

Significance of a Fossil Horse Tooth Found at Moscow, Idaho¹

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Late in June, 1939, a lower cheek tooth of a horse was uncovered while digging the foundation for the Signal Oil Station at Main and 8th Streets, Moscow, Idaho. It was found about four feet below the surface. The earth surrounding the tooth was undisturbed and was identical in all characteristics with the "Palouse"² formation, as it is exposed in road cuts throughout the surrounding country.

The tooth (Fig. 1) is a lower left cheek tooth—whether a molar or premolar it is impossible to determine. When dug up, it was complete but the lower portion of the anterior root broke off later. The tooth is large and heavily cemented, so that the upper portion of the buccal surface slopes inwardly toward the grinding surface. The cement is lightly striated vertically and shows flat, horizontal, irregular bulges on the upper one-third of the buccal surface of the crown. As viewed from the posterior the tooth shows a slight curvature; the outer side being convex. All sides of the tooth are somewhat vertically grooved; the buccal side distinctly and the labial side very pronouncedly. An unusual feature of the section shown by the grinding surface is the small, oval conulid (see "a" of Fig. 1) near the middle of the anterior surface. Measurements of the tooth are recorded as follows:

| | |
|--------------------------------|--------|
| Anteroposterior length | 33 mm. |
| Transverse width | 23 mm. |
| Height (vertical length) | 75 mm. |
| Height of Crown | 44 mm. |

The tooth was examined by Dr. C. L. Gazin, U. S. Nat. Museum who writes³ "that it seems to be very near the form *Equus idahoensis*. It is fully as large as in *E. idahoensis* but differs from this species in exhibiting a somewhat more modern pattern. I have no hesitancy, however, in regarding the specimen as of Pleistocene age rather than Recent."

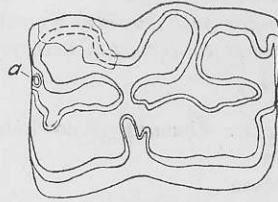


Fig. 1. Grinding surface of horse tooth from the "Palouse" formation, Moscow, Idaho. Natural size.

Fossils are practically unknown from the "Palouse" formation throughout the "Palouse country" of eastern Washington and the adjacent portions of Idaho. This fact lends added importance to the Moscow horse tooth as a clue to the age of the sediments. As noted above from a letter by Dr. Gazin, the tooth is near but apparently younger than *E. idahoensis*, which was first described by Merriam⁴ from the Idaho formation. This formation has been studied and correlated by several workers. Merriam writes⁵ that the Idaho formation "contains a fauna of a stage representing either the latest Pliocene or the earliest Pleistocene". Kirkham in his revisional study agrees⁶ with Merriam. But Hay⁷ would restrict the formation to the Pleistocene and suggests that the contained fauna "may justify the reference of the deposits to some part of the Nebraskan stage". Thus, it seems well established that the Idaho formation is early Pleistocene bordering on late Pliocene. The new species, *Equus idahoensis*, would of course have the same age. On the basis of the more modern enamel pattern, the horse tooth from Moscow may be considered at least slightly younger than *E. idahoensis* and therefore of post-Nebraskan age; if Hay's correlation of the Idaho formation is to be accepted.

An upper limit to age of the tooth is

not so easily obtained and can only be estimated after considering the geology of the "Palouse" formation. Since its definition by Treasher⁸ the validity of the "Palouse" as a single formation and its position in the geologic column has been questioned by several workers. Treasher, himself, pointed out that the formation was composed of two phases: (1) a lower, well stratified and thinly bedded loess and (2) an upper, massive silt formed from reworked material of the lower phase. Above both phases is the present fertile soil of the "Palouse country"; this Treasher considers to be a residual modification of the two underlying phases.

Most other workers have also recognized two phases in the "Palouse" formation. Bryan's study⁹ nicely summarizes the known geologic and physiographic data of the formation. He also recognized two phases: an older phase, which composes the inner core of the Palouse hills and a younger phase above it. The older phase is composed of several types of sediments; including a well weathered and compacted glacial till. The younger phase is a thin veneer, 3 to 10 feet deep of loessial soil. The younger or upper phase was established by him as older than the Spokane glacial stage and younger than the "early" glacial stage of Bryan; the till of which, as previously noted, is contained in the older phase of the "Palouse" formation. This places the age of at least a part of the older phase as that of the contained glacial till which with the elephant bones¹⁰ uncovered by Bryan caused him to consider the age of the older phase of the "Palouse" formation to be "pushed far back into Pleistocene time"¹¹. More recently Culver¹² has argued that the "Palouse formation is an extension of the Ringold¹³ formation of central Washington. He would restrict the term "Palouse" formation to mean only the agricultural soil of the "Palouse country"; that is, the surficial material, a few feet thick, formed as a reworked modification of the underlying "Palouse" or Ringold formation. Merriam and Buwalda¹⁴ consider the Ringold formation to be Pleistocene rather than the latest Pliocene and imply that they favor the

lower Pleistocene. If by extension this is accepted as the age of the formation at Moscow, it is seen to be near that of the Idaho formation of southwestern Idaho. However, whether the tooth was lodged in the upper or lower phase of the "Palouse" formation is not known. As shown by Bryan the upper phase of the "Palouse" formation is older than Spokane till but younger than still another but undated till contained in the lower phase.

Thus the determination of the exact age of the formation containing the horse tooth at Moscow must await additional evidence. Its geological location quite clearly places it as older than the modern, residual, reworked, surface soil (Palouse of Culver) that furnishes the fertility of this region. From admittedly scant paleontological evidence the formation is younger than Nebraskan and even if it should prove to be the upper phase of the "Palouse" formation, physiographic and geologic studies of similar deposits throughout the "Palouse country" have shown it to be older than the Spokane glacial stage. These limits suggest middle or lower middle Pleistocene time as the age of at least a part of the "Palouse" formation around Moscow.

¹Presented at the annual meeting of the Northwest Scientific Association, Spokane, Washington, December 27-28, 1933.

²Treasher, R. C., Origin of the loess of the Palouse region, Washington: Science, new ser., vol. 61, p. 469, 1925.

³Personal communication.

⁴Merriam, J. C., New mammalia from the Idaho formation: California Univ., Dept. Geology Bull., vol. 10, pp. 523-530, 1918.

⁵Merriam, J. C., Relationships of Pliocene mammalian faunas from the Pacific Coast and Great Basin provinces of North America: California Univ., Dept. Geology Bull., vol. 10, p. 432, 1917.

⁶Kirkham, V. R. D., Revision of the Payette and Idaho formations: Jour. Geology, vol. 39, p. 235, 1931.

⁷Hay, O. P., The Pleistocene of the western region of North America and its vertebrated animals: Carnegie Inst. Washington Pub. 322B, p. 269, 1927.

⁸Op. cit.

⁹Bryan, Kirk, The "Palouse soil" problem, with an account of elephant remains in wind-borne soil on the Columbia Plateau of Washington: U. S. Geol. Survey, Bull. 790, pp. 21-45, 1927.

¹⁰Idem., pp. 34-35.

¹¹Idem., pp. 37.

¹²Culver, H. E., Extensions of the Ringold formation: Northwest Sci., vol. 11, pp. 57-60, 1937.

¹³Merriam, J. C. and Buwalda, J. P., Age of strata referred to the Ellensburg formation in the White Bluffs of the Columbia River: California Univ., Dept. Geology Bull., vol. 10, pp. 255-266, 1917.

¹⁴Idem., p. 260.