

THE SKULL OF *MEGALAGUS TURGIDUS* (COPE).

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ABSTRACT. A skull of *Megalagus turgidus* from the Brule of western Nebraska is figured and described briefly. Skull characters bear out the contention based on dental characters that the specimens referred to *Megalagus turgidus* are generically distinct from *Paleolagus*. *Paleolagus* and *Megalagus* are on a similar evolutionary plane but have diverged considerably from the presumed common ancestry.

INTRODUCTION.

SPECIMENS of the leporid now called *Megalagus turgidus* have been known since 1873 when Cope¹ described the genotype under the name of *Paleolagus turgidus*. In 1931, Walker² recognized that the specimens referred to this species were generically distinct from *Paleolagus* and proposed the generic name of *Megalagus*. The genus is confined to the Oligocene being represented by *M. turgidus* in the Brule of the Great Plains and by *M. brachyodon* in the Chadron of Pipestone Springs, Montana. Until recently only upper and lower dentitions, skull fragments, and a few postcranial elements had been found. During the summer of 1941 Mr. Paul C. Miller of Walker Museum had the good fortune to obtain a fairly well preserved skull and lower jaw of *M. turgidus*, No. W.M. 1642, from the Brule on Grime's Ranch, Sioux County, Nebraska. The skull, lower jaw, and dentition are figured in the present paper and the dentition and skull are discussed briefly.

DENTITION.

A complete left upper dentition, right upper dentition lacking only P³, and a complete lower left dentition are preserved.

The dimensions of the teeth of W.M. 1642 are quite similar to those of the specimens of *M. turgidus* listed by Wood.³

¹ Cope, E. D.: 1873, "Third Notice of Extinct Vertebrata from the Tertiary of the Plains," Paleontological Bull. No. 16, pp. 1-8.

² Walker, M. V.: 1931, "Notes on North American Fossil Lagomorphs," Aerenid II, pp. 227-240.

³ Wood, A. E., 1940, "The Mammalian Fauna of the White River Oligocene," Pt. III, Lagomorpha. Trans. Amer. Philos. Soc., n.s., Vol. XXVIII, Pt. 3, pp. 342-343.

TABLE I.
Measurements in mm. of Cheek Teeth of *M. turgidus*, W.M. 1642.

Tooth	a.-p.	Width		Width
		Protoloph(id)	Metaloph(id)	
P ² r.	1.88	3.51	...	2.42
P ³ l.	2.80	3.51	4.70	...
P ⁴ l.	2.94	5.01	5.12	...
M ¹ l.	2.59	4.89	4.75	...
M ² l.	2.39	4.50	3.88	...
M ³ l.	1.40	...	...	2.10
P ₃ l.	2.30	1.91	2.80	...
P ₄ l.	3.42	3.31	2.53	...
M ₁ l.	3.00	3.16	2.10	...
M ₂ l.	3.10	3.21	2.44	...
M ₃ l.	1.95	2.00	1.15	...

Variations are in part the result of individual variations but in larger part due to differences in the degree of wear. The crown pattern of the upper and lower cheek teeth of this specimen show no significant differences from those of other known specimens of the species.

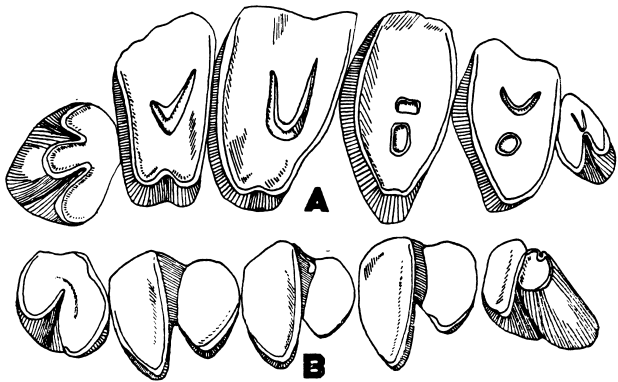


FIG. 1. The cheek teeth of *Megalagus turgidus*, No. W.M. 1642, x 5.
A. Occlusal view of upper left molars and premolars.
B. Occlusal view of lower left molars and premolars.

Both pairs of upper incisors are present. The anterior incisor differs little from that of *Paleolagus* except in size. The sulcus is fairly deep but there is no infolding of the enamel. The posterior incisor is strongly developed.

The upper and lower cheek teeth are shown in Fig. 1 and since they contribute nothing new to the knowledge of the dental structure of the species description is unnecessary.

THE SKULL.

The skull is little distorted but is rather badly cracked and parts of a number of elements have been lost. Neither zygoma is complete, the anterior part of the nasals is lacking, the dorsal part of each premaxillary has been eroded away, and the pterygoid region is missing. Preservation of the rest of the skull is

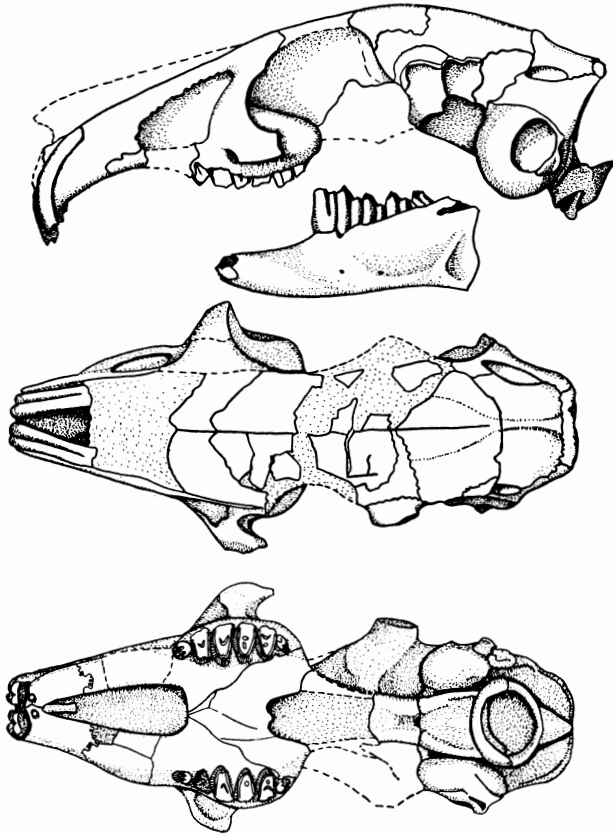


FIG. 2. The skull and lower jaw of *Megalagus turgidus*, No. W.M. 1642, x 1.

good and most of the details of the structure can be seen. Part of the occiput is concealed by the atlas which is articulated with the skull and which cannot be removed without damaging the occipital condyles.

The skull measures about 75 mm. in length from the top of the occiput to the anterior end of the premaxillaries. It is

much larger than the skull of *Paleolagus*, somewhat larger than that of *Sylvilagus*, and shorter than the average skull of *Lepus*.

Many of the skull characters are shown in Fig. 2 but certain ones are of sufficient interest to warrant brief description and comparisons with skulls of other leporid genera. The shape of the premaxillaries is quite similar to that of the corresponding bones in *Paleolagus*. As in this genus, a strong posterior spur is present on the lateral part of the premaxillary, a structure absent in *Lepus* and *Sylvilagus*. The dorsal extent of the bone and the degree of development of the notch between the premaxillary and nasal is uncertain.

Almost the entire dorsal portion of the maxillary is fenestrated and the ventral solid portion is more extensive than that of *Lepus* but less well developed than in *Paleolagus*. The fenestrated area is not well preserved but so far as can be told all but the ventral margin of the infraorbital foramen lay within it. The infraorbital foramen is large and ventrad as in *Paleolagus* but is not distinctly separated from the fenestrated area as it is in that genus, the condition being more or less intermediate between that of *Paleolagus* and *Lepus*. The zygomatic process of the maxillary does not extend outward so abruptly as it does in living leporids and only a shallow pit is developed on the anterior face of the process. Posteriorly the maxillary is extended into a rather weak tuberosity in the orbit. The dorsal margin of this structure does not rise above the level of the zygoma, its relatively poor development being correlated with the lack of pronounced hypsodonty of the cheek teeth. The infraorbital canal is not restricted as it is in *Lepus* and *Sylvilagus*. On the palate, the maxillary anteriorly is much like that of other leporids but the suture between the maxillary and premaxillary passes medially almost at right angles to the axial plane of the skull whereas in *Paleolagus* and *Lepus* it passes medioanteriorly. The suture marking the junction between the maxillary and the palatine is rather different from that in other genera. In most leporids the suture passes across the palate at the level of P^3 or P^4 and the palatine is excluded from the border of the palatine fenestrae. In *Megalagus* the suture passes anteromedially to the fenestra so that the palatine forms a small portion of the posterior border of this structure and the maxillaries fail to meet. This appears to be a primitive condition for in other leporids there seems to have been a ten-

dency toward the development of the suture at right angles to the tooth row and for a posterior migration of the suture at the expense of the palatine. The condition in *Paleolagus* appears to be somewhat intermediate between that of *Megalagus* and *Sylvilagus*.

The palatine fenestrae are expanded posteriorly and their development is considerably greater than in *Paleolagus*. The posterior termination lies well back, at about the level of the anterior margin of P³.

Except for the elongation of the anterior process mentioned above, the palatines are very much like those of *Paleolagus*. Reduction of the palatal part of the palatines as seen in *Lepus* and *Sylvilagus* has not occurred in *Megalagus*. The posterior nares open at the level of the posterior margin of M² and are not restricted as they are in *Paleolagus*.

Only the posterior part of the nasals is preserved. This portion shows no significant differences from *Paleolagus* but it is entirely possible that the more anterior portions would show a difference in the development of the notch between these bones and the premaxillaries.

The frontals are badly shattered but most of the characters except those of the lateral margins can be seen on one side or the other. It is impossible to tell whether a supraorbital process was developed. The frontals are extended somewhat farther posteriorly than they are in *Paleolagus* and lie in a position similar to that found in *Lepus* and *Sylvilagus*. The frontal area of the skull is not expanded posteriorly as it is in the living hares and rabbits.

The parietal portion of the skull is elongated with the result that the parietal is proportionately longer than that in the other leporids. Anteriorly the parietal makes contact with the frontal and passes forward to the temporal fossa. Laterally it is in contact with the squamosal, and posteriorly it appears to make lateral contact with the supraoccipital as it does in *Paleolagus*. Complete fusion between the parietal and interparietal has occurred. Along the parietal-squamosal suture there is developed a large, elongate temporal foramen, a structure unusual among the leporids. The parietal itself is more arched than that of *Paleolagus* but not nearly so arched as that of *Lepus* or *Sylvilagus*. A low but distinct sagittal crest is developed posteriorly. The anterior continuation is lyrate and marked only by slight grooves on the parietals.

Little detail can be given concerning the squamosal. As in *Paleolagus*, it makes contact with the parietal and posteriorly it reaches the end of the skull. Erosion has obscured most other significant characters.

The bulla is compressed laterally and is proportionately much smaller than in *Paleolagus* and somewhat smaller than in *Lepus* and *Sylvilagus*. The meatal tube is damaged so that it is impossible to determine its exact extent. The mastoid, like that of *Paleolagus* and unlike that of *Sylvilagus* and *Lepus*, is unexpanded dorsally and does not extend onto the roof of the skull. No fenestration of this element has occurred.

The occiput is broad and rather low. The supraoccipital has but slight development on the dorsal surface of the skull. The lateral margins of the occipital surface are occupied by the mastoid in much the same manner as they are in *Paleolagus*. The foramen magnum is broader than high. The orientation of the occipital condyles is somewhat uncertain since these structures are covered by the atlas. The condyles appear to be somewhat less vertical than those of *Sylvilagus* and somewhat more vertical than those of *Paleolagus*.

The basioccipital resembles that of *Sylvilagus* closely as does the part of the basisphenoid which is preserved. The junction between the two elements is accomplished by processes which are condylar in nature.

DISCUSSION.

Knowledge of the skull of *Megalagus turgidus* is at present more of potential than immediate value in determination of relationships of this genus to other leporids since the skulls of few extinct types are now known. The opinion of Walker⁴ that this species belongs in a genus distinct from *Paleolagus* is amply supported by marked differences in the skulls of the two genera. Particularly important differences occur in the development of the palatine fenestrae and posterior nares, the tympanic bullae, the relationships of the palatines and maxillaries, and the proportions of the parietal regions of the brain cases. The skull of *M. turgidus* resembles that of *Ochotona* more closely than that of any other living leporid. The similarities are the result of retention of a number of primitive characters by the pika, for, while there is little in the skull of *Megalagus* to bar this

⁴ Walker, M. V.: *op. cit.*

genus from the ancestry of *Ochotona*, direct ancestral relationship is not suggested by the dentition. Dental characters seem to indicate that *Megalagus* is representative of a line which did not give rise to forms leading to either *Lepus* or *Sylvilagus*, but, as in the case of *Ochotona*, there is nothing in the skull structure of *Megalagus* which would bar it from this position.

Until such time as skull material of *Mytonolagus* is obtained, the suggested relationships between this genus and *Megalagus* must continue to rest on evidence of dental characters. This evidence, as advanced by Burke⁵ appears to be very strong.

⁵ Burke, J. J.: 1934, "*Mytonolagus*, a new leporine genus from the Uinta Eocene series in Utah," *Annals Carnegie Mus.*, XXIII, pp. 399-430.

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