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Descriptions of species of Pleistocene Vertebrata, types or ... 

Oliver Perry Hay
DESCRIPTIONS OF
SPECIES OF PLEISTOCENE VERTEBRATA, TYPES
OR SPECIMENS OF MOST OF WHICH ARE
PRESERVED IN THE UNITED STATES
NATIONAL MUSEUM

BY

OLIVER P. HAY
Associate of the Carnegie Institution of Washington

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DESCRIPTIONS OF SPECIES OF PLEISTOCENE VERTEBRATA, TYPES OR SPECIMENS OF MOST OF WHICH ARE PRESERVED IN THE UNITED STATES NATIONAL MUSEUM.

By Oliver P. Hay, 
Associate of the Carnegie Institution of Washington.

INTRODUCTION.

In the paper which follows there are described fossil remains of Pleistocene Mammalia, which have been found at three principal places: Denver, Colorado; Wenatchee, Chelan County, Washington; and Anita, Coconino County, Arizona. In addition to the species from these places there are described remains of camels and of rodents and lagomorphs from various localities west of the Mississippi River; also bones of a sloth from near Williston, Levy County, Florida.

1. COLLECTION OF FOSSIL VERTEBRATE REMAINS FOUND AT DENVER, COLORADO.

In the United States National Museum there is a small collection of fossil mammals which was presented in 1915 by Prof. George L. Cannon, of the Eastern High School of Denver. Nearly all of these remains had been found by Mr. E. Blackburn, about 1902, and given to Professor Cannon. They had been discovered mostly about one-half mile south of Fairmount Cemetery, on the western side of Platte River, in the fine deposit which was laid down by Platte River and regarded sometimes as loess. The depths at which the bones were found are not known. The Quaternary geology of the quadrangle has been described by Dr. S. F. Emmons, aided by Professor Cannon.1 According to the geological map of that quadrangle,2 the Quaternary deposits along the Platte consist of ancient river drift (Terrace) and of a later alluvium. The former is mapped along the eastern shore of the river from Denver northward. On the western shore there is indicated only the later alluvium. Nevertheless, in this later deposit there have been found remains of horses and camels. The present writer believes that these deposits are about as old as the first interglacial stage. It can not be said that deposits laid down at an early

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2 Idem, pl. 2.
first column are those assigned in the catalogue of the department of vertebrate paleontology in the United States National Museum.

Table of measurements of teeth of *Camelops huerfanensis*.

<table>
<thead>
<tr>
<th>Tooth</th>
<th>Height</th>
<th>Length</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Denver</td>
<td>Type</td>
<td>Denver</td>
</tr>
<tr>
<td>Pm 1</td>
<td>38</td>
<td>43</td>
<td>27 (22)</td>
</tr>
<tr>
<td>M 1</td>
<td>35</td>
<td>50</td>
<td>40 (22)</td>
</tr>
<tr>
<td>M 2</td>
<td>45</td>
<td>70</td>
<td>50 (35)</td>
</tr>
<tr>
<td>M 3</td>
<td>63</td>
<td>63</td>
<td>56 (34)</td>
</tr>
</tbody>
</table>

On comparison of the structure of the teeth of Cragin's type specimen and that from Denver, few differences are observed, and these are probably not important. The median style of the Denver teeth is more undercut than in the type specimen, and the spaces between the styles are somewhat more elevated. In the figure showing the grinding surfaces the latter appear much broader in the type than in the Denver specimen, but this is because the teeth of the type are worn down farther toward the base.

There are some lower teeth to be described.

Table of measurements of lower teeth of *C. huerfanensis*.

<table>
<thead>
<tr>
<th>Tooth</th>
<th>Height</th>
<th>Length</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Denver</td>
<td>Type</td>
<td>Denver</td>
</tr>
<tr>
<td>M 2</td>
<td>55±</td>
<td>60±</td>
<td>45 (—)</td>
</tr>
<tr>
<td>M 3</td>
<td>65±</td>
<td>70±</td>
<td>62 (—)</td>
</tr>
</tbody>
</table>

Inasmuch as the lower teeth of the type of *C. huerfanensis* are to a considerable extent hidden in the bone, some of their dimensions cannot be secured. The right lower second molar from Denver is a thinner tooth than the corresponding one of the type. It is possible, of course, that this Denver tooth did not belong to the same species as the other teeth. Leidy referred a lower second molar to his *Megalomeryx niobrarensis*. In its less wedgelike form it is different from the corresponding molar from Denver, and it is larger; otherwise the teeth are not greatly different. The lower left hindermost molar is represented by figure 7 of plate 116. The Denver teeth appear not to be much different from camel teeth found at Minidoka, Idaho, and described by the writer in 1913. In the United States National Museum there is a lower left hindermost molar (Cat. No. 3252) of a camel which was sent from Wakonda, Turner County, South Dakota.

ment of the humerus mentioned above (Cat. No. 8230) is too large to fit into the upper end of the ulno-radius present.

There are present the distal ends of two cannon bones. One (Cat. No. 8238) is taken to belong to a foreleg; the other (Cat. No. 8237) to a hinder leg. The former is the larger. The articular surfaces are damaged, but the distance across the end was close to 92 mm. Across one of the articular surfaces the width is 43 mm. At a distance of 75 mm. above the distal end of the bone the width of the shaft is 66 mm., the thickness 30 mm. The split between the two divisions does not reach quite to this height. One proximal phalange is present (Cat. No. 8239). The length is 102 mm.; the width of the proximal end is 42 mm.; of the distal end, 33 mm. At the middle of the length the side-to-side diameter is 22 mm.; the fore-and-aft, 22 mm. This bone is slightly longer than the hinder first phalange in the dromedary. The upper and middle diameters of both species are about the same. The lower articular surfaces of the fossil bone are abraded somewhat, but it is hardly probable that they were expanded laterally as much as in the dromedary. A right navicular (Cat. No. 8246), somewhat large for the astragalus 8244, has a fore-and-aft diameter of 50 mm.; a side-to-side diameter of 30 mm.

Of the left innominate bone there is a piece (Cat. No. 8240) a little more than 200 mm. long. The diameters of the acetabulum are 70 mm.

The cannon bone mentioned above as a supposed hinder one has each of the articular surfaces 38 mm. wide. The distance across both is 85 mm. At a height of 75 mm. from the lower end the shaft is only 50 mm. wide; the thickness is 25 mm. The split extends a short distance above this height.

There are present three calcanea. One (Cat. No. 8242) belongs on the right side. Its total length is 155 mm.; the greatest height (at surface for articulation with the fibula), 68 mm.; the greatest thickness (just at the rear of the articular surface mentioned), 60 mm. Another calcaneum belonging to the left side shows no important difference in size or form. A third one, somewhat damaged, is slightly smaller.

A right and a left astragalus in the collection differ only slightly in size. One (Cat. No. 8244), fitting pretty closely the calcaneum (Cat. No. 8242), had a length along the outer face of about 80 mm.; along the midline, a length of 60 mm. The width along the front end is 58 mm.

2. REMARKS ON CAMEL REMAINS FOUND IN SOME WIDELY DISTANT LOCALITIES, WITH DESCRIPTIONS OF TWO NEW SPECIES.

From Prof. Mark Francis, of College Station, Texas, an enthusiastic collector of vertebrate fossils, the writer has received a cervical vertebra, probably the fifth, which is of much interest. This bone,
is well preserved and is not essentially different from the corresponding tooth from Denver here figured (pl. 116, fig. 6). The tooth and the cannon bone are referred to *Camelops huerfanensis*.

From Christmas Lake there is present a first, apparently anterior, phalangeal bone (Cat. No. 3821; pl. 123, fig. 2), which is to be compared with that of *Camelops huerfanensis*.

**Measurements of first phalanges of camel.**

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Camelops (No. 3821)</th>
<th><em>C. huerfanensis</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Length on median plane</td>
<td>117</td>
<td>111</td>
</tr>
<tr>
<td>Fore-and-aft width of upper end, at epiphysial suture</td>
<td>40</td>
<td>41</td>
</tr>
<tr>
<td>Side-to-side width of upper articular surface</td>
<td>43</td>
<td>42</td>
</tr>
<tr>
<td>Fore-and-aft diameter at middle of length</td>
<td>24</td>
<td>26</td>
</tr>
<tr>
<td>Side-to-side width at middle of length</td>
<td>24</td>
<td>21</td>
</tr>
<tr>
<td>Width of distal articular surface</td>
<td>24</td>
<td>22</td>
</tr>
<tr>
<td>Greatest width of distal articular surface on lower side of the bone</td>
<td>34</td>
<td>22, 5</td>
</tr>
</tbody>
</table>

It is probable that this bone belongs to *Camelops huerfanensis*.

In the United States National Museum there are some remains of a camel which was found, associated with a horse, at Keams Canyon, Arizona. The parts seen are the upper end of a tibia, the lower end of the same tibia, the external malleolus, an astragalus, a calcaneum, a navicular, and the proximal end of a cannon bone, all of the same right limb. The total length of the calcaneum is 156 mm., being close to that of *Procamelus coconinensis* from Anita, Arizona, described on page 622. Instead, however, of finding an astragalus nearly as large as that of *P. major*, figured by Leidy and Lucas (a bone only slightly too large to fit the Anita calcaneum), one finds that the bone from Keams Canyon is much smaller. On the inner face the latter is 75 mm. long; that from Florida, 92 mm. The Keams Canyon animal belongs possibly to *Camelops huerfanensis*. The bones agree in every way with corresponding bones from Denver, Colorado, referred to *C. huerfanensis*.

It is interesting to find that remains of one or more very large camels have been found at various places in the elevated regions of the West. Matthew, in his list of vertebrates found at Christmas Lake ("Silver Lake"), Oregon, and Washtucna Lake, in southwestern Washington,* mentions "teeth, foot bones, etc., of *Camelops* sp. max." In the National Museum there are some bones that were collected in 1882 at Christmas Lake by Dr. I. C. Russell, among which are the head of a humerus, the distal half or more of a left humerus, one of the distal divisions of a cannon bone, and a complete first phalangeal.

The head of humerus from Christmas Lake measures from front to rear of the articular surface 93 mm.; in the dromedary this

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The first phalange (pl. 123, fig. 1) is compared with that of the dromedary.

Measurements of first anterior phalange in millimeters.

<table>
<thead>
<tr>
<th></th>
<th>Oregon camel</th>
<th>Dromedary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of bone in median plane</td>
<td>115</td>
<td>94</td>
</tr>
<tr>
<td>Fore-and-aft diameter of proximal articular surface</td>
<td>47</td>
<td>54</td>
</tr>
<tr>
<td>Side-to-side diameter of proximal articular surface</td>
<td>58</td>
<td>41</td>
</tr>
<tr>
<td>Fore-and-aft diameter at middle of length</td>
<td>29</td>
<td>21.5</td>
</tr>
<tr>
<td>Side-to-side diameter at middle of length</td>
<td>35.5</td>
<td>21</td>
</tr>
<tr>
<td>Width of articular surface at distal end</td>
<td>47</td>
<td>34</td>
</tr>
</tbody>
</table>

This phalange resembles much that of the dromedary and differs from that of Camelops in the greater antero-posterior flattening of the bone and in the extension of the articular surface for the second phalange backward on the lower face of the bone. In this respect it agrees with the phalange here made the type of Camelus arctoamericanus. In each of these bones the articular surface extends backward about 43 mm. The two bones hardly belonged to the same species. As will be seen on comparing the measurements they are of nearly the same length, but differ in other dimensions.

The second phalange is broad and flattened. The greatest length in the median plane is 81 mm.; the greatest width near the upper end, 51 mm.; the greatest width in the lower half, 49 mm.

It seems to the writer that the remains of the large camel from Christmas Lake and those from Washtucna Lake indicate a species different from any described species of Camelops and that this animal belonged to the genus Camelus. Following Doctor Matthew's suggestion it is named Camelus maximus. The first phalange from Washtucna Lake is made the special type specimen.

Type specimen.—A first phalange, No. 9717, U.S.N.M.
Type locality.—Washtucna Lake, Washington.
Type formation.—Early Pleistocene.
Diagnosis.—Size large. Width of upper end of phalange equaling one-half of the length of the bone. Lower articular surface carried back on lower surface of this bone as in Camelus.

CAMELUS ARCTOAMERICANUS, new species.

Plate 119, fig. 12.

Type specimen.—A first phalange, No. 7713, U.S.N.M.
Type locality.—Old Crow River, near Alaska–Yukon boundary.
Type formation.—Pleistocene.
Diagnosis.—A large camel with broad phalanges, whose upper articular surface from side to side equals less than one-half of the length of the bone, and whose lower articular surface extends well backward on lower face.
township 23 north, range 19 east, near Wenatchee, Chelan County, Washington. An account of this find and the fossils themselves were sent to Dr. Henry Gannett, of the United States Geological Survey, by Mr. Fred G. Plummer. The correspondence is preserved in the National Museum. Mr. Parrish was making an excavation into a ridge to reach a perpendicular vein of travertine, in the search for supposed onyx. At a depth of 16 feet from the surface he found the bones. A geological section shows that at the top there was 1 foot of recent soil. This was followed by a bed 15 feet thick composed of angular and partly rounded boulders, somewhat cemented together by calcite. Below this was an old soil, 4 feet in thickness, and in this were found the fossils. The soil was underlain by sandstone of unknown thickness.

Many of the bones are fragmentary and indeterminable even generically but the following list has been made out.

**List of Fossils as Determined.**

- *Megalonyx jeffersonii*?
- *Equus niobrarensis*?
- *Odocoileus*, species indeterminable.
- *Sangamona?* species indeterminable.
- *Alces?* species indeterminable.
- *Bison*, species indeterminable.
- *Marmota arroden*, new species.
- *M. flaviventer*.
- *Thomomys fuscus*.
- *Lepus* or *Sylvilagus*, species indeterminable.

There are too few species and their identification too uncertain to justify one in fixing too exactly the age of the deposit. The presence of *Equus* and of probably *Sangamona* appears to indicate a time not later than the Sangamon interglacial.

**Megalonyx Jeffersonii**

A tooth, a second or third molar, of a species of *Megalonyx*, probably *M. jeffersonii* (Cat. No. 2658), is in the collection. The fragment is 42 mm. long; the greater diameter is 20.5 mm.; the shorter, 14 mm. A section of the tooth resembles most that presented by Leidy.†

**Equus Niobrarensis?**

A species of horse is represented by two lower left true molars—the first and the third (Cat. No. 10287). They are little worn. The first molar has the grinding surface 27.5 mm. long and 17 mm. wide, not including the cement. The third molar is 36 mm. long and 16 mm. wide in front. So far as the writer can see, these teeth are not distinguishable from those of the type of *Equus niobrarensis*.

BISON, species indeterminable.

A species of BISON is indicated by one first phalange. Its proximal end is broken off. It is possible that it belongs to the preceding species. The catalogue number is 10318.

MARMOTA ARRODENS, new species.

Plate 117, figs. 3-5, 7, 9; plate 118, figs. 1, 3, 4.

Type specimen.—Lower jaw, No. 2656, U. S. N. M.
Type locality.—Chelan County, Washington.
Type formation.—Pleistocene.

Diagnosis.—Size large. Lower incisors in adults equaling in breadth about two-fifths of the length of the row of molar teeth; its outer face, behind the enamel, furnished with a prominent ridge.

In the collection here considered there is a considerable number of teeth and bones of woodchucks. There appear to be present two species. One of these, represented by a lower jaw, probably also by other bones, was an unusually large marmot. As type of this supposed species are taken the right and left rami of the lower jaw, which bear the catalogue number 2656 of the United States National Museum. Neither of these rami is complete, the better preserved one lacking the coronoid, condylar, and angular processes (pl. 117, figs. 3, 4).

Inasmuch as the locality which furnished these bones lies within the area occupied by Marmota flaviventer and close to that occupied by subspecies of M. caligata, it is fair to make comparisons with the two species mentioned.

Measurements of teeth and lower jaws of species of Marmota.

<table>
<thead>
<tr>
<th></th>
<th>M. arrodens</th>
<th>M. flaviventer</th>
<th>M. caligata</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance from incisive border to border between the condylar and angular processes</td>
<td>64</td>
<td>62</td>
<td>64</td>
</tr>
<tr>
<td>Length of row of molars</td>
<td>20</td>
<td>20</td>
<td>22</td>
</tr>
<tr>
<td>Height of jaw on inside at front of last molar</td>
<td>16.5</td>
<td>15</td>
<td>15.5</td>
</tr>
<tr>
<td>Height of jaw between symphysis and first molar</td>
<td>14</td>
<td>12</td>
<td>12.5</td>
</tr>
<tr>
<td>Width of incisors at bone</td>
<td>8.1</td>
<td>6.5</td>
<td>7</td>
</tr>
<tr>
<td>Thickness of incisor at bone</td>
<td>5</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

Besides the ridges and grooves of various widths usually found on the enamel of the incisors of the species of Marmota, there is in M. arrodens, about halfway between the hinder edge of the enamel and the hinder border of the tooth, a prominent ridge. In front of it is a broad groove; behind it a narrower one. On the enamel there are distinct remains of the original pale orange color.

There are various limb bones which may or may not belong with the jaw just described. They may, indeed, belong to the same individual. In the jaw the molar teeth are all worn down smooth, while
greatest width of the lower end of the bone is 22.5 mm. in *M. vancouverensis*; in *M. arroden* 20 mm.

The ulna of *M. arroden* originally had a length of 83 mm. and the humerus is 74 mm. long. In *M. vancouverensis* the ulna is only 2 or 3 mm. longer than the humerus. The bones of *M. arroden* are stouter than the corresponding ones of *M. vancouverensis*. In an ulna of the latter 77 mm. long, the depth in front of the coronoid process is 8 mm.; in *M. arroden*, 9 mm. In a radius of *M. vancouverensis* the least diameter at the middle of the length is 4 mm.; in *M. arroden*, 5 mm. The ulna and radius of the latter are more bent than in the other species.

The humerus, ulna, and radius of *M. arroden* have been compared with the same bones of *M. flaviventer flaviventer* and *M. f. sierrae*, from various localities in California, sent by Doctor Grinnell. Both forms are smaller than *M. arroden* and considerably smaller than *M. vancouverensis*. These two forms of *M. flaviventer* differ from *M. arroden* in the same way as does *M. vancouverensis*.

*MARMOTA FLAVIVENTER* (Audubon and Bachman).

Plate 118, figs. 6–8.

This species appears to be represented in the collection by the rear of a skull preserving the basioccipital, the bullae, the petrosals, and the supraoccipital; also by the remainder of possibly the same skull from just behind the orbits to the front of the maxilla (pl. 118, figs. 6, 7). These have the catalogue number 2655. The nasals are missing; also the incisor teeth and three of the molars of the right side. On comparison with skulls of *M. flaviventer* no differences are noted. The molar teeth are little worn. The interorbital portion of another skull (Cat. No. 2657) is also represented (pl. 118, fig. 8). In this there is a complete postorbital process. Two right rami of lower jaws, or rather parts of them, with some little worn teeth, may belong to these incomplete skulls.

*THOMOMYS FUSCUS* (C. H. Merriam).

Plate 118, figs. 9 and 10.

This species is represented by a single incisor and by the anterior half of a skull, which contains both incisors, but lacks all the molars and both nasal bones. On comparison with a skull of *M. fuscus* from that region no differences are observed. The incisors retain much of their original color.

*LEPUS OR SYLVILAGUS*, species indeterminable.

A single right ramus of a rabbit is in the collection. It has about the size of the corresponding part of *Sylvilagus nuttallii*. 
the fossil, 8 mm. The interorbital space of the former is transversely concave; in the latter it is flat. The nasals of the fossil were considerably wider than those of *T. bottae leucodon*.

The lower jaw has the same length as that of the specimen of *T. b. leucodon*, No. 4783, mentioned above. In the latter the incisors project beyond the extreme end of the jaw 10 mm.; in the fossil they project only 7.4 mm.

The fossil skull appears to resemble still more closely that of *T. bottae nigricans*, a form inhabiting the region about San Diego, California. In this again the incisors project beyond the bone more than in the fossil, and they appear to be somewhat more strongly curved downward. The interorbital space is 7 mm. wide and transversely concave. The ridges form the same lyriform figure as in the fossil. The nasals overlap the frontals more than they did in the fossil.

The species here described is named in honor of Mr. N. P. Scudder, librarian at the United States National Museum, to whom the writer has been greatly and for a long time indebted for assembling the literature that he has required in his studies.

**Cynomys Niobrarius, new species.**

Plate 122, fig. 7.

*Type specimen.*—A part of the skull which presents the palate and its teeth; part of the interorbital space; and the bases of the zygomatic arches (No. 2715, American Museum of Natural History, New York).

*Type locality.*—Niobrara River, near Grayson, Nebraska.

*Type formation.*—Sheridan beds of the Pleistocene.

*Diagnosis.*—Allied to *C. leucurus*, but appears to have differed in being larger and in having a broader and deeper groove for the anterior branch of the masseter muscle.

The label on this specimen states that it was collected by the American Museum expedition in 1897. It is a thoroughly mineralized fossil and was evidently buried in sand. The third milk molar is present on the left side. On the right side it is missing, but deep in the socket is seen the uncut third premolar. The next tooth behind on each side is probably the fourth milk molar. All three molars on each side are present.

The bases of the zygomatic arches are somewhat injured, but they show that the anterior border of the upper root approached the premaxilla as it does in *C. leucurus*, and not nearly at a right angle, as it does in *C. ludovicianus*. The lower border of the anterior root of the zygomatic arch ends abruptly opposite the first molar, as in
this species and others there is an infold of the enamel on the inner part of the front face of the premolar, or a deep notch between the cusps. Nothing of this is seen in the fossil. The teeth have suffered but little wear, and yet a very little more would have produced one straight loop of enamel across the front of the grinding surface of the anterior premolar.

The length of the tooth row is 10 mm. The distance from the mental foramen to the rear of the condyle is 22 mm. The height of the ramus at the second molar is 6.5 mm.

5. COLLECTION OF FOSSIL MAMMALS MADE AT ANITA, COCONINO COUNTY, ARIZONA.

From Mr. Barnum Brown, of the American Museum of Natural History, New York City, the writer has received a small collection of fossil mammals which had been made at Anita, Arizona. The greater part of these specimens had been secured by Mr. B. C. Bicknell in 1901; another part was collected by Mr. Brown himself in 1904. The portion gathered by Mr. Bicknell was the property of the Arizona School of Mines, at Tucson, and had been sent for examination in 1904 to Mr. Brown by the director, Dr. W. P. Blake. Other pressing duties prevented Mr. Brown from completing his studies of these remains. From Mr. Brown's notes it appears that the fossils were found at the Val Verde Copper Mines, at Anita, a station on the Grand Canyon branch of the Santa Fe Railroad, 40 miles north of Williams and 20 miles south of the Grand Canyon. The collection has become the property of the United States National Museum through exchange.

The fossils were discovered in a fissure in a Carboniferous limestone. This fissure was entered in the making of some prospect holes by the workmen of the copper company. The bones appear to have been buried in a deposit of sand about 7 or 8 feet thick, lying on the bottom of the cave or fissure. They are in a fine state of preservation, but are mostly pretty badly broken up. Mr. Brown's examination of the collection resulted in the recognition of remains of horses, camels, rabbits, woodchucks, packrats, pocket gophers, and squirrels. Being engaged in other investigations he did not have the time to study the remains and he generously put them into the hands of the writer. Unfortunately other lines of work have prevented a consideration of them until recently. Most of Mr. Brown's general determinations have been confirmed. In addition, a few other forms have been recognized, among them a hyaena-like animal. In case this determination shall be confirmed an important addition will have been made to our extinct fauna. Cope believed that the genus Borophagus belonged to the Hyaenidae, but it is now arranged among the Canidae.
The second right premolar is a nearly unworn tooth. In order to get an adequate view of the enamel, the tooth was sawn across, about 1 inch below the grinding surface. The end of the proximal section was polished and a view of it is presented (pl. 118, fig. 11); but this is the reverse of the one that would be shown on the grinding surface of a tooth of that side. The upper right hindmost molar is worn down to about 45 mm. of the root. The length of the crown along the outer border is 33 mm.; the width is 24 mm.; the fore-and-aft diameter of the protocone, 17 mm. Besides the unusual length of the protocone it is thin and flat, differing in these respects greatly from that of the tooth figured by Gidley. The postprotoconal valley, too, has a deep inlet near its head. The width and thinness of the protocone is shown in two fragments of upper teeth. The hindmost lower molar had just begun to wear. The height is 85 mm.; the length at half of the height, 38 mm.; the thickness in front, 15 mm. A fragment of an upper tooth (Cat. No. 10215), somewhat worn, is 80 mm. high and considerably curved. A fragment of a little-worn lower tooth (Cat. No. 10216) is 100 mm. high. A little-worn and deeply cupped incisor (Cat. No. 10217) is 20 mm. wide. It appears to be safe to refer these teeth to Equus occidentalis. There are in the collection a few vertebrae and fragments of other bones of Equus, some of which may belong to this species. It is not at all improbable that the remains here described will prove eventually to belong to an undescribed species.

Equus Giganteus: Gidley.

Plate 118, fig. 12; plate 124, fig. 2-3.

The larger horse of the collection is referred with doubt to Mr. J. W. Gidley's Equus giganteus found in southwestern Texas and based on a tooth which had been referred by Cope to E. crenidens. The reason for this identification of the Anita materials is admitted by the writer to be the evident large size of the horse. There are present an upper right hindmost molar (Cat. No. 14361 Amer. Mus. Nat. Hist.) and some fragments of teeth which appear not to belong to Equus occidentalis; but these fragments (Cat. No. 10137) present no special resemblance to the tooth which forms the type of E. giganteus. Two of the fragments are here illustrated. Figure 12 of plate 118 presents a part of the anterior fossette of an upper grinding tooth. The section shown belongs about an inch above the root of the tooth. The distance across this fossette is 16.2 mm.; in a large domestic horse the corresponding distance is 15 mm. Figure 3 of plate 124 gives a view of the postprotoconal valley of an upper tooth,

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11 Idem, p. 137, fig. 27.
12 Amer. Naturalist, vol. 19, p. 1206, pl. 37, fig. 4.
comparison. A part of the shaft of a radius (Cat. No. 10142), 185 mm. long, has a breadth of 47 mm. at about the middle of the whole bone. A nearly complete left third metacarpal (Cat. No. 10143) is present.

The following comparative measurements are given:

<table>
<thead>
<tr>
<th>Measurements of third metacarpals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>E. pigatus</td>
</tr>
<tr>
<td>No. 17460 U. S. N. M.</td>
</tr>
<tr>
<td>Total length</td>
</tr>
<tr>
<td>Width of upper end</td>
</tr>
<tr>
<td>Side-to-side diameter at middle</td>
</tr>
<tr>
<td>Fore-and-aft diameter at middle</td>
</tr>
<tr>
<td>Side-to-side diameter at lower end</td>
</tr>
<tr>
<td></td>
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<td></td>
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<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

It will be seen that the fossil bone is only about one-tenth longer than the recent one. It is not at all improbable that it belonged to the smaller horse, but the metacarpal described as representing that horse is only 50 mm. wide above.

A first phalangeal bone (Cat. No. 10144) of the third digit has a length, in the median plane, of 88 mm.; that of the hinder bone of the recent horse being 77 mm. The width at the upper end is 63 mm.; that of the recent horse, 57 mm. It is not larger than corresponding bones of supposed E. pacificus from Christmas Lake, Oregon. A second phalange (Cat. No. 10146) is 55 mm. wide at its lower end; that of the recent horse, 44 mm. A hoof phalange (Cat. No. 10147) is 78 mm. wide. The latter bone appears to belong to a hinder limb. In the part of this collection that was made for the American Museum of Natural History there are a second and a third phalangeal which appear to belong to a fore limb. These have that museum's catalogue number, 14362. The second phalange is 63 mm. wide at the upper end; 55 mm. wide at the lower end. The hoof phalange is 84 mm. wide. This phalange is more broadly rounded than that supposed to belong to the forefoot.

MYLOHYUS? species indeterminable.

In the collection there is a fragment (Cat. No. 10153) of the upper end of the ankylosed lower arm bones of the right side. The olecranon process is likewise broken off. The whole fragment is only 80 mm. long, and it extends 65 mm. below the greater sigmoid cavity. The width of the radius in this cavity is 29 mm. At the lower end the fragment has a width of 26.5 mm.; a thickness of 17 mm. On the hinder face of the fragment, at a distance of 42 mm. below the front of the greater sigmoid cavity, is a foramen. A specimen of Platygonus from a fissure near Cumberland, Maryland, measures 160 mm. from
ences in thickness. Measuring from the pillar on the outer face of the anterior crescent to its inner wall the distance is 17 mm.; in \textit{P. major} it is only 14 mm. One must measure from nearly the bottom of the fossette in order to get a width of 17 mm. The hinder crescent of the Arizona specimen at the worn surface is 14 mm. wide; that of \textit{P. major} only 9 mm. It is only at the bottom of the fossette that the width is 14 mm. These differences appear to be indication of specific difference.

Of a large camel there are some fragments of limb bones. One of these is part of the distal end of a right tibia (Cat. No. 10158). An estimate shows that the width of the lower end of this bone was close to 93 mm. It lacks only 5 mm. of fitting into the right astragalus of \textit{P. major}.\textsuperscript{14} A complete bone is the right external malleolus (Cat. No. 10157). Its greatest diameter is 52 mm., and it fits closely against the right calcaneum. This calcaneum (Cat. No. 10158) belonged to an animal that had not reached its greatest size, inasmuch as the hinder epiphysis is missing. The length is now 146 mm. The same bone of the dromedary has a total length of 141 mm. The fossil calcaneum must have been originally about 165 mm. long. The height at the external malleolus is 75 mm.; in the dromedary, 61 mm. A right navicular (Cat. No. 10159) has its greatest diameter 56 mm.; in the dromedary this diameter is 48 mm. The fossil bone fits quite exactly on the astragalus of \textit{P. major}.

There is in the collection a part of the shaft of a hinder cannon bone (Cat. No. 10162), the length of the fragment being 185 mm. Proximally it reaches about the middle of the shaft; distally a little beyond the top of the split. The fore-and-aft diameter of the upper end is 45 mm.; the side-to-side diameter, 40 mm. In the dromedary these diameters are, respectively, 34 mm. and 30 mm.

A fragment (Cat. No. 10175) which presents the distal articular end of one of the divisions of a cannon bone is 50 mm. wide. In the dromedary the width of the corresponding part of the anterior cannon bone is 41 mm.; the width of this part of a metapodial of \textit{Camelops huefananensis}, 40 mm. This bone has the size and general appearance of the same part in the large camel which the writer describes in this paper as \textit{Camelus maximus}. When closely examined, however, differences are seen. The grooves alongside of the guiding keels are deeper in \textit{C. maximus}. While the side-to-side widths of the articular surface is the same in the two bones, the fore-and-aft thickness in \textit{C. maximus} is 45 mm.; in the Arizona bone it is 50 mm. This bone may belong to a very large individual of \textit{Procaminelus coconinensis} or it may represent an otherwise unknown form.

A practically complete first phalange (Cat. No. 10163), probably an anterior one, is present (pl. 122, fig. 6). The length in the median

\textsuperscript{14} Leidy and Lucas, pl. 18, fig. 1.
the fossil bone would be about 130 mm. That part present, from the front of the odontoid process to the rear of the neural arch, is 125 mm. long; and there is still no indication of the ridges that must have run forward from the postzygapophyses. The width of the bone, across the front end is 50 mm. The width, 80 mm. behind the front end, is 26 mm.; the height, 39 mm. On the part of the bone preserved there are no, or very obscure, indications of the wing-like transverse processes that are present on the axis of the llama and that of the dromedary; nor is there any beginning of the posterior enlargement of the median ridge on the lower face; likewise none of the posterior enlargement of the crest of the neural arch.

The fragment of cannon bone (pl. 124, fig. 4) is 288 mm. long. It is complete above, but does not quite reach the split at the lower end. The hinder face is occupied by a broad groove. At the upper articular surface the side-to-side diameter is 44 mm.; the greatest fore-and-aft diameter, 40 mm. At a point 125 mm. below the upper articular surface the fore-and-aft diameter is 32 mm. on the outer face; 25 mm. in the median plane. Figure 8 of plate 120 presents a section at this point. The lateral faces are convex and nearly parallel; the front face is rounded. At the lower end the fore-and-aft diameter is 22 mm.; the side-to-side diameter, 28 mm. This bone is to be compared with the corresponding one of *P. minimus*. Similar parts of the two bones are preserved. The two agree in having a strong ridge running down in front of the process at the rear of the upper articular surface. In this they differ from both the dromedary and the llama. A comparison of figure 8 of plate 120 and figure 9 of plate 120 will show that the cross sections, taken 125 mm. below the upper ends, are very different. In section the bone of *P. major* resembles that of the dromedary, while that of *P. longuirio* is not greatly different from the corresponding bone of the llama. Two first phalangeals (Cat. No. 10168) are present and are taken to be the anterior. One has lost the epiphysis. The other is here illustrated (pl. 123, fig. 3).

The following comparative measurements are given:

**Measurements of anterior first phalangeals.**

<table>
<thead>
<tr>
<th></th>
<th><em>Procamelus longuirio</em></th>
<th>Dromedary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of bone in its median plane</td>
<td>111</td>
<td>94</td>
</tr>
<tr>
<td>Fore-and-aft diameter of upper articular surface</td>
<td>33±</td>
<td>34</td>
</tr>
<tr>
<td>Side-to-side diameter of articular surface</td>
<td>26</td>
<td>41</td>
</tr>
<tr>
<td>Width of distal articular surface</td>
<td>22</td>
<td>20</td>
</tr>
<tr>
<td>Fore-and-aft diameter at middle of bone</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>Side-to-side diameter at middle of bone</td>
<td>18</td>
<td>21</td>
</tr>
</tbody>
</table>

* Leidy and Lucas, p. 60, pl. 16, fig. 1.

27177—21—Proc. N. M. vol. 59—40
Family SCIURIDAE.

MARMOTA ARIZONAE, new species.

Plate 123, figs. 6-8.

Type specimen.—The front two-thirds of a skull (Cat. No. 10181).

Type locality.—Coconino Forest region, Arizona.

Type formation.—Early Pleistocene.

Diagnosis.—Belonging near to or within the flaviventer group of the genus. Snout narrower and more rounded than in M. f. obscura. Nasal processes of premaxillae broader than in the just mentioned subspecies. Incisors absolutely striated.

A species of marmot belonging apparently to the group of M. flaviventer is represented by the anterior part of the skull of one individual and two molar teeth of another. On comparison of the skull with that of a specimen of M. flaviventer obscura—a female from San Miguel county, New Mexico—differences appear which, on the discovery of additional materials, may prove to be of specific or of only subspecific value. At the present day no species of marmot is known to live within the territory of Arizona; and New Mexico harbors only in its northern part the subspecies named above—M. flaviventer obscura.

Figures 6-8 of plate 123 present views of the specimen on which the new species is based. The incisor teeth are broken off at the bone. On the right side, three molars, little worn, are present; on the left side, only one. The nasal bones and the zygomatic arches are missing. The distance from the rear of the last molar to the front of the premaxillae is 47 mm. In the recent skull used for comparison this distance is 46 mm. The nasal process of each premaxilla is nearly as wide as the space occupied by both of the nasals. The width of the frontals at the front of the orbits is somewhat less than in the recent skull. Examined from below, the snout is narrower in the fossil. The width at the maxillo-premaxillary suture is 19 mm.; in the recent skull, 20 mm. The palate behind the incisors is more rounded from side to side. In the recent skull a ridge running back on each side from the incisor gives an effect of squareness to this region. The processes on the maxillae just in front of the rows of teeth appear to be unusually strongly developed in M. f. obscura. They are much less prominent in the fossil. No differences are observed in the rows of teeth or of the individual molariform teeth. The incisors of M. f. obscura are very distinctly striated; in the fossil they are nearly smooth.

CITELLUS TUITUS, new species.

Plate 120, figs. 5-6.

Type specimen.—The anterior half of a skull, with incisors and all the upper teeth except the third premolars (Cat. No. 14353 of the Amer. Mus. of Nat. History).
Named in honor of Dr. Marcus Benjamin, editor of the Proceedings of the United States National Museum.

Besides the fragment of the lower jaw which is made the type of this species there is a considerable number of other parts referred to it provisionally. The principal of these are the following: A right upper incisor (Cat. No. 10184); the greater part of both maxillae (Cat. No. 10185), containing the left first true molar and the sockets of the other teeth, excepting the front premolar; an interparietal bone (Cat. No. 10186); one lumbar vertebra (Cat. No. 10187); a complete humerus (Cat. No. 10198); five fragments of innominate bones (Cat. Nos. 10189, 10190); three complete femora (Cat. Nos. 10191, 10192); the upper half of a right tibia (Cat. No. 10193); a tibia lacking the upper epiphysis and a part of the distal end (Cat. No. 10194); and a distal end of another tibia (Cat. No. 10195). These bones are described below:

The type ramus is figured (pl. 121, fig. 1) as seen from the inner side. The height at the first molar is 16 mm. The anterior premolar is only slightly larger than the other teeth. In it, as in the other teeth, the enamel is thin and delicate, thickest where it forms the front wall of the main outer valley. In the anterior tooth this front wall is angulated and slightly wavy in its course. The rear part of the loop is very thin and distinctly crenulated. In the front border of this tooth there is a narrow but pretty deep inflection of the enamel. In the outer face of the front half of the tooth there is a wider inflection of the enamel, and this also is crenulated. In the other teeth the anterior part of the loop of enamel is thickened and forms a ridge across the grinding surface. The hinder part of the loop is crenulated. The writer was on the point of referring the fossil to Lepus campestris, but an examination of many specimens of its various subspecies resulted in finding that in none of them did the hinder element of the loop show more than feeble traces of crenulations. Other species, as L. alleni and L. gaillardii, present these constantly. These species, however, differ in other ways from the fossil species.

Figure 2 of plate 121 presents a view of two maxillae of one individual which is believed to belong to the species described. The right first molar is present. The parts resemble the corresponding ones of L. campestris. A complete upper right incisor appears not to differ from that of the species just named. The groove is nearer the inner border of the tooth, and it retains its cement. L. californicus rarely has cement in the grooves of the incisors.

The lumbar vertebra present resembles more that of a species of Sylvilagus than of Lepus. Perhaps it does not belong to the species being described. The humerus (pl. 121, fig. 5a) is 91 mm. long. It is somewhat more compressed than one 95 mm. long and supposed to
individual. The front half (Cat. No. 10197) is here figured (pl. 121, figs. 7–9). It has been impracticable to remove all of the calcite and sand, but the form of the skull is shown. From the rear of the hinder tooth to the front of the snout is 28 mm.; in a specimen of the living species from Nevada this distance is only 23 mm. The nasal bones, the incisors, and some of the other teeth are missing from the specimen figured. Figure 10 of plate 121 presents a view of a palate and maxillae (Cat. No. 10198) from which the teeth have fallen. The first premolar, to judge from the size of the socket, was larger than the corresponding tooth of B. idahoensis. Figure 6 of the same plate presents a view of the type—a palate (Cat. No. 10196) in which many of the teeth are retained. Another figure (pl. 121, fig. 12) gives a view of the left zygomatic arch and palate, as seen from below (Cat. No. 10199). Some matrix yet clings to the bone. There are present several rami of lower jaws. Figure 13 of plate 121 represents one of these (Cat. No. 10200) lacking the angular process. From the rear of the condyle to the front of the jaw is 44 mm.; in a specimen of B. idahoensis this distance is 39 mm. Another right ramus (Cat. No. 10201) (pl. 121, fig. 11) presents a view of the incisor and of all the other teeth except the hindermost molar. Figure 14 of plate 121 is that of a right humerus (Cat. No. 10202) 45 mm. long; but the animal had perhaps not reached its full size. The bone is slightly shorter than the humerus of B. idahoensis from Nevada. One-half of a right innominate bone (Cat. No. 10203) is shown as seen from below in figure 15 of plate 121. The total length is 49 mm.; that of the specimen of B. idahoensis is 46 mm. Figure 16 of plate 121 presents a front view of a right femur (Cat. No. 10204); figures 17 and 18 of the same plate show parts of two tibiae, one (Cat. No. 10206) lacking the epiphysis; the other (Cat. No. 10207) the distal half of the bone.

**TAXIDEA ROBUSTA, new species.**

Plate 119, figs. 3–5.

*Type specimen.*—A left ulna.

*Type locality.*—Coconino Forest region.

*Type formation.*—Early Pleistocene.

*Diagnosis.*—Ulna stouter than in T. taxus. Inner face with a ridge from coronoid process to distal end. Pubic bone at rear of obturator foramen thicker and wider than in T. taxus.

In the collection there is a single ulna (Cat. No. 10208), that of the left side, which appears to have belonged to a species of Taxidea distinct from T. taxus. This bone has lost all that part above the middle of the greater sigmoid cavity, and also the head and styloid process.

When compared with the corresponding bone of T. taxus (pl. 119, figs. 1, 2) the fossil is seen to be stouter. When measured halfway
Measurements of radii of wolves.

<table>
<thead>
<tr>
<th></th>
<th>C. nubilus</th>
<th>C. nubilus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total length</td>
<td>202</td>
<td>204</td>
</tr>
<tr>
<td>Greatest width of head</td>
<td>21</td>
<td>23</td>
</tr>
<tr>
<td>Width at middle of length</td>
<td>15.5</td>
<td>16</td>
</tr>
<tr>
<td>Thickness at middle of length</td>
<td>11.8</td>
<td>13.5</td>
</tr>
<tr>
<td>Thickness 30 mm. above lower end</td>
<td>10.5</td>
<td>13.5</td>
</tr>
<tr>
<td>Greatest diameter at lower end</td>
<td>28.5</td>
<td>30.0</td>
</tr>
</tbody>
</table>

The thickening of the bone in the distal half is especially noticeable. The humerus of the wolf No. 1308 is 205 mm. long. The length of the fossil cannot be determined. It is assumed to have been closely the same.

Measurements of humeri of wolves.

<table>
<thead>
<tr>
<th></th>
<th>C. nubilus</th>
<th>C. nubilus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total length</td>
<td>205</td>
<td>205</td>
</tr>
<tr>
<td>Fore-and-aft diameter 102 mm. above lower end</td>
<td>17.5</td>
<td>21</td>
</tr>
<tr>
<td>Side-to-side diameter 102 mm. above lower end</td>
<td>13.5</td>
<td>16</td>
</tr>
<tr>
<td>Width of lower articular surface</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>Width acrosscondyles at lower end</td>
<td>38</td>
<td>41.5</td>
</tr>
</tbody>
</table>

The best preserved ramus of the lower jaw, in comparison with that of C. nubilus, is lower and thinner. The teeth differ apparently only in being thinner. The canine, as shown by a part of the socket present, was slender.

Another fragment of a left ramus is similarly low, but is thicker. The fourth premolar is as thick as in C. nubilus. A third left ramus had early lost the carnassial tooth by disease. The socket is filled with bone and the jaw is swollen in that region. The fourth molar is longer and thicker than in C. nubilus. A complete axis is of a size corresponding to the other bones. It appears probable that all of these parts belong to C. nubilus or to a species very close to it.

In the American Museum of Natural History there is a fragment of a left ramus of a lower jaw (Cat. No. 14360) which contains the last two molars. It probably belongs to the same species as the others. An atlas in the same collection is to be similarly referred.

In addition to these bones there are some of a smaller individual, a cervical vertebra, apparently the seventh, and a dorsal vertebra, about the fifth (Cat. No. 10220); the distal ends of two tibiae and the corresponding astragali (Cat. Nos. 10218, 10219).

**Canis latrans** Say.

*Canis latrans*, or a species close to it, is represented by a part of a right tibia (Cat. No. 10221) and an upper left canine (Cat. No. 10222). The fragment of tibia is 113 mm. long, and lacks a little of the upper
molar, but no traces of others or of their backwardly directed canals. It is possible, however, that these were lower down than in the part of bone preserved. (d) In no felid that the writer has found does the symphysis on its upper surface, extend backward beyond the front of premolar 3. In the fossil fragment the curvature of the surface indicates that the upper face of the symphysis reached back at least as far as the middle of the anterior premolar. It appears improbable, therefore, that this fragment was that of a jaw of any of the Felidae.

Now as to the larger fragment of the jaw: (a) In the cats the lower border of the ramus is nearly straight from the symphysis to the angle, so that, when placed on a level surface, the angle touches the surface or nearly so. The upper and inner border of the jaw along the tooth row then slopes slightly downward. When the fossil ramus is placed on a level surface the inner upper border of the bone slopes slightly upward in front. Unless the jaw below the anterior teeth maintained the great depth which it has behind, 51 mm., the angle of the jaw must have been raised above the supposed level surface. (b) In the cats the surface for the insertion of the masseter muscle is nearly always deeply excavated, and the bone at the lower edge of this surface stands out as a sort of shelf. In the fossil the masseter surface is less deeply excavated. (c) In the cats, so far as observed, the depth of the jaw at the middle of the molar is considerably less than the length of the sockets of the last premolar and the molar taken together. In the fossil the two dimensions are equal. The characters just discussed, it seems to the writer, make it very improbable that the jaw belongs to Felis or any closely related genus.

The general appearance of the fragments, the similar fossilization, the filling of sediment in the canals and other openings, the size of the small fragment relative to the larger one, and the improbability that either of them belonged to a felid, make it probable that they were parts of the same jaw.

If this is the case, it appears that the jaw must be referred to the Hyaenidae, for there are three premolars, all two-rooted, the hindermost large, and a large molar, doubtless a shearing tooth. The diastema is short, as in the hyaenas. In Crocuta the symphysis comes back even with the middle of premolar 2, as it does in the fossil. There is a large single mental foramen in the position of that of the fossil. The lower border of the ramus rises from beneath the molar to the angle; and this was probably the case with the fossil jaw. The masseter excavation is comparatively shallow, as it is in the fossil. On the outer face of the jaw, beneath the molar and the last premolar, the surface is somewhat concave in the hyaenas; in the cats it is convex; in the fossil it is concave. The inferior dental foramina and canal in the cats are large; in the hyaenas they are much smaller.
It will be seen that the fossil animal was apparently a somewhat larger one than that with which it is here compared. If this is taken into account, some differences are not so great as they appear to be. The second premolar of the fossil would be relatively of about the same length as that of the living species; the fourth premolar somewhat longer, the first molar considerably longer. On the other hand, the roots of the teeth, probably the crowns also, would be relatively thinner.

In size of jaw and length of teeth the fossil species resembles more Crocuta crocuta. The crowns of the teeth appear to have been thinner than in either of the living species. Although the teeth of Crocuta are larger than those of Hyaena the jaw is but little longer.

Besides the parts described above, there is a root of a large canine which resembles closely the root of an upper canine of a hyaena, also a left mandibular condyle which differs little from that of Hyaena hyaena. It is possible that it belongs to the mandible forming the type of the species here described, but contact between the two fragments can not be established.

Having described the species found at Anita it appears proper to consider what may be learned from that assemblage. By far the larger number of the species are such as are generally recognized as belonging to the Pleistocene. While horses and true dogs (Canis) may yet be found to occur in Pliocene deposits, it is not yet proved that they do so occur. The preservation of the bones and teeth in a limestone cave itself indicates that they belong to the Pleistocene; yet among these Pleistocene animals are found remains of two camels which it seems necessary to refer to the genus Procamelus. Members of this genus have not usually been recognized as having existed at a later time than the early Pliocene. In 1916 Dr. E. H. Sellards referred to the apparent admixture of Pliocene and Pleistocene species that had been observed in the Dunellon (Alachua) formation in Florida. Among the fossils were three species of Procamelus—P. major, P. minor, and P. minimus. The two species of the same genus found at Anita are so closely related to two of those from Florida, P. major and P. minimus, that it was at first thought that they were the same. The writer has briefly discussed this Florida case also the finding of similar mixtures of Tertiary and Pleistocene fossils in Idaho and in Oregon. In these western localities, as well as in Florida, there have occurred, it has been supposed, either in the deposits or in the collections, accidental minglings of fossils of two distinct formations. At Anita, however, there can have happened nothing of the sort.

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In general terms the description of the fourth metatarsal of *Mylodon robustus* applies to the corresponding one of *Thinobadistes* (Cat. No. 2509d, pl. 119, fig. 9). However, the latter is narrower at its distal end and gradually widens upward. It has a total length of 102 mm.; the height of the distal end is 46 mm. The fifth metatarsal (Cat. No. 2509e; pl. 119, fig. 9) has a length of 127 mm., very close to that of *Mylodon robustus*. The greatest width of the proximal end is 56 mm. A comparison with Owen's figure will show that the distal half of this bone is differently shaped in the two animals. In *M. robustus* the outer border is nearly straight; in the Florida animal the border is sigmoid. The distal end of the fifth metatarsal reaches nearly to the distal end of the fourth; in *M. robustus* it falls considerably short of reaching that point. The proximal end of the outer border of this metatarsal is thick, and rounded; and it forms part of a smooth surface which continues around to the underside of the bone. This surface was probably covered by a pad of thickened skin and bore much of the weight of the animal.

The second phalanx in the collection appears to belong to the median digit of the right hind foot (pl. 119, fig. 10). The total length is 50 mm.; that taken along the axis of the bone 38 mm. The height of the hinder end, taken in the median plane, is 33 mm.; the width of this end, 35 mm.; the width of the distal articulation, about 25 mm. The base of an ungual phalanx (pl. 119, fig. 11) is taken to be that of the hinder third digit, and it fits closely to the end of the second phalanx just described. The height of the hinder end of the bone is 45 mm.; the width, 38.5 mm. On the sides of the base of the phalanx are indications of the presence of the sheath for the horny claw; but, as represented in Owen's figure of the hinder median claw, this sheath was deficient on the middle of the upper surface.

It will be a matter of great interest to discover additional remains of this animal, especially remains of the skull and teeth. In the hinder foot the digits resemble much those of *Mylodon*; but the astragalus, especially on the underside, is much like that of *Megaatherium*. The size of the animal was about that of *Mylodon robustus*, but considerably smaller than *Mylodon sodalis* from Christmas Lake.

**EXPLANATION OF PLATES.**

**PLATE 116.**

**Fig. 1-7. Camelops huerfanoensis.** Upper teeth. X 7+:
1. Right fourth premolar, grinding surface.
2. Right first molar, outer face.
3. Same tooth, grinding surface.
4. Right second molar, outer face.
5. Same tooth, grinding surface.
6. Right third molar, outer face.
7. Lower left hindermost molar.
PLATE 120.

Figs. 1-4. Thomomys scudderi. Skull. Type:
1. Skull seen from left side. X 1.
2. Right ramus of lower jaw seen from right side. X 1.
3. Skull showing palate. X 2.
4. Lower jaw seen from above. X 2.

Figs. 5-6. Citellus taylori. Skull. Type. X 2:
5. Palate, showing teeth.

Fig. 7. Citellus taylori. Type. X 1. Left ramus of lower jaw seen from left side.

Fig. 8. Procamelus longurio. Type. X 1. Section of the right hinder cannon bone.

Fig. 9. Procamelus major Leidy. Section of the right hinder cannon bone.

PLATE 121.

All the figures are of approximately the natural size.

Figs. 1-5. Lepus benjaminii:
1. Lower jaw. Type. Inner face of left ramus.
2. Referred maxilla.
3. Right femur, front view.
4. Right tibia, front view.
5. Left humerus, front view.
5b. Right innominate bone.

Figs. 6-18. Brachylagus brownii:
6. Palate, with teeth. Type.
7. Referred skull, showing right side. The bone encrusted with calcite.
8. Same skull, seen from above.
9. Same skull, seen from below.
10. Palate of another skull, showing tooth sockets.
11. A right mandible with most of the teeth.
12. A left maxilla showing zygomatic arch.
13. A right ramus of the lower jaw.
14. A right humerus seen from radial side.
15. Right innominate bone.
16. Right femur seen from in front.
17. Right tibia, lacking the epiphyses.
18. Upper half of left tibia.

PLATE 122.

Figs. 1-3. Camelops huerfanensis A cervical vertebrae. X .5±:
1. Seen from below.
2. Seen from the right side.
3. Seen from in front—
   (aa) Span of the front and lower parts of the transverse processes.
   (bb) Span of the lower plate of the transverse processes.

Figs. 4-6. Procamelus cocominensis. Tooth and first phalange:
5. Same tooth, presenting outer face. X 1.

Fig. 7. Cynomys niobrarius. Palate presenting the teeth. Type. X 1.

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BONES OF RODENTS AND OF A HORSE.

For explanation of plate see page 840.
SKULLS OF RODENTS AND SECTIONS OF CANNON BONES OF CAMELS.

For explanation of plate see page 861.
SKULL OF PRAIRIE DOG AND BONES AND TEETH OF CAMELS.
FOR EXPLANATION OF PLATE SEE PAGE 541.
TEETH OF HORSE, BONE OF CAMEL, AND JAW OF HYAENA.

FOR EXPLANATION OF PLATE SEE PAGE 642.