HITHERTO UNPUBLISHED PLATES
OF
TERTIARY MAMMALIA
AND
PERMIAN VERTEBRATA

Prepared under the Direction of
EDWARD DRINKER COPE
for the
U. S. Geological Survey of the Territories
with
Descriptions of Plates
by
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Prefatory Note.

The accompanying plates were prepared and printed by the United States Government for the Report on Tertiary Vertebrata by E. D. Cope, forming Volumes III and IV of the final report of the Geological and Geographical Survey of the Territories, P. V. Hayden in charge. The first part of this Report (Volume III), treating of the Eocene and a part of the Oligocene vertebrata was completed and published in 1885. The second part, treating of the remainder of the Oligocene and all the Miocene vertebrata, was never completed. A large number, but not all, of the plates for this part were prepared and printed, together with seven plates for a contemplated report on Permian Vertebrata.

The specimens illustrated are contained in the Cope Collection, purchased by the American Museum of Natural History. The ownership of certain parts of the collection having been satisfactorily adjusted it seemed proper that the plates should be distributed for the benefit of paleontologists, jointly by the United States Geological Survey and the American Museum of Natural History. The plate descriptions were prepared and the plates bound and distributed by the latter institution.

Illustrations of many of the specimens here figured, copied from these plates, have been published by Professor Cope, chiefly in the American Naturalist of 1880–1888. The nomenclature and identification of the material has been materially changed since 1880–1883 when the illustrations were made, and it has been thought advisable to give in the plate descriptions both Cope’s identifications and the revision now current (1915). No text is known to have been prepared by the author, but the substance of his views and interpretations of the later Tertiary vertebrates of Western America may be found in his numerous publications dealing with fossil mammals, chiefly in the American Naturalist, and Proceedings of the American Philosophical Society, between 1880 and 1892, also in Bulletins and Annual Reports of the U. S. Geol. Geog. Sur. Territories, 1872–1882 and the Texas Geological Survey Reports, 1891–1893.

A number of plates illustrating the Brontotheriidae of the Oligocene of Colorado are included in the Monograph of that family by Henry Fairfield Osborn, and are omitted from the present series.

Schedule of Plates.

Permian Vertebrata. Twelve plates; Nos. 1, 3, 7, 8, 10, 11, 12, 13, 16, 16a, 19, 22.

Oligocene Ungulata. Fifteen plates; Nos. 102, 104, 105, 109, 109a, 110, 110a, 11, 112, 113, 113a, 115, 115a, 116.

Miocene Carnivora and Rodentia. Seven plates; Nos. 118, 118a, 118b, 119, 119a, 119b, 119c.

Miocene Proboscidea. Five plates; Nos. 120, 121, 122, 123, 124.


Miocene Equidae. Seven plates; Nos. 145, 147, 148, 148a, 149, 150, 151.

Miocene Camelidae. Two plates; Nos. 153, 154.
PLATE I.

Permian Vertebrata. Megalichthys

Nomenclature

Cope 1880-3          Revised 1915
Ectosteorhachis nitidus  Megalichthys (= Palæobatrachus) nitidus

Figs. 1–3. *Megalichthys nitidus* (Cope 1880). Type specimen, two-thirds natural size. Amer. Mus. No. 7239, Cope Coll. Wichita basin, Texas. Fig. 1, ventral view of head and fore part of trunk; fig. 2, 2a, 2b, dorsal, lateral and anterior views of head. (Fig. 4 is not identified).
PLATE III.

PERMIAN VERTEBRATA

VERTEBRATE REMAINS FROM VERMILLION CO., ILLINOIS

Nomenclature

Cope, 1880-3
Orthacanthus quadriseriatus
Diplodus compressus
Ctenodus pusillus
" gurleyanus
" fossatus
Ceratodus paucicristatus
" vinslovi
Peplorhina arctica
Janassa strigilina
" gurleiana
Archeobulus vellicatus
Cricotus heteroelitus
Lysorophus tricarinatus
Diplocaulus salamandroides

Revised, 1915
Pleuracanthus quadriseriatus
Diacranodus texensis
Gnathorhiza pusilla
Sagenodus fossatus
" fossatus
" paucicristatus
" vinslovi
Sphærolepis arctica
Janassa strigilina
" gurleiana
Archeobulus vellicatus
Cricotus heteroelitus
Lysorophus tricarinatus
Diplocaulus salamandroides

Figs. 1-50. Vertebrate remains from the Permian bone bed of Vermillion County Illinois. This fauna described by Professor Cope in 1877 was the first Permian fauna found in North America, and contains the genotypes of many of the genera later described from better material in Texas and New Mexico. The collection is the property of the Walker Museum of the University of Chicago, and has been redescribed by Dr. E. C. Case (1900) in the Journal of Geology, Vol. VIII, pp. 698-729, with five plates of figures. The revised nomenclature is auct. Case and Hussakof 1911.

Figs. 1, 1a. Pleuracanthus quadriseriatus (Cope, 1877). Fragment of head spine, × 2. Type specimen; No. 6502, Walker Mus. (Case, 1900, pl. i, fig. 3).

Figs. 2-4. Diacranodus texensis (Cope, 1890). Teeth, No. 6504, Walker Mus., referred by Cope to Diplodus (Didymodus) compressus Newberry. (Case, 1900, pl. i, fig. 5; I am unable to state the enlargement, as Dr. Case does not give it in his figure, nor have measurements been published).

Fig. 5. Sphærolepis arctica (Cope, 1877). Dentigerous plate, × 3. Type specimen No. 6511, Walker Museum. (Hussakof, 1911, pl. xxxi, fig. 2).

Fig. 6, 6a, 6b, 6c. Gnathorhiza pusilla (Cope, 1877). Right palatal plate, × 3, type specimen, No. 6508, Walker Mus. (Case, 1900, pl. i, fig. 9; Hussakof, 111, pl. xxvii, fig. 10).

Fig. 7, 7a, 7b. Sagenodus fossatus (Cope, 1877). Upper dental plate, natural size, No. 6509, Walker Mus., type of Ctenodus gurleyanus Cope, 1877. (Case, 1900, pl. i, fig. 8; Hussakof, 1911, pl. xxvi, fig. 9).

Fig. 8, 8a, 8b, 8c. Sagenodus fossatus (Cope, 1877). Imperfect left mandibular plate, immature, about 1/3 natural size. Type specimen, No. 6506, Walker Museum. (Case, 1900, pl. i, fig. 10; Hussakof, 1911, pl. xxvi, fig. 8).

Fig. 9, 9a, 9b, 9c. Sagenodus paucicristatus Cope, 1877. Imperfect dental plate, natural size, Type specimen, No. 6505 Walker Mus. (Case, 1900, pl. i, fig. 11; Hussakof, 1911, pl. xxvii, fig. 4).
Fig. 10, 10a, 10b, 10c. *Sagenodus vinulovii* (Cope, 1875). Incomplete left palatal plate, natural size. Type specimen, No. 6507 Walker Mus. (Case, 1900, pl. i, fig. 6; Hussakof, 1911, pl. xxiv, fig. 7).

Fig. 11, 11a, 11b. *Janassa striatilina* Cope, 1881. Tooth probably of median series, twice natural size. Type specimen, No. 6500 Walker Mus. (Case, 1900, pl. 1, fig. 1; Hussakof, 1911, pl. xxvi, fig. 1).

Fig. 12, 12a, 12b. *Janassa gurleyana* Cope, 1878. Small tooth, lacking the root, twice natural size. Type specimen, No. 6501 Walker Mus. (Case, 1900, pl. i, fig. 2; Hussakof, 1911, pl. xxvi, fig. 2).

Fig. 13, 13a, 13b, 13c. *Archaeobelus veleliticus* Cope, 1877. Jaw fragment with tooth, about natural size. Type specimen, No. 6524, Walker Mus.

Fig. 14, 14a. Undetermined jaw fragment, "Species two" of Cope, 1877, auct. Case (agrees better with "species one" of Cope's description), natural size and enlarged to \( \frac{3}{4} \). No. 6567, Walker Mus. (Case, 1900, pl. v, fig. 12). Fig. 14b, tooth, undet.

Fig. 15, 16. *Cricotus heteroclitus* Cope, 1875. Two intercentra, ? types of *C. discophorus* Cope, 1877, natural size, Walker Mus., ? No. 6518. (Case, 1900, pl. i, figs. 13–14).

Fig. 17, 17a, 17b. *Cricotus gibsoni* Cope, 1877. Supposed caudal vertebra, natural size. Type specimen, No. 6521, Walker Mus. Case, 1900, pl. i, fig. 15.

Fig. 18. ? *Diplocaulus*, fragment of sculptured plate.


Figs. 21–23. *Diplocaulus salamandroides* Cope, 1877. Vertebræ, about \( \frac{3}{4} \) natural size. Typical specimens, Nos. 6513–6, Walker Mus. (Case, 1900, pl. v, fig. 17).

Fig. 24. Unidentified jaw fragment "Species one" of Cope, 1877, auct. Case (agrees better with "species two" of Cope's description). No. 6567, Walker Mus. (Case, 1900, pl. v, fig. 12). Probably enlarged, but as Cope gives no measurements and Case does specify the enlargement on his figure I can not determine how much.

Fig. 25. Unidentified.

Fig. 26, 26a, 26b. *Clepsydrops* ? *pedunculatus* Cope, 1877. Humerus, lacking distal end. Half natural size. No. 6542, Walker Mus. (Case, 1900, pl. iii, fig. 5; reference auct. Case).

Fig. 27. Unidentified.

Fig. 28. Unidentified vertebra.

Fig. 29. " intercentrum.

Figs. 30–35. Pelycosaurian carpal and tarsal bones, unidentified, probably *Clepsydrops*. No. 6559, Walker Mus. (Case, 1900, pl. v, figs. 18–21.) Enlargement not determined.

Figs. 37–47. *Clepsydrops* metapodials and phalanges. Enlargement not determined. Nos. 6563–5, Walker Mus. (Case 1900, pl. v, figs. 9–10).

Figs. 48–49. ? Podial bones of Pelycosaurians.

Fig. 50. Coprolite. No. 6574, Walker Mus.
1-4 SELACHII. 6-10 DIPNOI. 11-12 JANASSA. 13 ARCHAEOBELUS. 14-17 STEGOCEPHALI. 19-20 LYSOROPHUS. 21-23 DIPLOCAULUS. 24-49 THEROMORPHA.
PLATE VII.

PERMIAN VERTEBRATES. TRIMERORHACHIS

Fig. 1, 1a. Trimerorhachis insignis Cope, 1878. Skull, superior and inferior views, natural size. Metatype, Amer. Mus. No. 4557, Cope Coll., Permian, Wichita basin, Texas.

Figs. 2, 2a, 3. ?Trimerorhachis, not identified.
PLATE VIII.

PERMIAN VERTEBRATA. TRIMERORHACHIS

PLATE X.

PERMIAN VERTEBRATA. ERYOPS

PLATE XI.

Permian Vertebrata. Skull of Eryops

PLATE XII.

PERMIAN VERTEBRATA. JAWS AND VERTEBRÆ OF ERYOPS


Fig. 1, 1a, lower jaw, \( \frac{3}{2} \) natural size; fig. 2, 2a, cervical 3, 3a, dorsal 4, 4a, sacral, and 5, 5a, caudal vertebrae all \( \frac{3}{2} \) natural size; fig. 6, anterior vertebra, natural size; fig. 7 posterior dorsal vertebra, natural size; figs. 8–10 not identified.
PLATE XIII.

Permian Vertebrata. Limb Bones of Eryops


Fig. 1, 1a. Scapula-coracoid, inner and outer views of lower portion; fig. 2-5, pelvis, outer, anterior, posterior and inferior views; fig. 6, 6a, 6b, 6c, 6d, femur, external anterior, posterior, proximal and distal views.
ERYOPS MEGACEPHALUS. 1/2.
PLATE XVI.

PERMIAN VERTEBRATES. SKELETON OF CRICOTUS

Figs. 1, 2 & 8, and probably 3–7 and 9. *Cricotus crusidiscus*, portions of skeleton, natural size. Am. Mus. No. 4550a, Cope Coll., Lower Permian, North Fork of Little Wichita River, Texas. Fig. 1, neck and anterior part of trunk; fig. 2, posterior part of trunk to anterior part of tail; fig. 3, middle portion of tail. The remaining figures are probably of this individual, but I am unable positively to identify them. The specimen has been much more thoroughly pieced together since it was acquired by the American Museum, being in fact a nearly complete articulated skeleton, lacking only the distal parts of limbs and feet. With it was associated a second skeleton, lacking the skull and jaws, but otherwise almost as complete as the other. Professor Cope appears to have considered both as portions of a single skeleton.
PLATE XVIa.

PERMIAN VERTEBRATES. SKULL AND VENTRAL ARMOR OF CRICOTUS


Fig. 2. Cricotus crassidiscus Cope, 1884. Skull and lower jaws, top and side views, natural size. Co-type (lectotype) No. 4550a, figured on pl. xvi.
PLATE XIX.

PERMIAN VERTEBRATES. SKULL OF DIADECTES

Nomenclature

Cope 1880-3    Revised 1915
Empedocles molaris    Diadectes molaris

Figs. 1-4. *Diadectes molaris* Cope, 1878. Skull, natural size, Amer. Mus. No. 4350, Cope Coll. Lower Permian, Little Wichita R., Texas. Fig. 1, palatal view restored; fig. 2, side view, missing parts in outline; fig. 3, occipital view, missing parts in outline; fig. 4, premaxilla, anterior view; fig. 5, crown view of upper teeth.

EMPEDOCLES MOLARIS. COPE IV.
PLATE XXII.

Permian Vertebrates. Skeleton of Dimetrodon


Fig. 1, 1a. Front of skull, with fragment of lower jaw attached, fig. 2, 2a, 2b, quadrate; figs. 3-5, vertebral column, axis to second caudal complete, spines mostly broken off; figs. 6, 7, anterior and posterior views of anterior dorsal vertebra (14th of this series); figs. 8, 9, posterior view of posterior dorsal and anterior view of sacral vertebra, both natural size; figs. 10, 10a, caudal vertebrae; fig. 11, mass of vertebral spines with head of rib attached.
PLATE CII.

Oligocene Rhinoceroses. Hyracodon

Figs. 1-11. *Hyracodon arcidens* Cope, 1873. Type specimen. Amer. Mus. No. 6309, Cope Coll., Cedar Creek beds (Oreodon zone) of Logan Co., Colorado. All figures two fifths nature. Fig. 1, palate and lower jaws, left side; fig. 2, palatal view of palate; fig. 3, occiput, posterior and right side views; fig. 4, superior view of lower jaws; fig. 5, fragment unidentified; fig. 6, atlas, inferior view; fig. 7, 7a, 7b, axis, lateral superior and inferior views; 8, 8a, 8b, 8c, 8d, middle cervical vertebra, lateral, superior, inferior, anterior and posterior views; 9, 9b, 9c, 9d, corresponding views of first dorsal; 10, 11, anterior dorsals.
PLATE CIV.

LIMB BONES OF OLIGOCENE RHINOCEROSES

Nomenclature

Cope 1880-3
Aceratherium occidentale  Caenopus (= Subhyracodon) mitis
Aceratherium pacificum  Diceratherium pacificum

Revised 1915

Figs. 1–2. Caenopus mitis (Cope, 1874). Femur, tibia, and fibula, part of type specimen figured on pl. ev. Amer. Mus. No. 6325, Cope Coll., Horsetail Creek beds (Titanotherium zone), Logan Co., Colorado.


All figures are two-fifths natural size.
PLATE CV.

FOOT BONES OF OLIGOCENE RHINOCEROSES

Nomenclature

Cope 1880–3
Aceratherium mite
Diceratherium pacificum

Revised 1915
Cænopus (= Subhyracodon) mitis
Diceratherium pacificum

1-4. ACERATHERIUM MITE 2/5.  6-13. Diceratherium pacificum 2/5.
PLATE CVIII.

Oligocene Equidæ. "Anchitherium"

Nomenclature

Cope 1880-3 Revised 1915
Anchitherium praestans Kalobatipus praestans

Figs. 1-8. Kalobatipus praestans (Cope, 1879). Skull, jaws, hind foot and part of hind leg, one-half natural size, except fig. 8. Type specimen, Amer. Mus. No. 7269, Cope Coll., Upper Bed of John Day formation, Oregon. Fig. 1, side view of skull and jaws, 1a, palatal view of skull; fig. 2, superior view of lower jaw; fig. 3, 3a, distal end of femur, distal and external views; fig. 4, 4a, 4b, 4c, tibia, anterior, external, proximal and distal views; fig. 5a, proximal view of cuneiforms; fig. 6, 6a, 6b, 6c, metatarsus, internal, anterior, proximal and distal views; fig. 7, 7a, second phalanx of median digit, anterior and internal views; fig. 8, lateral ungual phalanx, natural size, all the preceding figures being one-half nature.

Kalobatipus gen. nov. Osborn. Upper molars with metaloph united to ectoloph as in Anchitherium, but m2 and heel of m3 unreduced and like Miohippus in pattern. Limb bones and metapodials much elongated, lateral digits unreduced from Miohippus stage; phalanges short; inner cuneiform of pes abutting upon cannon-bone.
PLATE CIX.

OLIGOCENE ENTELODONTS. JAW OF PELONAX

Nomenclature

Cope 1880-3 Revised 1915
Elotherium ramosum Pelonax ramosus


Fig. 3, unidentified.
Oligocene Peccaries and Entelodonts

Nomenclature

Cope 1880-3  Revised 1915
Elotherium ramosum  Pelonax ramosus
Elotherium imperator  Entelodon imperator
Thinohyus pristinus  Perchoerus pristinus

Fig. 1. *Pelonax ramosus* (Cope, 1874). Lower jaw, anterior view, one third natural size. Type specimen figured on Pl. cix.

Fig. 2, 2a, 2b. *Entelodon imperator* (Leidy, 1873). Anterior end of lower jaw, superior, inferior and anterior views, one-third natural size. Amer. Mus. No. 7381, Cope Coll. John Day formation; Camp Creek, John Day Valley, Oregon.

Figs. 3-8. *Boöcharus humerosus* Cope, 1879. Parts of type skeleton, figured on pl. cx. Fig. 3, fore foot, external; fig. 4, proximal view of metacarpus; fig. 6, 6a, proximal phalanx, proximal and distal views; fig. 7, 7a, second phalanx, same views; fig. 8, proximal view of tibia. All one-third natural size.

Fig. 9, 9a. *Perchoerus pristinus* Leidy, 1873. Skull, lateral and palatal views, three-fifths natural size. Amer. Mus. No. 7394, Cope Coll., from the John Day formation of Oregon.
1 ELOTHERIUM RAMOSUM ♂. 2-6 IMPERATOR ♂. 9 THINCHYUS PRISTINUS ♂.
PLATE CX.

Limb Bones of Boöchærus

Nomenclature

Cope 1880-3 Revised 1915
Boöchærus humerosus = ? Daodon humérosus


Fig. 1, 1a, 1b, 1c, humerus, posterior, anterior, proximal and distal views.
Fig. 2, 2a, 2b, distal end of radius, anterior, distal and posterior views.
Fig. 3, 3a, 3c, carpus, dorsal, proximal and internal views.
Fig. 4, 4c, manus, dorsal and internal views.
Fig. 5, 5a, 5b, 5c, femur, posterior, anterior, proximal and distal views.
PLATE CXa.

SKULLS OF JOHN DAY DICOTYLYLIDÆ

Nomenclature

Cope 1880-3
Paleochœrus subsequans
Paleochœrus trichænus
Chænohyus decedens

Revised, 1913
Percherus subsequans
Percherus trichænus
Chænohyus decedens

Fig. 1. *Percherus subsequans* (Cope) 1879. Skull and lower jaw. Type specimen, Condon Coll., University of Oregon. Three-fourths natural size.

Fig. 2. *Percherus trichænus* (Cope) 1879. Upper jaw of type specimen, Amer. Mus. No. 7390, Cope Coll., John Day formation, Oregon. Three-fourths natural size.

Fig. 3. *Chænohyus decedens* Cope 1879. Upper jaw of type specimen, Condon Coll., University of Oregon. Natural size.
1. Palaeochœrus Subæquans
2. P. Trichaenus
3. C. Decedens

Plate CXa.
PLATE CXI.

JOHN DAY DICOTYLINES AND OREODONTS

Nomenclature

Cope 1880-3 Revised 1915
Chænohyus decedens Chænohyus decedens
Paleochoerus pristinus Perchoerus pristinus
Paleochoerus socialis Perchoerus socialis
Coloreodon ryderanus Agriochoerus ryderanus

Fig. 1, 1a. Chænohyus decedens Cope, 1879. Side and top views of anterior half of skull. Type specimen, Condon Coll., University of Oregon. See pl. CXa, fig. 3. Natural size.

Fig. 2. Perchoerus pristinus (Leidy 1873). Lower jaw, Am. Mus. No. 7392, Cope Coll. Natural size.

Fig. 3. Perchoerus socialis (Marsh, 1875). Lower jaw, Am. Mus. No. 7393, Cope Coll. Natural size.

Fig. 4. Agriochoerus ryderanus (Cope, 1881). Skull, type specimen, Am. Mus. No. 7407, Cope Coll. side view, natural size. Figs. 4a, 4b, superior and inferior views, three-fourths natural size.
1 CHAENOHYUS DECEDENS  2 PALAECHOERUS PRISTINUS ½
3 P. SOCIALIS ¼ 4 COLOREDON RYDERIANUS ¾ a AND b ¾
PLATE CXII.

Oligocene Oreodonts. Skull of Agriochoerus

Nomenclature
Cope 1880-3 Revised 1913
Agriochoerus guiotianus Agriochoerus guyotianus

PLATE CXIII.

OLIGOCENE OREODONTS. SKULLS OF AGRIOCHÆRUS

Nomenclature

Cope 1880–3

Agriochærus guyotianus
Coloreodon macrocephalus

Revised 1915

Agriochærus guyotianus
Agriochærus macrocephalus


1-2 AGRICHOERUS GUIOTIANUS ♂ 3-4 COLOREODON MACROCEPHALUS ♂.
PLATE CXIIla.

Oligocene Oreodonts. Skull of Agriocherus

Nomenclature

Cope 1880-3 Revised 1915
Coloreodon ferox Agriocherus ferox

PLATE CXV.

WHITE RIVER CAMELIDÆ. SKULL AND SKELETON OF POÉBROTHERIUM.

PLATE CXVa.

WHITE RIVER CAMELIDÆ. SKELETON OF POÉBROTHERIUM


1-12 FOEBROtherium labiatum 13-21 P Wilsoni.
PLATE CXVI.

Oligocene Camels. Skeleton of Paratylopus

Nomenclature

Cope 1880–3 Revised 1915
Poebrotherium sternbergi Paratylopus sternbergi

Figs. 1–7. Paratylopus sternbergi (Cope, 1879). Skull and parts of skeleton, three-fifths natural size. Type specimen, Amer. Mus. No. 7910, upper bed of John Day formation of Oregon. Figs. 1, 1a, 1b, skull, lateral, superior and palatal views; fig. 2, premaxilla, inferior view; fig. 3, 3a, humerus, external and proximal views; fig. 4, distal end of radius; fig. 5, 5a, 5b, 5c, tibia, posterior, external, proximal and distal views; 6, 6a, metatarsus with distal tarsals, posterior and internal views; 6b, proximal view of distal tarsals, 6c, of metatarsus; 6d, distal ends of metatarsals; fig. 7, 7a, patella, anterior and superior views.
PLATE CXVIII.

Miocene Canidæ. Skull of Ælurodon

PLATE CXVIIIa.

Miocene Canidæ. Skeleton of Ælurodon

Figs. 1–16. Ælurodon saxus (Leidy, 1858). Vertebrae of skeleton figured on pll. CXVIII, CXVIIIb, CXIX. Fig. 1, posterior cervical; figs. 2 to 8, dorsal; figs. 9–15, lumbar vertebrae; fig. 16, pelvis and anterior caudals; figs. 17–19, distal caudal vertebrae.

All three-fourths natural size. Republican River beds, Driftwood Creek, Nebraska. Amer. Mus. No. 8305, Cope Collection.
PLATE CXVIIIb.

*Miocene Canidae.* Skeleton of *Ælurodon*

*Ælurodon saxus* (Leidy, 1858). Parts of skeleton figured on pll. CXVIII, CXVIIIa, CXIX. Figs. 1, 1a, 1b, scapula, external, posterior and proximal views; figs. 2, 2a, ulna, external and anterior views; figs. 3, 3a, 3b, 3c, radius, anterior, internal, proximal and distal views; figs. 4, 4a, 4b, 4c, second metacarpal, anterior, external, internal and proximal views; fig. 5, 5a, 5b, 5c, 5d, fifth metacarpal, anterior, external, internal, proximal and distal views; fig. 6, 6a, pelvis, right side, inferior and external views; fig. 7, 7a, 7b, astragalus and calcaneum, internal, external and distal views. All three-fourths natural size. From the Republican River beds, Driftwood Creek, Nebraska, American Museum No. 8305. Cope Collection.
PLATE CXIX.

Miocene Canidæ. Skeleton of Ælurodon

Figs. 1–8. Ælurodon savus (Leidy, 1858). Parts of skeleton figured on pll. CXVIII, CXVIIIa, CXVIIIb. Fig. 1, 1a, 1b, femur, anterior, posterior and internal views; fig. 2, 2c, tibia and fibula, anterior view and distal view of tibia; fig. 3, astragalus and calcaneum, anterior view; figs. 4, 5, 6, metatarsal bones, third, fourth and fifth, dorsal internal and external views; fig. 7, proximal phalanx, and fig. 8, middle phalanx, dorsal and proximal views.

Fig. 9. Ælurodon savus. Lower jaw, Amer. Mus. No. 8312, Cope Coll., superior view.

Fig. 10. ?Ælurodon, milk carnassial, Amer. Mus. No. 8306, Cope Coll., internal, posterior and superior views.

All specimens from the Republican River beds of Driftwood Creek, Nebraska, and figured three-fourths the natural size.
PLATE CXIXa.

JAWS AND SKELETAL PARTS OF MIocene CARNIVORA

Nomenclature

<table>
<thead>
<tr>
<th>Cope 1880-3</th>
<th>Revised 1915</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elurodon wheelerianus</td>
<td>Elurodon wheelerianus</td>
</tr>
<tr>
<td>Elurodon hyænoides</td>
<td>?Brachypsalis hyænoides</td>
</tr>
<tr>
<td>Canis brachypus</td>
<td>Cynodesmus brachypus</td>
</tr>
</tbody>
</table>

Figs. 1-3. Elurodon wheelerianus Cope, 1874. Upper and lower jaws, Amer. Mus. No. 8307, from Republic River bed of Red Willow Co., Nebraska. About three-fifths natural size. Fig. 1, external view of upper and lower jaw; fig. 2, inferior, fig. 2a, anterior view of maxilla; fig. 3, superior view of lower jaw.

The second upper molar, not figured here, was subsequently found among the fragments and fitted to place. The first molar is incorrectly drawn. The specimen was refigured in 1904, Bull. Am. Mus. Nat. Hist., vol. XX, pp. 250-251, figs. 3 and 4.

Fig. 5. ?Brachypsalis hyænoides (Cope, 1881). Upper jaw, type specimen, Amer. Mus. No. 8338, Republican River bed, Driftwood Creek, Hitchcock Co., Nebraska. Natural size.

This species appears to be of Mustelid affinities as shown in the form and construction of the teeth, especially of p4 and m3, although it retains a functional m2, as in the Canidae. It may be the upper dentition of Brachypsalis, which accords in the proportions of molar and premolar dentition.

Figs. 4 & 7. Cynodesmus brachypus. Parts of the type skeleton figured on Pl. CXIXb. Figs. 4, 4a, superior and inferior views of axis; fig. 7, astragalus, superior, inferior and external views.

Fig. 6, unidentified.
PLATE CXIXb.

**Miocene Canidae. Skeleton of Cynodesmus**

Nomenclature

**Canis brachypus**  
**Cynodesmus brachypus**


Fig. 1, skull and lower jaw side view; fig. 2, cervical vertebrae second to sixth; fig. 3, seventh cervical, lateral and posterior views; figs. 4, 5, 6, lumbar vertebrae; fig. 7, distal caudals; fig. 8, fifth metatarsal dorsal and plantar views; fig. 9, unidentified.

See also pl. CXIXc and CXIXa.
can River beds) of Driftwood Creek, Hitchcock Co., Neb. It was associated
with Mylagaulus monodon No. 8328, M. sesquipedalis No. 8330 and Eucastor
tortus No. 8333. These specimens were evidently picked up loose, and although
all are weathered in much the same way, it cannot be positively stated that all
are of the same geologic age. The associated specimens are characteristic species
of the late Miocene and early Pliocene fauna; it is probable that the human tooth
has come from some overlying Pleistocene or recent deposit and been dropped
down into the older bed.
PLATE CXIXc.

Miocene Carnivora and Rodentia. Human tooth found with Miocene Fossils

Nomenclature

Cope 1880-3  Revised 1915
Canis brachypus       Cynodesmus brachypus
Tomarctus brevirostris Tomarctus brevirostris
Lutra lycopotamica    ?Sthenictis lycopotamica
Castor                 Dipoides ?tortus
Mylagaulus monodon    Mylagaulus monodon
Mylagaulus sesquipedalis Mylagaulus sesquipedalis
Palcolagus            Lepus sp.
Homo                   Homo ?sapiens

Figs. 1-3. Cynodesmus brachypus (Cope, 1881). Parts of type skeleton figured on pl. CXIXb. Miocene, East of Laramie Peak, Wyo. Fig. 1, pelvis sacrum and adjoining vertebrae, side view, about three-fifths natural size; 1a ventral view of pelvis. Fig. 2, 2a, 2b, metacarpal, dorsal, external and internal views. Fig. 3, proximal phalanx, dorsal, lateral and proximal views.

Fig. 4. Tomarctus brevirostris Cope, 1873. Lower jaw, type specimen, Amer. Mus. No. 8302, Cope Coll., internal and superior views, natural size. Middle Miocene, Pawnee Creek beds near Pawnee Buttes, Colorado.

The systematic position of this genus is doubtful. The type is an immature jaw, the carnassial about half emerged, and the anterior part of the jaw so broken that it is not at all certain that the premolars were, as Cope considered them, reduced in number.

Fig. 5. ?Sthenictis lycopotamica (Cope, 1879). Lower jaw, type specimen, internal and superior views. From Pawnee Creek beds (Middle Miocene) of northeastern Colorado. The original has been lost. Professor Cope's descriptions have not sufficed to determine the affinities of this species, which he referred to Potamogale (Lutraictis ?). It appears to be related to "Stenogale" robusta, Cope, which Peterson has (1910) made the type of Sthenictis.

Figs. 6-9. Dipoides sp. Figs. 6, 6a, lower jaw, Amer. Mus. No. 8332, Cope Coll., external and superior views; Fig. 7, lower incisor, external view; Fig. 8, humerus, anterior view, Fig. 9, caudal vertebra, superior view; all natural size. Republican River beds, northwestern Kansas.

Fig. 10. Mylagaulus monodon Cope, 1881. Lower premolar, p. 4, Am. Mus. No. 8328, Cope Coll. Natural size. Republican River bed, Kansas.

Fig. 11. Mylagaulus monodon Cope, 1881. Lower jaw, type specimen, Amer. Mus. No. 8327, Cope Coll. External, internal and superior views, natural size. Republican River beds, Driftwood Creek, Hitchcock Co., Neb.

Fig. 12. Mylagaulus sesquipedalis Cope, 1878. Upper premolar, p. 4.

Fig. 13. Lepus sp. Lower jaw, Amer. Mus. No. 8335, Cope Coll. External and superior views, natural size. Republican River beds, Driftwood Creek, Hitchcock Co., Neb.

Fig. 14. Homo ? sapiens. Human tooth found in association with upper Miocene mammals. Amer. Mus. No. 8304, Cope Coll. Republican River beds, northwestern Kansas. This tooth was collected by Professor Cope's party on the "Loup Fork" (Repubi-
1-3 CANIS BRACHYPUS. 4. TOMARCTUS BREVIROSTRIS. 5. LUTRA Lycopotamica. 6-9 CASTOR
10-11 MYLAGAULUS MONODON. 12 M. SESQUIPEDALIS. 13 PALAEOLAGUS. 14 HOMO.
PLATE CXX.

Miocene Proboscidea. Skull of Tetralophodon

Nomenclature

Cope 1880-3 Revised 1915
Mastodon campester Tetralophodon campester


See also pll. CXXI, CXXII, CXXIII.

Note on the Nomenclature of Tertiary Mastodons

*Gomphotherium* Burmeister, 1837, appears to be the earliest available generic name for the four-tusked mastodons with three transverse crests on the intermediate teeth of which the type and best known species is *G. angustidens* (Cuv.) of the European Miocene. *Trilophodon* Falconer and *Tetrabelodon* Cope are based upon the same species but are of later date. *Trilophodon* is the name adopted at present for the publications of the American Museum.

*Tetralophodon* Warren, 1852, applies to the genera with four crests on the intermediate molars, *Mastodon longirostris* and *arvernensis* of Europe being the types.
PLATE CXXI.

MIocene Proboscidea. Bones of Tetralophodon

Nomenclature
Cope 1880-3 Revised 1915
Mastodon campester Tetralophodon campester

Figs. 1–2. Tetralophodon campester (Cope, 1878). Type specimen, Amer. Mus. No. 8827, Cope Coll., from Republican River beds, Sappa Creek, Kansas. Fig. 1, 1a, pelvis, inferior and external views; fig. 2, 2a, 2b, 2c, 2d, fifth metacarpal, plantar, dorsal, internal, proximal and distal views. All one-fourth natural size.

Specimen figured in pll. CXX, CXXII, CXXIII.
PLATE CXXII.

Miocene Proboscidea

Nomenclature

Cope 1880-3                Revised 1915
Mastodon campester         Tetralophodon campester
Mastodon "ligoniferus" (unpub.)    ?Tetralophodon sp.

Figs. 1-2. *Tetralophodon campester* (Cope, 1878). Part of skull and lower jaw. Type specimen, Amer. Mus. No. 8527, Cope Coll., from Republican River beds, Sappa Creek, Kansas. Fig. 1, side view of skull and jaw restored in outline; 1a, 1b, cross-sections of upper tusk; fig. 2, lower jaw, superior view. Specimen figured in pl. CXX, CXXI, CXXIII.

Figs. 3-5. ?*Tetralophodon* sp. Lower jaw and femur, Amer. Mus. No. 8529, Republican River beds, Driftwood Creek, Hitchcock Co., Nebraska. Fig. 3, 3a, inferior and anterior views of lower jaw; fig. 5, 5a, external and distal views of femur. Specimen figured on pl. CXXIV.

All figures one-fourth natural size.
PLATE CXXIII.

MIocene Proboscidea

Nomenclature

Cope 1880–3  Revised 1915
Mastodon campester  Tetralophodon campester
Mastodon sp.  ?Trilophodon (= Gomphotherium) sp.

Fig. 1.  *Tetralophodon campester* (Cope, 1878).  Inferior view of lower jaw of type specimen,  
Amer. Mus. No. 8527, figured on pl. CXX-CXXII.

Fig. 2.  ?*Trilophodon* sp.  Basicranial region, from below.  Amer. Mus. No. 8520, Cope Coll.  
Republican River beds, Kansas.

Fig. 3, 3a.  ?*Trilophodon* sp.  Scapula, external and proximal views.  Amer. Mus. No. 8540,  
Cope Coll.  Republican River beds, Decatur Co., Kansas.

All figures one-fourth natural size.
Mastodon 1/4
PLATE CXXIV.

MIocene PROBOSCIDEA

Nomenclature
Cope 1880-3 Revised 1915
Mastodon ligoniferus ?Tetralophodon sp.


Fig. 1. Lower jaw external view; fig. 2, superior view; fig. 3, ? upper molar; fig. 4, distal end of femur.

Fig. 3. ?Tetralophodon sp.; upper molar, ? Amer. Mus. No. 8529, Cope Coll. Republican River beds, Driftwood Creek, Nebraska. Specimen figured on pl. CXXII.

Fig. 4. ?Tetralophodon sp., distal end of femur of No. 8529. See pl. CXXII.

All one-fourth natural size. The name ligoniferus appears to be unpublished.
PLATE CXXV.

MIOCENE RHINOCEROSES. SKULL OF APHELOPS MEGALODUS


See also Plt. CXXVI-CXXX and CXXXV.
PLATE CXXVI.

Miocene Rhinoceroses. Skull of Aphelops megalodus

Aphelops megalodus Cope, 1873. Superior view of skull one-half natural size. Type specimen, figured on pl. CXXV, CXXVII–CXXX and CXXXV.
PLATE CXXVII.

Miocene Rhinoceroses. Skull of Aphelops megalodus

*Aphelops megalodus* (Cope, 1873). Inferior view of skull, one-half natural size. Type specimen, figured on pll. CXXV–CXXVI, CXXIX–CXXX and CXXXV.
PLATE CXXIX.

Miocene Rhinoceroses. Vertebrae of Aphelops


Fig. 1, 1a. Atlas, lateral and inferior views; fig. 2, 2a, 2c, axis, lateral, inferior and posterior views; fig. 3, 3a, 3b, third, cervical vertebra, lateral, inferior and anterior views; fig. 4, 4a, 4b, 4c, fourth cervical vertebra, lateral, inferior, anterior and posterior views.

Fig. 5, 5a. *Aphelops megalodus* (Cope, 1873). Distal end of ulna, paratype, No. 8293, figured on pl. CXXX.

Figs. 6–7. *Aphelops megalodus* (Cope, 1873). No. 8293a, specimen figured on pl. CXXX, proximal views of metacarpals.

All figures two-fifths natural size.
PLATE CXXX.

Miocene Rhinoceroses. Limb and Foot Bones of Aphelops


Figs. 1–3. Amer. Mus. No. 8293a, Cope Coll. Fig. 1, 1a, 1b, second metacarpal, anterior, external and internal views; fig. 2, 2a, fourth metacarpal, anterior and external views; fig. 3, 3a, 3b, 3c, radius, anterior, external, proximal and distal views.


Fig. 4. Proximal end of second metacarpal; fig. 5, 5a, head of tibia, posterior and proximal views; fig. 6, 6a, 6b, distal end of tibia, anterior, distal and internal views; fig. 7, 7a, hind foot, dorsal and external views; fig. 8, calcaneum, dorsal view; figs. 9, 9a, astragalus, plantar and distal views; fig. 10, cuboid, internal view; fig. 11, navicular, distal view; fig. 12, metatarsals, proximal view; fig. 13, second metatarsal internal view; fig. 14a, 14b, third metatarsal, internal and external views; fig. 15, fourth metatarsal, internal view.

All figures two-fifths natural size.
PLATE CXXXII.

Miocene Rhinocerose. Skull of Teleoceras

Nomenclature
Cope 1880-3            Revised 1915
Aphelops fossiger      Teleoceras fossiger

PLATE CXXXIII.

Miocene Rhinoceroses. Skull of Teleoceras

Teleoceras (= Eusyodon) fossiger Cope, 1878. Palatal view of skull, two-fifths natural size. Type specimen, Amer. Mus. No. 8390, Cope Coll. Republican River beds, Decatur Co., Kansas. Specimen figured on pl. CXXXV.
PLATE CXXXIV.

Miocene Rhinoceroses. Skulls of Aphelops and Teleoceras

Fig. 1. *Teleoceras* (= Eusyodon) *fossiger* (Cope, 1878). Occipital view of skull. Amer. Mus. No. 8383, figured on pl. CXXXI-CXXXII.

Fig. 2. *Teleoceras* (= Eusyodon) *fossiger* (Cope, 1878). Top view of skull. Amer. Mus. Cope Coll. Republican River beds, Decatur Co., Kansas.

Fig. 3. *Aphelops megalodus* Cope, 1873. Occipital view of incomplete skull. Amer. Mus. No. 8383, Pawnee Creek beds, near Pawnee Buttes, Colorado. Specimen figured on pl. CXXIX and CXXX.

All figures two-fifths natural size.
PLATE CXXXV.

Miocene Rhinoceroses. Skulls of Apelops and Teleoceras

Fig. 1. Apelops megalodus Cope, 1873. Skull and lower jaws, occipital view, one-third natural size. Type specimen, Amer. Mus. No. 8292, Cope Coll., figured on pl. CXXV-CXXX. Pawnee Creek beds, near Pawnee Buttes, Colorado.

Fig. 2. Teleoceras (= Euryodon) fossiger (Cope, 1878). Skull, occipital view, one-third natural size. Type specimen, Amer. Mus. No. 8390, Cope Coll., figured on pl. CXXXIII.
1 APHELOPS MEGALODUS & 2. APHELOPS FOSSIGER.
PLATE CXXXVI.

Miocene Rhinoceroses. Vertebrae of Teleoceras

Nomenclature

PLATE CXXXVII.

Miocene Rhinoceroses. Limb and Foot Bones of Teleoceras

Nomenclature

Cope 1880-3 Revised 1915
Aphelops (in part) Teleoceras

PLATE CXXXVIII.

Miocene Rhinoceroses. Limb and Foot Bones of Teleoceras

Miocene Rhinoceroses. Skull of Aphelops malacorhinus

PLATE CXL.

Miocene Rhinoceroses. Skull of Aphelops malacorhinus

Aphelops malacorhinus Cope, 1878. Superior view of skull, two-fifths natural size. Type specimen, Amer. Mus. No. 8381, Cope Coll. Republican River beds, Nebraska. Specimen figured on pl. CXLI.
Miocene Rhinoceroses. Skull of Aphelops malacorhinus

Aphelops malacorhinus Cope, 1878. Palatal view of skull, two-fifths natural size. Type specimen, Amer. Mus. No. 8381, Cope Coll., from Republican River beds of Nebraska. Specimen figured on pl. CXL.
PLATE CXLII.

Miocene Rhinoceroses. Bones of Apelops malacorhinus

Figs. 1–6. Apelops malacorhinus Cope, 1878. Skeleton bones referred to this species by Professor Cope. Amer. Mus. Cope Coll., from Republican River beds, Nebraska.

Fig. 1, 1a, 1b, pelvis, anterior, posterior and external views, one-fourth natural size; fig. 2, 2a, tibia, anterior and distal views, two-fifths nature; figs. 3–6, dorsal and a cervical vertebra, two-fifths nature.

These specimens were presumably referred to this species on account of their being found associated with the type or some referred skull material of A. malacorhinus; but the record of such association has been lost, and a search through the published references, field records and other possible sources of information has failed to recover any conclusive evidence upon it. The association of skull and skeletal parts in the related species A. ceratorhinus Douglass indicates however that these bones are correctly referred to A. malacorhinus. (W. D. M.).
PLATE CXLIII.

Miocene Rhinoceroses
Skull and Skeletal Parts of Aphelops ? malacorhinus

Figs. 1–7. Remains of Rhinoceroses, part or all referable to Aphelops malacorhinus. Amer. Mus. Cope Coll. Republican River Bed, Kansas or Nebraska.

Fig. 1. Humerus, anterior view.
Fig. 2. Part of maxilla.
Fig. 3. Aphelops malacorhinus, occipital view of skull. Paratype, Amer. Mus. No. 8439, Cope Coll.
Fig. 4, 4a. Cervical vertebra, lateral and inferior views.
Fig. 5, 5a, 5b. Ulna, probably A. malacorhinus, external, anterior and distal views. No. 8382.
Fig. 6, 6a. Proximal and distal ends of femur.
Fig. 7, 7a, 7b. Astragalus, dorsal, plantar and distal views.
PLATE CXLIV.

Miocene Rhinoceroses. Skull of Peraceras

*Peraceras superciliosus* Cope, 1880. Side view of skull, one-half natural size. Type specimen, Amer. Mus. No. 8380. Republican River beds, Nebraska.

Specimen figured on pl. CXLIVb.
PLATE CXLIVb.

MIocene RHINOCEROSSES. SKULL OF PERACERAS

*Peraceras superciliosus* Cope, 1880. Top view of skull, two-fifths natural size. Type specimen, No. 8380, figured on pl. CXLIV.
PLATE CXLV.

Miocene Equidæ. Skull of Merychippus

Nomenclature

Cope 1880-3  Revised 1915
Hippotherium speciosum (in part)  Merychippus sp.


Fig. 4. Merychippus sp. Fourth premolar and first molar of No. 8347, natural size, crown view.
PLATE CXLVII.

Miocene Equidæ. Skull and Bones of Merychippus

Nomenclature
Cope 1880-3
Hippotherium seversum (in part)

Revised 1915
Merychippus isonesus

Figs. 1-8. Merychippus isonesus (Cope, 1889). Skull and parts of skeleton, figured also on pl. CXLVIII. All one-half natural size except fig. 16. Type specimen, Amer. Mus. No. 8175, Cope Coll. Mascall formation, Cottonwood Creek, John Day Valley, Oregon.

Fig. 1, 1a, skull, lateral and palatal views; fig. 1b, two upper molars, m₁-₂ of the right side, natural size; fig. 2, 2a, atlas, superior and posterior views; fig. 3, sacrum, inferior view; fig. 4, pelvis, inferior view; figs. 5, 6, proximal and distal views of femur; figs. 7, 8, proximal and distal views of tibia; fig. 9, inferior view of astragalus.
HIPPOTERIUM SEVERSUM. COPE ½.
PLATE CXLVIII.

Miocene Equidae. Skeleton of Merychippus

Nomenclature

Cope 1880-3                          Revised 1915
Hippotherium seversum (in part)       Merychippus isonesus
Hippotherium sphenodus                 Merychippus sphenodus


Fig. 1. Pelvis, external view; fig. 2, 2a, femur, anterior and posterior views; fig. 3, 3a, tibia, anterior and posterior views; fig. 4, hind foot, dorsal view; fig. 5, 5a, internal and external views; figs. 6, 6a, navicular, proximal and distal views; fig. 7, 7a, cecocuneiform, proximal and distal views; fig. 8, metatarsals and phalanges, internal view; 8a, 8b, proximal and distal views of metatarsus.

1—8 HIPPOtherium SEVERSUM. 9—10 H. SPHENODUS.
PLATE CXLVIIIa.

Miocene Equidæ. Teeth and Brain Cast of Merychippus, etc.

Nomenclature

Cope 1880-3
Hippotherium sphenodus
Protohippus (in part)
Protohippus perditus (in part)
Protohippus insignis (Cope, non Leidy)
Protohippus sejunctus (in part)
Hippidium spectans

Revised 1915
Merychippus sphenodus
Protohippus sp., aff. perditus
Merychippus sejunctus
Merychippus labrosus etc.
Merychippus isonesus
Pliohippus spectans

Fig. 1. Merychippus? sphenodus (Cope, 1889). Upper premolars; paratype, natural size, Amer. Mus. No. 8281a, Cope Coll., Pawnee Creek beds, Colorado.

Fig. 2. ? Merychippus, unidentified specimen, upper molars.

Fig. 3. Merychippus sejunctus. Upper teeth, natural size, crown view. Amer. Mus. No. 8254, Cope Coll., recorded as "East of Laramie Peak, Wyoming."

Fig. 4. Protohippus sp., aff. perditus. Upper teeth, crown view, natural size. Am. Mus. No. 8340, Cope Coll., Republican River Bed, Nebraska. Hind foot of this individual figured on pl. CXLIX.

Figs. 5-7. Type specimens of Protohippus labrosus Cope, Amer. Mus. No. 8266, Pawnee Creek Bed, Pawnee Buttes, Colorado. Fig. 5, upper teeth, crown view, natural size; fig. 6, 6a, lower jaw external and superior views, half natural size; fig. 7, upper jaw, half natural size, external view. Part of this specimen is now missing, only the lower jaw (fig. 6) being identifiable. This lower jaw is a composite of two individuals, the symphysis belonging certainly to a different individual and probably to a distinct species from the remainder of the jaw, which along with the upper teeth figured here (fig. 5) but now lost, agrees very nearly with Merychippus sejunctus. The symphysis, however, which in conformity with the author's description and evident intent must be regarded as the primary basis of the species and selected as lectotype, is clearly distinct from M. sejunctus and cannot be correlated with any of the better known species. W. D. M., 1913.

Fig. 8, 8a. Merychippus isonesus, natural braincast, lateral and superior views. From the specimen figured on pl. CXLIX. Amer. Mus. No. 8105, Cope Coll., Deep River beds, Deep River (Smith Creek), Montana.

Figs. 9-11. Pliohippus spectans (Cope, 1880). Upper teeth, natural size, type specimen, Amer. Mus. No. 8183, Cope Coll., Mascall formation, Cottonwood Creek, John Day Basin, Oregon. Fig. 9, 9a, first or second, upper molar, crown and anterior views; fig. 10, second upper premolar crown view; fig. 11, upper incisor, crown view.
PLATE CXLIX.

Limb and Foot Bones of Miocene Equidae

Nomenclature

Cope 1880-3  Revised 1915
Protohippus sejunctus (in part)  Merychippus isonesus
Protohippus perditus  Protohippus sp. aff. perditus
Hippidium ? pernix  ?Hipparion sp.

Figs. 1-4. Merychippus ? isonesus (Cope, 1889). Limb and foot bones with skull. Amer. Mus. No. 8105, Cope Coll., Deep River beds, Deep River (Smith Creek), Montana. Fig. 1, 1a, ulno-radius, anterior and external views, one-half natural size; fig. 2, 2a, 2b, 2c, fore foot, anterior and external views, with proximal and distal views of metatarsus half natural size; fig. 3, proximal view of magnum and unciform with part of metacarpal III, two-thirds natural size; fig. 4, proximal view of tibia, one-half nature. See also pl. CXLVIIIa.

Fig. 5-6. Protohippus sp. aff. perditus. Parts of skeleton associated with upper jaw figured on pl. CXLVIIIa, Am. Mus. No. 8340, Cope Coll., from Republican River beds, of Nebraska. Fig. 5, pelvis, inferior view; fig. 6, 6a, 6b, anterior, internal, proximal views of median metatarsal; both one-half natural size.

Fig. 7. Atlas, unidentified (not Equid).

Fig. 8. ? Hipparion sp. Metatarsal III and proximal phalanx, anterior and external views and proximal view of metatarsal, one-half natural size. Amer. Mus. No. 8357, Cope Coll. Republican R. beds, Nebraska. (The specimen includes remains of more than one individual and no teeth are associated, so that the reference is wholly doubtful. It has the proportions of the American species of Hipparion but is exceptional among them in the tarso-metatarsal articulation).
1-4 PROTOHIPPUS SEJUNCTUS. 5-6 P. PERDITUS. 7-8 HIPPIDIUM IPERNIX
PLATE CL.

Miocene Equidæ. Skull of Merychippus

Nomenclature

Cope 1880–3 Revised 1915
Protohippus sejunctus Merychippus sejunctus


Skeleton parts figured on pl. CLI.
PLATE CLI.

Miocene Equidæ. Skeleton Parts of Merychippus


Fig. 1, lower jaw, superior view; fig. 2, 2a, atlas, superior and inferior views; fig. odontoid 2b, process of axis; fig. 3, 3a, third cervical vertebra, inferior and posterior views; fig. 4, 4a, seventh cervical, anterior and inferior views; fig. 5, 5a, first dorsal, anterior and lateral views; 6, 6a, 6b, 6c, humerus, anterior, external, proximal and distal views; 7, 7a, 7b, tibia, anterior, external and distal views; figs. 8–14, hind foot, anterior and external views, 8b, inferior view of astragalus, 8c, 9b, of calcaneum and astragalus, 10b, proximal view of navicular and cuboid, 11b, 11c, proximal and distal views of metatarsus, 12b, proximal view of proximal phalanx; 13b, of second phalanx, 14b, 14c, proximal and inferior views of ungual phalanx.

The humerus and tibia here figured were found in the Cope Collection with No. 8251, a specimen which Cope referred to *Protokipps perditus*, and which is now (1913) referred to *Merychippus sphenodus*. It appears probable that parts of the type skeleton of No. 8291 had become mixed with No. 8251, but the two individuals are so closely allied specifically that I am unable to clear up the confusion.
PLATE CLIII.

Miocene Camelidæ

Nomenclature

Cope 1880-3 Revised 1915
Protolabis transmontanus Miolabis transmontanus
Protolabis heterodontus Protolabis heterodontus

Figs. 1, 2. *Miolabis transmontanus* (Cope, 1879). Skull, lateral and palatal views, two-thirds natural size. Type specimen, Amer. Mus. No. 8196, Cope Coll., from Mascal formation of Cottonwood Creek, John Day Valley, Oregon.

1-2 Protalabis transmontanus. 3-4 P. Heterodontus. 
PLATE CLIV.

SKULL AND JAWS OF MIocene CAMELS

Nomenclature

Cope 1880-3     Revised 1915
Procamelus angustidens Cope 1872 = Protolabis angustidens Cope
"Procamelus angustidens" Cope 1881 = Procamelus inequidens sp. nov.

Fig. 1. *Procamelus inequidens* sp. nov. Side view of skull and jaws, No. 8446, type, from Upper Miocene, Republican R. beds, Driftwood Creek, Hitchcock Co., Nebraska. This skull was referred by Cope to *P. angustidens*, but differs from topotypes of that species in the absence of the upper incisors and other characters of less moment.

Figs. 2, 3. Inferior and superior views of same skull.

Fig. 4. *Protolabis angustidens* Cope, 1872. Lower jaws, type specimen, superior view. From Middle Miocene (Pawnee Creek beds) near Pawnee Buttes, Colorado. Cope Coll., Am. Mus. No. 8294.
PROCAMELUS ANGUSTIDENS. COPE \xa2.