After practically 25 years' research on the antiquity of man in California from the point of view of the archeologist, anthropologist, paleontologist and geologist, it is clear that the problem is not only extraordinarily interesting but is exceedingly complicated. There are many evidences in caves, in alluvial and stream deposits, in the shell mounds and in asphalt deposits, indicating the occurrence of man on the Pacific Coast for a period which must in all probability be measured in terms of many thousands of years. Up to the present time all the human remains discovered are of what have been recognized as modern types. So far as has been determined they do not differ materially in their characteristics from the various races included within the group of the American Indians of to-day. The implements and other evidences of man's handiwork are also in general of modern appearance and different from the ancient types known from the Pleistocene deposits of Europe.

Up to the present time no definite evidence has been secured in California of the occurrence of human remains in a geological formation older than the present or Recent period. Although there are occurrences which have suggested the possibility of man's existence in the Pleistocene or the period immediately preceding the present, most careful investigation has not up to the present time given us definite evidence indicating that either human remains or implements produced through the work of man have been recovered from deposits antedating the present geological period.

Though the geological evidence before us does not give for the Pacific Coast of America any clear proof of man's presence in the Pleistocene, during which he is known to have been distributed widely over the Old World, this must not be interpreted to mean that the human race has not been present in that region for many thousands of years. A time measured in thousands or perhaps tens of thousands of years would naturally be required for the development of such divergence as we know among the physical types of America, and would also seem to be required for origin of the differences in culture and in language so abundantly represented among the aboriginal peoples of the western hemisphere. The geological evidences of occurrence of man in California permit our considering the possibility of his presence there for at least as long a time as seems required by the evidence of his physical and cultural differentiation on this continent.

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A RECENT DISCOVERY OF ANCIENT HUMAN REMAINS IN LOS ANGELES, CALIFORNIA[1]

INTRODUCTION

IN March, 1924, the Thomas Haverty Company, in cutting a trench preparatory to laying Section 11 of the north outfall sewer for the city of Los Angeles, encountered human remains at a depth of approximately 19 feet. Through the interest of Mr. George Hess, vice-president of the Haverty Company, the human remains were submitted to Dr. William Alanson Bryan, director of the Los Angeles Museum of History, Science and Art. The museum has appreciated greatly the courteous service rendered by the officials of the Haverty Company in the excavation of the locality where the human bones were found. Under the supervision of Dr. Bryan, and with an appropriation by the Board of Supervisors of Los Angeles County, the investigations are being continued in the vicinity of the original locality.

LOCATION AND GENERAL FEATURES OF THE REGION OF THE DISCOVERY

The locality is situated approximately one third of a mile west of the Angeles Mesa Drive and 300 yards south of the tracks of the Pacific Electric Air Line, on the Spanish land grant called Paso de la Tijera (Santa Monica Quadrangle, U. S. G. S.), between Los Angeles and Culver City. The Pleistocene asphalt deposits of Rancho La Brea lie three miles to the north and slightly to the west of this locality.

The region in which the human remains were found is a relatively flat or slightly undulating country bordered on the southwest side by the Baldwin Hills. These hills rise rather abruptly along their northeast front to a height of over 500 feet. The Baldwin Hills are presumably traversed by a fault (Inglewood Fault) extending in a north-west-southeast direction and emerging from the hills near their western border. The valley or plain area along the northeast front of the Baldwin Hills and in the immediate vicinity of the locality where the human remains were found has an elevation of 100 to 125 feet above sea level, and is drained by Ballona Creek. This stream does not possess much of a gradient and within very recent times (topographic survey 1893) marsh lands and ponds featured its course in the northern portion of the land grant Paso de la Tijera and in the southern portion of the land grant Las Cienegas. To the north of this marsh area the land surface becomes gradually higher toward the base of the Santa Monica Mountains.

[1] Read at the meeting of the National Academy of Sciences, Washington, D. C., April 29, 1924.

NATURE AND OCCURRENCE OF HUMAN REMAINS AT THE TYPE LOCALITY

At least six human individuals were found between the levels of 19 and 23 feet below the surface and within an area of not more than 12 square feet. Five individuals represented in this group were adults. A sixth individual, somewhat younger, may be a female. The structural characters of the skulls, so far as comparisons have been made, are those of modern types. The skulls do not exhibit the primitive features seen in the Neandertal man of the European Pleistocene. The remains resemble closely those of American Indians but have not been definitely determined as belonging to racial types represented by the Channel Island Indians of Southern California. There is undoubtedly resemblance between the two forms, but further comparison should be made, particularly with a larger series of modern types than that which has been available to the writer.

The osseous material was not scattered and the skeletal elements for some of the individuals at least were observed to be in normal position. Some of the human remains show considerable replacement of the bone material by mineral matter. In other specimens this replacement does not seem to be so great. A chemical analysis of the specimens has not yet been made. The occurrence of the material at a depth ranging from 19 to 23 feet and the lack of evidence of disturbance of the overlying deposits preclude the possibility of burial. The osseous material was not washed in, and its occurrence suggests rather a miring under bog or marsh conditions, presumably prior to the accumulation of the greater portion of the deposits that now overlie the human remains. A quartzite boulder, regarded as an implement by Dr. Edgar L. Hewett, and a small awl-like object were found in the sedimentary materials removed from the pit at the human locality. Data regarding their position in the section are not available. No remains of Pleistocene or of recent mammals were secured from the deposits in which the human material occurred.

The section at the type locality (Locality 1) presents a conformable sequence of deposits, consisting largely of drab- or olive-colored, unconsolidated, micaceous sands and sandy clays. A light-colored sand, eight inches thick, occurs four feet below the surface. In the entire exposure horizontal bedding is suggested only by the light-colored sand at the four foot level and by dark carbonaceous bands occurring at three lower levels. The upper and middle dark bands, at depths of 10 and 14 feet, respectively, are sharply set off in color from the materials immediately above, but grade downward in each case into drab-colored sand or sandy clay. The upper and middle carbonaceous bands are rather persistent and have been observed for nearly a mile along the line of the Haverty ditch on Section 11. Small nodules of gypsum appear below the upper margin of the second dark band. The deposits above this horizon appear to be quite gypsiferous. Numerous fresh-water molluscs were found above the second or middle dark band and scattered remains occurred below the upper margin of this horizon. Dr. A. J. Tieje, of the Los Angeles Museum, has determined the following forms:

Helisoma (Planorbella) trivolvis Say
Helisoma ammon Gould
Lymnaea solida cubensis Pfeiffer
Lymnaea (Galba) truncatula Müller
Physa cf. hypnrorum Linne
Physa sp.
Pisidium sp.

A small crustacean, referred tentatively to the genus *Porcellio,* was also found. The molluscs represent types living to-day and are regarded by Dr. Tieje as indicative of quiet waters and of swamp or marsh conditions.

The third or lowest zone of dark, carbonaceous sand occurs at a depth of approximately 18 feet and is narrower and not so well defined as the middle and upper bands. A few inches above this horizon is a thin (1 inch thick) concretionary layer, distinctly more consolidated than the surrounding sands. The bed in which the human remains were found lies below the narrow third dark band and above a clay, green or greenish-blue in color when moist and with some carbonaceous matter. Below this is a greenish micaceous sand. A considerable seepage of water occurred immediately above the green clay.

DEPOSITS IN THE VICINITY OF THE TYPE LOCALITY AND THEIR BEARING ON THE AGE OF THE BEDS CONTAINING THE HUMAN REMAINS

The section at Locality 2, situated at Mesa Drive, east of Locality 1, so far as this is exposed in the wall of the Haverty trench, does not differ noticeably from that at Locality 1.

At Locality 3, on Ballona Creek near Mesa Drive and approximately three quarters of a mile southeast of Locality 1 an upper sand member rests on a micaceous sandy clay and the contact line apparently marks the water table in this region. Below this occurs a massive bed of peat. At Locality 4 (Vernon Avenue and 11th Avenue) a short distance east of the Ballona Creek locality, narrow bands of peat are present below a stratum of gray sand. These are followed below by dark carbonaceous sands and gray sands. This portion of the section lies above, and is apparently conformable with, gravelly sand.

No great differences in elevation are noted when the three stations (Localities 1, 3 and 4) are compared. It does not appear unlikely, in view of the

relatively short distances that separate these localities, that portions of the sections containing peat at Localities 3 and 4 represent the same period of accumulation as that recorded by at least a portion of the deposits at the human locality. It seems premature, however, to state definitely that the dark carbonaceous sand horizons noted at the human localitity (Locality 1) are the equivalent of the peat beds at Localities 3 and 4. There remains the possibility that these bands represent a later accumulation. More information is needed concerning the beds that underlie the deposits containing the human remains. Undoubtedly, further trenching of the region, as the installation of the outfall sewer progresses, will throw light on this relationship.

At Locality 5, east of the Inglewood Fault and perhaps a mile or more west of Locality 1, a splendid exposure is seen in the sewer trench (Section 10), having a depth of 24 feet. Near the bottom of the trench are exposed clays of Upper Pliocene age, containing marine shells. These deposits have a northeasterly dip and are overlain unconformably by a heavy boulder bed, consisting of granitic materials. Some of the boulders exceed a foot in diameter. Toward the top of the bed are found arkosic sands and large boulders. The accumulation shows decided cross-breeding in places and is undoubtedly of fluviatile origin. Above the boulder bed is a greenish clay with upright stems of plants, and above this is peat. This deposit appears to rest unconformably upon the boulder bed. Laterally the peat may grade into carbonaceous earth.

At Locality 6, just north of Locality 5, a tibia presumably of a camel was found in the course of the excavation for a temporary sewer. This specimen, now in the collections of the Los Angeles Museum, was found over a year ago. It is reported to have come from a depth of 18 feet, although no definite information is now available regarding its position. It is possible that the specimen occurred distinctly higher in the section. A small amount of material in which the tibia was imbedded still adheres to the bone and suggests that the specimen occurred in an arkosic sand. The section at Locality 6 below the capping of soil consists of peat and peaty earth to a depth of 9½ feet. Pockets of shells, comparable to those found at Locality 1, occur in this material. Below this peaty earth is a greenish, micaceous sandy clay with numerous stems or roots, some of which extend downward from the peat beds into the sandy clay. A fragmentary toe bone of a horse was found in this deposit. The sandy clay is three feet thick and is underlain by arkosic sand. The exact relationship of the arkosic material to the sandy clay was not determined. It should be noted from this description that the section at Locality 6 closely resembles that at Locality 5.

The tibia is similar to but not identical with the tibia of the large camel, *Camelops hesternus* (Leidy), of Rancho La Brea. The specimen does not show the type of preservation exhibited by the human remains. If the specimen came originally from the arkosic sand associated with the boulder bed, it suggests Pleistocene age for the latter deposit.

In the Baldwin Hills immediately to the south occur clays and sands containing marine shells indicating Upper Pliocene age. Gravels and sands, referred to the San Pedro Pleistocene, are also present. The pebbles in the gravel beds are usually small, frequently possess ferruginous stains, and do not consist exclusively of granitic rocks. It is evident that there is no deposit exposed in the Baldwin Hills comparable to that of the boulder bed. The latter deposit presumably accumulated after the deposition of these San Pedro beds and, therefore, is at least later than a portion of San Pedro time. It would be of much interest to determine, if possible, the stage or stages of the Pleistocene represented by the deposits exposed in the Baldwin Hills.

The source of the material constituting the boulder bed was presumably in the western part of the Santa Monica Mountains or in the San Gabriel Range. It does not appear likely that the accumulation could have been formed under present climatic conditions by such a stream as the Los Angeles River even if we grant greater carrying power in flood seasons and a course through this region rather than its present course. The course of the old Los Angeles River is still very obscure.

If we concede the Pleistocene age of the boulder bed based on the evidence cited above, then the peat and peaty earth are later, perhaps distinctly later, at least at Localities 5 and 6. Should the deposits underlying the beds containing the human remains prove to be the equivalent of the peat beds, then these deposits are also later than the latest Pleistocene accumulation recorded in that region.

A second possibility presents itself if we regard the deposits exposed at the human locality or a portion of these deposits as having accumulated in ponded waters on the flood plains of the stream responsible for the deposition of the boulder bed. The materials in which the human remains occur and those above this horizon resemble, however, more closely in their lithologic characters the argillaceous sands, carbonaceous sands, and peat at Localities 5 and 6 than they resemble the boulder bed and associated arkosic materials. Undoubtedly the trenching now in progress between Localities 5 and 1 will furnish valuable information bearing on the problem of the relationship of the boulder bed and overlying sands and peat to the deposits in which the human remains were collected.

Lastly, it should be noted that the latest deposit in the immediate vicinity of the human locality is the

material constituting the very small alluvial fans in front of the gullies incising the northern front of the Baldwin Hills.

CONCLUSION

It is apparent from a preliminary investigation of the occurrence of the recently discovered human remains in Los Angeles that the evidence at present available does not point unequivocally to Pleistocene age of the deposits containing the human material. The fact should be emphasized, however, that the sequence of physical events and of faunal changes in the Pleistocene of California requires much careful investigation before a stage of understanding is reached comparable to that represented by Pleistocene history as now recorded in the region east of the Rocky Mountains.

Extensive trenching of the western region of Los Angeles now in progress should result in fuller knowledge of the geological events recorded in the area under consideration, and should establish more definitely the relationship of the Pleistocene deposits and faunas to those of the Recent. While the present report has not shown that the deposits containing the human remains are old in the sense that they belong to a geological period antedating the Recent period, the age of these beds and of the human remains might well be measured in terms of thousands of years, but not necessarily tens of thousands.

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"ANALYZED SOUND" IN NATURE

THE following is an account of an interesting group of phenomena, fundamentally alike, which have been noticed and described independently by five different observers, including myself. Comparing notes with one of these, Dr. Edward W. Emerson, resulted in his suggesting that I should put a description of his observations and mine together in an article, including also the description of two similar observations left with him by his uncle, Dr. Charles Thomas Jackson.[1] Soon after this conversation still another observation of a similar nature was made by Mr. Raymond Emerson, Dr. Emerson's son, and I am fortunate in being able to include a description of this which he has kindly furnished me. Still more recently Mr. W. Rodman Peabody has told me of another instnace of the same sort of phenomenon.

I can best place the data before the reader by simply giving the descriptions of these observations exactly as they were furnished me, and in the case of my own observation, as I wrote it down soon after I made it.

ANALYZED SOUNDS[2]

While engaged in the geological survey of Maine, I had occasion to make a trip through the forests from Farmington to Saddleback Mountain—and, after passing over a hill, we suddenly came in view of Saddleback between which and our party lay a large dismal swamp with a lake in the midst of it. The huge mountain range covered with snow stretched away for a great distance and presented so magnificent a sight as to call forth a shout from my party. The echo, after some moments, came back in musical tones, though the shout was anything but musical.

A fierce Indian war whoop was returned to us in the softest musical tones, not one of the discords being heard.

A gun was fired and the report came back in a *feu de joie* of long continuance and decidedly musical in its effect. Very discordant yells were made to try the effect, but only musical tones were returned. These interesting acoustic experiments were repeated for a long time with much amusement to the party—to me the matter seemed full of meaning—and was a subject of much reflexion.

While engaged in the earliest mining researches on Lake Superior, in 1844, a very curious instance of analyzed sounds was observed by F. W. Davis and myself—I had been sick and in consequence remained at the log cabin we had erected at Eagle Harbor on Keweenaw Point and sent out our miners to open a mine at Eagle River eight miles distant. Davis and myself set out one day to shoot some pigeons and while wandering not far from the shore in the cedar swamp near the harbor, we both suddenly stopped and listened to a sound which had reached our ears.

It was a melodious and solemn dirge in slow music like that I have sometimes heard in European cathedrals.

We listened for some moments before speaking, wondering where this music could come from. At first we thought it might be that our party of miners were returning and were chanting in the forest. To ascertain if such was the case, we ran in the direction the sound appeared to come from but in a short time we lost it. We then went down to the lake shore and looked up and down the coast from the point, but there was no boat and not a human being to be seen and no music was heard.

On returning to the spot where we first heard it, it was still heard there, but moving a few hundred yards either way, we lost it again. Much puzzled with this strange music of the woods, we returned to our cabin and found that old Jacob, our cook, was then engaged in his operations of making bread and had not been out of the cabin and had not been singing—indeed, he was no musician.

[1] Dr. Jackson was the geologist and chemist whose observation in 1842, of ether anesthesia, induced in himself, led to the introduction of this practice into surgery by Morton in 1846.

[2] From the notes of Dr. Charles Thomas Jackson, chemist and geologist.