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## TOOTH-MARKS ON BONES OF THE ORLETON FARMS MASTODON

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A number of bones of a mastodon from Orleton Farms, Madison County, Ohio, exhibiting some tooth-marks have been submitted to me by Dr. Edward S. Thomas of the Ohio State Museum.

Included among the material are seven specimens that show grooves cut in them, clearly the result of gnawing by rodents. These tooth marks are of three or perhaps four sizes.

The largest size, represented by one specimen ("A") is about two centimeters in diameter. Because of its size, this is quite clearly the tooth mark of a beaver (*Castor* sp.). It is much too small for the giant beaver (*Castoroides*), and seems to have been the work of one animal over a very short period of time. Little or no trace of separate cuts can be seen.

The next largest size is represented by three specimens ("B," "C" and "D"). These cuts are approximately a centimeter in width. "B" is a smooth cut, extending into the cancellous bone, "C" is similar, but slightly narrower. There is another, smaller, cut on this specimen. "D" is an irregular cut that seems to have been worked on in a number of separate attempts. These cuts were made by a rodent with much smaller incisors than was that of specimen "A." From their size, they could easily have been made either by a porcupine (*Erethizon*) or a woodchuck (*Marmota*).

Two specimens show the smallest size cuts, about one or two millimeters in diameter ("E" and "F"). In both of these specimens, there are two parallel cuts, spaced about 2 mm apart. These could be cuts made simultaneously by both front teeth of a medium-sized rodent (such as the muskrat, *Ondatra*), but more probably represent separate cuts of a smaller form, of the size of the deer mouse (*Peromyscus*), or a small squirrel (*Sciurus*), or of a vole (*Microtus*, etc.).

Finally, one specimen ("G") shows clear evidence of a series of cuts along the edge of the bone for a distance of about 3 cm. Although the edges of these tooth marks have cut each other, so that they are somewhat indistinct, they seem to have been made by a rodent of about the size of *Ondatra* or *Sciurus*.

This group of bones, then, indicates rather clearly that a considerable variety of rodents had access to the mastodon bones as they lay around on the ground surface. With the exception of the beaver and possible muskrat cuttings, all of these

seem to have been made on land and not under water, and all of them could have been made on land.

Rodent gnawings of this sort always cause surprise to the layman. The basic reason for them is the necessity for rodents to wear off their incisor teeth. These teeth grow from persistent pulps, never developing roots. The enamel is limited to the anterior face of the tooth, the rest being formed of softer dentine. Thus, wear gives a sharp chisel-edge of enamel, supported and kept from breaking by the dentine. Due to the continual growth of the incisors, they must be used with great regularity to wear them down. The rate of their growth (and resultant wear) is much greater than is generally realized. For example, in the rat, the upper incisors grow at a rate of slightly over 2 mm per week, and the lower incisors at a rate of about 2.9 mm per week, making a total of about 4.3 and 6.0 inches per year, respectively (Shadle, Wagner, and Jacobs, 1936). In the porcupine, the rate is considerably slower, but still very notable. Here the comparable figures are 1.3 mm per week for the upper incisor and 1.7 mm per week for the lowers, or 2.7 and 3.5 inches per year, respectively (Shadle, Ploss, and Marks, 1944).

Rodents, then, are likely to gnaw any hard objects that are available to them. Where there is some possible nutritive value, such materials are even more readily gnawed. This seems to be the reason why bones are very often selected by rodents, in view of the mineral matter they contain, which is important to all mammals, but particularly so to ones showing such extremes of tooth growth.

#### REFERENCES

- Shadle, A. R., W. R. Ploss and E. M. Marks. 1944. The extrusive growth and attrition of the incisor teeth of *Erethizon dorsatum*. *Anat. Rec.*, 90: 337-341.
- Shadle, A. R., L. G. Wagner and T. Jacobs. 1936. The extrusive growth and attrition of the incisors in albino and hybrid *Rattus norvegicus* (Erxleben). *Anat. Rec.* 63: 321-325.
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