MAMMALIA.

+ MARSUPIALIA.

POLYPROTODONTIA.

Didelphyidæ.

\+ *Didelphys valens*, sp. nov.

UNGULATA.

ARTIODACTYLA.

Anthracotheriidæ.

\+ *Ancodus* (*Hyopotamus*) *brachyrhynchus*, Osborn and Wortman.
\+ *Anthracotherium ? pygmæum*, sp. nov.

Elotheriidæ.

* \+ *Elotherium coarctatum*, Cope.

Agriochœridæ.

\+ *Agriochœrus antiquus*, Leidy.
* \+ *Merychoidodon culbertsoni*, Leidy.

Camelidæ.

\+ *Poëbrotherium wilsoni*, Leidy.

Tragulidæ.

\+ *Leptomeryx esuleatus*, Cope.
* \+ *Leptomeryx mammifer*, Cope.
\+ *Leptomeryx speciosus*, sp. nov.

Position uncertain.

* \+ *Leptomeryx semicinctus*, Cope.
* *Hypertragulus transversus*, Cope.

PERISSODACTYLA.

Equidæ.

* \+ *Mesohippus westoni* (Cope).
\+ *Mesohippus præcocidens*, Lambe.
\+ *Mesohippus propinquus*, Lambe.
\+ *Mesohippus brachystylus*, Osborn.
\+ *Mesohippus stenolophus*, Lambe.
\+ *Mesohippus planidens*, Lambe.
\+ *Mesohippus assiniboiensis*, Lambe.

Hyracodontidæ.

* \+ *Hyracodon nebrascensis*, Leidy.
\+ *Hyracodon priscidens*, Lambe.

Rhinocerotidæ.

* \+ *Aceratherium mite*, Cope.
* \+ *Aceratherium occidentale* (Leidy).
\+ *Aceratherium exiguum*, sp. nov.
\+ *Leptaceratherium trigonodon*, Osb. and Wort.

Titanotheriidæ.

* *Megacerops angustigenis* (Cope).
* *Megacerops selwynianus* (Cope).

* *Megacerops syceras* (Cope).
\+ *Magacerops primitivus*, sp. nov.
\+ *Mugacerops assiniboiensis*, nom. prov.

ANCYLOPODA.

Chalicotheriidæ.

* \+ *Chalicotherium bilobatum*, Cope.

RODENTIA.

SIMPLICIDENTATA.

? Sciuridæ.

\+ *Sciurus ? saskatchewensis*, sp. nov.

Ischyromyidæ.

\+ *Ischyromys typus*, Leidy.

? Castoridæ.

\+ *Cylindrodon fontis*, Douglass.
\+ *Eutypomys parvus*, sp. nov.

DUPLICIDENTATA.

Leporidæ.

* *Palæolagus turgidus*, Cope.
\+ *Palæolagus haydeni*, Leidy.

CARNIVORA.

CREODONTA.

Hyænodontidæ.

* \+ *Hyænodon cruentus*, Leidy.
\+ *Hyænodon crucians*, Leidy.
* \+ *Hemipsalodon grandis*, Cope.

FISSIPEDIA (CARNIVORA VERA).

Canidæ.

\+ *Cynodictis lippincottianus* (Cope).
\+ *Daphænus felinus*, Scott.
\+ *Protemnocyon hartshornianus* (Cope).

Felidæ.

\+ *Dinictis felina*, Leidy.

and about equally developed. The protoconule* (anterior intermediate cusp) is very much smaller than the metaconule (posterior intermediate cusp), and passes posterior to, and beyond the inner end of, an inwardly directed spur from the protocone (antero-external cusp of the premolar, adopting Scott's nomenclature). The cetoloph has a distinct mesostyle, a broadly rounded and well detached parastyle, and strong ribs, of which the anterior one is particularly rotund. The hypostyle tends to separate from the posterior cingulum, to which it remains connected by a stout bar. The cingulum is robust, high and sharp edged behind, low and forming a narrow shelf abutting against the base of the parastyle in front, and is entirely absent within. The external cusps (protocone and tritocone) rise considerably higher than the internal ones (deuterocone and tetartocone).

This species, known only from the second premolar, in which the size of the parastyle would be expected to be accentuated, appears to approach most nearly in tooth development to the much smaller *M. brachystylus*. It exceeds *M. intermedius* and ? *M. validus* in size, but apparently, more closely resembles the latter. It is distinguished from the last two species by (1) the greater development of the protocone and deuterocone in this species, (2) the slight development of the protoconule, (3) the more complete separation of the parastyle, and (4) the intermediate height of the cetoloph.

The foregoing species of *Mesohippus* are related to, or resemble, previously described species of the genus from Montana and Dakota as follows :—

M. westoni, (Cope.)	More primitive than *M. latidens*, Douglass, and *M. montanensis*, Osborn, from the Lower Oligocene, Titanotherium beds.
M. præcocidens, Lambe.	Nearly related to and more advanced than *M. westoni* (and ? *M. montanensis* of the Titanotherium beds).
M. propinquus, Lambe.	Nearly related to and more primitive than *M. bairdi*, Leidy, of the Middle Oligocene, Oreodon beds.
M. brachystylus, Osborn.	The type of the species is from the Upper Oligocene, Leptauchenia beds.
M. stenolophus, Lambe.	Approaches closely *M. brachystylus* of the Leptauchenia beds.
M. planidens, Lambe.	Approaches in size *M. intermedius*, Osborn and Wortman, from the Upper Oligocene, Protoceras beds.
M. assiniboiensis, Lambe.	Some resemblance to, but larger than *M. validus*, Osborn, of the Protoceras beds.

It would seem probable then, that the species from the Cypress hills, in their relative degrees of progressiveness, are to be assigned to the horizons of the Oligocene in the following order :—

M. westoni, *M. præcocidens*	Lower Oligocene, Titanotherium beds.
M. propinquus	Middle Oligocene, Oreodon beds.
M. brachystylus *M. stenolophus*	Upper Oligocene, Leptauchenia beds.
M. planidens *M. assiniboiensis*	Upper Oligocene, Protoceras beds.

* It has been pointed out by Scott (The Evolution of the Premolar Teeth in the Mammals, Proc. Acad. Nat. Sci. Philadel. vol. XLIV, 1892) that the anterior and posterior intermediate cusples of the premolar teeth are not homologous with the proto and metaconules of the molar although they correspond in position.

Hyracodon nebrascensis, Leidy.

Aceratherium pumilum, Cope, in part, 1885. The White River beds of Sw current river, North West Territory; American Naturalist, vol. XIX, p. 163, name only.

Aceratherium pumilum, Cope, 1885. Geol. and Nat. Hist. Survey of Canada, vol. I, new series, part C, appendix I, p. 83, specimen II; and 1891, this volume, part 1, p. 19, specimen II, pl. IV, fig. 4.

Hyracodon nebrascense, Osborn, 1898. The Extinct Rhinoceroses. Memoirs Amer. Mus. Nat. Hist., vol. I, pt. III, p. 138, fig. 28.

The principal specimen from the Cypress hills, representing this species, is the portion of mandible, holding teeth, described by Cope under the name *Cænopus pumilus*, (specimen 2). This specimen, as pointed out by Osborn in 1898, is part of the right ramus of a young individual of *H. nebrascense*. A tooth, belonging to the collection 1904, is referred to this species; it is from the right side of the lower jaw, and is apparently a deciduous third premolar.

Hyracodon priscidens, Lambe.

Plate IV, figs. 1, 2, 3 and 4.

Hyracodon sp., Lambe, 1905. Geol. Survey of Canada, Summary Report for 1904, p. 368.

Hyracodon priscidens, Lambe, 1905. A new species of *Hyracodon* (*H. priscidens*) from the Oligocene of the Cypress hills, Assiniboia; Trans. Royal Soc. of Canada, second series, section IV, vol. XI, p. 37, pl. I, figs. 1, 1*a*.

Another species of *Hyracodon* is represented, in the collection of 1904 from the Oligocene deposits at Bone coulée, Cypress hills, by an upper jaw with teeth, giving the complete premolar-molar series. Three teeth are missing, viz., the fourth premolar from the left side, and the second and third premolars from the right. As the form of the tooth in each case is seen in the corresponding one of the opposite side, the details of structure of all the cheek teeth are presented. The ectoloph of the right third premolar remains. The teeth are in an excellent state of preservation and, as they are only slightly worn, evidently belonged to a young animal. The last molar on either side has not protruded from the jaw to its fullest extent. Both jugals are preserved, and, on the right side, part of the squamosal also.

The specimen to which the following remarks apply consists for the most part of the two maxillary bones holding teeth. These bones are imperfect in their lateral upward extension. The right maxilla is broken off slightly in advance of the first premolar, but, on the left side, the full extent of the diastema, separating the first premolar from the canine, is preserved. The lower margin of the orbital opening on either side is intact.

This specimen (type) indicates an animal of about the size of *Hyracodon nebrascensis*, Leidy, from the Oligocene of Nebraska, South Dakota and Colorado, from which, however, judging from its tooth structure, it differed specifically. The species has been described under the above name.

Hyracodon priscidens, as compared with *H. nebrascensis*, exhibits the following characteristics:—(1) The teeth are shorter or more brachyodont, (2) in the premolars the protoloph is continued in a curve round the inner end of the metaloph, the tetartocone being confluent with the deuterocone and arising from the protoloph, (3) in the last molar, m^3, the ectoloph

is relatively much shorter, with a concomitant greater development of the metaloph, (4) the exterior cingulum is developed only on the posterior half of the base of the ectoloph in the seven teeth, and the internal cingulum is absent in p^1, (5) the parastyle in the premolars is only slightly developed, (6) the skull is apparently flatter and relatively more elongate, the lower margin of the orbit being less distant from the alveolar border, and the jugal less curved upward in the posterior half of its length, (7) the diastema in advance of p^1 is proportionately longer and its margin is not so arched.

For this species of *Hyracodon* the name *priscidens* has been proposed, indicative of the less advanced stage of its dentition as compared with *H. nebrascensis*. In the form of its premolars it is decidedly primitive, and implies a position in a direct line of descent from *Hyrachyus*. A progressive character is seen in the squareness of the premolars which in *Hyrachyus* are triangular; also in these teeth the metaloph is much advanced in comparison with the Eocene genus.

In *H. priscidens*, as in the type species, m^2 is much the largest tooth, and m^1 is larger than p^4. The molars occupy about the same space antero-posteriorly as the premolars.

In the premolars there is a progression toward the molar pattern, but the advance has been slow. The anterior premolars are more progressive than the posterior ones in some respects. This is shown in the tendency to the separation of the tetartocone from the deuterocone seen in passing from p^4 forward. In p^4 the tetartocone and the deuterocone are very closely united, but in p^2, although still connected to the protoloph, the tetartocone has moved farther toward the posterior border of the crown, lengthening the anterior loph, and also effecting a junction with the metaloph.

In p^4 the cross lophs are unequal in length, the protoloph, in which the tetartocone very intimately united with the deuterocone, not passing beyond a point in line with the inner end of the metaloph, which is short and curves slightly backward. In p^3 the protoloph is increased in length by the shifting backward of the tetartocone, with a tendency to separate from the deuterocone. The two lophs remain distinct, the anterior one passing slightly beyond the inner end of the metaloph, which in this tooth is developed to about the same extent as that of p^4, with a like backward obliquity. In p^2 the protoloph is still further increased in length, and curves round the inner margin of the crown considerably past the metaloph toward the posterior border of the tooth. The metaloph curves slightly forward and unites with the protoloph at a point some distance in advance of the latter's posterior termination. The increased length of the protoloph is due to the further recession of the tetartocone from the deuterocone, although the union of the two remains complete. In the protoloph is separate from the metaloph, a narrow but distinct sinus dividing them, and the tetartocone arises from the metaloph which in its inner half presents a concave surface forward. A variation is noticed in the right first premolar of the Cypress Hills specimen. this tooth the sinus, seen in the left first premolar, in advance of the metaloph, does not occur in which case the tetartocone would still be said to arise from the protoloph which, commencing at the ectoloph, behind the parastyle, forms a high continuous wall curving round the inner border of the tooth for some distance past its union with the metaloph, giving the protoloph a length proportionately still greater than the corresponding loph of p^2. The left first premolar, above described, resembles the corresponding tooth of *H. nebrascensis* figured by Leidy in plate XIV, figure 5, accompanying his description of the type species "The Ancient Fauna of Nebraska," 1852, (Smithsonian Contributions to Knowledge). The

other premolars in this figure denote a stage of evolution much in advance of the corresponding teeth of *H. priscidens*.

In the premolars of *H. priscidens* the deuterocone arises from the protoloph, as in p^3 and p^4 of *Hyrachyus agrarius*, Leidy, of the Bridger Eocene of Wyoming and Utah; also, in the second, third and fourth premolars, the general outline of the tooth is quadrangular instead of triangular as in *Hyrachyus*. The transverse diameter of p^4 is relatively greater than that of either p^3 or p^2. The second, third and fourth premolars are provided with a well defined cingulum that is continuous round the entire base of the crown, except at the base of the tritocone; at the base of the parastyle the cingulum is feebly shown, with increasing faintness in passing from p^4 to p^2. In the first premolar the exterior cingulum is developed only in the posterior half of the ectoloph, the posterior cingulum is strong, the anterior cingulum extends but a short distance from the parastyle, and there is no internal cingulum.

In the molars the cross lophs are nearly equal in length, the protoloph being slightly the longer, the hypocone is strongly developed and of the size of the protocone, from which it is separated by a deep anterior valley (medisinus). A crista, strongest in m^1, is developed from the ectoloph, and an antecrochet, of fair size in m^1, smaller in m^2 and incipient in m^3, is given off from the protoloph. In p^4, in addition to a small crista, and an indication of an antecrochet in the form of a decided tubercle, there is a delicate crochet* which is of interest as a decidedly progressive character. In the molors there is no internal cingulum, hut posteriorly, anteriorly, and externally the cingulum is as in the premolars, except that externally it is scarcely more than suggested at the base of the parastyle. As already mentioned, the ectoloph in m^3 is short as compared with that of m^2 and m^1, principally on account of the reduction in size of the metacone, which does not extend, as in the other molars, far posterior to its junction with the metaloph, but is curtailed at this point, in consequence of which there is only a slight indication of the formation of a posterior valley (postsinus) that in *H. nebrascensis* has reached a more advanced stage.

The order of premolar transformation in *H. priscidens* is apparently an exception to the usual metamorphosis of the Hyracodont premolars, which, as stated by Osborn in his memoir on "The Extinct Rhinoceroses" 1898, p. 90, is presented in three successive stages of evolution toward the molar pattern in the second, third and fourth premolars, the last premolar (p^4) being the most advanced.

In *H. priscidens* the fourth premolar is the least advanced, as regards the relation of the lophs to each other, although in other respects, viz., in the presence of secondary crest folds ("crista," "antecrochet" and "crochet"), a decided advance has been made, and it may be considered in this regard as more progressive than p^4, p^2 and p^3.

* Professor H. F. Osborn in his memoir on "The Extinct Rhinoceroses" (Memoirs of the Amer. Mus. of Nat. Hist., vol. 1, part III, p. 89, 1898), has mentioned that the "crochet" is "peculiar to the true Rhinoceros molars" and is "only feebly developed, if at all, in the Amynodonts and Hyracodonts."

Measurements.

	H. priscidens.	*H. planiceps***	*H. nebrascensis***
	MM.	MM.	MM.
Upper molar series, length	62	103	70
Upper premolar series, length	62		
M^1 width, (tr.)	23·2	35	26
M^2 "	24·5	36	28
M^3 "	24	37	26
M^1 length (a p.)	22		
M^2 "	23	35	27
M^3 "	19·5	40	
P^1 width (tr)	13·5		
P^2 "	20		
P^3 "	21·7		
P^4 "	23		
P^1 length (a.p.)	12·3		
P^2 "	16		
P^3 "	16·8		
P^4 "	17·3		

The anterior end of the mandible of a Hyracodon, obtained in 1904 from the Bone Coulée beds, is of special interest; it is provisionally assigned to this species.

The specimen (plate IV, figures 3 and 4) consists of nearly half the left ramus with that part of the right ramus anterior to the second premolar. Premolars 2, 3 and 4 are preserved, as well as the roots of the canines, and of the three pairs of incisors. The alveolus of the second premolar is partly seen on the right side.

A striking feature is the long diastema, between the canine and the second premolar, nearly equal to that of *Hyrachyus* (*H. agrarius*) in proportionate as well as actual length, and about twice as long as that of *Hyracodon nebrascensis*, Leidy. A basal cingulum is continuous round the entire crown of the premolars, exeept for a short distance internally, in the second and fourth teeth, posterior to their mid-length.

Measurements.

	MM.
Length of premolar series	41
Premolar 2:–	
Antero-posterior diameter	13
Transverse diameter	10
Premolar 3:	
Antero posterior diameter	15
Transverse diameter	12
Premolar 4:—	
Antero-posterior diameter	16·5
Transverse diameter	13·5
Depth of ramus in front of premolar 3	28·5
Maximum thickness of ramus beneath same tooth	15
Length of diastema behind canine	26
Breadth of mandible at mid length of diastema	21
Length of symphysis	52
Thickness of mandible at posterior end of symphysis	14

** The measurements of the type of *H. planiceps* and *H. nebrascensis* are taken from the "Preliminary account of the Fossil Mammals from the White River Formation, contained in the Museum of Comparative Zoology" by W. B., Scott and Henry F. Osborn, 1887, p. 171, Bull. Mus. Comp. Zool., Harvard College.