

### Art. III.—Observations on the Faunæ of the Miocene Tertiaries of Oregon.

By E. D. Cope.

A considerable number of *Vertebrata*, almost exclusively *Mammalia*, have been described by authors from the White River and Pliocene formations of Oregon. The descriptions are found in Professor Leidy's contribution to the Final Report of the United States Geological Survey under Dr. Hayden (Vol. I); in those of Professor Marsh in the American Journal of Science; in a paper by Mr. Bettany in the Quarterly Journal of the Geological Society of London for 1876; and in a paper by myself (Paleontological Bulletin No. 30) in the Proceedings of the American Philosophical Society, published in December, 1878.\* Having recently had the opportunity of inspecting a considerable amount of material from the horizons in question, I give a list of the species which I have observed. A few new ones occur in collections received since the publication of my last paper, and are now described, together with some of interest from the Loup Fork beds of the same region.

#### *White River Fauna.*

#### TESTUDINATA.

STYLEMYS OREGONENSIS Leidy.

#### RODENTIA.

STENEOFIBER GRADATUS Cope.

STENEOFIBER ? NEBRASCENSIS Leidy.

MENISCOMYS HIPPODUS Cope.

MENISCOMYS MULTIPLICATUS Cope.

PLEUROLICUS SULCIFRONS Cope.

ENTOPTYCHUS CAVIFRONS Cope.

ENTOPTYCHUS PLANIFRONS Cope.

ENTOPTYCHUS CRASSIRAMIS Cope.

PALÆOLAGUS HAYDENI Leidy.

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\* See also the American Naturalist, December, 1878.

## CARNIVORA.

HOPLOPHONEUS BRACHYOPS Cope.

MACHÆRODUS STRIGIDENS Cope.

ENHYDROCYON STENOCEPHALUS, gen. et sp. nov.

*Generic Characters.*—Dental formula: I. ?; C.  $\frac{1}{1}$ ; Pm.  $\frac{3}{3}$ ; M.  $\frac{2}{5}$ . The superior premolars consist of two ordinary and one sectorial; the first and second are both compressed, two-rooted, and in the typical species with median lobe of posterior cutting edge. The two true molars are transverse and tubercular. The three inferior premolars are all two-rooted, and with posterior lobe in the two known species. The heel of the sectorial is cutting, as in *Temnocyon*, and the internal tubercle is present. There is at least one inferior tubercular tooth; specimens are injured so as not to display a second.

In a nearly complete cranium belonging to the typical species of this genus, we observe the shortness of the facial part of the skull as compared with the length of the cerebral, and also the constriction of the skull behind the orbits. The zygomatic arches are robust and expanded, and the sagittal crest is high. The auditory bullæ are inflated and thin-walled.

The dentition of this genus refers it to the *Canidae*, but the form of the skull resembles that of *Putorius vison* and *Lutra*.

*Specific Characters.*—The principal cusps of the inferior premolars present cutting edges, as does the median posterior lobe. In both third and fourth there is a small conic heel posteriorly, but an anterior basal tubercle on the fourth only. The sectorial is large and robust, and the heel is short, with an absolutely median cutting edge. The first tubercular is longer than wide, and presents a nearly median cusp in front, which is joined to a low one on the internal border of the crown.

The superior canine has an obtuse cutting edge on the anterior and posterior borders of the inner side. The first (third) superior premolar is near to it, and is rather large, displaying a median cutting lobe and low posterior heel. The fourth is similar but larger. The sectorial is much worn in the only specimen where it is preserved; it is rather short, and is widened anteriorly. The first tubercular is large, and has considerable transverse extent; it is a little wider externally than internally, and has much the form of the corresponding tooth in *Canis*. The second tubercular is transverse and small, not being much more than half the length of the first, and is situated in contact with it.

The cranium is remarkable for the anterior position of the orbits, and the associated shortening of the face and lengthening of the parietal region. The orbits look somewhat forwards and very little upwards. The superciliary region is slightly prominent, and there is a prelacrymal concavity. The infraorbital foramen is moderate, and is situated mostly above the posterior part of the fourth premolar. The muzzle is flat

above, and the nasal bones are wide, and are not emarginate above the osseous nares, as in many recent *Carnivora*. Posteriorly, the superior border of the brain-case descends, but the parietal bones maintain a gently convex outline in their high sagittal crest. The supraoccipital region is elevated, and projects posteriorly.

### Measurements.

#### Specimen No. 1.

	M.
Antero-posterior diameter of second superior premolar .....	0.010
Antero-posterior diameter of third inferior premolar .....	0.013
Width of base of third inferior premolar .....	0.0065
Elevation of crown of third inferior premolar .....	0.010
Diameter of inferior sectorial	
{ transverse .....	0.010
{ antero-posterior .....	0.021
Width of first tubercular .....	0.006

#### Specimen No. 2.

Total length of cranium .....	0.170
Width across zygomatic arches .....	0.114
Least width behind orbits .....	0.024
Depth of cranium with crest at otic bulla .....	0.070
Vertical diameter of orbit .....	0.025
Length from orbit to end of muzzle (axial) .....	0.040
Interorbital width .....	0.043
Width of muzzle above second premolar .....	0.018
Length of superior molar series .....	0.051
Length of fourth premolar .....	0.012
Length of sectorial .....	0.016
Length of first tubercular .....	0.008
Width of first tubercular .....	0.015
Width of second tubercular .....	0.0085

The length of the skull is about that of the Coyote, but it is much more robust in all its proportions excepting the postorbital constriction.

Discovered by Charles H. Sternberg in the Oregon White River beds of the John Day River region.

#### ENHYDROCYON BASILATUS, sp. nov.

This Carnivore is represented by a mandible with coössified rami, which are broken off behind the sectorial teeth. The crowns of the latter and but one incisor and one canine tooth remain. The premolars and one canine are in good preservation.

These portions indicate an animal of the same general character as the *Enhydrocyon stenocephalus*, but of larger and more robust proportions, and characterized by many dental peculiarities. These will be at once pointed out. The canine is directed upwards and a little outwards, and possesses two obtuse ridges bounding the interior face. The third incisor is compressed and truncate superiorly and distally. The first (second) premolar is two-rooted, compressed, and trilobate. It consists of a principal cutting edge little elevated, and a small accessory lobe

at each extremity of the crown; its base is expanded posteriorly. The principal cusp of the third premolar is more elevated, and, besides the anterior and posterior tubercles, there is a basal posterior heel, which is continued as an expansion of the inner base of the crown. In the fourth premolar, the base of the crown is expanded, especially posteriorly; the principal cusp has a nearly circular section at the base, and the posterior median lobe is a subconic tubercle standing on the middle of the heel. The sectorial is large and relatively rather narrow, but the details of its form are not ascertainable.

#### Measurements.

	M.
Length of dental series, including canine and sectorial.....	0.076
Length of the base of the sectorial.....	0.024
Length of the premolar series.....	0.037
Length of the fourth premolar.....	0.016
Width of the fourth premolar.....	0.009
Length of the third premolar.....	0.013
Width of the third premolar.....	0.008
Length of the second premolar.....	0.009
Width between centres of crowns of fourth premolars.....	0.034
Length of symphysis.....	0.035

This species was probably of the dimensions of the Gray Wolf. Found by Mr. Sternberg in the same region as the *E. stenocephalus*.

TEMNOCYON ALTIGENIS Cope.

CANIS HARTSHORNIANUS Cope

CANIS GEISMARIANUS Cope.

CANIS CUSPIGERUS Cope.

CANIS LIPPINCOTTIANUS Cope.

CANIS GREGARIUS Cope.

#### PERISSODACTYLA.

DÆODON SHOSHONENSIS Cope.

ACERATHERIUM PACIFICUM Leidy.

ANCHITHERIUM EQUICEPS Cope.

ANCHITHERIUM BRACHYLOPHUM Cope.

ANCHITHERIUM LONGICRISTE Cope.

#### ARTIODACTYLA.

ELOTHERIUM IMPERATOR Leidy.

PALÆOCHÆRUS CONDONI Marsh.

PALÆOCHÆRUS PRISTINUS Leidy.

PALÆOCHÆRUS SOCIALIS Marsh.

MERYCOPATER GUYOTIANUS Cope.

EUCROTAPHUS SUPERBUS Leidy.

EUCROTAPHUS OCCIDENTALIS Marsh.

MERYCOCHÆRUS LEIDYI Bettany.

MERYCOCHÆRUS TEMPORALIS Bettany.

POËBROTHERIUM STERNBERGII, sp. nov.

This Ruminant is represented by a considerable part of the skeleton with both mandibular rami supporting the teeth, of one individual. The bones are all in close proximity, and sometimes in undisturbed relation, in a single block of stone.

The species to which I give the above name presents the characters already ascribed to the genus *Poëbrotherium* by Leidy as regards cranial features, and by myself as regards the rest of the skeleton. The third and fourth metacarpals are not coössified, and the second and fifth are not distinguishable. The preservation of the premaxillary bone in this species enables me to demonstrate the presence of superior incisor teeth, a character the presence of which I have heretofore only inferred. As compared with the *P. vilsoni*, the species differs in its superior size and greater relative robustness. This is seen in the greater depth of the mandibular ramus, and the greater stoutness of the metapodial and other limb-bones. The last inferior molar tooth presents a characteristic peculiarity. The anterior external cusp is separated by a deep groove which divides the external side of the crown to the base from the succeeding cusp. It results that on trituration, the anterior external crescent is isolated, and does not communicate by its posterior horn with the succeeding crescent, as in *P. vilsoni*. The last premolar is more robust than that of the *P. vilsoni*, the width of the half-worn surface being half the length of the tooth and enclosing behind an enamel fossa. In *P. vilsoni*, this tooth is more compressed, and the fossa is represented by an open groove. The first inferior premolar occupies the middle of the diastema following the canine, instead of standing near the canine as in *P. vilsoni*.

#### Measurements.

		M.
Diameter of last molar.....	{ antero-posterior.....	0.020
	{ transverse .....	0.009
Diameter of penultimate molar..	{ antero-posterior .....	0.013
	{ transverse .....	0.009
Depth of ramus at second molar .....		0.025
Length of ramus from third molar to extreme posterior edge .....		0.061
Length of metacarpus .....		0.178
Transverse proximal diameter of the two metacarpi .....		0.029
Greatest diameter of the head of the humerus .....		0.053
Antero-posterior diameter of the condyle of the femur.....		0.048

This species is named in honor of Charles H. Sternberg, the indefatigable explorer of the fossil deposits of the West.

BOÛCHÆRUS HUMEROSUS, gen. et sp. nov.

*Generic Characters.*—The species on which this genus is founded, is represented by a part of the skeleton, which is unfortunately not accom-

panied by cranial bones or teeth. The characters are, however, sufficiently clear for purposes of determination. The great tuberosity of the humerus is produced beyond the head, and does not close round the bicipital groove. The intertrochlear ridge is well developed, and there is no internal epicondyle; the external epicondyle is moderately developed. On the carpal extremity of the ulno-radius, the facets of the scaphoid, lunar, and cuneiform bones, are distinguished by strong oblique ridges, and the last named is nearly in the horizontal line of the two others. In the carpus, the trapezoides is distinct, and the trapezium wanting. The unciform is in contact with the lunar. Metacarpals two, distinct from each other, with free rudiments of the second and fifth at their proximal extremities. Their distal keels confined to the posterior faces of their extremities. Phalanges depressed; ungues short, obtuse.

In the above description is found a combination of characters not known to me to exist in any recent or extinct genus of *Artiodactyla*. Several of its features indicate affinity to the suilline division, while others point to the *Ruminantia*. The imperfect distal articulation of the metacarpals is characteristic of the extinct types *Oreodontida* and *Poëbrotheriida*, and the two distinct metacarpals constitute the resemblance to the latter family the stronger. The latter character is, however, not inconsistent with the *Omnivora*, and the depressed phalanges add to the weight of affinity in this direction. The distal extremity of the humerus is much like that of a peccary. The distal articular surface of the ulno-radius points, however, again to the *Ruminantia* of the group *Pecora*, displaying a specialization quite in contrast with the primitive character of the metacarpo-phalangeal articulation. From these considerations it can be seen that it is not easy to affirm whether this genus possesses bunodont or selenodont dentition. If I may venture an inference as to the affinities of the genus, I would suggest that it will be found to be as nearly allied to the *Hypertragulida* as to the *Oreodontida*, though not without suilline affinities.

*Specific Characters.*—The only species of this genus known to me is of large size. It is represented by the greater part of a scapula and both anterior limbs and feet; by the pelvis, femur, and part of tibia, and by some vertebræ; all found in immediate association by Mr. Sternberg. These remains indicate an animal of the size of the *Rhinoceros indicus*. The animal is characterized by the massive proportions of the humerus as compared with the femur, and by the short, robust form of the metacarpals.

In the *humerus*, the external border of the great tuberosity is entire, and is not reverted, but descends backwards like the remainder of the surface. The apex of the great tuberosity is much recurved, rising steeply proximad of the head. The bicipital groove is deep. The lesser trochanter is large and simply conic; its transverse extent is not great. External to its base is a small tuberosity, which is represented in *Bos*, but not in *Dicotyles* or *Sus*. The deltoid crest is very prominent, de-

scending to the middle of the length of the humerus, before abruptly sinking to the shaft. Its continuation is very prominent as it crosses the axis of the shaft and becomes the anterior bounding ridge of the internal side of the distal extremity. The section of the shaft is thus subtriangular at all points, the obtuse apex of the triangles revolving from the external side proximally, to the internal distally. The external epicondyle is proximal to the condyle, as in *Dicotyles*, but is more prominent than in that genus, and more as in *Oreodon*. It is the extremity of the external acute edge of the humerus, which, rising from the shaft at a point  $90^\circ$  posterior to the extremity of the deltoid ridge, turns forwards to the external epicondyle. The condyles are transverse and not much contracted from side to side. The intertrochlear ridge is sharper than in the species of *Oreodon*, *Dicotyles*, or *Sus*, and is continued round to the shaft anteriorly, as in *Bos*. The condyles otherwise resemble those of *Dicotyles*, not being so contracted in their free margins as in *Bos*.

*Measurements of the Humerus.*

	M.
Total length .....	0.500
Length from middle of head .....	0.425
Diameter of proximal end { antero-posterior .....	0.140
{ transverse .....	0.170
Diameter of head { antero-posterior .....	0.100
{ transverse .....	0.100
Width of humerus near extremity of deltoid crest .....	0.130
Diameter of shaft just below extremity of deltoid crest { antero-posterior .....	0.078
{ transverse .....	0.065
Width at epicondyle .....	0.130
Transverse diameter of condyles .....	0.120
Antero-posterior diameter of condyles { internally .....	0.070
{ at constriction .....	0.055
{ externally .....	0.050

This bone has about the size of the corresponding one of the *Rhinoceros indicus*.

The carpal extremity of the *ulno-radius* is extended transversely. The cuneiform or ulnar articular face forms posteriorly two-fifths the entire extremity, and is only recurved in the external part of its posterior border, which is very concave. The ridge which separates it from the lunar surface is very oblique, following just outside of the ulno-radial suture, and contracting the cuneiform facet anteriorly. Distally and posteriorly it forms the external border of the posteriorly reverted lunar facet, bounding a deep fossa, which is posterior to the cuneiform facet on its inner side. The lunar facet widens behind at the expense of the scaphoid, so that the scapho-lunar ridge is even more oblique than the luno-cuneiform. This ridge disappears supero-anteriorly, and the lunar facet is recurved upwards, occupying the distal extremity of a strong median ridge of the ulno-radius. The reverted portion is almost a half circle in outline, and is partly continuous with the scaphoid facet. The

latter is subtriangular in outline, its apex being the point of conjunction of the scapho-lunar ridge with the internal border, just posterior to its greatest convexity. Its superior boundary is interrupted by the wide groove which separates the median ridge from the internal border of the distal part of the radius.

*Measurements of the Ulna-radius.*

	M.	
Transverse diameter, total .....	0.110	
Transverse diameter of ulna .....	0.050	
Antero-posterior diameter of articular face	{ externally .....	0.035
	{ at middle of ulna .....	0.021
	{ at luno-cuneiform ridge .....	0.055
	{ internally .....	0.045

But for the extent and transverse position of the ulnar portion of this articular face, it might be regarded as pertaining to a typical Ruminant.

The length of the *carpus* is about three-fourths its width, the proximal elements being larger than the distal. A feature of its anterior face is the close approximation of the inferior angle of the lunar to the superior angle of the third metacarpus, which allows the magnum and unciform a very slight contact. The external face of the scaphoid is chiefly lateral; its posterior border is a vertical, short tuberosity. The proximal face is abruptly decurved at the anterior outer angle, to meet the lunar. There are two separate oval superior lunar facets, and one narrow anterior inferior one. The inferior face is nearly equally divided by a low cross ridge which fits a concavity of the posterior part of the magnum. The lunar is the largest bone of the carpus. Its proximal face is decurved anteriorly, posteriorly, and on each side, and is twice as long as wide at the middle. The postero-internal and antero-external angles are produced, the latter into a compressed process which articulates with the adjacent angle of the cuneiform. Besides this facet there is one other for the cuneiform, which occupies the posterior half of the inferior part of the outer side, and is separated from the superior edge by a deep groove. The unciform facet is in front nearly as wide as that of the magnum, but grows gradually narrower posteriorly. The facet for the magnum is concave, and grows very wide posteriorly, with the posterior internal angle produced downwards. The proximal facet of the cuneiform is very concave, the anterior and posterior borders being elevated, and the internal and external decurved; the latter prolonged a little backwards. Below this extremity on the external aspect is a fossa. The pisiform facet makes an angle of 90° with the ulnar, and extends behind and along the posterior edge of the latter to its apex. The unciform facet is simple, and is in shape a right-angled triangle with convex hypotenuse. The posterior aspect of this bone is concave.

The proximal face of the trapezoides is longer than wide, convex antero-posteriorly, and subdiamond-shaped. The inferior face is narrow subdiamond-shaped, and has less than half the area of the proximal. There is a small round tuberosity on the posterior border, and no trace



of facet for a trapezium. The anterior face of the magnum is wider than long, and is divided into three planes. The proximal extremity is divided into two areas by a high antero-posterior keel. The inner area is the larger, and is bounded by the entire superior border of the anterior face of the bone. The outer area, or the lunar facet, extends very obliquely downwards, most so in front, where it forms the external side of the magnum. It is interrupted by a large sinus, which leaves the posterior portion of the face narrow and transverse. Behind it is first a fossa and then two short tuberosities, one above and external to the other. The inferior face is undivided, and is concave antero-posteriorly, and convex transversely. The unciform is the second bone of the carpus in size. Its anterior face is broader than long, and is convex transversely. The inner face has in front a large trapezoidal facet for the third metacarpus, which is only separated from that of the lunar by the angle. The superior face is divided, by an angular ridge nearly parallel with the inner border, into two unequal faces for the lunar and cuneiform. The latter is half as wide posteriorly as long, and terminates anteriorly in an obtuse angle. The distal face is undivided, but is recurved postero-externally, apparently offering a narrow facet for the fifth metacarpus. This face nearly meets the cuneiform face posteriorly. Behind both the unciform is produced into a decurved, subconic tuberosity.

*Measurements of the Carpus.\**

	M.
Diameter of scaphoid .....	{ antero-posterior ..... 0.066
	{ longitudinal ..... 0.048
Diameter of proximal face of scaphoid .....	{ antero-posterior ..... 0.048
	{ transverse ..... 0.030
Diameter of distal face of scaphoid .....	{ antero-posterior ..... 0.048
	{ transverse ..... 0.023
Diameter of proximal face of lunar .....	{ transverse .. { anteriorly ..... 0.047
	{ at middle ..... 0.032
	{ longitudinal ..... 0.053
Diameter of anterior face of lunar .....	{ longitudinal ..... 0.048
	{ transverse ..... 0.032
Diameter of cuneiform .....	{ antero-posterior, oblique ..... 0.059
	{ transverse, behind ..... 0.040
Diameter of proximal face of cuneiform .....	{ antero-posterior ..... 0.040
	{ transverse ..... 0.044
Diameter of distal face of cuneiform .....	{ antero-posterior ..... 0.040
	{ transverse ..... 0.031
Length of trapezoides .....	..... 0.027
Diameter of proximal face of trapezoides .....	{ antero-posterior ..... 0.029
	{ transverse ..... 0.016
Diameter of distal end of trapezoides .....	{ antero-posterior ..... 0.020
	{ transverse ..... 0.010
Diameter of magnum .....	{ longitudinal { anteriorly ..... 0.029
	{ externally ..... 0.040
	{ transverse, posteriorly ..... 0.047
	{ antero-posteriorly, outer side ..... 0.055

\* These measurements are always the greatest, and are axial, or in straight lines.

*Measurements of the Carpus—Continued.*

	M.
Diameter of lunar face of magnum.....	{ antero-posteriorly ..... 0.046
	{ transversely ..... 0.031
Diameter of distal face of magnum .....	{ antero-posteriorly ..... 0.040
	{ transversely ..... 0.048
Diameter of unciform .....	{ antero-posterior ..... 0.080
	{ transverse ..... 0.053
	{ longitudinal, in front..... 0.040
Diameter of lunar facet.....	{ antero-posterior ..... 0.047
	{ transverse (least)..... 0.016
Diameter of cuneiform facet.....	{ antero-posterior ..... 0.052
	{ transverse (behind)..... 0.028
Diameter of 4th metacarpal facet.....	{ antero-posterior ..... 0.044
	{ transverse ..... 0.046

As already remarked, this carpus displays resemblances to some recent types, and possesses some which are not known among living *Artiodactyla*. The inferior face of the scaphoid is narrower from side to side than in the *Ruminantia* or *Sus*, *Dicotyles* only approaching but not equalling it in this respect. The strong inferior keel of the lunar exceeds that seen in any of the *Ruminantia* or *Omnivora*. The pisiform facet is more oblique than in those groups. The posterior tuberosities of the magnum and unciform are larger than those of the genera of either group, while the distinct trapezoides, the slightly shortened magnum and unciform, and slight decurvature of the cuneiform facet of the unciform posteriorly, are suilline characters.

The *metacarpals* are robust, but flattened antero-posteriorly. The rudiments of the second and fifth are free, and the latter is the larger. The third has a considerable surface of contact with the unciform; its anterior face displays two shallow fossæ, one at each superior angle. The corresponding positions on the fourth metacarpal are occupied by two low bosses. Otherwise the surfaces of the shafts of these bones are uniform. The phalangeal articular face is well reverted anteriorly and posteriorly, and is not bounded by a transverse depression anteriorly above. The carina is short, though prominent, and extends to the middle of the distal extremity. The lateral distal tuberosities are very low.

*Measurements of the Metacarpals.*

	M.
Length of M. III.....	0.210
Length of M. IV .....	0.190
Diameter of M. III proximally.....	{ transverse (total)..... 0.063
	{ antero-posterior ..... 0.055
Diameter of M. III distally .....	{ transverse ..... 0.053
	{ antero-posterior (chord)..... 0.045
Diameter of M. IV proximally .....	{ transverse ..... 0.054
	{ antero-posterior ..... 0.045
Diameter of M. IV distally.....	{ transverse ..... 0.043
	{ antero-posterior (chord)..... 0.048
Length of M. II.....	0.055
Length of M. V.....	0.040
Diameter of M. V antero-posteriorly.....	0.021

The *phalanges* are more depressed than in any genus of *Artiodactyla* known to me, excepting *Hippopotamus*. The proximal articular surface of the first is gently concave, with the anterior border not produced. The shaft is not contracted, and is regularly convex above or anteriorly. The distal articular face is narrower above and not produced. The superior border of the proximal face of the second phalange is produced medially. The distal face is narrowed and produced upwards, so as to stand in high relief, from which it results that the middle of the shaft is very concave above. The external and internal borders of the inferior or posterior part of the distal face, are produced backwards, covering lateral basal ridges of more than half the length of the shaft, which form the inferior border of lateral fossæ. One unguis is preserved. It is distinct in form from that of *Hippopotamus*, *Sus*, or *Dicotyles*, and resembles that of the llama. It is short, obtuse, and compressed. The external face is nearly plane fore and aft, and slightly convex vertically. The inner is convex fore and aft, and concave vertically. The profile descends steeply to the apex, the curve commencing but little beyond the base. The inferior face is at right angles to the interior face, and is moderately wide.

*Measurements of the Phalanges.*

	M.
Median length of first of M. IV .....	0.066
Proximal diameter .....	{ antero-posterior ..... 0.042
	{ transverse ..... 0.055
Distal diameter .....	{ antero-posterior (median) .. 0.030
	{ transverse (greatest) ..... 0.055
Median length of second phalange .....	0.055
Diameter of second phalange proximally .....	{ antero-posterior ..... 0.035
	{ transverse ..... 0.045
Diameter of second phalange distally .....	{ antero-posterior ..... 0.032
	{ transverse ..... 0.041
Length of ungual phalange below .....	0.042
Proximal diameter of ungual phalange .....	{ antero-posterior ..... 0.032
	{ transverse ..... 0.025

The *femur* is slender as compared with the humerus, and of moderate length. The great trochanter is produced, but not beyond the line of the convexity of the head, and is not much recurved. The expanse externally is about as great as that of the head internally. The trochanteric fossa is not large, and is cut off below by a plane surface at the base of the great trochanter, whose superior border forms a curved line connecting the great and little trochanters. The latter is large and projects well inwards. The *fossa ligamenti teris* is large and central, having no connection with the border of the head of the femur. The posterior side of the shaft is flat, and the anterior face regularly convex. The two faces meet externally in a well-marked representative of the *linea aspera*. The rotular face of the femur is short and wide, with the borders somewhat oblique, and the inner edge is higher than the outer at its proximal part. It is strongly convex from above downwards, and

does not connect below with the condylar surfaces. Its entire inferior border is well defined and angulate. The condyles are well separated, and the intercondylar fossa is wide above or anteriorly. The external is a little the larger, and the internal is distinguished by the presence of a deep lateral fossa.

The head of the *tibia* is characterized by a distinct bifid spine, and a low, wide crest, which presents an open, shallow groove forwards. The articular faces are of subequal width, but the external is shortened anteriorly by the usual notch; it is also decurved posteriorly.

*Measurements of the Femur.*

	M.
Expanse proximally (greatest) .....	0.170
Expanse proximally at extremity .....	0.150
Diameter of head .....	0.068
Diameter of shaft at middle { antero-posteriorly .....	0.053
{ transversely .....	0.030
Length of chord of rotular face.....	0.088
Width of rotular face .....	0.070
Expanse of condyles (greatest).....	0.122
Greatest chord of distal end of femur.....	0.110

*Measurements of the Tibia.*

	M.
Diameter of head of tibia { antero-posterior .....	0.130
{ transverse .....	0.125

The form of the head of the tibia is much like the corresponding region in *Oreodon culbertsoni*; but the characters of the femur do not resemble those of that species, particularly as regards the distal extremity.

A peculiarity of the long bones of this species is seen in their very large medullary cavities. This is especially true of the humerus, whose walls are remarkably thin; those of the femur are thicker.

This species was found by Mr. C. H. Sternberg in the John Day River region.

LEPTOMERYX EVANSI Leidy.

HYPERTRAGULUS CALCARATUS Cope.

This species is much more abundant in the John Day River deposit than the *Leptomeryx evansi*. The two genera represent a peculiar family, which I call the *Hypertragulidæ*, with the following characters:

Selenodont *Ruminantia* with an interrupted dental series, coössified ulna and radius, cuboid and navicular bones, and third and fourth metapodial bones. Only two continuous metapodial bones, their distal articular extremities not presenting a complete trochlear keel. No fibula. Premolars except the fourth, cutting.

This family connects the *Tragulidæ* with more typical *Ruminantia*. It differs from that family in the absence of the fibula and the external metapodial bones. From the typical *Ruminantia* or *Pecora*, it differs

in the incompleteness of the trochlear keel of the metapodials, and the trenchant character of the premolars, excepting the last.

The species of the preceding list which I have observed in other localities are the following, which I procured in the White River beds of Eastern Colorado: *Palæolagus haydeni*, *Canis hartshornianus*, *Canis lippincottianus*, *Canis gregarius*, *Leptomeryx evansi*, *Hypertragulus calcaratus*. Professor Leidy has recognized a number of species as those previously found in the White River beds of Dakota by Dr. Hayden.

#### Loup Fork Fauna.

Two new species were obtained by Mr. Sternberg at this horizon, which present characters of considerable interest. They are as follows:

#### LUTRICTIS? LYCOPOTAMICUS, sp. nov.

This Carnivore is represented by a left mandibular ramus, which contains alveoli and crowns of the canine and molars, excepting those posterior to the sectorial. These teeth have the formula, four premolars, of *Mustela* and of the Dogs, but the sectorial is much more like that of *Lutra* than that of either of the genera named. The heel of this tooth is long, and encloses a wide space transversely, while the sectorial portion is short and low, and includes a large internal tubercle. In the absence of the tubercular teeth, the generic reference is uncertain; but its characters agreeing, so far as they go, with the genus *Lutricaris* of Pomel, I refer it there provisionally.

The first premolar only is one-rooted; the third is wide behind, developing a low heel. The heel of the fourth is a little better developed, and there is a small anterior basal cutting lobe; there is also a tubercle on the posterior cutting edge at the middle. The three cusps of the anterior part of the sectorial tooth are situated at the corners of an imaginary equilateral triangle. The heel continues the width of the crown, is wider than long, and is abruptly truncate behind. It supports a long cutting edge just within the external border, and a shorter one on the internal. The surface of the enamel is smooth. There are two mental foramina, one below the interval between the first and second premolars, the other beneath the anterior root of the third premolar.

#### Measurements.

	M.
Length of molar series without tubercular .....	0.0220
Diameter of sectorial { antero-posterior .....	0.0066
{ transverse .....	0.0040
Length of heel of sectorial .....	0.0024
Length of fourth premolar .....	0.0045
Elevation of fourth premolar .....	0.0036

From the Loup Fork formation of Cottonwood Creek, Oregon; discovered by Charles H. Sternberg.

#### PROTOLABIS TRANSMONTANUS, sp. nov.

A nearly complete cranium, without lower jaw, of an adult animal, is

the basis of our knowledge of this species. It presents the characters of the genus in the following superior dental formula: I. 3; C. 1; P.m. 4; M. 3. The first premolar is situated in the middle of a long diastema, and a short one separates the canine from the third incisor.

On comparison of this species with the *P. heterodontus*, the type, and heretofore the only known species of the genus, various characteristic peculiarities may be observed, which will be noticed in the course of the description. It is considerably smaller than the *P. heterodontus*, resembling in its dimensions the *Procamelus occidentalis*.

The crown of the second superior incisor is directed forwards, and the cutting edge is oblique to the long axis of the tooth. The first incisor is equally large, and its alveolus occupies the apex of the premaxillary bone. In *P. heterodontus*, the alveolus is smaller, and the apex extends considerably beyond it. The third incisor has a conic crown, with sub-round section. In *P. heterodontus* it is more robust, and is oval in section, with weak posterior cutting edge. The canine is less robust than the third incisor, and is about as far posterior to it as the latter is from the second incisor. The crown is slightly compressed, and is less robust than that of *P. heterodontus*. The first premolar is still weaker, and the crown is compressed; the roots are only discrete at their extremities. It is situated a little more than one-third the distance between the canine and second premolar behind the former. The second premolar is well developed, and is two-rooted. The third premolar is also large, with the grinding surface of the crown about half as wide as long. It has a strong internal basal cingulum, which on attrition encloses a groove-like fossa with the principal crown. The external face of the crown is gently convex between an anterior and a posterior ridge. The internal face of the crown is uniformly convex. The fourth premolar has both crescents well developed. Its grinding face is subsemicircular, and there are a strong anterior and a weak posterior external vertical ridge. In *P. heterodontus*, the grinding surface of this tooth is more nearly subquadrate.

The true molars are subquadrate in horizontal section, and have short crowns, well distinguished from the roots. The anterior horn of each external crescent is prolonged, constituting a section of a prominent vertical external ridge of the crown at each point. The external sides of the columns are but slightly convex. The inner sides of the internal columns are strongly convex. The enamel borders of the lakes are absolutely simple, and there are no included enamel fossæ. The posterior outer angle of the last superior molar is not produced.

As compared with the true molars of *P. transmontanus*, those of the *P. heterodontus* are relatively smaller in transverse diameter. The masticating surfaces of the crowns of the second and third are thus more elongate in outline. They are also rather more prismatic, and the last two apparently occupied longer time in the process of protrusion. They are much larger than those of *P. transmontanus*.

The *foramen infraorbitale* issues above the middle of the fourth pre-

molar. In *P. heterodontus* it issues above the anterior part of the first true molar. A sharp angle separates the exterior and extero-inferior faces of the malar bone.

*Measurements.*

	M.
Length of dental series from base of first incisor .....	0.257
Length of incisors on chord .....	0.023
Space between third incisor and canine .....	0.006
Length of crown of third incisor .....	0.013
Antero-posterior diameter of third incisor .....	0.008
Length of interval between canine and first premolar .....	0.011
Length of interval between first premolar and second premolar .....	0.020
Length of three contiguous premolars .....	0.035
Length of third premolar .....	0.014
Width of third premolar (greatest) .....	0.0075
Length of true molar series .....	0.057
Diameter of second true molar { antero-posterior .....	0.018
{ transverse .....	0.018
Diameter of third true molar { antero-posterior .....	0.022
{ transverse .....	0.019

Discovered by C. H. Sternberg in the Loup Fork beds of Cottonwood Creek, Oregon.