

# A COLLECTION OF PLEISTOCENE VERTEBRATES FROM SOUTHWESTERN TEXAS

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In August, 1925, Dr. Mark Francis, of College Station, Texas, sent the writer a small collection of fossil teeth and bones which he had collected near the west bank of Aransas River, in San Patricio County. The locality is described as being about 1 mile north of the bridge on which the St. Louis & Brownsville Railroad crosses the Aransas. It is also about 20 miles southwest of Refugio. Nearer is a town named Sinton, and for convenience the collection will be spoken of as from Sinton. Doctor Francis wrote that the fossils were found in a deposit of sand at a height of about 4 feet above the average water level. Credit is due to Frank Low, of Refugio, for notifying Doctor Francis of the discovery of these fossils.

The following animals have been identified:

- Atractosteus tristocchus?*
- Testudo*, species indeterminable.
- Alligator mississippiensis*.
- Megatherium mirabile*.
- Chlamytherium septentrionale*.
- Glyptodon petaliferus*.
- Equus complicatus*.
- E. littoralis?*
- Camelops aransas*, new species.
- Bison*, species indeterminable.
- Odocoileus*, species indeterminable.
- Mammut americanum*.
- Elephas columbi*.
- Anancus orarius*, new species.
- A. defloccatus*, new species.
- Neochocerus pinckneyi*, new genus.

A large garfish (*Atractosteus tristocchus?*) is represented by several scales.

The genus *Testudo* is represented by a part of a costal plate, apparently the eighth, a part of a scapula, and the head of a femur. It was a large species, inasmuch as the costal plate measures 80 mm. along the sulcus separating the neural scute from the costal scute.

The thickness of the costal plate, at about the middle of its length, is 20 mm. The femur was about the size of that of a medium-sized horse. The side-to-side diameter of the articular surface is 68 mm.; the oblique and greatest, 82 mm.

Of the alligator there is present the distal half of the right mandible and a dorsal bony scute. The jaw contains sockets, or parts of them, of 15 teeth. Near the front is the socket for what may be called the canine; this socket has a diameter of 23 mm. Behind this come sockets for 7 small teeth, and behind these 4 sockets whose diameters are 16, 20, 19, and 15 millimeters. These teeth appear to have been much larger than those of an alligator in the United States National Museum whose length is 11 feet. The jaw does not, however, appear to be much larger. From the front of the canine socket to the rear of the last one mentioned is 185 mm. The dorsal scute is 55 mm. wide and 52 mm. long.

Of the *Megatherium* there is present a part of one tooth, apparently the front half of the lower first one, and one astragalus. The width of the tooth is 32 mm. The diameter of the astragalus is 6.5 inches.

Of *Chlamytherium* (pl. 2, fig. 2) there is a part of the right side of the lower jaw containing the four hinder teeth. This row measures 90 mm. Several teeth of *Equus* are present; two little-worn right upper premolars,  $pm^3$  and  $pm^4$ , and a last molar are identified as *Equus complicatus*. Five lower teeth may belong to the same species. A lower second premolar, much waterworn, is taken to belong to *E. littoralis*; but it may belong to *E. tau*. Its crown measures, fore-and-aft, only 23.5 mm.; its thickness is 10.5 mm. A bison is represented by a lower molar and most of the ulno-radius. These seem not to differ from the same elements of the existing bison, but it probably belonged to an extinct species. A deer, quite certainly a species of *Odocoileus*, is known from only 130 mm. of the upper part of the right hinder cannon bone. At 50 mm. below the upper end the fore-and-aft diameter is 19.5 mm.; the side-to-side diameter 13 mm. A narrow groove descends on the front face; a broad one occupies the hinder face. Of *Elephas columbi* there are present about 13 enamel plates of the rear of a tooth, but no fragment has more than 4 plates. One plate is 195 mm. high and 95 mm. wide. Apparently there were 7 plates in a 100-mm. line.

The remaining species require more extended treatment.

#### GLYPTODON PETALIFERUS Cope

Plate 1, fig. 1; plate 2, fig. 3

The following are the parts of a glyptodon included in Doctor Francis' collection: Five fragments of lower jaws, three belonging to right rami and two to left rami, the parts representing per-

haps three animals; three fragments of the carapace, and a complete femur.

An important part consists of two fragments of a right horizontal ramus, between which close to 5 mm. only of bone is missing. The anterior portion presents half or more of the symphysis, the lower border of the jaw, and the bottom of the sockets of 5 teeth and a part of the sixth. The hinder fragment offers the horizontal ramus as far as 45 mm. behind the last tooth; the hinder half of the sixth socket, most of the seventh tooth, and all of the eighth tooth except the summit; also a part of the ascending ramus. The length of the tooth row was originally not far from 192 mm. The first tooth is represented by only the bottom of the socket. It was shorter and narrower than the other teeth, convex on the inner face, concave on the outer, with at least one intercolumnar groove. The second was trilobate, 20 mm. long and 8 mm. wide. The remaining teeth were close to 22 and 23 mm. in length and 14 mm. in width (pl. 2, fig. 3). The forms of these teeth resemble in general those of the teeth of Burmeister's *G. asper* and *G. elongatus*<sup>1</sup>; and, as in the species just cited, the symphysis reaches the front of the fourth tooth. At the seventh tooth the jaw on the inner face is 65 mm. high and 40 mm. thick. On a fragment of the left side of the jaw the ascending ramus rises 130 mm. above the alveolar border.

In 1916<sup>2</sup> the writer described portions of a glyptodon found near Wolfe City, Hunt County, Texas, and referred the animal to Cope's *G. petaliferus*. The two specimens need to be carefully compared. As regards the skull the two specimens present, as common parts, only one tooth, the sixth, and a fragment of the jaw bearing the ascending ramus and the outer walls of the tooth sockets. The fragments of the jaw present no apparent differences. The Sinton tooth is 22 mm. long, 15 mm. wide at the rear lobe, and 13.5 mm. wide at the front lobe. The Wolfe City tooth is 20.5 mm. long, 13.5 mm. wide at the rear, and 11 mm. in front. It may be that it belonged to a smaller animal. However, it is, relatively to the length, narrower in front than the Sinton tooth in the ratio of 54 to 61. On the inner border of the front lobe of the Wolfe City tooth there is a rather deep groove; on the other tooth this groove is very shallow. It is shallow on the fifth and fourth teeth of the Sinton tooth; missing on the third and eighth.

The three fragments of the carapace belong above the pelvis. The largest piece consists of 17 polygonal dermal scutes. Its inferior surface is traversed by an elevated tract of bone from 50 mm. to 70 mm. in width which evidently was connected with the spines of the sacral vertebrae. It is rough from fracture, without indica-

<sup>1</sup> An. Mus. Buenos Aires, vol. 2, 1874, pl. 27, figs. 3, 4.

<sup>2</sup> Proc. U. S. Nat. Mus., vol. 51, p. 107, pls. 3-5.

tions of sutures. On each side of this tract, at right angles with it, is another surface which probably was connected with the ilium. Its surface resembles that of a suture. The two other fragments of the carapace also belonged above the sacrum. Away from the median line the carapace varies in thickness from 23 mm. to 27 mm. The dermal scutes vary in diameter from 36 mm. to 46 mm. (pl. 1, fig. 1). In general, they are not coössified and the borders of the fragments follow the sutures. Each scute is ornamented by a rosettelike figure. The central portion of each rosette is much larger than the peripheral parts. The groove around the central area and those radiating from it are wide and deep. On a casual view the rosettes resemble much those shown in Lydekker's work.<sup>3</sup> Close inspection shows differences. In Lydekker's figure the peripheral pieces of each rosette are separated from those of the surrounding rosettes by a very distinct groove. If in the Sinton specimen the groove which appears to surround the rosette is followed one comes into contact with the central area of other rosettes. In fact, the grooves which separate contiguous rosettes and which usually follow the bone sutures are nearly suppressed in the Sinton specimen. Occasionally traces of them may be found, as shown in the illustration (pl. 1, fig. 1).

In another respect the rosettes differ from those cited from Lydekker's work. In that specimen the central areas are somewhat excavated, but the peripheral areas are flat. In the Sinton glyptodon both the central and the peripheral areas are hollowed out. Each excavation of the peripherals occupies adjoining areas of two rosettes.

On comparing the carapace here described with that of the Wolfe City specimen it is seen that in the latter the central areas are often relatively smaller, sometimes hardly larger than the peripherals; also that all the areas are either flat or convex. Often, too, in the groove surrounding the central areas there may be found three or four large pores; in the Sinton animal none, one, or two. In the Wolfe City glyptodon it is observed that occasionally rosettes are found some of whose peripheral areas are not separated by grooves from those of adjoining areas.

The writer has not seen the femur which was obtained on Aransas River, but Doctor Francis sent a carefully drawn sketch of the natural size. When this is compared with the femur of the Wolfe City specimen no differences are observed. It is possible that the differences existing between the Wolfe City specimen and that found near Sinton are indicative of distinct species. Considering, however, the variability of the elements of the skull and of the skeleton, the writer believes it better to refer the specimen to Cope's *Glyptodon petaliferus*.

<sup>3</sup> An. Mus. La Plata, Palaeont. Argentina, vol. 3, 1894, pl. 3, fig. 2.

Two fragments of the carapace found at Sinton were presented by Doctor Francis to the United States National Museum. To these are assigned the number 11,379.

Since going to press Doctor Francis has sent a photograph of another fragment of the carapace, which presents 11 rosettes and three bones along the border. So far as can be determined these appear to be similar to those of some part of the border of the specimen found at Wolfe City.

NEOCHOERUS PINCKNEYI (Hay)

Plate 1, fig. 2; plate 6, fig. 2; plate 7, fig. 2

In Doctor Francis' collection are found a part of an upper jaw and a part of the left side of a lower jaw of a species of rodent related to the South American capybara. The lower jaw presents the premolar, the outer walls of the sockets of the two anterior molars, and a small part of that of the last molar, also the outer wall of the socket of the left incisor. The whole fragment is 122 mm. long. The three anterior teeth occupied 80 mm. of the jaw, and the whole tooth line was close to 108 mm.; that of a specimen of *Hydrochoerus hydrochoerus* at hand is 79 mm. long. The premolar appears to differ from that of the existing capybara only in size. Its length is 29 mm. on the outer border; the oblique width at the rear is close to 13 mm.

Some important differences between this jaw and that of the South American capybara are noted. In the latter there is on the outer face of the bone a broad shelf, the masseteric ridge, which furnishes attachment for the various divisions of the masseter muscle. In the existing capybara the ridge begins at the condyloid process and, expanding in its course, forms a rounded prominence beneath the premolar and subsides below the front of this tooth. In the fossil jaw (pl. 1, fig. 2) the ridge doubtless originates at the condyloid process and, pursuing its way, develops its prominence not quite so far forward as in the capybara, and the ridge subsides below the middle of the molar. As a result the front of the jaw was not so suddenly narrowed as it is in the capybara. The course of the shelf is not so straight as in the capybara, its upper border being considerably arched, and the anterior end of the muscular insertion is curved downward. The shelf is 14 mm. thick below the third tooth; only 8 mm. in the capybara.

In the capybara the coronoid process is thin and prominent, curving outward and upward and rising some 13 mm. above the alveolar border. In the fossil (pl. 8, fig. 2) it does not reach the level of the alveolar border, but extends somewhat outward and backward as merely a continuation of a ridge just below the tooth row. The incisor tooth was relatively larger than it is in the capybara, its



diameter at right angles with the width being at least 16 mm. (pl. 6, fig. 2); in the capybara, only 8.9 mm. In the latter its base is in a prominence halfway down on the inside of the jaw and opposite the rear of the first tooth; in the fossil it was as far backward but higher up, apparently below the alveolar border about one-third the width of the jaw. The length and width of the incisor can not be determined. If the proportions were as in the capybara the width was 20 mm. In front of the base of the premolar and well in front of the masseteric ridge is a mental foramen whose diameter appears to have been about 4 mm. In the capybara the foramen is only 2 mm. in diameter, and it pierces the bone somewhat behind the front end of the ridge.

The writer is indebted to Gerrit S. Miller, jr., for some important observations on this fossil. He suggests that in two respects the animal is in a more advanced stage than is the capybara. One progressive feature is found in the elevation of the rear of the incisor; the other is indicated by the reduction of the coronoid process. A less progressive feature is found in the failure of the masseter muscle to extend as far forward as it does in the capybara.

In consideration of the differences between the Sinton rodent and the existing capybara (*Hydrochoerus hydrochoerus*) it seems that the former belonged to a line of descent which had parted from that of the capybara, and that hence a new generic name is appropriate. *Nechoerus* is chosen, as suggesting the swimming habits of the animal and its relationship to *Hydrochoerus*, the first part of the name being derived from the Greek *νέω*, to swim, the remainder from *χοῖρος*, a hog.

Accompanying the mandibular ramus above described is an upper left third molar in a piece of the maxilla and a little of the palatine. The length on the grinding face is 60 mm.; the greatest width 24 mm. It is composed of 17 plates, as represented by the edges exposed on the outer face. The best-preserved plates are 36 mm. high. It appears that the palate of the Aransas River specimen was not so flat as in the capybara. In this the roof of the palate, at the middle of the hinder molar, makes an angle of 123° with the grinding surface of the molar; in the fossil an angle of 138°. At this inclination the roof rises a distance of 21 mm. to the fracture near the midline.

In 1923 the writer described a species of *Hydrochoerus* founded on a tooth discovered in the Pleistocene deposits at Charleston, South Carolina, and this he called *H. pinckneyi*.<sup>4</sup> Later in the same year that tooth was further described and other figures of it were shown.<sup>5</sup>

<sup>4</sup> Publ. 322, Carnegie Institution, Washington, p. 365, fig. 18.

<sup>5</sup> Pan. Amer. Geologist, vol. 39, p. 103, pl. 7, figs. 3-5.

From this tooth the upper molar from Texas appears to differ only in being somewhat broader, 24 mm. instead of 22 mm. It can hardly be doubted that the South Carolina and the Texas specimens belong to the same species. The name for both will be, therefore, *Neochoerus pinckneyi*. As shown in the writer's second publication cited, other teeth of probably the same species have been discovered in Florida.

CAMELOPS ARANSAS, new species

After this paper had been sent to press Doctor Francis transmitted a small box of fossils which he had just received from the Aransas locality. In this lot were a lower molar of a bison and some remains of a camel. He also sent photographs of an astragalus of *Megatherium* and of a fragment of the carapace of *Glyptodon*. These are mentioned in their proper places.

The camel remains consist of the distal end of a front cannon bone and of a part of the right side of the lower jaw with all three molars. This belonged to an old animal, the teeth being worn down to within about an inch of the forking of the roots. The wear of mastication had obliterated the fossettes. The following measurements are presented. The length and the thickness are taken on the grinding faces; the length on the midline; the height on the inner face of the teeth.

Measurements of molars in millimeters

First:

Height.....	10.0
Length.....	28.0
Width, first lobe.....	17.0
Width, second lobe.....	21.0

Second:

Height.....	20.0
Length.....	30.0
Width, first lobe.....	20.0
Width, second lobe.....	22.0

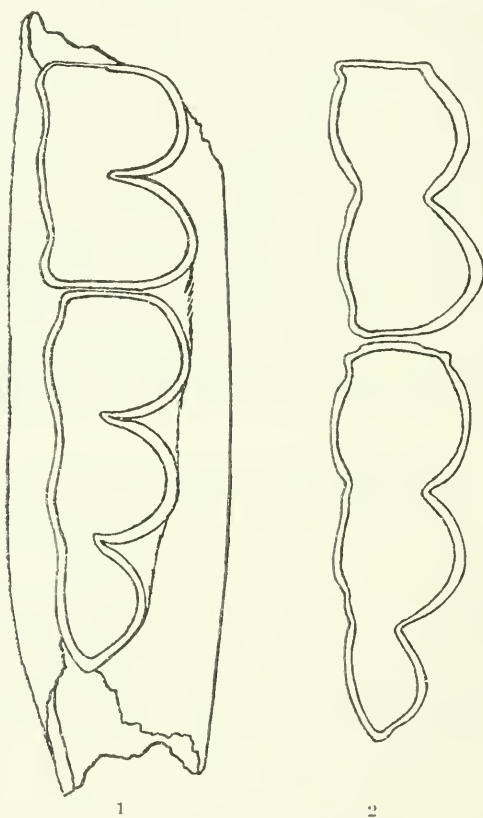
Third:

Height.....	20.0
Length.....	52.0
Width first lobe.....	20.0
Width, second lobe.....	17.5
Width third lobe.....	12.5

The length of the row of molars is 111 mm.

These molars appear to differ from those of our other camels in the broadly rounded form of the outer faces of the lobes and in the narrowness of the valley separating them. They are in this respect more like the teeth of the Bactrian camel. The differences between these teeth and those of the camel found at Minidoka, Idaho, and now referred to *Camelops sulcatus* (*C. huerfanensis* of Hay, Proc.

U. S. Nat. Mus., vol. 46, 1913, pp. 268, 271, pl. 26). They also lack the deep groove on the inner face which separates the lobes of *C. sulcatus* and also of *C. hesternus*. These differences are brought out in the figures here presented (fig. 1, *Camelops aransas*, fig. 2, *C. sulcatus*). Considering this structure, the writer is not able to refer the jaw to any described form and he regards it as better to give it a definite name and status. It is, therefore, to be called *Camelops aransas*. It is possible that it belongs to the genus *Camelus*.



FIGS. 1-2.—SECTIONS NEAR BASE OF LOWER MOLARS 2 AND 3 OF CAMELS. 1, *CAMELOPS ARANSAS*; 2, *CAMELOPS SULCATUS*. NEARLY ACTUAL SIZE

The cannon bone probably belongs to the same species. It indicates a large animal. It measures 94 mm. across the distal end with a space of 9 mm. between the two divisions.

**ANANCUS ORARIUS, new species**

Plate 2, fig. 1; plate 3, fig. 1; plate 4; plate 5, figs. 1-3

The mastodon to which this name is applied is represented by the symphysis and somewhat less than one-half of both horizontal rami with a much-worn right second molar, the complete crown of



the lower right third molar, the detached lower left third molar, a detached upper left second molar—and a section of the right maxilla supporting the third molar nearly complete, these parts belonging to one individual.

The part of the lower jaw preserved is remarkably short and deep. From the front of the tooth row the profile turns downward more abruptly than is usual, even in *Mammot americanum* (pl. 5, fig. 3). The depth of the jaw at the front of the tooth row is 200 mm. The lower face of the symphysis forms an ascending curve measuring 150 mm. The hinder face rises perpendicularly a distance of 130 mm. to the lingual gutter. This gutter runs forward a little and then turns rapidly downward to meet the ascending curve of the lower face of the symphysis in the blunt beak. The length of the gutter is close to 190 mm. At its lower end it is only about 25 mm. wide, and it is nowhere more than 45 mm. deep. The lower face of the symphysis is at first flat, but it soon presents two slightly diverging keels separated by a sharp furrow (pl. 5, fig. 2). In this are seen the openings of several foramina which probably transmitted nerves and blood vessels to the lower lip.

Where the keels and the ridges bounding the lingual gutter meet there is on each side a constricted foramen which opens directly backward into the jaw and has a long diameter of 10 mm. It seems possible that these foramina represent the sockets of vestigial lower tusks; but, as shown by the somewhat injured alveolar ridges bounding the lingual gutter, a canal, which probably transmitted a branch of the inferior dental nerve, opens into the supposed socket through its roof. Possibly the lower portion of the openings is all that remains of the sockets. On Figure 3 of Plate 5 no part of the lingual groove is seen. At the right hand in the lower half of the border a part broken away exposes the canal which transmitted the dental nerve. In Figure 2 on the left side (right in the specimen) the upper dark spot represents this canal 40 mm. higher up than that taken to be a possible socket. On the side of the jaw in front of the second molar are three openings for exit of branches of the nerve mentioned.

In the collection is a detached upper left second molar which the writer refers to this species. The great front root supporting the outer end of the first crest is preserved. It has a length of 123 mm., with some part of the distal end missing. The base of the root which supported the inner end of the first and second crests remains. The crown has lost the outer half of the first valley and the adjacent part of the second crest. All three crests are worn so that in each the dentine areas of the inner and outer halves coalesced. The pretrite end of the hinder crest is, for some reason, worn deepest. Remains of a trefoil are preserved on the first crest.

The inner ends of the first and second valleys were occupied by large elongated tubercles. A pressure area is present on the front end of the crown; the talon on the hinder end was almost obliterated by the pressure of the molar behind. The crown is 122 mm. long and 93 mm. wide at the first and third crests. This tooth probably belonged to the type specimen.

The upper right third molar in its fragment of the maxilla is practically complete (pl. 3, fig. 1; pl. 4, fig. 1; pl. 5, fig. 1). However, the inner half of the pretrite portion of the third cone was lost in collecting the tooth and the distal ends of the hinder portion of the rear root are broken off. The grinding face is worn as far back as the fourth crest. The length of the crown is 202 mm., measured on the midline. The width at the first crest is 102 mm.; at the second, 105 mm.; at the third, 100 mm.; at the fourth, 90 mm.; at the fifth, 68 mm. At the rear is a small talon of 3 tubercles. The outer cones of the crests are wedge shaped, and the enamel figures resulting from wear are elongated in the direction of the crest. As shown on the third and fourth crests, each outer cone terminates in 4 conules. On the hinder face of the first outer cone near the midline, is an area of dentine on the point of being connected with the dentine of the main area of wear. A large, worn-down tubercle in the valley at the midline presents another area of dentine. Near the midline, at the base of the hinder face of the second outer cone, is a similar area of dentine. These remains of buttresses would each in time have had its dentine area joined to that of the principal cone. On the inner half of the first, second, and third crests are well-developed trefoils. On the hinder face of the fourth crest the buttress is wanting. The basal lobes of the trefoils are pointed. This appears to have been produced by a chopping motion between the jaws instead of a sliding one. On such manner of wear Schlesinger<sup>6</sup> has based his subspecies of *Mastodon angustidens subtapiroideus*.

The original height of the outer cones of the first and second crests can not be determined exactly. Measured from the lower border of the enamel the heights are 53 mm., 61 mm., 68 mm., 68 mm., 45 mm. The third cone was originally but little higher than now. The inner cone of the fifth crest is 66 mm. high. The enamel of the trefoils is thick and moderately folded.

The roots of this tooth, except the outer anterior one, are shown on the inner side of the fragment of maxilla (pl. 4, fig. 1). The anterior branch of the inner front root rises to a height of 150 mm., the posterior branch to a height of 125 mm., and the front part of the great hinder root to a height of 125 mm.

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<sup>6</sup> Denkschr. naturh. Staatsmus., vol. 1, 1921, p. 36 .

The lower right second molar (pl. 5, fig. 3) is so deeply worn that all of the dentinal areas are confluent and nearly all traces of trefoils are obliterated. The length was originally close to 125 mm. The width in front is 75 mm.; at the rear, 90 mm. There were three crests; also a talon, which was nearly destroyed by the pressure of the succeeding tooth and by the wear of mastication. The valleys are shown to have been wide to their bottoms. A large, well-worn tubercle is seen at the outer end of each valley and one at the inner end of the second valley. The tooth was apparently somewhat twisted outward during burial.

The lower right third molar presents a crown complete, except where worn by usage during life (pl. 2, fig. 1; pl. 5, fig. 3). The roots are mostly missing. The length of the crown is 223 mm.; the width at the first crest, 88 mm.; at the second, 92 mm.; at the third, 95 mm.; at the fourth, 92 mm.; at the fifth, 72 mm. All the crests are worn, the hindmost only slightly; none so much as to allow the dentine areas of the opposite ends of the crests to coalesce. The original heights of the crests can not, on account of the wear, be exactly determined. In the condition of wear, and measured on the slope from the lower border of enamel to the worn summit, the heights of the inner cones, from the first to the fifth, are as follows in millimeters: 51, 47, 58, 61, 55. The probable original elevations were greater by from 13 mm. in the second to 5 mm. in the fifth. The heights of the outer cones similarly measured are, in millimeters, 34, 39, 45, 53, 57. Trefoils are found on the outer halves of all the crests, although the lobes descending from the pretrite half of the fifth crest into the fourth valley are absent. The enamel of the trefoils and of the inner ellipses is little folded. There are no traces of trefoil-producing buttresses on the inner halves of the crests. Besides a fifth crest, there is a well-defined talon. A small amount of cement appears in many of the valleys, especially in the one between the last crest and the talon. A large patch of it is present at the outer end of the fourth valley.

The fifth crest requires further description. On the pretrite side it presents two cones, a large outer one and a small, thinner one next to the median cleft. No buttress appears on the front face of this half of the crest. On the rear face of the principal cone is a ridge, which may represent a buttress. On the posttrite side are two cones. The one on the lingual side resembles its homologue in the other crests. The other, the one next to the median cleft, is greatly enlarged, being 21 mm. wide in the right tooth, 24 mm. in the left. It is expanded forward, especially in the tooth of the left side, so as to join the pretrite buttress of the crest in front, partially blocking the fourth valley. In the tooth of the left side this cone sends

down on its front face three strong ridges, two of them crossing over to the buttress of the crest in front.

The talon is composed of three conules, the largest on the outer side, the smallest on the inner. One may satisfy himself that he finds the same elements as in the fifth crest.

The lower left hindmost molar is present and in fine condition, except that the roots are injured. Few differences between this and the one of the right side are observed. The length is 225 mm. At the first crest the width is 91 mm.; at the second, 95 mm.; at the third, 101 mm.; at the fourth, 93 mm.; at the fifth, 83 mm. Most of the great root supporting the front crest is preserved. Measured from the crown the height is 140 mm., and some part is missing. The width is 70 mm.

Of the upper tusks of the animal above described nothing is known. The lower teeth of this species show relationships of their possessor to Cope's *Dibelodon tropicus*,<sup>7</sup> a species based on H. von Meyer's *Mastodon humboldtii*?,<sup>8</sup> found in Mexico and referred by Freudenberg to the Pleistocene. Von Meyer's plate was reproduced by Dr. W. Freudenberg in 1922.<sup>9</sup> The tooth from Aransas River appears not to belong to that species for these reasons: 1, The lower teeth of *Anancus tropicus* (Cope) appear to have possessed a well-defined cingulum; nothing of the kind appears in the Aransas tooth, except large tubercles in the ends of some of the valleys; also on the pretrite end of the fourth crest of the right lower tooth a row of small tubercles represents the cingulum. 2, The pretrite cones appear to have been less elevated. 3, The buttresses producing trefoils were evidently weaker than they are in the Aransas tooth, and the lobes of these are of a different form. 4, The fifth crest of *A. tropicus* is far simpler in structure than it is in *A. orarius*. 5, The talon of the former consists of a single conule, in *A. orarius* of three. This species is evidently in a higher stage of development than that named and described by Cope.

Cope in 1893<sup>10</sup> referred remains found in the Blanco beds to *Dibelodon tropicus*, first called by him *Mastodon successor*; but Osborn has restored the name last mentioned. These teeth appear to have trefoils on both halves of the two anterior crests.

In 1911<sup>11</sup> the writer characterized a large upper left hindmost molar of a mastodon from Fort Worth, Texas, and referred it to *Anancus gratus*. With a cast of this tooth at hand and a third molar of the type of *A. gratus* and the Aransas River upper third molar, the writer is inclined to refer the Fort Worth tooth (pl. 4,

<sup>7</sup> Proc. Amer. Philos. Soc., vol. 22, p. 7.

<sup>8</sup> Palaeontogr., vol. 17, 1867, p. 64, pl. 6.

<sup>9</sup> Geol. Palaeont. Abhandl., vol. 14, Heft. 3, p. 29.

<sup>10</sup> Vert. Palaeont. Llano Estac., p. 62, pls. 16, 17.

<sup>11</sup> Publ. 322 A, Carnegie Institution, Washington, p. 13.



fig. 2; pl. 6, fig. 1) to the new species. It differs from the type of *A. gratus* in being larger; in having the fourth crest more strongly developed, the inner cone of the fourth crest being 80 mm. high in place of the 62 mm. of *A. gratus*; in having a large talon approaching a crest; and in having large tubercles at the inner ends of the first and second valleys. The inner cone of the fourth crest has in front a buttress which nearly blocks the third valley, and another behind which joins closely the talon. This tooth differs from the upper last molar of *A. orarius* in some respects. The width does not diminish from front to the rear, the width at the first crest being 96 mm.; at the fourth, 97 mm. There is no well-defined fifth crest, but the talon may easily be regarded as a crest, and the buttress of the fourth crest joins it closely. No other structure represents a talon. The Fort Worth tooth is only slightly worn, but it is noted that trefoils begin to wear as in the teeth of the type of *A. orarius*. The differences observed may be due to individual variations or to those of closely related races.

Dr. W. Freudenberg<sup>12</sup> described and illustrated a fine tooth which he referred to *Mastodon tropicus*. This has remarkable resemblance to the upper molar from Fort Worth. The height of the cones appears to be too great for *M. tropicus*. Freudenberg identified his tooth as the lower left third molar. The slight obliquity of the crests appears to confirm this disposition of it. He wrote that there were incipient trefoils on the outer ends of the crests, but these hardly reveal themselves in the figure.

The upper third molar of the type of *Anancus orarius* differs in various respects from that of *A. gratus*.<sup>13</sup> *A. orarius* is a larger and more rugged tooth, but that might be due to sex or some other condition. It has five crests and a talon; the third valley is blocked by buttresses descending from the adjacent crests; there is a distinct tendency toward the formation of buttresses on the posttrite ends of the crests; on the pretrite side there is, on the front half of the tooth at least, a distinct cingulum, and this, at the ends of the valleys, expands into large tubercles. In *Anancus gratus* there are only four crests and a hinder talon; the third valley is wide open; no buttresses are developed on the posttrite ends of the crests; there are no traces of a cingulum on the sides of the tooth; and no tubercles are developed at the ends of the valleys.

*Anancus orarius* differs in its lower hinder molar distinctly from that of *A. brazozius*.<sup>14</sup> The width is 0.45 of the length; the main cones are wedge shaped and the valleys are wide; the buttresses are simple and they do not block to a great height the valleys. In

<sup>12</sup> Geol. Palaeont. Abhandl., vol. 14, Heft. 3.

<sup>13</sup> Hay, Bull. Univ. Texas, No. 71, 1917, p. 18, pls. 3, 4.

<sup>14</sup> Hay, Pan. Amer. Geologist, vol. 29, 1923, p. 112, pl. 8, figs. 1, 2.



*Anancus brazozius* the width is only 0.40 of the length of the tooth; the main cones are high and columnar; the valleys are narrow; the buttresses are more complicated; and they block the valleys to a relatively great height.

The left lower third molar of the type specimen of this species was presented by Doctor Francis to the United States National Museum, and it now has the catalogue number 11.377.

ANANCUS DEFLOCCATUS, new species

Plate 7; plate 8, fig. 1

The second mastodon found near Sinton is represented by the left horizontal ramus and parts of its second and third molars, and by the hinder half of the lower right third molar. The individual was one of rather advanced age, as the hinder teeth are worn on all the crests.

Name from Latin *defloccatus*, a worn out, rusty old fellow (Ainsworth's Dictionary).

The horizontal ramus (pl. 8, fig. 1) is quite different from that of *Anancus orarius*, being much lower in front, 150 mm. or less at the front of the second molar, instead of 200 mm. as in *A. orarius*. Below this point the thickness is 105 mm. At the rear of the third molar the height is 130 mm., the width 180 mm. The symphyseal articulation is 135 mm. long and 96 mm. high. The jaw seems not to have ended in a beak as in many mastodons. There are three mental foramina, all opening near the alveolar border. A small one is situated below the hinder border of the front root of the second molar, another just below the front border, and a third about 35 mm. further forward. The second and the third have a diameter of about 5 mm.

In the jaw are remains of the second and the third molars. Of the second there remain the anterior root and the hinder root, capped by a part of the last crest worn down so that only the dentine is seen and a fragment of the enamel on the inner border. More of the tooth was present but was lost in collecting. The front root is about 50 mm. wide and 40 mm. front to rear. It seems a large remnant for a tooth so nearly worn out. From the front of this root to the rear of the tooth is 110 mm. The width of the crown in front may have been more than 70 mm.; at the rear, nearly 100 mm. The fore-and-aft width of the last crest was at least 36 mm. There could therefore have been only three crests. The structure of these can be judged only from their condition in the hindmost molar. Unfortunately the third molar is much injured, a large section of the middle of its length being absent (pl. 7). The crown was 230 mm. long, and it consisted of five crests and a hinder talon. Width of

the crown at the first crest, 100 mm.; at the third, 101 mm.; at the fourth, 93 mm.; at the fifth, 85 mm.

The bases of the anterior crest and a part of the second are present. On the outer side they are worn down quite to the base of the enamel; on the inner side the enamel rises not more than 33 mm. The inner end of the first valley is present and exposes the remains of a large tubercle which blocked it more or less. A considerable part of the enamel of the third crest remains. The fourth shows on the outer end a trefoil whose anterior lobe is large and meets the hinder lobe of the trefoil of the third crest. On the front face of the inner cone is a buttress which was worn down so as to present a circle of dentine. This, with some tubercles, blocked the third valley. No buttress is found on the rear face of the inner end of this fourth crest; but at its base, as in the third valley, close to the midline, are two tubercles. A small buttress is present on the front face of the outer half of the fifth crest and aids in blocking the valley on that side. The hinder face is expanded backward, but no distinct buttress is formed. On the front face of the inner end of this fifth crest is a buttress which on further wear would have produced a lobe of a trefoil, imperfect only because no corresponding buttress is developed on the hinder face. The talon is rather small and consists of a large conule and a row of three smaller ones on the posttrite side of it.

On the outer side of the base of the crown is a distinct cingulum, composed at the ends of the crests of a row of small tubercles, while opposite the outer ends of each of the valleys is a large, rounded tubercle. Similar tubercles are located at the inner ends of all the valleys. The enamel is nearly everywhere more or less rough and wrinkled. The valley between the fifth crest and the talon is nearly filled by a mass of cement. A much smaller amount is seen in the fourth valley at the midline of the tooth.

This lower third molar must be compared with that of *A. orarius*. However much they differ, however closely they agree, the jaws testify that two species are present. It is evident that the molar of *A. defloccatus* had crests less elevated than those of *A. orarius*. Also there is an evident tendency to the production of trefoils on the posttrite side of the crests. The presence of a distinct cingulum on the pretrite side of the crown and of the large, knoblike prominences at the ends of the valleys distinguish this species from *A. orarius*.

Doctor Francis presented to the United States National Museum the lower right third molar of the type specimen of *Anancus defloccatus*, and to this has been assigned the number 11,378.

In the Francis collection from near Sinton is a small tooth of a mastodon which is possibly a first milk molar, but which is taken

to be a third premolar (pl. 3, figs. 2, 3). To which of the two species of mastodons found by Doctor Francis it belonged, if either, it is impossible to determine. The tooth had not yet come into action. It appears to be an upper tooth, but whether upper or lower, it belonged to the left side. The length of the crown is 31 mm.; the greatest width, that at the second crest, is 30 mm.; the height, 22 mm. Seen from above the crown is approximately triangular, with the angles rounded. The anterior crest consists of a pretrite cone without subsidiary conules. The posttrite half consists of a principal cone against whose hinder face is a conule, the summit of which is free. The conule forms a sort of buttress. The hinder crest presents, in the pretrite half, a main cone between which and the medium cleft is a subsidiary conule. The front face of the main cone shows a rather prominent buttresslike ridge which partly blocks the valley. The rear face presents another ridge not so large but more distinctly marked off from the main cone. These buttresses appear to presage the development of a trefoil on the second crest. The posttrite half of the second crest consists of a large principal cone and a row of three conules between it and the midline. The main cone is furnished on its front face with a distinct ridge descending to the valley, and a similar one on the rear face.

Above the base of the crown in front is a prominent beaded cingulum, and this passes backward on the pretrite side to the mouth of the valley. It is not present on the posttrite side. At the rear of the crown is a cingulum of a row of about 20 small tubercles of varying size. At a little higher level and between the cingulum and the base of the second crest is a row of about 8 conules which appear to represent a rear talon. The surface of the enamel is everywhere wrinkled, and there is shown a tendency to the formation of ridges and sharp pustules.

## EXPLANATION OF PLATES

### PLATE 1

- FIG. 1. *Glyptodon petaliferus*. Portion of carapace from above the sacrum.  $\times 1$ .
2. *Xcochocrus pinckneyi*. Part of lower jaw, left side.  $\times 1$ . *co. pr.* Coronoid process. *m. for.* Mental foramen.

### PLATE 2

- FIG. 1. *Anancus orarius*. Type. Lower right third molar, showing grinding surface.  $\times \frac{2}{3}$ .
2. *Chlamytherium septentrionale*. Part of right side of lower jaw, showing four hinder teeth.  $\times 1$ .
3. *Glyptodon petaliferus*. Part of right side of lower jaw, showing seventh and eighth teeth.  $\times 1$ .

### PLATE 3

- FIG. 1. *Anancus orarius*. Upper right third molar, showing grinding surface. Type.  $\times \frac{2}{3}$ .
- 2, 3. *Anancus*, species indeterminable.
2. Supposed upper right third premolar. Grinding face.  $\times 1$ .
3. Same tooth seen from inner side.  $\times 1$ .

### PLATE 4

- FIG. 1. *Anancus orarius*. Part of maxilla with third molar. Seen from inner side and showing crown and roots of the tooth. Type.  $\times 0.43$ .
2. *Anancus orarius*. Upper left third molar. Fort Worth specimen. Showing inner face.  $\times 0.56$ .

### PLATE 5

- FIGS. 1-3. *Anancus orarius*.
1. Right maxilla with third molar. Seen from right side. Type.  $\times 0.3 \pm$ .
2. Lower face of symphysis showing keels, included furrow, foramina, and possible sockets for vestigial lower tuks. Lingual groove above.  $\times 0.6 \pm$ .
3. Front of lower jaw with the second and third molars. Seen from right side.  $\times 0.28 \pm$ .

### PLATE 6

- FIG. 1. *Anancus orarius*. Upper left third molar. Fort Worth specimen. Showing grinding surface.  $\times \frac{2}{3}$ .
2. *Xcochocrus pinckneyi*. Left side of lower jaw seen from within. Shows front tooth, parts of sockets of others, and the smooth surface forming a part of the socket for the left incisor.  $\times 1$ .

## PLATE 7

FIG. 1. *Anancus defloccatus*. Lower left third molar, showing the injured grinding face. Type.  $\times \frac{2}{3}$ .

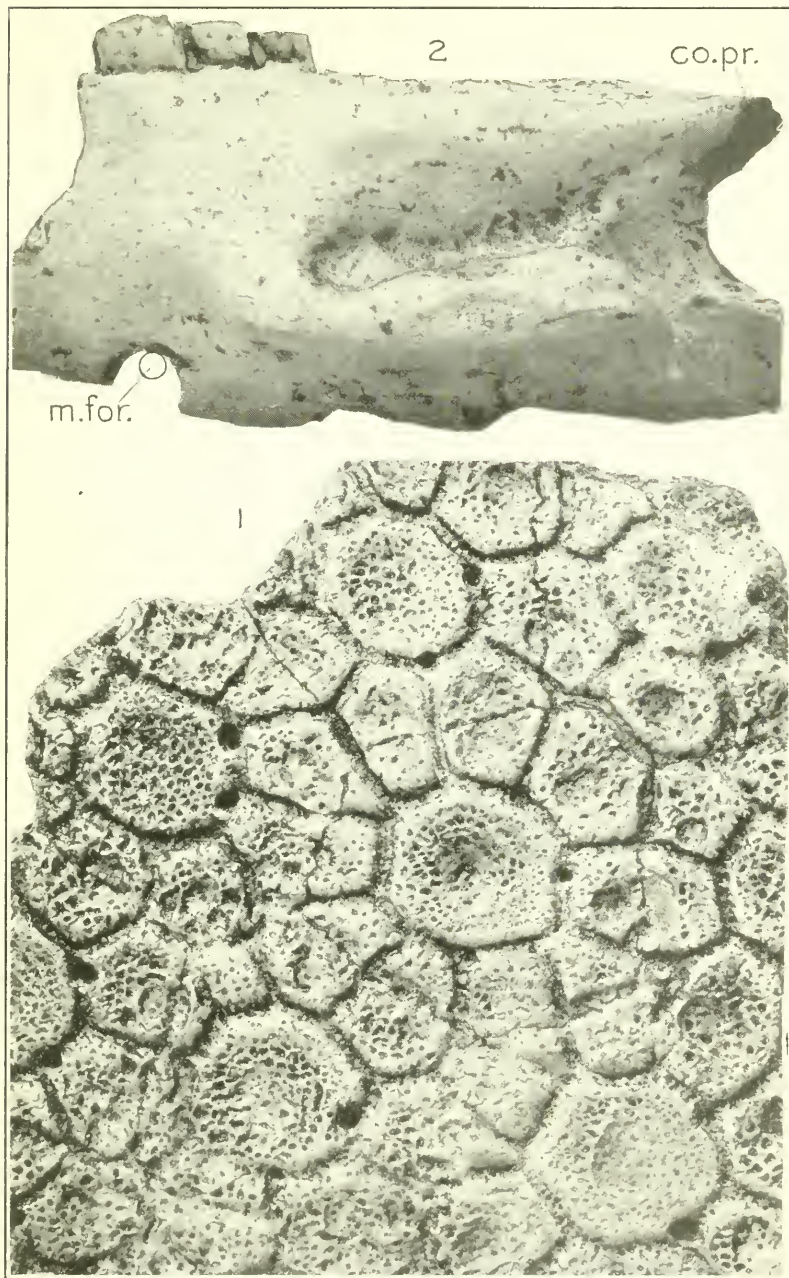
## PLATE 8

FIG. 1. *Anancus defloccatus*. Horizontal ramus showing its inner face, the symphysis, and the second and third molars. Type.  $\times 0.3 \pm$ .

2. *Ncochocrus pinckneyi*. Left side of lower jaw seen from above. Shows the front tooth, the insertion of the masseter muscle, and the reduced coronoid process.  $\times 1$ .

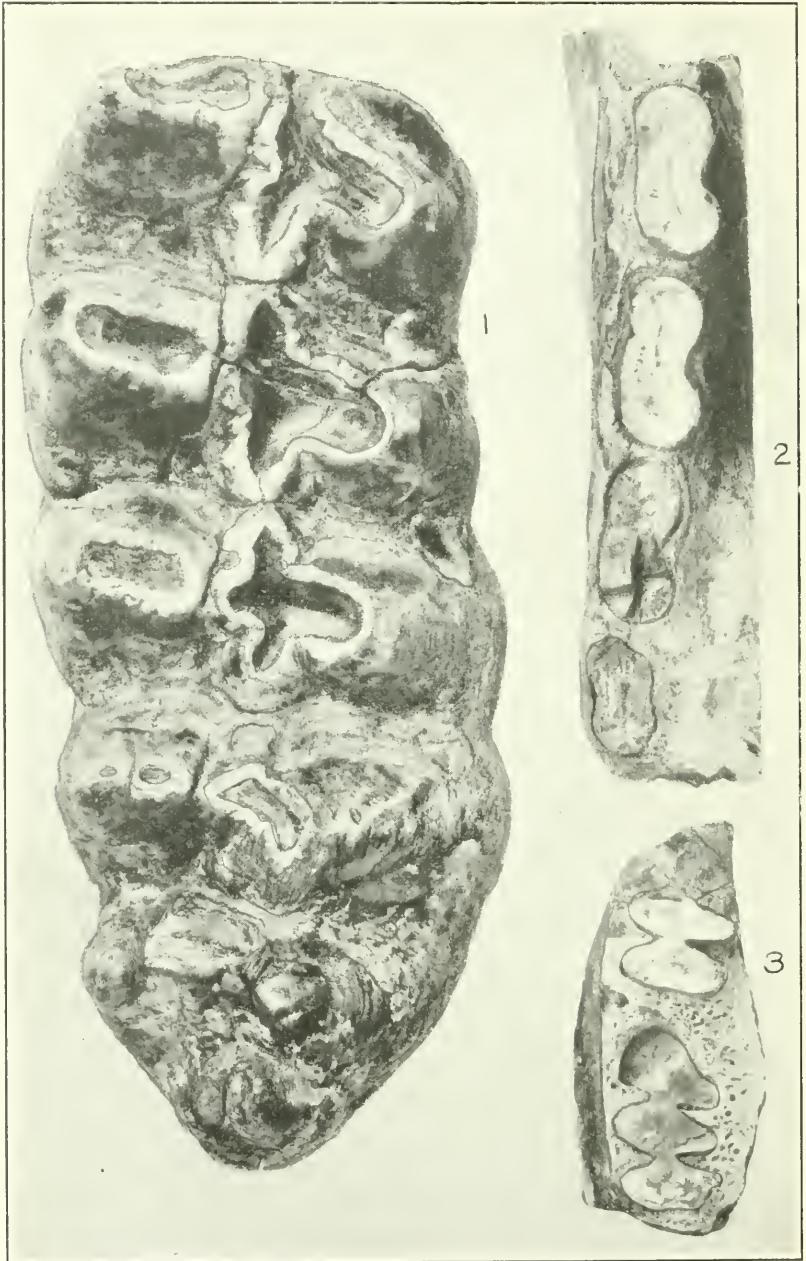






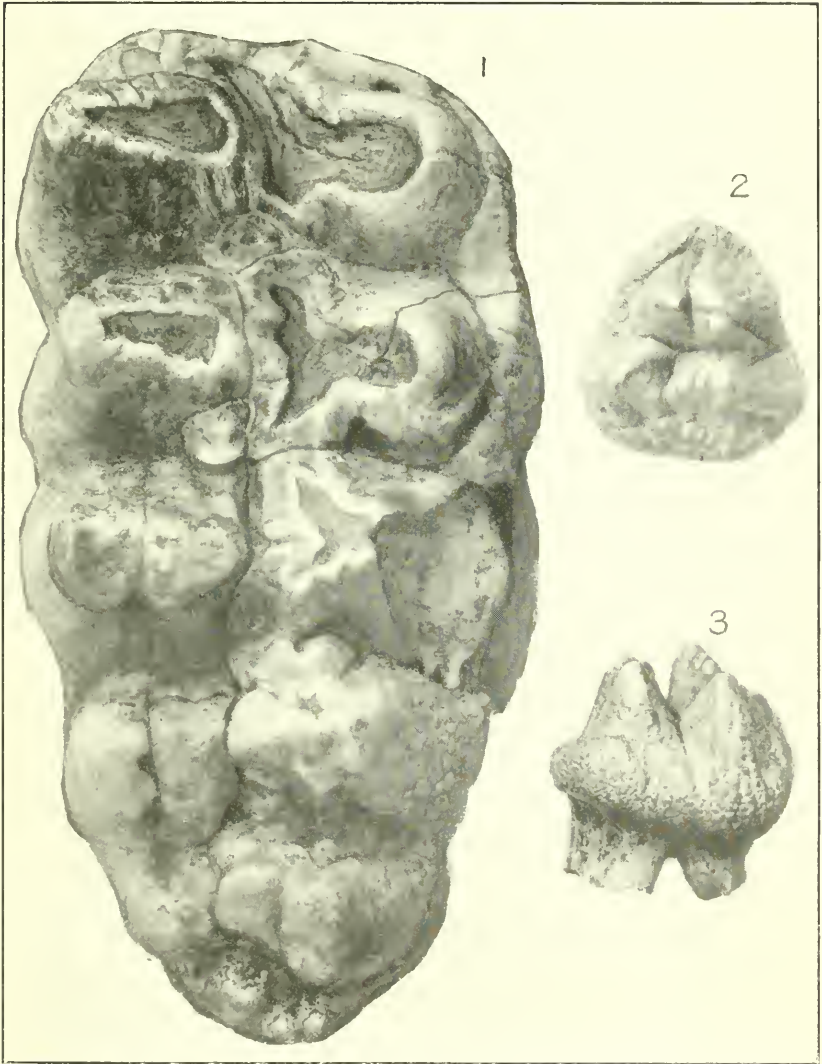
1. GLYPTODON PETALIFERUS. 2. NEOCHOERUS PINCKNEYI

FOR EXPLANATION OF PLATE SEE PAGE 17



1. ANANCUS ORARIUS. 2. CHLAMYTHERIUM SEPTENTRIONALE. 3. GLYPTODON PETALIFERUS

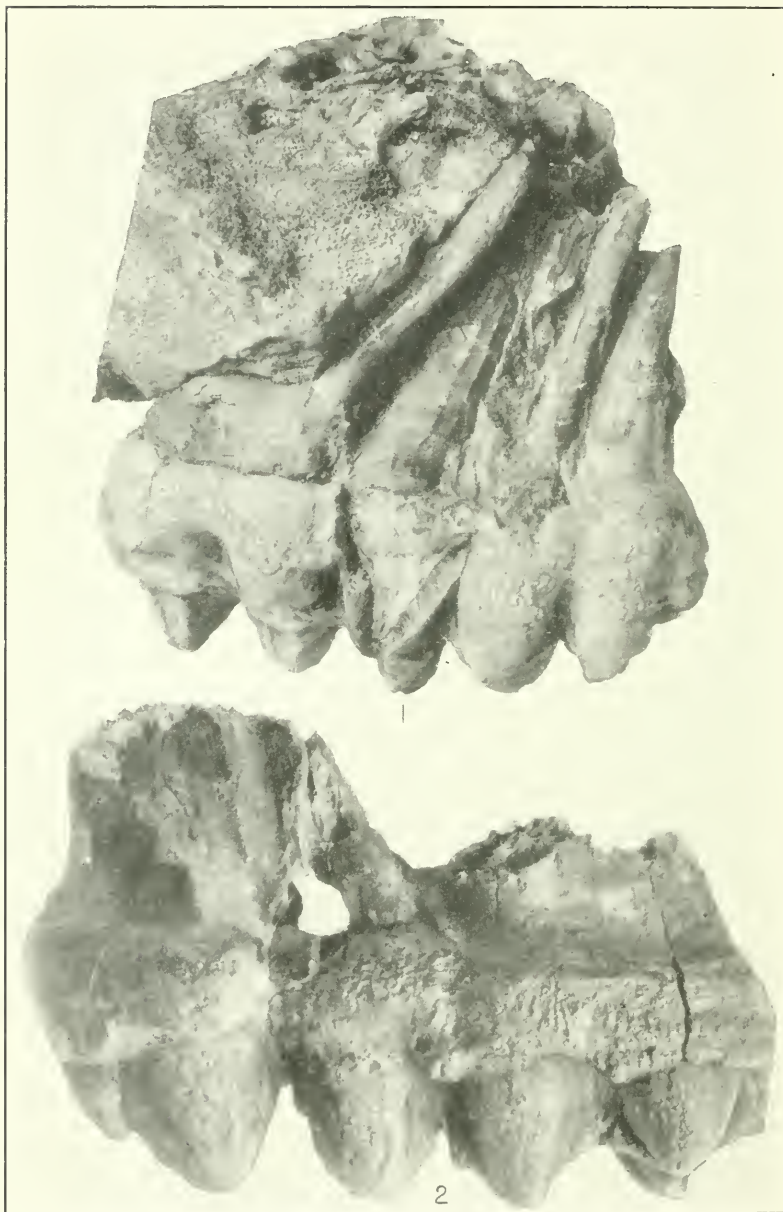
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TEETH OF ANANCUS

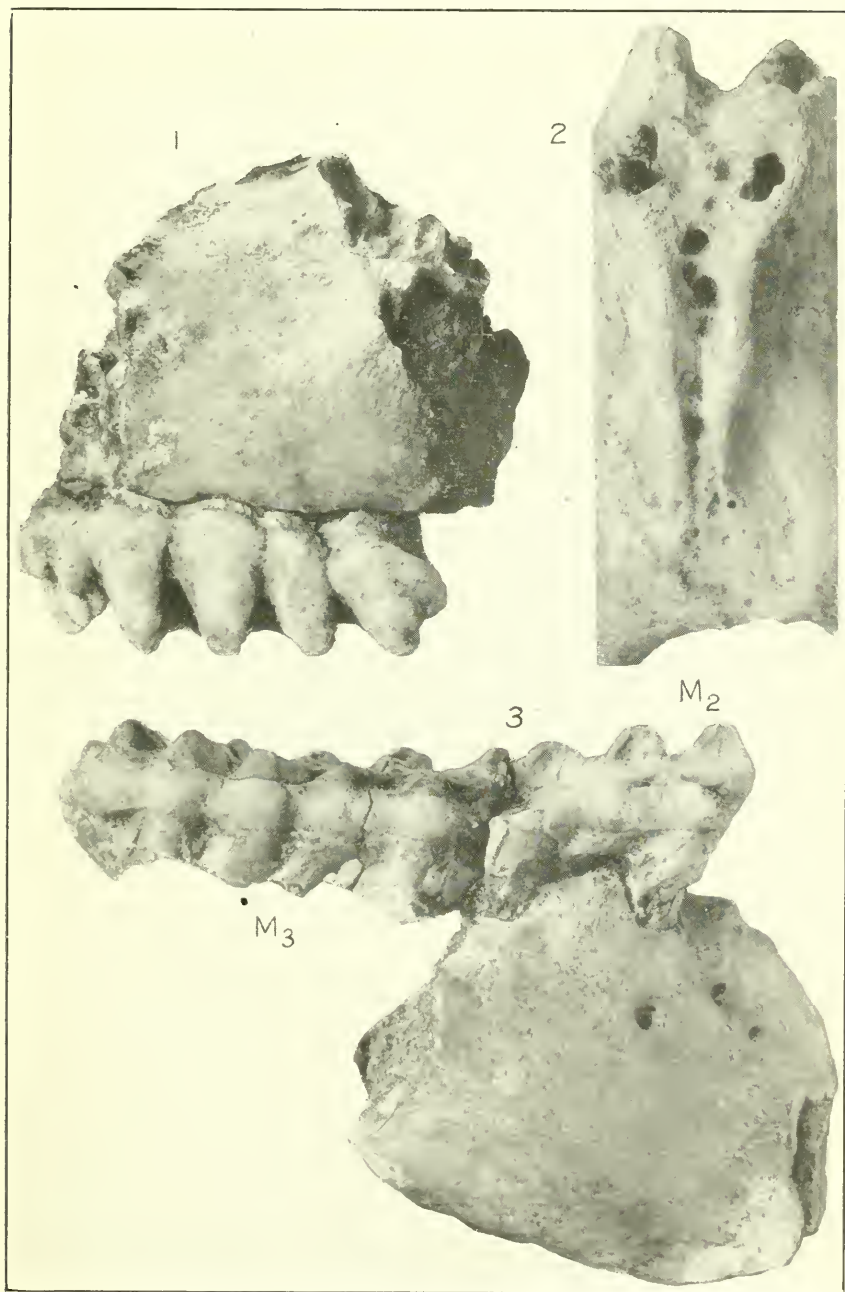
FOR EXPLANATION OF PLATE SEE PAGE 17





TEETH OF ANANCUS ORARIUS

FOR EXPLANATION OF PLATE SEE PAGE 17



TEETH AND JAWS OF ANANCUS ORARIUS

FOR EXPLANATION OF PLATE SEE PAGE 17





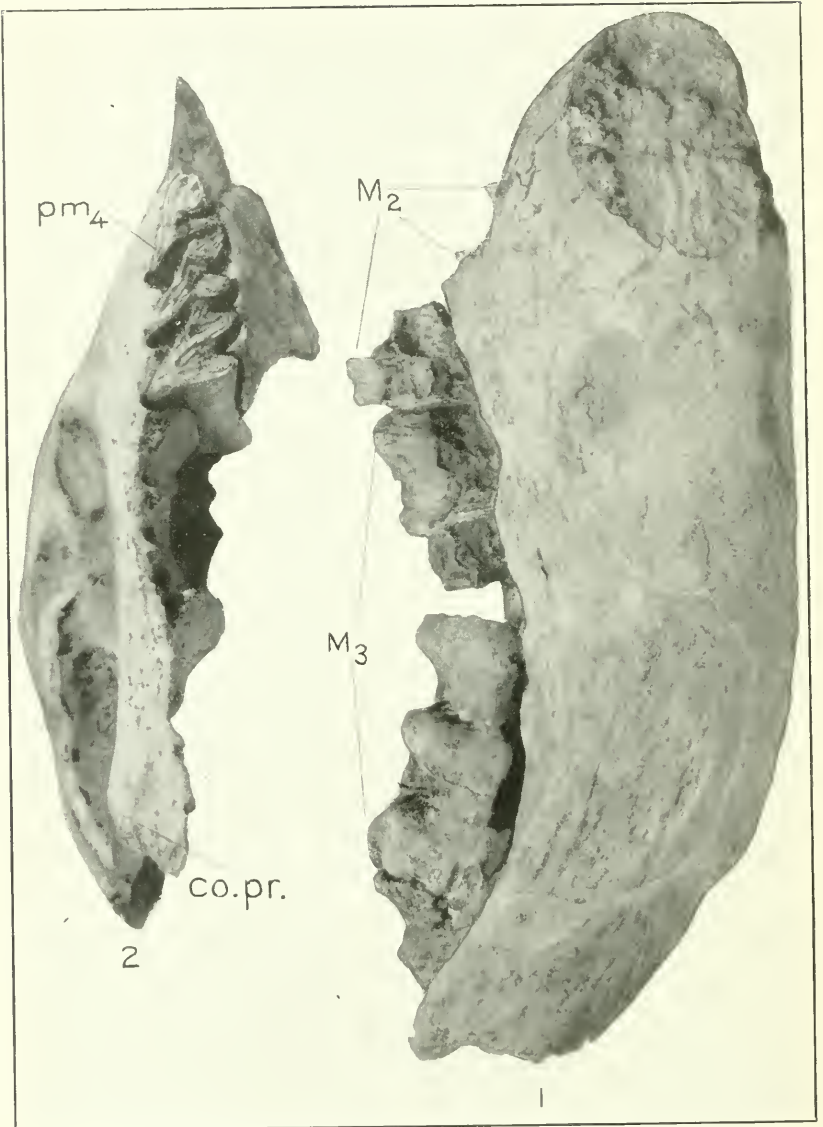
1. ANANCUS ORARIUS. 2. NEOCHOERUS PINCKNEYI

FOR EXPLANATION OF PLATE SEE PAGE 17



TOOTH OF ANANCUS DEFLOCCATUS

FOR EXPLANATION OF PLATE SEE PAGE 17



1 ANANCUS DEFLOCCATUS. 2. NEOCHOERUS PINCKNEYI

FOR EXPLANATION OF PLATE SEE PAGE 18



