New Mexico Anthropologist

Volume 5 | Issue 4 Article 2

12-1-1941

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ARCHAEOLOGICAL ASPECTS OF THE ALASKA MUCK DEPOSITS

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The following observations comprise the summation of evidence gleaned during the University of New Mexico's expedition to Alaska in the summer of 1941. The purpose of this expedition was the survey of all data concerning the Paleo-Indian thus far discovered and the searching out of such additional evidence as could be found. This reconnaissance for Early Man for the most part was made in two areas of Alaska, the first on the northern shore of Cooks Inlet and the mainland immediately adjacent thereto, and the second in the lower Yukon Valley especially in the vicinity of Koyukuk. Approximately two months were spent in these two areas in search of evidence of Early Man. Both in the Cooks Inlet area and in the Yukon Valley, but more especially in the latter, this reconnaissance took the form of examinations of successive muck deposits. It is with the archaeological possibilities of these muck deposits that this paper deals.

The typical Alaska "muck" is described by Mertie[1] as a dark gray to black silt, principally derived from the underlying schist bedrock, containing a considerable quantity of vegetal material, lenses of ice, and strata of peat and volcanic ash. These silt or muck deposits are eternally frozen three feet below the surface. Tuck[2] differentiates between silt and muck pointing out that the silt occurs only on the sides of the valleys and is unfrozen. Many of the local miners refer to these side valley deposits as "dry muck." The muck blankets considerable portions of the interior of Alaska in thicknesses varying from four or five feet to over 100 feet in the vicinity of Fairbanks. These muck deposits and accompanying sedimentary depositions are regarded as late Pleistocene or Early Recent in date and overlie older Quaternary gravels. In the streams and valleys of the Yukon and its tributaries, most of the placer gold mining operations are carried on in these older gravels. The superimposed muck, with its frozen bulk, must first be removed, consequently to expose the auriferous gravels beneath. It is in these placer operations, for the most part of a hydraulic nature, that most of the information of the muck deposits is to be gleaned. Hydraulic giants of immense power are used to cut away faces of the muck so that the summer sun may thaw the surface and the resultant sludge be sluiced away. Faces of the muck deposits exposed in this manner may be viewed from Kotzebue Sound in the west to Yukon Territory in Canada on the eastern headwaters of the Yukon. Especially informative exposures may be viewed in the vicinity of Fairbanks in the pits of the Fairbanks Exploration Company, where the author was allowed to examine these deposits through the courtesy of Mr.

1. Mertie, J. B., Jr., 1937, pp. 188-189.
2. Tuck, Ralph, 1940, pp. 1299-1302.

Otto Geist who is in charge there of the paleontological operations for the Frick Laboratories.

Insomuch as it is generally conceded that the entry of Man into the New World took place during late Pleistocene and Early Recent times[3], these muck deposits, of comparable age, are the likeliest places for this search. Indeed, evidence of the Paleo-Indian, although of an as yet undetermined nature, have been found in the mucks in the vicinity of Fairbanks[4].

For ordinary considerations, two methods of differentiation are possible for the Pleistocene. European standards usually dictate the pleistocene on a basis of successive glaciations and accompanying phenomena. In Alaska, glacial chronology for the Pleistocene is not as feasible by reason of the fact that the Yukon Valley and much adjacent territory was never glaciated. Insomuch as the Yukon is the most likely area in which to search for evidence of Early Man, we are forced to rely entirely upon the second consideration, namely, faunal remains. Paleontological evidences of mammals referable to extinct species are extremely common in the muck deposits. Conceding for the moment that man's entry into Alaska from Siberia was coeval with the formation of the Alaska mucks, these deposits give promise of much valuable information as to the environment, climate, and mammal population of these times, especially owing to the fact that the mucks are frozen and much otherwise perishable material is thus preserved.

No discussion of the Alaska mucks is complete without some reference to similar deposits in Siberia. Although these have not been completely worked, it was in these deposits that the first evidences of large extinct mammals were found. Beginning with the discovery of the first complete frozen mammoth, known as the Adams mammoth, near the mouth of the Lena River in 1799,[5] many such finds have been made. An idea of the immensity and the richness of these deposits may be gathered from the fact that trade in mammoth ivory dug from these mucks began in China as early as 500 B. C. and has been estimated as high as 62,500 pairs of tusks for the last two centuries and a half.[6] This astounding number, even allowing for exaggerations in estimates, forms a very adequate background for human occupation of these seemingly inhospitable areas. It is presumed that the Paleo-Indian in an upper Paleolithic status, as judged by European standards, hunted such animals as the mammoth in northeastern Siberia during the late Pleistocene times, and thence found his way into Alaska, following the same occupation. Unfortunately, however, no studies of the muck of Siberia, as such, have as yet been made.

Although the Alaskan muck deposits do not contain whole frozen

3. Hibben, F. C., 1941, p. 1.
4. Rainey, F. G., 1939, pp. 390-405.
5. Tolmachoff, I. P., 1929.
6. Osborn, H. F., 1930, p. 232.

mammoth carcasses such as those recorded for northern Siberia,[7] or such large numbers of well preserved ivory tusks, nevertheless, the Alaska mucks are well supplied with faunal remains which must have served as the living larder for the first American inhabitants. Animals at present identified from the Alaska muck include the mammoth, mastodon (although not nearly so common as the mammoth), horse, at least three species of bison, (*Bison crassicornis, Bison occidentalis,* and *Bison alleni*),[8] two species of musk ox, saber toothed tiger, lion, camel, gazelle, antelope, an extinct bear, sheep, and a number of rodent forms. In addition to the above now extinct species, there also occur moose and caribou, similar to, if not identical with, living forms.

Not the least interesting aspect of the muck deposits is the vegetal material contained therein. It is remarkable to note that all plant species excepting two from the mucks are found in the region today among existing forms.[9] The only common species which has not been identified in the living flora of Alaska is an indeterminate *Silene.* It has been widely believed that the late Pleistocene and Early Recent climate of Alaska was more moderate than at present and that this fact had much to do with the entrance of Early Man into the Behring Strait region. This floral assemblage might be referred entirely to the Recent period were it not for the association of such undoubted Pleistocene forms as *Felix atrox alaskensis, Mammonteus primogenius,* and *Bison crassicornis.* Sukachoff[10] reports *Betulo, Carex,* and *Ranunculus* in the stomach contents of a frozen mammoth from the Berezovka River all of which genera are noted in the Alaska mucks.[11] There is no floral nor, indeed, faunal evidence to indicate that the Alaskan climate of the Yukon region differed measurably in the Pleistocene from that of today.

With this climatic evidence the deposition of the Alaska mucks may be presumed to have occurred under conditions similar to those of today. In spite of this fact, however, no such deposition may be demonstrated to be in progress at the present time nor, indeed, has the mode of deposition been adequately determined up to the present date.

In contrast to certain of the Siberian occurrences, the Alaska mucks contain faunal remains that are almost invariably disarticulated in spite of the fact that not uncommonly ligaments, cartilage, and portions of flesh and skin yet adhere to the bones. Cross sections of the muck in those places where these can be observed by the cutting action of the hydraulic giants show an abundance of vegetal material, much of which is in the form of large trees. Some of the latter are in an upright position with stumps in place,[12] apparently growing on their

7. Lang, Herbert, 1927.
8. Mertie, J. B., op. cit., pp. 190-191.
9. Chaney, R. W., and Mason, H. L., 1936.
10. Sukachoff, P., 1914.
11. Chaney, R. W., and Mason, H. L., op. cit.
12. Giddings, J. L., Jr., 1938, pp. 3-5. Also Giddings, J. L., Jr., 1941.

original ground level. By far the majority of the tree and larger wood remains lie in twisted piles in accumulations suggesting their deposition in ephemeral arroyo or small canyon cuts. The torn and lacerated limbs and trunks of these trees give every indication of violent but not lengthy transportation to their present situation. Intermittently, however, with these violent erosional evidences, are lenses of peat apparently representing a static ground level at that particular stratum for at least several years. The total of these evidences indicates the alternate and intermittent periods of violent erosion such as would dismember animal remains and splinter trees, interspersed with other periods of comparative quiescence so as to allow the growth of "forests" and peat bogs in the same area.

A possible clue to this erratic climatic sequence is to be found in the occurrence of definite layers of volcanic ash in the muck deposits themselves and in the other portions of the same region.[13] The sources of these ash falls have not as yet been ascertained, but the ash layers are thick enough (at least 15 inches in some cases) so that these eruptions may be described as of major importance. Periodic volcanic disturbances of this nature could have been of such violence as to disturb the climatic equilibrium sufficiently to produce violent storms which would cause the accompanying phenomena. Mr. Geist is of the opinion that the large fauna of the region was completely killed off by such a volcanic action and ash fall, and the surface of the valleys and the hills of the region subsequently washed and cut by the violent storms occurring as an aftermath of the eruption itself. The intermittent nature of the ash layers in the muck might seem to argue in such a direction.

A wholly volcanic explanation, however, fails to satisfy two of the physical conditions of the mucks, namely, the frozen nature of the deposits and the origin of the muck material itself. It is obvious that the remains were frozen soon after their deposition as evidenced by the amount of perishable material which they contain. Although detailed microscopic studies of the muck are yet to be made, the material appears to consist of fine subangular to rounded grains of quartz and other rock-forming minerals.[14] The author was much impressed by the loess-like nature of these deposits. Although dark in color when wet or frozen, the Alaska muck is light bluish gray when dry, not unlike wind-borne materials in other areas where the underlying bedrock consists of dark colored schists and schistose rocks. Loess, if such is the entire explanation of the muck material itself, would naturally bring forth explanations of glacial phenomena and their outwash plains as the probable source of this material. As the periphery of Alaska and surrounding regions were known to have been glaciated at the last of the Pleistocene, a loess deposit in central

13. Tuck, Ralph, op. cit., p. 1302. Records volcanic ash only in the dry muck on the sides of the vallies.

14. Mertie, J. B., Jr., 1937. op. cit. p. 188.

Alaska would not be difficult to explain. Furthermore, the establishment of a loess sequence for central Alaska would tie in the Pleistocene chronology more firmly with both faunal and glacial evidence as criteria. Bennett[15] in 1914 classified these silts as loessial soil.

Archaeologically, the Alaska mucks became important when Rainey[16] published upon evidences which had been collected during hydraulic operations, some of which evidences were extremely similar to materials of recognized antiquity found in other sections of North America. Some of Rainey's material was of the type known as Yuma[17] in the Southwestern United States, where the question of Early Man has received its greatest impetus. The exact position of the Yuma culture, if this is a separate horizon, is not well understood even in Yuma County, Colorado, the type locality for this material. Even a recent symposium of the foremost scholars in this field has failed to entirely clarify the Yuma question. The discovery, then, of Yuma points frozen in the muck deposits of Alaska, gave promise not only of furnishing additional evidence on the Yuma question proper, but also of establishing incontrovertible evidence of the entrance of the Paleo-Indians into the New World by means of the Behring Straits. Although several so-called Yuma points have occurred in the muck deposits near Fairbanks (some additional specimens have turned up since the original Rainey publication) there is some doubt as to the exact disposition of these in the frozen muck. Also, other implements of more modern appearance have likewise occurred in these same mucks, casting some doubt on the position or the dispositions of the supposedly late Pleistocene specimens.

With this background in mind, it was hoped that some definite evidence could be found in the mucks to relieve this doubt and establish the chronology. The recent trip of the University of New Mexico found such evidence in the form of a Yuma point in situ in the muck at Cripple Creek near Fairbanks, Alaska. While assisting Mr. Geist in the collection of faunal material at this site, the basal half of a Yuma point was found embedded in undisturbed material directly after the sludge had been sluiced away by the hydraulic nozzle. This point was of that type now known as Eden Yuma with typical chipping and shoulder profilation. That the point was in place could not be questioned. That the place itself adds measurably to our information is, however, in doubt. The point occurred at the edge of a peat layer which, horizontally placed, apparently represented a one time surface level, at present some 45 feet from the top of the muck. The stratum immediately above the point gave every indication of having been deposited in a violent fashion. Furthermore, there was no indication of a continuous ground level or habitation layer in the vicinity of the point. Although this Yuma point was frozen in the muck, it is apparent that

15. Bennett, H. H., and Rice, J. D., 1914, pp. 43-236.
16. Rainey, F. G., op. cit., pp. 390-405.
17. Rainey, F. G., op. cit., fig. 9, 5.

it had been moved from its original point of deposition as have been most of the faunal remains. As the latter have not been carried very far by such agencies, it is probable that the Yuma point also is near the original point of deposition but was moved at least some distance before the freezing of the muck in its present position. The low hills on both sides of the valleys where the muck occurs would be a likely spot for the original source of this material. If this evidence, then, is even partially conclusive, it would seem that camp sites or other sites of this nature, were impossible of discovery, as the original depositions would be washed from the hills and the subsequent muck deposits be so mixed that the evidence would be inconclusive. Furthermore, the climatic picture of the central Yukon basin during late Pleistocene times was far from conducive to permanent habitation by Early Man. With a mean temperature possibly lower than that today because of the large ice masses in surrounding regions, with winds sweeping out from these ice masses carrying loessy materials, the Yukon valley must have been an inhospitable, windswept plain at least intermittently during these times. Even in intervals of comparative calm when the peat lenses were being laid down and forests established themselves on semi-permanent levels, such camp sites of the Paleo-Indian as might have been used, would be obliterated or distorted beyond recognition by subsequent periods of erosion or solifluxion as is evidenced at all levels in the muck deposits. Logically, such sites of Early Man, might survive in side valiies or in protected spots or areas away from the main Yukon and its tributaries where most of the deposition of loess took place.

This Yuma type of point is also somewhat unexpected in these deposits. The now famous Folsom and the Sandia types of projectile points are now considered the earliest forms that can be recognized out of context. Although the various Yuma types are at present undetermined, they are generally conceded to be later than other forms, especially the Sandia. The occurrence of Yuma points in the Alaska muck, presumably much closer to the North American dispersal center than the Southwestern sites, does nothing to clarify this problem. The discovery this season of a site near Chinitna Bay, Alaska, with accompanying points of a Folsom-like type may be significant.[18]

Failing in the delineation of definite sites in the Alaska mucks, there only remains the typology of the included artifacts or the environmental evidence as gleaned from vegetal, faunal, and geological sources. It was hoped that some human skeletal remains would appear in the abundance of faunal evidence, but none has thus far occurred. That man was present in Alaska during or just before the formation of the muck deposits now seems certain. However, owing to the extremely disturbed conditions of the mucks, this evidence is difficult to translate, especially into horizons and cultures of the Paleo-Indian as we now know him. Contemporaneity with certain ani-

18. Hibben, F. C., 1942, (to appear in *Amer. Antiq.*).

mals and plants can be established as well as a sequence of climatic events in the Alaska mucks, but sites must be discovered in sections other than those disturbed by wind, vulcanism, or solifluction to give additional information.

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