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A New Fossil Horse, "Hypohippus Matthewi"

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Nebraska Geological Survey

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A NEW FOSSIL HORSE, HYPOHIPPIUS MATTHEWI

BY

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A NEW FOSSIL HORSE, HYPOHIPPIUS MATTHEWI

BY ERWIN HINCKLEY BARBOUR

During the field season of 1913, while exploring Devil's Gulch and vicinity, a new *Hypohippus* of unusual size was found. It was associated with a rich mammalian fauna equivalent to the Snake Creek Pliocene of southeastern Sioux County. The specimen was secured for the State Museum, The University of Nebraska, by Mr. A. C. Whitford, a Fellow in the Department of Geology. We have named this horizon the Devil's Gulch. It is older than the Hay Springs deposits, but younger than the Agate Springs. Though Pliocene, it is not unlikely that the upper portions of the Devil's Gulch beds merge into Pleistocene.

A partial faunal list is as follows: *Testudo orthopygia*, T. indet.; *Aelurodon*, *Tephrocyon*, *Cynarctus*, sp. nov., *Cyon*, *Temnocyon*?; Mustelid, indet.; *Machærodon* sp. nov.; *Oxydactylus*, *Alticamelus*, *Procamelus*, *Pliauchenia*, *Camel* indet.; *Metoreodon*; *Merycodus*; *Teleoceras*, *Rhinoceros* indet.; *Parahippus*, *Hypohippus*, sp. nov., *Merychippus*, *Protohippus*, *Pliohippus*, *Neohipparion*; *Tetrabelodon*, sp. nov.; *Mastodon* ?*euhypodon*, *Mastodon* indet., sp. nov., *Mastodon*, sp. nov.

The differences between ancient and modern horses may be briefly summarized as follows: ancestral horses are characterized by long bodies, arched backs, short limbs, short necks, relatively large heads, long tails, short cementless teeth, and polydactyl feet. Just the opposite is true of the later equines. Ancestral horses fall into four broad groups, each including a large number of genera, namely: 1. *Hyrachtheres*, very early type; 2. *Anchitheres*; 3. *Protohippines*, intermediate type; and 4. *Equines*, the later horses.

At the close of the Pliocene and through the Pleistocene, native wild horses roved in great herds in every country save Australia, and were in numerous varieties. Now, horses are reduced to a single family, the *Equidae*, and to a single genus, *Equus*. Some authors divide the genus, horse, into three genera: *Assinus*, the wild asses, *Hipprotigris*, the zebras, and *Equus*, the true horses. Structurally the wild asses, zebras and true horses are alike. Any differences in color are superficial and unessential. Owing to its complete domestication, the horse is a com-

panion of man in every climate, and is therefore universally distributed.

As for wild horses, none are known in the Western Hemisphere. Their extinction was probably aided by prehistoric man, who is said to have used the horse originally for food and not as a beast of burden. Changes of climate, the spread of disease, competition with other grazing animals, and the interminable struggle for existence against predacious beasts, were all factors leading to their complete extermination. The *Equus* beds of Kansas and Nebraska are so named because of the abundance of fossil horse remains found in them. Wild horses are found at the present time in desert regions of Asia and Africa. The so-called wild horses of the Western Hemisphere were undoubtedly horses which had escaped from the early Spanish explorers.

During Tertiary time, a period reckoned at about three million years, horses passed through many adaptive changes, yet no important links are missing, so their genealogy is practically complete.

Horses are distinguished from all other mammals because they are one-toed (monodactyl). All other mammals have two, or four (artiodactyl), or three, or five toes (perissodactyl). Yet in a strict sense, modern horses are all three-toed (tridactyl), for the two splint bones which persist to the present time are remnants of ancestral toes.

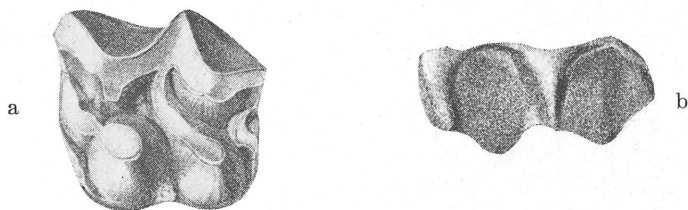
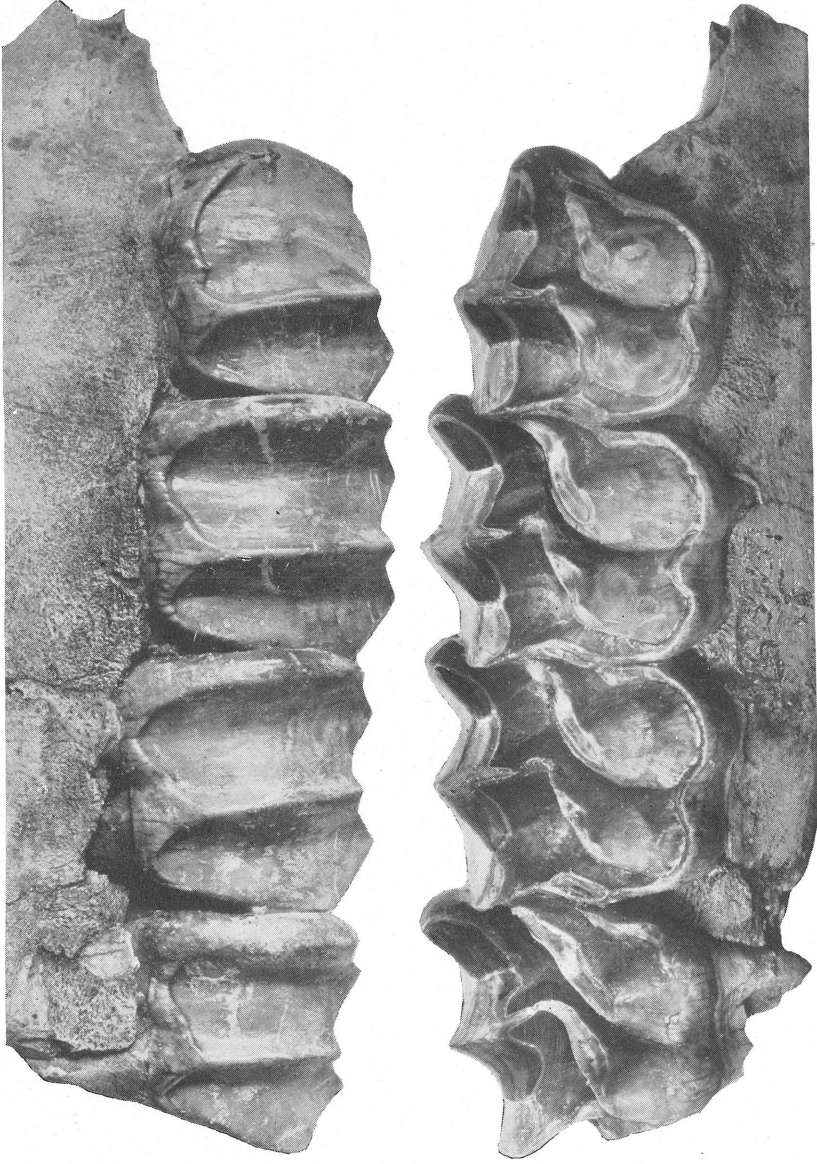


Fig. 1.—Second or third upper molar of *Hypohippus affinis*, Leidy.
a. Crown view, natural size; b. Side view, natural size.

The teeth of early horses were short-crowned, (brachydont) cementless teeth. Later members of the branch had partly cemented crowns of considerable length (sub-hypsodont), and the more recent members had uncommonly long, (hypsodont), well-cemented teeth. The presence of cement signifies progress. Cement is like dentine, and is deposited upon and around teeth before they are erupted from the gum.

It is interesting to note in the Devil's Gulch bed, as in the Snake Creek, the intermingling of early, with advanced horses, which empha-



RIGHT UPPER DENTITION OF *HYPOHIPPIUS MATTHEWI*, SP. NOV.

Crown and side views. Natural size.

Premolar No. 1 is represented by roots.

Premolars 2, 3, 4, and molar 1 follow in order from right to left.

From collection of Hon. Charles H. Morrill.

sizes the fact that the old and less progressive persisted and mingled with the new and more advanced.

HYPOHIPPIUS.

Hypohippus is a browsing horse of forest adaptation, which presumably frequented forests and thickets, and browsed on young leaves, and the tender tips of growing plants. Hypohippus is closely related to Anchitherium, and is classed as the most advanced member of the Anchitheres. Leidy, in his "Extinct Mammalian Fauna of Dakota and Nebraska" says that the name Hypohippus affinis, has been applied to a genus and species of supposed solipedal animal allied to Anchitherium, and that its existence is inferred from a single fossil tooth in the Niobrara collection. The tooth which he figures, supposedly the second or third of the temporary series, consists of a well-preserved crown of an upper molar shown in figure 1. He likens the tooth to that of Anchitherium aurelianense and Palaeotherium medium.

HYPOHIPPIUS MATTHEWI, sp. nov.

Of the genus, Hypohippus, several species are known, notably *H. affinis*, *H. osborni*, and *H. equinus*. *Hypohippus matthewi*, named for Dr. W. D. Matthew, exceeds all of these in size. It is the largest member of the genus known as yet, and is from a fourth to an eighth larger than *Hypohippus affinis*, and is noticeably more hypsodont than any of them. It is presumably a later mutant.

The material upon which this new species is based, consists of the right maxilla with four perfect teeth, and the left, with three, together with strong incisors. In addition, scattered lower teeth, numerous limb bones, and several nearly complete feet were found and referred to this species. The best of the limb bones came from a bed of diatomite, about 10 inches in thickness, and about 150 feet in length. The preservation of the bones in this matrix was faultless. The teeth figured in this report were found 6 feet below the level of the mastodon skull, which we have named *Mastodon morrilli*. The feet are tridactyl, although it is to be noted that metatarsals two and four are noticeably reduced at the distal extremity, and the corresponding digits seem weak, but with ungual phalanges larger than ordinary.

THE TEETH.

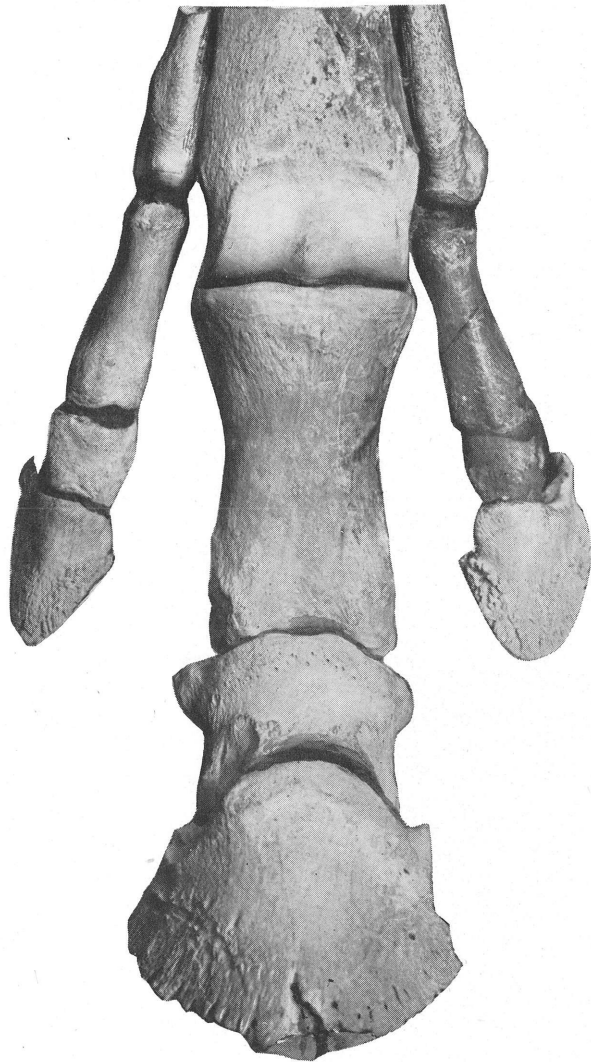
The briefest description of the teeth of *Hypohippus matthewi*, is that they are those of *Mesohippus bairdi* grown enormously large. They are strikingly similar point for point. It should be noted that Anchi-

therium, the European form, is closely related to the American Mesohippus. The teeth in question are fully adult, though not old, with the outer crests and cross crests somewhat worn. The teeth, especially those of the left side, show cement reinforcement half way up the crowns. All the teeth, and all bones found in these beds are noticeably etched by "Daimonelix fibers."

In Anchitherium, Mesohippus, Hypohippus, and closely related forms, the transverse crests are generally distinct, and perfect. In Hypohippus matthewi, the metaloph is continuous with the ectoloph. This cross crest runs obliquely forward, then obliquely backward, and meets the ectoloph opposite the mesostyle. The protoloph runs obliquely forward and outward by a sigmoid curve to the anterior border of the tooth. It is entirely disconnected from the ectoloph in the premolars, but becomes decreasingly disconnected in the posterior grinders. In none of them, however, is connection complete. The styles are well developed, and the parastyle is thick and strong. The fossettes are deep, and the bounding walls nearly vertical.

The accompanying figures are reproduced to exact size so that measurements and descriptions are scarcely necessary. The following measurements make possible ready comparison with other species of Hypohippus:

- Pm1. Missing. Represented by an alveolar scar and root.
- Pm2. Antero-posterior diameter along outer border, 38 mm.
Diameter through hypoconule to front of tooth, 31 mm.
Greatest transverse diameter, 36 mm.
Extreme height of crown, 30 mm.
- Pm3. Antero-posterior diameter along outer border, 37 mm.
Diameter through hypoconule to front of tooth, 32 mm.
Greatest transverse diameter, 41 mm.
Extreme height of crown, 36 mm.
- Pm4. Antero-posterior diameter along outer border, 35 mm.
Diameter through hypoconule to front of tooth, 33 mm.
Greatest transverse diameter, 43 mm.
Extreme height of crown, 36 mm.
- M1. Antero-posterior diameter along outer border, 36 mm.
Diameter through hypoconule to front of tooth, 33 mm.
Greatest transverse diameter, 41 mm.
Extreme height of crown, 29 mm.



FORE FOOT OF HYPOHIPPIUS MATTHEWI.

Natural size.

From collection of Hon. Charles H. Morrill.

Hypohippus affinis, Leidy:

2d or 3d Upper molar. Antero-posterior diameter along outer border, 29 mm.

Diameter through hypoconule to front of tooth, 26 mm.

Greatest transverse diameter, 27 mm.

Extreme height of crown, 15 mm.

The University of Nebraska.
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