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

Lloyd G. Tanner
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A New Species of Rhinoceros, 
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ABSTRACT

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

Lloyd G. Tanner

An uncrushed skull and associated skeletal elements of a very large rhinoceros are the basis for the description of a new species of *Aphelops* from Frontier County, Nebraska. The major differences are: the skull is much larger in most dimensions than other *Aphelops*; it has an extremely elevated occipital region in comparison to *Aphelops mutilus*; the narial notch is retracted to a point perpendicular to the center of molar one; and the teeth are more hypsodont than any other species of this genus. The sediments which yielded the skull and skeletal parts are considered to be Kimballian in age (latest Pliocene). This giant rhinoceros may represent the last species of the genus *Aphelops*.
A New Species of Rhinoceros, *Aphelops kimballensis*, \(^2\)
from the Latest Pliocene of Nebraska

**INTRODUCTION**

A study of the specimens referrable 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

\(^1\) Associate Curator of Vertebrate Paleontology, University of Nebraska State Museum.

\(^2\) 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,* new species

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

Type Locality.—University of Nebraska State Museum Coll. Loc. Ft—40, E1/2, E1/2, SW1/4, SE1/4, Sec. 15, T5N, R. 26 W., Frontier County, Nebraska.

Stratigraphic Occurrence.—Tertiary, Pliocene, Ogallala Group, Kimball Formation (see Fig. 1).

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

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*4 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

<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td><em>A. kimballensis</em> U.N.S.M. 5788</td>
<td><em>A. mutilus</em> A.M.N.H. 17584</td>
</tr>
<tr>
<td>Total length of skull</td>
<td>710 mm.¹</td>
</tr>
<tr>
<td>Skull length P&lt;sub&gt;1&lt;/sub&gt; condyle</td>
<td>672</td>
</tr>
<tr>
<td>Tip of nasal–posterior narial notch</td>
<td>195²</td>
</tr>
<tr>
<td>Narial notch–occ. crest</td>
<td>525</td>
</tr>
<tr>
<td>Breadth across zygoma</td>
<td>525</td>
</tr>
<tr>
<td>Height, condyle-occ. crest</td>
<td>282</td>
</tr>
<tr>
<td>Breadth across palate M&lt;sub&gt;2&lt;/sub&gt;</td>
<td>275</td>
</tr>
<tr>
<td>Width between orbits</td>
<td>280</td>
</tr>
<tr>
<td>Width of occiput</td>
<td>255</td>
</tr>
<tr>
<td>Upper cheek teeth P&lt;sub&gt;1&lt;/sub&gt;-M&lt;sub&gt;3&lt;/sub&gt;</td>
<td>351</td>
</tr>
<tr>
<td>Upper molars M&lt;sub&gt;2&lt;/sub&gt;-M&lt;sub&gt;3&lt;/sub&gt;</td>
<td>167</td>
</tr>
<tr>
<td>Upper premolars P&lt;sub&gt;1&lt;/sub&gt;-P&lt;sub&gt;4&lt;/sub&gt;</td>
<td>179</td>
</tr>
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</table>

¹ Approximate.

### Transverse and anteroposterior measurements of upper teeth

<table>
<thead>
<tr>
<th><em>A. kimballensis</em> U.N.S.M. 5788</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>M&lt;sup&gt;1&lt;/sup&gt;, A-P&lt;sup&gt;1&lt;/sup&gt;</td>
<td>P&lt;sup&gt;1&lt;/sup&gt;, A-P&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>Tr</td>
<td>Tr</td>
</tr>
<tr>
<td>M&lt;sup&gt;2&lt;/sup&gt;, A-P</td>
<td>M&lt;sup&gt;2&lt;/sup&gt;, A-P</td>
</tr>
<tr>
<td>Tr</td>
<td>Tr</td>
</tr>
<tr>
<td>M&lt;sup&gt;3&lt;/sup&gt;, A-P</td>
<td>M&lt;sup&gt;3&lt;/sup&gt;, A-P</td>
</tr>
<tr>
<td>P&lt;sup&gt;1&lt;/sup&gt;, A-P</td>
<td>P&lt;sup&gt;1&lt;/sup&gt;, A-P</td>
</tr>
<tr>
<td>Tr</td>
<td>Tr</td>
</tr>
</tbody>
</table>
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. P₁ and P₂ are not present in the mature lower jaw nor are there any alveoli in evidence for these premolars. The dental formula is I₁P₂-M₃.

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 P₂ 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. P₂ 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 (P₂-P₄) on the lower dentition U.N.S.M. 5789 and U.N.S.M. 5790 and are present M₁-M₃. The lower teeth P₃-M₃ of A. kimballensis are subhypodont and P₃-P₄ are molarform in character. The posterior portion of the M₃ 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

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

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower jaw, length, incisor-condyle</td>
<td>712</td>
</tr>
<tr>
<td>Width across tusks</td>
<td>165</td>
</tr>
<tr>
<td>Width behind tusks</td>
<td>38</td>
</tr>
<tr>
<td>Lower cheek teeth P₃-M₃</td>
<td>280</td>
</tr>
<tr>
<td>Lower premolars P₃-P₄</td>
<td>82</td>
</tr>
<tr>
<td>Length of symphysis</td>
<td>221</td>
</tr>
<tr>
<td>Depth of jaw beneath M₁</td>
<td>117</td>
</tr>
<tr>
<td>Height, angle to condyle</td>
<td>245</td>
</tr>
</tbody>
</table>

**MEASUREMENTS—ANTEROPOSTERIOR, TRANSVERSE, LOWER DENTITION**

<table>
<thead>
<tr>
<th>Tooth</th>
<th>A-P</th>
<th>Tr</th>
</tr>
</thead>
<tbody>
<tr>
<td>M₁</td>
<td>65</td>
<td>52</td>
</tr>
<tr>
<td>M₂</td>
<td>61</td>
<td>35</td>
</tr>
<tr>
<td>M₃</td>
<td>62</td>
<td>35</td>
</tr>
<tr>
<td>P₁</td>
<td>48</td>
<td>24</td>
</tr>
<tr>
<td>P₂</td>
<td>56</td>
<td>36</td>
</tr>
</tbody>
</table>

³ All measurements in millimeters.
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Fig. 1. 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.)
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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. 8881; *A. mutilus* (Matthew) A.M.N.H. 17584; and *A. longinaris*, Cook, C.M.N.H. 249.

*Aphelops projectus* (Matthew) should be provisionally retained since the recently reported skull and mandible of Izett and Lewis (1963, p. B120) provides information hitherto lacking in regard to the stratigraphic occurrence of *A. megalodus* and/or *A. projectus*. 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. 8881, 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. longinaris*. 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. longinaris* 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. longinaris* are older than the deposits from which the type of *A. kimballensis* was collected. *A. longinaris* 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.; *Prosthcnops* sp.; *Procamelus Pliauchenia*; *Cranioceras*; *Texoceros guymonensis* Frick;
The Ogallala Group concept of Lugn (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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ACKNOWLEDGMENTS

The advice and assistance of Professor C. Bertrand Schultz, Director of the University of Nebraska State Museum and Curator of Vertebrate Paleontology, toward the preparation of this report is most gratefully acknowledged. Through the courtesy extended to me by Dr. Malcom McKenna of the American Museum of Natural History and Mr. Morris Skinner, Frick Laboratory, New York, the types and referred material in the American Museum collection were made available for study. Thanks are also due to Mr. Childs Frick for his support in the preparation of this report. The writer is also indebted to individual members of the Museum staff—especially Messrs. Ivan Burr, Henry Reider, and Donald Martin, who aided in the preparation of the Aphelops remains, to C. R. Eisele for the preparation of tables, and to Mrs. Norma Wagner, Mrs. Connie Brdicco, and Mrs. Linda Murphy for typing the manuscript of this report.

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Conference Assistance from Harold J. Cook and A. L. Lugn.


———. 1962. University of Nebraska Trailside Museum at Fort Robinson. Ibid. No. 18, April: 1–4, 5 illus.


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