The Type Specimens of *Tapiravus validus* and ? *Tapiravus rarus* (Mammalia, Perissodactyla), with a Review of the Genus, and a New Report of *Miotapirus (Miotapirus marslandensis* Schoch and Prins, new species) from Nebraska

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Abstract

*Tapiravus* Marsh, 1877, is a tapirid genus known from the ?middle Miocene to ?early Pliocene of New Jersey, Maryland, Florida and Nebraska. Three species have been referred to *Tapiravus*: *T. validus* (Marsh, 1871: the type species), *T. rarus* Marsh, 1877, and *T. polkensis* Olsen, 1960. In this paper the type specimens of *T. validus* and *T. rarus* are thoroughly described and illustrated for the first time. Additionally, all known specimens referable to the genus *Tapiravus* are listed. I conclude that *Tapiravus* is a valid genus composed of two recognizable species: *T. validus* and *T. polkensis*. The holotype and only known specimen of *Tapiravus rarus* is an isolated P3 which is not diagnostic at the specific level; thus the name *Tapiravus rarus* is best considered a nomen dubium. Finally, I report the first substantiated occurrence of *Miotapirus, M. marslandensis* Schoch and Prins, new species, from the early Miocene of Nebraska. *M. marslandensis* is based on two upper molars which are slightly larger than the corresponding teeth of *M. harrisonensis*.

Key Words

*Tapiravus, Miotapirus, Tapiroidea, Miocene, Pliocene, fossil mammal.*

Introduction

*Tapiravus* Marsh, 1877, has been one of the most elusive of tapirid genera. The genus was based by Marsh on two upper molariform teeth, one from the ?Miocene of New Jersey and the other from the ?Miocene or ?Pliocene of Nebraska, each of which was designated the type of a distinct species, *T. validus* and *T. rarus* respectively. Although several additional specimens, and a third species, have since been referred to the genus *Tapiravus* (Gazin and Collins 1950; Olsen 1960; Schultz, Martin and Corner 1975), the two original specimens have never been adequately described or illustrated. This fact alone virtually relegated *Tapiravus* to the status of a nomen dubium (Simpson 1945). However, to add to the problem, at present the type specimens of *T. validus* and *T. rarus*, which are catalogued as part of the Yale Peabody Museum Vertebrate Paleontology Collections, cannot be located. Fortunately, casts of the crowns of these two teeth are housed in the American Museum of Natural History, New York. In this paper I review the taxonomic history of *Tapiravus*, I illustrate, describe and discuss these casts of the holotypes of *Tapiravus validus* and *T. rarus*,...
and I summarize all known specimens referable to *Tapiravus*. I conclude that *Tapiravus* Marsh, 1877 is a valid and distinct genus composed of two species: *Tapiravus validus* (Marsh, 1871) and *T. polkensis* Olsen, 1960. *Tapiravus rarus* Marsh, 1877, known only from the holotype, is best considered a nomen dubium. Finally, I report the first substantiated occurrence of the early Miocene tapirid *Miotapirus, M. marslandensis* Schoch and Prins, new species, from Nebraska.

**Abbreviations**

- AMNH American Museum of Natural History, New York
- FGS Florida Geological Survey, Tallahassee
- MCZ Museum of Comparative Zoology, Harvard University, Cambridge
- UNSM University of Nebraska State Museum, Lincoln
- USNM National Museum of Natural History, Washington, D.C.
- YPM Peabody Museum of Natural History, Yale University, New Haven

Tooth nomenclature follows Radinsky (1969, fig. 1).

**Taxonomic History of Tapiravus**

In 1871 O. C. Marsh (1871, p. 9) exhibited to the Academy of Natural Sciences, Philadelphia, a tapirid “first true molar of the left upper jaw” which had been collected from the “Miocene marl of Cumberland County, New Jersey.” For this specimen, YPM 13474 (Fig. 1A), Marsh proposed the name *Lophiodon validus* (*Lophiodon* is a genus of European Eocene tapiroids). The species was distinguished by the size of its tooth which (Marsh 1871, p. 9) “measured across the crown seven lines [=14.8 mm] in antero-posterior diameter, and eight and one-quarter lines [=17.5 mm] in transverse diameter.”

In 1877 Marsh designated *Lophiodon validus* the type species of a new genus of tapirs, *Tapiravus*. Marsh (1877, p. 252) stated that “this genus may readily be distinguished from *Lophiodon* or *Hyrachyus* [an early to middle Eocene rhinocerotoid], by the last upper premolar, which is similar to the adjoining molars.” This statement by Marsh indicates that in 1877 either he possessed additional specimens which he referred to *Lophiodon validus* (however, no further specimens are recorded as having ever been present in the YPM collections) or that Marsh now believed that YPM 13474 represented *P₄*. In the same paper Marsh (1877, p. 252) described a second species which he also referred to *Tapiravus, T. rarus*. This species was based on “an upper molar tooth” (YPM 13475, Fig. 1B) from the “Lower Pliocene east of the Rocky Mountains” [but within the Rocky Mountains region], the crown of which measured “15 mm in antero-posterior diameter, and 17 mm in transverse diameter.”

Scott (1883, p. 50) merely quoted Marsh (1877), stating that in *Tapiravus* the fourth premolars are molariform. Cope (1887, p. 1007) distinguished *Tapiravus* as bearing “two superior premolars different from true molars.” That is, Cope believed that in *Tapiravus* *P₃₋₄* were molariform whereas *P₁₋²* were nonmolariform or submolariform. It is unclear on what basis Cope (1887) came to this conclusion, except that it is what he expected to be the case if, as he believed, in an approximate way (Cope 1887, p. 996), the Oligocene genus *Protapirus* gave rise to the Miocene *Tapiravus* which in turn gave rise to *Tapirus* in the late Miocene. Given the animosity between Marsh and Cope (Wheeler 1960, Howard 1975), it is doubtful that Cope was ever permitted to study the actual specimens of *Tapiravus*.

Earle (1893, p. 395–96) restated that in *Tapiravus* “the last two premolars are as complex as the molars” and that this genus may be ancestral to *Tapirus*. Hatcher (1896, p. 178) mentioned the existence of *Tapiravus*, but stated that he had never seen the relevant specimens. Likewise, Sinclair (1901, p. 702) mentioned *Tapiravus* in passing, but concluded that “from the brevity of the
description and the lack of figures, these species are practically indeterminate." Schlaikjer (1937, p. 248-49) also cited Marsh (1871, 1877) and concluded that "on the basis of the known material, which is very scanty [two teeth, YPM 13474 and YPM 13475], Tapiravus differs from Tapirus only in size."

In 1942 White referred a tapir lower jaw (MCZ 3808) from the phosphate deposits of Florida (?upper Miocene—?lower Pliocene) to ?Tapiravus. Apparently this identification was based primarily on the stratigraphic occurrence of the specimen. In his comprehensive classification of all mammals Simpson (1945, p. 140) noted that Tapiravus "is practically undefined but does show the presence of tapirs in North America between the Lower Miocene and the Pleistocene."

Gazin and Collins (1950) made the first substantial contribution toward elucidating the morphology and status of Tapiravus. These authors described and illustrated a right maxilla bearing P3 and M1 (USNM 18372) of a tapirid from the ?middle Miocene (latest Hemingfordian or earliest Barstovian) aged Calvert Formation of the Chesapeake Bay region, Maryland. Gazin and Collins (1950, p. 11) believed that YPM 13474, the holotype of Tapiravus validus, probably came "from the marl of the Kirkwood formation [in New Jersey], which is considered to be very close in age to the Calvert formation in Maryland." On this basis, and the fact that the teeth of USNM 18372 are comparable in size and morphology to YPM 13474, Gazin and Collins (1950) referred USNM 18372 to Tapiravus cf. T. validus.

Olsen (1960) restudied MCZ 3808 and two additional specimens belonging to the Florida Geological Survey from the phosphate deposits of Polk County, Florida. Olsen (1960) compared this material to YPM 13474 and concluded that the Florida specimens represented a new species of Tapiravus which Olsen (1960) designated Tapiravus polkensis.

Most recently Schultz, Martin and Corner (1975) redescribed and illustrated six tapirid specimens, all lower jaws and teeth, from the late Miocene or early Pliocene Ogallala Group of Nebraska. Schultz, Martin and Corner (1975) rediagnosed the genus Tapiravus and referred their six specimens to Tapiravus cf. T. polkensis.

**Systematic Paleontology**

CLASS Mammalia Linnaeus, 1758
ORDER Perissodactyla Owen, 1848
SUBORDER Moropomorpha Schoch, 1984
INFRAORDER Ceratomorpha Wood, 1937
SUPERFAMILY Tapiroidea Burnett, 1830
(Gill, 1872)
FAMILY Tapiridae Burnett, 1830
SUBFAMILY Tapirinae Burnett, 1830
TRIBE Tapiravini Schoch, new

**Type and Sole Included Genus**

*Tapiravus.*

**Diagnosis**

Same as that for the genus (given below).

**Genus Tapiravus Marsh, 1877**

**Type Species**

*Lophiodon validus* Marsh, 1871.

**Included Species**


**Known Distribution**

?Middle Miocene of New Jersey and Maryland; ?upper Miocene or ?lower Pliocene of Florida and Nebraska.

**Revised Diagnosis**

Medium-sized tapirs (smaller than *Tapirus terrestris*); dentition similar to that of *Tapirus,
but teeth lower-crowned (relatively brachyodont); lower cheek teeth elongated anteroposteriorly; M2–3 trigonids and talonids separated by a deep groove or constriction; maxilla relatively deep as compared to Tapirus; lachrymal processes less prominent than in Tapirus; sulcus on the lateral face of the ascending portion of the maxilla shallower and more constricted than in Tapirus; mandibular symphysis narrow relative to Tapirus.

Discussion

Until Gazin and Collins’ (1950) description of USNM 18372, Tapiravus was virtually undiagnosable (see above, and Simpson 1945). The work of Gazin and Collins (1950), Olsen (1960) and Schultz, Martin and Corner (1975) has demonstrated that Tapiravus is a distinct genus. The revised diagnosis of Tapiravus given above is based on these authors’ work and the specimens which they have convincingly demonstrated to pertain to Tapiravus.

Referred Specimens

USNM 18372, right maxilla with P3 and M1 (Gazin and Collins 1950) and ?USNM 21377, right dentary with M2–3 (Olsen 1960): from ?middle Miocene (latest Hemingfordian or earliest Barstovian) aged strata of the Calvert Formation, Chesapeake Bay region, Maryland.

Revised Diagnosis

Smallest known species of Tapiravus; approximately 15–20% smaller in linear dental measurements than T. polkensis.

Description of YPM 13474

According to Marsh (1871) the crown dimensions of YPM 13474 are 14.8 mm (anteroposteriorly) by 17.5 mm (transversely), but according to Olsen (1960) the crown of this tooth measures 14.5 mm by 18.5 mm. Based on AMNH 15592, the cast of YPM 13474, the tooth crown measures approximately 15 mm by 18 mm.

YPM 13474 is extremely similar in morphology to the P3 and P4 of Miotapirus (Schlaikjer 1937) and Tapirus (Hatcher 1896), although slightly lower-crowned (brachyodont) relative to the cheek-teeth of Tapirus. In occlusal view YPM 13474 is rectangular in outline. Labially YPM 13474 bears a prominent paracone anteriorly and an equally prominent metacone posteriorly. Both are closely appressed to the labial edge of the tooth with the result that the stylar shelf is extremely narrow. The anterolabial corner of the tooth bears a small parastyle. The metacone is set slightly lingual to the paracone and labial to the metacone is a well-developed, distinct cingulum. This cingulum is continuous with the posterior cingulum which borders the tooth distally and wraps around to the posterolingual edge of the tooth. On its anterior edge YPM 13474 bears a very weak cingulum. On the far lingual edge of the tooth YPM 13474 bears a prominent protocone anteriorly and an equally prominent hypocone posteriorly. Running from the anterolabial apex of the protocone to the anterolinguall base of
Two Fossil Tapir Genera

Schlaikjer (1937, p. 248) and Gazin and Collins (1950, p. 13) referred to YPM 13474 as a "P₄ or M₁." Olsen (1960), however, studied a cast of YPM 13474 directly (although failing to publish an illustration of the specimen) and convincingly demonstrated that YPM 13474 represents the same (i.e., homologous) tooth as FGS V-5941 (the holotype of *Tapiravus polkensis*: see below), and further that both are P₄'s. Olsen (1960, p. 166) noted that both of these P₄'s are extremely similar: "Cusp arrangement is the same in *Tapiravus validus* and *T. polkensis*, even to the distinct cingulum on the posterolingual border." Olsen (1960) was thus able to show that the Florida tapir material, *Tapiravus polkensis*, pertains to the same genus as the New Jersey and Maryland tapir material, *Tapiravus validus*. Simultaneously, Olsen's (1960) work strengthened the suggestion of Gazin and Collins (1950) that *Tapiravus validus* is a distinct genus and species.

**Tapiravus polkensis Olsen, 1960**

**Synonymy**

*Tapiravus* (?): White, 1942, p. 91.

**Holotype**

FGS V-5941, left P₄.
Horizon and Locality of the Holotype

Upper Miocene or lower Pliocene aged strata of the "phosphate beds" of the Bone Valley (Hawthorne Formation), phosphate pit of the American Agricultural Chemical Company, Pierce, Polk County, Florida.

Referred Specimens

FGS V-5942, mandibular symphysis and partial right dentary with right C, right P2-M1 (P4 in the crypt); MCZ 3808, left dentary with M2-3 (referred to as dP2-3 by White 1942, p. 91): from the same horizon and locality as the holotype.

UNSM 45081, lower mandible with complete dentition, except for l3's; UNSM 20835, mandible with dP2-4 and unerupted M1; UNSM 20837, right M3; UNSM 20838, left M3: from late Miocene or early Pliocene aged sediments equivalent to the Valentine Formation, Ogallala Group, NW 1/4, Sec. 26, T 1 N, R 11 W, Webster County, Nebraska.

UNSM 45102, mandible with dP2-4 and unerupted M1; UNSM 45103, mandible with dP2-4 and unerupted M1: from late Miocene or early Pliocene aged sediments equivalent to the Valentine Formation, Ogallala Group, east side of the Snake River, near the center of the NE 1/4, Sec. 22, T 32 N, R 30 W, Cherry County, Nebraska.

Revised Diagnosis

Largest known species of Tapiravus.

Discussion

Olsen (1960) designated FGS V-5941, a P4, the holotype of his new species, Tapiravus polkensis, so that the holotype of T. polkensis would be directly comparable to YPM 13474, the genoholotype of Tapiravus validus. Thanks to the work of Olsen (1960) and Schultz, Martin and Corner (1975) who have described the known remains of this species in detail, Tapiravus polkensis is a moderately well-known and demonstrably distinct species.

Postilla 195

?Tapiravus rarus Marsh, 1877, nomen dubium
(Fig. 1B)

Synonymy

Tapiravus rarus Marsh, 1877, p. 252.

Holotype

YPM 13475, left P3.

Horizon and Locality of the Holotype

Uncertain. Supposedly late Miocene or early Pliocene aged strata of the Rocky Mountains region. YPM catalogue records denote this specimen as having been collected by O. C. Marsh in 1873 from the "Lower Pliocene, Niobrara River, Nebraska." Both Hatcher (1896, p. 178) and Sinclair (1901, p. 702) state that this specimen is from the "Loup Fork" of the Rocky Mountains. However, as Wood et al. (1941, p. 24) remarked, "Loup Fork or Loup River" are "obsolete or obsolescent terms of vague significance for continental late Cenozoic of western North America. Deposits covering almost all of the Miocene and Pliocene have been called Loup Fork at various times." Thus, as Schultz, Martin and Corner (1975, p. 2) noted with regard to ?T. rarus, "the precise geological and geographical provenience of the holotype is virtually unknown."

Referred Specimens

None.

Description of YPM 13475

According to Marsh (1877) the crown dimensions of YPM 13475 are 15 mm (anteroposteriorly) by 17 mm (transversely). These measurements are compatible with the size of AMNH 15592, the cast of YPM 13475. In occlusal view YPM 13475 is rectangular in outline. Labially, YPM 13475 bears a prominent paracone anteriorly and a
prominent metacone posteriorly. There is a very small parastyle borne on the anterolabial corner of the tooth. Lingually YPM 13475 bears a prominent protocone anteriorly and a prominent metacone posteriorly. Running from the anterolabial apex of the protocone to the anterolingual base of the paracone, and from the anterolabial apex of the hypocone to the anterolingual base of the metacone, are the distinct and moderately high protoloph and metaloph respectively. The anterior paracone–protoloph crest is very slightly shorter in transverse length than the posterior metacone–metaloph crest. Anteriorly and posteriorly YPM 13475 bears low, indistinct cingula.

Discussion

YPM 13475 is extremely similar in morphology to the \( P^3 \) and \( P^4 \) of *Miotapirus harrisonensis* (Schlaikjer 1937, figs. 1 and 4E) and *Tapiravus validus* (Fig. 1A; Gazin and Collins 1950, fig. 4) and to the \( P^4 \) of *Tapiravus polkensis* (Hatcher 1896, pl. II, fig. 3; Schlaikjer 1937, fig. 4B–D) and more primitive tapirids in having better developed, more continuous, higher and sharper protolophs and metalophs (i.e., YPM 13475 is relatively molariform). However, YPM 13475 differs from the \( P^3 \) and \( P^4 \) of *Protapirus* (Hatcher 1896, pl. IV, figs. 1–4; Schlaikjer 1937, fig. 4F; Schultz, Martin and Corner 1975, fig. 6) in being slightly less molariform and in lacking a prominent and well-developed anterior cingulum. In the last mentioned feature YPM 13475 is similar to the \( P^3 \) and \( P^4 \) of *Miotapirus* and *Tapiravus*.

Without knowledge of the remainder of the dentition, it is extremely difficult to distinguish between the \( P^3 \) and the \( P^4 \) of advanced tapirid genera (namely *Miotapirus*, *Tapiravus*, *Tapirus*). However, in YPM 13475 the protoloph is slightly shorter transversely than the metaloph and this strongly argues that YPM 13475 may be a \( P^3 \).

Marsh (1877, p. 252) stated that the crown of YPM 13475 measures 15 mm by 17 mm and this is the approximate size of the plaster cast (AMNH 15592). The single \( P^3 \) known of *Tapiravus validus* measures 13.4 mm by 16.4 mm (Gazin and Collins 1950, p. 13); thus YPM 13475 is slightly larger than this specimen of *T. validus*. The \( P^4 \)s of *Tapiravus polkensis* and *Miotapirus harrisonensis*, the only other known species which YPM 13475 closely resembles, measure 17 mm by 22 mm (Olsen 1960, p. 166) and 16.5 mm by 20.5 mm (Schlaikjer 1937, p. 234) respectively. In known tapirids the \( P^3 \) is generally slightly smaller than the \( P^4 \); it can be expected that this would be the case for both *Tapiravus polkensis* and *Miotapirus harrisonensis*. Based on the size and morphology of YPM 13475, this tooth may represent the \( P^3 \) of either *Tapiravus polkensis*, *Miotapirus harrisonensis* or a closely related species.

Corroborating this suggestion is the fact that, according to YPM catalogue records, YPM 13475 was collected in Nebraska. *Tapiravus polkensis* is known to occur in Nebraska (see above and Schultz, Martin and Corner 1975). Previously, specimens of *Miotapirus* have only been described from Wyoming and South Dakota (Schlaikjer 1937, Macdonald 1970). Schultz, Martin and Corner (1975, p. 1) stated that *Miotapirus* occurs in the early Miocene of Nebraska, but these authors did not cite either a specimen or a published reference to substantiate their claim. However, examination of new material does provide a record of *Miotapirus*, the new species *Miotapirus marslandensis* (described in the following section) from Nebraska. Thus if YPM 13475 does represent *Miotapirus* in Nebraska, it is not an isolated occurrence of this genus in the state.

In conclusion, the evidence concerning YPM 13475 suggests that it probably represents the \( P^3 \) of *Tapiravus polkensis*, *Miotapirus harrisonensis* or a closely related species. In and of itself, however, YPM 13475 is not definitely diagnostic of a distinct species. I thus here prefer to regard the name which YPM 13475 carries, *Tapiravus rarus* Marsh, 1877, a nomen dubium which cannot be applied unambiguously to a single species. It should also be noted that if YPM 13475
could be demonstrated to definitely pertain to either *Tapiravus polkensis* Olsen, 1960, or *Miotapirus harrisonensis* Schlaikjer, 1937, then *Tapiravus rarus* Marsh, 1877, would be a senior synonym of either name and use of the junior synonym would have to be discontinued unless the name *Tapiravus rarus* were to be suppressed by the International Commission on Zoological Nomenclature.

**Conclusions Regarding *Tapiravus***

Until 1950 (Gazin and Collins 1950) the genus *Tapiravus* was based on virtually a single tooth, a left P₄, YPM 13474 (Fig. 1A), the holotype of the type species. As was long accepted (see above), in isolation this tooth is virtually indeterminate. It is only through the unequivocal referral of more complete material to the taxon at both the specific and generic levels that *Tapiravus* has recently been regarded as a distinct and valid taxon. Here I recognize *Tapiravus* as an advanced tapirid genus closely allied to *Tapirus*. Two distinct species referable to *Tapiravus* are recognized: *T. validus* (Marsh, 1871) and *T. polkensis* Olsen, 1960. *Tapiravus rarus* Marsh, 1877, is based on YPM 13475, a left P₃ which is not presently diagnostic of a distinct genus or species. Thus, this name is best regarded as a nomen dubium.

**A New Species of *Miotapirus* from Nebraska**

**Systematic Paleontology**

CLASS Mammalia Linnaeus, 1758  
ORDER Perissodactyla Owen, 1848  
SUBORDER Moropomorpha Schoch, 1984  
INFRAORDER Ceratomorpha Wood, 1937  
SUPERFAMILY Tapiroidea Burnett, 1830  
(Gill, 1872)  
FAMILY Tapiridae Burnett, 1830  
SUBFAMILY Tapirinae Burnett, 1830  
TRIBE Miotapirini Schoch, new  

**Type and Sole Included Genus** *Miotapirus*.

**Diagnosis** Same as that for the genus (given by Schlaikjer 1937).

**Genus Miotapirus Schlaikjer, 1937**

**Type species** *Miotapirus harrisonensis* Schlaikjer, 1937.

**Included Species** The type species and *Miotapirus marslandensis* Schoch and Prins, new species.

**Known Distribution** Early Miocene (Ankareean) of Wyoming (Schlaikjer 1937) and South Dakota (Macdonald 1970); early Miocene (Hemingfordian) of Nebraska (this report).

**Diagnosis** See Schlaikjer (1937).

**Miotapirus marslandensis** Schoch and Prins, new species (Fig. 2)

**Holotype** AMNH 82804, left M₁⁻².

**Horizon and Locality of the Type** Collected by John Graham Cooke in August 1917, approximately 18 miles (30 km) east of Agate, northwestern Nebraska (that is, near Marsland, Nebraska: see Schultz and Stout 1961, p. 49); specimen collected from early Miocene (middle Hemingfordian) aged strata of the "Running Water beds," "Marsland Formation" (see McKenna 1965 for a discussion of the stratigraphy in this area).

**Hypodigm** Known only from the holotype.

**Etymology** Named after the town of Marsland, near which the specimen was found.

**Diagnosis** Largest known species of *Miotapirus*: approximately 20–25% larger in linear dental measurements than the only previously known species, *Miotapirus harrisonensis*. 
Two Fossil Tapir Genera

Note on the Authorship of the Species
AMNH 82804 was examined by Nienke Prins and myself during our studies of fossil mammals (see Prins and Schoch 1983). We jointly assume responsibility for the authorship of the new species.

Description
According to notes now housed in the American Museum of Natural History, when J. G. Cooke found AMNH 82804 the two molars were in place in an almost completely disintegrated mandible. It was not possible for Cooke to collect anything other than the teeth; however, there can be no doubt that both teeth came from a single individual.

The upper molars of Miotapirus marslandensis are indistinguishable in morphology, except for size, from those of M. harrisonensis. The latter taxon has been thoroughly described and illustrated by Schlaikjer (1937) and Macdonald (1970). Consequently, it would be redundant to describe in detail the crown morphology of AMNH 82804 here (see Fig. 2). The greatest anteroposterior length x greatest labiolingual width of the M1 of AMNH 82804 is 22.1 mm x 24.6 mm, and of the M2 is 24.3 mm x 25.9 mm. The corresponding measurements of the M1 of the holotype of M. harrisonensis are 16.3 mm x 20.3 mm (Schlaikjer 1937).

Discussion
Schlaikjer (1937) suggested that the Oligocene tapirid genus Protapirus (includes Tanyops: Schoch 1983a) gave rise to the early Miocene genus Miotapirus which in turn gave rise to the late Miocene genus Tapiravus and the late Miocene to recent genus Tapirus. Although similar to one another, these genera can be distinguished on the basis of the upper molars. In most respects, the teeth of Miotapirus are intermediate in morphology between those of Protapirus and those of Tapiravus and Tapirus. [For descriptions and illustrations of the teeth of Protapirus, see Hatcher (1896) and Scott (1941); for descriptions and illustrations of the teeth of Tapiravus and Tapirus, see Lundelius and Slaughter (1976), Olsen (1960) and Schultz, Martin and Corner (1975).] Characters which are observable in AMNH 82804 and readily identify this specimen as pertaining to Miotapirus are: 1) the crests of the upper molars are better developed than in Protapirus, but are not as high, sharp and well developed as in Tapiravus and Tapirus; 2) the teeth have relatively square outlines in occlusal view (a

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Fig. 2
characteristic distinctive of *Miotapirus*; 3) the metacones are large, square and posteriorly placed relative to those of *Tapirus*; and 4) the cross-lophs are set at a slightly oblique angle (that is, they run anterolabio-posterolingually rather than strictly labio-lingually) relative to the condition seen in *Tapirus*.

AMNH 82804 differs in known characters from the holotype of *Miotapirus harrisonensis* (described by Schlaikjer 1937) only in having molars which are approximately 20 to 25% larger in linear dimensions. Among early tapirs (and many other mammals), a difference in tooth dimensions of as little as 10–15% often distinguishes distinct species (Radinsky 1963, Schoch 1983b). On this basis Nienke Prins and I believe that AMNH 82804 represents a species distinct from *M. harrisonensis*. Corroborating our opinion is the fact that whereas *M. harrisonensis* is known only from Arikareean aged (early early Miocene) strata, *M. marslandensis* occurs in slightly younger, Hemingfordian aged (late early Miocene) strata. One of the dominant trends in tapir evolution throughout much of the Cenozoic was gradual size increase (Schlaikjer 1937; Radinsky 1963). The larger size of *M. marslandensis* relative to *M. harrisonensis* suggests that *M. marslandensis* may have evolved from a smaller form similar to *M. harrisonensis*.

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