

It is fortunate that the holotype of this species (genoholotype of "*Pronomotherium*") consists of a nearly complete skull and lower jaws. This facilitates comparison with the genoholotype of *Brachycrus*.  

1940] *Schultz and Falkenbach, Merycochoerinae* 231
Two recorded specimens:

**HOLOTYPE.**—Skull with I\(^1\)-M\(^3\) (I\(^1\), I\(^2\) and P\(^1\) alv. and P\(^2\)-P\(^3\) br.), mandible with /C-P\(_2\) rt. and P\(_3\)-M\(_4\), and skeletal fragments. (w+). From E. of New Chicago, Granite County, Montana; collected by Earl Douglass, 1899. Figured by Douglass, 1900, Figs. 1–3; Thorpe, 1937, Fig. 118; Pl. xxiv, Figs. 1–3.

**REFERRED.**—Anterior portion of skull with I\(^1\)-C/ br. and P\(^1\)-M\(^1\), and partial mandible with I\(_r\)-I\(_s\) rt. and /C-M\(_1\) (P\(_1\) br.). (w+)

This specimen is somewhat smaller than the holotype, but falls within the range of allowable specific variation. The numerous associated skulls of *B. siouense* from Nebraska demonstrate the wide extent of possible variation.

(6) **Brachycrus siouense** (Sinclair)

From the Miocene Deposits ("Lower Snake Creek" Horizon) of Sioux County, Nebraska; Referred Specimens from Nebraska


**SPECIFIC CHARACTERS**

**SKULL.**—Brachycephalic; larger and slightly heavier than holotype of *B. rusticus* from Wyoming; construction lighter and basal length less than in *B. wilsoni*; nasals short and protruding slightly upward.

**MANDIBLE.**—Larger and more massive than that of *B. rusticus*; smaller and lighter than *B. wilsoni* and *B. sweetwaterensis*.

**DENTITION.**—Series larger and heavier than examples of *B. rusticus*; average series smaller and lighter than *B. wilsoni*.

**LIMBS.**—Approximately same length as examples of *B. rusticus*; average somewhat lighter and shorter than *B. wilsoni*. (The limbs of *B. wilsoni* and *B. siouense* are not well represented in the collections.)

**MEASUREMENTS.**—Tables I and II.

**DISCUSSION**

*B. siouense* is better represented in the collections than any other species of this genus. The large collections from single quarries provide a basis for a better understanding of the individual variation within a species. All material here listed from Sioux County, Nebraska, except where otherwise stated, has been collected by Jack Wilson, Carl Long, and their associates, 1928–1939.
Specimens of *Brachycrus* collected from various levels within the Sheep Creek-Snake Creek section have indicated, interestingly enough, the occurrence of the largest forms in the lowest deposits, an exception to the observed tendency of the oreodonts to increase in size during the Tertiary progression.

Five hundred and sixteen specimens are here recorded:

**Holotype.**—Right ramus with Iᵡ-C alv. and P₁-M₂ (w+)

P.U.12057 From Sinclair Draw, "Lower Snake Creek" deposits, Sioux County, Nebraska; collected by William Sinclair and associates, 1914.

Figured by Sinclair, 1915, Fig. 11; Matthew, 1924, Fig. 52; Thorpe, 1937, Fig. 123.

**Referred.**—

(A) FROM TYPE LOCALITY, SINCLAIR DRAW (collected by Albert Thomson and associates, 1921):

From "B Quarry":

Skull with I₁-I₈ alv. and C/-M₈, lacking nasals; figured by Matthew, 1924, Figs. 51-52; Thorpe, 1937, Figs. 120-122... (w) 18333

Mandible with I₁/C alv. and P₁-M₃ (P₂ alv.)................. (w) 18336

Right ramus with /C-M₄; figured by Matthew, 1924, Fig. 53... (w+) 18334

From "Sheep Creek Quarry" of 1921 ("Lower Snake Creek" horizon):

Right maxilla with P₁(alv.)-M₃(br.) (P₂-M₃ br.)............. (w+) 18338

Right ramus with P₂(rt.)-M₄............................ (w+) 18335

Left ramus, immature, with dI₁-C-dP₁-M₃(germ)................. (t) 18337

(A') FROM SINCLAIR DRAW (F:A.M. collections, 1932-1939):

From West Sinclair Draw:

Inferior portion of skull with I₁-I₈ alv. and C/-M₈ (P₄ alv. and P₅-P₆ br.)................................................ (w+) 372967

Partial right ramus, immature, with I₁-P₂ alv. and dP₁-M₄(br.) (t) 372933

From East Sinclair Draw:

Partial left maxilla with C/-P₄ (P₄ alv.)........................ (w) 37294

From Sinclair Quarry 1:

Mandible, immature, with I₁-dP₁-M₃(erupt.) (I₃, P₂-P₃ alv.)... (t) 34270

From Sinclair Quarry 4:

Anterior portion of skull with P₄(alv.)-M₈........................ (w) 33576

Partial left maxilla, immature, with C/-dP₉-M₉(br.)............. (t) 34341
Two partial right rami with
I$_1$–P$_1$ alv. and P$_2$–M$_2$. ........................................ (w+) 33557
P$_1$(rt.)–M$_5$(br.) ........................................ (w++) 33560

Two partial left rami with
/C–M$_3$ (P$_1$–P$_2$ alv.) ....................................... (w+) 33570
M$_2$–M$_1$ .................................................. (w++) 37134

Two metapodials ................................................. 43004A–B

(B) From Echo Quarry, Antelope Draw, “Lower Snake Creek” Deposits, Sioux County, Nebraska:

FORTY-FIVE SKULLS

Sixteen skulls with
I$^1$–I$^7$ alv. and C$^3$–M$^2$ (P$^1$ alv.). *Figures 1, 6* .......... (m+) 36113
I$^1$–I$^7$ alv. and C$^3$–M$^2$, lacking nasals and left zygomatic arch. (w) 33575
I$^1$(alv.)–M$^3$, partial skull and left ramus, I$_1$–P$_1$ alv. and P$_2$–M$_3$. (w++) 35550
I$^1$–I$^7$ alv. and I$^1$–M$^2$, lacking nasals .................................. (w++) 36109
I$^1$–I$^7$ alv. and C$^3$–M$^2$, lacking nasals ................................ (w++) 36110
I$^1$–I$^7$ alv. and C$^3$–M$^2$ (P$^1$ alv.), partial skull . .............. (w) 36111
I$^1$–I$^7$ alv. and C$^3$–M$^2$, lacking nasals and partial frontals ...... (w++) 36112
I$^1$–I$^7$ alv. and I$^2$–M$^3$, lacking nasals ................................ (w++) 36114
I$^1$–I$^7$ alv. and C$^3$–M$^2$ (P$^2$ alv.), lacking nasals and partial frontals .................................. (w) 36115
dP$^2$(br.)–M$^3$(erupt.), lacking nasals, premaxillary, and left zygomatic arch. ... (t) 36134
I$^1$–I$^7$ alv. and C$^3$–M$^2$ (P$^1$ alv.), lacking nasals (occipital region distorted) ............................................ (w++) 37553
I$^1$–I$^7$ alv. and C$^3$–M$^2$, lacking nasals, occipital region, and zygomatic arches ........................................ (w++) 37554
I$^1$–I$^7$ alv. and C$^3$–M$^2$ (P$^1$–M$^2$ alv.), lacking nasals and right orbit ........................................... (w++) 37555
I$^1$–I$^7$ alv. and C$^3$–M$^2$, lacking nasals and frontals ............... (w++) 37556
I$^1$–M$^2$ (P$^1$ alv., C$^3$ br., and P$^1$ alv.), lacking nasals .......... (w++) 37559
I$^1$–M$^2$, lacking nasals and left zygomatic arch ........................................... (w++) 42317

Twenty-four anterior portions of skull with
I$^1$–P$^1$ alv. and P$^2$–M$^2$. .................................. (w++) 33554
P$^2$–M$^2$ .................................................. (w) 33568
I$^1$–I$^7$ alv. and C$^3$–M$^2$ .................................. (w) 33572
I$^1$–I$^7$ alv. and C$^3$–M$^2$ (P$^1$ alv.) .......................... (w++) 36116
I$^1$–I$^7$ alv. and C$^3$–M$^2$ (P$^4$ alv.) .......................... (w++) 36117
I$^1$–I$^7$ alv. and C$^3$–M$^2$ .................................. (w++) 36118
I$^1$–I$^7$ alv. and C$^3$–M$^2$ (P$^5$ alv.) .......................... (w++) 36119
I$^1$(rt.)–M$^3$ (I$^1$–I$^7$, P$^2$–M$^1$ alv.) ....................... (w++) 36120
I$^1$–I$^7$ alv. .................................................. (w) 36122
I$^1$–I$^7$ alv. and C$^3$–M$^2$ (P$^1$ alv.) .......................... (w++) 36124
Schultz and Falkenbach, Merycochoerina

Five skulls, immature with
C/(rt.)-dP2-M2 (P1 alv.). ................................................... (i) 34267
I(alv.)-I3(germ)-dP2-M2 (P1, P3 alv.). ................................... (i) 34268
C/-dP2-M2* .......................................................... (i) 36121
I-I3 germs and C/-dP2-M2(ited) (P2-P3 alv.) ................................ (i) 36123
I-I3 alv. and C/-dP-M2 (P1-P2 alv.) .................................... (i) 36129

ONE HUNDRED AND EIGHT MAXILLAE

Sixty-four right maxillas with
C/-M3 (P1 alv.). Figure 9. .................................................. (M+) 36186

This specimen has styles on the inner side of the molars between the hypocone and the protocone, a condition not observed in other specimens of oreodonts. This character is more typical of the bovids and cervids.

C/(br.)-M(germ) (P1 alv.). .................................................. (w) 36137
C/-M3 ............................................................................ (w) 36147
P1-M(germ) .......................................................... (w++) 36190

<table>
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<th>P2-M2</th>
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<td>(m)</td>
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Forty-four left maxillae with

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P2\(-M^2\)

| (w\dagger) 33555 | (w\dagger+) 37265 | (w\dagger) 36183 | (w\dagger) 37267 |
| (w\dagger) 36169 | (w\dagger) 36179 | (w\dagger+) 37199 | (w\dagger+) 37270 |
| (w\dagger) 36174 | (w\dagger+) 37200 | (w\dagger) 37271 |
| (w+) 36176 | (w+) 36182 | (w) 37261 | (w+) 37266 |
| (w\dagger+) 36179 | (w) 36182 | (w+) 37261 | (w+) 37266 |

ONE HUNDRED AND NINETY-EIGHT MANDIBULAR SPECIMENS

Three mandibles with
I\(_1\)-/C alve. and P\(_1\)-M\(_3\).  *Figure 6* ...............................  (w) 36195
I\(_1\)-P\(_2\) alve. and P\(_2\)-M\(_3\)..........................  (w\dagger+) 33669
I\(_1\)-M\(_3\) (I\(_3\)/C, P\(_1\) alve.) .........................  (w+) 36219

Ninety-nine right rami with
I\(_1\)(alve.)-M\(_3\) (/C alve.).................................  (w+) 36202
I\(_1\)(alve.)-M\(_3\).............................................  (w+) 36239
I\(_1\)-I\(_3\) alve. and /C-M\(_3\)......................... (w\dagger+) 36252
I\(_1\)-I\(_3\) alve. and /C-M\(_3\)...............................  (w\dagger+) 36253

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<td>(w\dagger) 36279</td>
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* In the following listings the alveoli for the missing teeth may or may not be present.
Schultz and Falkenbach, Merycochoerina

Ninety-six left rami with I1(alv.)–M3(br.) ......................... (w+) 
/C–M3 ........................................ (m+) 

F: A.M. 34251

36289

P1–M3 P2–M3 P3–M3 misc. misc. immature
(w+) 33556 (w++) 36220 (w+) 37127 (w+) 33559 (w++) 37150 (1) 36295
(w+) 36281 (w++) 36286 (w++) 37136 (w++) 33563 (w++) 37153 (1) 37111
(w++) 36283 (w+) 36291 (w) 37137 (m) 33564 (w) 37155 (1) 37117
(w+) 36284 (w+) 37110 (w+) 37105 (w+) 37156 (1) 37118
(w++) 36292 (w+) 37144 (w) 37107 (w) 37191 (1) 37119
(w+) 37194 (m+) 33571 (w++) 37112 (w++) 37192 (1) 37120
(w++) 36299 (P2–M3) 34216 (m) 34264 (w) 37122 (w) 37283 (1) 37123
(w) 36300 (w++) 33567 (m) 34264 (w) 37122 (w) 37284 (1) 37129
(w++) 37106 (w++) 34211 (w) 36285 (w++) 37124 (w) 37285 (1) 37132
(w) 37109 (w) 36282 (w++) 36287 (w++) 37130 (w) 37286 (1) 37154
(w++) 37113 (w++) 36289 (w++) 36288 (w) 37131 (w) 37287 (1) 37182
(w++) 37114 (w++) 36290 (w++) 36296 (w++) 37133 (w) 37288 (1) 37268
(w++) 37128 (w++) 36293 (w++) 37102 (w) 37135 (w) 37291 (1) 37282
(w) 37138 (w+) 36297 (w+) 37116 (w+) 37143
(w+) 37139 (w+) 37101 (w++) 37126
(w++) 37140 (w++) 37103 (w++) 37151
(w+) 37141 (w+) 37104 (w+) 37152
(w++) 37149 (w++) 37108 (w+) 37289
(w++) 37235 (w+) 37125 (w+) 37290

FIFTY-ONE SKELETAL ELEMENTS

Five humeri. (Figure 10, 37296B) ........................................ 37296A–E
Nine radii. (Figure 10, 37297G) ...................................... 37297A–I
Two ulnae. (Figure 10, 37298B) ...................................... 37298A–B
Two femora. (Figure 10, 42332A) ...................................... 42332A–B
Seven tibiae. (Figure 10, 37295B) ..................................... 37295A–G
Metacarpal III. Figure 10 ............................................. 42336
Metatarsal III. Figure 10 ............................................. 42337
Fourteen metapodials .................................................... 43003A–N
Five calcanea .............................................................. 43001A–E
Five astragali ............................................................... 43002A–E

(C) From Version Quarry, Antelope Draw, “Lower Snake Creek” deposits, Sioux County, Nebraska:

SKULL

Skull with I1–I2 alv. and C–M2, lacking nasals, frontals, and left zygomatic arch. .................................................. (m+) 34212

TWO MAXILLAE

Right maxilla with M1(br.)–M3 ......................................... (w+) 37188
Left maxilla with P2–P4 alv. and M1–M2 ................................ (m) 34255
FIVE MANDIBULAR SPECIMENS

Partial right ramus with /C(alv.)-M₃(br.) ........................................... (m) 34207

Four partial left rami with

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<td>M₂-M₃</td>
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<td>M₁-M₂(br.)</td>
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(D) FROM HUMBUG QUARRY, RANCHHOUSE DRAW, "LOWER SNAKE CREEK" DEPOSITS, SIOUX COUNTY, NEBRASKA:

TEN SKULLS

Seven skulls with

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<td>I₁⁻I₃ alv. and C/-M₃, lacking nasals and left zygomatic arch</td>
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<td>I₁⁻I₃ alv. and C/-M₃, lacking nasals</td>
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<td>42426</td>
<td>I₁⁻I₃ alv. and C/-M₃, lacking nasals, orbits, and left zygomatic arch</td>
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<td>I₁⁻I₃ alv. and C/-M₃, slightly crushed, lacking part of nasals and occipital region</td>
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<td>C/-dP₃-M₃(germ), lacking nasals, supraoccipital region, and most of zygomatic arches</td>
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<td>Three anterior portions of skulls with</td>
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<td>42421</td>
<td>I₁⁻I₃ alv. and C/-dP₃-M₃(br.)</td>
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EIGHT MAXILLÆ

Five right maxillae with

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<td>C/-M₃(br.) (P₁ alv.)</td>
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The length of the above dental series is less than the average of this species from Echo Quarry.

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<td>I₁⁻I₃ alv. and C/-M₃ (P₁-P₃ alv., M₁ br.)</td>
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Three left maxillae with

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FORTY MANDIBULAR SPECIMENS

Mandible with I₁-/C alv. and P₁-M₃ ........................................... (w) 42453
Four partial mandibles with

I₁–P₁ alv. and P₂–M₃ ........................................ (w±)
I₁–/C alv. and P₁–M₃ (P₁–P₄ alv., M₁ rt.) ............... (w±+)
M₅ .................................................. (w+)
I₁–P₁ (I₁–/C rt.) ...................................... (w+)

Ten right rami with

P₁(rt.)–M₅ ............................................ (w±) 37538

The P₂–P₄ of the above specimen are quite large in comparison with the average of this species.

P₁(br.)–P₄ ............................................ (w) 37539
P₁–M₃ (P₃ alv.) ...................................... (w±) 42412
I₁–P₁ alv. and P₂–M₃ .................................. (w±) 42131
I₁–P₃ alv. and M₁–M₃ .................................. (w+) 42414
P₃(alv.)–M₃ (M₃–M₅, br.) ............................ (w+) 42440
I₁–/C alv. and P₁–M₃ ................................ (w) 42441
M₁–M₅(br.) ........................................... (w+) 42442
P₅(br.)–M₅ ........................................... (w+) 42443
M₅–M₃ ................................................ (w) 42444

Nine right rami, immature, with

I₁(alv.)–I₃(germ)–P₁–P₁(germ)–dP₄–M₂ (I₁–/C, P₁ alv.) .... (i) 42416
I₁–/C alv. and P₁(erupt.)–dP₄(alv.)–M₃ .................. (i) 42439
P₃(germ)–dP₂–M₃ ...................................... (w) 42445
P₃(gerupt.)–dP₂–M₁ .................................... (i) 42446
I₁–P₁ alv. and dP₁–M₁ .................................. (i) 42447
I₁–P₃ alv. and dP₃–dP₄ ................................ (i) 42448
P₃–dP₃–M₁ ............................................. (i) 42449
dP₃–M₁ ............................................... (i) 42450
I₁–I₃ alv. and C–dP₃–M₁ (P₁ alv.) ...................... (i) 42451

Eleven left rami with

I₁–/C alv. and P₁–M₃ .................................. (w+) 37540

The P₁ of the above specimen is quite large.

M₁–M₃ ................................................ (w+) 42140
I₁(alv.)–M₃ (I₂ rt., I₁–P₁ alv.) ......................... (w++) 42111
I₁(alv.)–M₃ (I₂ rt., I₁–/C alv.) ......................... (w++) 42415
P₃(alv.)–M₃(br.) (P₄, M₂ br.) ........................ (w+) 42417
I₁–I₃ alv. and /C–M₃ ................................ (w++) 42429
I₁–/C alv. and P₁(br.)–M₃ ................................ (w) 42431
I₁–P₁ alv. and P₂–M₃(br.) (P₁ alv.) ...................... (w++) 42432
I₁–/C alv. and P₁–M₁ .................................. (w+) 42433
I₁–/C alv. and P₁–M₃ .................................. (w+) 42435
I₁(alv.)–M₃ (I₂ alv.) .................................. (w+) 42436

Five left rami, immature, with

dP₁–M₂ ................................................. (i) 42418
I₁–/C alv. and P₃–dP₃–P₄(alv.)–M₅(gerupt.) .......... (i) 42434
I₁–P₁ alv. and dP₁–dP₃ ................................ (i) 42437
I₁–P₁ alv. and dP₁–P₄(alv.)–M₁(gerupt.) .......... (i) 42438
dP₃–M₃(br.) ........................................... (i) 42465
SIX SKELETAL ELEMENTS

Two radii
   Radius (equal to Echo Quarry examples) .................. 42428
   Radius (more massive than Echo Quarry examples) ..... 42456
Femur (equal to Echo Quarry examples) ..................... 42430
Two tibiae
   Tibia (more massive than Echo Quarry examples) .......... 42466
   Tibia (longer and heavier than average Echo Quarry examples) 42468
Metatarsal .................................................. 43015

STATEMENT

The material from Humbug Quarry, which is represented by sixty-four specimens, shows a different range of variation in size than the four hundred and two specimens from Echo Quarry. The following table gives the comparison of measurements of material from the two quarries. The measurements show that the material from Humbug Quarry has a slightly different range of size from that of Echo Quarry, but not enough to warrant separation into distinct varieties. The two quarries are probably only in part stratigraphically contemporaneous.

Brachycrus siouense, referred

<table>
<thead>
<tr>
<th>Rami /C–M3</th>
<th>Skulls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basal length</td>
<td>Width</td>
</tr>
<tr>
<td>min. max.</td>
<td>min. max.</td>
</tr>
<tr>
<td>Echo Quarry</td>
<td>218. 246.</td>
</tr>
<tr>
<td>Humbug Quarry</td>
<td>234. 254.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Limbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radii</td>
</tr>
<tr>
<td>min. max</td>
</tr>
<tr>
<td>Echo Quarry</td>
</tr>
<tr>
<td>Humbug Quarry</td>
</tr>
</tbody>
</table>

(E) FROM QUARRY 6, ½ MI. N. OF OLCCOTT HILL, "LOWER SNAKE CREEK" DEPOSITS, SIOUX COUNTY, NEBRASKA (collected by Albert Thomson and associates, 1925):

<table>
<thead>
<tr>
<th>F:A.M.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left maxilla with M1(alv.)–M3 ........................................... (w+))</td>
</tr>
<tr>
<td>Right ramus with I1–C alv. and P1(br.)–M3(br.) (P2 rt.) .......... (w+)</td>
</tr>
<tr>
<td>Two left rami with /C–P2 alv. and P2–M3 ............................ (w+)</td>
</tr>
<tr>
<td>I1–P2 alv. and P2–M3(br.) ........................................... (w+)</td>
</tr>
</tbody>
</table>

(F) FROM INDEFINITE LOCALITY, (?) "LOWER SNAKE CREEK" DEPOSITS, SIOUX COUNTY, NEBRASKA:

<table>
<thead>
<tr>
<th>F:A.M.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anterior portion of skull with C/–M3 (P1 alv.) .................. (w+)</td>
</tr>
</tbody>
</table>
Schultz and Falkenbach, Merycochoerinae


From Observation Quarry:

**MAXILLA**

Left maxilla with C/–P³ (P¹ alv.).......................... (m) 34287

**MANDIBULAR SPECIMEN**

Partial right ramus with I⁰–/C alv. and P₁(br.)–M₂(br.)...... (w+) 34286

**EIGHT SKELETAL ELEMENTS**

Radius.......................................................... 42408
Five metapodials.................................................. 4301A–E
Astragalus....................................................... 43010
Calcaneum....................................................... 43009

From Ginn Quarry:

**TWO MAXILLÆ, IMMATURE**

Two partial right maxillae, immature, with
P³(èrupt.)–dP³.................................................. (i) 33639
dP⁴–M²(br.).................................................. (i) 33650

**TWO MANDIBULAR SPECIMENS**

Two right rami with
I⁰–/C alv. and P₁–M₂(br.)..................................... (w+z) 33655
I⁰–/C alv. and P₁(br.)–M₂ (P₂–P₄ alv.)........................ (w+z+) 33657

From Jorgenson Quarry:

**MAXILLA**

Partial left maxilla with M¹(alv.)–M⁴.......................... (w+z) 33649

From Sand Canyon, southwest of Hay Springs:

Mandible with I₁–M₂, associated with radius, ulna, femur, and
misc. vertebrae.............................................. (w+z) 37215
Radius, ulna, and manus...................................... 42497
Occipital region of skull, partial mandible with I₁(alv.)–M₃,
radius, ulna, and partial manus............................ (w+z) 3972
(7) **Brachycrus wilsoni**, new species

From the Miocene Deposits ("Sheep Creek"² Horizon) of Sioux County, Nebraska


**Specific Characters**

**Skull.**—Mesocephalic; longer but noticeably narrower than examples of *B. laticeps*; longer and more massive than those of *B. siouense*; malar quite deep and massive; nasals (only incompletely preserved) appear to protrude upward as in *B. siouense*; superior border of the maxilla similar to that of *B. siouense*, in rising very gradually to a point anterior of the nasals, also in the widening of the border surface and the rapid ascent to the nasals; orbits large and oblont.

**Mandible.**—Lighter construction than examples of *B. laticeps*, and more massive than those of *B. siouense*; inferior border of the ramus with gradual descent from below anterior of M₂, reaching maximum below posterior of M₃. (The examples of this genus show a great variation of the inferior border and the angle of the rami. All rami of this genus have the concave inferior border characteristic of the genus.)

**Dentition.**—Dental series approximately equal in length to those of *B. laticeps*; more massive than either *B. laticeps* or *B. siouense*; molar series longer than in the latter species.

**Limbs.**—Slightly heavier than examples of *B. laticeps*; somewhat heavier and longer than in *B. siouense*.

**Measurements.**—Tables I and II.

**Discussion**

In 1924 Matthew,³ referring to numerous specimens belonging to "*Pronomotherium siouense*, variety," stated:

"A number of upper and lower jaws from the Sheep Creek beds at Stonehouse draw (Sheep Creek, Hor. A) are referable to the genus and not positively distinguishable from *P. siouense*. I regard them provisionally as a variant, and specify as type No. 18344, upper jaw. The size is a little larger throughout, the premolars, especially the anterior ones, proportionately larger and more robust but not showing any clearly distinctive construction."

Matthew hesitated to propose a name for the variant, probably because of insufficient material on which to base a differentiation. With the additional specimens now at hand, the writers believe it necessary to consider this variant as a

---

¹ Named in honor of Jack Wilson who has been conducting extensive field work in the Sheep Creek-Snake Creek area of Nebraska for the Frick Laboratory since 1932.
² The limited meaning of the Sheep Creek is here used. Only the deposits below the "Lower Snake Creek" horizon are referred to in this usage.
distinct species, *B. wilsoni*. Specimens referred to this new form are definitely larger and more massive than those of *P. siouense* and the skull proportionately narrower.

Matthew noted that "*Pronomotherium siouense, variety*" occurred in the "Sheep Creek" and "*Pronomotherium siouense*" in the "Lower Snake Creek." Field work carried on in the type area since 1924 confirms Matthew's contention that the two forms are found at different faunal levels in the same area.

F:A.M. collections from Sioux County, Nebraska, have been made by Jack Wilson, Carl Long, and their associates, 1933–1937.

Ninety-six specimens are here recorded:

**Holotype.**—Skull with I–I alv. and C–M, lacking nasals.  
From "Sheep Creek" deposits, Greenside Quarry, Ranchhouse Draw, Sioux County, Nebraska.  
*Figures 1, 7, 11.*

**Referred.**—

(A) **From Type Locality (Greenside Quarry):**

**Two Skulls, Immature**

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Description</th>
<th>Location</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>(w†)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Five Maxillae**

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>33551</td>
<td>Partial right maxilla with P alv.</td>
<td></td>
</tr>
<tr>
<td>33573</td>
<td>Immature, partial right maxilla with C–P alv.</td>
<td></td>
</tr>
<tr>
<td>34204</td>
<td>Three partial left maxillae with P alv.</td>
<td></td>
</tr>
<tr>
<td>34278</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33665</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33666</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34347</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Fifteen Mandibular Specimens**

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>33579</td>
<td>Three right rami with I–C alv. and P–M alv.</td>
<td></td>
</tr>
<tr>
<td>34210</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34273</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33578</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Four left rami with
I₂(alv.)-M₂(br.) (M₂ br.)  Figure 7. (w) 33670
P₁-M₂ (P₃ very large) (M+) 33558
I₁-C alv. and P₁-M₂ (P₂ alv., M₃, M₄ br.) (w+) 33561
I₁-I₄ alv. and C(rt.)-M₂. (w) 33672

Five left rami, immature, with
I₁-C alv. and P₁-dP₁-M₃(germ) (P₁ erupt., P₂ alv., M₂ br.)... (i) 34279
I₁-C alv. and P₁(germ)-dP₁-M₃(germ). (i) 34281
I₁-C alv. and P₁(germ)-dP₁-M₃(germ). (i) 34282
I₁-C alv. and P₁-dP₁-M₃(germ). (P₂ alv.)... (i) 34285
dP₁-M₁. (i) 34342

FIFTEEN SKELETAL ELEMENTS

Humerus Figure 10. 37515
Radius Figure 10. 37517
Ulna Figure 10. 37516
Metacarpal III Figure 10. 42339
Metatarsal III Figure 10. 42338
Nine metapodials. 42498A-I
Astragalus. 42499

(B) FROM HILLTOP QUARRY, ANTELOPE DRAW, "SHEEP CREEK" DEPOSITS, SIOUX COUNTY, NEBRASKA:

THREE MAXILLÆ

Right maxilla with P⁴-M¹ br. and M¹-M² (w+) 36189
Two left maxillae with
C/(rt.)-M². (w) 36188
P²-M². (w) 37159

NINE MANDIBULAR SPECIMENS

Two right rami with
M₂-M₄. (w++) 37510
P₁-M₁. (w+) 37513

Two right rami, immature, with
dP₁-M₁(br.). (i) 37511
I₁-P₁ alv. and dP₁-dP₁. (i) 37512

Five left rami with
I₁-C alv. and P₁(rt.)-P₁ (P₂ alv.)... (w) 37142
(P₁-P₁, rather large)
P₁-M₂ (P₂ alv.) (w) 37145
P₂(rt.)-M₁. (w+) 37147
I₅-M₂(br.). (w) 37157
I₅(alv.)-M₅ (I₁-C rt., M₂ br.)... (w+) 37514
SKELETAL ELEMENT

Calcaneum................................................................. F:A.M. 43006

(C) FROM LONG QUARRY, ANTELOPE DRAW, "SHEEP CREEK" DEPOSITS, SIOUX COUNTY, NEBRASKA:

TWO PARTIAL SKULLS

Anterior portion of skull with P2-M2............................. (w+) 34203
Immature, partial skull with C/-P1 erupt. and dP2-M1............. (i) 34284

NINE MAXILLÆ

Three right maxillæ with
C/-M1 (P4 very large).................................................. (w) 33674
M2-M3................................................................. (w+) 34276
M3-M4................................................................. (w+) 34277

Five left maxillæ with
C/-M1................................................................. (m) 33673
C/-M2................................................................. (w+) 34205
P4-M2................................................................. (w) 34256
P4-M3................................................................. (w+) 34275
P4-M4................................................................. (w++) 36193

Immature, left maxilla with C/-dP4-M2 (P4-P3 germs)............. (i) 34283

FIFTEEN MANDIBULAR SPECIMENS

Ten partial right rami with
I1/C alv. and P1-M2.................................................. (w+) 33667
/C(alv.)-M2 (P3 alv.) (P2-P3 very large).......................... (w) 33668
P1(alv.)-M2......................................................... (m+) 33678
I1/C alv. and P1-M3.................................................. (w+) 34206
I1/C alv. and P1-M3(br.)............................................ (w++) 34208
P1-P3 (P2-P4 quite small)........................................... (w+) 34263
M1-M2................................................................. (m) 34327
M2-M3(br.)......................................................... (w) 34340
I2-I3 alv. and /C-M2.................................................. (w+) 36205
P1-M1 alv. and M1-M2................................................ (w++) 37146

Five partial left rami with
M1-M2................................................................. (w+) 33562
I1/C alv. and P1-M2.................................................. (m+) 33569
M2-M3................................................................. (w+) 34535
I2(alv.)-P1 (I2 rt., /C alv.)........................................ (w+) 34254
M1(br.)-M2.......................................................... (w++) 34274

TWO SKELETAL ELEMENTS

Metapodial.............................................................. 43007
Astragalus.............................................................. 43008
(D) FROM THOMSON QUARRY, STONEHOUSE DRAW, “SHEEP CREEK” DEPOSITS, SIOUX COUNTY, NEBRASKA:

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>SKULL</td>
<td>F: A. M.</td>
</tr>
<tr>
<td>Skull with 1₁–I₃ alv. and C₋₄ alv., lacking nasals and occipital region</td>
<td>34201</td>
</tr>
</tbody>
</table>

FOUR MANDIBULAR SPECIMENS

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two partial right rami with</td>
<td></td>
</tr>
<tr>
<td>P₁₋₃₁ (br.) (P₂ alv.)</td>
<td>34271</td>
</tr>
<tr>
<td>/C₋₄ (P₃ alv.) (P₄ very large)</td>
<td>34272</td>
</tr>
<tr>
<td>Two partial left rami with</td>
<td></td>
</tr>
<tr>
<td>P₃(rt.)₋₃₂ (P₄ large)</td>
<td>33565</td>
</tr>
<tr>
<td>I₁₋₄ alv. and P₁₋₄</td>
<td>33671</td>
</tr>
</tbody>
</table>

FIVE SKELETAL ELEMENTS

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three metapodials</td>
<td>42499A–C</td>
</tr>
<tr>
<td>Two calcanea</td>
<td>42500A–B</td>
</tr>
</tbody>
</table>

(D') FROM STONEHOUSE DRAW (collected by Albert Thomson and associates, 1922–1925):

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right maxilla with P₄(br.)₋₃₂</td>
<td>18953</td>
</tr>
<tr>
<td>Left maxilla and fragment of right with P₁₋₃₂</td>
<td>18344</td>
</tr>
<tr>
<td>“Type” of “P. siouense, variety” Matthew (op. cit., p. 184).</td>
<td></td>
</tr>
<tr>
<td>Right ramus with I₁₋₄ alv. and C₋₄</td>
<td>21421</td>
</tr>
<tr>
<td>Left ramus with I₁₋₄ alv. and P₁₋₃₂</td>
<td>18345</td>
</tr>
</tbody>
</table>

(E) FROM INDEFINITE LOCALITY, (?) “SHEEP CREEK” DEPOSITS SIOUX COUNTY, NEBRASKA (collected by American Museum party, 1908):

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>TWO PARTIAL MAXILLÆ</td>
<td></td>
</tr>
<tr>
<td>Right maxilla with P₄ and M₁₋₃₂ br.</td>
<td>14066</td>
</tr>
<tr>
<td>Left maxilla with M₁₋₃₂</td>
<td>14068</td>
</tr>
</tbody>
</table>

The foregoing two specimens were referred to “Metoreodon profectus” by Matthew and Cook (1909, op. cit., p. 394). Specimen A.M.14066 shows evidence of the typical facial cavity of Brachycrus.

M. profectus has been found in the “upper Snake Creek” (Pliocene) but has not been reported from the earlier “lower Snake Creek” or Sheep Creek deposits (Miocene). The fossilization of the two examples in question more nearly resembles Sheep Creek than “upper Snake Creek” material.

TENTATIVELY REFERRED.—

(F) FROM SAND CANYON, DAWES COUNTY, NEBRASKA (collected by Ted Galusha, 1938):

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial right ramus with M₁(br.)₋₃₂</td>
<td>42496</td>
</tr>
</tbody>
</table>
Schultz and Falkenbach, Merycochoerinae

(7a) 

**Brachycrus wilsoni longensis**,

1 new variety

From the Miocene Deposits ("Sheep Creek" Horizon) of Sioux County, Nebraska

**VARIETAL DESCRIPTION**

**SKULL.**—Diffsers from examples of *B. wilsoni* as follows: not as wide across infraorbital foramina; palate narrower anterior of P1; pronounced pinching together of the spout-shaped depression on the premaxillae, creating a flare above and below the compressed area on either side of the muzzle, and resulting in an inflated region around the canine.

**MANDIBLE.**—Unknown.

**DENTITION.**—Superior series somewhat smaller than the type of *B. wilsoni*, but within the variation found in that species; premolar series approximately equal in length to those of *B. wilsoni*, but molar series shorter, due to the small heel of M3 (the heel, however, varies in the referred material of *B. wilsoni*); inferior series unknown.

**LIMBS.**—Unknown.

**MEASUREMENTS.**—Table I.

One listed specimen:

**HOLOTYPE.**—Anterior portion of F:A.M.33574 skull with 11–12 alv. and 11–M2.

(\textsuperscript{w+}) From the Sheep Creek deposits, Long Quarry, Antelope Draw, Sioux County, Nebraska; collected by Jack Wilson and Carl Long, 1934. *Figure 9.*

(8) **Brachycrus rusticus** (Leidy), genotype

From the Miocene Deposits of the Sweetwater River Area of Wyoming


**SPECIFIC CHARACTERS**

**SKULL.**—Brachycephalic; smallest known of the genus; somewhat lighter than examples of *B. siouense*; nasals greatly shortened and apparently protruding straight forward and not upward as in *B. siouense*.

---

1 Name derived from Long Quarry, which in turn had been named after Carl Long of the Frick Laboratory.

2 The limited meaning of the Sheep Creek is here used. Only the deposits below the "Lower Snake Creek" horizon are referred to in this usage.
MANDIBLE.—Small and light; smaller than in B. siouense, the nearest related species.

DENTITION.—Series smallest known of the genus; slightly lighter than in B. siouense; P¹ very small.

LIMBS.—Approximate size of examples of B. siouense.

MEASUREMENTS.—Table I.

DISCUSSION

Peterson,¹ in his discussion of Merychys medius Leidy, stated:

"Very careful comparison with the types of Merychys medius, Merycochoerus rusticus, and the specimens in the Carnegie Museum shows that the dentition is so nearly identical as not to warrant separation. Other features of the cranium of the type specimen of Merycochoerus rusticus, however, differ from the specimens here referred to Merychys medius in having the muzzle more produced in front of the nasals, and the infraorbital foramen placed further back as in Merycochoerus proprius."

The present writers have also observed that the two forms are similar in many respects, but a close comparison shows that the position of the infraorbital foramina and the type of nasals are distinct enough to warrant generic separation.

Nineteen specimens are here recorded:

Genoholotype.—Anterior portion of skull with I¹(br.)—M² (P¹ br.) and partial mandible with I₁—I₂ alv. and I₃(rt.)—M₃(br.) (P₁ br.). (w⁺)

N.M.145 From near Devil's Gate, Sweet-water River area, Wyoming; collected by F. V. Hayden. Figured by Leidy, 1873, Pl. iii, Figs. 1–3; Thorpe, 1937, Pl. xxviii, Figs. 1–2. Figure 2.

The genoholotype is usually listed as including the left ramus only, but there is a partial right ramus in the National Museum collection that has the same number (N.M.145). The fossilization, size, and stage of wear of the teeth of this latter specimen are the same as that of the left ramus.

REFERRED.—

(A) Fifteen additional specimens from the type area (collected by F. V. Hayden):

SIX MAXILLÆ

Right and left maxillæ with M¹—M³. (w) N.M.442 Figured by Leidy, 1873, Pl. vii, Fig. 1. Figure 2 (in part).

Left maxilla with M¹. (w) 443
Left maxilla with P²(alv.)—M¹. (w⁺) 443

It is quite possible that the left maxilla, N.M.443, and the right maxilla, N.M.916, may be of the same skull.

Left maxilla with dP²-dP⁴. (t) N.M.536 Pl. vii, Fig. 2.
Left maxilla with P²-P³. (w) 537 Pl. vii, Figs. 3-4.
Right maxilla with P⁴(br.)-M¹. (w) 916

SEVEN MANDIBULAR SPECIMENS

Partial mandible with M₁ (br.)-M₄. (w) 444

Three partial right rami with
M₄(br.). (w) 444 Figure 2.
M₁(br.)-M₃(br.). (w) 444
M₃-M₄. (w+) 444

Left ramus with P₃(alv.)-M₃ (M₂, M₁ rt.). (w) 444

Two symphyses with
I₁-I₄ br. and /C-P₁(br.). (w) 535 Pl. vii, Fig. 5.

Immature, I₁-P₄(germ) (I₃ germ, /C-P₁ br., P₂ germ). (t) 441

SKELETAL ELEMENTS

Right calcaneum (very pathological). 532
Distal end of tibia, calcaneum, and astragalus. 913 Pl. xx, Figs. 9-11.

(B) THREE REFERRED SPECIMENS FROM EXPOSURE 2A, 7 Mi. N.E. OF MUDDY GAP, SWEETWATER RIVER AREA,¹ FREMONT COUNTY, WYOMING (collected by Nelson J. Vaughan, John Lynch, and Charles H. Falkenbach, 1937-1938):

TWO SKULLS

Skull with P¹-M¹, lacking nasals, premaxillae, and occipital region. (M) F:A.M. 36105 Figures 1, 3.
Partial skull (in two sections, without contact) with I¹-P³ and posterior portion with P⁴(br.)-M₄, and partial right ramus with P₁-M₄. (M+) 37587

The above specimen is larger than the holotype and the referred skull (F:A.M.36105). It was collected from a different horizon than the referred skull and may represent a distinct variety.

MANDIBLE

Partial mandible with I₁-M₄ (I₁, I₃ alv.). (w+) 37588 Figure 3.

¹ See discussion of Sweetwater River collecting localities, p. 250.
(9) **Brachycrus sweetwaterensis**, new species

From the Miocene Deposits of the Sweetwater River Area of Wyoming

**DESCRIPTION**

**SKULL.**—Brachycephalic; exceptionally high above the molar region; average length, slightly longer than *B. laticeps*; longer and wider than *B. vaughani*; nasals long, posterior edge more or less circular, with a rounded superior surface (in *B. laticeps* the nasals are more triangular in outline); the superior border of the maxillae rises sharply to the nasals without a noticeable break (in *B. vaughani* there is a definite break before the abrupt rise of the border to the nasals); orbits oblong in shape; condyles slightly lighter than *B. laticeps*.

**MANDIBLE.**—Inferior border of ramus descends abruptly below M₃, reaching maximum depth posterior to M₃; having less depth below M₃ (anterior) than shown in example of *B. laticeps*; angle of ramus more like holotype of *B. elrodi*.

**DENTITION.**—Superior and inferior series approximately same length as in *B. laticeps*, but somewhat heavier; heel of M₃ about size of that of *B. laticeps*, decidedly larger than *B. elrodi*.

**LIMBS.**—Moderately heavy; considerable variation in length and robustness, probably due to sexual variation.

**MEASUREMENTS.**—Tables I and II.

**DISCUSSION**

The heights of the skull and the superior border of the maxillae definitely separate this species from *B. vaughani*. The limbs apparently are about the same size in both species.

Material listed under this species was collected by Nelson J. Vaughan, John Lynch, and Charles H. Falkenbach, 1937–1938.

**SWEETWATER RIVER COLLECTING LOCALITIES**

The Miocene exposures in the Sweetwater River area, Wyoming, are small and scattered. The various collecting localities have been divided and numbered, in order to facilitate the recording of field data.

Exposure No. 1 is located about eleven miles west of Devil’s Gate, Natrona County. The holotype of *B. sweetwaterensis* and the majority of specimens referred to the same species were collected at this locality. Exposure No. 1a, located a few hundred yards to the southwest of No. 1, produced several examples of *B. vaughani*. The fossil material from No. 1 is stained yellow, while that from No. 1a is dark gray to black. Although these two exposures are very closely associated, there is no proof that they are of exactly the same geological age. Since the area is largely grass covered and there are no large and extensive

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1 Named after the Sweetwater River, Wyoming, the collecting area of the holotype of this species as well as the holotypes of *B. rusticus* and *B. vaughani*. 
outcrops, it is difficult definitely to correlate the various exposures or to determine the extent of faulting.

Exposure No. 2, located approximately seven miles west of Muddy Gap, Fremont County, is divided into three small localities, namely, a, b, and c. These three outcrops extend consecutively from northeast to southwest for nearly a mile and are separated from each other by grass-covered areas. Exposures 2a and 2b have produced examples of *B. vaughani*, and No. 2c, *B. sweetwaterensis*. Here again no definite association of these two species has been established. Referred material of *B. rusticus* comes from exposure No. 2a, but apparently at a lower level than the specimens of *B. vaughani* from the same location.

Sixteen specimens are here recorded:

**Holotype.**—Complete skull with I-1-M$^3$. (w) F:A.M.34498 From exposure No. 1, 11 mi. W. of Devil’s Gate, S. of Sweetwater River, Natrona County, Wyoming.1

**Figures 1, 5.**

**REFERRED.**—

(A) From Type Area, Exposure No. 1, 11 mi. W. of Devil’s Gate, S. of Sweetwater River, Natrona County, Wyoming:

**Seven Skulls and Associated Material**

Skull with P-1-M$^3$ (lacking nasals and premaxilla), mandible with I-M$^2$, 2 humeri, 2 radii, 2 ulnae, left and right fore feet. *Figures 5, 10* (in part) ................................................ (w) 34494

Skull with I-1-M$^2$ (lacking supraoccipital region), mandible with /C-M$^2$, scapula, 2 humeri, and partial pelvis .................. (w) 34493

Skull with I-1-M$^2$ (lacking nasals), partial mandible with /C-M$^2$, tibia, distal end of fibula, partial pes, distal end of humerus, and vertebrae (w+) 34495

Anterior portion of skull with I-1-M$^2$, associated with partial skeleton (w+) 34496

Right side of skull with C/-P$^1$ br. and P-2-M$^2$, and partial right ramus with P$^3$(br.)-M$^2$, associated with nearly complete skeleton (w+) 34500

Skull with I-1-M$^2$ (lacking posterior portion of left maxilla and left zygomatic arch), and attached mandible with /C-M$^2$ ................. (w+) 36104

Skull fragments with M-1-M$^2$, partial mandible with I-M$^1$(br.), and vertebrae ........................................... (w+) 37503

**Four Mandibular Specimens and Associated Material**

Three partial mandibles with
I-M$^1$ .................................................. (w+) 34497
I-M$^1$(br.) ............................................ (w+) 36103
P-M$^2$, humerus, partial ulna, femur, tibia, calcaneum, and skeletal fragments ................................................................. (w+t) 36107

Two partial rami
Left with P-M$^1$ ........................................... (w) 37506
Immature right with dP$^3$(rt.)-M$^1$(br.) ....................... (t) 37507

1 See page 250 for discussion of Sweetwater River collecting localities.
(B) From Exposure No. 2c, 7 Mi. W. of Muddy Gap, Sweetwater River Area, Fremont County, Wyoming:

TWO MANDIBULAR SPECIMENS

Mandible with P2-M3 ........................................... (M+) 37591
Mandible with I1-M3 and partial pes ............................ (w+) 37597

(10) Brachycrus vaughani,1 new species

From the Miocene Deposits of the Sweetwater River Area of Wyoming

DESCRIPTION

SKULL.—Moderately high; length less than in examples of B. sweetwaterensis, close to B. laticeps; narrower than in either of the latter two species; nasals long, posterior edge rounded, anterior surface somewhat flattened in comparison with B. sweetwaterensis; superior border of the maxillae rises gradually to a point just anterior of the tip of the nasals, where it rises abruptly; orbits oval.

MANDIBLE.—Larger than those of B. siouense; smaller than in B. laticeps and B. sweetwaterensis; inferior border of ramus descends abruptly below anterior of M3, reaching maximum depth posterior to M3.

DENTITION.—Superior and inferior series intermediate in length between B. laticeps and B. siouense; teeth heavier than in both latter species.

LIMBS.—Approximately equal to those of B. sweetwaterensis.

MEASUREMENTS.—Tables I and II.

DISCUSSION

The material listed under this species was collected by Nelson J. Vaughan, John Lynch, and Charles H. Falkenbach, 1937–1938.

Twenty-one specimens are here recorded:

HOLOTYPE.—Skull and mandible with I1-M3, 2 partial humeri, 2 ulnae, 2 radii, femur, tibia, pelvis, and vertebrae. (w+)

F:A.M.34492 From exposure No. 2a, 7 mi. W. of Muddy Gap, Sweetwater River area, Fremont County, Wyoming.2

Figures 1, 4, 10.

1 Named in honor of Nelson J. Vaughan, collector, Frick Laboratory.
2 See page 250 for discussion of Sweetwater River collecting localities.
Schultz and Falkenbach, *Merycochoerina*

**REFERRED.—**

(A) From Type Area, Exposure No. 2A, 7 Mi. W. of Muddy Gap, Sweetwater River Area, Fremont County, Wyoming:

**NINE SKULLS AND ASSOCIATED MATERIAL**

Anterior portion of skull with P2-M3(br.), partial mandible with I1-M3, and partial pes. *Figure 10* (in part) ........................................ (w+) 36102

This specimen is smaller than the average of this species.

Skull with I1-I2 alv. and P4(br.)-M3 (M1 br.), and mandible with I1- I2 br. and /C-M3 ........................................... (w+) 36101

Skull and mandible with I1-M3 (/C alv.) ........................................ (w+) 37583

Anterior portion of skull with I1-M3 (P1 br.) ................................ (w) 37584

Posterior portion of skull with M1(br.)-M3(br.), right ramus with I1- M3 (M2 br.), and skeletal fragments ................................ (w+) 37585

Anterior portion of skull with C/-M3 .................................... (m) 37586

Skull with P1-M3 (lacking supraoccipital region, left zygomatic arch and premaxilla) and mandible with P1(br.)-M3, associated with partial skeleton ................................................... (w+) 37589

Skull with I1-M3, associated with partial skeleton .................. (w+) 37590

Partial skull with I1-M3 (P1 alv.), right ramus with /C-M3, associated with partial skeleton .................................. (w+) 42305

**THREE SKULLS AND ASSOCIATED MATERIAL, IMMATURE**

Partial skull with C/(germ)-dP2-M1 and mandible with I1-/C rt. and P1(erupt.)-dP2-M1(germ) ...................................... (i) 37592

Partial skull with I1-I2 alv. and dC/-M1, and partial femur ........ (i) 37593

Partial skull with I1-I2-dC/-P1(germ.)-dP2-M1 and mandible with I1-I2-dC-P1(erupt.)-dP2-M1 ........................................ (i) 37596

**FOUR MANDIBULAR SPECIMENS AND ASSOCIATED MATERIAL**

Mandible with I1-I2 alv. and I1-M3 (/C alv.), 2 humeri, 2 ulnae, 2 radius, femur, and vertebrae ............................................ (w+) 36108

Anterior portion of mandible with I1-M3(br.) .......................... (w+) 37508

Anterior portion of mandible with I1-M3(br.) .......................... (w+ 37509

Immature partial mandible with I1-dP1-M3(germ.) .................... (i) 37594

**SKELETAL ELEMENTS**

Tibia, calcaneum, and astragalus ........................................ 37505

(B) From Exposure No. 1A, 11 Mi. W. of Devil's Gate, Sweetwater River Area, Natrona County, Wyoming:

**TWO SKULLS AND ASSOCIATED MATERIAL**

Skull with I1-M3, lacking nasals and posterior portion of left zygomatic arch ................................................................. (w+) 34499

Anterior portion of skull with I1-M3, partial ulna, and metapodial... (w+) 36106
MAXILLA AND ASSOCIATED MATERIAL

Partial right maxilla with P1–P4, femur, and tibia............................. (w+’) 37595

The above three specimens are of a black color and differ in fossilization from material collected from exposure No. 1. (See page 250 for discussion of localities.)

(11) Brachycrus, species undetermined

(A) From the lower part of the "Santa Fé Beds," East of Española, Santa Fé County, New Mexico (collected by Joseph Rak, John C. Blick, and Charles H. Falkenbach, 1926, 1927, and 1930):

FIVE MANDIBULAR RAMI

From southeast of White Operation:
Mandible with I1–P1 rt. and P2–M3.............................................. (w+) 33688

From Skull Ridge:
Partial mandible with P1–P4(br.).............................................. (w+) 34388
Left ramus with P1(rt.)–M3(br.).................................................. (w+’+) 33690
Left ramus with P1–M2 (P1 alv.)................................................. (w+’+) 37543
This ramus has an exceptionally large M3.

From East Skull Ridge:
Partial right ramus with I1–C alv. and P1–M1.............................. (w+) 33641

STATEMENT

The above material from New Mexico is represented only by five mandibular rami. The mandibles of the various species of Brachycrus are not so readily distinguished as the skulls. Although the specimens from New Mexico compare favorably with B. siouense, more material is needed in order definitely to establish the validity of this reference.
### Table I.—*Brachycerus Matthew*. Comparative Measurements of Skulls and Rami

<table>
<thead>
<tr>
<th>Skull</th>
<th>B. buwaldi (Merrim)</th>
<th>B. buwaldi barstowensis, d.v.r.</th>
<th>B. altiramus (Douglass)</th>
<th>B. ebrodi (Douglass)</th>
<th>B. madisonius (Douglass)</th>
<th>B. laticeps (Douglass)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage of wear of teeth</td>
<td>Holotype U.C. 21350</td>
<td>F.A.M. 34467</td>
<td>Holotype A.M. 9746</td>
<td>Holotype C.M. 818</td>
<td>Holotype C.M. 819</td>
<td>Holotype C.M. 796</td>
</tr>
<tr>
<td>Length (including supraoccipital crest and incisors)</td>
<td>(w)</td>
<td>(w+)</td>
<td>(w)</td>
<td>(w)</td>
<td>(w)</td>
<td>(w+)</td>
</tr>
<tr>
<td>Basal length (from anterior notch of foramen magnum to posterior base of P1)</td>
<td>246</td>
<td>290</td>
<td>220</td>
<td>102</td>
<td>135</td>
<td>233.5</td>
</tr>
<tr>
<td>Width (max.)</td>
<td>190</td>
<td>102.2</td>
<td>182</td>
<td>135</td>
<td>133</td>
<td>110</td>
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<tr>
<td>Width, interorbital (min.)</td>
<td>83.5</td>
<td>137.5</td>
<td>84.2</td>
<td>133</td>
<td>134</td>
<td>113.3</td>
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<tr>
<td>Distance from anterior rim of orbit to anterior base of canine</td>
<td>55</td>
<td>48</td>
<td>55</td>
<td>51.5</td>
<td>57</td>
<td>57.8</td>
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<tr>
<td>Distance from anterior rim of orbit to supraoccipital crest</td>
<td>46</td>
<td>46</td>
<td>46</td>
<td>46</td>
<td>46</td>
<td>46</td>
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<tr>
<td>Width across canines (max.)</td>
<td>55</td>
<td>48</td>
<td>55</td>
<td>51.5</td>
<td>57</td>
<td>57.8</td>
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<tr>
<td>Width of palate between canines</td>
<td>23</td>
<td>23</td>
<td>23</td>
<td>23</td>
<td>23</td>
<td>23</td>
</tr>
<tr>
<td>Length, C-/M1 incl.</td>
<td>142</td>
<td>146.5</td>
<td>140</td>
<td>176</td>
<td>158</td>
<td>158.5</td>
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<tr>
<td>Length, P1-P4 incl.</td>
<td>128.5</td>
<td>129.5</td>
<td>123.5</td>
<td>155</td>
<td>145.5</td>
<td>145.5</td>
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<tr>
<td>Length, M1-M2 incl.</td>
<td>53.5</td>
<td>57</td>
<td>50</td>
<td>64</td>
<td>49.5</td>
<td>49.5</td>
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<tr>
<td>Width of M2 (max.)</td>
<td>73</td>
<td>74</td>
<td>74.5</td>
<td>93</td>
<td>85</td>
<td>85</td>
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<tr>
<td>Depth of malar below orbit</td>
<td>17.5</td>
<td>24</td>
<td>22</td>
<td>35</td>
<td>26</td>
<td>25.6</td>
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<table>
<thead>
<tr>
<th>Ramus</th>
<th>B. buwaldi (Merrim)</th>
<th>B. buwaldi barstowensis, d.v.r.</th>
<th>B. altiramus (Douglass)</th>
<th>B. ebrodi (Douglass)</th>
<th>B. madisonius (Douglass)</th>
<th>B. laticeps (Douglass)</th>
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<tbody>
<tr>
<td>Stage of wear of teeth</td>
<td>Holotype F.A.M. 34462</td>
<td>F.A.M. 34450</td>
<td>Holotype C.M. 759</td>
<td>Holotype C.M. 59.5</td>
<td>Holotype C.M. 59</td>
<td>Holotype C.M. 62</td>
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<tr>
<td>Depth below anterior edge of M1</td>
<td>(w)</td>
<td>(w+)</td>
<td>759</td>
<td>59</td>
<td>59</td>
<td>59</td>
</tr>
<tr>
<td>Length, C-/M1 incl.</td>
<td>49</td>
<td>47</td>
<td>759</td>
<td>59</td>
<td>59</td>
<td>59</td>
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<tr>
<td>Length, P1-M4 incl.</td>
<td>124</td>
<td>127</td>
<td>127</td>
<td>127</td>
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<td>127</td>
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<tr>
<td>Length, P1-P4 incl.</td>
<td>125</td>
<td>117.5</td>
<td>158.3</td>
<td>158.3</td>
<td>158.3</td>
<td>158.3</td>
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<td>Length, M1-M2 incl.</td>
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<td>44.5</td>
<td>61</td>
<td>44.4</td>
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<td>44.4</td>
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<td>Depth below anterior edge of M2</td>
<td>76</td>
<td>75</td>
<td>75</td>
<td>75</td>
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1 ( ) = approximate; ( ) = estimated. All measurements in millimeters.

255
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<th></th>
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<tr>
<td><strong>SKULL</strong></td>
<td></td>
<td></td>
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<tr>
<td>Stage of wear of teeth</td>
<td>Referred F.A.M.</td>
<td>Holotype F.A.M.</td>
<td>Holotype N.M.</td>
<td>Genotypic Holotype F.A.M.</td>
<td>Referred F.A.M.</td>
<td>Holotype F.A.M.</td>
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<td>Basal length (from anterior notch of foramen magnum to posterior base of brain case)</td>
<td>36113 (w)</td>
<td>34202 (w)</td>
<td>33357 (w)</td>
<td>145 (w)</td>
<td>36105 (w)</td>
<td>34498 (w)</td>
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<tr>
<td>Width (max.)</td>
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<td>190.5</td>
<td>138.5</td>
<td>128.5</td>
<td>125.5</td>
<td>144.5</td>
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<tr>
<td>Distance from anterior rim of orbit to anterior base of canine</td>
<td>136.5</td>
<td>157.5</td>
<td>145.5</td>
<td>135.5</td>
<td>144.5</td>
<td>125.5</td>
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<tr>
<td>Distance from anterior rim of orbit to supraoccipital crest</td>
<td>138.5</td>
<td>157.5</td>
<td>145.5</td>
<td>135.5</td>
<td>144.5</td>
<td>125.5</td>
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<tr>
<td>Width across canines (max.)</td>
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<td>52.5</td>
<td>45.5</td>
<td>45(2)</td>
<td>40.5</td>
<td>39.5</td>
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<tr>
<td>Width of palate between canines</td>
<td>52(2)</td>
<td>54(2)</td>
<td>46(2)</td>
<td>47(2)</td>
<td>40(2)</td>
<td>33(2)</td>
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<tr>
<td>Length, C-M* incl.</td>
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<td>157.5</td>
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<td>Length, L-M* incl.</td>
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<td>Length, P-M* incl.</td>
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<td>139(2)</td>
<td>127(2)</td>
<td>110(2)</td>
<td>141(2)</td>
<td>127(2)</td>
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<tr>
<td>Length, M-M* incl.</td>
<td>123(2)</td>
<td>147.5</td>
<td>111(2)</td>
<td>116(2)</td>
<td>143.5</td>
<td>135.5</td>
</tr>
<tr>
<td>Depth of malar below orbit</td>
<td>23.5</td>
<td>31.5</td>
<td>25.5</td>
<td>18.5</td>
<td>29.5</td>
<td>27.5</td>
</tr>
<tr>
<td><strong>RAMUS</strong></td>
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<td></td>
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<tr>
<td>Stage of wear of teeth</td>
<td>Referred F.A.M.</td>
<td>Holotype F.A.M.</td>
<td>Holotype P.U.</td>
<td>Referred F.A.M.</td>
<td>Referred F.A.M.</td>
<td></td>
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<tr>
<td>Depth below anterior edge of M*</td>
<td>54</td>
<td>60</td>
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<td>58.5</td>
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<td>Length, C-M* incl.</td>
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<td>147(2)</td>
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<td>116</td>
<td>143.5</td>
<td>135.5</td>
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<td>Length, P-M* incl.</td>
<td>136.5</td>
<td>157.5</td>
<td>145.5</td>
<td>135.5</td>
<td>144.5</td>
<td>125.5</td>
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<tr>
<td>Length, M-M* incl.</td>
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<td>147(2)</td>
<td>111</td>
<td>116</td>
<td>143.5</td>
<td>135.5</td>
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</tbody>
</table>

1 See Table II, page 257, for measurements of skeletal elements of this specimen.
### Table II.—Brachycerus Matthew. Comparative Measurements of Skeletal Elements

<table>
<thead>
<tr>
<th></th>
<th>B. buwaldi (Merriam)</th>
<th>B. siouense (Sinclair)</th>
<th>B. wilsoni, n.sp.</th>
<th>B. sweetwaterensis, n.sp.</th>
<th>B. vaughani, n.sp.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Referred</td>
<td>Referred</td>
<td>Referred</td>
<td>Referred F:A.M. 34494¹</td>
<td>Referred F:A.M. 36102</td>
</tr>
<tr>
<td>Length of humerus (articular)</td>
<td>156. 37296B</td>
<td>131. 37517</td>
<td>131. 37517</td>
<td>34494</td>
<td>34492</td>
</tr>
<tr>
<td>Length of radius (articular)</td>
<td>132. 37297G</td>
<td>131. 37517</td>
<td>131. 37517</td>
<td>140.5</td>
<td></td>
</tr>
<tr>
<td>Length of ulna (max.)</td>
<td>((186.)) 37298B</td>
<td>206. 37516</td>
<td>180. ((190.))</td>
<td>36102</td>
<td></td>
</tr>
<tr>
<td>Length of metacarpal III (max.)</td>
<td>61. 42355</td>
<td>58. 42336</td>
<td>62. 42339</td>
<td>63.</td>
<td></td>
</tr>
<tr>
<td>Length of femur (articular)</td>
<td>147. 42333</td>
<td>137. 37295B</td>
<td>65. 42338</td>
<td>195.</td>
<td></td>
</tr>
<tr>
<td>Length of tibia (articular)</td>
<td>61. 42334</td>
<td>61. 42334</td>
<td>65. 42338</td>
<td>161.</td>
<td>62.</td>
</tr>
<tr>
<td>Length of metatarsal III (max.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ See Table I, page 256, for measurements of skull and ramus of this specimen.

### Table III.—Merycochoerus Leidy. Comparative Measurements of Skeletal Elements

<table>
<thead>
<tr>
<th></th>
<th>M. proprius magnus (Loomis)</th>
<th>M. matthewi Loomis</th>
<th>M. proprius Leidy</th>
<th>M. proprius magnus (Loomis)</th>
<th>M. matthewi Loomis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Holotype A:M.</td>
<td>Holotype A:M.</td>
<td>Referred</td>
<td>Referred</td>
<td>Referred</td>
</tr>
<tr>
<td>Length of humerus (articular)</td>
<td>14242</td>
<td>202</td>
<td>Min. Max.</td>
<td>Min. Max.</td>
<td>185. 192.</td>
</tr>
<tr>
<td>Length of radius (articular)</td>
<td>151.5</td>
<td>144</td>
<td>130. 166.</td>
<td>129. 151.</td>
<td>144. 164.</td>
</tr>
<tr>
<td>Length of ulna (max.)</td>
<td>224.5</td>
<td>200</td>
<td>186. 224.</td>
<td>189. 224.</td>
<td>200. 211.</td>
</tr>
<tr>
<td>Length of metacarpal III (max.)</td>
<td>68.5</td>
<td>73</td>
<td>54. 75.</td>
<td>60. 73.</td>
<td>73. 81.</td>
</tr>
<tr>
<td>Length of femur (articular)</td>
<td>236</td>
<td>...</td>
<td>197. (244.)</td>
<td>216. 236.</td>
<td>211. 232.</td>
</tr>
<tr>
<td>Length of tibia (articular)</td>
<td>178</td>
<td>...</td>
<td>132. 176.</td>
<td>149. 178.</td>
<td>170. 192.</td>
</tr>
<tr>
<td>Length of metatarsal III (max.)</td>
<td>65.5</td>
<td>...</td>
<td>53. 68.</td>
<td>48. 65.</td>
<td>74.</td>
</tr>
</tbody>
</table>
Fig. 1. Outlines of skulls representing eight species of *Brachycerus* (*B. laticeps*, after Peterson). (See opposite page.) × \( \frac{1}{4} \). (Compare *Merycochoerus*, Fig. 12.)
Fig. 1 (cont.). See legend, opposite.

259
Fig. 2. *Brachycrus rusticus* (Leidy), Genoholotype, N.M.145, partial skull and ramus (/C from opposite side), and referred, N.M.442, maxilla, and N.M.444, M3, from the Sweetwater River area, Wyoming. (See Fig. 3 for comparison.) $\times \frac{1}{2}$.
Fig. 3. *Brachycrus rusticus* (Leidy), Referred, F:A.M.36105, skull, and F:A.M.37588, ramus, from type area, Sweetwater River area, Wyoming. (See Fig. 2 for comparison.) $\times \frac{1}{3}$. 
Fig. 5. *Brachycrus sweetwaterensis*, new species, Holotype, F:A.M.34498, skull, and Referred, F:A.M.34494, ramus, from the Sweetwater River area, Wyoming. × ½.
Fig. 6. *Brachycrus siouense* (Sinclair), referred, F:A.M.36113, skull, and F:A.M.36195, ramus, from "Lower Snake Creek" deposits, Sioux County, Nebraska. × ½.

APF = anterior palatine foramen; B = auditory bulla; FO = foramen ovale; IF = infraorbital foramen; MA = external auditory meatus; NF = nasal-frontal contact; PP = paroccipital process; PPF = posterior palatine foramen; PPR = posterior palatine projection; PS = posterior border of symphysis; SOF = supraorbital foramen; Z = depression for tympanohyal; 5 = lacerated foramina; 6 = glenoid foramina; 7 = condylar foramen.
Fig. 7. *Brachycrus wilsoni*, new species, HOLOTYPE, F:A.M.34202, skull (some restoration from right side), and REFERRED, F:A.M.33670, ramus, from "Sheep Creek" deposits, Sioux County, Nebraska.  × ½.
Fig. 9. *Brachycrus siouense* (Sinclair), REFERRED, F:A.M.36186, maxilla, from Sioux County, Nebraska (ST = style); *B. wilsoni longensis*, new variety, HOLOTYPE, F:A.M.33574, anterior of skull, from Sioux County, Nebraska; *B. madisonius* (Douglass), HOLOTYPE, C.M.800, ramus, and REFERRED, C.M.819, partial maxilla, from Gallatin County, Montana; *B. elrodi* (Douglass), HOLOTYPE, C.M.818, ramus, from Gallatin County, Montana; *B. buwaldi barstowensis*, new variety, HOLOTYPE, F:A.M.42402, superior dental series, and REFERRED, F:A.M.34450, ramus, from Barstow area, San Bernardino County, California. × 1.
Fig. 10. Brachyurus Matthew, comparison of skull elements. A = B. stenotes (Sinclair), from Nebraska; B = B. stegani, new species, from Nebraska; C = B. baressi (Merrill), from California; D = B. stegani, new species, from Wyoming; E = B. ephraimi, new species, from Wyoming. × 3.
Fig. 11. *Brachycrus wilsoni*, new species, Holo type, F:AM.34202, adult skull, referred, F:AM.33551, young skull, and F:AM.33573, very young skull, showing age variation, from “Sheep Creek” deposits, Sioux County, Nebraska. × ½.

NA = nasals.
II. **Merycochoerus Leidy**


**Genotype.**—*Merycochoerus proprius* Leidy.

**Generic Characters**

**Skull.**—Medium to very large size; brachycephalic; occipital region fan-shaped with supraoccipital crests protruding posteriorly; cranial region foreshortened; brain case laterally expanded; frontals wide and moderately convex; zygomatic arches of medium to heavy construction; maxillae form a curve along the upper contour in advance of the anterior narial opening; pronounced extension of the posterior palate to the pterygoid region; bullae inflated but small for size of skull.

**Mandible.**—Medium to large; long symphysis, with tuberosity on the posterior border.

**Dentition.**—Brachyodont.

**Limb.**—Moderately heavy to robust; feet vary from long and light to short and heavy.

**Measurements.**—Tables III and IV.

**Discussion**

*Merycochoerus proprius* Leidy, the genotypic species, was established on material collected "from the Miocene red-grit bed near Fort Laramie, Wyoming." The type locality is commonly considered to be near Fort Laramie in Wyoming because of Leidy's statement, but F. V. Hayden definitely placed the collecting locality of the holotype in Nebraska along the Niobrara River, not far from the present site of Dunlap in the Hemingford area. Hayden reported, concerning the Nebraska location,

"August 2nd. ... From the head of the Loup Fork we pursued a north-west course to the Niobrara River..."

"August 10th. On reaching the Niobrara we observed some of the upper Miocene beds... As we pass up the Niobrara the gray sandstone bed assumes a variety of characters... About fifty miles up the Niobrara from the point where we struck it (Aug. 10th) the Pliocene beds cease to appear, and the whole country is occupied by the Miocene formation D and E of the general section.

"August 14th. ... Fifty miles above our camp of August 10th, a new bed arises above the water level of the river, composed of a flesh-colored calcareous grit with a reddish tinge. Sometimes it is a light yellow calcareous marl, and the eroded material gives a reddish yellow tint to the whole surface of the country. It seems to pass up quite gradually into the..."

---

1 Leidy, Joseph, 1858, op. cit., p. 24.
sandstone above. The remains of an animal allied to the *Oreodon*, named by Dr. Leidy, *Merycochoerus proprius*, were collected from this bed at this locality."

Hayden plotted the various "camps" of the survey party on his map¹ of Nebraska and Dakota. The location given for August 14th (the day that the holotype of *M. proprius* was collected) indicates that the camp was near the present site of Dunlap, northeast of Hemingford, Nebraska. This information agrees with that given in the 1863 report.² The examples of *Merycochoerus* recently collected from this same area are referable to *M. proprius*.

*Merycochoerus* remains are very restricted in distribution and have been found only in Colorado, Nebraska, South Dakota, and Wyoming. This is due to the scarcity of deposits of lower Hemingford age in North America.

Considerable individual variation within a species is noted in the genus. This is very much in evidence in *M. proprius* as illustrated by the seven associated skulls, mandibles, and limbs, F:A.M.42469A to 42471, from Dawes County, Nebraska. The outlines of four of these skulls are shown in Figure 16 in order to demonstrate the differences in size and shape. The following table contains measurements for all seven skulls as well as the remaining associated material.

### *Merycochoerus proprius*, referred

<table>
<thead>
<tr>
<th>F:A:M.</th>
<th>Wear</th>
<th>Length (max.)</th>
<th>Width (max.)</th>
<th>Height of pre-maxilla (max.)</th>
<th>C/– Maxillary notch (min.)</th>
<th>C/–M²</th>
<th>Length</th>
<th>/C–M²</th>
</tr>
</thead>
<tbody>
<tr>
<td>42469A</td>
<td>(w+)</td>
<td>341.</td>
<td>276.5</td>
<td>120.5</td>
<td>133.</td>
<td>178.</td>
<td>255.</td>
<td>170.5</td>
</tr>
<tr>
<td>42469B</td>
<td>(w+)</td>
<td>297.</td>
<td>225.</td>
<td>93.</td>
<td>113.5</td>
<td>168.</td>
<td>(241.)</td>
<td>(163.5)</td>
</tr>
<tr>
<td>42469C</td>
<td>(w)</td>
<td>316.</td>
<td>203.</td>
<td>(90.)</td>
<td>116.5</td>
<td>168.5</td>
<td>(249.)</td>
<td>(168.5)</td>
</tr>
<tr>
<td>42469D</td>
<td>(w)</td>
<td>297.</td>
<td>197.</td>
<td>97.</td>
<td>105.</td>
<td>164.</td>
<td>....</td>
<td>....</td>
</tr>
<tr>
<td>42469E</td>
<td>(r)</td>
<td>234.5</td>
<td>154.</td>
<td>78.</td>
<td>83.</td>
<td>....</td>
<td>192.5</td>
<td>....</td>
</tr>
<tr>
<td>42470</td>
<td>(w+)</td>
<td>319.</td>
<td>....</td>
<td>94.</td>
<td>105.</td>
<td>162.</td>
<td>....</td>
<td>....</td>
</tr>
<tr>
<td>42471</td>
<td>(w+)</td>
<td>....</td>
<td>....</td>
<td>....</td>
<td>156.</td>
<td>162.</td>
<td>245.5</td>
<td>158.5</td>
</tr>
</tbody>
</table>

### Associated Limbs

(F:A.M.42469A to 42471)

<table>
<thead>
<tr>
<th>Component</th>
<th>Articular</th>
<th>Length (articular)</th>
<th>Ulna (max.)</th>
<th>Femora (articulard)</th>
<th>Tibia (articulard)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humerus</td>
<td>(articulard)</td>
<td>130.5</td>
<td>206.5</td>
<td>225.5</td>
<td>150.5</td>
</tr>
<tr>
<td>Radius</td>
<td>(articulard)</td>
<td>187.</td>
<td>185.</td>
<td>219.</td>
<td>136.5</td>
</tr>
</tbody>
</table>

³ Measured from anterior base of canine to maxillary notch of sigmoid curve, below nasals.
SUMMARY OF SPECIES AND TYPES

Two species\(^1\) and three\(^2\) varieties of *Merycochoerus* from six Miocene localities are here recorded:

(1) *Merycochoerus proprius* Leidy, 1858, genotype, from Hemingford area, Nebraska.

**Genoholotype.**—Right maxilla, right ramus, A.N.S.P.10868; left maxilla, A.N.S.P.10867; and left ramus, N.M.156 (all from one individual).

(1a) *Merycochoerus proprius magnus* (Loomis), 1924, from near Agate, Sioux County, Nebraska, and referred remains from Dawes County, Nebraska, and Logan County, Colorado.

**Holotype.**—Skull, mandible, and skeletal elements, A.M.14242. *Figures 12, 14, 17, 18.*

(2) *Merycochoerus matthewi* Loomis, 1924, from near Porcupine Butte, Shannon County, South Dakota, and geographic varieties (2a) from Goshen and Niobrara Counties, Wyoming, and (2b) from Sioux County, Nebraska.

**Holotype.**—Skull, mandible, and skeletal elements, A.M.12970. *Figures 12, 15, 17, 18.*

(3) *Merycochoerus* species undetermined, from Hemingford area, Dawes County, Nebraska.

\(^1\) Scott, W. B., 1890, Morpholog. Jahrb., XVI, Figs. 33–34.

In this paper Scott named a new species of oreodont, "*Merycochoerus coenopus,∗" based on a distal end of an ulna and elements of manus and pes. The present writers have compared the holotype of this species with skeletal elements of *Merycochoerus* and they feel certain that this form should be referred to a different genus. "*M.∗ coenopus will be considered in a later paper under the subfamily Ticoletine.*

\(^2\) Two geographic varieties are included in this count.
DETAILED LISTS OF TYPES, REFERRED SPECIMENS, AND SYNONYMY

*Merycochoerus*, total available specimens, 135

(1) *Merycochoerus proprius* Leidy, genotype

From the Upper Part of the Marsland Formation, Hemingford Area, Nebraska


SPECIFIC CHARACTERS

SKULL.—Average larger and more massive than *M. proprius magnus* or *M. matthewi*; very high muzzle and maxillæ; maxillary notch of sigmoid curve, below nasals, retracted to a point above M¹–M²; nasals retracted more than in *M. proprius magnus* or *M. matthewi*; tendency for nasals to protrude upward anteriorly; brain case with a pronounced ridge.

MANDIBLE.—More robust than examples of *M. matthewi*.

DENTITIONS.—Slightly heavier than those of *M. matthewi*, but overlapping in size range with that species.

LIMBS.—Definitely heavier than examples of *M. matthewi*; feet shorter and more robust than those of *M. matthewi*.

MEASUREMENTS.—Tables III and IV.

DISCUSSION

*M. proprius* is readily recognized by a more massive appearance of the muzzle and a greater amount of retraction of the nasals than is found in the other two described forms. The average skull is definitely larger than that of *M. proprius magnus*, although the latter name suggests a more massive form. Loomis,¹ in naming "*M. magnus,*" pointed out the larger size of his new species compared with examples of *M. proprius*. He apparently used the specimens from Colorado, which Matthew² had referred to *M. proprius*, for the comparison. The present writers include the Colorado specimens under *M. proprius magnus* and consider the size difference mentioned by Loomis as an individual rather than a specific variation (see discussion of variation, p. 278).

*M. proprius* appears at higher levels in the Marsland formation than *M. matthewi* and has not been reported in association with this latter species, which comes from the lower part of the Marsland. A detailed discussion of the type area of *M. proprius* will be found on p. 277.

The University of Nebraska State Museum specimens referred to this species were collected by E. L. Blue, Thompson M. Stout, Grayson E. Meade, Guy Johnson, Loren Toohey, C. Bertrand Schultz, and associates, 1935–1939.

Ninety-three specimens are here recorded:

**Genoholotype.**—Right maxilla A.N.S.P.10868 from the Marsland formation of the Hemingford group, near Dunlap, Hemingford area, Nebraska; collected by F. V. Hayden, 1857.

The above specimens listed as the holotype appear to have been from the same individual. Douglass\(^1\) considered that the holotype of *M. proprius* included a portion of a maxilla and a mandible in the Academy of Natural Sciences of Philadelphia, while Thorpe\(^2\) stated that it consisted of “upper and lower jaws containing nearly complete dentition...U.S.N.M.156.” The specimens, however, are divided so that the right and left maxillae as well as the right ramus are in the Academy of Natural Sciences of Philadelphia and the left ramus is in the United States National Museum.

**Referred.**—

(A) **From Type Locality, Hemingford Area** (collected by F. V. Hayden, 1857):

- M\(\text{M}\) (w+)
  - 445

(A') **From Type Area, near Dunlap, Hemingford Area, Dawes County, Nebraska** (collected by Ted Galusha and associates):

  From Pebble Creek, 1938:

  **Seven Associated Skulls, etc.**

- F:A.M.
  - 42469A

  Skull with I\(\text{I}\)–M\(\text{M}\) and mandible with I\(\text{I}\)–M\(\text{M}\). Figures 12, 13, 16 (w)

  Accessory tooth between I\(\text{I}\) and /C on left side, alveolus on right.

- 42469B

  Skull with I\(\text{I}\)–I\(\text{I}\) alv. and C//–M\(\text{M}\) and mandible with I\(\text{I}\)(rt.)–M\(\text{M}\) (I\(\text{I}\)–I\(\text{I}\) alv., /C br.). Figure 16 (in part) (w+)

- 42469C

  Skull with C//–M\(\text{M}\) and partial mandible with I\(\text{I}\)–I\(\text{I}\) alv. and I\(\text{I}\)(rt.)–M\(\text{M}\) (C/ rt.)

- 42469D

  Skull with I\(\text{I}\)–I\(\text{I}\) alv. and I\(\text{I}\)(rt.)–dP\(\text{M}\)–M\(\text{M}\) and left ramus with I\(\text{I}\)–dP\(\text{M}\)–M\(\text{M}\). Figure 16 (in part) (i)

- 42469E

  Partial skull with I\(\text{I}\)(alv.)–M\(\text{M}\) (P\(\text{M}\)–M\(\text{M}\) br.) and partial mandible with /C–P\(\text{P}\) rt. and P\(\text{P}\)(br.)–M\(\text{M}\) (w+)

- 42470

  Skull with I\(\text{I}\)–M\(\text{M}\) (lacking nasals, and premaxillae badly eroded) and mandible with I\(\text{I}\)–M\(\text{M}\) (w+)

- 42471

  Ramus with I\(\text{I}\)–dP\(\text{M}\)–M\(\text{M}\)(germ) (i)

- 42470A

---

\(^1\) Douglass, Earl, 1906, Science, N.S., XXIV, No. 618, p. 565.

SKELETAL ELEMENTS

2 scapulae (1 partial), 3 humeri (1 partial), 5 radii (2 partial), 5 ulnae (1 partial), 5 femora (1 partial), 5 tibiae (3 partial), 2 calcanea, 3 astragali, manus and pes elements, pelvis, and vertebrae.

Figures 17, 18 (in part) ................................................. 42469A-E

3 partial humeri, 2 radii, 4 ulnae (2 partial), and skeletal fragments 42470-1

The foregoing seven skulls, mandibles, and skeletal elements were found associated. They illustrate very well the large amount of individual variation to be expected within a single species. The length and width of the skulls as well as the lengths of the superior and inferior dental series vary considerably. The length of the muzzle and the distance from the anterior base of the canine to the posterior notch of the sigmoid curve of the maxilla, however, are very constant in all examples including the immature (see p. 278 for discussion).

From various localities on Pebble Creek, 1937–1938:

FOUR PARTIAL SKULLS AND ASSOCIATED MATERIAL

Inferior portion of skull with I1–M2 (P1 absent), partial mandible with C1–M2, partial radius, and partial ulna. (w+)

Left posterior portion of skull with P4–M3. (m) 42492A

Anterior portion of skull with C1/(rt.)–M2(br.). (m) 42492B

Proximal end of radius, 2 partial ulnae, and 2 distal ends of tibiae. 42492A–B

The above limb elements and the two partial skulls (42492A and 42492B) were found associated.

Partial skull (crushed) with I1(alv.)–M4(br.) (I1–C/ alv., M1–M4 br.), left ramus with I1–P1 alv. and P2(rt.)–M2, humerus, and skeletal fragments. (w+)

TWO PARTIAL MANDIBULAR SPECIMENS

Fragment of right ramus with M3(br.). (w−) 43026

Partial right ramus with P1–M2. (w+) 43027
Schultz and Falkenbach, *Merycochoerine*

From Cottonwood Creek, 1937:

**THREE SKULLS AND ASSOCIATED MATERIAL**

Skull with I1–I2 alv. and I1–M2 (P4 alv., M1 br.), lacking occipital region, and left dentition. (w†+)

Skull with P2–M3 (lacking premaxillae). (w)

Skull with I1–M3 (lacking nasals and zygomatic arches), mandible with I1–M3, and skeletal fragments. (w†)

**TWO MANDIBULAR SPECIMENS**

Partial mandible with I1–M3. (w+)

Partial left ramus with /C–M3(br.) (P4–M3 br.). (w+)

**LIMB**

Humerus. 43024

From N.E. of Dunlap, 1933–1937:

**SKULL**

Skull with P2–M3 (lacking premaxillae). (w)

**LIMB**

Femur. F:A.M.43025

From Dunlap Camel Quarry, 1937–1939:

**TEN SKULLS**

Nine skulls with

*P3–M3, lacking premaxillae.*

*P2–M3, lacking premaxillae and occipital region.*

*I1–I2 alv. and C/M3 and partial mandible with P1–M3.*

*I1–I2 alv. and C/M3.*

*I1–I2 alv. and C/M3, lacking anterior of nasals.*

*I1–I2 alv. and C/M3.*

*P2–M3, lacking premaxillae.*

*I–C/ alv. and P–M.*

*C–dP/M (germ) (P2 alv.), lacking nasals and premaxillae.*

F:A.M.

37240

37241

37518

42475

42476

42477

42478

42479

42481
PARTIAL SKULL

Superior portion of skull with nasals (without dentition).............. F·A·M. 42483

FOUR PARTIAL MAXILLAE

Right maxilla with P2-M3.................................................. (w) 42473

Three left maxillae with

dP2-M1................................. (l) 37214
P2-M3 (M1-alv.)........................... (m+) 37238
P4-M3................................. (w+) 42474

FOUR MANDIBULAR SPECIMENS

Two partial right rami with

P3-M2 (br.)................................. (w+) 37221
P1-M2 (P3 alv., M1-M3 br.)............... (w+) 42482

Two left rami with

I1-/C alv. and P1-M3.......................... (w+) 37239
I1-/C alv. and P1-M3.......................... (w+) 42480

TWENTY-FOUR SKELETAL ELEMENTS

Two radii................................................... 42487A-B
Two ulnae............................................. 42486A-B
Femur.................................................... 42484
Tibia..................................................... 42485
3 astragali......................................... 43012A-C
15 metapodials..................................... 43013A-O


EIGHT SKULLS AND ASSOCIATED MATERIAL

Six skulls with

I1-M2, brain case and zygomatic arches damaged. (w+)

P2-M3 (lacking premaxillae and supraoccipital region) and partial mandible with P1-M3 (w+)

I1-M2 (lacking occipital region) and mandible with I1-I2 rt. and I1-M3 (w+)

I1-M2 (lacking zygomatic arches and most of anterior right side) and mandible with I1-M3 (w+)

N.S.M.

1-10-8-36N.P. From N.E. of Marsland, Dawes County.
2-27-8-35S.P. From N.E. of Dunlap, Dawes County.
1-10-8-36N.P. From N.E. of Marsland, Dawes County.
1-20-6-36N.P. From N.E. of Marsland, Dawes County.
2-27-8-35S.P. From N.E. of Dunlap, Dawes County.
1-28-6-35S.P. From N. of Hemingford, Box Butte County.
Schultz and Falkenbach, *Merycochoerinae*

C/−M² (P¹ br.) (lacking condyles) and mandible with I_r−/C alv. and P₁−M₃, associated with 2 scapulae (1 partial), 4 humeri (1 partial), 3 radii, 3 ulnae (1 partial), distal end of femur, and fragment of pelvis (limbs from several individuals).

(w+*)

P¹−M² (lacking premaxillae and partial mandible with P₁−M₃. (w+)

Two skulls, immature, with

I( alv.) − dP¹−M⁴(germ), lacking occipital region and zygomatic arches.

(i)

C/( alv.) − M⁴(germ) (P²−P⁴ germs), lacking premaxillae and condyles. (i)

MAXILLA

Partial right maxilla with P²−M²(br.) (M¹ br.). (w)

Various individual teeth of *Merycochoerus* have also been found in Hemingford Quarry 7B.

TWO MANDIBULAR SPECIMENS

Partial mandible with P₁−M₃. (w+)

Partial left ramus with I_r−/C alv. and P¹(br.)−M¹(br.). (w)

MISC. ASSOCIATED SKELETONS

Large block, containing skulls, jaws, and associated skeletal elements of *Merycochoerus proprius*. (Block collected in sections, total weight approximately 3,800 lbs., only partially prepared at present time.)

N.S.M. 1-12-8-36N.P. From Hemingford Quarry 24, Dawes County. *Figure 17* (in part).

3-10-9-36N.P. From N.E. of Marsland, Dawes County.

5-17-10-38N.S.M. From Hemingford Quarry 12 B, Box Butte County.

1-10-9-39 From N. of Hemingford, Box Butte County.

2-10-9-39 From Hemingford Quarry 7 B, Box Butte County.

2-3-8-37S.P. From N.W. of Hemingford, Box Butte County.

2-14-8-35N.W.P. From N.W. of Marsland, Dawes County.

1-8-8-35N.W.P. From Hemingford Quarry 25 Dawes County.
(A’’) From near Marsland, Hemingford Area, Dawes County, Nebraska (collected by Frank Figgins and Nelson J. Vaughan, 1927):

TWO SKELETONS

Two mounted skeletons and skeletal elements of several immature individuals. .......................... Col. M. 1264

From near Marsland:

SKULL AND MANDIBLE

Skull with P1-M3 (lacking premaxilla) and mandible with I1-M3. ........................................ (w+ 43014

FOUR SUPERIOR DENTITIONS

Posterior portion of skull with M1 .......................................................... (w+ 43016A

Left maxilla with C–M1(br.) ................................................................. (w+ 43016B

Right half of skull with I1-C/(br.) and P1–M1 ....................................... (w) 43016C

The above three specimens were found associated.

Right maxilla with P1–M1 ................................................................. (w+) 43017

SIX MANDIBULAR SPECIMENS

Two partial mandibles with

I1–P3 br. and P3–M1(br.) ................................................................. (w+ 43018

I1–P3 ................................................................. (w) 43022

Two partial right rami with

P3–M1 ................................................................. (m) 43019

M1 ................................................................. (w+ 43020A

Associated with left ramus 43020B.

Two partial left rami with

M2–M3 ................................................................. (w+) 43020B

M1(br.)–M2 ................................................................. (w+) 43021

(1a) Merycochoerus proprius magnus1 (Loomis)

From the Marsland Formation, Nebraska, and Referred Specimens from Colorado


VARIETAL CHARACTERS

SKULL.—Differs from M. proprius in having less height to muzzle and maxilla as well as less retraction of the nasals; maxillary notch of sigmoid curve, below nasals, retracted to a point above M1 (usually anterior of M1); nasals nearly horizontal.

1 It is unfortunate that the name magnus was applied to this form since it is now established that skulls of M. proprius develop to a larger size.
MANDIBLE.—Similar to examples of *M. proprius*.

DENTITIONS.—Inseparable from *M. proprius*.

LIMBS.—Approximately equal to those of *M. proprius* and heavier than in *M. matthewi*; metapodials like examples of *M. proprius* but shorter and heavier than in *M. matthewi*.

MEASUREMENTS.—Tables III and IV.

DISCUSSION

Loomis, pointed out the close relationship of *M. proprius* and *M. magnus* when he described the latter form:

"This species is nearer to *M. proprius*, in that the sagittal crest ends some distance in front of the lambdoidal region... The zygomatic arches are heavy and wide, but not as wide proportionally as those of *M. proprius*, being heavy and stocky, with feet extremely short and stubby."

The sagittal crest in the holotype of *M. magnus* is broken but in complete specimens the crest continues to the lambdoidal region. This character is typical of the genus. The differences in the zygomatic arches to which Loomis referred are not of specific value, but are to be considered as individual variations (see discussion of variations, p. 278).

Thorpe stated that "the skull (of *M. magnus*) is about a sixth longer and a seventh wider than that of *proprius*." This conclusion apparently was based on material from Colorado referred to *M. proprius* by Matthew (see specimen list, p. 288), which the writers consider as belonging to *M. proprius magnus*. The Colorado specimens, although smaller than the holotype of *M. proprius magnus*, are well within the range of variation of this variety.

More information concerning the stratigraphic occurrence of this variety is necessary. The degree of development of the skull and skeletal elements would strongly suggest that this form represents a stage more advanced than *M. matthewi* and less advanced than *M. proprius*. Remains of *M. proprius magnus*, therefore, should be found in Marsland deposits of intermediate age between those containing the remains of *M. matthewi* and *M. proprius*, but somewhat nearer the level of the latter.

Eighteen specimens are here recorded:

**Holotype.**—Skull with I1–M3, mandible with I1–I2 alv. and I3–M2 (/C, P2–P4 alv.), partial scapula, humerus, 2 radii, 2 ulnae, manus, femur, tibia, calcaneus, astragalus, pes, pelvis, vertebrae and ribs. (w†+)

**A.M.14242** From Marsland formation of Hemingford group, 7 mi. N.E. of Agate, Sioux County, Nebraska; collected by R. L. Moodie, 1908. Figured by Loomis, 1924, Figs. 16–17 (in part); Thorpe, 1937, Fig. 113, Pl. xxi (in part). **Figures 12, 14, 17, 18.**

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1 Loomis, F. B., 1924, op. cit., p. 28.
Referred.—

(A) FROM COTTONWOOD CREEK, HEMINGFORD AREA, DAWES COUNTY, NEBRASKA (collected by Ted Galusha and associates, 1937):

**SKULL AND ASSOCIATED MATERIAL**

Partial crushed skull with I\(^1\) (alv.)–M\(^2\) (P\(^2\) alv.), right ramus with I\(^1\)–M\(^2\) (/C, M\(^3\) erupt., P\(^3\) alv.) and skeletal fragments............. (−m) 42491

**SKULL**

Skull with I\(^1\)–M\(^3\)........................ (−m) 37520

**FOUR MANDIBULAR SPECIMENS**

Partial mandible with P\(_1\) (rt.)–M\(_2\)................................. (w) 37520A

Right ramus with I\(_1\)–M\(_1\)........................................ (w+) 37521

Left ramus with I\(_1\)–I\(_2\) alv. and I\(_1\)–M\(_2\)................................ (m) 37521A

Right ramus with I\(_1\)–/C rt. and P\(_7\)–M\(_4\)........................................ (w) 37223

**SKELETAL ELEMENTS**

Femur, partial tibia, and metapodial..................................... 37520 to 37521A

F:A.M.37520, 37520A, 37521, and 37521A were found associated.

(B) FROM HEMINGFORD AREA, DAWES COUNTY, NEBRASKA (collected by University of Nebraska State Museum field parties, 1935–1937):

**FOUR SKULLS, ETC.**

Skull with I\(^1\)–M\(^3\) partial N.S.M.1-10-6-36.N.P. From N.E. of Marsland.

mandible with I\(_1\)–P\(_2\) alv. and P\(_2\)–M\(_3\) (M\(_2\) br.), and skeleton (mounted). (w+)

Skull with I\(^2\)–M\(^3\) (lacking zygomatic arches and occipital region) and mandible with I\(_1\)–M\(_3\). (w+)

Skull with I\(^1\)–I\(^2\) alv. and I\(^2\)–M\(^3\) (zygomatic arches damaged). (w)

Skull with I\(^1\)–M\(^1\). (w+) 3-10-7-37.N.P. From N. of Dunlap.

(C) FROM MARTIN CANYON, EASTWARD HEAD OF CEDAR CREEK, LOGAN COUNTY, COLORADO (collected by W. D. Matthew and H. T. Martin, 1898):

**FIVE SKULLS AND ASSOCIATED MATERIAL**

Group of five individuals, skull with I\(^1\)–I\(^3\) alv. and C/-M\(^2\) (w+), 3 immature skulls, 4 immature mandibles, and skeletal elements. (Figured by Matthew,\(^1\) 1901, Figs. 18, 20, 23, 24, 25, and 26)................. 8968

Skull with I\(^1\)–M\(^3\) (I\(^1\)–I\(^2\) alv.) (supraoccipital region restored). (Figured by Matthew, 1901, Fig. 21.).......................... (w+) 9052

---

The following fragmentary upper and lower dentitions from Martin Canyon were also referred to *M. proprius* by Matthew¹: A.M. Nos. 9051, 9053, 9055, 9057, 9058, 9062, and 9064 (9062 has since been discarded).

(2) **Merycochoerus matthewi** Loomis

From the Lower Part of the Marsland Formation, South Dakota; and Geographic Varieties

(2a) from Wyoming and (2b) from Nebraska


**SPECIFIC CHARACTERS**

**SKULL.**—Smaller and somewhat lighter construction than in *M. proprius*; muzzle low in comparison with that of *M. proprius* and nasals not as retracted; maxillary notch of sigmoid curve, below nasals, retracted to a point above P₃–P₄; nasals nearly horizontal; brain case more rounded than in *M. proprius.*

**MANDIBLE.**—Lighter construction than average of *M. proprius.**

**DENTITIONS.**—Tendency to be lighter in construction than *M. proprius;** length of upper and lower series equal in length to smaller examples of *M. proprius.**

**LIMBS.**—Equal in length to those of *M. proprius,* but lighter; metapodials longer and lighter than examples of *M. proprius.**

**MEASUREMENTS.**—Tables III and IV.

**DISCUSSION**

The muzzle region of the skull of *M. matthewi* is much lower than in *M. proprius* and the premaxillae do not extend as high at the anterior surface of the muzzle as in that species. The height of the muzzle and the amount of upward extension of the premaxillae are important diagnostic characters of the genus *Merycochoerus.* These characters appear to remain constant within a species, in both immature and adult specimens.

Loomis² used as a specific character of *M. matthewi,* "the fact that the sagittal crest extends to the rear of the skull and unites with the lambdoidal crests in making the projection behind." This character is not of specific value since he was referring especially to the holotype of *M. proprius magnus,* in which specimen the sagittal crest is broken (see discussion, p. 287).

It is interesting to note the contrast in the shape of the various skulls referred to *M. matthewi.* Much of this apparent variation is due to the crushing of the specimens by pressure from the overlying sediments.

This species seems to occur only in the lower part of the Marsland formation and so far it has not been found associated with *M. proprius.*

¹ Matthew, W. D., 1901, ibid., p. 401.
² Loomis, P. B., 1924, op. cit., p. 27.

Nineteen specimens are here recorded:

**HOLOTYPE.**—Skull with I(\text{rt.})-M^2 (lacking supraoccipital region), mandible with I_1(br.)-M_3, radius, ulna, manus, and skeletal fragments. (w+)


**Figures 12, 15, 17, 18.**

**REFERRED.**

(2a) **VARIETY FROM GOSHEN AND NIOPRARA COUNTIES, WYOMING.**

(A) **FROM JAY EM AREA, GOSHEN COUNTY, WYOMING** (the Jay Em area includes the exposures on the east side of United States highway No. 85, from 2 mi. S. to 5 mi. N. of Jay Em), 1931–1937:

**FIVE SKULLS AND ASSOCIATED MATERIAL**

F:A.M. 

Skull with I^1-I^5 alv. and C/-M^2, lacking anterior of nasals........ (w) 33317

Skull with I^1-M^3(br.) (crushed, lacking occipital region) and partial right ramus with /C(alv.)-M_3(br.)......................... (w) 37526

The above specimen was collected from a higher level than the balance of the referred material from the Jay Em area. The depth of the muzzle and the distance from the anterior base of the canine to the posterior notch of the sigmoid curve of the muzzle are somewhat greater than in the other referred remains. The size and characters of this specimen approach *Merycochoerus proprius*, which possesses a very deep muzzle.

Skull with I^1(alv.)-M^3 (I^5 alv.), lacking anterior of nasals........ (w) 37527

Anterior portion of skull with I^1-M^4 (nasals present), partial mandible, with I_1-M_4, distal end of humerus, partial radius, and partial manus........................................ (w) 37528

Anterior portion of skull with I^1-P^1................................................ (w+) 42472

**SKELETAL ELEMENTS**

Radius, partial ulna, and partial manus................................. 43028

(A') **FROM EXPOSURES ON EAST SIDE OF UNITED STATES HIGHWAY NO. 85, 16 MI. S. OF LUSK, GOSHEN COUNTY, WYOMING, 1938:**

**THREE ASSOCIATED SKULLS, ETC.**

F:A.M. 

Skull with I^1-I^5 alv. and I^4-M^3 and mandible with I_1-M_3 (I_3 alv.) (w+) 42490A
Partial skull with I₁–M² and mandible with I₁–M₃............. (w) 42490C
Skull with I₁–I₈ alv. and C/M⁴(ereupt.) (P²–P⁴ ereupt., dP²–dP⁴ present on left side) and mandible with I₁–dP₁–M₃(ereupt.) (1) 42490B
Mandible with I₁–M₅.......................................... (w) 42490D
3 scapulae, 3 humeri, 4 radii, 4 ulnas, manus elements, 4 femora (1 partial), 4 tibias, 2 fibulas, 4 calcanea, 2 astragali, pes elements, 2 pelvis (1 partial), and vertebrae. Figures 17, 18 (in part)............. 42490A–D

(A') FROM EXPOSURES 16 Mi. S. and 9 Mi. E. of Lusk, Goshen County, Wyoming, 1936:

MANDIBULAR RAMUS, ETC.

Right ramus with I₂–I₃ br. and /C–M₂ and skeletal elements.... (w) 43029

(B) FROM ROYAL VALLEY, 8 Mi. S. of Lusk, Niobrara County, Wyoming, 1933:

PARTIAL SKULL AND MANDIBLE

Posterior portion of skull with I₁–M² and partial mandible with I₁–M₄ (P₂ alv.) (badly weathered).................. (w++) 42489

(2b) VARIETY FROM SIOUX COUNTY, NEBRASKA.—

(C) FROM 10 Mi. S.W. of Harrison, Sioux County, Nebraska, 1937:

SKULL, ETC.

Skull with I₁–M₄ (I₈ alv.), mandible with I₁–M₃, and skeletal elements........................................... (w) 42494

(D) FROM NEAR AGATE, SIOUX COUNTY, NEBRASKA (collected by O. A. Peterson and Earl Douglass, 1901):

TWO SKULLS AND ASSOCIATED MATERIAL

Left side of skull with I₁–M₄, mandible with I₁–M₃, vertebrae, ribs, and skeletal fragments.............................. (w) 1306
Skull with I₁–M₄ (I₈ alv., P₁ br.), mandible with I₁–C alv. and P₁–M₃, and vertebrae.............................. (w+) 1399¹

Peterson¹ suggested that the above two specimens were distinct from Merycochoerus proprius but hesitated to base a new species on the material at hand. He questionably placed

¹The tray card of specimen No. 1399 shows that this example came from the base of the "Nebraska beds," which would indicate its derivation from the base of the Marsland. This agrees with the age of other referred material of M. matthewi.
them in *M. proprius*, using Matthew's¹ referred material from Colorado for comparison. The present writers consider the Colorado specimens as belonging to *M. proprius magnus*, which appears to be a more primitive form than *M. proprius*. Loomis² later named a new species, *M. matthewi*, basing his descriptions on a specimen similar to Peterson's two examples, to which, however, he did not refer. Thorpe,³ on the other hand, allocated C.M.1306 and 1399 to *M. magnus*.

TENTATIVELY REFERRED.—

(E) FROM NEAR AGATE, SIOUX COUNTY, NEBRASKA:

From 5 mi. N.E. of Agate; collected by Albert Thomson, 1908:

TWO SKULLS AND ASSOCIATED MATERIAL

Skull with C/-M¹ (lacking premaxilla and supraoccipital region), mandible with I₁–M₄, partial radius, partial ulna, and partial fibula. [Figured by Loomis, 1924, Fig. 16 (in part); Thorpe, 1937, Fig. 113 (in part)⁴] .................................................. (m) 14238

Skull with mandible attached, humerus, radius, and skeletal parts (t) 14239

From 6 mi. N.E. of Agate; collected by Harold J. Cook, 1908:

MANDIBLE

Partial mandible with I₁–M₄ ................................................. (w) 14241

(3) Merycochoerus, species undetermined

Four additional sites in the Hemingford area, Dawes County, are here recorded:

From Hank's Locality, 1935:

Anterior portion of skull with I₁–M¹ and anterior of right ramus with F:B:A.M. I₁–P₄ ................................................. (w) 33651

From B Quarry, 1935:

TWO MANDIBULAR SPECIMENS

Partial right ramus with M₂–M₄ ............................................. (w+) 33656

Left ramus with I₁–C alv. and P₁–M₂ ..................................... (w+) 33648

² Loomis, F. B., 1924, op. cit., p. 28.
⁴ Loomis and Thorpe referred this specimen to *M. magnus*. The present writers, however, consider that it more nearly approaches *M. matthewi* because of the position of the nasals. The Marsland section northeast of Agate is very thick and it is possible that this, as well as the other two A.M. specimens listed here, was collected at a lower level than the type of *M. magnus*, which also came from the same locality.
From Wood's Canyon, 1935:

Posterior portion of skull with M³, occipital region of second skull, partial left maxilla with M₁–M³, partial mandible with M₁–M₃, anterior portion of right ramus with I₃(alv.)–P₂ (I₃ br.), distal end of scapula, radius, ulna, partial manus, distal end of femur, proximal end of tibia, and fragments of pes. ......................... (w+) F:B:A.M. 33647

From Sand Canyon,¹ 1938:

Fragment of right ramus with M₁–M₃(erupt.) ....................... (i) F:A.M. 42495

STATEMENT

The above specimens collected by Ted Galusha are not complete enough for definite specific identification but are worth listing since no other material has been reported from these sites. The geologic age of several of the sites has been questioned by some field observers, but the appearance of *Merycochoerus* seems to indicate that the deposits are Marsland.

¹ Deposits of both lower and upper Hemingford age occur in Sand Canyon. *Brachycerus* remains are found in the upper part of the section in this canyon.
TABLE IV.—Merycochoerus LEIDY. COMPARATIVE MEASUREMENTS OF SKULLS AND RAMI

<table>
<thead>
<tr>
<th>SKULL</th>
<th>M. proprius Leidy (Genotype)</th>
<th>M. proprius magnus (Loomis)</th>
<th>M. matthewi Loomis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Geno-holotype</td>
<td>Referred</td>
<td>Holotype A.M.</td>
</tr>
<tr>
<td></td>
<td>A.N.S.P.</td>
<td>F:AM.</td>
<td>(w+)</td>
</tr>
<tr>
<td>Stage of wear of teeth</td>
<td>10867–8</td>
<td>42469A</td>
<td>142421</td>
</tr>
<tr>
<td>Length (including supraoccipital crest and incisors)</td>
<td>341.</td>
<td>353.</td>
<td>298.</td>
</tr>
<tr>
<td>Basal length (from anterior notch of foramen magnum to posterior base of I1)</td>
<td>279.</td>
<td>306.</td>
<td>257.</td>
</tr>
<tr>
<td>Width (max.)</td>
<td>276.5</td>
<td>278.</td>
<td>215.</td>
</tr>
<tr>
<td>Width of brain case (max.)</td>
<td>140.</td>
<td>138.</td>
<td>112.</td>
</tr>
<tr>
<td>Width, interorbital (min.)</td>
<td>104.</td>
<td>102.</td>
<td>100.</td>
</tr>
<tr>
<td>Distance from anterior rim of orbit to anterior base of canine</td>
<td>173.5</td>
<td>170.</td>
<td>136.</td>
</tr>
<tr>
<td>Distance from anterior rim of orbit to supraoccipital crest</td>
<td>168.</td>
<td>178.</td>
<td>162.</td>
</tr>
<tr>
<td>Height of premaxilla (max.)</td>
<td>94.</td>
<td>112.</td>
<td>93.</td>
</tr>
<tr>
<td>Distance from anterior base of canine to maxillary notch of sigmoid curve of muzzle (min.)</td>
<td>120.5</td>
<td>78.5</td>
<td>35.</td>
</tr>
<tr>
<td>(max., along upper contour)</td>
<td>133.</td>
<td>105.</td>
<td>67.</td>
</tr>
<tr>
<td>Width across canines (max.)</td>
<td>152.</td>
<td>115.</td>
<td>72.</td>
</tr>
<tr>
<td>Width of palate between fourth premolars</td>
<td>86.</td>
<td>107.</td>
<td>71.</td>
</tr>
<tr>
<td>Width of palate between canines</td>
<td>54.</td>
<td>59.</td>
<td>39.</td>
</tr>
<tr>
<td>Length, C/–M3 incl.</td>
<td>179.</td>
<td>178.</td>
<td>192.</td>
</tr>
<tr>
<td>Length, P1–M2 incl.</td>
<td>158.</td>
<td>154.</td>
<td>161.</td>
</tr>
<tr>
<td>Length, P1–P4 incl.</td>
<td>69.</td>
<td>65.</td>
<td>67.</td>
</tr>
<tr>
<td>Length, M1–M3 incl.</td>
<td>90.</td>
<td>88.</td>
<td>95.</td>
</tr>
<tr>
<td>Width of M3 (max.)</td>
<td>35.5</td>
<td>32.</td>
<td>34.5</td>
</tr>
<tr>
<td>Depth of malar below orbit</td>
<td>57.</td>
<td>53.</td>
<td>35.</td>
</tr>
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<table>
<thead>
<tr>
<th>RAMUS</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Length (max.)</td>
<td>255.</td>
<td>288.</td>
</tr>
<tr>
<td>Depth below anterior edge of M3</td>
<td>57.5</td>
<td>53.</td>
</tr>
<tr>
<td>Length, /C–M1 incl.</td>
<td>175.</td>
<td>170.5</td>
</tr>
<tr>
<td>Length, P1–M1 incl.</td>
<td>160.</td>
<td>156.5</td>
</tr>
<tr>
<td>Length, P1–P3 incl.</td>
<td>66.</td>
<td>67.5</td>
</tr>
<tr>
<td>Length, M1–M3 incl.</td>
<td>94.5</td>
<td>93.5</td>
</tr>
</tbody>
</table>

1 See Table III, page 257, for measurements of skeletal elements of this specimen.
Fig. 12. Comparison of skulls representing the two species and one variety of *Merychoerus*. × ¼. (Compare *Brachycerus*, Fig. 1.)
F.A.M. 42469A

Fig. 13. *Merychippus proprius* Leidy, Raynolds, F.A.M. 42469A, skull and ramius, from Marcellus deposits, Dawes County, Nebraska.

× 4. MN = maxillary notch; PMX = premaxilla; X = accessory tooth. See legend, Fig. 6.

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Fig. 14. *Merycochoerus proprius magnus* (Loomis), Holotype, A.M.14242, skull and ramus, from Marsland deposits, Sioux County, Nebraska. × ½.
Fig. 15. Megatherium americanum, horotype, A.M. 12970, skull and mandible, from Shannon County, South Dakota. X 1.
Fig. 16. *Merycochoerus proprius* Leidy, Referred, four associated skulls, F:A.M.42469A, 42469B, 42469D (adults), and 42469E (young), showing individual and age variation, from Dawes County, Nebraska. × 1/4.
Fig. 18. Meiaceus Leidy, comparison of skeletal elements. (See legend, Fig. 17.) × 4.