REVIEW OF SOME RODENT GENERA FROM THE BRIDGER EOCENE.

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PART II.

MYSOPS LEIDY, 1871.

Synonymy:

Mysops Leidy, 1871. Proc. Acad. Nat. Sci. Phila., 1871, pp. 231-232; issued Nov. 28, 1871.

Syllophodus Cope, 1881.

Type Species: *Mysops minimus* Leidy, 1871. Type specimen: Fragmentary right ramus with M_2-M_3, Acad. Nat. Sci. No. 10266.

Age: Middle Eocene.

Generic Characters: Dentition 1/1, 0/0, 2/1, 3/3; brachydont with cross-crests more highly developed than in *Sciuravus*. P^4

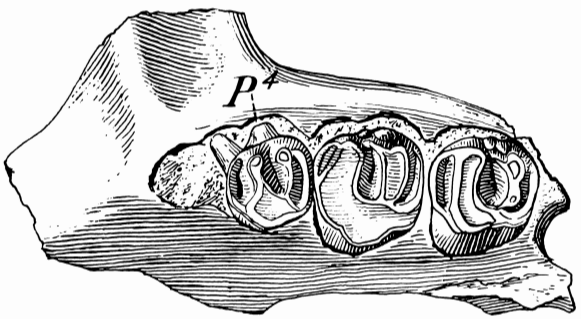

Fig. 5. *Mysops parvus* (Marsh). No. 13566 YPM. Left P^4-M^2, x 10.

with moderate connection of metaloph to protocone, metaconule more or less perfectly fused into metaloph; hypocone absent. Superior molars with hypocone weakly developed, not discrete from protocone; metaloph and protoloph more or less convergent toward protocone; union of metaloph with protocone weak, but loph united to this cusp rather than to hypocone; cresting of protoloph more pronounced than in metaloph, with protoconule less distinct than metaconule.

Trigonids of inferior molars more or less elevated, character less pronounced in rear teeth. Molar teeth with hypolophid generally well-developed, weakest in M_1; ectolophid strong and linear; posterolophid elevated. Mandibular incisor with semi-flattened anterior face.

REMARKS.

The third upper premolar of *Mysops* is not known, but it can hardly possess any very diagnostic features. The central basins of the upper molars are pocketed, at least in the posterior molars. Cuspules are irregularly developed at the external margins of the central basins of these teeth. Distinct metastylids are usually not present in *Mysops*. The masseteric fossa terminates under M_2, but there is a considerable range in character of the scars.

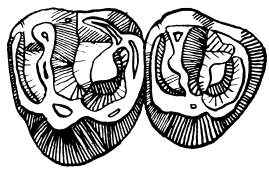

Fig. 6.

Fig. 7.

Fig. 6. *Mysops parvus* (Marsh). No. 13565-1 YPM. Left M^2-M^3, x 10.
Fig. 7. *Mysops parvus* (Marsh). No. 13468 YPM. Left upper molar, x 10.

Compared to those of *Sciuravus*, the lower cheek-teeth of *Mysops* possess more crescentic protoconids; the hypoconid pillars are more angulate; dams of the anterior basins are better developed; trigonids are higher; the ectolophid probably more internal in position, much less cuspate; entoconids are relatively smaller, more anterior in position; the hypolophids are better developed, at least in the rear molars; posterior basins generally broader; and posterolophids more elevated, usually longer.

That the upper and lower dentitions assigned to *Mysops* are to be associated is shown by their comparable size and occlusal relations. Moreover, *Pareumys* of the upper Eocene, believed to be a derivative of *Mysops*, possesses superior molars agreeing more closely to those allocated to *Mysops* than to any other Bridger type.

Matthew (1910, p. 60) gave the first adequate diagnosis of the genus *Mysops*. At that time, he stated that *Tillomys*

Marsh was hardly separable from *Sciuravus* on the basis of the existing description by Marsh, and that the smaller referred species of *Tillomys*, *T. parvus*, was perhaps identical with *Mysops*. However, it was not stated in this paper whether Matthew had access to Leidy's type material. It can be inferred that he did not study Marsh's types of *Tillomys senex* and "*T.*" *parvus*. In 1923, Troxell restudied the Yale collection of small Bridger rodents, publishing figures and descriptions of Marsh's types together with additional remains of more complete character. Departing from Matthew, he referred the specimens agreeing with the former's diagnosis to *Tillomys*. A study of the type of *Mysops minimus* and comparison with "*Tillomys*" *parvus parvus* and "*T.*" *p. plicatus* enabled Troxell to list the following characters of *Mysops* as compared to the latter species: "(1) hypolophid ridge weak and fails to connect; (2) the deep ramus, (3) the longer M_3, (4) M_2 of uniform width, (5) the heavy incisor, (6) the sharp curve of the incisor." It does not appear certain, in view of the variation in specimens assigned to *Tillomys* by Troxell, that these characters clearly demonstrate a generic difference. The character of most importance cited above is the absence of a hypolophid connection between entoconid and hypoconid in M_2. This character is rare in the Yale material referred in the present paper to *Mysops*, but has been observed in one specimen at least (No. 13466). The other features are hardly of generic importance.

Unfortunately, as regard to subsequent confusion, *Tillomys senex*, the genotype species, apparently is neither congeneric with "*T.*" *parvus* and referred material, or with *Mysops*. It is nearest in character to *Sciuravus*. Hence, either the specimens under discussion are to be referred to the genus *Mysops*, or a new generic name must be proposed for them. If the character of the hypolophid is of generic importance, *Mysops* is represented only by the genotype species as Troxell believed. The types of *M. fraternus* and "*T.*" *parvus plicatus* show a hypolophid connection to be present, and that of "*T.*" *p. parvus* does not possess the comparable tooth, and represents too old an individual to demonstrate any details of the dentition. In the author's opinion, establishment of a new generic type is not warranted.

The generic description given in the diagnosis is based on Yale specimens referred to *Mysops parvus*.

MYSOPS MINIMUS LEIDY.

Synonymy:

(1) *Mysops minimus* Leidy, 1871, Proc. Acad. Nat. Sci. Phila., pp. 231-232; issued Nov. 28, 1871. Leidy, 1873, pp. 111-112, 336, pl. 6, figs. 31-32. Matthew, 1899, p. 39. Hay, 1902, p. 725. Matthew, 1909, p. 300. Troxell, 1923b, pp. 384, 387, 391. Hay, 1930, p. 904.

(2) *Syllophodus minimus* (Leidy). Cope, 1883, p. 47.

Type Specimen: Fragmentary right ramus with M_2-M_3, Acad. Nat. Sci. No. 10266. Collected by J. Van A. Carter.

Locality and Age of Type: Grizzly Buttes; Bridger Basin, Wyoming; lower Bridger.

Specific Characters: Hypolophid of M_2 incomplete. M_2 quadrate; posterior valley between entoconid and posterolophid very narrow, and shallow (at least in present stage of wear).

REMARKS.

As Troxell has stated, the hypolophid of M_2 is very weak in this species, an unusual feature in *Mysops*. The second molar is of nearly uniform width. M_3 is relatively long. The ramus is deep and the incisor is heavy with relatively small radius of curvature.

One specimen in the Peabody Museum collections appears to be referable to the genotype species. This individual, No. 13466, is quite similar to No. 10266, but M_2 bears a more robust entoconid. However, the hypolophid is incomplete, an important feature of *M. minimus*. Size and proportions of the last two molars may be slightly different; and the incisor of the type may be heavier with less radius of curvature. These last characters may perhaps be more properly regarded as evidence of individual variation than of specific difference. No. 13466 is presumably from the Bridger but the exact locality is unknown.

MYSOPS PARVUS PARVUS (Marsh).

Figures 5-7.

Synonymy:

(1) *Tillomys parvus* Marsh, 1872, This Journal, 3d ser., Vol. 4, No. 21, p. 219. Matthew, 1899, p. 39. Hay, 1902, p. 724. Matthew, 1909, p. 300. Troxell, 1923b, pp. 384, 388, 390-393, figs. 16-17. Hay, 1930, pp. 904-905.

(2) *Tillomys parvus parvus* Marsh. Troxell, 1923b, pp. 387, 391, fig. 13.

(3) *Tillomys lucaris* (Marsh) [*partim*]. Troxell, 1923b, pp. 389-390, fig. 11.

(4) *Tillomys* cf. *T. lucaris* (Marsh). Troxell, 1923b, pp. 390-391, fig. 12.

Type Specimen: Fragmentary right ramus with well-worn M_1, Y.P.M. No. 11787. Collected by O. Harger, 1871.

Locality and Age of Type Specimen: Grizzly Buttes; Bridger Basin, Wyoming; lower Bridger. Age of species: middle Eocene.

Specific Characters: Hypolophid of M_2 generally strongly developed. Entoconids usually not especially robust, more or less crested. Posterior valleys of molars well-developed. M_2 more elongate than in *M. minimus*. Size about as in *M. minimus*.

Subspecific Characters: Size larger than *M. parvus plicatus* (Troxell).

REMARKS.

In view of apparently great individual variation, a definite statement of characters is difficult. The above diagnosis is based on more or less average characters exhibited by material in the Yale collections.

Mysops parvus plicatus (Troxell).

Figure 8.

Tillomys parvus plicatus Troxell, 1923b, This Journal, 5th ser., Vol. 5, No. 29, pp. 384, 387, 391-392, figs. 14-15. Hay, 1930, p. 905. Burke, 1935, p. 9.

Type Specimen: Right ramus with P_4-M_3, Y.P.M. No. 13352. Collected by J. W. Chew, 1874.

Locality and Age of Type Specimen: Bridger Basin, Wyoming; locality uncertain: middle Eocene.

Subspecific Characters: Size smaller than *Mysops p. parvus* (Marsh).

REMARKS.

The subspecies *Mysops parvus plicatus* was described by Troxell as *Tillomys parvus plicatus*. Characters cited by Troxell as distinguishing *M. parvus plicatus* from *M. p. parvus* were the smaller size of the former together with more complicated pattern. However, it does not appear that the pattern

of *M. p. plicatus* is any more complicated than that of specimens referred to *M. p. parvus* in the present paper.

Since Marsh's type specimen of *Mysops parvus parvus* possesses few, if any, specific characters, Troxell's subspecies may not be conspecific. *M. p. parvus* was found in strata of lower Bridger age at Grizzly Buttes as was the type of *M. minimus*. The type locality of *M. p. plicatus* is not known. However, since the character of the hypolophid of M_2 in *M. minimus* is unusual, and specimens possessing hypolophids similar to that in the type of *M. p. plicatus* are common, the assignment, by

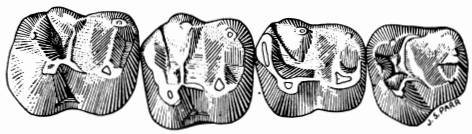

Fig. 8. *Mysops parvus plicatus* (Troxell). Holotype. No. 13352 YPM. Right P_4-M_3, x 10.

Troxell, of *M. p. plicatus* to the species *M. parvus* seems justified.

Incompleteness of the type of *Mysops parvus parvus* prevents a definite statement of distinguishing characters, if they exist, which would serve to separate this subspecies from *M. p. plicatus*. As far as the types are concerned, they are fairly comparable in size but *M. p. parvus* is slightly larger. Further comparison of the types suggests the following differences which are probably individual rather than subspecific. In *M. p. plicatus* (a) anterior termination of masseteric fossa slightly farther forward; and (b) mental foramen relatively superior and anterior in position.

Mysops fraternus Leidy.

Figure 9.

Synonymy:

(1) *Mysops fraternus* Leidy, 1873, Rept. U. S. Geol. Surv. Terr., Vol. 1, pp. 112-113, 336, pl. 27, figs. 14-15. Matthew, 1899, p. 39. Hay, 1902, p. 725. Matthew, 1909, p. 300. Troxell, 1923b, pp. 384, 388 [suggested by Troxell as a possible synonym of *Tillomys parvus*]. Hay, 1930, p. 904.

(2) *Syllophodus fraternus* (Leidy). Cope, 1883, p. 47.

Type Specimen: Right ramus with M_1-M_3, Acad. Nat. Sci. No. 10267. Collected by a Shoshone Indian.

Locality and Age of Type Specimen: Bridger Basin, Wyoming; locality not known: middle Eocene.
Specific Characters: Hypolophid of M_2 intermediate in development between that of *Mysops minimus* and average specimens of *M. parvus*. Entoconids of molars relatively robust. Posterior valleys of M_1 and M_2 narrow, and, at least in present stage of wear, shallow. Size somewhat larger than *Mysops p. plicatus*.

Fig. 9. *Mysops fraternus* Leidy. Holotype. No. 10267 Acad. Nat. Sci. Phila. Right M_1-M_3, x 5.

REMARKS.

The molars of *Mysops fraternus* are of average elongation, progressively increasing in size from M_1 to M_3. Talonids and trigonids are of approximately equal width. The ramus is robust.

Difficulty is experienced in clearly separating Leidy's species from *M. p. plicatus*. Characters of larger size, more robust entoconids, and less well-developed hypolophids and posterior valleys exhibited by the former, vary with individual specimens. Troxell tentatively referred *M. fraternus* to *M. parvus*. Because of the uncertain relation of *M. p. parvus* to *M. p. plicatus* and *M. fraternus*, all three have been retained provisionally.

Unless the dentition exhibited by the type of Leidy's *Mysops minimus* and by No. 13466, a referred specimen in the Yale collections, are extreme variants, at least two of the established species of the genus are valid, namely, *M. minimus* and a species represented by *M. fraternus* and *M. p. plicatus*. Whether more than two valid forms have been established up to the present cannot be determined definitely.

Apparently none of the types already established is entirely typical of most of the *Mysops* specimens from the Bridger. However, specimens of *Mysops* appear to be highly variable in dental characters, approaching in degree the variation shown in *Sciuravus*. That the species available include most of the Yale specimens seems reasonably certain. Of the three species or subspecies to which the Yale fossils may be assigned, the type localities of two, *M. p. plicatus* and *M. fraternus*, are unknown. The third, *M. p. parvus*, is from the lower Bridger

at Grizzly Buttes. This latter type is first in point of priority but presents the poorest type specimen. Most of the better-preserved specimens of *Mysops*, concerning which there is definite stratigraphic information, come from the upper Bridger. Rather than attempt to establish any more species, the present author prefers to assign more or less arbitrarily the greater part of the Yale collection of *Mysops* to *Mysops parvus parvus*. Most of the lower jaws referred by Troxell to *Tillomys lucaris* appear to be referable also to *Mysops parvus*. Presumably, the lower dentition of *T. lucaris* should resemble those of small sciuravids.

Variation in the Dentition and Ramus of Mysops.

An inspection of the specimens of *Mysops parvus* in the Yale collections strongly suggests the presence of several distinct species. A more detailed study of the material weakens but does not necessarily remove this impression. Certainly, there are individuals that appear to be quite distinct from others. A few possess characters that seem to go beyond the limits of individual variation. However, most of the more complete specimens, to which definite localities can be assigned, are from the upper Bridger. Hence, a further separation of types would not lead to a sharper distinction between lower and upper Bridger rodent faunas. Moreover, the establishment of a large number of new types could be accomplished almost as readily as one or two. Lastly, most of the proposed species would be based primarily on single characters. It was found that groups based on suites of characters could not be established. If specimens were separated into two groups on the basis of one character, other characters seemed to bear no relation to this separation.

Since many of the specimens are from unknown levels in the Bridger formation, there may be considerable mixing of faunas. This fact may lead to an apparently greater individual variation than is actually present. Mixing of individuals from two successive stages, if there is much individual variation in each stage, makes the detection of distinct species extremely difficult.

The most noteworthy instances of variation are discussed below:

Ramus: The most outstanding feature is variation in the masseteric fossa and masseter muscle scars. In the more common type of jaw, the anterior termination of the fossa is parabolic in outline and rather deeply cupped. The ridge for attachment of the masseter lateralis is pronounced. A distinct but short impression of the masseter medialis muscle may be present. In a second type, best exemplified by No. 13565-2 (Troxell, 1923b, p. 391, fig. 12), the concavity of the fossa is much less pronounced. The area above the masseter lateralis scar is flattened; and the masseter medialis cicatrix is present as a short but rather pronounced horizontal ridge. Since certain features of the dentition of No. 13565-2 are distinct from the more average specimens referred to *M. parvus*, this individual suggests a separate type. However, other individuals exhibit somewhat intermediate stages of the fossa, and the dentition of some specimens with similar types of fossa are not distinct from *M. parvus*.

Variation in the depth of ramus, curvature of ramus, and length of diastema is also shown by specimens of *Mysops*. However, crushing and breaking away the bone from the inferior border of the ramus may lead possibly to differences that are more apparent than real.

Mandibular Incisor: The incisor varies in regard to size, curvature, degree of transverse compression, and flattening of the anterior enamel face.

Size and Proportions of Inferior Cheek-tooth Dentition: The alveolar length of the cheek-tooth series is relatively constant. This length varies between 6.3 and 6.9 millimeters in 23 specimens. The average is slightly less than 6.6 mm. Size of dentition varies over a like or possibly greater range, but alveolar length and actual size do not always parallel one another.

Proportions of individual cheek-teeth are subject to variation. A few specimens possess relatively broad cheek-teeth. M_3 is usually the largest tooth, and P_4 the smallest one. However, M_3 varies considerably as to size and proportions and may be equal or smaller than M_2. P_4 also shows a wide range in size. Rarely, this tooth is almost equal to M_1. Other specimens possess premolars which are quite reduced. Moreover, the cheek-tooth pattern of P_4 varies through a wide range. The entoconid may be almost indistinguishable from the posterior rim of the tooth or quite pronounced. It is generally distinct. Degree

of separation of the forward cusps may alter the outline of the premolar to some extent. A hypolophid may be either present or absent.

Anterior Cingulum: The anterior cingulum or ridge in *Mysops* exhibits different degrees of elevation.

Protolophulid II: The strength of the protolophulid II spur is not constant. The spur is most strongly developed in M_1 and weakest in M_3. In the specimens available for study, protolophulid II is united to the metaconid in M_1, usually in M_2, and most variable in M_3.

Entoconid and Hypolophid: The entoconid is usually prominent, but is more marginal and not as large as in *Sciuravus*. In a few specimens, this cusp is rather strongly crested. In others, it is relatively robust. The strength of the hypolophid union with the hypoconid varies both in respect to individuals represented by the same tooth, and to position of teeth in the cheek-tooth series. The hypolophid connection is weakest in M_1 where it is sometimes entirely missing. Perhaps, it is most consistently present in a well-developed state in M_3. M_1 and M_2 of No. 13467 (and less-well exhibited in some other specimens) possess small spurs directed posteriorly from the hypolophid and joining the posterolophid, thus enclosing small accessory lakes in the posterior valleys of these teeth.

Posterolophid and Posterior Valley: The posterolophid is more elevated and usually longer than in *Sciuravus*. Sometimes the ridge extends around the postero-internal wall of the tooth to unite with the entoconid. In these specimens the posterior valley is inclosed. More often, the posterolophid is somewhat shorter, and a distinct notch is present on the inner wall of the tooth, separating entoconid and posterolophid. Generally, the posterior valley is relatively broad and deep. However, types are present with posterior valleys which are narrower antero-posteriorly, and sometimes apparently shallower. Basining of the valley may partially inclose it even when the internal exit is open.

Variation in Superior Dentition: The upper dentition of *Mysops* is known by fragmentary specimens from both upper and lower Bridger beds. While perhaps there are at least specific differences separating some of the specimens, lack of material prevents a definite determination of this point. Certainly, the variation among the few specimens of the upper dentition that are available, is as pronounced as that found in the inferior dentition of *Mysops*. All the material has been assigned tenta-

tively to *Mysops parvus*. Variation occurs in size and shape of the superior cheek-teeth; in the degree of inclosure of the central basin; and in the development of the lophs.

Measurements (in millimeters)

	Mysops parvus Y.P.M. No. 13566	*Mysops parvus* Y.P.M. No. 13565-1
P^4-M^2, antero-posterior length	4.15	..
M^2-M^3, antero-posterior length	..	3.45
P^4, transverse width normal to axis of tooth-row	1.6	..
P^4, antero-posterior length	1.2	..
M^1, greatest transverse width	1.8 (a)	..
M^1, antero-posterior length	1.4	..
M^2, greatest transverse width	1.8	2.0
M^2, antero-posterior length	1.5	1.8
M^3, greatest transverse width	..	1.9
M^3, antero-posterior length	..	1.65

(a) Approximate.

	Mysops p. plicatus Y.P.M. No. 13352	*Mysops p. parvus* Y.P.M. No. 13565-2	*Mysops p. parvus* Y.P.M. No. 13569
P_4-M_3 antero-posterior length	5.8	6.6	6.8
P_4, greatest transverse width	1.3	1.4	1.3
P_4, antero-posterior length	1.2	1.5	1.3
M_1, greatest transverse width	1.3	1.5—	1.5+
M_1, antero-posterior length	1.4	1.5	1.65
M_2, greatest transverse width	1.5—	1.6	1.7—
M_2, antero-posterior length	1.5	1.6	1.75
M_3, greatest transverse width	1.4	1.6	1.7—
M_3, antero-posterior length	1.7	1.9	2.0

Tillomys Marsh, 1872.

Figures 10-11.

Tillomys Marsh, 1872. This Journal, 3d ser., Vol. 4, No. 21, p. 219. Separate issued Aug. 17, 1872.

Type Species: *Tillomys senex* Marsh, 1872. This Journal, 3d ser., Vol. 4, No. 21, p. 219. Matthew, 1899, p. 39. Hay, 1902, p. 724. Matthew, 1909, p. 300. Troxell, 1923b, pp. 384, 388, 390, figs. 7-8, Hay, 1930, p. 905.

Type Specimen: Fragmentary right ramus with worn M_1, Y.P.M. No. 11788. Collected by O. C. Marsh, 1871.

Locality and Age: Henry's Fork; Bridger Basin, Wyoming: upper Bridger.

Generic and Specific Characters: Dentition $_{1,\ 0,\ 1,\ 3}$; brachydont. Upper dentition not known but undoubtedly sciuravid in char-

acter. Trigonids apparently more massive than in *Sciuravus* with less separation of metaconids and protoconids as distinct cusps; protolophulid II of M_1 and M_2 as in *Sciuravus* but perhaps directed more transversely than in average specimens of that genus; ectolophid cuspate, compressed antero-posteriorly; posterior edge of metaconids in M_1 and M_2 prolonged posteri-

Fig. 10. *Tillomys senex* Marsh. No. 11608 Am. Mus. Nat. Hist. Left M_1-M_3, x 10.

orly, and internal exit of median basin more sharply V-shaped than in *Sciuravus*; entoconid large, pyriform, projecting into central basin, directed postero-externally with union of entoconid to hypoconid-posterolophid relatively posterior in comparison to *Sciuravus*; very weak development of a definite

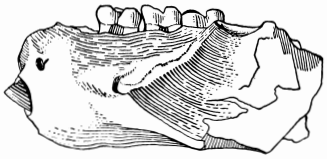

Fig. 11. *Tillomys senex* Marsh. No. 11608 Am. Mus. Nat. Hist. External view of ramus, x 3.

hypolophid; M_1 with ectostylid. No mesolophid spur in molars. Mandibular incisor relatively compressed with rounded enamel face. Masseteric fossa extending under M_1. Size intermediate between *Mysops* and *Sciuravus nitidus*.

REMARKS.

The type specimen of *Tillomys senex* is a fragmentary jaw with a single molar, M_1, in a relatively worn condition. An examination of the collections of the Peabody Museum, National Museum, and the American Museum of Natural History reveals only a single additional specimen which may be referred to the type species. This specimen, A.M.N.H.

No. 11608, consists of a left ramus with M_1-M_3. Size, preservation, stage of wear, details of the tooth pattern, and matrix are practically identical with the type. Marsh's type is from near Henry's Fork; No. 11608 is from Henry's Fork, base of Lone Tree.

Generic and specific characters cited above are somewhat tentative because of the worn dentitions in the two known specimens of *Tillomys senex*. It may be considered questionable whether *Tillomys* is generically separable from *Sciuravus*. However, the species *senex* is valid, and the generic name already established. The upper dentition when known may prove to be distinct from that of *Sciuravus*. Hence, it seems best to keep the generic name until further information is available. W. D. Matthew in his paper on the affinities of the Ischyromyidae (1910, p. 60) appears to have been the first worker to suggest the correct affinities of *Tillomys*.

Several species have been assigned to *Tillomys* by Marsh and Troxell. *Tillomys parvus* Marsh is based on a fragment of jaw with well-worn M_1. As has been stated previously, this species does not appear to represent the genus *Tillomys*, and has been referred to *Mysops*. The type of *Tillomys parvus plicatus* Troxell is a well-preserved ramus with complete dentition. This species is certainly not to be referred to *Tillomys*. In addition, Troxell synonymized *Taxymys* Marsh with *Tillomys*, and referred certain lower jaws to "*Tillomys lucaris*," the type species of *Taxymys*. Of *Tillomys*, Troxell says, "Since it is possible that the two" (i.e. *Tillomys senex* and *Taxymys lucaris*) "are not generically distinct, and since *T. senex* takes precedence over the other species, *Tillomys* is considered to be the genus to which all these smaller species pertain, including *T. parvus*, *T. lucaris*, "*S.*" *parvidens*, and probably *M. fraternus* Leidy. "*S.*" *parvidens* is hard to distinguish from *T. senex* because of the incompleteness of the types and because of the advanced state of wear of the teeth." The relation of *Tillomys senex* to *Taxymys lucaris* will be discussed under the description of the latter genus. As Troxell has indicated, it is somewhat doubtful whether the two are generically distinct. However, the rami referred by Troxell to the species *lucaris* are of the *Mysops* type and do not represent the genus *Tillomys*. *Sciuravus parvidens* Marsh is certainly not to be referred to *Mysops*, nor does it appear referable to *Sciuravus*. The species may be tentatively included in the genus *Tillomys*.

The following comparisons serve to demonstrate the characters distinguishing *Tillomys senex* from *Mysops parvus*: (1) size larger, a distinct break between *T. senex* and some twenty-four lower jaws in the Yale collections referred to *Tillomys* by Troxell; (2) entoconid relatively larger, more or less as in *Sciuravus*; union of entoconid with hypoconid-posterolophid more posterior in position; entoconid crest oblique, not transverse as in *Mysops*; (3) ectolophid a cusp rather than a ridge, not so internal in position; (4) trigonids not as massive nor as erect possibly, as in *Mysops*; anterior lakes probably not so well-developed; (5) posterior valley open internally, not extending as far externally as the posterior valley or basin of *Mysops* in a comparable stage of wear.

The first and second molars of *Tillomys* differ chiefly from the corresponding teeth of *Sciuravus* in (1) trigonid as a whole more elevated (judging from the absence of any trace, in the existing stage of wear, of the incomplete anterior lake); (2) entoconid more oblique, union with hypoconid-posterolophid more posterior; and (3) posterior valley more widely open and shorter, buccal portion probably shallower. The relatively worn teeth of No's Y.P.M. 11788 and A.M.N.H. 11608 make comparisons difficult.

Measurements (in millimeters)

	Tillomys senex A.M.N.H. No. 11608
P_4-M_3, alveolar length	8.1
M_{1-3}, antero-posterior length	6.0
M_1, greatest transverse width	1.9—
M_1, antero-posterior length	1.9
M_2, greatest transverse width	2.0
M_2, antero-posterior length	1.95
M_3, greatest transverse width	1.8—
M_3, antero-posterior length	2.1

TILLOMYS? PARVIDENS (Marsh)

Figure 12.

Synonymy:

(1) *Sciuravus parvidens* Marsh, 1872, This Journal, 3d ser., Vol. 4, no. 21, p. 220. Matthew, 1909, p. 300.

(2) *Paramys parvidens* (Marsh). Matthew, 1899, p. 39. Hay, 1902, p. 724.

(3) *Tillomys parvidens* (Marsh). Troxell, 1923b, pp. 384, 388 [considered by Troxell as a possible synonym of *Tillomys lucaris*]. Hay, 1930, p. 904.

Type Specimen: Fragment of right ramus with M_2, Y.P.M. No. 13350. Collected by O. C. Marsh?, 1871.
Locality and Age of Type: Grizzly Buttes?; Bridger Basin, Wyoming: lower Bridger.
Specific Characters: Entoconid large and distinct, but relatively marginal. Hypolophid not present. Size somewhat smaller than *Tillomys senex*.

Fig. 12. *Tillomys*? *parvidens* (Marsh). Holotype. No. 13350 YPM. Right M_2, x 10.

REMARKS.

Marsh (1872, p. 220), in the original description of the species, remarks that *Sciuravus parvidens* is, "evidently represented in our collections by a lower jaw containing the third molar, part of an upper jaw with the penultimate molar, and several isolated teeth." The material was collected at Grizzly Buttes (lower Bridger) and Henry's Fork (upper Bridger) by O. C. Marsh and G. M. Keasbey. No type specimen was selected by Marsh or subsequently by Troxell. Y.P.M. No. 13350 is the first mentioned specimen and the Yale labels indicate this as the type, collected by Marsh presumably at Grizzly Buttes. The other specimens are indicated as paratypes, Y.P.M. No. 13569, collected by Keasbey apparently at Henry's Fork. If the records at present accompanying the specimens are correct, then the type is from lower Bridger beds, the paratypes from the upper member of the Bridger. The latter material consists of fragments which are to be identified as follows: (a) *Taxymys lucaris*, fragment of left maxillary with M^1; (b) *Sciuravus nitidus*, right M^3; (c) *Sciuravus*, fragment of upper cheek-tooth; and (d) an isolated right M_3, a sciuravid of uncertain relationship but possibly representing the genus *Tillomys*. Troxell referred *T.*? *parvidens* to the genus *Tillomys* as a possible synonym of either *T. senex* or *T. lucaris*. He also suggested "S." *parvidens* as a synonym of *S. nitidus*. This latter assignment presumably refers to the *Sciuravus* material noted above.

Tillomys? parvidens is not referable to the genus *Mysops.* It is a sciuravid which perhaps agrees more closely in character with *Tillomys* than with any other form. The species possesses some features which apparently indicate a stage of development between the paramyids and typical *Sciuravus.* The poor material known at present makes the diagnosis given above a tentative one. The listed characters and older age indicate a type at least specifically distinct from *T. senex.* Until adequate remains of *Tillomys* and *Taxymys* are known, no very definite conclusions can be reached concerning the relationship of these genera and their species to *Sciuravus* and to each other.

Measurements (in millimeters)

	Tillomys? parvidens Y.P.M. No. 13350 Type specimen
M_2, greatest transverse width	1.8
M_2, antero-posterior length	1.9

Los Angeles, California.