

[FROM THE AMERICAN JOURNAL OF SCIENCE AND ARTS, VOL. II, JULY, 1871.]

NOTICE
OF SOME
NEW FOSSIL MAMMALS FROM THE TERTIARY
FORMATION.

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IN association with the Reptilian fossils collected by the Yale College party last summer, and already described in this Journal,* numerous remains of Mammals were also discovered, and in the following article some of the more interesting new species are briefly characterized. A few species from the other Tertiary lake-basins of the Rocky Mountains have been included, as they throw considerable light on the ancient sub-tropical fauna of that region. The present notice is merely preliminary to a full description, with illustrations, now in course of preparation.

Titanotherium? anceps, sp. nov.

The largest extinct mammal discovered by our party in the Green River basin was apparently one of the rarest; and the remains obtained, although in themselves characteristic, include, unfortunately, none of the teeth sufficiently well preserved to afford generic characters. The single species thus indicated has accordingly been referred, with a doubt, to the genus *Titanotherium*, seemingly a near ally, until the discovery of additional material clears up the question of its exact affinities.

* Vol. i, 1871, pp. 192, 322, and 447.

The specimens discovered, which evidently pertained to three different individuals, mainly consist of several dorsal vertebræ, the distal end of a humerus, the greater portion of a tibia, and some of the smaller bones of the extremities. They indicate a Pachyderm, much larger than any other known mammal from the same deposits, and about two thirds the size of *Titanotherium Prouti*, from the Tertiary basin east of the Rocky Mountains. The anterior dorsal vertebræ preserved have both articular faces slightly concave, thus distinguishing the species at once from *T. Prouti*, which has in this part of the series the front vertebral face very convex, and the posterior face concave. Another marked difference is seen in the tibia, which at its proximal end has the femoral articular surfaces contiguous, with no prominent elevation between them, resembling in this respect some of the Proboscidea.

Measurements.

Length of anterior dorsal vertebra, on lower surface,	2 inches 2 lines.
Width of posterior face between rib cavities,	3 "
Height of posterior face,	2 " 5 "
Transverse diameter of tibia at proximal end, ...	4 " 10 "
Fore and aft diameter,	4 " 3 "
Transverse diameter at distal end,	3 " 11 "
Fore and aft diameter,	3 " 3 "

The remains were found by Lieut. Wann, and the writer, in the "Mauvaises Terres" deposits, near Sage Creek, Western Wyoming. The geological horizon is lower Miocene, or perhaps Eocene.

Palæosyops minor, sp. nov.

This species is indicated by a molar tooth, from the right lower jaw, and probably by some other less characteristic remains. The tooth, which is apparently from near the middle of the series, is of the *Palæotherium* type, and nearly resembles in its main characters the corresponding molar of *Palæosyops*. The crown is composed of two united, antero-posterior lobes, with crescent-shaped summits. The anterior lobe is the more elevated, and the posterior has a greater fore and aft extent. The animal thus represented was apparently about as large as

the South American Tapir, and less than one half the size of *Palaeosyops paludosus* Leidy,* from the same deposits.

Measurements.

Antero-posterior diameter of lower molar,..... 10 lines.
Transverse diameter of front lobe, at summit,..... 5. " "
Transverse diameter of posterior lobe, at summit,..... 5.6 "

The only known specimens of this species were found by the writer at Grizzly Buttes, near Fort Bridger, Wyoming, in the same deposits as the preceding species.

Lophiodon Bairdianus, sp. nov.

The remains on which this species is based consist of portions of several skeletons, with numerous teeth which show considerable variation in size and other characters of minor importance. The various specimens indicate an animal somewhat smaller than the modern Tapir of South America, but much larger than the *Lophiodon modestus*,† founded by Dr. Leidy on a tooth from the same Tertiary beds that afforded the fossils under consideration. From the latter species, so far as it is now known, the present specimens may be readily distinguished, moreover, by the enamel of the teeth, which, instead of being coarsely wrinkled, is nearly smooth, or marked by very delicate, irregular striæ.

Measurements.

Length of portion of upper jaw, enclosing the three posterior molars,..... 25. lines.
Antero-posterior diameter of last upper molar,..... 9. " "
Transverse diameter of same,..... 10.25 "
Length of fragment of lower jaw with three posterior molars, 25. "

The specimens now representing this species, which is one of the most common fossil mammals in the earlier Tertiary of Western Wyoming, were found by G. B. Grinnell, J. W. Griswold, C. W. Betts, A. H. Ewing, J. M. Russell, and the writer, at various localities near Fort Bridger, and on the White River, in Eastern Utah. The species is named in honor of Professor S. F. Baird, of the Smithsonian Institution.

* Proceedings Philadelphia Academy of Natural Sciences, 1870, p. 113.

† Proceedings Philadelphia Academy of Natural Sciences, 1870, p. 109.

Lophiodon affinis, sp. nov.

A second and somewhat smaller species of the same genus, closely allied to the preceding, is indicated by various fragmentary remains, including several molar teeth in an excellent state of preservation. A comparison of the last upper molar with that of *L. Bairdianus*, shows, aside from the smaller size, a marked difference, especially in the contour of the crown, which has a deep notch in the outer posterior margin of the base, between the external tubercles in which the transverse ridges terminate. In the species just described, the margin is here nearly straight. The present specimen, moreover, has the small anterior external tubercle more prominent, and less closely connected with the adjoining ridge. This tooth is larger than the corresponding one of *Lophiodon modestus*, and has quite different proportions. The enamel, also, is similar to that in the preceding species.

Measurements.

Antero-posterior diameter of last upper molar.....	7.1	lines.
Transverse diameter of same,.....	8.3	"
Antero-posterior diameter of penultimate upper molar,	8.	"
Transverse diameter of same,.....	8.	"

The principal specimens on which this species is established were found by H. D. Ziegler, in the Mauvaises Terres beds, near Marsh's Fork, Wyoming.

Lophiodon nanus, sp. nov.

A small, well marked species, apparently of the genus *Lophiodon*, is represented by a number of fossils collected by the Yale party at various localities. The most characteristic of these specimens is a right upper jaw containing a series of four premolars, and three molars, and part of the corresponding left jaw with several teeth of the same animal. The molars differ especially from those of the two preceding species, in having a much shallower valley between the two transverse ridges, and in having a strong basal ridge, or shelf, at the external posterior corner of the crown. The enamel of the whole series is very smooth. The species was probably about two thirds the size of *L. modestus*.

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Measurements.

Length of portion of upper jaw, containing seven posterior teeth,	26·	lines.
Length of same, with three last molars,	13·7	"
Antero-posterior diameter of last upper molar,	5·	"
Transverse diameter of same,	5·25	"

The remains now known to represent this species were discovered by C. W. Betts, H. B. Sargent, and the writer, in the Tertiary strata at Grizzly Buttes, near Fort Bridger.

Lophiodon pumilus, sp. nov.

A still more diminutive species, of the same, or a nearly related, genus, is indicated by several specimens, including a fragment of a left upper jaw, containing three premolars and the two succeeding molar teeth. The species may easily be distinguished from the small one above described, by the presence, on the outside of the superior teeth, of a strong, continuous, but irregular basal ridge, which, at the external angle of the crown, replaces the elevated tubercle present in all the molars of the species already noticed. The present specimen may also be distinguished from *L. nanus*, by the form of the last two upper premolars, which in the latter have their greatest transverse diameter behind the center, while the reverse is true of these premolars in the species under consideration.

Measurements.

Length of portion of upper jaw, with three premolars, and next two molars,	14·	lines.
Antero-posterior diameter of penultimate upper molar,	3·25	"
Transverse diameter of same,	4·	"

The only specimens at present known to represent this species were found by C. T. Ballard, in the Tertiary beds near Marsh's Fork, Western Wyoming.

Anchitherium gracilis, sp. nov.

The Green River Tertiary basin of Wyoming apparently contains very few extinct solipedal mammals, one or two fragments only being all our party secured during several weeks of explorations. In the Uintah or southern basin, however, especially

near the White River of Eastern Utah,* remains of this group are more abundant, and some characteristic specimens were obtained. Among these, were three lower jaws, with many of the teeth in good preservation. They represent an animal less than one half the size of *Anchitherium Bairdi* Leidy, and apparently belonging to the same genus. There are seven premolar and molar teeth, with essentially the same constitution as in that species. The first premolar has but one fang, and between this and the symphysis there are no teeth. On the inner face of each ramus there is a shallow, sickle-shaped impression, with the point directed forward, and terminating under the first premolar.

Measurements.

Length of portion of lower jaw, with six posterior teeth,	23.58	lines.
Length of same with three posterior teeth,	12.5	"
Antero-posterior diameter of last lower molar,	5.	"
Transverse diameter of same,	2.	"

The above specimens were discovered by C. T. Ballard and the writer, on the north side of the White River, in Eastern Utah. The geological horizon is upper Eocene, or lower Miocene.

Lophiotherium Ballardii, sp. nov.

A small Pachyderm, apparently nearly related to the genus *Lophiotherium*, is indicated by a fragment of a right lower jaw, with the last two molars, and a few less important remains. The species thus represented appears to have been about two thirds the size of *Lophiotherium sylvaticum*, recently described by Dr. Leidy from the same Tertiary basin in which these fossils were found,† and the teeth, so far as known, have nearly the same composition. Those preserved in the present specimen are somewhat worn, showing that the individual was fully adult. The enamel, especially on the sides of the crown, is much wrinkled, and thus the external basal ridge is rendered strongly serrated.

Measurements.

Antero-posterior diameter of last lower molar,	4.4	lines.
Transverse diameter of same,	2.1	"
Antero-posterior diameter of penultimate lower molar, ..	3.2	"
Transverse diameter of same,	2.25	"

* This Journal, vol. i, p. 196, March, 1871.

† Proceedings Philadelphia Academy of Natural Sciences, 1870, 126.

The species is named for the discoverer, Mr. C. T. Ballard, of the Yale party, who obtained the specimens here described at Grizzly Buttes, Western Wyoming.

Elotherium lentus, sp. nov.

The presence of numerous Suilline Pachyderms in the Green River Tertiary basin was clearly established during the investigations of our party by the discovery of several extinct species, all different from any hitherto described. One of these, which evidently belonged to the genus *Elotherium*, is represented by a single fragment of a left lower jaw, with the last molar in fine preservation. This specimen indicates a species about one half the size of *Elotherium Mortoni* Leidy, which is comparatively abundant in the lower Tertiary deposits east of the Rocky Mountains. The upper surface of this last lower molar is composed of two transverse pairs of conical lobes, with a single posterior one on the median line. The anterior inner cone is larger than its fellow, and has its summit bifid. In the next pair, which are much less elevated, the external lobe is the larger. The posterior cone is low, and shows a tendency to subdivide. There is a basal ridge in front, and indications of its continuation on the external border. The enamel is finely corrugated. There is a prominent rugose tubercle on the inner superior margin of the lower jaw, a short distance behind and above the last molar.

Measurements.

Antero-posterior diameter of last lower molar, 9 lines.
Greatest transverse diameter of same, 5 "
Transverse diameter between first and second pair of cones, 4.4 "

The specimen on which this species is established was found by the writer, in October last, in the Tertiary beds, on Henry's Fork, Wyoming.

Platygonus Ziegleri, sp. nov.

Remains of another Suilline animal, fully as large as the modern *Sus scrofa*, were obtained in the same Tertiary beds with the last species. The most characteristic specimens discovered are a number of upper premolar and molar teeth, which agree so nearly in general composition with those of *Platygo-*

nus, that they may very properly be referred to that genus. One prominent character in these teeth, especially the anterior ones, is the remarkably strong basal ridge, which, on the inner border at least of the first and second premolars, exceeds in breadth that in *Platygonus compressus* LeConte, although on the posterior margin it is less developed than in that species. The crowns of all the upper premolars are composed of a single transverse pair of cones, closely united. The second premolar in this specimen has a greater fore and aft diameter than the third. The enamel of all the teeth is rugose, as in the modern Pecaries.

Measurements.

Length of fragment of upper jaw, containing the three premolars, -----	18.5 lines.
Antero-posterior diameter of first upper premolar, -----	6. "
Transverse diameter of same, -----	6. "
Antero-posterior diameter of second upper premolar, --	6.5 "
Transverse diameter of same, -----	7.3 "
Antero-posterior diameter of third upper premolar, ----	6.2 "

The species is named for H. D. Ziegler, of Yale College, who discovered the specimens on which the present description is based. The locality was at Grizzly Buttes, near the base of the Uintah Mountains.

Platygonus striatus, sp. nov.

A third Suilline species, nearly related apparently to the last, and quite equaling it in size, is indicated by portions of two lower jaws, with a few of the anterior teeth, collected by our party in the Pliocene strata of Northern Nebraska. In one of the specimens, the second left premolar is well preserved, and characteristic. It has the same general composition as the corresponding tooth in *Platygonus compressus*, but, in addition to its much larger size, it is proportionally broader, and has the basal ridge in front less developed. The posterior basal ridge, moreover, is expanded into two rudimentary tubercles. The enamel is marked by delicate irregular striæ, mostly parallel with the base of the crown, and to this ornamentation the specific name refers.

Measurements.

Length of portion of left lower jaw containing first four teeth,	25· lines.
Length of same, with first three teeth,	17· “
Antero-posterior diameter of second lower premolar, ..	6·2 “
Transverse diameter of same,	5·8 “

The above specimens were found by the writer, in July last, in the Pliocene sands, near the head-waters of the Loup Fork River, Nebraska.

Platygonus? Condoni, sp. nov.

The present species is founded on a portion of a right upper jaw containing the three posterior molars. The specimens evidently belonged to a true Suilline mammal, at least equal in size with the last two described. The exact generic relations of the species cannot at present be ascertained, but it differs essentially from any known recent or extinct American species of this group in several particulars. One of the most marked of these is the unusual elongated fore and aft proportions of the last upper molar, which has to the diameter of the penultimate tooth the ratio of three to two. The crown of the posterior molar is composed of two transverse pairs of principal cones, the front pair being the larger, and a posterior lobe, which is partially divided into three tubercles. The enamel is smooth, and there is no basal ridge on the sides of the teeth preserved.

Measurements.

Length of jaw enclosing last three upper molars,	27· lines.
Antero-posterior extent of last molar,	12· “
Transverse diameter of same, through anterior lobes, ...	7· “
Antero-posterior extent of penultimate molar,	8· “

This species is named for Rev. Thomas Condon, who discovered the specimen described, in the Pliocene beds of Oregon.

Dicotyles Hesperius, sp. nov.

A new and interesting small Suilline mammal is well represented by a portion of a right upper jaw, with the last premolar, and the succeeding three molars, all in excellent preservation. The teeth indicate an individual fully adult. They have nearly the composition of those of the modern Peccaries, and

evidently belonged to the same, or a closely related, genus. The species is well marked, and was apparently not more than one half the bulk of *Dicotyles torquatus*. The crowns of the molars have a more rhombic outline than in that species, and a more distinct valley between the anterior and posterior pair of cones. The basal ridge is also more strongly developed, especially on the outer margin, where it is continuous. In other respects the composition of these teeth is very similar in the two species. The last upper premolar in the present specimen, however, differs widely from the corresponding tooth in any of the known Peccaries, living or fossil, resembling most nearly in its composition the second premolar of *D. torquatus*. The latter has, however, the single posterior cone distinct, while in the species under consideration it is connate with the anterior outer tubercle. The upper dental series is here somewhat curved outwardly, and not on a line, as in the living Peccaries.

Measurements.

Length of part of upper jaw with four posterior teeth, ..	19·	lines.
Length of same, with three molars,	15·2	"
Antero-posterior diameter of last upper molar,	5·6	"
Transverse extent of same,	4·	"
Antero-posterior diameter of penultimate upper molar, ..	5·4	"

This specimen, for which the writer is likewise indebted to Rev. Mr. Condon, is from the same locality and geological horizon as the species last described.

Hyposodus gracilis, sp. nov.

This species was about the same size as *Hyposodus paulus*, a small mammal described by Dr. Leidy from the lower Tertiary basin in Wyoming, and supposed by him to indicate an animal probably allied to the suilline family.* It may readily be distinguished from that species, especially by the first true molar of the lower jaw, which is proportionally narrower in front, and broader at its posterior margin. There is also on this tooth a strong external basal ridge, and, at the anterior inner angle, a prominent projection, which is wanting in *H. paulus*. The lower jaw is, moreover, deeper and more compressed in the region of the premolars.

* Proceedings Philadelphia Acad. Nat. Sciences, 1870, p. 109.

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Measurements.

Length of part of lower jaw containing first molar and last two premolars,	5.1 lines.
Antero-posterior diameter of first lower molar,	2. " "
Transverse diameter through posterior lobe,	1.6 " "
Antero-posterior diameter of last lower premolar,	1.6 " "

The specimens representing this species at present were found by the writer, at Grizzly Buttes, Wyoming.

Limnotherium tyrannus, gen. et sp. nov.

A somewhat larger pachyderm, but distantly allied apparently to the two small species last described, is represented by the anterior portions of two united lower jaws, with several teeth, and a few other fragmentary remains. These specimens appear to indicate a genus quite distinct from any hitherto known, but additional remains will probably be required to determine its exact affinities. The teeth of the lower jaws are twenty in number, and form an uninterrupted series, which may be divided as follows:—Incisors 2-2, canines 1-1, premolars 4-4, molars 3-3. The incisors are small, and crowded together. The canines are large, nearly round at the base, and evidently formed most efficient weapons. The first and second premolars had but a single fang. The two anterior molars are in excellent preservation, and have their crowns composed of four principal cones. The first is at the anterior outer angle; the second just behind this, on the inner margin; the third at the outer posterior angle; and the fourth and smallest at the inner posterior corner, separated from the others by a deep pit. Each molar has a rudimentary double tubercle on the anterior margin, and a moderate basal ridge, except on the inner side.

Measurements.

Length of dental series of lower jaw,	18. lines.
Antero-posterior extent of three molars,	7.5 " "
Transverse extent of four incisors,	3. " "
Length of symphysis,	8.5 " "
Depth of lower jaw below last molar,	5.15 " "
Depth below last premolar,	6. " "
Antero-posterior extent of first lower molar,	2.5 " "
Transverse diameter of same,	2. " "

The specimens here described were found by the writer near Dry Creek, Western Wyoming, in deposits which are probably of Upper Eocene age.

Limnotherium elegans, sp. nov.

A diminutive mammal is represented in our collections by portions of two lower jaws, with several teeth, which have so nearly the composition of those in the preceding species that they undoubtedly belong to the same, or a nearly related, genus. One of these specimens contains the last premolar, and the two succeeding molars. In the latter, the two anterior cones form a transverse pair, and are not oblique as in the larger species. The posterior pair of tubercles, also, are nearly on a transverse line.

Measurements.

Length of fragment of lower jaw, enclosing last premo-	
lar and three molars,-----	7.5 lines.
Antero-posterior diameter of second lower molar,-----	2. "
Transverse diameter of same,-----	1.6 "

The only two specimens of this species now known were found by the writer at Grizzly Buttes, near the base of the Uintah Mountains, in Wyoming.

Yale College, New Haven, June 5th, 1871.

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Notice of some new Fossil Mammals and Birds, from the Tertiary Formation of the West; by O. C. MARSH.

IN addition to the species of extinct Mammals described in the last number of this Journal, page 35, the Yale party, during their investigations in the Rocky Mountain region, discovered several others of interest, which are here briefly characterized.

120 The remains of a number of fossil Birds were also found, and a
121 preliminary notice of the more important specimens is included in the present article.

Arctomys vetus, sp. nov.

Remains of Rodents are very rare in the Green river Tertiary basin, although not uncommon in the more recent strata, east of the Rocky Mountains. A small species of the genus *Arctomys*, represented by a nearly perfect lower jaw, and other remains; was discovered during our explorations on the Loup Fork river. This species was only about one-third the size of the modern *Arctomys monax* Gm., and may at once be distinguished from that rodent by the lower incisors, which have on the anterior surface a shallow median groove. The molar teeth of the lower jaw have essentially the same composition as those of the larger species.

Measurements.

Length of lower jaw from condyle to base of incisor,	17.75	lines.
Antero-posterior extent of four lower molars,-----	6.5	"
Depth of lower jaw below first molar,-----	4.5	"

The specimens on which the species is based, were found by Mr. J. W. Wadsworth and the writer, in the Pliocene beds, on the Loup Fork, in northern Nebraska.

Geomys bisulcatus, sp. nov.

Another extinct Rodent, about the same size as the preceding species, is indicated by several fragments of jaws and teeth, found in the same Pliocene Tertiary beds. The incisors of the lower jaw in this species have the anterior face broad and flat, with the external angle acute. They extend backward under the entire molar series. The latter has a very similar composition to the molars of the recent *Geomys bursarius* Shaw, and the two species may eventually prove to be nearly allied. The upper incisors, likewise, are similar. On their anterior face there is a deep, rounded groove, with its lowest part just outside the median line. Near the inner angle, also, of each incisor, there is a second, very fine, sharp groove. The external front angle is rounded, and the lateral face but slightly convex. The premaxillary suture forms externally an obtuse angle, with the apex forward, near the posterior face of the incisor. In both jaws, the incisors are deeper than wide.

Measurements.

Transverse diameter of upper incisor,	1.6 lines.
Antero-posterior extent,	2. "
Depth of skull at premaxillary suture,	6. "
Length of lower incisor on arc of curve,	15. "
Transverse diameter at apex,	1.5 "
Depth of lower jaw below first molar,	5.6 "
Antero-posterior extent of first three lower molars,	3.5 "

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The only known specimens representing this species were found by the writer in the Pliocene strata, near Camp Thomas, on the Loup Fork river.

Sciuravus nitidus, gen. et sp. nov.

A very small extinct rodent of much interest is indicated by a portion of a left upper jaw, enclosing the last three molars, which was one of the treasures secured by the Yale party last autumn in the Tertiary beds of the Green River basin. The teeth preserved have apparently a near resemblance to those of the *Sciuridae*, and hence the present fossil may be referred provisionally to that group. The genus is apparently distinct from any known, and will be more completely defined in the full description. The upper molars are composed essentially of two pairs of tubercles, with a minute intermediate cone on the outer edge. There is a strong basal ridge in front, and the inner margin is bifid. The species was about the size of the common brown rat, *Mus decumanus*.

Measurements.

Length of part of upper jaw, enclosing the three posterior molars,	3.4 lines.
Antero-posterior extent of antepenultimate upper molar,	1. "
Transverse extent of same,	1. "

This unique specimen was discovered by the writer at Grizzly Buttes, near Fort Bridger, Wyoming.

Sciuravus undans, sp. nov.

The present species was somewhat larger than the preceding, but probably a near ally. A single specimen only can now with certainty be referred to it, and a discussion of its exact affinities must be reserved for another occasion. The fossil

in question is part of a right lower jaw containing the incisors and first three molars, all in excellent preservation. The incisor extends below the entire molar series. Its anterior surface is smooth, and somewhat convex, and the inner face, where the two teeth meet, is marked by a succession of delicate wave-like impressions. The tubercles of the molars are more prominent than in those of the last species.

Measurements.

Length of portion of lower jaw, containing first three molars,	3.5 lines.
Transverse diameter of third lower molar,	1. " "
Transverse diameter of lower incisor,	.6 " "

This specimen was found by the writer at the same geological horizon, and near the same locality that afforded the species last described.

Triacodon fallax, gen. et sp. nov.

A small extinct mammal of much interest, is indicated by a premolar tooth, and possibly by some additional remains, collected in the lower Tertiary beds of Wyoming. The tooth appears to be the last premolar of the right lower jaw, but differs so widely from the corresponding premolar in any known species, as to render the nature of the animal to which it belonged more or less uncertain. The crown is triangular at the base, the outer and longest side being somewhat convex, and the other two nearly flat. The upper surface is composed of three triangular tubercles, one at each angle, the anterior being much the highest, and the inner one the smallest. This peculiar tooth resembles slightly the corresponding premolar in some of the Insectivores, and is likewise similar in some respects to those of certain Marsupials, but further remains will doubtless be necessary to determine its true zoological position. The present species was probably about two thirds the size of the North American opossum.

Measurements.

Antero-posterior diameter of lower premolar,	2.25 lines.
Transverse diameter of same,	1.95 " "
Height of anterior tubercle,	2.8 " "
Height of posterior tubercle,	1.6 " "
Height of inner tubercle,	1.75 " "

All the specimens supposed to pertain to this species were found by J. M. Russell and the writer, at Grizzly Buttes, near the base of the Uintah Mountains.

Canis montanus, sp. nov.

The presence of a large Carnivore in the fossil fauna of the Green River Tertiary basin, which could with comparative certainty be predicated upon the discovery there of so many extinct pachyderms, was clearly established by our party; although the evidence at present rests on remains more or less fragmentary. Those already known consist of a last upper premolar tooth in good preservation, a Canine, wanting most of the crown, and a number of the larger bones of a skeleton, all apparently of the same species, but pertaining to three individuals, differing somewhat in size. These various remains indicate an animal considerably larger than the recent Gray Wolf (*Canis occidentalis*), and one probably belonging to the same family. The last upper premolar in the present extinct species is robust, has a short compressed crown. The principal cusp is conical, with sub-acute edges, the anterior being about twice the length of the posterior. Behind the main cusp there is a large triangular tubercle, with its apex exterior to the fore and aft axis of the crown. In the canine tooth, the base of the crown forms a broader oval than in most of the recent *Canidae*

Measurements.

Antero-posterior diameter of last upper premolar,-----	9 lines.
Greatest transverse diameter of same,-----	4.25 "
Height of main cusp,-----	6 "
Height of posterior tubercle,-----	3.75 "
Antero-posterior diameter of canine at base of crown,---	7 "
Transverse diameter of same,-----	5 "

The above specimens were found by H. B. Sargent and the writer, at Grizzly Buttes, Western Wyoming.

Vulpavus palustris, gen. et sp. nov.

A second, much smaller carnivore is indicated by several upper molar teeth, and other fragmentary remains, found during our explorations in the same Tertiary deposits that yielded the preceding species. The specimens belonged to several indi-

viduals, all considerably smaller than a fox, and apparently having some affinities with that animal, although generically distinct. One of the best preserved of the teeth is a second, right, upper molar, which has a similar composition to the corresponding tooth of the common Red fox (*Vulpes fulvus* Desm.), but differs in the outline of the crown, which has the posterior side the longest, thus indicating a relative greater expansion at this part of the skull. The first upper molar, also, has a proportionally less fore and aft extent than the same tooth in the fox.

Measurements.

Length of portion of jaw containing last three upper molars,	10.5 lines.
Antero-posterior diameter of second upper molar,	2.35 "
Transverse diameter of same,	4. "

The specimens now representing this species were discovered by Dr. J. V. A. Carter, and the writer, near Fort Bridger, Wyoming.

Amphicyon angustidens, sp. nov.

Another extinct carnivore, about as large as the preceding species, and perhaps related to the same group, is represented by the anterior portion of a right lower jaw, containing the last three premolars, and the canine. The ramus is slender, but rather deep. The premolar teeth are low, and unusually compressed. All have a distinct tubercle in front of the main cusp, and the third and fourth have the posterior edge trifid. The present specimen agrees essentially in size with the corresponding jaw of *Amphicyon gracilis* Leidy, but the last premolar is less elevated, more compressed, and has the middle tubercle on the posterior edge much less developed than in that species.

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Measurements.

125

Length of part of lower jaw containing four premolars, ..	9.5 lines.
Depth of jaw below last premolar,	5. "
Width of jaw below last premolar,	2.1 "
Antero-posterior diameter of last lower premolar,	3. "
Transverse diameter of same,	1.25 "
Height of crown,	1.8 "

This species was found by the writer, in the Miocene Shale, at Scott's Bluff, on the North Platte river, Nebraska.

FOSSIL REMAINS OF BIRDS.

Since the beginning of the last year, when the first fossil Birds from this country were described by the writer,* but two additional species have been announced: an extinct Turkey, *Meleagris altus* Marsh (*M. superbus* Cope), from the Post-Tertiary of New Jersey,† and a Gannet, *Sula loxostyla* Cope, from the Miocene of North Carolina.‡ A special search was made by the Yale party last season for Bird remains, and a number of specimens were discovered, most of which were not sufficiently well preserved to admit of accurate determination. The few described below, although imperfect, are quite characteristic, and form an acceptable addition to the rich Tertiary fauna of the West, which has so long been deemed wanting in remains of this class.

Aquila Dananus, sp. nov.

An extinct species of Eagle, nearly as large as the modern Golden Eagle, (*Aquila Canadensis* Cass.) is indicated by the distal portion of a left tibia, discovered during our explorations in the Pliocene beds of the Loup Fork river. The specimen shows, at its lower extremity, the peculiar fore and aft flattening, and the oblique, tapering supra-tendinal bridge over a deep canal, so characteristic of the recent birds of prey belonging to this genus. From the tibia of the Golden Eagle, evidently a nearly related species, the present fossil may readily be distinguished, aside from its inferior size, by the less concave inferior and posterior trochlear surfaces, and by the more prominent and well defined tubercle at the center of the ento-condyloid surface.

Measurements.

Width of condyles in front,.....	8·	lines.
Antero-posterior diameter of inner condyle,.....	5·25	"
Antero-posterior diameter between condyles,....	3·3	"
Transverse extent of outlet of canal below bridge,....	2·	"

This unique specimen was discovered in July last by Mr. A. H. Ewing, in a Pliocene bluff on the Loup Fork river. The species is named in honor of Professor James D. Dana.

* This Journal, vol. xlix, p. 205, 1870.

† Proceedings Philadelphia Acad. Nat. Sciences, 1870, p. 11, and American Naturalist, vol. iv, p. 317.

‡ Synopsis of Extinct Batrachia, &c., p. 236.

Meleagris antiquus, sp. nov.

A large Gallinaceous Bird, approaching in size the wild Turkey, and probably belonging to the same group, was a cotemporary of the *Oreodon* and its associates, during the formation of the Miocene lake deposits east of the Rocky Mountains. The species is at present represented only by a few fragments of the skeleton, but among these is the distal end of a right humerus, with the characteristic portions still preserved. The specimen agrees in its main features with the humerus of *Meleagris gallopavo* Linn., the most noticeable points of difference being the absence in the fossil species of the broad longitudinal ridge on the inner surface of the distal end, opposite the radial condyle; and the abrupt termination of the ulnar condyle at its outer, superior border.

Measurements.

Greatest diameter of humerus at distal end,.....	12·	lines.
Transverse diameter of ulnar condyle,.....	3·4	"
Vertical diameter of same,.....	4·	"
Transverse diameter of radial condyle,.....	4·25	"

The specimens on which this species is based were discovered by Mr. G. B. Grinnell, of the Yale party, in the Miocene clay deposits, of Northern Colorado.

Bubo leptosteus, sp. nov.

Several imperfect specimens of bird bones were found in the early Tertiary beds of the Green river basin, only one of which, however, the distal half of a left tibia, is sufficiently characteristic to suggest the near affinities of this species to which it pertained. This specimen shows that the tibia, when entire, was a slender, nearly straight bone, much compressed in an antero-posterior direction at its distal end, and having similar proportions to the same bone in the *Strigidae*, or Owl family. The near resemblance is rendered especially striking by the entire absence of the osseous supra-tendinal bridge, which is wanting in this group, and in a few other birds with which the present species is apparently less nearly allied. The fossil under consideration would indicate a species about two-thirds the size of the Great Horned Owl (*Bubo Virginianus* Bon.), the tibia of which it resembles in nearly all essential particulars.

There is, however, no trace of a fibular ridge on the outer surface of the distal end, as in that species, or on the portion of the shaft preserved; which would seem to imply a generic difference between the two forms, and additional material will doubtless prove such to be the case.

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Measurements.

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Length of portion of tibia preserved,-----	15·	lines.
Width of condyles in front,-----	6·5	"
Transverse anterior diameter of inner condyle,-----	2·5	"
Transverse anterior diameter of outer condyle,-----	1·8	"

This specimen, the only known representative of the species, was found by the writer last autumn at Grizzly Buttes, near Fort Bridger, Wyoming.

Yale College, New Haven, June 12th, 1871.