No. 3 — *Eight Historic Fossil Mammal Specimens in the Museum of Comparative Zoology*

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TABLE OF CONTENTS

INTRODUCTION

For a quarter of a century I have planned to restudy several neglected and inadequately known fossil mammals in the Museum of Comparative Zoology. These specimens, seven rhinoceroses and an entelodont, include the types from the "auriferous gravels" of California that Leidy described in 1865 and 1869 and that Whitney carried to Harvard following his colorful controversy at the California Academy of Natural Sciences. Scott and Osborn's types (1887) collected in the Big Badlands in 1880-81 by Samuel Garman are reassigned; and for the first time an illustration of the dentition of the type of *Metamynodon planifrons* appears in print. In general, this study simplifies

rhinoceros taxonomy. The unusual historic associations and stratigraphic significance of these half-forgotten genera should revive interest in this small collection.

My thanks go to Dr. A. S. Romer for permission to redescribe this interesting assemblage and to his staff for their assistance. The collections at the American Museum of Natural History and Yale Peabody Museum have also afforded valuable comparative material. Some unpublished drawings by the late Rudolph Weber are included, and, as always, I am deeply grateful to Florence D. Wood, who provided the remaining illustrations. Grants from the Rutgers University Research Council assisted this investigation.

Specimen numbers carry abbreviations indicating the institutions which house them. A.M.N.H. refers to the American Museum of Natural History; C.I.T. refers to California Institute of Technology. In this connection, the Los Angeles County Museum, Los Angeles, California, now contains the entire former paleontological collection from California Institute of Technology. M.C.Z. is Museum of Comparative Zoology; P.U. is Princeton University; and Y.P.M. is Yale Peabody Museum.

SYSTEMATIC DESCRIPTIONS

Order ARTIODACTYLA

Family ENTELODONTIDAE

ARCHAEOTHERIUM SUPERBUM (Leidy), 1868

Figure 1 *A-C*

Elotherium superbus Leidy, 1868, p. 177.
Elotherium superbum, Leidy, 1869, p. 388.
Archaeotherium superbum, Troxell, 1920, p. 244.
Entelodon superbum, Allen, 1931, p. 281.

Type. M.C.Z. No. 9564, right I^3, the only known specimen (Fig. 1, *A-C*).

Horizon and locality. Deep "auriferous gravels," Oligocene, probably middle, Douglas (or Douglass) Flat, Calaveras County, California.

Diagnosis. Referable to the genus *Archaeotherium*, larger than *A. mortoni*, close to *A. wanlessi*, smaller and more primitive than the largest giant pigs, such as *Megachoerus*, *Daeodon* and *Dinohyus*.

This specimen, out of place among rhinoceroses, is discussed here in order to treat the Whitney collection as a unit. Apparently collected in 1867, and now figured for the first time, the

tooth was tentatively identified as a hyaena canine by Whitney (1867 b). Leidy (1868) gave an accurate verbal description, correctly referring it to *Elotherium*, which was republished in essentials by him (1869, p. 388) and by Whitney (1879, pp. 244-245, 283). Subsequent workers evidently found this description useless without the specimen or illustration. Peterson (1909, p. 69) considered that "this species should be regarded as only possessing value from the standpoint of history and geographic distribution," i.e., in modern terminology, he considered it a *nomen dubium*. This opinion was apparently endorsed by Troxell (1920, p. 250), and the issue was not reopened by Sinclair (1922 a and b), by Allen (1931, p. 281) who listed this specimen among M.C.Z. types, or by Scott (1940).

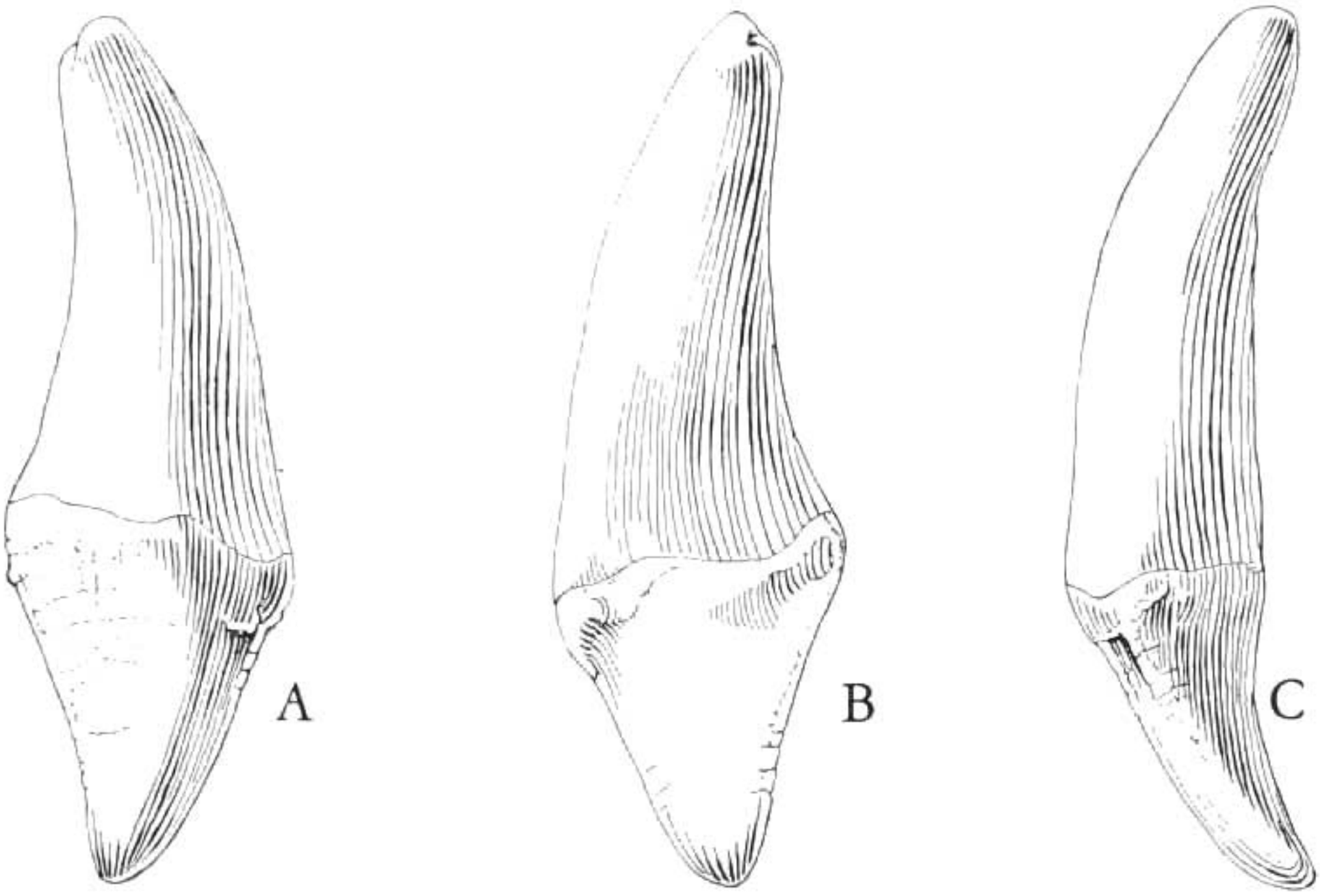

Fig. 1. *Archaeotherium superbum*, type, M.C.Z. No. 9564, right I^3, x 1. *A*, buccal aspect; *B*, lingual aspect; *C*, medial aspect.

It was also my first impression that this species could best be treated as a *nomen dubium*, but, inadequate as the type specimen is, detailed comparisons show that it can yield considerable information. Leidy's tentative identification as the right upper lateral incisor is fully confirmed, as is Troxell's reference to the genus *Archaeotherium*. I follow Peterson (1909), Troxell (1920), Sinclair (1922a), and Scott (1940) in separating *Archaeotherium* Leidy generically from the European form, whether one prefers to call the latter *Entelodon* or *Elotherium*. As

Leidy stated, it is larger than *A. mortoni*. It is neither *Dinohyus* nor any of the large Whitneyan forms. It is far smaller than *?Megachoerus praecursor* Scott, type A.M.N.H. No. 572, from the upper Oreodon beds (Scott, 1940, pp. 426, 435-436 and 736). Although it does not exactly duplicate any American Museum specimen, it compares best with middle-sized Chadronian and Orellan specimens. Despite the work of Peterson, Troxell, Sinclair and Scott, the taxonomy of the middle-sized archaeotheres (i.e., the next larger size grade than *A. mortoni*) is in a sadly muddled state. Without trying to decide what specific name or names may be valid, I find the closest match to this tooth in the type of *Archaeotherium wanlessi* Sinclair, P.U. No. 12552 (Scott, 1940, Pl. 40, fig. 1) from the turtle-oreodon zone of the Scenic Member (Bump, 1956) of the Brule formation. The stratigraphic significance of this specimen is discussed below, in connection with *Subhyracodon occidentalis*, M.C.Z. No. 9119. There is an excellent cast of *Archaeotherium superbum* in the American Museum, A.M.N.H. No. 9975.

Order PERISSODACTYLA
Family RHINOCEROTIDAE

Subhyracodon hesperius (Leidy), 1865
Figure 2 *A*, *B*

Rhinoceros hesperius Leidy, 1865, p. 176.
Aphelops hesperius, Roger, 1887, p. 56.
Aceratherium hesperium, Osborn, 1898, pp. 144-145.
Aceratherium (Aphelops) hesperium, Trouessart, 1898, pp. 747-751.
Diceratherium hesperium, Hay, 1902, p. 644.

Type. M.C.Z. No. 9118, a symphysis and right ramus, with I_2 left, M_{1-3} right, and the roots or alveoli of the intervening teeth (Fig. 2, *A*, *B*, and Leidy, 1869, Pl. 23, figs. 11 12), and a separate portion of the left condylar region, supposed to be associated, probably correctly.

Horizon and locality. Mid-Tertiary "auriferous gravels" channel, probably Oligocene, Chili Gulch, Calaveras Co., California.

Diagnosis. Lower jaw of *Subhyracodon* character, about the size and shape of *S. tridactylus*, I_2 C_0 P_4 M_3; premolar series relatively short, molars closest to *S. occidentalis* in size and character but with weaker external and internal cingula; molars noticeably smaller and slighter than in *S. tridactylus*.

Whitney (1865, pp. 251 and 268) announced the former occurrence of the rhinoceros in California on the basis of this

specimen. Leidy (1865) described and named it; later (1869, pp. 230-231, 390, Pl. 23, figs. 11-12), he redescribed it in more detail, in his usual, extraordinarily able fashion, and with his usual exact illustrations. His Plate 23, figure 11, shows the left I_2 reversed, as a right I_2, in external aspect. After the abrupt discontinuance of the California Geological Survey, Whitney took this specimen, as well as the other fossil vertebrates, including the controversial Calaveras human skull, to Harvard. He redescribed M.C.Z. No. 9118 (1879, pp. 243-244, 283), largely by quoting from Leidy. Thereafter, the location of this collection seems to have dropped out of general knowledge. Osborn (1898, p. 144) supposed it to be in California; Peterson (1920, p. 411) called the "location of the type uncertain," apparently with some additional confusion as to what the type specimen was. Troxell (1921, p. 197) merely called the type "inadequate," without further discussion. Allen (1931, p. 287) listed it among M.C.Z. types. Stock (1933, pp. 22-23) discussed this specimen in connection with his description of *Subhyracodon kewi*, also mentioning its presence in the M.C.Z. collections. There is a satisfactory cast of this jaw in the American Museum, A.M.N.H. No. 9973.

The jaw, which is undistorted, compares closely in total length, in length of symphysis, and in depth, with *Subhyracodon tridactylus* (e.g., A.M.N.H. No. 538, the type, and A.M.N.H. Nos. 534 and 1126). The separate left condylar region, also of a rhinoceros of *Subhyracodon* aspect, resembles *S. tridactylus* generally, but has a more rugose postcotyloid process. The lower profile of the chin and horizontal ramus are characteristic of *Subhyracodon* in general and of *S. tridactylus* in particular. The jaw, by itself, could be assigned to *S. tridactylus*, but it is well outside the known geographic range of *S. occidentalis*, including its advanced variant, *S. metalophus*. On the other hand, as Leidy recognized, the teeth (Fig. 2, *A*, *B*, and Leidy, 1869, Pl. 23, fig. 12) are closest to *S. occidentalis* among Great Plains forms. The alveoli of I_1, right and left, are of good size, about as in *S. occidentalis*. Right I_2 is broken off at the root and left I_2, though well worn, is long. This lower tusk varies extensively with wear, and, perhaps, sex: that of M.C.Z. No. 9118 is rather large and long for *S. occidentalis* but is exceeded in cross-section and, probably, in original length, by I_2 of A.M.N.H. No. 38995, an unusually large individual. This tusk is well worn in M.C.Z. No. 9118, ovoid in cross-section, tapering somewhat medially, with indications that a small median flange may have formerly

been present, but worn off. There is no trace of I_3 or C_1 and the diastema, like the symphysis, is rather long for the size of the jaw. The premolars are broken off at the gum line. P_1 (or dP_1) had a single small root; P_{2-4} were two rooted, increasing in size, caudally. Relative to the length of the jaw and the size of the molars, the premolars are small in both dimensions, even allowing for the exaggeration of this impression by their being broken off at the gum line. This raises the question as to whether the premolars were primitively small or secondarily reduced. The characters of the teeth and jaw make the second

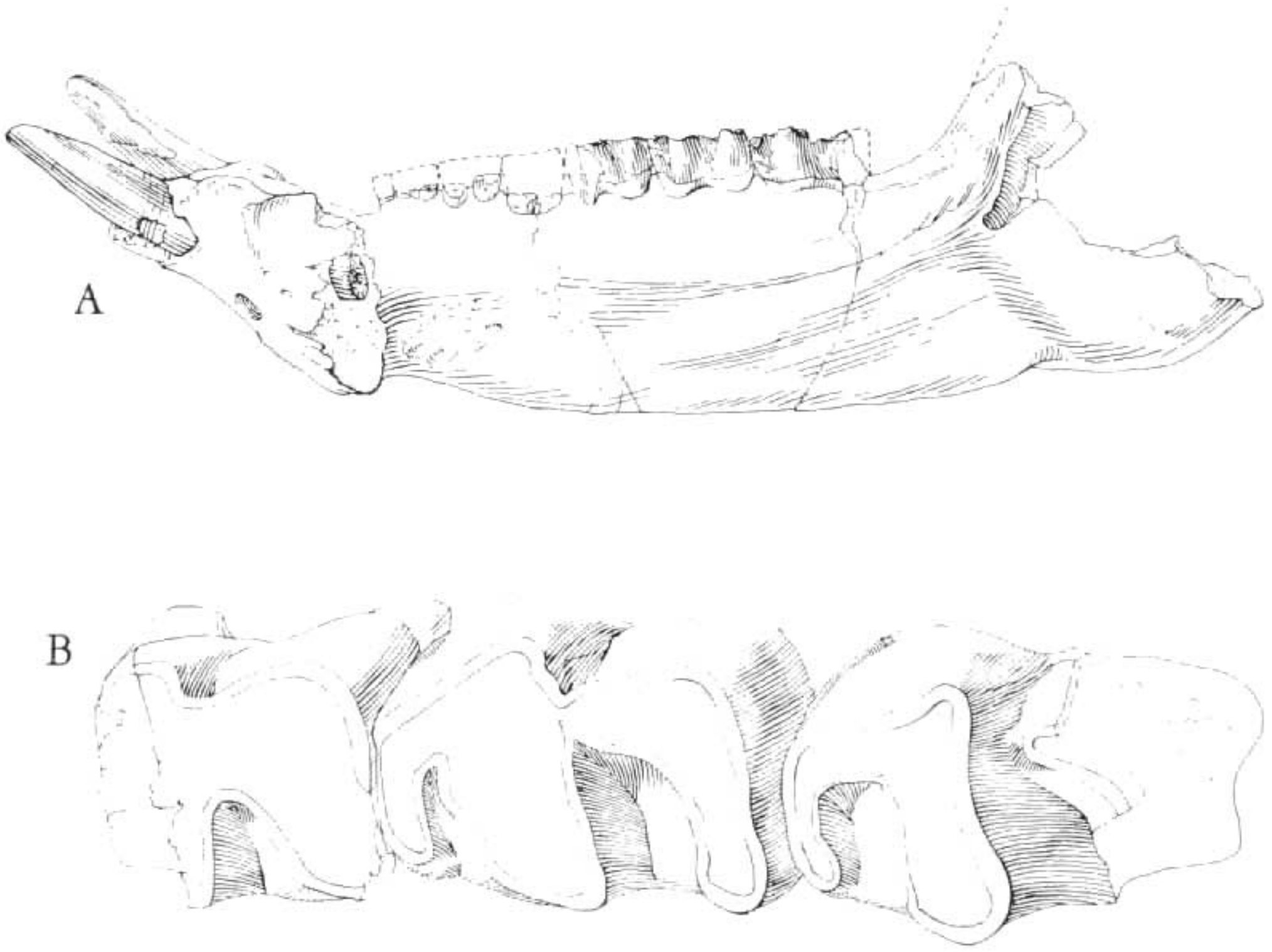

Fig. 2. *Subhyracodon hesperius*, type, M.C.Z. No. 9118. *A*, symphysis and lingual aspect of right ramus, right I_2 reversed from left I_2, x .23; *B*, right M_{1-3}, crown view, x .798.

alternative seem much more probable. The molars are moderately worn; the anterior third of M_1 is broken off; M_2 is substantially intact; much of the talonid of M_3 is missing. As Leidy indicated, the molar patterns are close to *S. occidentalis*, with perfectly simple crescents. However, the California specimen has much weaker cingula. The anterior cingula of M_{2-3} are moderately strong, but more like *Cacnopus* than *Subhyracodon;* the posterior cingula of M_{1-2} are obscure, but also seem weak

compared with *Subhyracodon*. Internal cingula are altogether absent on M_1 and from the preserved portions of M_2 and M_3. M_1 has a very weak but continuous external cingulum, which is represented on M_{2-3} only by a trace across the median valleys.

Varied relationships have been suggested for this form. Leidy correctly indicated both its resemblances to and its differences from *S. occidentalis*, regarding them as related species. On the other hand, Osborn considered it close to *Amphicaenopus platycephalus* Roger, and Trouessart assigned it to *Aphelops* for reasons which are purely speculative. Hay assigned it to *Diceratherium*, in which he was followed by Loomis (1908, p. 55), Peterson (1920, p. 411) and, more positively, by Troxell (1921b). Stock (1933, pp. 22-23) suggested that M.C.Z. No. 9118 might as well be a large *Subhyracodon* as a *Diceratherium;* he considered the possibility that his new species, *Subhyracodon kewi*, might be conspecific with M.C.Z. No. 9118, and decided against it, an opinion with which I fully concur. It seems unnecessary to prove that the specimen is not generically referable to *Rhinoceros, Aceratherium* or *Aphelops*. There is no significant resemblance to American Museum specimens of *Amphicaenopus platycephalus* whether from the lower or upper Oligocene. It is certainly not *Trigonias, Caenopus, sensu stricto,* nor *Diceratherium cooki*. Significant resemblances are limited to the *Subhyracodon-Diceratherium* lineage; and inside this lineage, to *S. occidentalis, S. tridactylus* and *Diceratherium*. This specimen does not match any in the American Museum's large collection of *S. occidentalis;* its size exceeds even the biggest, A.M.N.H. No. 38995. Among specimens of *S. occidentalis*, the molars are closest to A.M.N.H. No. 39110. However, the premolars of M.C.Z. No. 9118 are markedly smaller, and the series as a whole shorter, although the teeth of A.M.N.H. No. 39110 were considerably more shortened by interstitial wear. Comparison with *S. metalophus*, an advanced variant of *S. occidentalis*, represented by the type, Y.P.M. No. 10254, and by A.M.N.H. No. 1123, also fails for much the same reasons but to a slightly lesser degree. Although the jaw of *S. hesperius* roughly agrees with *S. tridactylus* the molars are too small and delicate for such an assignment. (If they were conspecific, *S. hesperius* would have twenty-eight years' priority over *S. tridactylus*.) Comparison with the John Day diceratheres at Yale and the American Museum also fails to disclose any very close match. M.C.Z. No. 9118 is larger than *Diceratherium annectens* and smaller than *D. armatum*, without any striking resemblance

in detail to either. Taking all these resemblances and differences into account, I conclude that M.C.Z. No. 9118 represents a valid species, that no other known material agrees sufficiently closely with it to be conspecific, that it must be assigned to the genus *Subhyracodon*, and that its age may be tentatively considered as late Oligocene.

Whitney (1865, p. 268, and 1879, pp. 128-129, 243) briefly described the geology of Chili Gulch, from which this is the only known vertebrate. The range in probable age appears to be from Orellan to Whitneyan; Whitneyan is more likely because of the larger size and reduced premolars, compared with *S. occidentalis*. This species represents a separate evolutionary trend from *S. tridactylus*.

TABLE 1

Measurements of *Subhyracodon hesperius*, M.C.Z. 9118

Measurements are given in millimeters throughout this paper.
A-P, antero-posterior; Tr, transverse; d, deciduous; e, estimated; r, across roots.

symphysis to angle of jaw	e405	
length of symphysis	106.4	
depth of jaw below P_2	65.4	
depth of jaw below M_2	71.8	
	right	left
mesio-distal I_1 alveolus	7.4	8.5
bucco-lingual I_1 alveolus	5.4	7.6
length (crown) of I_2 right (between worn tip and end of enamel)	39.3	
width (mesio-distal) I_2 right	20.3	
P_1-M_3	e171	
P_2-M_3	e165.5	
P_1-4	r67.4	
P_2-4	r61.9	
M_1-3	e101.2	
	e103, if complete	
A-P, P_1	r6.0	
A-P, P_2	r14.9	
A-P, P_3	r19.1	
A-P, P_4	r23.4	
A-P, M_1	e28.5	
Tr, M_1	24.2	
A-P, M_2	36.3	
Tr, M_2	24.6 (talonid)	
	26.5 across trigonid	
A-P, M_3	e42.3	
Tr, M_3	e22.0 (talonid)	
	25.5 across trigonid	

SUBHYRACODON OCCIDENTALIS (Leidy), 1850
Figure 3 *A*, *B*

Rhinoceros hesperius Leidy, referred specimen, Leidy 1868; Leidy, 1869, p. 388; Whitney, 1879, pp. 234-244, 253; Stock, 1933, p. 22.

Specimen. M.C.Z. No. 9119, a left ramus of a young individual with dP_{2-4} and M_1 in place and the unerupted trigonid of M_2 (Fig. 3, *A*, *B*).

Horizon and locality. Tertiary "auriferous gravels," presumably Oligocene, Douglas (or Douglass) Flat, Calaveras Co., California.

Leidy several times mentioned the association of this specimen (which he referred to *R. hesperius*) with *Archaeotherium superbum* (Leidy, 1868; 1869, p. 388; 1873, p. 218). Whitney (1879, pp. 243-244, 253) gave a brief description, chiefly quoted from Leidy's manuscript notes, with some information on the geology of the site (pp. 129, 243-244, 253, 527). An old paper label on the specimen bears the number "82." The ramus was preserved in a coarse sandstone with numerous volcanic fragments. Some of the grains and small pebbles are angular. The tooth pattern was largely obscured by this matrix and is only now adequately exposed for comparison. M_1 had just fully erupted; the trigonid is somewhat worn but the talonid barely so; the crown of the trigonid of the unerupted M_2 is near the cingulum of M_1. Some fracturing artificially elongates and narrows the teeth. This specimen is obviously not the other side of M.C.Z. No. 9118, the type of *S. hesperius*, an adult, nor could it be from the same individual as M.C.Z. No. 9120-9121, also an adult. The type of preservation resembles M.C.Z. No. 9120-9121 but differs definitely from M.C.Z. No. 9118.

Leidy's assignment of M.C.Z. No. 9119 to his *Rhinoceros hesperius*, which has not previously been questioned, was a natural one. However, it is clearly incorrect, since the deciduous and permanent premolar series of rhinoceroses in general, and of any given primitive rhinoceros, in particular, are of comparable length; whereas *S. hesperius*, M.C.Z. No. 9118, has a length of 67.4 for P_{1-4}, and M.C.Z. No. 9119 a length of 91.8 for dP_{2-4} (measured along the roots in both cases). Nor are the comparable parts of M_1 closely similar.

Comparison with *Trigonias*, *Subhyracodon* and *Diceratherium* seems warranted. No deciduous lower dentition of *Trigonias* was available for comparison; dP_{2-4} of M.C.Z. No. 9119 occlude readily with a deciduous upper dentition, A.M.N.H. No. 46000. However, the external and internal cingula of M_1 are too heavy for

Trigonias, thereby conforming to the *Subhyracodon — Diceratherium* pattern. Inside this line, the deciduous premolars show significant resemblances to those of *Subhyracodon occidentalis*, *S. tridactylus* and *Diceratherium annectens*. A.M.N.H. No. 1112, a calf jaw preserving alveoli of two deciduous incisors (apparently dI_{2-3}), the alveolus of dP_1, dP_{2-4} in place and M_1 not erupted, from the *Protoceras* beds, assigned, doubtless correctly, on the basis of size and stratigraphic level, to *Subhyracodon tridactylus*, agrees generally with M.C.Z. No. 9119. However, assignment of M.C.Z. No. 9119 to this species is ruled out by the character of M_1,which is markedly larger and coarser and has heavier cingula in A.M.N.H. No. 1112. Deciduous lower

Fig. 3. *Subhyracodon occidentalis* calf, M.C.Z. No. 9119. *A*, left ramus with dP_{2-4} M_{1-2}, lateral view, position of M_2 slightly shifted; *B*, left dP_{2-4} M_{1-2}, crown view; both x .598.

premolars referred to *D. annectens* are generally somewhat more specialized than M.C.Z. No. 9119, but four calf specimens, Y.P.M. No. 11066, a collective number, including a left ramus with dP_{3-4}, another with dP_{1-2}, and a third with dP_{3-4}, and a fourth consisting of both rami with dP_{2-3} in place and dP_4 erupting, show rather close resemblance to M.C.Z. No. 9119. However, assignment to *D. annectens* is improbable on the basis of the character of M_1 which, while otherwise the same size, is higher crowned in *D. annectens* than in M.C.Z. No. 9119.

On the other hand, resemblance to *Subhyracodon occidentalis* calves is close throughout. The closest match is with A.M.N.H. No. 38938, a calf skull and jaws of *S. occidentalis* from the lower Oreodon beds. These two specimens are in almost exactly the same stage of tooth eruption and wear, and the agreement is

extremely close. The teeth of M.C.Z. No. 9119 have been somewhat elongated and narrowed by crushing, accounting for some slight differences in measurement. Otherwise, agreement is extraordinarily close, including the enclosed basin in the talonid of dP_2 of M.C.Z. No. 9119, which is usually open in *S. occidentalis*, as it is on left dP_2 of A.M.N.H. No. 38938, but it is closed on the right dP_2. It also compares well, although not quite so closely, with A.M.N.H. No. 534, a calf skull and jaws also referable to *S. occidentalis*, from the Oreodon beds (Osborn 1898, pp. 155-156, fig. 46). It occludes well with A.M.N.H. Nos. 534, 1125 and 11297, all calf upper dentitions referable to *S. occidentalis*. As no other comparisons are equally close, this ramus is reidentified as *Subhyracodon occidentalis*. The character of the lower teeth is shown in Figure 3 *A*, *B*, and the measurements are given below.

TABLE 2

Measurements of *Subhyracodon occidentalis*

	Subhyracodon occidentalis		*Subhyracodon occidentalis*		
	M.C.Z. No. 9119	A.M.N.H. No. 38938		A.M.N.H. No. 534	
	Left	Right	Left	Right	Left
A-P, dP_{2-4}	93.7		e82.7	88.9	87.8
A-P, dP_2	26.0	20.9	20.8	25.6	24.4
Tr, dP_2	11.3	12.1	11.9	14.1	13.3
A-P, dP_3	35.1	33.5	32.6	33.4	33.1
Tr, dP_3		17.0	16.9	18.6	17.9
A-P, dP_4	33.9	29.9	31.3	33.7	33.1
Tr, dP_4	16.7	17.9	17.5	19.6	18.9
A-P, M_1	37.0	32.7	33.3		
Tr, M_1	15.9	21.3	21.0		

I submitted a sample of the matrix removed from M.C.Z. No. 9119 to Dr. Donald E. Savage of the University of California, who reports (letter dated February 25, 1955): "... regarding the matrix from the *Subhyracodon*, M.C.Z. 9119 from Douglass Flat. I conferred with two geologists who have mapped that region and have a better picture of the lithologic units. They agree that the matrix was at least partly volcanic debris in origin; however, this isn't particularly definitive because volcanics below the Valley Springs formation (rhyolite debris) and Mehrten fm. (andesitic debris) are known from the 'auriferous gravel' complex. It was no special surprise to them that a specimen of Oligocenish age had some volcanic matrix."

To summarize the stratigraphic indications, *Archaeotherium superbum*, discussed above, and this *Subhyracodon occidentalis* calf, M.C.Z. No. 9119 constituting the Douglass Flat local fauna (Wood *et al.*, 1941, p. 19) indicate an Orellan (middle Oligocene) age.

Subhyracodon kewi Stock, 1933
Figure 4

"Probably *R. hesperius*," Leidy, 1869, pp. 231-232; Stock, 1933, p. 23.

Specimens. M.C.Z. No. 9120, an M^3, left, and M.C.Z. No. 9121, a partial left M^2 (Fig. 4), with fragments of other teeth, all apparently from a single individual.

Horizon and locality. "Reported to have been discovered in association with human and equine remains in Calaveras Co., California" (Leidy, 1869, p. 231).

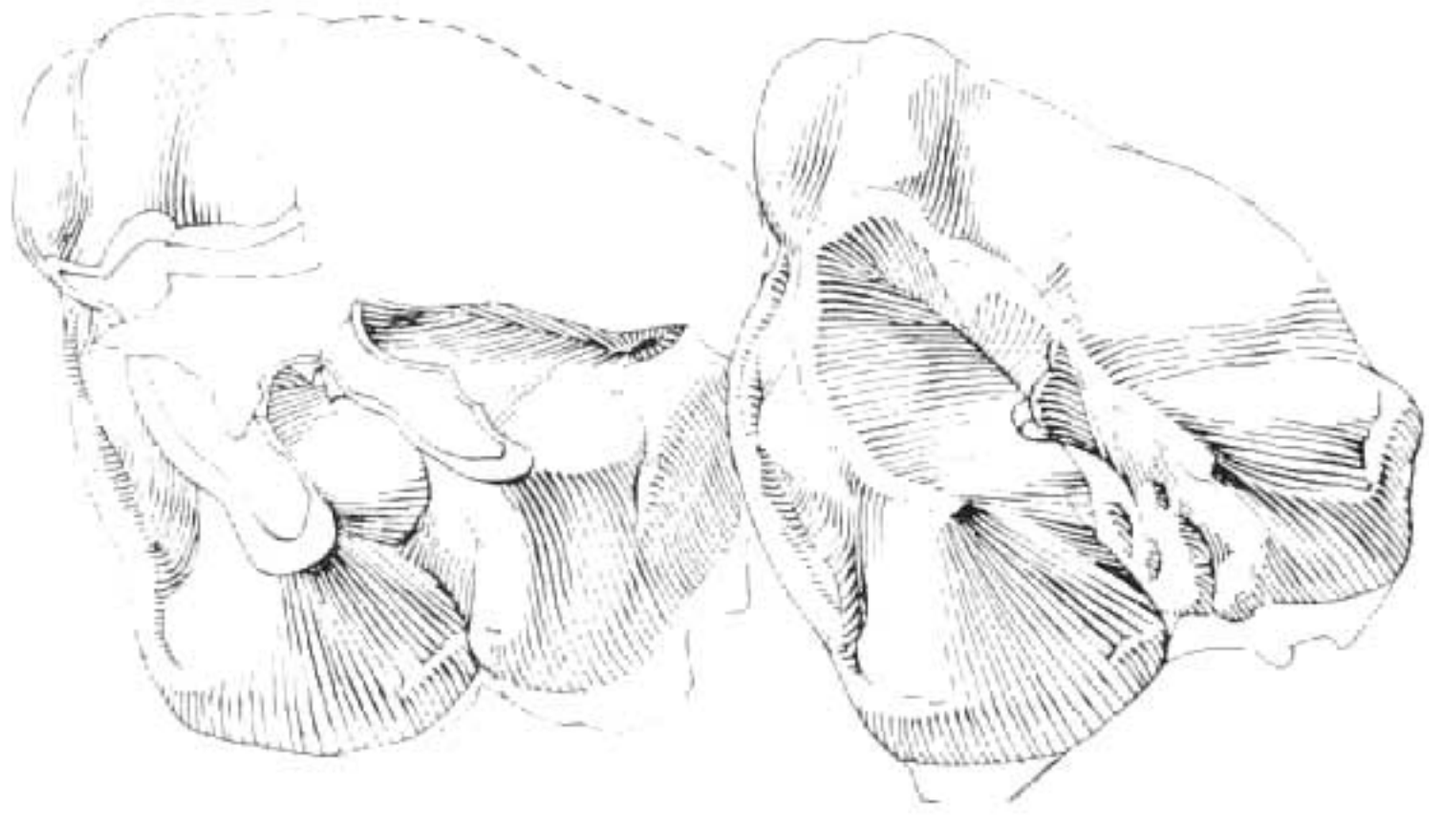

Fig. 4. *Subhyracodon kewi*, M.C.Z. Nos. 9120-9121, left M^{2-3}, crown view, x 1.

I was struck by this material in the M.C.Z. collections, labelled "*Diceratherium hesperium* (Leidy); ?California (Miocene); J. D. Whitney Coll.," without further data. Comparison of these teeth with Leidy's accurate description (1869, pp. 231-232) leaves no possible doubt that he was referring to these teeth. A visit to the California Institute of Technology collections convinced me that these teeth are referable to *Subhyracodon kewi* Stock (1933, pp. 17-23, Pls. 1-3). Every identifiable morphological character appears to be identical, particularly the incipiently *Aphelops*-like crochet of M^3 and the somewhat greater pinching off of the protocone than is usual in *Subhyracodon*, superimposed on a generally *Subhyracodon* aspect. The molars seem to be nearly or entirely devoid of internal cingula. Some

of these points suggest how a particular species of *Subhyracodon* could have been the start of the *Aphelops* line, and strengthen my previous suspicion that *Aphelops* is a descendant of *Subhyracodon* rather than an immigrant from the Eastern Hemisphere. Whether this line passes through any species of *Diceratherium* or, rather more probably, through something that, if known at all, has been called *Diceratherium* on the basis of inadequate material, must be left for future evidence to decide.

The two molars, M.C.Z. Nos. 9120 and 9121, with identical color and mode of preservation, are regarded as having belonged to the same individual as (with M^3 in a not quite fully erupted position) their interproximal wear facets fit exactly.

TABLE 3

Comparative Measurements of *Subhyracodon kewi*

		Subhyracodon kewi referred	*Subhyracodon kewi* (after Stock, 1933)		
		M.C.Z. Nos. 9120 and 9121	C.I.T. No. 1205	C.I.T. No. 1221	C.I.T. No. 1222
		Left	Type	Paratype	Paratype
Tr	M^2	e41	36.3	40.4	39
A-P	M^3	32.9		35.4	35.2
Tr	M^3	36.9		40.1	35.1

These measurements show that there is nothing unreasonable in referring M.C.Z. Nos. 9120-9121 to *S. kewi*, Stock. The locality is sufficiently uncertain so that stratigraphic inferences should not be based on these teeth. From the morphology of the teeth, the first probability would be Whitneyan age, or, if not, early Arikareean, i.e., somewhere near what is currently taken as the Oligocene-Miocene boundary.

These teeth have a unique claim to fame. The famous Calaveras human skull was collected in 1866 (Whitney, 1867 a). Leidy (1869, p. 231) refers to these rhinoceros teeth as "reported to have been discovered in association with human and equine remains in Calaveras Co., California." In view of Leidy's undeviating exactitude, this statement must have been based on Whitney's authority, perhaps softened with a note of caution on Leidy's part. Apparently, Whitney, himself (1867 a, 1868, 1879) never recorded this association in print. Whitney found himself in a highly controversial position regarding Calaveras man (cf. Bret Harte's [1902] poem "To the Pliocene Skull" and Stewart [1931]). While Whitney (1879) still considered the

Calaveras skull as Pliocene, he never mentioned the rhinoceros teeth. Perhaps Whitney realized that these teeth proved too much, that, as "Miocene," in his terminology, or "Oligocene or early Miocene," in modern terminology, their association with the Calaveras skull, if any, must have been accidental or intrusive. These teeth, then, are the closest to a concrete foundation for Bret Harte's lines:

"Then Brown he read a paper, and reconstructed there,
From these same bones, an animal that was extremely rare."

These lines are often quoted by vertebrate paleontologists but seldom identified with "The Society Upon the Stanislaus" much less with Whitney's arbitrary stand. The situation caught the public fancy when Harte's poem first appeared in the San Francisco News Letter and National Advertiser in September, 1868, under the title "Proceedings of the Academy of Sciences at Smith's Crossing, Tuolumne County" (Stewart, 1931, p. 177). Frederic Remington's contemporary sketch (Harte, 1902, facing p. 132) shows Remington himself smiling beside the preposterous restoration. The determined man with beard and glasses, his hand clenched on the manuscript, doubtless "Brown of Calaveras" could be a thinly disguised portrait of Whitney. Mark Twain appears gleeful in the upper left with John Muir just below, and Bret Harte on Brown's right. Besides numerous miners convulsed in mirth, there are other portraits whose identity is probably gone forever.

SUBHYRACODON PLANICEPS (Scott and Osborn), *nomen dubium*

Figure 5; Plate, *lower figure*

Hyracodon planiceps Scott and Osborn, 1887, pp. 170-171.
Hyracodon planiceps, Hay, 1902, p. 641.
Cacnopus mitis?, Scott, 1941, p. 794.

Type. M.C.Z. No. 6608, a partial calf skull, with dP^{2-4} right and left.

Horizon and locality. Collected by Samuel Garman, in the White River group, July 1880, without data as to level, doubtless from the Oligocene Big Badlands of South Dakota.

The original description of this specimen and of the species proposed for it, was based on an extraordinary misconception, namely, that the teeth are true molars, representing a young adult. Hence the infantile characters, such as the flat dorsal surface of the skull (thus "*planiceps*") and the widely separated temporal ridges, were regarded as specific characters. It was

never figured and has never been redescribed. Making the obvious correction that this is a calf skull, with dP^{2-4}, it is certainly not *Hyracodon* nor any hyracodont, but an Oligocene true rhinoceros, i. e., one of the Caenopinae. This was implied by Matthew (*in* Osborn, 1909, p. 105). It is not *Trigonias* because of the heavy internal cingula; the pattern seems too primitive for *Diceratherium*. *Amphicaenopus* calves appear to be unknown; its size could not debar it with certainty from *Amphicaenopus platycephalus*, though there is no positive evidence to support this assignment. Scott (1941, p. 794) tentatively refers

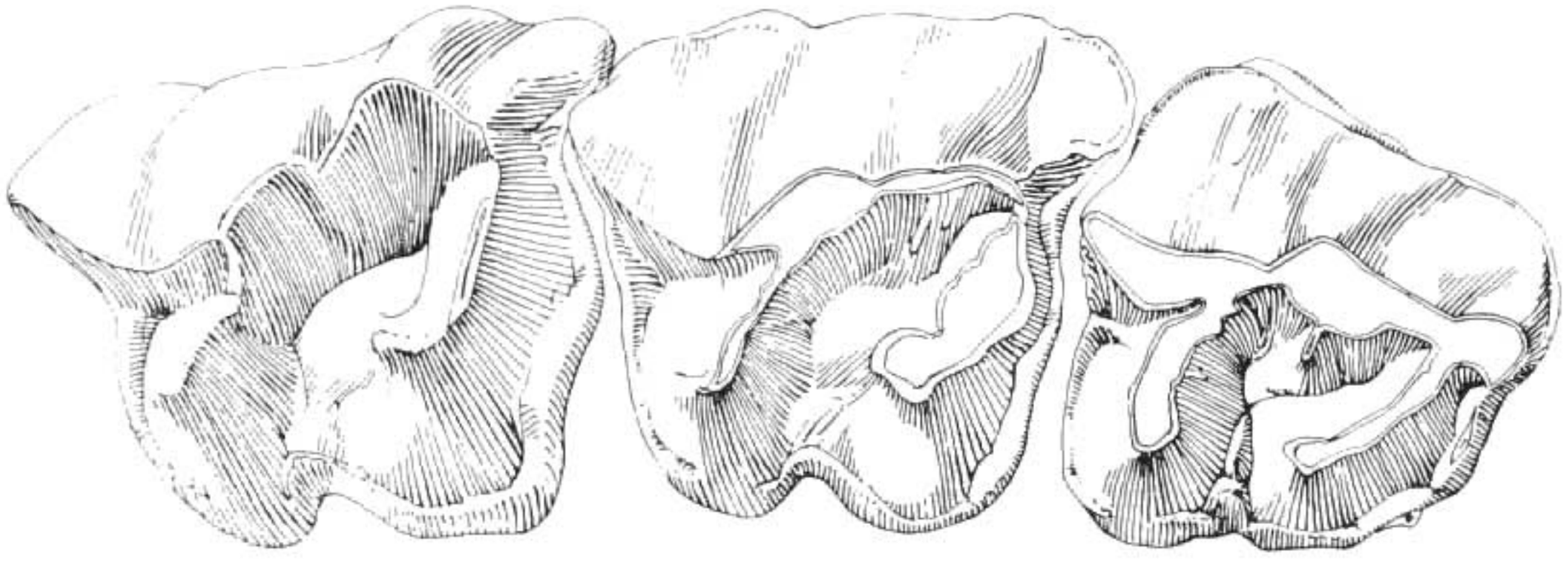

Fig. 5. *Subhyracodon planiceps*, type M.C.Z. No. 6608, right dP^{2-4}, crown view, x 1.

H. planiceps to *Cacnopus mitis*, which is impossible on size alone, as well as highly improbable from the tooth characters, such as the heavy cingula.

There is no trace of M^1; dP^{2-3} are moderately worn, dp^4 is unworn. All the close resemblances of M.C.Z. 6608 are to *Subhyracodon* calves. There are general resemblances to *S. occidentalis* calves in the American Museum collections (e.g., A.M.N.H. No. 534, see Osborn, 1898, Pl. 13, fig. 6), but some differences are present. The teeth of M.C.Z. No. 6608 are somewhat larger and "heavier" looking, about in proportion to the dental advance of adult *S. tridactylus* over *S. occidentalis*. A sharp, distinct, cuspule juts up in the median valley of dP^2; buccal to the internal cingulum. Right dP^2 has an incipient double crochet on its metaloph. The premolars have internal cingula, briefly interrupted by the hypocones. The minute remaining fragments of the matrix are more suggestive of the Poleslide (upper) Member of the Brule (Bump, 1956) than of the Scenic Member.

TABLE 4
Measurements of M.C.Z. No. 6608

	Right	Left
A-P, dP^{2-4}	88.7	89.6
A-P, dP^2	28.5	28.0
Tr, dP^2	33.0	31.3
A-P, dP^3	28.8	28.3
Tr, dP^3	36.0	e35
A-P, dP^4	33.0	31.5
Tr, dP^4	35.5	34.8

If I were only guessing, the most probable specific allocation would be with *Subhyracodon tridactylus* since, in addition to the reasons already given, dP^{2-4} is about the length of P^{2-4} of this species. It also occludes satisfactorily with A.M.N.H. No. 1112, a calf lower dentition referred to *S. tridactylus*. If this synonymy could be conclusively demonstrated, *S. planiceps* (Scott and Osborn, 1887) would have priority over *S. tridactylus* (Osborn, 1893) by six years. However, the following alternative interpretations are possible: (1) an extra large, aberrant *S. occidentalis;* (2) *S. occidentalis metalophus*, if that form is valid; or (3) the unknown calf of *Amphicaenopus platycephalus*. Even if one concludes that *S. planiceps* is more probably conspecific with *S. tridactylus* than not, it would be pedantic and a definite disservice to everyone to try to substitute a nearly forgotten name, based on a calf skull of unknown stratigraphic level, for a long established name, based on a nearly complete adult skeleton from a known level. The soundest treatment, therefore, seems to be to refer "*Hyracodon*" *planiceps* to *Subhyracodon*, with fair probability, but to consider it a *nomen dubium*.

A notice has been submitted to the Secretary of the International Commission on Zoological Nomenclature proposing the suppression of *Hyracodon planiceps* Scott and Osborn as a *nomen dubium*, stating the case as herein given. This notice has been accepted for publication in the Bulletin of Zoological Nomenclature.

DICERATHERIUM sp. cf. D. ARMATUM (Marsh), 1873
Figure 6 *A, B*

". . . a small rhinoceros," Woodworth and Wigglesworth, 1934, pp. 26, 85, 159-160.

Specimen. M.C.Z. No. 10883, the cast of a left permanent upper premolar, without ectoloph, interpreted as P^2 of *D.* sp. cf. *D. armatum*.

Horizon and locality. Miocene deep blue clay at base of greensand, Gay Head Cliff, Martha's Vineyard, Mass.

This specimen has stratigraphic and geographic significance only: it extends the range of *Diceratherium* farther east than New Jersey (Wood, 1939) and indicates, in the famous Gay Head Cliff section, an equivalent of the continental early Miocene (Arikareean). The specimen is referred to *Diceratherium* because of the incipient double crochet on the metaconule and the ribs which descend from protocone and metacone to join as a sort of half-hearted mure. This combination of characters could hardly be found except in *Diceratherium* and no characters contradict this assignment. The anteroposterior dimension

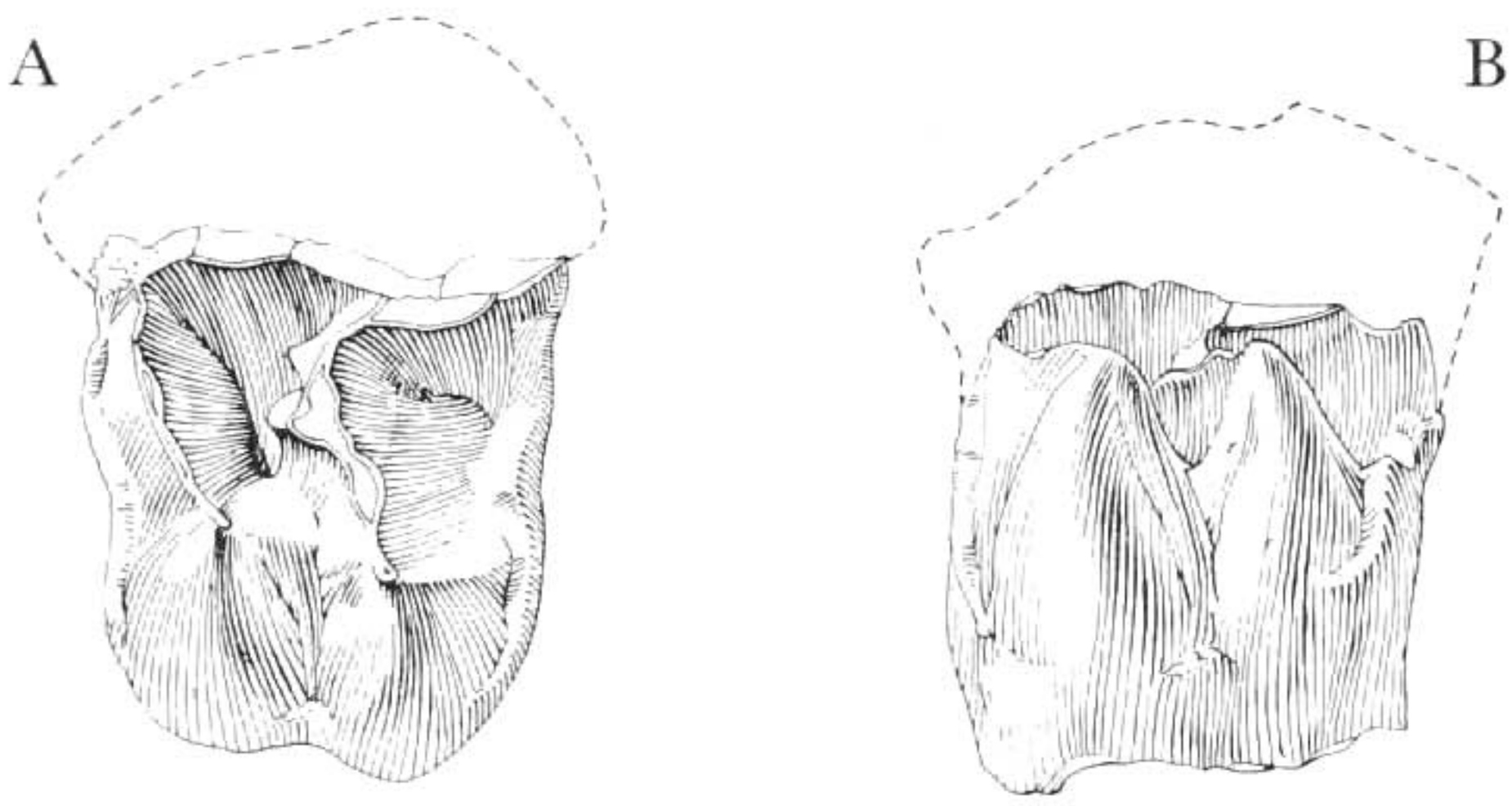

Fig. 6. *Diceratherium* sp. cf. *D. armatum*, M.C.Z. No. 10883, cast of a damaged left upper premolar, apparently P^2, from Martha's Vineyard, Mass.; *A*, crown view, *B*, lingual view, x 1.

along the middle of the tooth is 28.9 mm. The tooth is tentatively identified as P^2 of *Diceratherium* sp. cf. *D. armatum*. Daniel Vincent collected this interesting specimen about 1913, and gave it to M.C.Z. on January 26, 1918. It later went to the Boston Society of Natural History in an exchange arranged by Prof. J. B. Woodworth. Since then it has eluded the most careful hunting. Fortunately, M.C.Z.'s presumably accurate cast, No. 10883, remains to document its former existence. Woodworth and Wigglesworth (1934, pp. 26, 85, 159, 160) cite it briefly as a mid-Tertiary rhinoceros tooth, omitting description or identification with the implication that it was examined and described by Glover M. Allen. However, Allen apparently never published a description.

TABLE 5
Comparative Measurements of *Diceratherium armatum*

	M.C.Z. No. 10883	*Diceratherium armatum* type, Y.P.M. No. 10003	
	Left	Right	Left
A-P, P^2	28.9	29.1	27.7
Bottom of "post fossette" to internal margin of tooth	20.5	18.3	18.4

Family HYRACODONTIDAE
HYRACODON NEBRASKENSIS (Leidy)
Figure 7

Hyracodon major Scott and Osborn, 1887, p. 170.

Type. P. U. No. 10001, miscellaneous postcranial bones of a large *Hyracodon*, inseparable from *Hyracodon nebraskensis.*

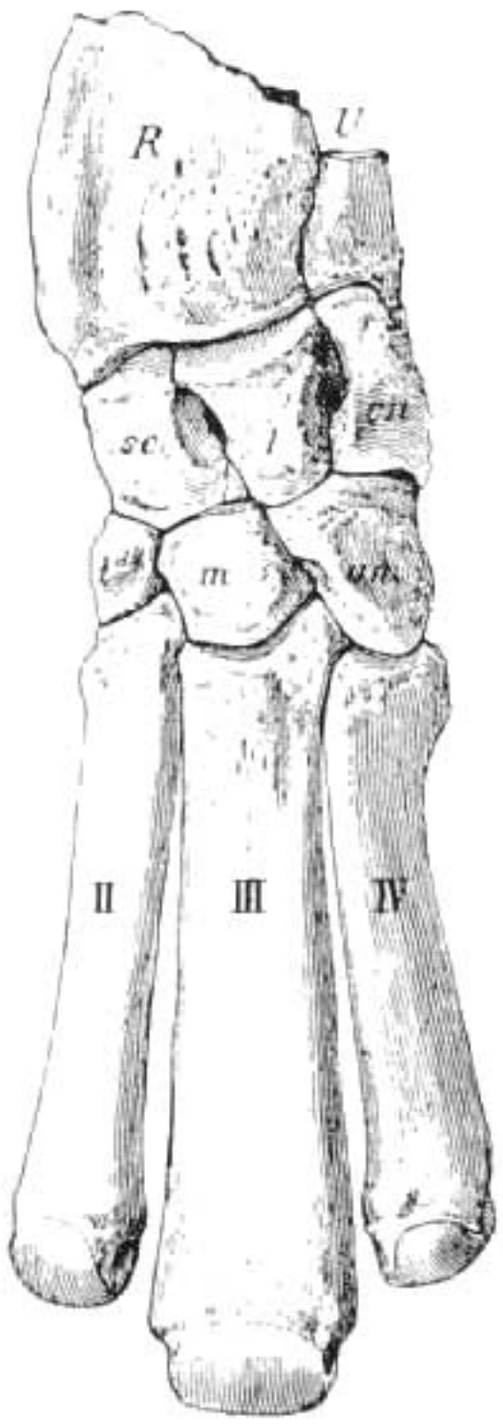

Fig. 7. *Caenopus* cf. *mitis*, M.C.Z. No. 11703, anterior aspect of left manus. Basis for type description of *Hyracodon major*, hitherto unpublished drawing by Rudolph Weber, x .325.

Type description. Based on M.C.Z. No. 11703, a partial left manus referable to *Caenopus, sensu stricto*, possibly to *Caenopus mitis* (Fig. 7).

Scott and Osborn (1887, p. 170) state that the "type of this species is a fairly complete skeleton in the Princeton Museum."

According to Sinclair (1922a, p. 477) and the Princeton University Catalogue of Fossil Vertebrates, this specimen is P.U. No. 10001, which, while a large individual, is not beyond the present known size range of *Hyracodon nebraskensis*, and is completely without other distinctive characters. Nevertheless, Scott and Osborn based their entire type description on M.C.Z. No. 11703, a specimen consisting of a partial left manus of a true *Caenopus* which agrees closely with P.U. No. 11418, the right manus attributed, probably correctly, to *C. mitis* by Scott (1941, Pl. 88, figs. 3 and 3a). Allen (1931, p. 286) concluded, with some reason, that, despite the clear statement by Scott and Osborn, M.C.Z. No. 11703 is really the type, since they based their description exclusively on it. This treatment would make *H. major* a probable synonym of *C. mitis*. I prefer the alternative interpretation, treating the Princeton specimen as the type, and assigning *H. major* to synonymy with *H. nebraskensis*, which would make M.C.Z. No. 11703 a misidentified referred specimen, now re-assigned to *Caenopus*, probably to *C. mitis*. In either case, *Hyracodon major* is a junior synonym, whether of *H. nebraskensis* or of *Caenopus mitis*.

TABLE 6
Measurements of manus, M.C.Z. No. 11703

Greatest length	Functional median length
Mtc. IV 102	110
Mtc. II 115	119
Mtc. III 126	99

Family AMYNODONTIDAE
METAMYNODON Scott and Osborn, 1887

Cadurcopsis Kretzoi, 1942.

Genotype. *Metamynodon planifrons* Scott and Osborn, 1887, pp. 165-169.

The genus *Metamynodon* will be given only a summary treatment here because an extended discussion of the Amynodontidae is in preparation. This genus has occupied an equivocal position because of numerous misconceptions in print. The following short discussion should clarify the more puzzling aspects pending the release of the more thorough treatment.

Scott (1941) treats this genus satisfactorily, limiting himself essentially to *M. planifrons*. It has been unfortunate that the most widely known purported illustration of the crown view of the upper dentition of *M. planifrons* (Osborn, 1898, fig. 10) actually represents the type specimen of *Amynodon intermedius*

Osborn (1889), redrawn somewhat incorrectly from a photograph. In conjunction with the damaged teeth of the type specimen of *M. planifrons*, this illustration seems to have misled various workers (especially foreign paleontologists forced to rely on illustrations) as to the dental characters of *Metamynodon*.

METAMYNODON PLANIFRONS Scott and Osborn, 1887
Figure 8; Plate, *upper figure*

Amynodon aff. *intermedius*, Pavlow, 1893, pp. 37-42.
Metamynodon rex Troxell, 1921a, p. 24.
Cadurcopsis dakotana, Kretzoi, 1942, pp. 139-148.

Type. M.C.Z. No. 9157, a good skull with badly damaged teeth; a left ramus, M.C.Z. No. 9157, is tentatively associated with the skull; *paratype*, M.C.Z. No. 11931, the right ramus of a different individual.

Horizon and locality. "White River Miocene" (= Oligocene), collected by Samuel Garman, 1880-1881. All specimens of this species of known locality and level are from the *Metamynodon* sandstones or stream channels, in the lower part of the Scenic Member of the Brule (early Orellan or early middle Oligocene) of the Big Badlands of South Dakota.

Diagnosis. $I\ ^{3\text{-}2}_{2\text{-}1}$, $C\ ^{1}_{1}$, $dP\ ^{3}_{3}$, $P\ ^{3}_{2\text{-}(1)}$, $M\ ^{3}_{3}$; incisors most often $^{2}_{1}$; large everted canines, crowns triangular in section; upper premolars relatively small and often incipiently trilophodont, with a high posterior cingulum simulating a third transverse crest; P^4 almost pear-shaped in outline, bulbous internally, instead of rectangular, an effect further accentuated by crown and interstitial wear; P_3 degenerate, suggestive of anterior premolars of other rhinoceroses, whether P_1 or P_2; molars, upper and lower, hypsodont, buccally, when unworn, and brachyodont or nearly so lingually, enormously overshadowing the premolars in size; outline of unworn M^1 keystone shaped, becoming rectangular with prolonged wear; lower molars unusually elongated, with posterior crescent relatively flattened; size range (in millimeters): P^2-M^3, 200-230; $P^{2\text{-}4}$, 60-67; $M^{1\text{-}3}$, 140-170; P_3-M_3, 203-217; $M_{1\text{-}3}$, 160-174, differences in length largely a function of wear; short broad skull with very short face; short nasals; dorsally convex sagittal crest; wide zygomata.

Scott (1941) treats the genus by a full discussion of the species *M. planifrons*, without much reference to the type specimen, except for figure 140 and page 848 which deal with the region of the anterior nares. Scott and Osborn (1887, pp. 165-169) gave

an excellent description of the type, for the time; their figures 7 and 8, giving lateral and anterior views, are still sufficiently accurate, as far as they go. The description does not indicate which characters of the lower jaw are taken from M.C.Z. No. 9157, supposedly part of the type, and which from M.C.Z. No. 11931, the paratype. The skull has been moderately crushed, dorsoventrally, with the dorsal surface shoved somewhat to the right, accounting for the general difference in appearance from many specimens which have been crushed laterally. Scott's restoration (1941, Pl. 91, fig. 1a) of the *M. planifrons* skull, in anterior view, with crushing compensated for, accords with present knowledge. The most unsatisfactory part of the type description is the account and illustration (Scott and Osborn, 1887, fig. 9) of

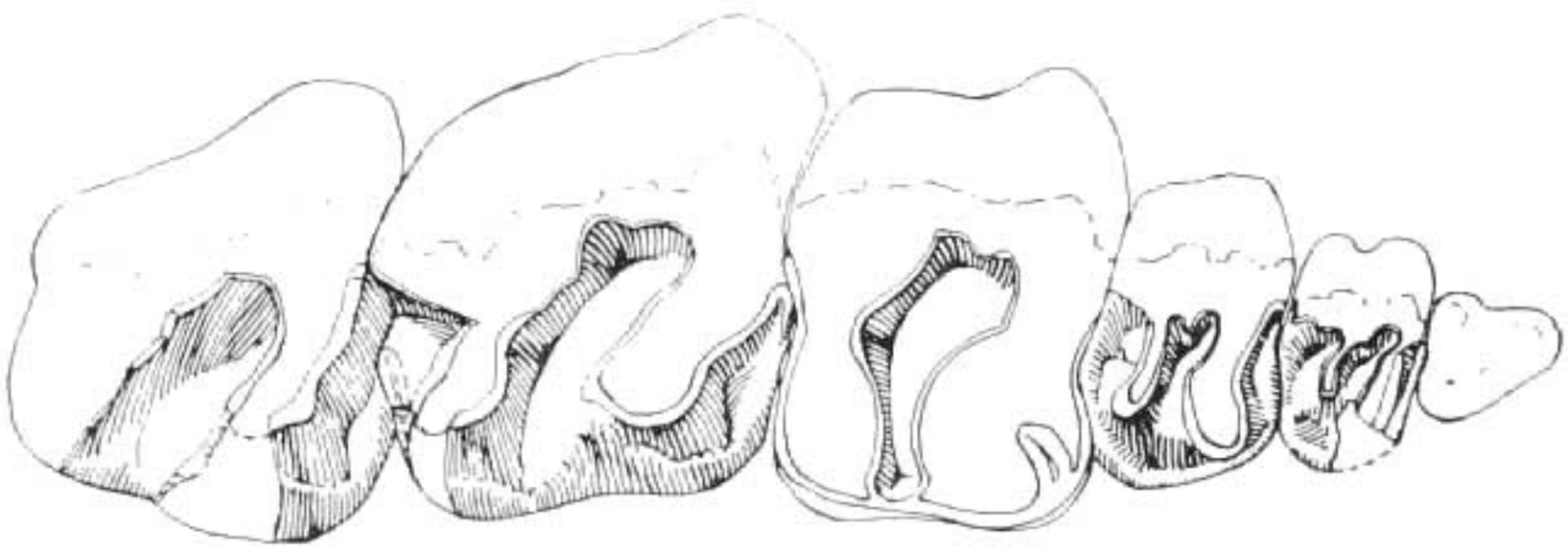

Fig. 8. *Metamynodon planifrons*, type M.C.Z. No. 9157, left P^2-M^3; P^3, M^1, and M^2 slightly restored from opposite side, x .372.

the dentition, as shown in the ventral view of the skull. This must have been largely conjectural, since the teeth are seriously damaged, and the valleys of the teeth were filled with matrix until my visit to Harvard in August, 1954. A new and more accurate figure of the check teeth is given here (Fig. 8).

SUMMARY

1. The fossil mammals of the Whitney collection from the California "auriferous gravels" are all of mid-Tertiary age, with the probable spread only from Orellan to Whitneyan (middle to upper Oligocene). The extreme possible spread would be from Chadronian to Arikareean.
2. *Subhyracodon kewi* is a reasonable structural ancestor for *Aphelops*.
3. The rhinoceros tooth from Martha's Vineyard is assigned to *Diceratherium* cf. *armatum*, an Arikareean (lower Miocene) guide fossil.

4. The Harvard rhinoceros types of Scott and Osborn are redescribed and discussed. "*Hyracodon major*" is a synonym of *Hyracodon nebraskensis*. "*Hyracodon planiceps*" is placed in *Subhyracodon* as a *nomen dubium*, and the characters of *Metamynodon planifrons* are clarified.

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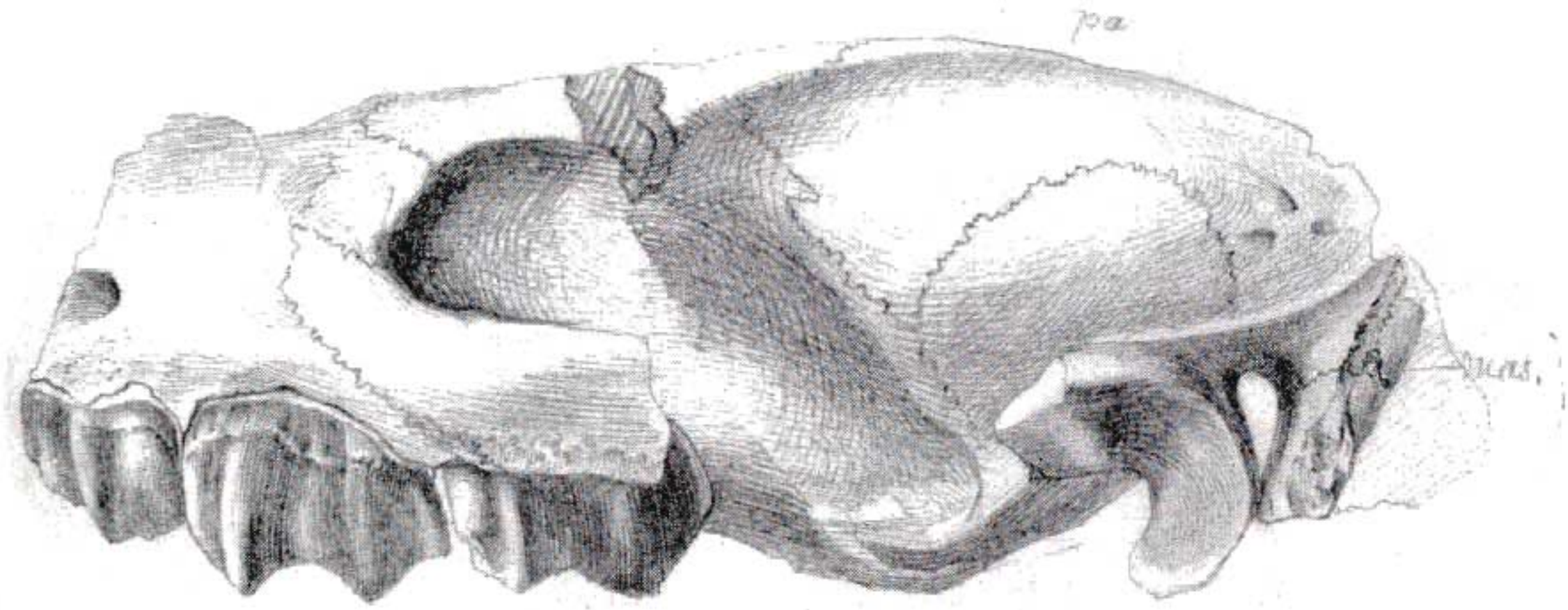

Plate. *Upper figure*, *Metamynodon planifrons*, type, M.C.Z. No. 9157, dorsal view of skull, x .20. Photograph by Frank White.

Lower figure, *Subhyracodon planiceps*, type, M.C.Z. No. 6609, lateral view of skull, x .50. Hitherto unpublished pencil drawing by Rudolph Weber, approved May 18, 1887.