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Article VII.—CONTRIBUTIONS TO THE SNAKE CREEK FAUNA

WITH NOTES UPON THE PLEISTOCENE OF WESTERN NEBRASKA AMERICAN MUSEUM EXPEDITION OF 1916

By W. D. Matthew

Plates IV–X

The line drawings of this article are by Lindsey M. Sterling; the photographs by Albert Thomson.

In 1908 the writer and Mr. Harold Cook investigated a locality for fossil bones of which Mr. Cook had heard from neighbors south of the James H. Cook ranch at Agate, Nebraska. It was found to be extraordinarily rich in fragmentary remains scattered along the southern edge of the plains that lie between the Niobrara and North Platte valleys. The fossils were exposed at the edge of the breaks leading down into a number of dry creeks — Snake, Sheep, Spotted Tail, and Dry Spotted Tail Creeks — and occurred in a thin irregular deposit of sand and gravel, mostly unconsolidated, resting on the eroded and pockety surface of a light buff-pink-colored, sandy clay beneath. Both formations were fossiliferous and were regarded as being local phases of the Ogalalla and Arickaree formations, respectively, of Darton. The names of Snake Creek and Sheep Creek beds were given to these local phases for convenience in faunal correlation.

From the older Sheep Creek beds were obtained a number of skeletons of *Merychippus* and skulls, jaws, etc., of camels, Carnivora, etc., all indicating an early phase of the *Merychippus* zone equivalent to or slightly older than the Mascall and Deep River of Montana, distinctly older than the Pawnee Creek beds of Colorado. The Snake Creek beds yielded a large fauna, mostly of fragmentary material which appeared to be of early Pliocene age. The exact nature of the Snake Creek deposits was not very clear; they were obviously river-channel deposits, but in some of the outcrops the fossils and coarse material appeared to be partly remanié, concentrated through removal of the sand by subsequent wind action.[1]

The locality was visited subsequently by parties from the Carnegie and Amherst Museums and in 1914 Dr. Sinclair secured for the Princeton Museum a large collection of Snake Creek fossils and described a number of new forms.[2] Mr. Cook made a number of visits from time to time and

[1] Matthew and Cook. 1909. A Pliocene Fauna from Western Nebraska. Bull. Amer. Mus. Nat. Hist., XXVI, pp. 361–414.

[2] Sinclair, W. J. 1915. Additions to the Fauna of the Lower Pliocene Snake Creek Beds, etc. Proc. Amer. Phil. Soc., LIV, pp. 73–95.

has also obtained a large collection and described a few new types.[1] In the spring of 1916 he secured from one of the pockets a remarkably fine skeleton of *Pliohippus* which is now in the American Museum collection. During the summer of 1916 the American Museum party in charge of Mr. Albert Thomson worked for part of the season in the great fossil quarry at Agate, and Mr. A. C. Whitford was detailed from this party to resume investigations in the Snake Creek locality with Mr. George Stoll as assistant. As the result of about a month's work a considerable collection was secured which is described in the following contribution.

Since the earlier exploration in 1908 the work of Dr. Merriam in the later Tertiary faunas of the Pacific Coast has added largely to the data for exact correlation of the later Tertiary mammal faunas of the United States, and has afforded evidence strongly suggesting that the Snake Creek fauna might in fact be a composite and not all of the same age.[2] Some doubt on this point had been expressed by Matthew and Cook in the early description. Unfortunately, the records and observations of the subsequent collecting have not been exact enough to clear up this doubt; but there seems to be some reason to believe that different fossiliferous pockets may be of different ages, ranging from late Miocene to early Pliocene. The writer purposes to devote some time next season to this problem.

The fauna is at all events a remarkably full one. Thirty-nine genera of mammals are listed here and it is probable that the number will be considerably increased by future collecting. Nearly all the known genera of the Upper Miocene and Lower Pliocene are present. The material is mostly fragmentary, but a number of more complete specimens have been secured, and the great numbers of individuals afford a much surer basis for distinguishing species than is usually the case in vertebrate palæontology. It will be understood that the "species" as here listed usually include a rather wide range of variation. They correspond to the older concept of the term, and by no means to the fine splitting that is customary among modern systematic zoologists. Such hair-splitting does not seem desirable at present in vertebrate palæontology, even if it be practicable on our usually fragmentary material. After all the larger novelties have been recognized and put on record it will be time enough to classify the minor differences

[1] Cook, H. J. 1912. Faunal Lists of the Tertiary Formations of Sioux Co., Nebraska. Neb. Geol. Sur. Rep., VII, pp. 33–45. 1914. A New Canid from the Lower Pliocene of Nebraska. Idem, part 7, pp. 49–50, Pll. I–III. 1915. Note on the Dentition of Amphicyon amnicola. Idem, part 10, pp. 57–58, Pl. I. 1915. Notes on the Geology of Sioux Co., Neb., etc. Idem, part 11, pp. 59–75, Pl. I.

[2] Dr. Merriam has not at the date of writing published this opinion, so far as I am aware; but the evidence that he has brought forward in a series of articles in the California University Geological Bulletin points very strongly to that conclusion, as he has made clear in discussions before the Palæontological Society.

and consider their nature and causes. That is very nearly the status at which systematic mammalogy has arrived; but we are a long way from having reached it with most fossil mammal faunas.

Although I have not listed fossil anthropoids as part of the fauna, it may be well to repeat that certain isolated teeth in the collection, provisionally referred to *Prosthennops*, are singularly like those of anthropoid apes. See Matthew and Cook, 1909, p. 390.

Snake Creek Faunal List

Revised, 1917

("P", in Princeton collection but not represented in American Museum; "H. C.," Harold Cook collection)

Carnivora (Feræ)

Canidæ

Pliocyon medius Matthew	skull; parts of jaw
" *amnicola* M. and C.	lower jaw
" sp. max.	parts of jaws
Ælurodon haydeni validus M. and C.	lower jaws, teeth
" *sævus secundus* M. and C.	" "
" *wheelerianus taxoides* Hatcher	" "
Tephrocyon mortifer Cook	" "
" *hippophagus* M. and C.	upper and lower jaws
" *temerarius* (Leidy)	lower jaws
" *confertus*, new species	"
Leptocyon vafer (Leidy)	"

Procyonidæ

Probassariscus antiquus (M. and C.)	part of jaw

Mustelidæ

Brachypsalis modicus, new species	upper and lower jaws
" *obliquidens* Sinclair	lower jaw
Martes glareæ Sinclair	lower jaws

Ursidæ

Indarctos sp.	m^2 (H.C.); skel. bones

Felidæ

Pseudælurus intrepidus sinclairi, new var.	lower jaws
?*Felis* cf. *maxima*	teeth, bones
Felinæ and Machærodontinæ indet.	bones

Rodentia (= Glires)

Mylagaulus cf. *monodon*	teeth, lower jaws
Dipoides tortus Leidy	upper and lower jaws
" *curtus* M. and C.	lower jaw
Amblycastor fluminis, new gen. and sp.	upper and lower jaws
Geomys cf. *bisulcatus* Marsh	lower jaw

Edentata (Xenarthra)

?Megalonychid gen. and sp. indet.	claw; navicular (P.)

Proboscidea

Mastodontidæ

Zygolophodon sp.	teeth
Trilophodon (= *Gomphotherium*) sp.	"

Perissodactyla

Rhinocerotidæ

Teleoceras sp.	lower jaw, teeth, etc.
Aphelops ?crassus (Leidy)	upper and lower jaws, etc.
Peraceras ?superciliosus Cope	skull, etc.

Equidæ

?*Archæohippus* sp.	teeth (P.)
Parahippus cognatus Leidy	upper and lower jaws
Hypohippus ?affinis Leidy	teeth
" *pertinax*, new species	upper and lower jaws
Merychippus insignis Leidy	" " common
" *calamarius* (Cope)	" " "
Protohippus perditus Leidy	teeth
" *placidus* Leidy	upper and lower jaws
Pliohippus mirabilis (Leidy)	teeth
" *leidyanus* Osborn	skeleton, etc.
Hipparion occidentale Leidy	teeth
" *gratum* Leidy	"

Artiodactyla

Dicotylidæ (= Tagassuidæ)

Prosthennops cf. *crassigenis* Gidley	jaws
" cf. *serus* Cope	teeth

Oreodontidæ	
Metoreodon relictus M. and C.	upper and lower jaws
" *profectus* M. and C.	" "
Pronomotherium siouense Sinclair	lower jaw (P)
Camelidæ	
Pliauchenia gigas M. and C.	skull, teeth, bones
" cf. *vera* Matthew	jaws, teeth
" sp. max. indesc.	upper jaw
Alticamelus procerus M. and C.	skull, jaws, skel. parts, etc.
" sp.	upper jaw, teeth
Procamelus cf. *occidentalis* Leidy	jaws, teeth
" cf. *robustus* Leidy	" "
" cf. *gracilis* Leidy	" "
Protolabis princetonianus Sinclair	skull (P), jaws, etc.
? " sp.	jaws, teeth
Palæomerycidæ	
Dromomeryx whitfordi Sinclair	jaws
" sp.	jaw fragments, teeth
Drepanomeryx falciformis Sinclair	horn (P)
Cervidæ	
Blastomeryx elegans M. and C.	jaws
" *wellsi* Matthew	"
Cervavus sinclairi, new species	"
" sp.	jaw fragments, teeth
Antilocapridæ	
Merycodus necatus Leidy	skulls, jaws, etc.
" sp.	teeth
?**Bovidæ** (or **Giraffidæ**)	
Neotragocerus improvisus M. and C.	horn
Cranioceras unicornis, new species	" , ? jaw
Aves	
Aquila danana ? Marsh	metatarsus (*P*)
Geranoaetus sp.	"
Buteo near *borealis*	(*P*)
Reptilia	
Alligator sp.	jaw, limb bones, etc.
Testudo sp. max.	fragments of shell
Lacertilians indet.	jaws

Amphibia

Plicagnathus matthewi Cook	part of jaw (H. C.)

Pisces

Ameiurus sp.	jaw, parts skull, etc.

CARNIVORA

Canidæ

Tephrocyon Merriam

The practical distinction of this genus from *Canis* in the lower jaws, which are most frequently found, is the invariable presence of a well developed paraconid on m_2. This is not uncommon as a vestigial cusp in some modern species of *Canis*, especially the Central and South American species and the jackals of the Old World. I have not observed it in the foxes. The genus includes the structural ancestors of *Ælurodon, Canis, Vulpes, Lagopus*, not of *Cyon, Icticyon, Lycaon* or of any Tertiary genera other than *Ælurodon*. Four species are recognized in the Snake Creek as follows:

Tephrocyon mortifer Cook. Size of wolf. Jaws heavy, long, premolars large.

Tephrocyon hippophagus Matthew & Cook. Size of coyote; but jaw decidedly shorter, teeth stouter, less compressed.

Tephrocyon temerarius Leidy. Size of fox; but jaw decidedly shorter, teeth stout, not compressed, premolars larger, metaconid of m_1 large, m_2 more than half length of m_1, heel of m_1 wider, about one-third length of tooth.

Tephrocyon confertus sp. nov. Somewhat smaller than *T. temerarius*. Carnassial more compressed, premolars decidedly smaller, m_2 less than half m_1, metaconid of m_1 small, heel of m_1 about one-fourth length of tooth. Canine quite small.

There are two other described species of *Tephrocyon*, the type *T. rurestris* (Condon), which is from the Mascall, and *T. kelloggi* Merriam from the Virgin Valley formation. Their characters and relations to the Nebraskan species have recently been summarized by Dr. Merriam.[1] Other undescribed species from various horizons are apparently represented in the American Museum's collections, the genus covering a fairly wide range of variation.

[1] Merriam. 1913. Notes on the Canid genus *Tephrocyon*. Univ. Cal. Publ., Bull. Dept. Geol., VII, pp. 359–372. Separata, Sept. 23, 1913.

It appears to constitute the ancestral group from which *Canis, Vulpes, Lagopus, Urocyon,* all in fact of the typical group of modern Canidæ, are derived. In turn, it is derived from *Cynodesmus* of the Lower Miocene, in which the carnassial shear is more transverse, the brain-case smaller, brain more primitive, and feet shorter, less compressed, more nearly pentadactyl. The European *Galecynus* may be identical with *Cynodesmus,* although from a somewhat later horizon, but its teeth are not sufficiently known for exact comparison. The generic reference of the Oligocene American species of typical Canidæ requires revision; two generic names

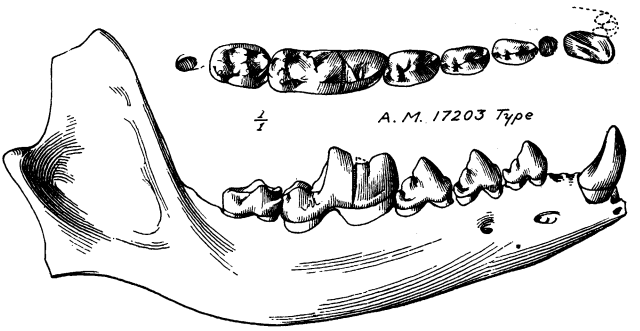

Fig. 1. *Tephrocyon confertus,* new species. Lower jaw, type specimen, external view with crown view of teeth; natural size. Snake Creek beds, expedition of 1916.

are available, *Nothocyon* Matthew, type *N. geismarianus* of the John Day,[1] and *Pseudocynodictis* Schlosser,[2] types *Canis gregarius* Cope, *lippincottianus* Cope, and *Cynodictis temnodon* Wortman and Matthew of the White River Oligocene. The European *Cynodictis,* as Père Chardin has clearly shown[3] is not congeneric with the American Oligocene species which have been referred to it but covers a stage of evolution fairly intermediate between them and the Middle Eocene *Miacis.*

Leptocyon, new genus

Jaws slender, compressed, premolar region long, premolars spaced, compressed, with prominent accessory cusps. Heel of m_1 with low marginal entoconid crest obscurely divided into two cusps. Paraconid of m_2 low, vestigial, shelf-like. M_3 very small.

[1] *Hesperocyon* Scott, 1890, was presumably intended for the typical Canidæ of the John Day and antedates *Nothocyon,* but is a *nomen nudum.*

[2] Schlosser. 1902. Beitr. z. Kennt. d. Säug süddeut. Bohnerzen, Koken's Geol. u. Pal. Abh., V, Heft 3, p. 50.

[3] Teilhard de Chardin. 1915. Ann. de Paléont., IX; Les Carnassiers des Phosphorites du Quercy, pp. 29–30.

Leptocyon vafer (Leidy)

Two lower jaws in the 1916 collection are referred to this species. The better one, No. 17201, shows p_4 to m_2 and alveoli of the remaining teeth; the second, No. 17202, has m_{1-2} complete.

Affinities. Although more progressive than *Tephrocyon* in the vestigial paraconid on m_2 the peculiar heel of m_1 does not suggest direct affinities to modern *Canis*. The proportions of the jaw show to an exaggerated degree the slenderness of the modern foxes especially some of the South American species. Although it parallels the foxes in this respect, yet both *Vulpes* and *Lagopus* appear to be too closely related in dentition to *Canis* to be separately descended from *Leptocyon* instead of *Tephrocyon*. Skulls, if known, would afford more decisive evidence.

Pliocyon, new genus

Dentition $\frac{3.1.4.2\text{-}3}{3.1.4.3}$. Tubercular dentition relatively large, carnassial teeth reduced, premolars much reduced, stout, short, canines and lateral incisors very large. Protocone of p^4 anterointernal, molars trigonal, wide transversely, conules small, not distinct; posterointernal shelf moderate. M_1 with distinct metaconid, broad heel, hypoconid crest submedian, entoconid a low internal shelf.

Whether this group of dogs deserves full generic separation from *Amphicyon* may appear open to question. The teeth are much as in *A. giganteus* save that the molars are less quadrate, m^3 is usually absent, the protocone of p^4 more anterior in position, and the inner halves of m^{1-2} more extended inward. It includes a group of species which have been commonly referred to *Amphicyon* by American authors, but Schlosser and other European authorities have always looked somewhat askance upon this procedure, and it has been generally recognized by my confrères here that the reference was questionable. The discovery of a well preserved skull in the Snake Creek beds enables me to define this American group more clearly and to determine its affinities more definitely.

Wortman in 1901 [1] in describing *Amphicyon americanus* (Upper Miocene) expressed the opinion that it was a descendant of *Daphœnus* of the White River Oligocene. Hatcher in 1902 [2] adopted this view, and described as a new genus, *Proamphicyon*, a species from the White River admittedly closely related to *Daphœnus* but considered as more directly ancestral to the American amphicyons. Matthew in 1903,[3] while questioning this view of

[1] Wortman. 1901. Amer. Jour. Sc., II, pp. 200–204.
[2] Hatcher. 1902. Mem. Carn. Mus., I, pp. 65–108, Pl. XIV–XX.
[3] Matthew. 1903. Science, XVII, p. 912; 1910, Bull. 361 U. S. G. S., p. 105.

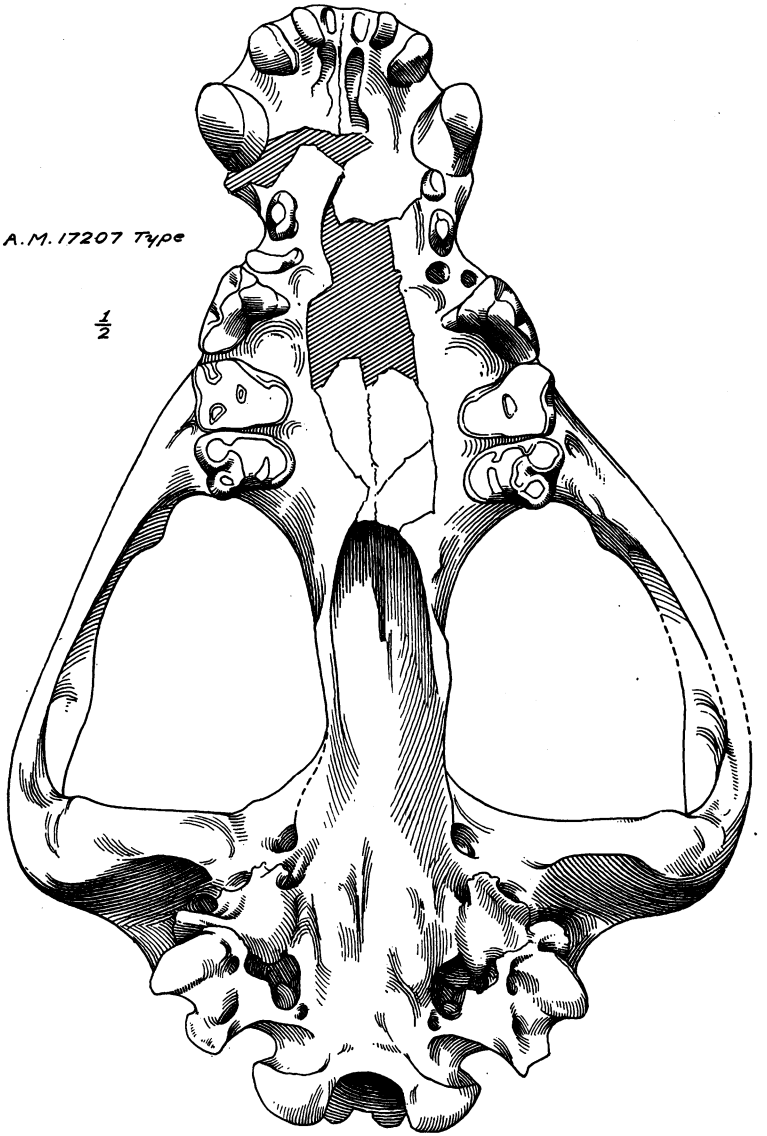

Fig. 2. *Pliocyon medius*, new genus, new species. Type skull, under side; half natural size. Snake Creek beds.

the phylogeny, regarded *Proamphicyon* as not generically separable from *Daphœnus*. Peterson in 1910[1] also expressed the view that these American amphicyons are descended from *Daphœnus* through *Daphœnodon*, a new genus based upon a finely preserved skeleton from the Lower Miocene. Such, at least, I gather to be the substance of his opinion and quite agree with it, although I cannot see that the view affords any support to Hatcher's separation of *Daphœnus* into three genera.[2] While it is quite possible that the three species upon which these three genera were based form the starting point for three important phyla, they are nevertheless closely allied species, separated by the usual amount of structural divergence that divides one canid species from another of the same genus. Only the most radical exponent of the phyletic view of classification — and Peterson is by no means such — should see in this a reason for reviving Hatcher's generic names. And a consistent application of the same view would necessarily make *Daphœnodon* a synonym of one of Hatcher's "genera," *Proamphicyon*.

The only generic names which need to be considered for this American group are *Borophagus* Cope[3] and *Borocyon* Peterson,[4] both founded upon material in which I am quite unable to find any generic characters. Peterson cites as the generic characters of his genus some which are common to all or nearly all Canidæ while the others are common to several known genera. If topotypes are found, it may become possible to define it properly. It is from the Upper Harrison, a formation whose fauna has hardly any genera in common with the Snake Creek. It is therefore very improbable that it will prove to be identical with the present genus. *Borophagus* Cope is from the Blanco and must likewise await the discovery of topotypes before it can be validated. There are several distinct genera of large Canidæ or Ursidæ, described and undescribed, to any one of which it may prove to belong.

Pliocyon medius, new species

Size of "*Canis*" *ursinus* Cope, with which it may possibly prove identical, but exact comparisons cannot be made at present.

Size of skull about that of *Ursus arctos*.

M^3 absent, m^1 and m^2 subequal, similar in proportions and construction. Premolars small, short, robust. P^4 smaller in bulk than m^1, with small anteriorly placed internal cusp. P^3 two-rooted, obliqely set in the jaw. P^2 somewhat smaller, two-rooted, not oblique. P^1 one-rooted. C^1 large, stout, prominent laterally but directed

[1] Peterson. 1910. Mem. Carnegie Mus., IV, pp. 259–262.
[2] Peterson thinks that it does. See *loc. cit.*, p. 261.
[3] Cope. 1892. Amer. Nat., XXVI, p. 1028.
[4] Peterson. 1910. *Loc. cit.*, p. 263.

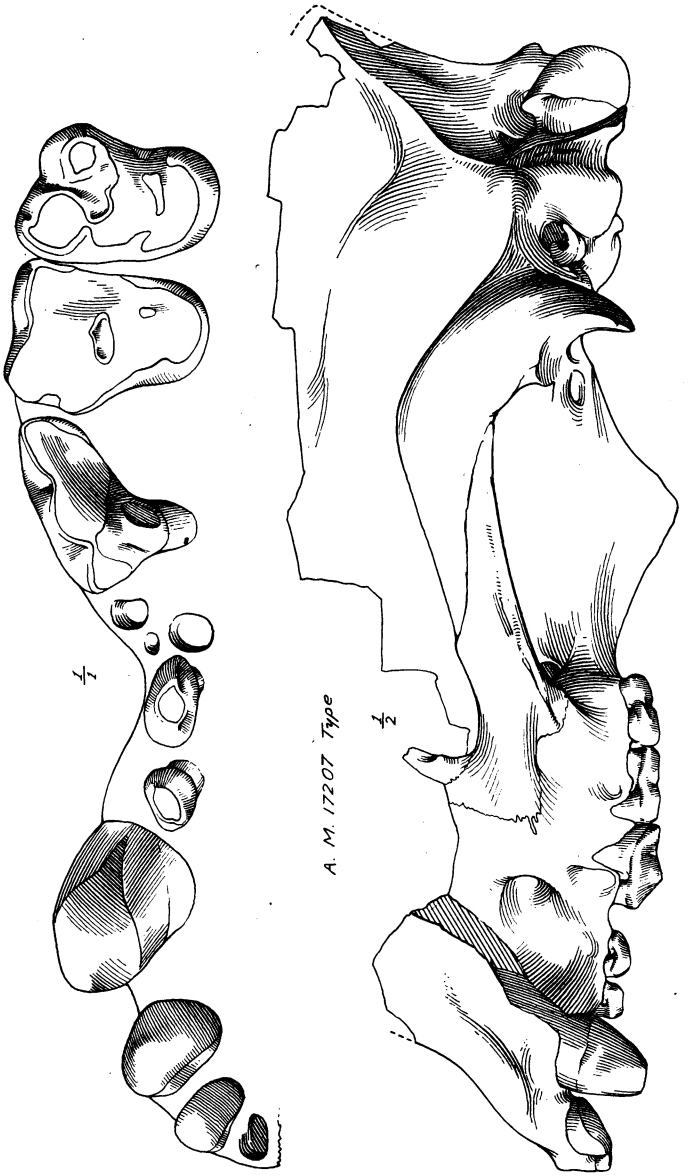

Fig. 3. *Pliocyon medius.* Upper teeth, natural size; and side view of skull, half natural size; type specimen, Snake Creek beds, expedition of 1916.

downward and somewhat forward. I^3 exceptionally large and stout. I^2 of more moderate size. I^1 smaller. Incisors set in a transverse row, not crowded. A short diastema between c^1 and i^3; no postcanine diastema.

Zygomatic arches stout and wide. Glenoid articulations large, postglenoid processes wide and moderately high, postglenoid foramen distinct. Tympanic comparatively small with a considerable bony meatus external to it. Mastoid process prominent, stout, constricted at base. Paroccipital process short spatulate, directed backward and very little downward. The base of the tympanic bulla is reflected at its anteroexternal margin over the back of the glenoid articulation from the postglenoid foramen nearly to the eustachian canal; and the mastoid border is similarly reflected over the posteroexternal margin of the bulla. Posterior lacerate foramen very large, oval, condylar foramen separate, small.

Palate extending only slightly behind m^2; pterygoid plates of palatines high, not approximated. Basicranial region wide, condyles large.

Occiput broad inferiorly with high occipital crest; sagittal crest high. Upper part of skull anteriorly unknown.

This species affords an interesting comparison with the Lower Miocene *Daphœnodon*. The premolars are further reduced; the molars, especially m^2, enlarged; m^3 lost; the incisors and canines enlarged; the arches much heavier and wider; the sagittal and occipital crests higher; the bulla more reduced; posterior lacerate foramen enlarged; mastoid process more prominent and robust — all characters showing a further progress on the lines of *Daphœnus-Daphœnodon*. Only in the paroccipital process is there a decided anomaly, for *P. medius* retains the primitive backward direction which is partly lost in *Daphœnodon*[1] and is completely lost in the modern *Canis*.

Comparison with the European amphicyons is not possible as they are known only from fragmentary material, save for certain older species which are of doubtful reference to the genus and far more primitive than the present form. *Dinocyon thenardi* is still less known; "*D.*" *goriachensis* is removed by Schlosser to *Hemicyon* and is clearly much more bear-like in dentition, the molars more quadrate, the inner cusp of p^4 more median in position. Schlosser associates the typical *Dinocyon, D. thenardi,* with his cynodontine group, which would indicate that it differs from *Pliocyon* in the same way, provided it conforms to the diagnosis of the group.[2]

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[1] If Peterson's figure is correct.

[2] The American genera placed by Schlosser (in Zittel's Grundzuge der Palæontologie II Abth., Vertebrata, Revised Edition, 1911) in one or another of the canid "subfamilies" are very far from conforming to the diagnosis of the divisions to which they are assigned, and present, in fact, a very heterogeneous association. Any attempt at working out satisfactorily the phylogeny of the Canidæ and their relatives requires a far more intimate acquaintance with the American Oligocene, Miocene, and Pliocene species than has been displayed by any European writer.

Mustelidæ

Martes glareæ Sinclair

A lower jaw, No. 17208, agrees with Sinclair's type. It adds nothing of importance to the known characters of the species.

Brachypsalis modicus, new species

Type, a lower jaw, No. 17209, with canine and p_2–m_1 r. and alveoli of the remaining teeth.

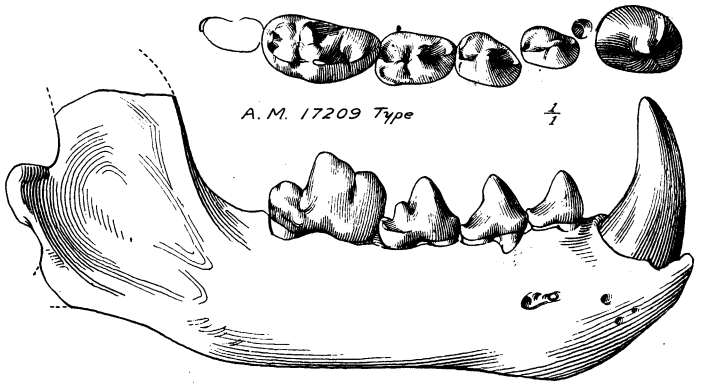

Fig. 4. *Brachypsalis modicus*, new species. Lower jaw, external view, and crown view of teeth; natural size. Snake Creek beds, expedition of 1916.

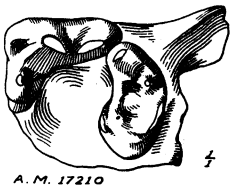

Fig. 5. *Brachypsalis modicus*. Fragment of upper jaw (topotype) referred to this species. Crown view, natural size, showing upper carnassial and first molar.

Distinguished from *B. pachycephalus* by more slender jaw, longer and much shallower beneath the molars, premolars less robust, m_1 smaller and more compressed, with smaller heel.

Part of an upper jaw, No. 17210, is provisionally referred to *B. modicus*. It differs from "*Ælurodon*" *hyænoides* Cope, which probably represents

the upper dentition of *Brachypsalis pachycephalus* or some related species, in the somewhat larger size of the molars, *pr.* and *pa.* of p^4 smaller, inner half of m^1 slightly broader, alveolus of m^2 apparently smaller.

Brachypsalis obliquidens Sinclair

This species differs from Cope's type of *B. pachycephalus* in an opposite sense from *B. modicus.* It is represented in our collection by No. 17211 and a few unnumbered fragments.

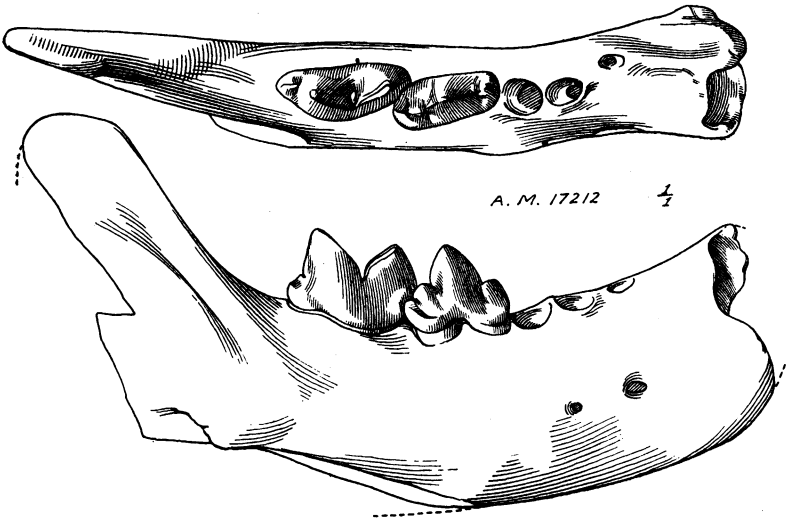

Fig. 6. *Pseudælurus intrepidus sinclairi,* new subspecies. Lower jaw of type, superior and external views; natural size. Snake Creek beds, expedition of 1916.

Felidæ

Pseudælurus intrepidus Leidy *sinclairi,* new variety

A lower jaw, No. 17212, is more complete than the specimen referred here by Sinclair and confirms the close relationship to Leidy's species. The most significant difference is the further reduction in the Snake Creek specimen of the vestigial metaconid and heel of m_1, constituting a closer approach to true *Felis.* The size is somewhat smaller and the mental foramina somewhat more posteriorly placed, in both particulars agreeing with Sinclair's specimen.

RODENTIA

Castoridæ

Amblycastor, new genus[1]

Large rodents apparently related to *Steneofiber* and *Euhapsis*, the cheek teeth of similar pattern so far as known, but relatively broader, $p\frac{4}{4}$ relatively large, molars reduced and tending to become caducous. Incisor large, robust, with very convex anterior surface and numerous longitudinal grooves. Jaw extremely short and wide with very short diastema.

Amblycastor fluminis, new species

Type No. 17213, right lower jaw with p_4 complete, from Snake Creek beds, Lower Pliocene, 20 miles south of Agate, Sioux Co., Nebraska. Found by A. C. Whitford and George Stoll of the American Museum Expedition of 1916.

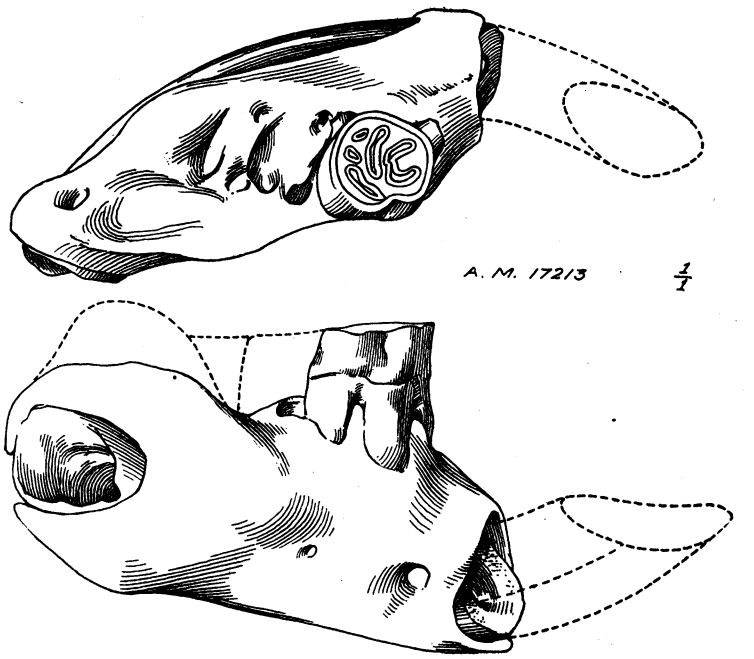

Fig. 7. *Amblycastor fluminis*, new genus, new species. Lower jaw of type, external and superior views; natural size. Snake Creek beds, expedition of 1916.

[1] Derivation: ἀμβλύς, blunt, κάστωρ, beaver — in reference to the very short blunt muzzle, indicated by the proportions of the lower jaw.

The incisor is broken off at the alveolar border, and the back part of the jaw is broken away behind the posterior end of the incisor, the angle, condyle and coronoid processes missing and the specimen considerably waterworn. The posterior end of the symphyseal suture is preserved.

The premolar is 13 mm. long and 12 wide with a backwardly directed external inflection and four closed lakes similar in form and relations to the lakes in p_4 of *Euhapsis* at a corresponding stage of wear, and like them no doubt derivatives of the three internal inflections. The anterior lake is recurved to the form of a horseshoe with its ends pointing anterointernally, and occupies the anterior segment of the tooth. The median lake is transverse, extending from near the middle of the inner border about two thirds across the tooth, and moderately concave anteriorly. The posterior pair of lakes are small, oval, lying between the end of the external inflection and the posterointernal border of the grinding surface.

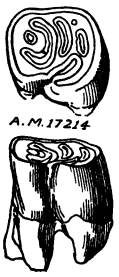

Fig. 8. *Amblycastor fluminis*. Lower premolar, p_4 of the left side, less worn than in the type specimen. Natural size, crown and external views. Topotype.

The alveoli of the true molars have been partly closed and are further obscured by wear. The alveoli of m_1 and m_2 are still distinguishable as containing each an anterior and a posterior root, very wide transversely, the anterior root bifid; they are about as wide as the premolar but much shorter anteroposteriorly. The alveolus of m_3 is almost entirely closed, but the traces remaining indicate a smaller tooth.

The diastema is very short, only 9 millimetres on the specimen, but the bone may have extended further forward as a thin casing over the incisor. It extends downwards, inwards and forwards about equally from the anterointernal corner of p_4.

The incisor is very stout, very convex on the anterior face so that its cross-section is a broad ovoid, wider anteriorly. It is rather sharply curved, the root appearing on the outer surface just posterior to m_3. The enamel is heavily striated longitudinally. The posterior end of the symphysis is opposite the middle of p_4; it is not extended downwards below the level of the incisive alveolus.

To this species should probably be referred the upper jaw fragment with p^4–m^1 described and figured by Matthew and Cook under a provisional reference to *Hystricops venustus* Leidy. A reexamination of Leidy's type makes it appear improbable that it could belong to the same animal as the jaw here described. Its pattern approaches too closely to that of *Hystrix* and *Erethizon*, while in the new genus the correspondence in pattern of the premolars to *Steneofiber* almost certainly would involve a corresponding resemblance in the true molars. Moreover, I find it impossible to place the type tooth of *H. venustus* anywhere in the dentition of the present genus. It is not a premolar and is much too long and narrow for a true molar of *Amblycastor*.

Affinities. The animal is apparently a large and specialized descendant of the *Steneofiber-Euhapsis* group of the Lower Miocene. It parallels *Myla-*

gaulus in the enlargement of $p\frac{4}{4}$ and reduction of the true molars, short wide jaw, etc., but it is not nearly related. It differs from *Eucastor* and *Castoroides* in these features, and the pattern of the grinding teeth shows little tendency to conversion into parallel oblique plates of enamel but, as in *Mylagaulus*, is converted by wear into a series of closed lakes, whose arrangement, however, is that of *Steneofiber* and wholly unlike that of the mylagaulids. The convex, striated enamel face of the incisor is not unlike *Castoroides* but the proportions of the jaw, pattern, and relative size of the grinding teeth forbid any closer affinity than a possible common descent from the Oligocene *Steneofibers*. Hystricomorph affinities are apparently excluded by the relations of the incisor to the axis of the jaw, which accord with those in *Steneofiber* and *Euhapsis*.

The genus is accordingly referred to the Castoridæ (*sensu lato*), its nearer affinities being with the group of species from the American Upper Oligocene and Lower Miocene referred to *Steneofiber*, and perhaps more especially to the genus *Euhapsis* closely related to this group.

It is the largest known rodent from North America, excepting *Castoroides*, and is exceeded in size only by the capybara among living members of the order.

Proboscidea

Sinclair has already called attention to the two types of *Mastodon* teeth found in the Snake Creek fauna. One is a zygolophodont type, allied presumably to *M. americanus*, the other a bunolophodont type of doubtful affinities.

The zygolophodont teeth are, however, quite as close to certain Mio-Pliocene species as they are to *M. americanus* and intermediate between the two. The North American Miocene species of this group are

M. brevidens Cope. Type, m^3; Middle Miocene, Montana.
M. serridens Cope. Type, m^2; Lower Pliocene, Texas.

No additional material of *M. brevidens* is known. To *M. serridens* is referred a fine skull and jaws from the Clarendon of Texas found by J. W. Gidley and now in the American Museum. This specimen will be described later by Professor Osborn; it is here noted merely to point out that the species has much the characters and proportions of *M. productus*, the distinct type of teeth and straighter upper tusks being the most notable distinctions. As in all Miocene proboscideans one or more of the permanent premolars are functional. It could not be referred to the same genus as the American

mastodon. *Zygolophodon* Vacek, 1877, type *Mastodon tapiroides* Cuvier,[1] appears to be available as a generic name for this group of species. The molars are distinguished from those of the *M. americanus-borsoni-progenium* group by the narrower proportions, with traces of subsidiary cusps appearing as ridges running downward and somewhat inward from the outer part of each transverse crest, and by the much more primitive condition of the tusks. The lower jaw is elongate with a pair of stout lower tusks; the upper tusks nearly straight with enamel band on outer side. $P\frac{3-4}{3-4}$ are functional teeth in the Lower Pliocene *Z. serridens*. I suspect that the later Pliocene species may have been more advanced than this, nearer to *M. americanus* in tusks and skull characters; but there is no adequate proof of this at present.

The Snake Creek species is very likely distinct from *M. serridens*, but until better material than isolated teeth is at hand it is not advisable to name it. I refer it therefore as *Zygolophodon* aff. *serridens* (Cope).

A bunolophodont species also occurs in these beds but it does not appear possible to determine its affinities until better specimens are secured. The bunolophodont genera are

1. *Gomphotherium* Burmeister, 1837; type, *M. angustidens* Cuvier.[2]
   Synonyms.—*Trilophodon* Falconer, 1842; type, *M. angustidens*.
   Tetrabelodon Cope, 1884; type, *M. angustidens*.
   ?Dibelodon Cope, 1884, gen. indet.; type, *Mastodon shepardi* Leidy.[3]
   Bunolophodon Vacek, 1877; type, *M. angustidens*.[4]
2. *Tetralophodon* Warren, 1852; species, *M. latidens* Clift, *M. arvernensis* Croiz. et Job., and *M. sivalensis* Cautley.
   Synonym.— *Anancus* Aymard, 1855; type, *A. macroplus* = *M. arvernensis*.[5]
3. *Pentalophodon* Falconer, 1857; type, *M. sivalensis* Cautley.
4. *Rhyncotherium* Falconer, 1868; type, an unnamed Mexican species. Beak of jaw sharply deflected; lower tusks present.

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[1] The included species are *M. tapiroides, turicensis, ?pentelici*, and *borsoni*. The first is the earliest described, is first mentioned in Vacek's diagnosis of the group, and was apparently the species primarily in mind in distinguishing it. It is therefore selected as type. The type of *M. tapiroides* is a part of a molar from the Calcaire de Montabuzard near Orleans (Lower Miocene); Vacek figures a perfect second lower molar from Murinsel in Croatia which is very like our Snake Creek species.

[2] Type specified by Gloger, 1841, who misspells the name "*Gamphotherium*."

[3] The type of *M. shepardi* is part of an upper tusk (in Amherst Museum) from Dry Creek, Stanislaus Co., Cal. In the original description the species is based solely upon this specimen; a tooth from another locality is mentioned but is referred to *M. obscurus*. The tusk has a strip of enamel, but is not further determinable.

[4] The included species are *M. angustidens, longirostris, arvernensis, atticus*, and *pentelici*, of which *angustidens* is first mentioned and in other ways appears to be the proper lectotype species.

[5] Auct. Lydekker. Brit. Mus. Cat. Foss. Mam. part iv.

5. *Stegomastodon* Pohlig, 1911; type, *M. mirificus* Leidy.
   Synonym.— *Rhabdobunus* Hay, 1914[1]; type, *M. mirificus.*
   Some, if not all, of the South American species are probably referable to this genus.
6. { *Eubelodon* Barbour; type, *E. morrilli* Barbour.
   { *Megabelodon* Barbour; type, *M. lulli* Barbour.[2]

PERISSODACTYLA

Rhinocerotidæ [3]

Three types of rhinoceroses occur in the American Pliocene; two of them, as yet, imperfectly known. They are:

1. *Teleoceras.* Mesaticephalic, nasals pointed, laterally compressed, with small median horn-core at tip; occiput subvertical, broad with wide

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[1] It is most regrettable that the laws of priority require that Dr. Hay's name be set aside in favor of the one proposed by Pohlig in a short notice in the Bull. Soc. Geol. Belg. Pohlig's paper consists chiefly of a description of a lower jaw of the American mastodon in the Krantz collection, in which two small tusks are present, and an attempt to prove that this species is found only in the Tertiary of North America and did not survive to the Pleistocene. He appears to be very imperfectly acquainted with the considerable body of American literature on the lower tusks of *M. americanus.* Pohlig states that he has critically examined the evidence as to geological age in all the recorded occurrences of the mastodon in this country, and that none furnish any proof of post-Tertiary age; that the only occurrence in which there is any evidence as to geologic age is in the Charleston phosphate deposits, where the mastodon is associated with a Tertiary fauna. It is, of course, well known to most palæontologists that *Mastodon americanus* occurs only in interglacial or postglacial deposits in this country. It has never been found in any preglacial formation. As for the Charleston phosphates, it is equally well known that they are a mixed fauna in which the marine element is derived from two Tertiary horizons, while the terrestrial mammals are without any certain exception all Pleistocene. The mastodons there (*M. americanus* and *obscurus*) are accompanied by *Elephas primigenius, E. columbi, Equus* sp. div., and other well known Pleistocene types in abundance.

Pohlig finally refers to a mastodon tooth which he has seen in the collection of F. Krantz in Bonn and which had been identified as *M. mirificus,* and observes that this specimen has a certain amount of cement deposited in the valleys. This he believes is unique among mastodons, and proposes for this tooth the name of *Stegomastodon.* The presence of cement in the valleys of *Mastodon andium* teeth was recorded, however nearly a century ago, and has since been well known to European writers, and is noticed in European text-books.

Nevertheless, Pohlig's name must stand for the genus represented by "*Mastodon*" *mirificus,* of which a fine skull and jaws have been on exhibition for some fifteen years in the American Museum collection. The distinctive characters of the genus were pointed out by Hay when proposing his name *Rhabdobunus.* The lower incisors are absent; the molars are bunolophodont; m_3, complex; m_{1-2}, early deciduous; the upper tusks curve upward and have no external enamel strip.

In this same short paper, Pohlig proposes another new Proboscidean genus, *Promastodon,* from the Puercol of North America. Whether this is intended to be a new name for *Polymastodon,* together with a new view as to its affinities, is not clear; the name seems to be a *nomen nudum.*

[2] These genera represent a Pliocene stage of American mastodons corresponding in some respects to *Tetralophodon,* but distinguished by extreme length of the lower jaw. "*Mastodon*" *campester* Cope and *M. dinotherioides* Andrews fall into this group.

[3] See Osborn's Revision of the Miocene Rhinoceroses in Bull. Amer. Mus. Nat. Hist., XX, 1904, pp. 307–326. Additional material from various formations leads to some modifications in Osborn's diagnoses and arrangement of the species.

vertex; upper incisors strong, lower tusks curving upward; premolars reduced, molars hypsodont. Lower limbs and feet very short.

2. *Aphelops.* Dolichocephalic, nasals long, pointed, not compressed, hornless or with rudimentary pair of horn-cores near tip; occiput vertical or backwardly projecting, narrow; upper incisors absent or weak, lower tusks heavy, procumbent; premolars unreduced, molars brachyodont. Lower limbs and feet rather long.

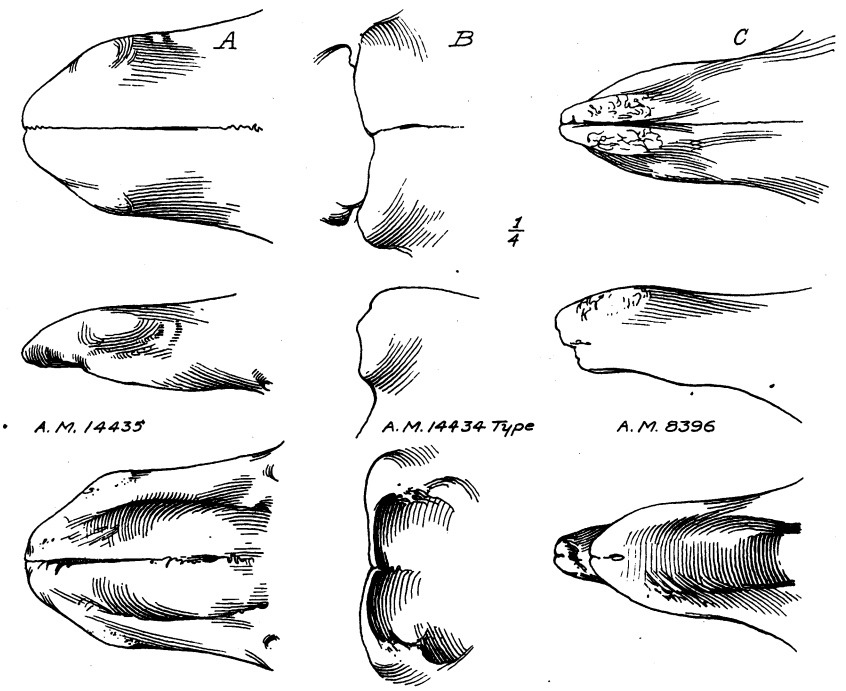

Fig. 9. Nasal bones of three American Pliocene rhinoceroses superior, lateral and inferior views: (A) *Aphelops* sp., cf. *ceratorhinus;* (B) *Peraceras troxelli;* (C) *Teleoceras fossiger.* All from Lower Pliocene of Nebraska and Kansas. One-fourth natural size.

3. *Peraceras.* Brachycephalic, nasals much abbreviated, square-ended, hornless; occiput pitched strongly forward, broad at base but much narrower at vertex; upper incisors absent; premolars unreduced, molars brachyodont. Lower jaws and skeleton not certainly known.

The first two of these genera are represented in the later Miocene (Pawnee Creek beds) by species of smaller size and more primitive characters, less differentiated one from the other than their Pliocene representatives.

These are *Aphelops megalodus* Cope and *Teleoceras medicornutus* Osborn, the latter including *Aphelops planiceps* Osborn and the specimens referred by Cope to *Aphelops crassus*. The ancestry of *Peraceras* is, as yet, unknown.

In the Snake Creek beds there are at least two distinct types of rhinoce-

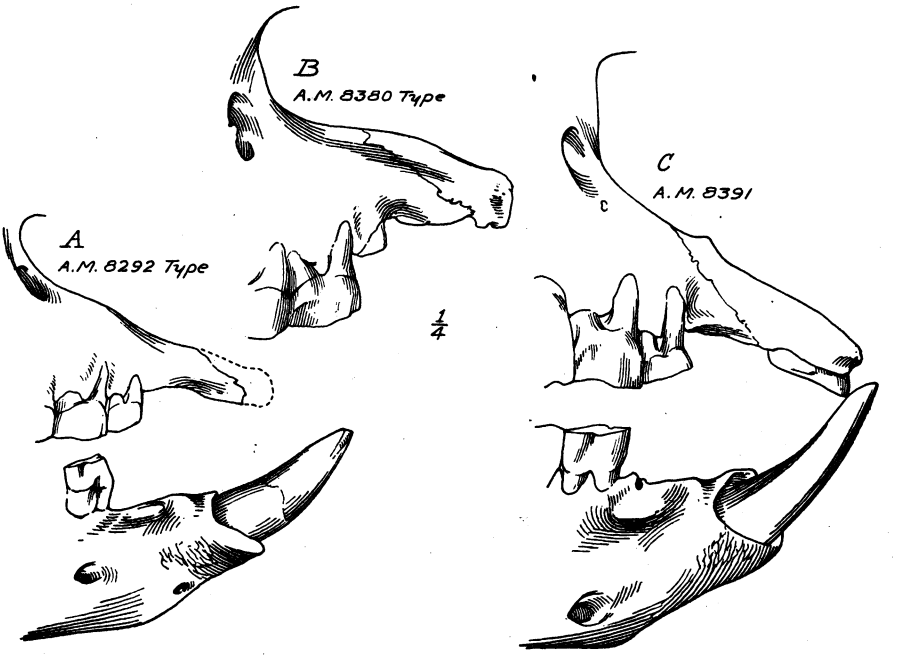

Fig. 10. Premaxillæ and tusks of *Aphelops*, *Peraceras*, and *Teleoceras*. (A) *A. megalodus*, Upper Miocene (Pawnee Creek beds) of Colorado; (B) *Peraceras superciliosus*, Lower Pliocene (Republican River beds) of Kansas; (C) *Teleoceras medicornutus*, Upper Miocene (Pawnee Creek beds) of Colorado. All one-fourth natural size.

ros, one a species of *Teleoceras*, the other apparently identifiable with *Aphelops crassus* Leidy (which, however, may be a species of *Peraceras*). *Peraceras* has not been recognized at the typical locality but a skull referable to it was secured some miles to the eastward in supposed Snake Creek beds. Very probably it is represented by some of the separate teeth of subbrachyodont rhinoceroses from the type locality, which are distinct from *A. crassus* but afford no reliable data for specific reference.

Aphelops Cope, 1874

Plates IV, V, and X

The type of this genus is *A. megalodus* from the Pawnee Creek beds of Colorado. A number of Lower Pliocene species of much larger size but with similar skull proportions, dentition, and, as it now appears probable, similar skeletal proportions have been referred to it. These are

A. malacorhinus Cope, 1881	Republican River, Neb.
A. ceratorhinus Douglass, 1903	Madison Valley, Mont.
A. montanus Douglass, 1909	Flint Creek, Mont.
?*A. crassus* (Leidy), 1858	Nebraska.
??*A. meridianus* (Leidy), 1865	Texas and New Mexico.

The first three are based upon more or less complete skulls. The last two, based upon isolated and imperfect upper teeth, are provisionally

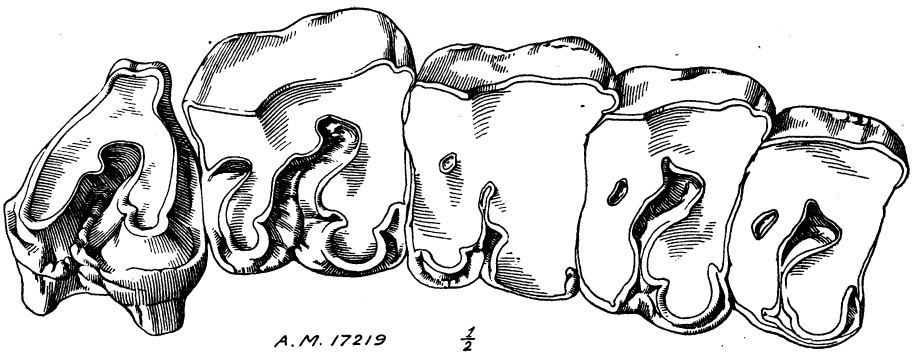

Fig. 11. *Aphelops crassus* Leidy. Upper teeth from Snake Creek beds referred to this species. Crown view, one-half natural size.

placed here upon the evidence of the referred specimens of *A. crassus*, described below, and the New Mexican specimen referred by Cope to *A. meridianus*. They are certainly not *Teleoceras;* but one or both may prove to belong to *Peraceras*.

? *Aphelops crassus* (Leidy, 1858)

Rhinoceros crassus Leidy, 1858, Proc. Acad. Nat. Sci. Phila., X, p. 28; 1869, Jour. Acad. Nat. Sci. Phila., VII, p. 228 (type limited to m^3 and upper incisor), Pl. XXIII, fig. 8 [figs. 6–7?]; (*Aphelops*) Osborn, 1890, Bull. Mus. Comp. Zool., XX, p. 92 (last upper molar selected as type); (*Rhinoceros*), 1904, Bull. Amer. Mus. Nat. Hist., XX, p. 308 ("type and species indeterminate owing to uncertainty as to type").

Not *Aceratherium crassum* Cope, 1874, Ann. Rep. U. S. G. S. Terrs. for 1873, p. 521; nor of Leidy, 1869, *loc. cit.*, figs. 4–5.

In accord with the indications of Leidy, 1869, and Osborn, 1890, the last upper molar is the lectotype of this species. The other material associated with it as cotypes in Dr. Leidy's original description may not belong to the same species or genus, and I know of no evidence that any part belongs to the same individual.

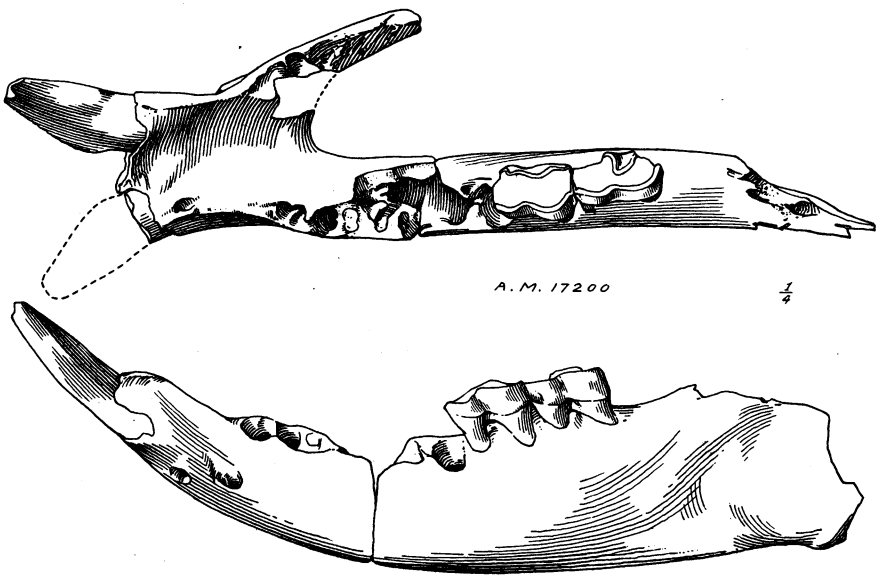

Fig. 12. *Aphelops* species. Lower jaw; one-fourth natural size. Snake Creek beds, expedition of 1916.

The type molar is considerably larger than *A. megalodus*, more triangular in form than *A. malacorhinus* or *Peraceras superciliosus*, and has a rather prominent crest at the bottom of the valley between protoloph and metaloph. This crest appears in a number of specimens from the Snake Creek beds which conform otherwise to the characters of the type and appears to be peculiar to the species. The specimens referred here, some of them provisionally, are as follows:

No. 17219, upper teeth, p^3–m^3 r., p^3 and m^2 l.
13878, upper molar, m^2 r.
13879, upper molars, m^{2-3} l.
13880, upper molar, m^1 r.

17222, upper and lower milk teeth, dp^{1-4} l., dp^{2-4} r., dp_3 and m_1 l. in parts of jaws.
17220, lower jaw, i_2 r., and m_{2-3} l.
17220*a*, lower jaw, p_4–m_3 l.
" m_{1-3} l.

The upper premolars are nearly as large as the molars, wide transversely, simple in construction, the crochet and antecrochet rudimentary. The molars are moderately brachyodont, crochet and antecrochet not strong, and crista not seen in any of our specimens. All of them show the sharp crest at the bottom of the median valley, merging into the base of the crochet externad and continuous with the inner cingulum internally.

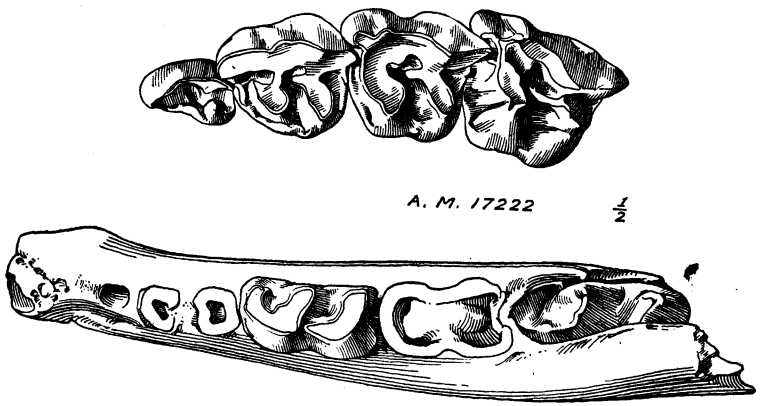

Fig. 13. *Aphelops* species. Upper milk premolars dp^{1-4}, and lower jaw of the same individual with the first molar partly erupted. One-half natural size. Snake Creek beds.

The lower jaws (provisionally referred, for they are not provably distinct from *Peraceras*) are rather shallow, less bowed inferiorly than in *Teleoceras*, and distinguished especially by the long flattened symphysis with heavy procumbent tusks, the brachyodont cheek teeth, unreduced premolars, and much smaller molars. They agree fairly well with the jaw of *A. ceratorhinus* Douglass but are of much smaller size than the jaw of a specimen (Amer. Mus. No. 9745) referred to that species.

The milk dentition is also readily distinguished from that of *Teleoceras*. Dp^1 is somewhat larger, with the inner crest of *T. fossiger* represented by two rudimentary cusps; dp^2 of about the same size but more triangular in outline, the protocone connected with the median instead of the anterior of the three crests that project inward from the ectoloph. Dp^3 and dp^4

are molariform, the former considerably smaller and more brachyodont, the latter only about two-thirds the size and very much shorter crowned than in *T. fossiger*. The crochets are decidedly weaker and the antecrochets quite rudimentary.

The lower milk molars are four in number instead of three as in *Teleoceras*. They are much narrower and lower crowned, especially the third and fourth, the crests more transverse.

The above differences are conformant with the differences in the permanent dentition between *Aphelops* (or *Peraceras*) and *Teleoceras*. The upper milk molar figured by Leidy as part of the type of *A. crassus*[1] appears to be a *Teleoceras*, and does not differ materially from *T. fossiger*. The lower milk molar, figured on the same plate,[2] I cannot positively identify.

Peraceras Cope, 1880

Type *P. superciliosus* Cope from Lower Pliocene of Nebraska.

Skull short, hornless with abbreviated nasals, premaxillæ vestigial, no incisors. Occiput strongly pitched forward, wide at base, narrowing towards vertex. Posttympanic process massive, flaring widely, separate from postglenoid process, which is also very robust and recurved forward. Paroccipital process attached at base to posttympanic, projecting downward, long and moderately heavy. Basioccipital with stout robust prominence for recti capitis muscles. Glenoid fossæ wide transversely; zygomatic arches wide and massive. Cheek teeth unreduced, premolars four, molars three, moderately brachyodont, p^{2-4} equalling m^{1-3} in size, p^1 small. Antecrochets rudimentary or absent, crochets moderate or weak, cristæ chiefly on premolars.

Lower jaw and skeleton unknown.

The cheek teeth of this genus are not readily distinguished from those of *Aphelops* of the *malacorhinus-ceratorhinus* group but the skull is widely different. The occiput in its strong forward pitch, narrow vertex and broad base, massive squamosal and occipital processes, etc. is very suggestive of *Rhinoceros indicus*; but the front part of the skull is very different, the posttympanic and postglenoid processes are separated, and the cheek teeth shorter crowned and more primitive in every way, the subordinate crests weaker and there is no suggestion of crenulation of the enamel.

Peraceras superciliosus Cope

Peraceras superciliosus Cope, 1880, Amer. Nat., XIV, p. 540; 1887, *idem.*, XXI, p. 1004, fig. 18; Osborn, 1904, Bull. Amer. Mus. Nat. Hist., XX, p. 312, figs. 6, 20, 21;

[1] Leidy, 1869, *loc. cit.*, Pl. XXIII, figs. 4–5.
[2] Leidy, *loc. cit.*, fig. 9.

Cope (Matthew), 1915, 'Hitherto Unpublished Plates of Tertiary Vertebrata,' Monograph Amer. Mus. Nat. Hist., Pll. CXLIV, CXLIV*a*, CXLIV*b*.

Type, Amer. Mus. No. 8380, a skull from the Republican River beds (Pliocene) of Nebraska.

A skull from supposedly Snake Creek beds west of Alliance, Neb., certainly belongs to this genus and may be provisionally referred to Cope's species. Some of the specimens referred to *Aphelops crassus* may also belong to *Peraceras*.

The skull, No. 17218, has the teeth more worn than in the type but agrees fairly well with it. The top of the skull is mostly destroyed by weathering, the under side well preserved. It shows the characteristic forward pitch of the occiput, massive recurved postglenoid process, thick and widely flaring posttympanic process, prominent thick knob at origin of recti capitis. It is somewhat larger than the type with broader and heavier zygomata.

Peraceras troxelli, new species

Plates VI–IX

Type, Amer. Mus. No. 14434, a skull from the Pliocene of Springview, Keyapaha Co., Nebraska. Found by E. L. Troxell 1916.

Smaller than *P. superciliosus*, nasals more reduced, cut short to the nareal notch above p^4. Occiput narrower, occipital portion of cranium less sharply bent upwards. M^3 smaller, less quadrate, crochet somewhat more developed on premolars and molars. A small crista on m^2.

The type skull was considerably broken up by weathering, when found, and many small pieces are missing, but it is undistorted by crushing and the outlines are practically complete save for the premaxillæ, which were not found. The anterior border of the nasals is complete and very peculiar in appearance; they appear as though cut squarely off just in advance of the lateral notch and do not project in advance of it as they do in *P. superciliosus*. The molars are moderately high crowned, p^{2-4} about the same size as m^{1-3}, p^{-1} small, not preserved. The third molar is only slightly squared at the base; the crochet is prominent on m^{1-3}; antecrochet rudimentary and confined to the base of the protoloph; crista absent, except on m^2 of one side; p^{3-4} have crochet and crista united, enclosing a medifossette; strong basal cingulum around inner, posterior, and anterior faces, so that in much worn teeth the pre- and postfossettes would also be distinct. On p^2 the antecrochet tends to unite with the metaloph to enclose a prefossette; the crochet is strong, united to the crista on p^2 l. but not on p^2 r.; and the internal cingulum is deeply notched and almost discontinuous at the median

valley. The molar cingula are discontinuous internal to the protocones, notched at the median valley.

Minor differences in many points between right and left teeth of the type individual show that too much weight should not be assigned to the details of cusp construction as species characters.

Teleoceras Hatcher

Type, *T. major* Hatcher = *Aphelops fossiger* ? Cope.

Skull of moderate length; nasals somewhat shortened, pointed, and pinched in toward the tip, with a small median terminal horn on upper surface, more or less distinctly indicated (apparently according to sex). Zygomatic arches moderately heavy, narrow anteriorly, broadened posteriorly. Occiput subvertical, broad, quadrate, the vertex very wide. Postglenoid process rather slender, posttympanic process thin, plate-like, plastered to lambdoid crest, and not freely projecting.

Upper incisors well developed, lower incisor tusks recurved upward, symphysis and diastema short. Lower premolars reduced in size and usually in number, $\frac{4-3}{3-2}$ in adult. Milk premolars, $\frac{4}{3}$. Molars large, hypsodont; crochet, antecrochet, and crista strong, and cingula high on upper molars; the half-worn teeth usually with three enclosed fossettes. The molar series considerably exceeds the premolar series in size in upper or lower cheek teeth.

Lower limb bones and foot bones very short and small in comparison with bulk of body. See Plates IV and V.

Osborn[1] admits *T. major* as doubtfully distinct from *T. fossiger* on the ground of larger size and describes *T. medicornutus*, a species clearly distinct and more primitive in skull form. The type of *medicornutus* is from beds 15 miles northeast of Grover, Colorado, which are of doubtful correlation. The paratype, however, Amer. Mus. No. 9374, is from typical Pawnee Creek beds, and it is represented also by a number of incomplete skulls, jaws, and skeleton parts in the American Museum collection from this formation. *Aphelops planiceps* Osborn, 1904, was based upon a skull lacking the front part, and belongs, I believe certainly, to the same genus as *T. medicornutus* and quite probably to the same species. The specimens which Cope referred to *A. crassus* Leidy in 1874 also belong to this species, also the front part of a skull, No. 9375, with the incisors and cheek teeth and one nasal preserved.

The cervicals, end of ulna and certain of the fore foot bones figured by Cope (Matthew) 1915[2] belong with parts of a skull of this species, although

[1] Osborn. 1904. Bull. Amer. Mus. Nat. Hist., XX, p. 314.

[2] 'Hitherto Unpublished Plates of Tertiary Vertebrata,' Monograph Amer. Mus. Nat. Hist., Pl. CXXIX, figs. 1–7, Pl. CXXX, figs. 1–3.

through an error in the records they were supposed to belong to the type and paratype of *Aphelops megalodus*. See Plate X.

T. medicornutus is considerably smaller than *T. fossiger* and more primitive in various respects. The nasals, however, are distinctly of the *Teleoceras* type, as are also the occiput, the cheek teeth, the upper and lower incisors, the cervicals, the short legs, and feet. It may be regarded as intermediate between the European Lower Miocene "*Teleoceras*" (*Brachypotherium*) *aurelianense*[1] and the highly specialized *T. fossiger*.

In the Snake Creek beds a species occurs which appears to be slightly

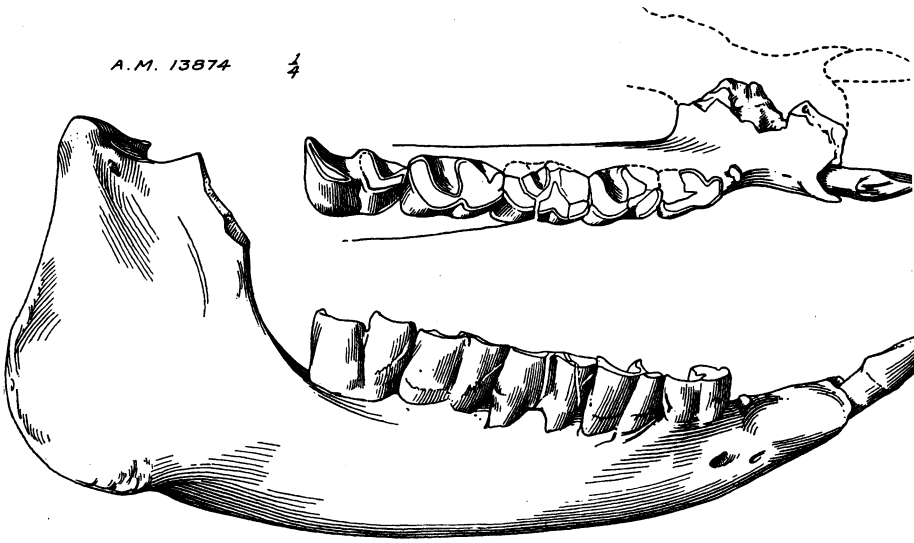

Fig. 14. *Teleoceras* species. Lower jaw; one-fourth natural size. Snake Creek beds, expedition of 1908.

more primitive in some respects than *T. medicornutus* although it may, when better known, prove to be more progressive in other features. We have no better specimens than lower jaws and fragments of the skull and various limb and foot bones. Pending the securing of more complete specimens, it appears better not to give a specific name.

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[1] M. Repelin (Repelin, 1917. Ann. Mus. Hist. Nat. Marseilles, XVI, pp. 1–47, Pll. I–XVI) has recently described and figured a series of admirable specimens from the upper Oligocene of France under the name of *Teleoceras aginensis*. While these are evidently related to "*T.*" *aurelianensis*, they are clearly not congeneric with *T. fossiger*. This European group may perhaps be ancestral to *Teleoceras*.