

A New Species of Rhinoceros, *Aphelops kimballensis*,²
from the Latest Pliocene of Nebraska

INTRODUCTION

A study of the specimens referable to the genus *Aphelops* that have been recorded from the Tertiary deposits of North America demonstrates that the genus evolved slowly, and the characters which have been used to separate one species from another are difficult to discern.

The nearly complete skull (U.N.S.M. 5788), a partial mandible (U.N.S.M.³ 5789), ramus, and skeletal elements were collected from the lower part of the Kimball Formation, U.N.S.M. Coll. Loc. Ft-40, Frontier County, Nebraska, and constitute the basis of the description of a new species of *Aphelops*. These remains indicate that this species of *Aphelops* is larger than any known North American fossil rhinoceros (see Tables 1 and 2), and the new species from uppermost Pliocene deposits may represent the latest recorded occurrence of the genus in Nebraska.

In previous studies by Cope (1873, 1878, and 1879), Osborn (1898, 1904), and Matthew (1901, 1918, 1923, and 1932), the following characteristics have been considered specific differences: size and

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² Named after the Kimball Formation, uppermost Pliocene, from which the type material was recovered.

³ Following is a list of abbreviations of institutions herein cited: A.M.N.H.—American Museum of Natural History, New York; C.M.—Carnegie Museum, Pittsburgh; C.M.N.H.—Colorado Museum of Natural History; U.C.—University of California; and U.N.S.M.—University of Nebraska State Museum.

shape of skull; overall length and relative thickness of nasals; retraction of narial notch; elevation of the occipital crest in relation to the frontal region; transverse diameters across the skull between mastoids; comparative length of tooth rows; lengthening of tooth from brachyodont to subhypsodont; comparison of dental characteristics, including the development or absence of crochets, antecrochets, cristae, premolar reduction and also the progressive molarization of the premolars.

The skull, U.N.S.M. 5788, on which this new species of *Aphelops* is based, possesses the following characteristics which seem sufficiently different from other described species of the genus to warrant the proposal of a new species:

Aphelops kimballensis,¹ new species

Holotype.—Skull (an uncrushed mature skull with premaxillae and nasal missing), U.N.S.M. 5788 (Plates 1, 2, 3, and Table I).

Type Locality.—University of Nebraska State Museum Coll. Loc. Ft—40, E $\frac{1}{2}$, E $\frac{1}{2}$, SW $\frac{1}{4}$, SE $\frac{1}{4}$, Sec. 15, T5N, R. 26 W., Frontier County, Nebraska.

Stratigraphic Occurrence.—Tertiary, Pliocene, Ogallala Group, Kimball Formation (see Fig. I).

Description.—Posterior portion of occipital crest nearly vertical in relation to occipital condyles, occiput region elevated to a greater extent than any other recorded specimen of the genus; nasals retracted; slightly concave at a point above the anterior portion of the orbits, and also moderately rugose at terminus of the preserved portion of the nasal; narial notch terminates posteriorly above the middle of M¹; infraorbital foramen large and opens anteriorly inside the external border of the nares; dentition; subhypsodont, and complete (P¹-M³), P¹ is much smaller than P²-P⁴, the premolars are molarform from P²-P⁴; and M¹-M³, antecrochet present and well developed P²-M², crochet weak P²-P⁴, strongly developed M¹-M², crista present on unworn M²-M³.

Discussion.—*Aphelops kimballensis* is best compared for specific distinction with the type skull of *Aphelops mutilus* (Matthew), A.M.N.H. 17584.

Aphelops kimballensis is larger than *A. mutilus*, has a greater elevation of the occipital region, the narial notch terminates above the midpoint of M¹; and the teeth are more hypsodont than *A. mutilus*. The type skull of *A. kimballensis* has the anterior portion

¹ Presented in preliminary form before the Nebraska Academy of Sciences, May 1959. The published abstract inadvertently included the new specific name, which is *nomen nudum* as of that date but is here validated.

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of the nasals missing as well as the premaxillae. Since the narial notch is extended farther posteriorly in *A. kimballensis* than in *A. mutilus* it is speculated that the retraction of the nasal is greater. A close examination of all the rhinoceros teeth from U.N.S.M. Coll. Loc. Ft-40 (the type locality for *A. kimballensis*) was made and no upper incisors which can be assigned to this genus were found. The rhinoceros upper incisors which were collected from this quarry are those of a large *Teleoceras*, which is not yet specifically assigned.

The skeletal parts collected from U.N.S.M. Coll. Loc. Ft-40 indicate that *A. kimballensis* is also considerably larger than the comparative skeletal elements which have been collected from the older Upper Ash Hollow deposits of Nebraska, at U.N.S.M. Coll. Localities Ft-47, Frontier County, and Bn-10, Bn-13 Banner County.

Lower dentition.—There were no lower jaws in articulation with the type skull. Two partial mandibles, U.N.S.M. 5789 and U.N.S.M. 5790, and several other rami were found near the type skull. U.N.S.M. 5789, a right ramus with symphysis and both tusks present (see Plate 5) is herein tentatively referred to as *A. kimballensis*.

TABLE I

COMPARATIVE MEASUREMENTS OF *Aphelops kimballensis* U.N.S.M. 5788 AND TYPE SKULL *Aphelops mutilus* (MATTHEW) 1924, A.M.N.H. 17584. (ALL MEASUREMENTS IN MM.) MEASUREMENTS OF TYPE *A. mutilus*, A.M.N.H. 17584, AFTER MATTHEW (1932, p. 431).

	<i>A. kimballensis</i> U.N.S.M. 5788	<i>A. mutilus</i> A.M.N.H. 17584
Total length of skull	710 mm. ¹	621 mm.
Skull length P ¹ condyles	672	643
Tip of nasal—posterior narial notch	195 ¹	
Narial notch—occ. crest	525	413
Breadth across zygomata	394	336
Height, condyle-occ. crest	282	240
Breadth across palate M ²	275	210
Width between orbits	280	206
Width of occiput	255	220
Upper cheek teeth P ³ -M ³	351	334
Upper molars M ³ -M ¹	167	
Upper premolars P ³ -P ⁴	179	170

¹ Approximate.

Transverse and antero-posterior measurements of upper teeth	<i>A. kimballensis</i> U.N.S.M. 5788	
M ³ , A-P ³	65	P ³ , A-P.....57
Tr.....	64	Tr.....75
M ² , A-P.....	64	P ² , A-P.....53
Tr.....	68	Tr.....67
M ¹ , A-P.....	65	P ¹ , A-P.....31
Tr.....	74	Tr.....33
P ¹ , A-P.....	63	
Tr.....	70	

All of the lower symphyses of rhinoceros mandibles from U.N.S.M. Coll. Loc. Ft-40 have either large tusks or alveolar openings of relatively large proportions. P_1 and P_2 are not present in the mature lower jaw nor are there any alveoli in evidence for these premolars. The dental formula is I, P_3-M_3 .

Examination of the rami and mandibles collected from earlier deposits, the upper portion of the Middle Ash Hollow of Nebraska (U.N.S.M. Collecting Localities Ft-47, Bn-10, and Bn-13), indicate that P_2 is present on rami from this level. Also through the courtesy of Mr. Childs Frick, the writer had the opportunity to examine and study the lower jaws which were collected by the Frick Laboratory from near Canadian, Texas, "Miami Quarry," Matthew's 1932 Locality 20, which is Hemphillian in age. P_2 is present in mature rami and mandibles of this Upper Ash Hollow form which has been referred to as *A. mutilus* var. Matthew (1932, p. 418). The labial cingula are missing or faint (P_2-P_4) on the lower dentition U.N.S.M. 5789 and U.N.S.M. 5790 and are present M_1-M_3 . The lower teeth P_3-M_3 of *A. kimballensis* are subhypodont and P_3-P_4 are molarform in character. The posterior portion of the M_3 is separated from the anterior angle of the ascending ramus on the average of 75-85 mm. on the mature jaw.

The lower jaw of *A. kimballensis* referred (U.N.S.M. 5789) is larger than any recorded Pliocene rhinoceros ramus from North America.

TABLE II

MEASUREMENT OF PARTIAL MANDIBLE OF *Aphelops kimballensis*, REFERRED, U.N.S.M. 5789 ARE AS FOLLOWS:

Lower jaw, length, incisor-condyle	712 ¹
Width across tusks	165
Width behind tusks	38
Lower cheek teeth P_3-M_3	280
Lower premolars P_3-P_4	82
Length of symphysis	221
Depth of jaw beneath M_2	117
Height, angle to condyle	345

MEASUREMENTS—ANTEROPOSTERIOR, TRANSVERSE, LOWER DENTITION

M_2 A-P	65
Tr	32
M_2 A-P	61
Tr	35
M_1 A-P	52
Tr	35
P_4 A-P	48
Tr	36
P_3 A-P	36
Tr	24

¹ All measurements in millimeters.



PLATE 1. Lateral view of holotype skull, *Aphelops kimballensis* U.N.S.M. 5788, from U.N.S.M. Coll. Loc. Ft-40, Frontier County, Nebraska. Pliocene, Ogallala Group, Kimball Formation. x 1/5.



PLATE 2. Dorsal view of holotype skull, *Aphelops kimballensis* U.N.S.M. 5788. x 1/5.



PLATE 3. Palatal view of holotype skull, *Aphelops kimballensis* U.N.S.M. No. 5788. x 1/5.



PLATE 4. Lateral view of partial mandible *Aphelops kimballensis*, ref., U.N.S.M. 5789, x 1/5.

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PLATE 5. Occlusal view of partial mandible of *A. phaclops kimbattenensis*, ref., U.N.S.M. 5789, x 1/5.

NEBRASKA PLIOCENE CORRELATION CHART

By C. Bertrand Schultz and Thompson M. Stout

Provincial Ages	PLEISTOCENE-Blancan above					European Standard	
KIMBALLIAN	KIMBALL	FM	UPPER MEMBER <i>Dalton L.F.</i>			PLAISANCIAN - ASTIAN	
		KIMBALL	Cambridge L.F. Oshkosh L.F. SIDNEY MEMBER				
CLARENDONIAN	HEMPHILLIAN	OGALLALA GROUP					PLAISANCIAN - ASTIAN
ASH HOLLOW	FORMATION	LOWER PT. ASH HOLLOW	UPPER PT. ASH HOLLOW	Upper Snake Creek L.F.			
		Feldt Ranch L.F. Xmas and Kat Quarries L.F.					
		Minnichadusa L.F. Complex (?) CAP ROCK BED					
VALENTINIAN	FM	BURGE MEMBER <i>Burge L.F.</i> <i>Devil's Gulch L.F.</i>			MESSINIAN		
	VALENTINE	<i>Fort Niobrara L.F.</i> <i>Railroad Quarry L.F.</i> <i>Crookston Bridge L.F.</i>					
MIOCENE- Hemingfordian below							

Fig. J. Nebraska Pliocene Correlation Chart. The black dots refer to terms suggested by the writers for use by a committee of the Society of Vertebrate Paleontology (see Wilson, 1960). L.F.=Local Fauna. (Reprinted from Schultz and Stout, 1961. *Field Conference on the Tertiary and Pleistocene of Western Nebraska*, University of Nebraska Special Publication Number 2, p. 9, Fig. 3.)

DISCUSSION

The following species of the genus *Aphelops* in this study are valid: *A. megalodus* (Cope) A.M.N.H. 8292; *A. malacorhinus* Cope, A.M.N.H. 8381; *A. mutilus* (Matthew) A.M.N.H. 17584; and *A. longinavis*, Cook, C.M.N.H. 249.

Aphelops profectus (Matthew) should be provisionally retained since the recently reported skull and mandible of Izett and Lewis (1963, p. B120) provides information heretofore lacking in regard to the stratigraphic occurrence of *A. megalodus* and/or *A. profectus*. Perhaps, further study of the relationship of these species can be accomplished in the near future.

The "horned" rhinoceros of Douglass, 1908, *A. ceratorhinus*, C.M. 857, has been a problem in the study of *Aphelops*. This problem involves the small, terminal horn rogosities on the nasals of *A. ceratorhinus* which are distinctly different from the smooth nasals of the other species. *Aphelops montanus* does not have these rogosities but is considered by Matthew (1932, p. 420) to be synonymous with *A. ceratorhinus*.

A. malacorhinus Cope, A.M.N.H. 8381, from the lower Ash Hollow, is the most likely ancestor to *Aphelops mutilus* (Matthew) which was collected from *Aphelops* Draw, Quarry Number 1, Sioux County, Nebraska, and this species seems to have given rise to *A. longinavis*. The type skull, A.M.N.H. 17584, of *A. mutilus* was collected from the Pliocene deposits, "Upper Snake Creek Local Fauna," of Sioux County, Nebraska.

A. longinavis Cook, C.M.N.H. 249 was collected from near Wray, Yuma County, Colorado. Faunal evidence from the Wray County Colorado deposits, Osborn (1936, p. 307) indicates that the deposits which yielded the type of *A. longinavis* are older than the deposits from which the type of *A. kimballensis* was collected. *A. longinavis* apparently represents a transitional species between *A. mutilus* and *A. kimballensis*.

ASSOCIATED VERTEBRATE FAUNA

A list of vertebrate fauna from the Kimball Formation of Nebraska has been published by Schultz and Stout (1948, p. 557, Table 1) and modified by Kent (1963, p. 14, Table 1) and includes: *Megalonyx* sp.; *Hypolagus*? sp.; *Perognathus* sp.; *Thomomys* sp.; *Dipoides stirtoni* Wilson; *Dipoides williamsi* Stirton; *Canid* sp.; Carnivore, undet.; saber-tooth tiger gen. and sp. undet.; *Amebelodon fricki* Barbour; *Teleoceras* sp.; *Neohipparion*; *Pliohippus (Astrohippus)*; *Pliohippus (Dinohippus)*; *Nannipus* sp.; *Prosthenops* sp.; *Procamelus Plianchenia*; *Cranioceras*; *Texoceros guymonensis* Frick

ref.; *Sphenophalos middleswarti* Barbour and Schultz; and *Aphelops kimballensis* new species.

The Ogallala Group concept of Lugen (1939) and as further outlined by Schultz and Stout (1961, p. 7 and 9, Fig. 3) and Fig. 1, this paper, is used in the discussion and description of the new species herein described.

SUMMARY

Aphelops kimballensis is the largest species of fossil rhinoceros so far recorded and was possibly the last form to have lived on the North American continent.

A continued program of research will be necessary before the ancestry of *Aphelops* can be clarified and perhaps through use of more detailed stratigraphic data the relationship of the allied forms to *Aphelops* can be established.

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