

ART. III.—Notes on the Bridger (Eocene) Carnivora;
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[Contributions from the Othniel Charles Marsh Publication Fund, Peabody Museum, Yale University, New Haven, Conn.]

INTRODUCTION.

As a result of the preparation of the Eocene (Bridger) material in the Marsh Collection, many specimens of Carnivora have appeared, which had not previously been identified or studied. Hence this paper describes the more important specimens of this new material, and corrects certain errors which have crept into the literature concerning the types and other specimens of the Bridger carnivores in the Marsh Collection. Reference should be made to Wortman's very valuable papers in this Journal during 1901-1902, describing the Eocene Carnivora in the Peabody Museum, and to Matthew's monograph on the Carnivora and Insectivora of the Bridger Basin, Middle Eocene.

There are thirty-two type specimens of species within this group in the Marsh Collection, and they are the material upon which the following forms were based:

1. *Viverravus gracilis* Marsh.
2. *V. vulpinus* (Marsh).
3. *V. minutus* Wortman.
4. *Miacis* (*Harpalodon*) *sylvestris* (Marsh).
5. *M.* (*Lycarion*) *hargeri* (Wortman).
6. *Oödectes herpestoides* Wortman.
7. *Vulpavus palustris* Marsh.
8. *Patriofelis latidens* (Marsh).
9. *P. ferox* (Marsh).
10. *Limnocyon verus* Marsh.
11. *Thinocyon velox* Marsh.
12. *T. medius* (Wortman).
13. *Sinopa minor* Wortman.
14. *S. major* Wortman.
15. *Tritemnodon agilis* (Marsh).
16. *Harpagolestes macrocephalus* Wortman.
17. *Dromocyon* (*Synoplotherium*) *vorax* Marsh.
18. *Ziphaeodon rugatus* Marsh (doubtfully carnivore).

MIACIDÆ.

Viverravus gracilis Marsh.

The holotype, Cat. No. 11836, Y. P. M., was collected at Grizzly Buttes, in strata of lower Bridger age. Several individuals were found in upper Bridger deposits, and hence we may assume that this form was common to both the lower and the upper Bridger period. There seem to be no real distinctions between the specimens of these two horizons.

The type specimen, consisting of two rami with teeth and a superior sectorial molar, figured by Wortman in 1901 (p. 146, figs. 18, 19), is there shown three quarters natural size, and not natural size as stated in the legend beneath those drawings. There are nearly two dozen representatives of this species, other than the type, in the collection, which were found on Cottonwood Creek, along Henry's Fork, at Cattail Spring, Grizzly Buttes, Point Gulch, Lone Spring, Little Spring, Dry Creek, and elsewhere in the Bridger Basin, Wyoming.

Viverravus vulpinus (Marsh).

The holotype of *Harpalodon vulpinus* Marsh, Cat. No. 11809, Y. P. M., is undoubtedly referable to *Viverravus*. Wortman and Matthew considered it a representative of *V. gracilis*, but a careful reëxamination of the type leads the author to feel that although it is closely related to *V. gracilis*, yet it apparently indicates a large variety or mutant of that species, which lived in the upper Bridger. The ramus is of greater depth and breadth beneath the premolars than that of *V. gracilis*. This type was collected in 1871, near Henry's Fork, in upper Bridger strata. (See Wortman, 1901, p. 201.)

A part of a left ramus, Cat. No. 13012, Y. P. M., collected near the top of the bluffs on Cottonwood Creek, southeast of Ft. Bridger, in middle Bridger strata, is apparently a transitional form between *V. gracilis* and *V. vulpinus*, for the length of the tooth-row is about the same as that of the former, and the depth and robustness of the ramus the same as that of the latter species.

Another specimen, Cat. No. 13054, Y. P. M., from the upper Bridger, is part of a right ramus which is referable

to this genus and species. A specimen in the American Museum, Cat. No. 12623, from the upper part of Horizon D, is probably a representative of *V. vulpinus*.

In view of the above, it would be well to restore this Marsh species, considering it a variety or mutant of *V. gracilis*, showing a decided increase in size and confined to the upper Bridger.

Measurements of Holotypes.

	<i>V. gracilis</i> mm.	<i>V. vulpinus</i> mm.
Length of inferior premolar series....	18	22
Depth of ramus below P ₄	6	8
Thickness of ramus below P ₄	2.75	4
Ant.-post. diameter of P ₄	5.5	7

Viverravus minutus Wortman.

There are several jaws, other than the types (holotype, Cat. No. 11837; paratypes, Cat. Nos. 12886 and 13090) in the collection. The main distinction of the species lies in its smaller size as compared to *V. gracilis*.

Viverravus sicarius Matthew.

Parts of three rami, found in the lower Bridger horizon, are referred to this species.

Viverravus (?) *nitidus* Marsh.

The holotype, Cat. No. 11888, Y. P. M., is a lower molar, presumably the first, of which the crown is complete. It was collected near Henry's Fork, in upper Bridger strata. Doctor Matthew considered it a deciduous tooth, of probably one of the Leptictidæ, but practically indeterminate. When Professor Marsh proposed the species, he referred it to *Viverravus* with a query (1872, p. 205). In the same article (p. 214), he proposed the genus and species *Entomodon comptus*, one of the Leptictidæ. After describing the holotype of this new form he said: "It is probable that the small mammal referred provisionally by the writer to the genus *Viverravus*, under the name *V. nitidus*, may belong to the present genus. The species is rather smaller than the one here

described." With the type specimen of *V. (?) nitidus* is a note, written by Marsh, saying "not *Viverravus* but *Entomodon*."

Hence it seems that Marsh thought that this species should be referred to the insectivores and that it was doubtfully carnivore. When the insectivore material in the Marsh Collection is restudied, doubtless its correct identification and true relationships will be made known. I might add that in comparison with the type of *Entomodon comptus*, there are no essential distinctions other than that of size.

Miacis (Harpalodon) sylvestris (Marsh).

The holotype, Cat. No. 11808, Y. P. M., was figured in this Journal in 1901 (p. 201), and was collected on Henry's Fork, in upper Bridger strata. At the time when Wortman studied this material, he concluded that "The structure of the premolars agrees most nearly with those of *Uintacyon edax*."

Since that time our knowledge of this form has been greatly amplified and the evidence points conclusively, it seems, to the opinion that *H. sylvestris* is most closely related to *Miacis*, and that, on account of certain differences in structure, we should consider it a subgenus of *Miacis*, rather than a synonym of it. Doctor Matthew first expressed this opinion.

Miacis (Lycarion) hargeri (Wortman).

The holotype (Cat. No. 10071, Y. P. M.) and two associated paratypes (Cat. Nos. 11839 and 11840) form the basis for this species. Several other specimens were collected in various parts of the Bridger Basin, as at Grizzly Buttes, Millersville, Point Gulch, Church Buttes, as well as on Henry's Fork, the type locality. The majority, including the types, came from upper Bridger strata.

Miacis parvivorus Cope.

At least eight specimens in the Marsh Collection are referable to this species although they show a certain amount of variation.

Uintacyon jugulans Matthew.

A part of a right ramus and both superior first molars, Cat. No. 12995, Y. P. M., are apparently much closer to this species than to *U. edax*, to which they were referred by Wortman (1901, pp. 25-28). The inferior P_4 is elongate and compressed, and the other characteristics of this ramus and its teeth coincide with Matthew's type and are in the same manner differentiated from Leidy's type of *U. edax*.

The associated upper molars I consider referable to the same species, and not to *Viverravus* as thought by Matthew. I am in agreement with Matthew that these molars are not absolutely typical of *Uintacyon*, but I do maintain that they are closer to this genus than to any other of the known Miacinae or the Viverravinae. Unfortunately the type of *U. edax* has disappeared, but there are here excellent casts of it made under the direction of Professor Marsh.

Additional material of both *U. jugulans* and *U. edax* may show that the former is a slightly smaller variety or maybe the female form of *U. edax*. The type of the latter is somewhat anomalous, bearing five premolars, and may indicate a robust long-jawed male, such as are sometimes found among recent canids, or as I have found in the Merycoidodontidae, and therefore not typical of the species. In that event, *U. jugulans* might well be close to the normal form.

Uintacyon vorax Leidy.

This species is represented by upper and lower teeth of several individuals. One specimen, Cat. No. 13077, Y. P. M., is an individual M^1 , intermediate in size between this species and *U. major* Matthew. Cat. No. 13004 embraces part of the left maxillary bone with the base of P^4 and complete M^1 (see Wortman, 1901, p. 448, fig. 16). Owing to the legend beneath this figure, which states that it is natural size, whereas it is one and one half times natural size, Matthew was led to refer it to *U. major* on the basis of relative dimensions. I am in accord with Wortman's identification for the specimen.

Uintacyon major Matthew.

An unworn M^1 in part of the maxilla, Cat. No. 13027, Y. P. M., shows excellently the tooth characters. It is very similar to the corresponding tooth of *U. vorax* and about one and one half times as large. It was collected near Ft. Bridger.

Uintacyon scottii (Wortman and Matthew).

The anterior portion of a left ramus, Cat. No. 13003, bearing a complete P_2 and alveoli of the canine, P_3 and P_4 , figured by Wortman in 1901, is provisionally referred to this genus, for the specimen is more closely allied to *Uintacyon* than to *Prodaphænus*, as now defined. This jaw apparently does not coincide with any other of the described species of this genus, although later it may be referred to some one of the larger forms of *Uintacyon*.

Oödetes herpestoides Wortman.

The type material upon which this genus and species are based is included under the catalogue numbers 11861 and 12845, Y. P. M. Parts of bones of other individuals were collected at or near Millersville.

It is my opinion that the holotype of *Triacodon nanus* Marsh represents this genus and species. This type, Cat. No. 11850, is the trigonid, presumably of a first lower molar. It apparently coincides with the corresponding part of M_1 of *O. herpestoides*, but no absolutely definite identification can be made with so small a part of an individual animal. This specimen was collected at Grizzly Buttes, Wyoming, presumably in lower Bridger strata.

Vulpavus palustris Marsh.

The holotype is an individual right M_1 , Cat. No. 11841, Y. P. M., of which the antero-external angle is broken away. This was figured by Wortman in 1901 (p. 341, fig. 1), but the drawing is incorrectly restored in outline so that it resembles the corresponding tooth in *Uintacyon* or *Miacis*, and is not typical of *Vulpavus*. The legend beneath the figure makes the scale natural size, whereas

it is one and a half times natural size. This type, collected by Professor Marsh in 1870 at Grizzly Buttes, is 8 mm. in transverse diameter at the posterior of the crown and 4.5 mm. in antero-posterior diameter in the middle of the crown. Its age is lower Bridger.

With the type, Marsh associated part of a right maxilla, with a portion of the crown of P⁴ and the roots of the two succeeding molars, Cat. No. 13091, Y. P. M. Wortman identified this specimen as belonging to *Sinopa*. The author now refers it to *Tritemnodon agilis* (Marsh), the type of which it resembles even in minute details. This maxillary was found at Grizzly Buttes by Dr. J. V. A. Carter in 1870 in the lower Bridger.

OXYÆNIDÆ.

Patriofelis latidens (Marsh).

The holotype, Cat. No. 10940, Y. P. M., collected near Henry's Fork, in upper Bridger rocks, was the basis for *Orecyon latidens* Marsh. Subsequently both Matthew and Wortman considered this latter synonymous with *Patriofelis ferox* Marsh.

It seems that there is sufficient evidence to warrant reöpening this case, for a very careful reëxamination of this type shows that there were but two lower incisors, as stated by both Marsh and Wortman. The external incisor is large and laterally compressed, having an antero-posterior diameter of 10 mm. and a transverse one of 6 mm., while the other incisor was situated almost directly behind it. This one had a transverse diameter of 3 mm. and was about that in the other diameter. The space between the outer incisor and the canine, and that between this incisor and the symphysial suture, are approximately the same, i. e., a trifle more than 1 mm. *Patriofelis* possessed three lower incisors, while *Oxyæna* had but two. On the other hand, *Patriofelis* had but three premolars and *Oxyæna* four. Hence the Yale specimen partakes of the characters of both, in that it had two incisors (like *Oxyæna*) and three premolars (as in *Patriofelis*). In other characters it is nearer to *Patriofelis* than to *Oxyæna*, and therefore at present I prefer placing it within *Patriofelis* as a distinct species.

However, I am inclined to view this as a transitional form and it may be given subgeneric rank under *Patriofelis*.

Measurements.

	mm.
Length of lower premolar series.....	51
Ant.-post. diameter of canine.....	21
Depth of ramus below P ₄	50.5
Length of symphyseal suture.....	76

Patriofelis ferox (Marsh).

The principal type specimens in this Museum now referred to this genus and species are as follows:

No. 11865. Part of a lower jaw with M₂ (Wortman 1901, p. 117, fig. 65), glenoid and base of zygoma of the squamosal, part of pelvis with half of the acetabulum, parts of three vertebrae, distal end of tibia, and upper portion of two ribs. Type of genus and species of *Limnofelis ferox* Marsh 1872, from near Henry's Fork, in the upper Bridger.

No. 10904. Individual left P⁴, with internal part broken off, together with a fragment of another tooth. Holotype of *Limnofelis latidens* Marsh 1872, from Grizzly Buttes. Lower Bridger.

No. 11755. Individual Dp₄. Holotype of *Ælurotherium bicuspis* Wortman 1901. Described as M₁. Henry's Fork. Upper Bridger.

Provisionally referred to this genus and species is Cat. No. 11756, Y. P. M., the type of *Ælurotherium "latidens"* Wortman. It is an incomplete left ramus with deciduous canine; alveolus of Dp₁, and part of the crowns of Dp₂ and Dp₃, and M₁ partially erupted. I wish to emphasize the provisional reference of this specimen to *Patriofelis ferox*, as there are some factors which render its position not at all certain.

The specimen should not have the specific name *latidens*, if my interpretation of the literature be correct. In 1872, when the genus *Limnofelis latidens* Marsh was proposed, the holotype was a left P⁴. The immature jaw, under consideration, was mentioned in the type reference of *L. latidens* in this manner: "Another specimen, apparently of this species, is the left lower jaw of

a young individual. It contains the canine, and three molars, the last of which is still nearly enclosed in the jaw. The space occupied by the three molars is 46 mm." Professor Marsh considered it *apparently* of the same species, but with a rank not higher than that of a referred specimen. Hence it should have received a new specific name when it was placed in the genus *Ælurotherium*, for Wortman regarded it as a form quite distinct from the holotype of *L. latidens*. Additional material led Professor Marsh in November 1872 to remove *L. latidens* from *Limnofelis*, and to create a new genus, *Oreocyon*, the type species being *O. latidens*. The type specimen is Cat. No. 10940, consisting of the anterior part of both rami and other material. It is now proposed to place *O. latidens* with *Patriofelis* as a distinct species, *P. latidens* (Marsh).

Reverting to the above mentioned immature jaw, the canine, which is seemingly deciduous, measures 12 mm. antero-posteriorly and 7 mm. transversely at the base of the crown, whereas the permanent canine in *P. ferox*, in the same diameters, measures 24 mm. and 18 mm. respectively. The first deciduous molar is two-rooted; not one-rooted. It is close to the canine, with its anterior root external, so that the tooth is set obliquely as in *Patriofelis*. This tooth would normally be supplanted by P_2 .

Wortman maintained that M_2 was smaller than M_1 , but Matthew held that, in a jaw so immature, the chamber for M_2 would not be of full size at that age, which is true. However, if this jaw is of the *Patriofelis* type, it would seem as though M_2 would have been farther advanced in its development than it apparently was at the time of death of this carnivore. The alveolus of M_2 is 4.2 mm. antero-posteriorly and 6 mm. in depth. The internal nutrient canal lies immediately below the base of this osseous chamber. The thickness of the ramus at the postero-superior part of the alveolar parapet of M_2 could not have been much greater than 3 mm.

A comparison of the relative depth of the ramus of this young animal with an adult jaw of *P. ferox* is interesting, as shown in the following table:

	No. 11756	<i>P. ferox</i> No. 12078
	Y. P. M.	A. M. N. H.
	mm.	mm.
Depth of ramus below ant. premolar...	32	46
Depth of ramus below post. part of M_1 .	24	45
Length, P_3 - M_1 , inclusive.....	46	54

Anteriorly, the depth of the ramus is relatively much greater than that of *Patriofelis*.

In conclusion, there is much uncertainty as to just how much the youthful characters influence the form and proportions now seen in this ramus. The relations between young and adult felids, as well as those between the youthful and mature stages of the canids, seem to be more uniform than those shown between this immature jaw and *Patriofelis*. I can not help feeling that we should have considerably more corroborative data before we confidently place this specimen with *Patriofelis*.

Several other specimens are referred to this genus and species. One, Cat. No. 12864, comprising several skeletal elements, was collected on Henry's Fork Divide. This animal suffered from acute exostosis, especially in the appendicular skeleton and its extremities. Another fragmentary skeleton, Cat. No. 13093, from Henry's Fork, has a nearly complete humerus, complete left ulna, and other material. The length of the ulna and of the humerus is approximately 207 mm., respectively, and the maximum diameter of the humerus (distal part) is 71 mm.

Patriofelis ulta Leidy.

The distal parts of two humeri, one from Grizzly Buttes, are identified with this species, as they are somewhat smaller than the corresponding part of *P. ferox*. The maximum diameter across the distal articular surface is 61 mm.

Limnocyon verus Marsh.

In the first description of this genus and species in 1872, Professor Marsh mentioned that there were remains of several individuals, which agreed in all respects excepting size. Cotype Cat. No. 11796 is a skull with the molars and last two premolars on each side.

Plate VIIIa, this Journal, March 1902, shows an excellent drawing of this skull, which was collected on Henry's Fork by Professor Marsh in presumably upper Bridger strata. There is also figured in the above reference a series of right upper teeth, including two of the three incisors. This also is a cotype, Cat. No. 13095, and these teeth were marked by Marsh as being one of the types of the species. They were collected in the lower Bridger formation at Grizzly Buttes, by J. F. Quigley, a member of the Yale Expedition of 1871.

With this species, Wortman united *L. riparius* Marsh, the type of which is numbered 11781, Y. P. M., also described and figured in this Journal by Wortman in 1902.

More than twenty individuals of this species are in the Marsh Collection, found chiefly at Grizzly Buttes and Henry's Fork, but also at Twin Buttes, Church Buttes, Dry Creek, and Lone Tree. These remains consist of both teeth and skeletal parts.

Thinocyon velox Marsh.

A nearly complete left ramus, with either the crowns or alveoli of all the teeth, and with the condyle detached, Cat. No. 11797, constitutes the holotype of this species, while the species is the type of the genus. It was collected in lower Bridger strata at Grizzly Buttes, and figured by Wortman in 1902, page 202. Figure 77 on the same page is incorrect and misleading. In fact, Matthew has said it was "certainly not *Thinocyon*." Of M^1 , the paracone and metacone are actually much closer together and the metastyle is much less prominent. The external cone of M^2 is actually but about half as large as the one beside it. In fact, the true relations of the various cones and styles are very similar to those shown by Wortman in figure 82 (of the same reference), which is a drawing of part of the type specimen of *Thinocyon medius*.

The fragment of maxilla, with molars, humerus, metacarpal, and phalanx, figures 77 to 80 inclusive, all belong to specimen No. 12870. There also belongs to this individual a cranium showing in clear detail the basi-cranial region. Some ten or more other specimens

were collected by the early expeditions under Professor Marsh at Millersville, Ft. Bridger, Lone Spring, Church Buttes, and Grizzly Buttes, all probably from lower Bridger strata.

When Professor Marsh proposed the new species *Triacodon grandis* in 1872, he described a portion of a very incomplete skeleton which he then used for amplification of his *T. fallax*, a genus and species established the previous year. This fragmentary skeletal material is Cat. No. 13072, Y. P. M., and consists of four fragments of rami, part of the femur, humerus, ulna, and other bone parts, collected by Marsh at Grizzly Buttes. After careful comparison, I do not hesitate to refer it to *Thinocyon velox*. The holotype of *Triacodon fallax* seems to coincide most closely with the trigonid of a lower molar of *Sinopa minor* Wortman. This holotype and Cat. No. 13072 do not belong to the same species, nor, if my interpretation be correct, to the same genus. The holotype is much larger and of different proportions from the other specimen. In this Journal, 1901, page 200, figure 36, Wortman reproduced a drawing of the holotype of *T. fallax*; this figure is four-thirds natural size instead of natural size as stated in the legend.

Thinocyon medius (Wortman).

Originally described and figured in 1902 as *Limnocyon medius*, this has since proved to be a large form of *Thinocyon*. In fact, about the only differences between this species and *T. velox* are (1) that the former is of larger size, and (2) that the P₄ of *T. medius* has a distinct anterior basal cusp which is very small or lacking in *T. velox*. Moreover, this species seems to be confined to the upper Bridger and *T. velox* to the lower. The holotype, Cat. No. 11798, Y. P. M., is the major portion of both rami with teeth, associated with the upper molars and part of the premolar dentition. A dozen individuals are represented in the collection, showing nearly all of the more important skeletal elements.

Thinocyon mustelinus Matthew.

This species is represented by a single specimen in the collection, Cat. No. 13005, Y. P. M., consisting of the

anterior half of a right ramus with P₄, the alveoli of the three anterior premolars, and a part of that of the canine.

Measurements.

	mm.
Length of inferior premolars.....	13
Antero-posterior diameter of P ₄	4.5
Transverse diameter of P ₄	2

HYÆNODONTIDÆ.

Sinopa rapax Leidy.

More than a dozen individuals of this species are represented in the Marsh Collection by teeth, rami, and skeletal parts.

Sinopa minor Wortman.

The holotype of this species bears the catalogue number 11880, Y. P. M. It is a considerable portion of a right ramus with P₃, the posterior part of P₄, and the first two molars complete; also the anterior part of the left ramus with the base of the canine and the alveoli of the first three premolars. A composite drawing of these two specimens is shown in this Journal for July 1902, page 17, figure 96. There is also another jaw fragment, not figured. The anterior mental foramen is placed below the middle of the diastema between P₁ and P₂, while the next one is beneath the middle of P₃. The drawing shows somewhat different positions for these two foramina.

With this material, Wortman associated as paratype, a part of "a fragment of a right upper jaw bearing the fourth premolar and first molar, figure 97." This drawing is on the same page with that of the holotype, and shows a part of a *left* maxilla with P⁴ to M² inclusive. This specimen is Cat. No. 12856, Y. P. M., while the specimen described by Wortman is not figured. It consists, as he said, of a *right* maxilla with P⁴ and M¹. This specimen, Cat. No. 13092, is also a paratype. In other words, some confusion arose, so that one paratype was figured and not described, while the other was described and not figured. Both, however, belong to this species and served as type material. No. 12856 is slightly larger than the other and the difference in size between these two paratypes may well be sexual.

In the description of this species, Wortman several times referred to "*S. gracilis*," which is a probable misprint for *Sinopa agilis*, or as it is now, *Tritemnodon agilis*.

There seems to be a small variation in size between the fourteen referred specimens, but apparently not more than would be expected in sexual variation. Besides the Grizzly Buttes locality, specimens were found at Pine Bluff, along Black's Fork, Millersville, Lone Spring, Cottonwood Creek, Dry Creek, and doubtfully along Henry's Fork, all in the lower Bridger.

The holotype of *Triacodon fallax* Marsh (Cat. No. 10021, Y. P. M.) is the trigonid of a lower molar, and after careful comparison I would refer it to this species, *S. minor*, for it seems much nearer this species than it is to *Viverravus gracilis*, *Vulpavus*, *Miacis parvivorus*, *Thinocyon velox*, *Harpalodon sylvestris*, or *Uintacyon jugulans*, to all of which genera and species it has been considered as possibly referable. A drawing of this type is reproduced by Wortman in 1901 (p. 200, fig. 36). The type locality is Grizzly Buttes.

Sinopa major Wortman.

The holotype, Cat. No. 11878, Y. P. M., was collected at Church Buttes in lower Bridger strata, and figured in this Journal in July 1902. With this is paratype No. 11879, which was collected near Lone Tree, in lower Bridger strata. Six other individuals are represented in this collection, their remains consisting of teeth and rami, and it is evident that the species ranged through the lower and upper Bridger.

The holotype of *Triacodon grandis* Marsh, Cat. No. 11849, consists of the trigonid of a lower molar. Wortman referred this to either *Limnocyon verus* or *Tritemnodon agilis*, while Matthew compared it with *Uintacyon*. It is my opinion that it should be referred to *Sinopa major*, the trigonid of the last lower molar of which is most similar to the holotype of *T. grandis*, even in the heavy external cingulum. However, this again is a specimen whose exact identification can not be absolutely determined.

Tritemnodon agilis (Marsh).

The type material of this species was originally described by Professor Marsh under the name of *Limnocyon agilis*. Subsequently Wortman referred it to *Sinopa*, and still later Matthew created the genus *Tritemnodon* for its reception.

Tritemnodon differs in several respects from *Limnocyon*, but one of the chief characteristics of the former is the presence of three molars in both upper and lower jaws, while *Limnocyon* has but two above and below. The heels of the lower molars of *Sinopa* are basin-shaped, but those of *Tritemnodon* are trenchant. *Sinopa* and *Tritemnodon* are closely related and yet generically distinct.

The holotype, Cat. No. 11877, Y. P. M., is a considerable part of the skeleton of a young animal, including parts of the skull and jaws bearing the dentition, while the paratype, Cat. No. 10073, has very well preserved skull, jaws, atlas, axis, humeri, tibia, part of scapula and ulna, patella, caudals, cervicals, and other elements. The former was collected at Grizzly Buttes and the latter at Church Buttes, both from the lower Bridger.

In addition to the type material, there are ten other individuals represented by teeth, rami, or skeletal parts.

MESONYCHIDÆ.

Mesonyx obtusidens Cope.

In 1902, Wortman described a part of a Marsh specimen, Cat. No. 11752, Y. P. M., of this species, and noted its larger size and more slender proportions in comparison with the Princeton specimen described by Professor Scott in 1886. The antero-posterior diameter of the femur is 42 mm., and the transverse, 37 mm. The diameters of the patella are 27 mm. in length and 16 mm. in width. The caudals are larger than any described by Scott, the largest now present being broken, but its length must have been not less than 46 mm., with a maximum diameter at the center of the shaft of 11 mm. Three others are 41, 42, and 43 mm. respectively in length. The shortest one is 17 mm., with a diameter of 4.5 mm. at the middle of the shaft. This specimen, whose geolo-

gic horizon is lower Bridger, was collected 5 miles south of Granger.

Several other individuals are represented, mainly by teeth, which were collected in various parts of this basin, including Church Buttes and Grizzly Buttes. A considerable part of the skeleton, exclusive of skull and jaws, of a young individual, with the epiphyses still free, which is a little smaller than No. 11752, was collected by Professor Marsh at Grizzly Buttes in 1870. It is Cat. No. 13094, Y. P. M.

Harpagolestes macrocephalus Wortman.

The holotype, Cat. No. 11901, Y. P. M., of this species, which is also the type species of the genus, is a nearly complete skull, jaws, right humerus, distal end of a femur, and centrum of the axis, all of one individual. It was collected near the mouth of Smith's Fork, presumably in the lower Bridger. The specimen, when described and figured by Wortman in this Journal in 1901, was the largest known Eocene carnivore, but subsequently Matthew described another, *H. immanis*, which, in skull length, exceeds Wortman's species by only about 10 mm. This latter specimen was collected in the Washakie Basin in the upper Washakie. In all probability the faunæ of the Bridger and Washakie basins are equivalent, and hence there is no fundamental geographic or geologic difference between these two species, except that between lower and upper Bridger.

Osteologically, the major difference lies in the presence of P² in *H. immanis* and in the absence of this tooth in *H. macrocephalus*. Whether or not the premolars were crowded in Wortman's species, as in Matthew's, can not now be determined. A part of a maxilla, with P⁴, M¹, and M², Cat. No. 13011, Y. P. M., is slightly smaller than the corresponding part of the holotype of *H. macrocephalus*. It was found on Leavitt's ranch in the Bridger Basin. Some individual teeth, Cat. No. 13009, of this species were found near Millersville. All of the Marsh specimens of this species were collected in lower Bridger strata.

INCERTÆ SEDIS.

Ziphaeodon rugatus Marsh.

The holotype, Cat. No. 11842, is the anterior half of a left ramus with teeth, collected near Henry's Fork in probably upper Bridger beds. Wortman (1901, pp. 200-201) identified it with *Viverravus gracilis*, but I see no more than superficial resemblance to that species. In fact, I doubt whether this specimen is actually a carnivore. The premolars are compressed and very sharp. They are large and crowded, while their anterior and posterior tubercles are basal and of subequal size. As noted by Professor Marsh, the enamel of the crowns is quite coarsely wrinkled. The anterior mental foramen is large and situated beneath the posterior root of P₁, while the other is very minute, located beneath the posterior root of P₃. The canine held a much more nearly vertical position than is usual in carnivores. The symphysis is short, extending not farther back than a line beneath the middle of P₁.

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