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QUATERNARY ANTELOPE REMAINS FROM A SECOND CAVE DEPOSIT IN THE ORGAN MOUNTAINS, NEW MEXICO

by

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INTRODUCTION

Explorations conducted by Mr. Roscoe P. Conkling during the past two years in the Organ Mountains of southern New Mexico have led to the discovery of two limestone caverns in the lower spurs of this range. Attention has been directed to the deposits of Conkling Cave[1]. The second occurrence is that of Shelter Cave, situated in Paleozoic limestones exposed on the west flank of Bishop's Cap (Pyramid) Peak, approximately two and one-half miles west and south of Conkling Cave. In the course of preliminary excavations in this cavern a vertebrate assemblage was collected including among other forms a horse (*Equus*), the ground sloth *Nothrotherium*, and a peculiar type of antelope. The remains of these mammals were all found, according to Mr. Conkling, within 48 inches of the present floor of the cave and imbedded in a gray ash deposit.

The presence of the horse, ground sloth and antelope indicates a Quaternary age of the cave deposits. No less than three individuals of the new antelope are recorded. A second type of antelope, larger in size than the first and approaching more closely the modern prong-horn in several characters, is represented by fragmentary specimens in the collection. Whether or not the two forms were contemporaneous has not been definitely determined. The preservation of the jaw and limb material of the larger antelope is somewhat unlike that of the specimens referred to the new species and is perhaps indicative of later age. The interest which attaches to a group so distinctively North American as the Antilocapridae and the unique characters presented by the small antelope from Shelter Cave make a description of the remains desirable in advance of a more detailed investigation of the deposit and fauna.

[1]Bryan, Wm. Alanson, The recent bone-cavern find at Bishop's Cap, New Mexico, Science, N. S., vol. 70, pp. 39-41, 1929.

TETRAMERYX(?) CONKLINGI, N. SP.

Holotype.—A fragment of the orbital portion of the frontal with horn cores of the left side, No. 174, Los Angeles Museum Collection, Vertebrate Paleontology.

Paratype.—A single (anterior) horn core, No. 175, L. A. Mus. Coll. Vert. Pale.

Referred material.—Right ramus of mandible, No. 176; vertebrae, Nos. 191, 192, 201; mesosternal segments, No. 189; scapula, No. 198; humerus, No. 179; radii, Nos. 180, 182, 183; anterior cannon bones, Nos. 184, 185; posterior cannon bone, No. 187; L. A. Mus. Coll. Vert. Pale.

Locality.—Shelter Cave, Organ Mts., Dona Ana County, New Mexico. L. A. Mus. Loc. No. 1010.

Specific characters.—Forked horn cores, arising from a common base, present on each side above and in part slightly behind orbit. Anterior horn core slightly stouter and longer than posterior; hinder not so greatly elongated as in *Tetrameryx shuleri* Lull. Base of anterior horn core relatively wider than in latter species. Horn cores divergent as in *Tetrameryx*, not parallel as in *Capromeryx minor* Taylor. Size distinctly smaller than *T. shuleri* and approximately two-thirds that of existing pronghorn. Metapodials relatively heavier than in *Antilocapra americana* (Ord).

DESCRIPTION OF MATERIAL

AXIAL SKELETON

Horn cores.—The most complete material representing these structures is the holotype, No. 174, figure 1*a*, presumably of a young adult. That the size of the prongs is subject to some individual variation is indicated by the difference in stoutness of anterior prong between No. 174 and a second specimen, No. 175, fig. 1*b*. In the former the anterior prong is slightly stouter than the posterior. A small portion of the tip is broken away and doubtless this horn core was slightly longer than its fellow of the same side. The diverging prongs, arising from a common base make an angle of 25°. Viewed from above the principal axis of each prong is seen to be oblique to the fore and aft axis of the base. An intersection of these axes would occur at a point internal to the base. If the fragment is so oriented that the superior margin of the orbit and the supraorbital foramen

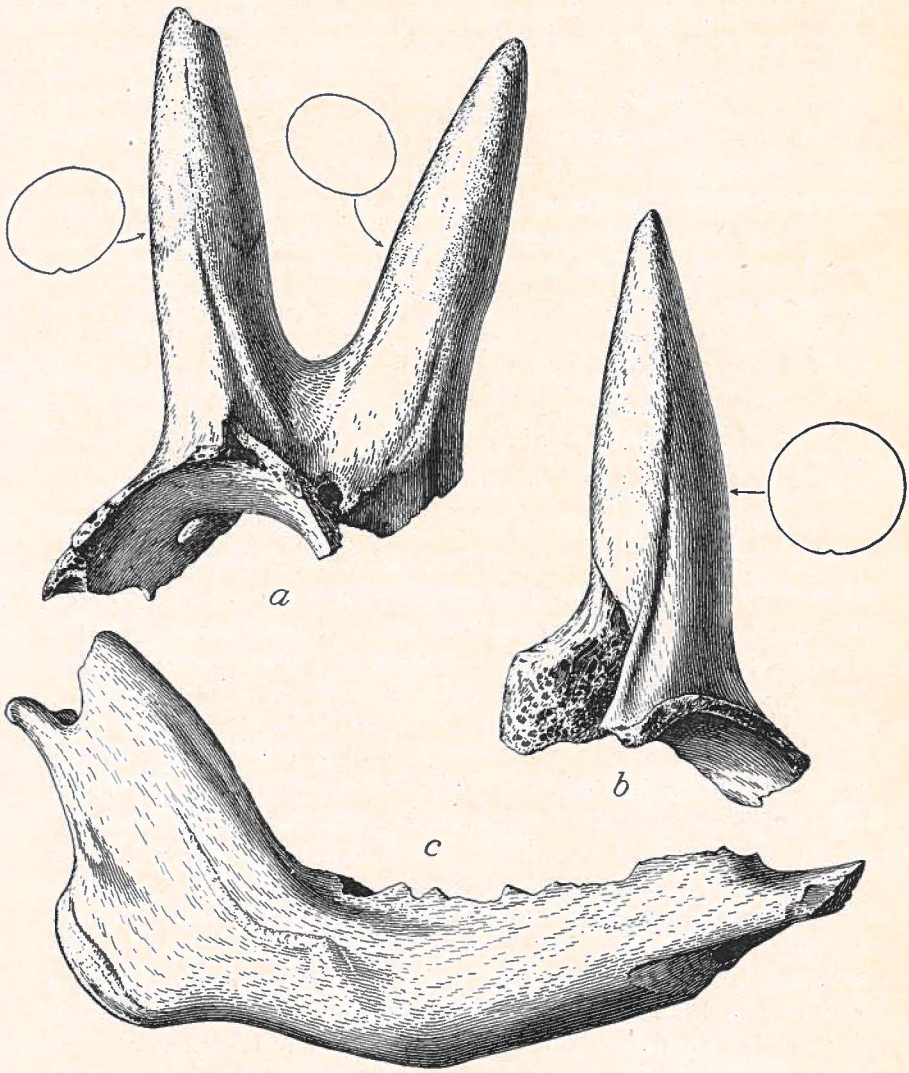

Fig. 1. *Tetrameryx* (*?*) *conklingi*, n. sp. Fig. 1*a*, left horn cores, holotype, No. 174; fig. 1*b*, right anterior horn core, No. 175; fig. 1*c*, ramus of mandible, No. 176; lateral views, x 1.0 Los Angeles Museum Collection. Quaternary deposits, Shelter Cave, Organ Mts., New Mexico.

correspond in position with those of the Pleistocene antelope *Capromeryx*, the anterior prong is seen to arise and to have an upward course similar to the horn cores in the latter genus. Likewise the anterior prong appears to correspond in position with the horn core of *Antilocapra*, in which respect No. 174 is like *Tetrameryx shuleri*[2]. In cross-section the anterior prong is seen to be rounded, not flattened transversely as in *Antilocapra*. While the transverse diameter at the base of this prong differs but slightly from that in the much larger *T. shuleri*, the anteroposterior diameter is distinctly smaller.

In the presence of a posterior prong No. 174 resembles *T. shuleri* much more closely than does either *Capromeryx* or *Antilocapra*. In the Texan species, however, the posterior prong is decidedly longer than the anterior and greatly exceeds in length the comparable prong in the form from New Mexico. Possibly the differences noted in the horn cores and the small size warrant a distinct generic recognition of the latter type. That the several individuals occurring at Shelter Cave were of small size, yet apparently had reached an adult stage of development, is suggested by the ramus of the mandible and by various skeletal elements referred to *Tetrameryx* (*?*) *conklingi*.

On the other hand it is conceivable that the differences in size of the horn core structures are due to a difference in age, the type from Shelter Cave representing presumably a much younger animal than *T. shuleri*. The presence of a second individual somewhat larger than No. 174 furnishes perhaps a further intimation that this is the case. Unfortunately the posterior horn core is not preserved in No. 175. In the collection is a terminal section of a horn core, No. 204, approximately 50mm. long and 10mm. wide at the broken lower end. This specimen differs in surface texture from Nos. 174, 175 and resembles in this respect the adult core in *Tetrameryx* and *Capromeryx*. A well defined sulcus is present and which extends nearly the entire length of the fragment. Possibly No. 204 is to be referred also to *T.* (*?*) *conklingi*. In the light of the variation in shape of horn core existing between males and females of *Antilocapra americana* the difference between No. 174 and the holotype of *T. shuleri* may be ascribed in part also to a difference in sex. The former may represent a young adult female and the latter an adult male.

In No. 174 the smooth and firm surface which characterizes the base of the horn cores is carried upward on each prong above the level of the notch separating the two prongs. At a point approximately

[2]Lull, R. S., Fauna of the Dallas sand pits, Amer. Jour. Sci., ser. 5, vol. 2, pp. 163-167, figs. 2 and 3, 1921.

11 or12mm. above the deepest margin of the cleft the surface presents a porous texture and this type of surface extends to the tip. The difference in surface texture between the upper ends of the prongs and the base of the horn cores is quite marked. A rather well defined sulcus is marked on the external surface of the anterior prong and extends from the lower border of the porous surface toward the orbital margin. Likewise a more faintly marked sulcus is present on the external side of the posterior prong and extends toward the orbital rim. The two sulci converge in their downward course.

The supra-orbital foramen, with broad groove in front, is slightly larger than that of *Capromeryx minor*, although decidedly smaller than that of *Antilocapra*.

Mandible.—A single ramus, No. 176, referable apparently to *Tetrameryx* (*?*) *conklingi*, is shown in figure 1*c*. This specimen is intermediate in size between the jaw of *Capromeryx minor* and that of *Antilocapra americana*. The small antelope from Rancho La Brea possesses, however, a lighter jaw, expressed particularly by the thinness of the horizontal ramus. The inferior border posterior to the tooth row is sinuous in No. 176, and the vertical ramus is not so broad as in *Capromeryx*. In shape of vertical ramus and in prominence of the angle *T.* (*?*) *conklingi* differs distinctly from the modern pronghorn. In latter character the form from New Mexico exhibits some resemblance to *Odocoileus*. The rugosity on the external surface is situated farther forward than in *Antilocapra*.

All the crowns of the cheek-teeth are wanting in No. 176. The alveoli indicate a total number of teeth comparable to that in *Antilocapra*. The tooth row is 11.5% longer than in *C. minor*, No. Z8511 from Rancho La Brea, and 22.5% shorter than in the living pronghorn, No. M760. The molar series is relatively large, the premolar series relatively small, in which respect No. 176 resembles *Tetrameryx*. Judging from an alveolar remnant of the third molar this tooth was three-lobed with the posterior lobe relatively wide transversely. The tooth is distinctly smaller than that in *Neomeryx*. In position of the posterior opening of the dental canal *T.* (*?*) *conklingi* resembles *Antilocapra* more than *Capromeryx*.

MEASUREMENTS

Horn Cores	*No. 174*	*No. 175*
Fore and aft diameter of base of horn cores	40.5 mm.	
Height of anterior prong measured from deepest point in cleft between two prongs (approximate)	53	
Long diameter of anterior prong at base of porous surface	16	19
Transverse diameter of anterior prong at base of porous surface	14.6	17.9
Height of posterior prong measured from deepest point in cleft between two prongs	50.7	
Long diameter of posterior prong at base of porous surface	15.7	
Transverse diameter of posterior prong at base of porous surface	13.1	

Right Ramus of Mandible	*No. 176*
Length from anterior border of alveolus for $P\overline{2}$ to posterior border of alveolus for $M\overline{3}$	54.5
Anteroposterior diameter of $M\overline{3}$ (approximate)	17.4
Greatest transverse diameter of $M\overline{3}$ (approximate)	6.2
Depth of ramus at posterior end of $M\overline{3}$, measured normal to inferior border	23.2
Thickness of ramus below anterior lobe of $M\overline{3}$	10.4
Transverse diameter of condyle	14.4

No complete vertebral column has been obtained, but individual segments are available from the cervical, thoracic and lumbar regions.

Cervical vertebrae.—A single vertebra, namely the fifth, of this series occurs in the collection and is tentatively referred to *T.* (*?*) *conklingi*. This specimen, No. 191, resembles the comparable element in *Antilocapra* and differs from that of *Odocoileus* in the elongation of the body and in the development of the transverse process. In No. 191, as in the existing pronghorn, the transverse process is somewhat plate-like and arises at the juncture of the posterior border of the inferior lamella and the outer posterior margin of the shelf extending outward from the side of the centrum. In the deer, on the other hand, the process is pointed, directed distinctly backward, and arises above the backward continuation of the border of the inferior lamella. In No. 191 the process does not project backward quite as far as in *Antilocapra*.

The elongation of the vertebra is expressed also by the length of the vertebrarterial canal. In the deer this canal is shorter and likewise larger than in antilocaprids. The posterior opening of the canal in the vertebra from Shelter Cave is situated at a point farther in front of the posterior border of the neural canal than in *Antilocapra*. The lower end of the inferior lamella is recurved inward. The ventral keel of the centrum is well marked but the anterior end sinks into the ventral surface before reaching the proximal epiphysis. The prezyga-

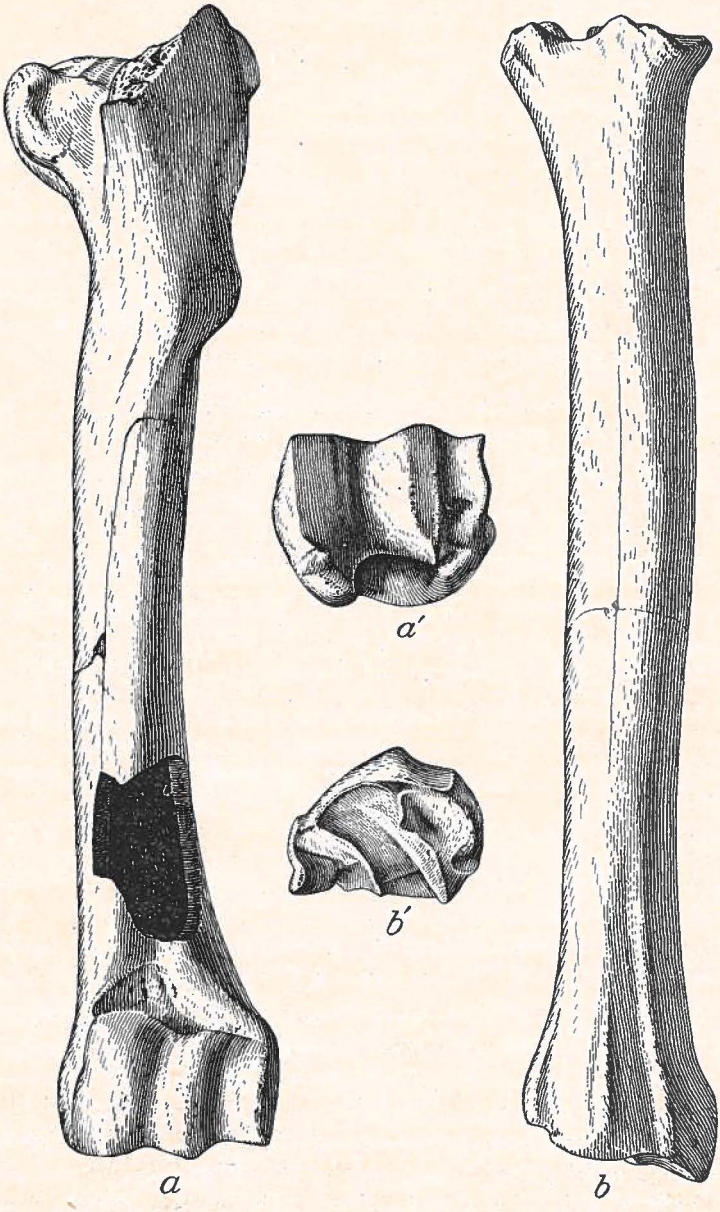

Fig. 2. *Tetrameryx (?) conklingi*, n. sp. Fig. 2*a*, 2*a*[1], humerus, No. 179, anterior and distal views; fig. 2*b*, 2*b*[1], radius, No. 180, anterior and distal views; x 1.0. Los Angeles Museum Collection. Quaternary deposits, Shelter Cave, Organ Mts., New Mexico.

pophyses are narrow transversely and elongate anteroposteriorly. The postzygapophyses resemble those of *Antilocapra* in shape and in curvature.

MEASUREMENTS

Fifth Cervical Vertebra	*T. (?) conklingi No. 191*	*Antilocapra No. M760*
Greatest length of centrum	42.3mm.	58.5
Depth of proximal epiphysis measured normal to dorsal surface of centrum	11.4	18.2
Width of proximal epiphysis	12.7	19
Width of distal epiphysis	18.2	25.5
Length from anterior end of prezygapophysis to posterior end of postzygapophysis	41.9	56.5
Transverse width across prezygapophyses	27.9	40.6
Transverse width across postzygapophyses	30.6	38

Thoracic vertebrae.—In depth of centrum the first thoracic vertebra, No. 192, resembles more closely *Antilocapra* than *Odocoileus*. The ventral surface is strongly keeled and at the anterior end are situated two knob-like processes as in the pronghorn. The facet for the tubercle of the rib is relatively large and faces in the main downward, less forward than in *Antilocapra*. The prezygapophyses are relatively large but narrow transversely. Unfortunately the major portion of the neural spine is lacking.

MEASUREMENTS

First Thoracic Vertebra	*T. (?) conklingi No. 192*	*Antilocapra No. M760*
Length of centrum along median line	19.9mm.	26.8
Depth of centrum across distal epiphysis	12.6	19.2
Transverse width of centrum across posterior demi-facets	22.2	31.8
Width across transverse processes	44	57.4

Lumbar series.—The last three lumbar vertebrae in *Tetrameryx* (*?*) *conklingi* resemble the corresponding segments in *Antilocapra*. As indicated by the comparative measurements the individual vertebrae are distinctly smaller than those of the latter type. The articulating surfaces of the postzygapophyses extend from the ventral to the dorsal side and are enclosed by the recurved outer walls of the prezygapophyses. Unfortunately the dorsal spines and the transverse processes are in large part broken away. The transverse processes may be relatively broad.

MEASUREMENTS

Lumbar Vertebrae	*Fourth*		*Fifth*		*Sixth*	
	T. (?) conklingi No. 201	*Antilocapra* No. M760	*T. (?) conklingi* No. 201	*Antilocapra* No. M760	*T. (?) conklingi* No. 201	*Antilocapra* No. M760
Length of centrum through middle	28.4	34.2	28.5	34.2	25.2	31.3
Transverse diameter across posterior face	20.3	26.6	22.3	29.4	27	34.5
Depth of centrum measured normal to dorsal surface and across anterior face	13	20.4	12.4	20.3	12.2	19.2
Length from anterior end of prezygapophyses to posterior end of postzygapophyses	38.5	49	37.7	50.9	37.8	46.4
Transverse diameter across postzygapophyses	23.5	28.6	25.7	31.3	28.4	43

Sternum.—The first three segments of the mesosternum and a fragment of the fourth, No. 189, are available for comparison. The fused series is somewhat concave upward in its long axis. The anterior segment is relatively wide transversely. Due to the development of the bony margins adjacent to the areas of attachment of the costal cartilages the sides of the segments are more conspicuously notched than in *Antilocapra.*

MEASUREMENTS

Sternum	*T. (?) conklingi* No. 189	*Antilocapra* No. M760
Length from anterior end of mesosternal element No. 1 to posterior end of mesosternal element No. 3	82.5mm.	115
Least width across middle of first mesosternal element	15.2	18
Least width across middle of second mesosternal element	18.7	28
Least width across middle of third mesosternal element	21.2	31

APPENDICULAR SKELETON

Scapula.—An incomplete scapula, No. 178, is referred to *Tetrameryx (?) conklingi.* This specimen resembles in characters other than size the comparable element in *Antilocapra.* In No. 178 as in the pronghorn and in the mountain sheep the ridge which extends from the axillary border obliquely across the outer surface, separating the infraspinous area from the neck, tends to become obscure. In *Odocoileus* the posterior edge of the scapula is continued by a ridge having considerable definition toward the base of the spine. The coracoid process in No. 178 is not so heavy as in *Ovis* and the notch between this process and the glenoid cavity is deeper than in *Antilocapra.* In *Ovis* the notch appears to be wider and shallower.

MEASUREMENTS

Scapula	*T.(?) conklingi No. 178*	*Antilocapra No. M760*
Greatest anteroposterior diameter across glenoid cavity and coracoid process	28.9mm.	39.4
Greatest transverse diameter taken normal to anteroposterior diameter	23	28.7
Least anteroposterior diameter of neck	16.1	21.6

Humerus.—The single specimen of this element available, No. 179, figure 2*a*, *a*[1], is intermediate in size between the humerus of *Capromeryx minor* and that of the living *Antilocapra americana*. In the sum of its characters it resembles more closely the latter rather than the former. The deltoid crest is prominently developed as in the pronghorn, more so than in *Capromeryx*. The shaft is relatively heavy. A nutrient foramen is present on the posterior surface of the shaft and is situated distinctly above the middle of the humerus. The distal articulating surface resembles that in *Antilocapra* and differs from that in *Odocoileus* in the presence of a more rounded keel for the groove at the proximal end of the radius. When the humerus is viewed from the distal end, figure 2*a*[1], the posterior walls of the olecranon fossa are seen to extend backward not so far as in *Odocoileus*, in which respect there is again a greater resemblance between the form from Shelter Cave and the modern pronghorn. As in the latter type the fossa is relatively wider than in the deer.

MEASUREMENTS

Humerus	*T. (?) conklingi No. 179*	*Antilocapra No. M760*	*Capromeryx No. Z8571*
Length measured from head to distal end	147.5mm.	183.8	95.9
Greatest anteroposterior diameter of proximal end	42	53.7	29.6
Greatest transverse diameter of proximal end	33.2	46.6	*a*24
Anteroposterior diameter of shaft at middle	20.3	22.8	11.8
Transverse diameter of shaft at middle	14.2	17.5	10
Greatest transverse diameter of distal end	30	39.1	20.6
Greatest anteroposterior diameter of distal end	23.5	31.7	17.1

a, approximate.

Radius.—A single complete radius and fragments of two additional specimens represent this element in the collection. The shaft, figure 2*b*, is relatively heavy, more so than that in *Antilocapra*. At the proximal extremity the groove for the distal keel of the humerus is broad and shallow as in the latter genus, not so deeply incised as in *Odocoileus*. At the distal extremity, figure 2*b*[1], the keel separating the posterior end of the surface for the scaphoid from that for the lunar tends to be

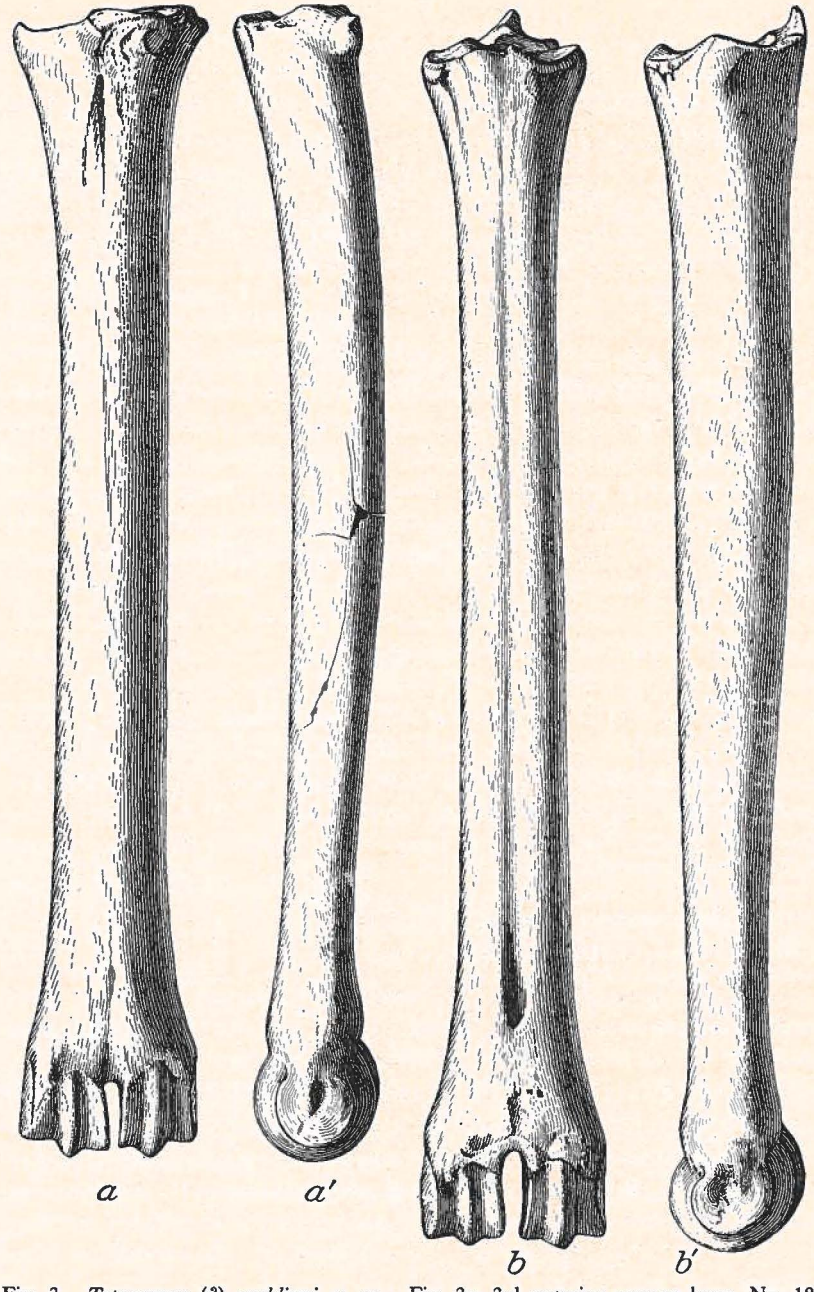

Fig. 3. *Tetrameryx* (*?*) *conklingi*, n. sp. Fig. 3*a*, 3*a*[1] anterior cannon bone, No. 185, anterior and lateral views; fig. 3*b*, 3*b*[1], posterior cannon bone, No. 187, anterior and lateral views; x1.0. Los Angeles Museum Collection. Quaternary deposits, Shelter Cave, Organ Mts., New Mexico.

rounded or flattened transversely as in the pronghorn and is not so sharply defined as in the deer. The posterior end of this keel is carried inward farther in the deer than in the pronghorn. In the radii from Shelter Cave the position of the posterior end is more as in *Antilocapra*. In the former type as in the latter the distal extremity of the ulna truncates obliquely the outer posterior end of the surface for the cuneiform. In *Odocoileus*, on the other hand, the ulna touches but does not truncate this surface.

Judging from the remnant of the ulna still adhering to the distal end of the radius, the shaft of this element was apparently somewhat more reduced than in existing types.

In *Tetrameryx (?) conklingi* the ratio of length of humerus to length of radius may be expressed as 1:1.05, whereas in *Antilocapra americana*[3] this ratio is 1:1.18. In other words, the radius of the former species is slightly shorter relative to the length of the humerus than in the pronghorn. The two elements may not, however, represent the same individual.

MEASUREMENTS

Radius	*T. (?) conklingi No. 180*	*Antilocapra No. M760*
Greatest length	156 mm.	217
Width of proximal end	28.8	37.2
Anteroposterior diameter of proximal end	16.3	
Transverse width of shaft at middle	16.4	20.5
Anteroposterior diameter of shaft at middle	9.6	10.6
Transverse diameter of distal end	26.7*	34.2
Anteroposterior diameter of distal end	20.6	24.3

*Measurement includes that of distal end of ulna.

Anterior cannon bone.—This element, represented by two specimens in the collection, Nos. 184, 185, is noticeably smaller than that of *Antilocapra americana* while the shaft is relatively heavier. The comparable element in *Capromeryx* while only a trifle shorter is decidedly more slender. The longitudinal groove of the anterior face, figure 3*a*, is faintly marked. The groove on the posterior face is broad and is clearly defined by the lateral walls along the upper two-thirds of the shaft. In deepness of pit on the outer wall of the distal trochlea *T. (?) conklingi* appears to resemble more closely the pronghorn than *Odocoileus*.

[3]Gregory records the ratio for this species as 1:1.23 Gregory, W. K., Ann. N. Y. Acad. Sci., vol. 22, pl. 34, 1912.

MEASUREMENTS

Anterior Cannon Bone	*T. (?) conklingi No. 185*	*T. (?) conklingi No. 184*	*Antilocapra No. M760*	*Capromeryx No. Z8667*
Greatest length	153.6mm.	147.5	218.4	146.7
Greatest transverse diameter of proximal end	26.6	23	28.3	15.4
Anteroposterior diameter of proximal end	17.5	15.5	20.6	11.8
Transverse width of shaft at middle	14.7	14.4	15.6	10.3
Anteroposterior diameter of shaft at middle	12.1	11.5	13.1	9.4
Transverse width across distal trochleae	23.4	23.5	28	15.6
Anteroposterior diameter of distal trochleae	16.6	15.6	20.7	11.7

Posterior cannon bone.—As indicated by the measurements the cannon bone of the hind limb is distinctly shorter than that of *Antilocapra* and may be only slightly longer than specimens of the comparable element in the Pleistocene *Capromeryx minor*. The shaft, figure 3*b*, *b*[1], is relatively heavy. In No. 187 the transverse diameter exceeds the anteroposterior diameter at the middle of the shaft, whereas in the pronghorn and in *Capromeryx* the reverse is true. The longitudinal groove of the anterior face is clearly marked, although the furrow is distinctly shallower than in *Odocoileus*. This groove is likewise more shallow than in *Antilocapra*. The foramen at the base of the groove is large and conspicuous. Two nutrient foramina are present at the upper end of the shaft and on the posterior face. The facets for the cuboid, navicular-cuboid, and for the external and middle cuneiforms are well defined. The interarticular area of the proximal end is more extensive in No. 187 than in *Ovis*, in which respect a closer approach is made to *Antilocapra*. The lateral walls of the distal trochlea are deeply pitted.

MEASUREMENTS

Posterior Cannon Bone	*T. (?) conklingi No. 187*	*Antilocapra No. M760*	*Capromeryx No. Z8706*
Greatest length	165.6mm.	229	161.7
Greatest transverse diameter of proximal end	22.2	25.7	16.7
Anteroposterior diameter of proximal end	21.9	28.6	17.9
Transverse width of shaft at middle	14.2	14.9	10.4
Anteroposterior diameter of shaft at middle	12.4	16.4	11.6
Transverse width across distal trochleae	24.4	28.3	18.4
Anteroposterior diameter of distal trochleae	17.2	21.2	13.8

CONCLUSIONS

While the skull of *Tetrameryx* (*?*) *conklingi* is as yet but imperfectly known, the characters displayed by the horn cores and more particularly by the associated lower jaw and skeletal material, point strongly to the presence of a family bond with the Antilocapridae. The relationship of *Tetrameryx shuleri* to the antilocaprid group has been established by R. S. Lull. The peculiar character of the horn cores in the form from Shelter Cave as in *T. shuleri* obviates the possibility of a close relationship with existing *Antilocapra* or with the Pleistocene *Capromeryx*. It is conceivable that the former species were derived from a *Sphenophalos*-like ancestor of the Pliocene.

In the light of the variation in structure of horn core of the modern pronghorn, some of the more striking characters which distinguish *T.* (*?*) *conklingi* from *T. shuleri* and which may be regarded as of generic value are attributed to a difference in age and sex. The material from Shelter Cave is therefore assigned, at least tentatively, to the genus *Tetrameryx*. The difference in the proportions of the anterior horn core and the consistently small size of the materials referred to the type from New Mexico serve to distinguish the form from *T. shuleri*. Presumably *T.* (*?*) *conklingi* is also smaller than *Neomeryx*.

The heavier limb elements in *T.*(*?*) *conklingi* suggest an antelope less fleet-footed than the modern pronghorn. The comparatively heavy metapodials offer a striking contrast to the slender elements in the light-limbed *Capromeryx*.