

# ARCHAEOLOGY OF THE SOUTHERN SAN JOAQUIN VALLEY, CALIFORNIA

BY

E. W. GIFFORD AND W. EGBERT SCHENCK

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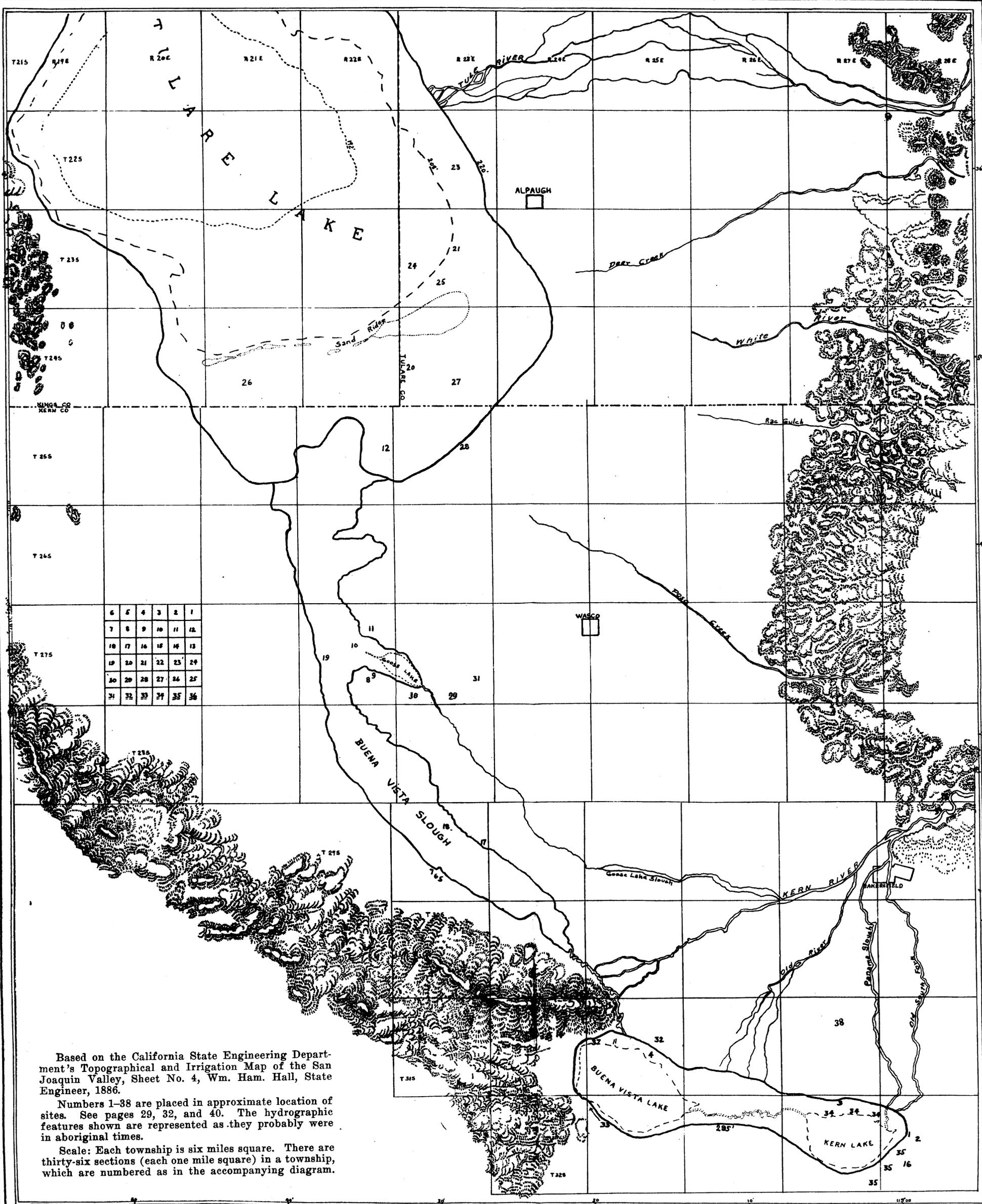
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18. Articles of steatite.
19. "Boat-shaped" stones and "snake heads."
20. Plummets-like stones and (or) "charmstones."



Based on the California State Engineering Department's Topographical and Irrigation Map of the San Joaquin Valley, Sheet No. 4, Wm. Ham. Hall, State Engineer, 1886.

Numbers 1-38 are placed in approximate location of sites. See pages 29, 32, and 40. The hydrographic features shown are represented as they probably were in aboriginal times.

Scale: Each township is six miles square. There are thirty-six sections (each one mile square) in a township, which are numbered as in the accompanying diagram.

MAP OF THE SOUTHERN SAN JOAQUIN VALLEY SHOWING ABORIGINAL SITES

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#### INTRODUCTION

This paper presents the archaeology of the southern portion of the San Joaquin valley of California.<sup>1</sup> The area is small and comprises only the floor of the valley from Tulare lake southward. To make the culture thoroughly understandable such enduring aspects of the region as geological and geographical features are presented. The historical data are summarized to aid in interpreting the archaeological material.

The present work is based on a study of the materials gathered by five University of California parties which visited the region in the years 1899, 1909, 1923, 1924, and 1925. In addition, local collectors in the region have generously made their materials available for study; to wit, Messrs. Samuel Fry and A. F. Mayer of Alpaugh, and Messrs. W. R. Dumble and W. B. Pryor of Bakersfield. The Fry collection has been acquired by the Museum of the American Indian, Heye Foundation.

In December, 1899, Dr. Philip Mills Jones headed a University of California expedition which worked for three weeks in the region between Buttonwillow and Adobe Holes, Kern county.

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<sup>1</sup> We follow the established popular usage in calling our area the Southern San Joaquin valley. Technically, it is the southernmost portion of the Great Central valley of California.

In February, 1909, Dr. N. C. Nelson visited the Elk hills at the northwest corner of Buena Vista lake to obtain for the University a cache of aboriginal artifacts, chiefly basketry, that had been discovered in a dry arroyo.

The third University party to visit the region comprised the authors, Mrs. Schenck, W. D. Strong, and Eugene Golomshtok. Three weeks were spent, largely in making excavations, in the winter of 1923-1924. Much of the success of the excavations was due to the hospitality of Mr. W. Y. Horner, Jr., at whose ranch the party camped. The region from Tulare lake to Kern lake was investigated, thus extending knowledge both to the north and to the south of the regions examined by the early investigators. To the unflagging interest of Mr. John B. Stevens, of Fellows, both at the time of the expedition and since, we owe the location of several important sites.

In the spring of 1924 the authors made a further survey of the area.

In November, 1924, the University obtained through the generosity of Messrs. T. E. Flowers and L. G. B. MacDowell, of Taft, California, two additional burials from the Elk hills. Mr. Strong visited the spot and obtained the specimens. His description of the burials is given elsewhere in this paper. Messrs W. W. Hill, G. M. Stirling, and W. L. Warner excavated at Pelican island in December, 1925, and donated the specimens obtained to the University.

To Miller and Lux Company the University is indebted for permission to examine aboriginal sites on the company's lands and especially for the privilege of excavating deposits at Elk Grove and Pelican island.

For the identification of animals, plants, and inorganic specimens our thanks are due to the following specialists: Dr. Frank C. Baker of the University of Illinois; Dr. Barton W. Everman of the California Academy of Sciences; Miss Edna M. Fisher, Professor E. Fritz, Professor N. L. Gardner, Professor Joseph Grinnell, Professor C. B. Lipman, Professor George D. Louderback, Miss Anne Swainson, of the University of California; Mr. Hubert G. Schenck of Leland Stanford Junior University; Mr. Stuart T. Henshaw of the Tubbs Cordage Company; Messrs. C. L. Hill and Arthur Koehler of the United States Forest Service; and Professor A. E. Douglass of the University of Arizona.

## GEOGRAPHY OF THE SAN JOAQUIN VALLEY

The area with which this paper is concerned lies chiefly between the center of old Tulare lake on the north and the Tehachapi mountains on the south and is comprised in the counties of Kings, Tulare, and Kern, California.

The basins of Buena Vista and Tulare lakes are portions of the San Joaquin valley, which is itself, roughly, the southern half of the Great Central valley of California. Thus the San Joaquin valley extends from Stockton in the north (latitude 38° N.) to the base of the Tehachapi mountains (latitude 35° N.). The general direction is northwest to southeast. It is forty miles in average width. The eastern boundary is the Sierra Nevada range which attains an elevation of 14,500 feet. The western boundary is the Mount Diablo range, with an elevation of 4000 to 5000 feet. The Tehachapi mountains, of about the same height, connect the two ranges and shut in the valley on the south. The area of the entire valley is about 11,500 square miles.

This great valley is remarkably flat and uniform. But taking the San Joaquin river as the longitudinal axis we find that the area between the river and the Sierra Nevada range forms an eastside plain of 7700 square miles, while the westside plain between the river and the Mount Diablo range is 1850 square miles. Each of these plains has characteristic features. The remainder of the valley, 1950 square miles, was covered anciently by lakes and marshes.

The valley is also divided into three sections transversely. The most northerly section is from Stockton to the Kings river, about 155 miles up the valley. At this point (about Township 18<sup>2</sup>) the Kings river on the east and Los Gatos creek on the west have pushed out alluvial fans which have coalesced into a ridge. To the south of the ridge the region is so arid that the drainage has been insufficient to keep a channel cut through the ridge. Accordingly it acts as a dam forming Tulare lake and its swampy basin. This is the second section of the valley and it is some seventy-five miles long. This is one of the portions of the valley with which the present paper is concerned. At the southern end of the Tulare basin (about T 31) the Kern river

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<sup>2</sup> Townships and ranges as referred to herein are respectively south and east of Mount Diablo. Each township or range is six miles. In citing township, range, and section the abbreviations T, R, and S will be used.

has pushed its delta clear across the valley until it abuts on the McKittrick hills on the west, forming a second dam and a basin extending thence to the foot of the Tehachapi mountains, a distance of 20 miles. In this basin lie Kern and Buena Vista lakes. It constitutes the third section of the valley, and with it this paper is also concerned.

The San Joaquin valley, geologically, is a great structural trough which has existed as such since Tertiary times. The waters from the surrounding mountains have filled this great trough with alluvial debris and the deltas of the streams have spread out to form the flat valley floor. The high Sierra Nevada range produces large perennial rivers and hence their deltas have covered by far the greater part of the valley as is indicated by the east-side plain previously mentioned. The low, and more arid Mount Diablo mountains produce only short creeks, mostly dry in summer and with correspondingly small deltas. The Tehachapi range which limits the valley on the south is one of the Coast range series and presents the same essential characteristics as the Mount Diablo range.

The floor of the valley itself rises from sea level near Stockton to about 300 feet elevation at the southern shore line of Buena Vista lake. The slope of the east-side plain to the trough of the valley is from five to ten feet per mile; of the west-side plain, from twenty-five to forty feet per mile.

The broad conclusion, pertinent to the present topic, is that from the time of man's first appearance in America to the historical epoch, the San Joaquin valley has offered a suitable habitat to him and one which has not essentially changed during this interval.

#### TULARE BASIN

The tourist traveling in his automobile from Bakersfield north towards Fresno, or west towards Paso Robles, soon feels that he is traversing an endless plain. It is as flat and as even as a plate. Around the rim are hazy mountain ranges. There are no streams or lakes. Occasional dykes indicate hardly recognizable drainage or irrigation ditches. **Everything** gives evidence of intense aridity—the baked ground, the absence of vegetation larger than sage or greasewood. Even this is very sparse. At intervals of from two to five miles are isolated farm houses with patches of green and perhaps a few trees.

Tulare basin has a maximum width of about fifty miles and a length of about seventy-five miles (T 18 to T 31). The dominant feature was Tulare lake (now dry) with its surrounding swamps and sloughs. Of these latter the most important was the Buena Vista slough.

### *Tulare Lake*

The northern margin of Tulare lake was about at the center line of Township 20. The region from here to the northern edge of the basin, about fifteen miles, was subject to inundations from the lake and from the Kaweah and Kings rivers. In this width this area extends from R 18 to the mountains. Though properly a portion of the Tulare basin, and though possessing the common characteristics of the San Joaquin valley, this district is quite different from that to the south of the lake. All territory north of Township 22 is excluded from this paper.

The lake when at the 220-foot level extended from the center of T 20 to near the southern line of T 25, about thirty miles from north to south. From east to west its widest extent was also about thirty miles—R 24 to R 19. The total area covered at this level was about 800 square miles.

Map 1 exhibits the southern portion of the Tulare basin and the Buena Vista basin with the principal physical features mentioned herein.

Tulare lake, on account of the flatness of its bed and the inconstancy of its water supply, has varied tremendously in area. The elevation of its bed is 175 feet above sea level. Since its northern rim is 214 feet the lake begins to drain into the San Joaquin river through the Kings river delta when the water level reaches that point. However, this elevation is not ordinarily attained and for years (e.g., 1883 to 1924) such water as the lake and basin receive either evaporates or sinks into the ground. In spite of this the lake has always been a freshwater lake. At intervals the flood waters will pour down from the mountains in tremendous volume and carry the lake level several feet higher than the point of overflow. The highest point known to have been thus attained is 220 feet above sea level. In November, 1883, when the level was 192 feet the area covered was only 300 square miles. Apparently the levels between 192 feet and 208 feet were normal. Map 1 offers a comparison of these areas.

The extent and periodicity of this lake were obviously factors of the greatest importance to peoples dwelling upon its margin.

The highest known historical level of the lake, 220 feet, was probably the maximum lake level in prehistoric times. This level of 220 feet was attained in 1861-3 before either drainage or irrigation projects were of sufficient magnitude to have had a retarding effect.

The other extreme is a state of absolute dryness. This is its present (1924) state and it was also true in 1905; while the water rose to 193 feet in 1907. Modern irrigation might be supposed to account for this dryness but the opinion of one of the best authorities on the subject is that, "It is to be presumed that the history of the lake for many centuries has been like that part of it which we know directly, i.e., that it has fluctuated in area and depth, occasionally drying out completely, then filling to the point of overflow."<sup>3</sup> If this lake dried up it eliminated what is assumed to have been important sources of aboriginal food, fish, mollusks, and tule. Also such an event would affect terrestrial forms of life by depriving them of their only available water supply.

When the lake was entirely dry it would seem that the entire absence of water would have prevented residence in the region. On the other hand the 220 foot level was probably very unstable. A settlement here would again be without water if the lake declined. However as the lake remained near the 192-foot level for considerable periods, people must have accumulated on its margin here. But since it was by no means limited to exactly the 192-foot level almost the entire area between the 192-foot and 220-foot levels was not only marshy, but was an area in which man could not have resided permanently. This is an area of 500 square miles. The likelihood of inundation and the desire to be permanently near a water supply must have tended to congregate people seeking the district on the high spots near the average lake level. According to topographical data available the only spot between the 192-foot and 220-foot levels that rises above 220-feet is a sand ridge, which in 1850 was found by Lieutenant G. H. Derby, U. S. A., to be "about 100 yards in width and twelve feet above the level of the lake." This ridge "divides the waters of the northern or Tache from the bed, now nearly dry, of the southern or Ton Tache lake."<sup>4</sup> The base of this sand ridge was just above the 208-foot level.

This sand ridge or series of dunes is at present known locally as the "Sand ridge." It extends along the center of the T 24 from R 21 to 24 (about 18 miles). At its western end it is perhaps 100 yards wide: at the eastern end it broadens to two or three miles and there it is known as Atwell's island on account of having been owned by a Judge Atwell of Visalia. The general location of the "island" is marked by the village of Alpaugh. Since the top of this ridge was above the highest flood waters and its base extended along the lake margin at the 208-foot level it must have offered an exceptionally favored site for reasonably permanent Indian habitation.

Generally it would seem that in prehistoric times we could not expect to find permanent places of residence below the 220-foot level of Tulare lake

<sup>3</sup>W. C. Mendenhall, Preliminary Report on the Ground Waters of San Joaquin Valley, California, U. S. Geol. Surv. Water Supply Paper 222, p. 38, 1908

<sup>4</sup>32nd Congress, 1st session, Senate Ex. Doc., No. 110, "Report of the Secy. of War . . . communicating . . . a report of the Tulare Valley made by Lieut. Derby," page 6, 1852.

except on the sand ridge, because of too much water, and only in exceptionally favored and limited areas on the 220-foot margin, because of not enough water. This means that the apparent population would appear on account of the shifting to have been larger than it was in fact. The inference is strong that the region instead of having any considerable permanent population was simply frequented by hunting and foraging parties at favorable seasons.

Considering the shores of Tulare lake with reference to human habitation the following conclusions are suggested. The northern shores of the lake were suitable for permanent residence but are beyond the limits of this paper. The entire western and southwestern shores were arid, apparently ill suited for residence and no traces of inhabitants have been reported. The southeastern portion, particularly the Sand ridge or areas made available by the streams of the Sierra Nevada, offered suitable residential sites and all we know of in the region were located here.

#### *Buena Vista Slough*

Buena Vista slough, is essentially an extension to the south of the overflowed area surrounding the main Tulare lake. It was through this passage that the waters from Buena Vista lake basin and Kern river reached Tulare lake.

The Buena Vista slough extended from the 220-foot level of Tulare lake (T 25, R 21-22) forty miles southeasterly to Buena Vista lake (northern part T 31, R 25). The northern thirty-five miles of the slough had an average width of from two to three miles. The last five miles to the south included only the slough proper, some eighty feet to one hundred feet wide, and its immediate east bank. The banks are higher here where the stream has had to cut through the Kern river alluvial fan. Generally, the slough itself clings to the sandy slope of the western hills so that the swamp throughout its course is mostly to the east. About twelve miles south of the 220-foot level of Tulare lake the slough formed a considerable bay towards the east (in T 27, R 22-23). This bay was in a depression deeper than the adjacent swamp and hence even in low water usually contained a lake. This still exists and is known today as Goose lake. Beyond Goose lake to the southeast a slough known as Jerry slough, or Goose lake slough extended twenty-five to thirty miles to the Kern river (in T 30, R 27, Sec. 6), about six miles west of Bakersfield.

The fall from Buena Vista lake's point of overflow (295 feet) to Tulare lake at its maximum (220 feet) is only seventy-five feet in some forty miles, or less than two feet per mile. The slough proper is much less marked in the northerly thirty miles after the hills and alluvial fan are left, and the area has generally the characteristics of the adjacent Tulare lake. When the lake receded to its 192-foot level the swamp bordering the slough must have dried up, but the slough itself remained. This was true when Lieut. Derby, in 1850,

marched by the southern end of Tulare lake (then at about 210 feet) and reported "the bed, now nearly dry, of the southern or Ton Tache Lake."<sup>5</sup> Derby continues to the effect that he had to cross the slough proper on rafts of tule.

At its maximum height we may assume that the waters of the slough covered the swamps to the width of two to six miles as indicated on the map. This is the marshy area disclosed by the surveys of 1853.

As indicated, the northern part of the slough probably varied directly as did Tulare lake. In the south the story was different. The Kern river, which fed Buena Vista lake, was a perennial stream, so that nearly all the year there must have been some flow from Buena Vista lake into the slough. During its first five miles the slough assumes definite stream characteristics. The more ample supply of water in the region is evidenced by greater tree growth. Some of the trees along the water courses are quite large. And altogether even the sparse timber contrasts markedly with the entire absence of trees to the north and around Tulare lake.

The same conditions applied in an even greater degree to Goose lake and its slough. This slough was a direct branch of the Kern river, and while it is probable that it received no water at the lower stages of the river, it is as likely that it did receive some water for a considerable period each year. Accordingly Goose lake must have dried up even more rarely than Tulare lake.

The southern twenty to twenty-five miles of Buena Vista slough, Goose lake, and both ends of Goose lake slough were probably the most favorable locations in the Tulare basin for aboriginal permanent residence.

### *Streams*

On the east the streams, though meagre compared with the rivers farther north, must have been of direct importance to the inhabitants of Tulare basin. For in times of drought, or low water, any people who did not migrate south to the Buena Vista basin could have followed these streams into the mountains, unless hostile peoples prevented.

No stream flowed out on to the floor of Tulare basin south of Township 22. Those that sank into the sands near the foothills were small. On the west was only Avenal creek. On the east beginning at the first stream north of Kern river, we have:

Poso creek, drainage 289 square miles, lost in T 26, R 24, S 14.

Rag gulch, lost in T 25, R 26, S 6.

<sup>5</sup> His report reads: "This last [i.e., the area to the south of the lake at about the mouth of Buena Vista slough] is little more than a very extensive swamp covering the plain for fifteen miles in a southerly direction and is about ten miles in width. It is filled with sloughs and small tule lakes. The gradual receding of the water is distinctly marked by the ridges of decayed tule upon its shore, and I was informed and see no reason to disbelieve that ten years ago it was nearly as extensive a sheet of water as the northern lake" (l. c., 7). It must be remembered that here Derby is including that area between the 210-foot and 220-foot levels of Tulare lake. Buena Vista Slough swamp would be still further south.

White river, drainage 90 square miles, lost in T 24, R 26, S 7.

Deer creek, drainage 110 square miles, lost in T 23, R 24, S 26.

Tule river just north of the region being considered was a stream of more importance.

### *Mountain Passes*

The principal mountain passes, as well as the streams, must have largely determined any transmontane intercourse of the people.

On the east of the Tulare basin there are no practicable passes across the Sierra Nevada range within the north and south limits of Tulare basin. Hence any people who may have inhabited the basin would have had to pass through other peoples to the north or south in leaving the basin, or would have had to cross the mountains on the west. Conversely the people across the western mountains were the only transmontane people who could come into direct contact with the inhabitants of Tulare basin.

A hardy mountaineer can traverse the mountains of the Coast range at almost any point. However, the ranges are rugged and the great scarcity of water makes it probable that there would have been little aboriginal travel except along the routes through the principal passes.

Leaving the northwest corner of Tulare lake there is a pass via Los Gatos creek into the San Benito river valley. Keeping more westerly from the head of Los Gatos creek one descends Lewis creek and San Lorenzo creek to the Salinas river near Kings city, some eighty-five miles from the lake. After leaving the lake via Los Gatos creek one can follow one of the southern branches of that creek (Waltham creek) to the San Lorenzo and thence as above; or taking Jacalitos creek and crossing over the ridge several creeks will be found leading to the Salinas river near San Miguel (T 25, R 12). The distance would be about seventy miles from the lake.

From the southwest corner of the lake (at about the Kings-Kern county line) a very low pass leads via Cholame creek and Estrella river to the Salinas river at San Miguel, about fifty miles from the lake. This is the lowest and easiest natural pass across the Coast ranges south of Carquinez straits.

There is no other marked route to the west until we reach the more favored portion of Buena Vista slough (twenty-five to thirty miles south of Tulare lake in T 29, R 23). From here one passes west (near the present McKittrick, T 30, R 22) over the first range of hills to the Carrizo plains, a flat, very arid region containing a soda lake on its western edge. A few miles south of this lake in T 31, R 20, San Luis Obispo county, is a spectacular sandstone formation known as the Painted Rocks. Here are Indian pictographs, considerable evidence of habitation, an amphitheatre adapted for defense, and pot-holes in the rock which are said to contain sweet water until very late in all except the driest summers. The earliest settlers here claim that the old Indians asserted that this was a way station on the route to the coast. Crossing the next ridge and keeping to the south, the Cuyama river is reached in some twenty miles. This river flows into the Pacific ocean about fifteen miles south of Pismo. The maximum elevation reached on this route would not much exceed 2000 feet. The distances are: Buena Vista slough to Painted Rocks, 35 miles; Painted Rocks to Cuyama river, 20 miles; down river to ocean, 50 miles; total distance from basin to sea 105 miles.

After reaching the Cuyama river an alternative route would be to continue due south across the mountains to the neighborhood of Santa Barbara—about forty-five miles in an air line, but probably seventy-five miles over the very rough intervening mountains. Pictographs are reported from this region similar to the Carrizo ones.

#### BUENA VISTA BASIN

This basin is entirely in Kern county, and extends from the McKittrick (or Elk) hills on the west (T 31, R 24) to the slopes of the Sierra Nevada foothills (T 32, R 29) on the east. The width is thus about thirty-two miles. It has an elevation of about 450 feet at either side and of about 268 feet at its lowest point. From the point of overflow of Buena Vista lake on the north (about the line of T 30–31) to the foot of the Tehachapi mountains on the south is some twenty miles, and this is the length of the basin. At its northern rim it is about 300 feet.

In this basin lay Buena Vista and Kern lakes, the latter now drained. At low water these were separate bodies connected by a slough, but at high water in ancient times they probably formed a single lake. This single lake had a maximum water level of 295–300 feet. At 295 feet it overflowed into Buena Vista slough. It is shown at this level on map 1.

Its maximum length was twenty-one miles from northwest to southeast. The maximum width was six miles, near the western end. The area covered was about eighty square miles. On the west it lay close to the foot of the Elk hills. On the south the surrounding slopes were inclined at some seventy feet to the mile, on the east about fifteen feet to the mile.

The lowest recorded water stage was in 1879 when the water stood at about the 282-foot level in Buena Vista lake and 284-foot level in Kern lake. It might be inferred from this that the low stages in Buena Vista basin did not coincide exactly with those in Tulare basin, for Tulare lake was lowest, at about this time, in 1883. This would mean that a people finding no water in Tulare lake could find it towards the southern end of Buena Vista slough.

At this low stage Buena Vista lake was about seven and a half miles by four and a half miles, and Kern lake about five by three miles, or about one-half as large. Connecting them was a slough which being very tortuous was twelve to thirteen miles long. This slough had firm banks of tule sod three to five feet high. On the other hand the margins of the lakes, particularly on the south and west, were almost unapproachable on account of deep slimy ooze. To the north and east the lake margins were firmer and much more sandy. Here the river spread over its delta in a perfect maze of channels. In times of freshet these channels would be more or less filled with silt and sand from the mountains, the water would change its course, and ridges of sand would be left.

At the present time a dyke extends across Buena Vista lake along the line of Ranges 25-26. The Kern river has been diverted by dams and irrigation canals. Hence Kern lake is entirely dry. Buena Vista lake on the contrary is used as a reservoir and has never been dry in the historic period. It is possible that in the past the water level may have fallen below 282 feet, but it seems almost certain that neither of the lakes was ever dry since they were fed by the perennial Kern river and could flow from one to the other irrespective of which the Kern emptied into. The greatest variability, then, would appear to have been from 300 feet to about 280 feet.

This lake was essentially different from Tulare lake. It was never dry. The fluctuations of its margins were never great enough to cause the removal of a people situated on the 300-foot line. It was able to support a more constant and vigorous flora; and animal life as a source of human food would never be forced away. In short, it was the most suitable habitat for permanent residence in the southern San Joaquin valley.

On the south and east the shore line of old Kern lake is about as shown on our map. On the United States Geological Survey quadrangle the line is marked by Petersdorff Canal. Mr. Hugh S. Allen reports from his survey that the shore is about one quarter mile south of the canal in some cases, in most cases less; and that there is about five feet rise in the thousand from the lake bed to the shore line. On the north we give the shore line as outlined by Mr. Allen: South of the east quarter corner of S 12, T 32, R 27 and thence westerly just north of the center line of S 12, 11 and 10; thence somewhat more northwesterly to Buena Vista lake.

Along this shore line and in the region north to Bakersfield and thence along the Kern river to the mountains there is much evidence to indicate a considerable concentration of aboriginal habitation.

### *Streams*

Few streams entered the basin, but one of these, the Kern river, was very important. It has a drainage area of 2345 square miles, covering part of the highest Sierra. It is consequently perennial. Debouching from the main mountain gorge some fifteen miles east of Bakersfield, it flows between high banks until just above that city (T 29, R 28). There it begins to branch and covers its delta (T 29-31, R 25-28) with a maze of streams. Of these channels there seem to have been five principal ones within historical times. These are noted on the map. It is probable that at all times the river's mouths were confined to the area delimited by the southern and northern of these channels.

### *Mountain Passes*

Leaving the western extremity of Buena Vista lake and passing up Buena Vista creek on a due westerly course one comes to the Painted Rocks in about thirty miles. The routes from here to the sea via Cuyama river, or to Santa Barbara have been described.

Going southwest from Buena Vista lake by the present town of Maricopa the Cuyama river is reached, in about twenty miles, at a point near the mouth of Santa Barbara creek. This point on the Cuyama river is some twenty miles upstream from where the Painted Rocks trail reached it. Hence from Buena Vista lake to the Pacific ocean via Maricopa would be about ninety miles. This was a comparatively easy route and must have been of importance. Moreover, passing up Santa Barbara creek from the Cuyama river, and crossing the ridge, one reached the head waters of creeks tributary to the Santa Inez river just behind Santa Barbara. This distance was about forty to fifty miles. This route offered the shortest and easiest way from Buena Vista lake to the Santa Barbara channel and its people, and vice versa. The total distance from the lake to the channel was sixty to seventy miles.

Going almost due south from Kern lake, at the present time one crosses the Tehachapi range at an elevation of about 4200 feet via Tejon pass, i. e., via Grapevine and Castac creeks. In this way the Santa Clara river valley is reached near Castac, in some seventy-five miles. Down the river to the Pacific ocean near Ventura (on the Santa Barbara channel, but twenty-eight miles east of Santa Barbara) is forty miles. It would seem more probable that aboriginal travel would have kept due south from the head of Grapevine creek and have thus reached the Santa Clara via Piru creek, ten miles nearer the sea. There is a third alternative. From near the point of discharge of Grapevine creek on to the Kern lake slopes one finds the mouth of Tejon creek. Following this over the first and main ridge of the Tehachapi one reaches the uplands of the Mohave desert in forty to forty-five miles from Kern lake. From here a route led southeast to Elizabeth lake (3400 feet elevation) and thence across the second Tehachapi ridge via San Francisquito creek to the Santa Clara river at Saugus. From Saugus to the sea is forty-five miles. This route is mentioned for two reasons. First, it gave access to the Mohave desert and the Colorado river region. Second, it seems to have been the trail familiar to the guides of the earliest Spaniards. Summarized, the distances from Kern lake to the Santa Barbara channel via Tejon pass and Santa Clara river are: via Piru creek, 100 miles; via Castac creek, 115 miles; via Tejon and San Francisquito creek, 145 miles.

Traveling southeast from Bakersfield, one can cross the Tehachapi mountains via the Tehachapi pass at an elevation of 4000 feet. From Bakersfield to the summit is thirty-three miles; from the summit to Mohave is twenty-nine miles along the route which leads to the Colorado river. An alternate route led from the summit to Elizabeth, fifty miles. Thence it led to the Pacific as above mentioned. From Kern lake to the sea via Tehachapi pass and Elizabeth lake is about 175 miles.

Branching from the Tehachapi route some fifteen miles southeast of Bakersfield, a route passes over the southernmost Sierra on to the Mohave desert. This is known as Walker's pass and was used by immigrants who crossed the American continent in the gold rush to central California.

The Buena Vista basin, then, was accessible by the following principal land routes:

1. To the Chumash of the Santa Barbara channel via the Cuyama river, or via Santa Clara river and Tejon pass.
2. To the Shoshonean peoples of southern California via Tejon pass.
3. To the other Shoshonean peoples, to peoples of the Colorado river region, and to those of the Southwest via Tehachapi and Walker's passes.

All these routes led through arid country, but offered no serious obstacles to aboriginal travel. The probable time for the traverse of any of them must have been from three days to a week. No doubt the great bulk of transmontane prehistoric travel used those routes into or out of the Buena Vista basin.

Travel in the open valley to the north requires no discussion.

#### CLIMATE

What is said of climate applies equally to Buena Vista basin and Tulare basin.

The area is exceedingly arid, the annual average rainfall being about five inches. The rain is very scant in the spring. In the three summer months there is none. Most of the rain occurs from November to April. However, there are two periods of high water in the streams. The first is the rain-flood of winter which in the Kern river, the principal stream, is highest from January to March. The second is the snow-flood of summer, which occurs with the melting of the snow on the Sierra. In the Kern river this high stage is from May to July. The lowest water occurs in October.

From June 15 to September 30 is the hottest period and very high temperatures prevail, 118° F. being the hottest on record. At this time also the range of temperature in a given day is very great, sometimes as much as 40°. In winter the temperature is generally above freezing point though as low as 13° has been known. In summer there is very low atmospheric humidity; in winter there are fogs. These are frequently very dense and trying in the lower parts of the valley. The fact that even the lower foothills may be bathed in sunshine while one shivers for half a day in a blinding fog on the lake margin might be expected to exert some influence as to place of aboriginal residence.

In short the climate was not an inviting one. But it was not unhealthful, and was far from impossible to Indians except in periods of drought when dependence upon surface water must have been absolute.

#### FLORA

Along the deltas of the eastern streams oaks extend for some little distance out on to the plain where along the water courses they give way to an open growth of cottonwoods, sycamores, and willows. Such growths are particularly noticeable along the Tulare river, down the Kern river channels and along the northern shore of Kern and Buena Vista lakes, and along the southern banks of Buena Vista slough.

The lower Tehachapi slopes, the eastern slopes of the Mount Diablo range, and all the balance of our region was practically treeless.

On the more elevated sandy portions of the valley there was a sparse growth of sage and greasewood, and a little grass.

The swampy or inundated land was covered in most places by a dense growth of marsh grass and tule. This tule is the common bulrush of California, either *Scirpus californicus*, or *S. tataru*. Such tules were ten feet to twelve feet high and one to two inches in diameter. They had a bulbous branching root eight to ten inches long and six to eight inches in diameter. Their growth formed a belt as wide as two to three miles around the marsh, perhaps even much wider in the area south of Tulare lake.

We may conclude then that so long as a people was restricted to the valley floor, their vegetable sources of food supply were limited. They would have had neither pinenuts nor acorns except by trade. How many species of shrubs and grasses produced edible seeds is not known. Doubtless sage seed, at least, was eaten. The pollen, seed, and root of the tule were eaten and the stem was used for hut construction, and for balsas and rafts.

#### FAUNA

River mussels (*Anodonta oregonensis*) seem to have been the only molluscs of importance as food. They are far more abundant within the Kern river influence and decrease rapidly as we go north from Buena Vista lake. Within this region they appear to have formed a considerable item of diet. The freshwater univalves noted were *Planorbis ammon* (common), *Gonidia angulata* (rare), and *Physa humerosa* (rare). *Epiphragmophora exarata*, a land shell, was obtained on sites 8 and 11 near Goose lake.

Within recent times ten species of fishes have been identified in the Tulare-Buena Vista Lakes region, namely:

Suckers: *Pantosteus araeopus* and *Catostomus occidentalis* (Sacramento sucker).

Minnows (Cyprinidae): *Orthodon microlepidotus* (blackfish), *Lavinia exilicauda*, *Mylopharodon conocephalus*, *Pogonichtys macrolepidotus* (split-tail), *Ptychocheilus oregonensis* (squawfish), *Leuciscus conformis*, *Luxilinus occidentalis*.

Trout: *Salmo irideus* (rainbow trout).

Of these we must consider the trout as being of moment only in the running streams, i. e., in our area only in the Kern river channels.

The bird life varies with the vegetation. On the valley floor and on the western slopes we find mostly the California sage sparrow and

the California horned lark. There are also sage and LeConte thrashers, and the Brewer sage sparrow. Near the lakes we find in addition large numbers of a great variety of waterfowl. Among these are the white pelican, Farallon cormorant, avocet, killdeer, snowy plover, mountain plover, Bonaparte and California gulls, stilt, black-crowned night heron, great blue heron, Forster and black terns; ruddy, fulvous tree, pintail, shoveler, red-head, and teal ducks; western grebe, American bittern, American coot; lesser, white-fronted, Canada and Hutchins geese; curlew, snipe, and sandpipers. This waterfowl life constitutes the dominant characteristic of the animal life of our region in historic times.

When we turn to the mammals we find quite a contrast to the abundance of bird life. Certain species of rats and mice, ground squirrels, gophers, jackrabbits, and cottontail rabbits are abundant. Coyotes and kit foxes are frequent. In limited localities shrews, badgers, weasels, skunks, and moles are present in small numbers. This about exhausts the present list. However, from historical evidence we know that this was not the whole story prior to the arrival of the whites. Then antelope and tule elk were present in extraordinarily large herds. These herds were the wonder of all the early travelers. Mule deer from the mountains can be added at certain seasons. Apparently, too, there were beaver in Tulare lake. In the Coast range mountain sheep in limited numbers could be had. Predatory animals were scarce in the valley, but mountain lions, grizzly bears, wild cats and raccoons have been identified. From about 1800, horses from Spanish importation began to run wild in the San Joaquin valley. Large bands of such horses are mentioned in many early accounts. These together with stolen cattle must have been a factor in Indian life subsequent to 1800.

Pleistocene fossil remains from the asphalt deposits near McKittrick in the western portion of our area indicate that "conditions during the Pleistocene might well be considered to have been much like those now prevailing at Buena Vista lake."<sup>6</sup>

The following species have been identified in the osteological remains from the excavations in aboriginal sites in the area under consideration. It is likely that some of the rodent remains reached their positions in the mounds through the burrowing of the animals. The animals identified by Professor Grinnell were as follows: Cottontail rabbit, jackrabbit, dwarf elk, *Canis* (coyote?), burrowing owl, white fronted goose, mud turtle. Grinnell identified about one quarter of the bones submitted to him, namely those which were

<sup>6</sup> Loye Miller, Fossil Birds from the Pleistocene of McKittrick, California, Condor, xxiv, 122-125, 1922.

most readily recognizable. The absence of antelope bones is interesting and perhaps indicates that these animals, which inhabited the dry plains rather than the swampy lowlands, were too wily for the hunters of our area, or that such antelope as were taken were eaten elsewhere. In short, the absence of antelope may be evidence of only part time residence in the tule swamps.

## HISTORICAL DATA

The written history of man in the San Joaquin valley begins with the Spanish chronicles. These have been examined with regard to aboriginal population, villages, culture, and homogeneity of population.

First comes an initial period. This ends about 1800. Accounts of the time show the beginnings of Spanish influence, but more largely they describe conditions which may be presumed to have existed for a long, prior period. Second comes the period extending from 1800 to 1850. During this half century the San Joaquin valley became a general rendezvous for many peoples of diverse tribes. All were brought under Spanish pressure and into more or less contact with Spanish culture, and with that of one another. Information concerning this possible mixture of cultures is important, since at the very beginning of archaeological work the problem is presented of distinguishing its remains before one can determine whether or not it succeeds a more uniform and more truly indigenous culture. Third follows the period subsequent to 1850. In this we see something of the result of this mixing, and the rapid disappearance of the Indian from our area. Between 1860 and 1870 the last of the Indian population disappeared.

## REPORTS OF EXPLORERS

*1773: Pedro Fages.* In 1773 Commandante Pedro Fages passed through a part of the valley and saw one of the lakes.

*1776: Francisco Garcés.* The document which alone covers the period prior to 1800 is the diary of a missionary priest, Francisco Garcés, who journeyed in the San Joaquin valley in 1776. He was a seasoned and intelligent traveler and although his route lay mostly in the foothills east of the valley floor, still the priority of his visit and the fullness of his report make it especially valuable. We consider only the data accumulated by him north of the Tehachapi mountains, April 26 to May 12, 1776. We equate Garcés' proper names with the Yokuts names given by Kroeber to the same probable places and peoples.

Garcés went eighty miles to the north of the Tehachapi mountains and eighty miles in his return which was partly by a new road. In this distance he visited twelve Indian villages or rancherias. In only a few cases is the population stated by him. It is judged that this is done for the larger villages.

The total population seen by Garcés was probably between 750 and 1000. The population was located somewhat like this: On the Tehachapi slopes 200; on the Kern river 250; on Poso creek in the hills 225; on White river in the hills 275.

Down the slopes of the Tehachapi to the southern end of the Buena Vista-Kern basin Garcés found a Shoshonean or Paiute people (Cuabajay), friendly with those over the range in the Mohave desert, but unfriendly with their Yokuts neighbors to the west and north. The principal rancherias which Garcés noted were located near El Tejon—probably Pusin Tinliu (see B. A. E. Bull. 78, pl. 47).

From Caliente creek and Kern river north to the White river he encountered what he considered to be a single people—probably the Paleuyami dialectic division of the Yokuts, with perhaps the Yauelmani also. He visited their villages of Konoilkin, Altai, Hoschiu, Tsineuhiu. These people he called Noche.

He learned that there were other people to the north of them with whom they were friendly and whom he even conjectures to be simply villages of the same people. These were, giving his nomenclature in parenthesis, Bokninuwad (Paginnoas), Wükhamni? (Buesanet), Gawia (Coguifa), Choinok (Choinoc). There was another tribe, the Telamni (Telemoteris), which is "Telam or Torim," according to Kroeber, who were not friendly to the "Noche," nor were the people to the west, i. e., those along the shores of Tulare lake, the Wowol and the Chuñut.

In leaving the valley he came into contact with the Kawaiisu (Cobaji or Noche Colteches).

From this we may infer that the people along the eastern shores of Tulare lake could not readily leave the lake for the hills since the hill tribes were unfriendly. And vice versa the hill tribes could not visit the lake. In other words the lake people would have been held very closely to the few geographically suitable locations along its shores.

Garcés' experience shows that very free intercourse prevailed among the peoples. Colorado river Indians came frequently to the coast and to the San Joaquin valley, even making the journey unarmed. Between the Shoshoneans and the Yokuts the intercourse was not so free, but there was considerable. There was trade between the lake peoples and the hill people in spite of the unfriendliness. The White river people considered the sea only four days distant and were wonderfully well informed as to what took place there, e. g., knowing of the Anza-Font expedition. Garcés found a Yokuts man married in a Shoshonean rancheria, an Indian from the sea in another, two Spanish soldiers had been killed in another for being "wicked with the women," a Spaniard was married and had a son in another, from another grown girls had been stolen by the Telamni. In all he found people from different regions freely coming and going. In other words in about half of the villages he visited he was able to observe in one day physical mixtures. It is unlikely that he observed them all. One intruder in a village may seem to be insignificant, but the largest village Garcés reports had only 150 population. The reports of other explorers, e. g., Zalvidea, would make it likely that many villages contained not more than thirty.

Some of the material objects of culture which Garcés mentions are:

Communal huts made of tule; baskets, knives of flint, vessels of mother of pearl (abalone?) like the shell work on the handles of the knives; petticoats of antelope skin, mantas of fur; sweat houses; wild tobacco; stone mortars and pestles; women's hair in a top-knot.

From Garcés' account we infer that the people of the valley floor were living on unfriendly terms with their neighbors in the foothills to the east and southeast, though there was some trading intercourse between them. We observe that since they lived near the region of Tulare lake that that lake must have been in such a state as to have enabled them to cling to its shores the year round. Since a balance of power was apparently maintained between the valley and the foothills we judge that there could not have been much of a numerical disparity in population. Hence the valley population south of the Tule river would be estimated at 1000 to 1500.

1804: *Juan Martin*. In this year Fray Juan Martin made a journey through the central and northeastern portions of the Tulare basin. He was the first white man who, without doubt, saw Tulare lake. For the entire region he reports a population of 4000. A large part of this, however, was to the northeast and north of Tule river in the rancherias of Notono, Tache, and Telame. The population in our areas was in the rancherias listed below, whose tentative locations are ours. We have also given what we believe to be the equivalent Yokuts name.

Rancheria of Bubal. This was eight leagues from timber of any kind and was probably Sukwutnu, the principal rancheria of the Wowol tribe. It was situated, most likely, on the Sand ridge on Atwell's island (T 23, R 23) near the present Alpaugh. It is interesting to note, however, that Martin makes no mention of its being an island in 1804, so that the lake must have been below the 210-foot level.

Rancheria of Chumtache. Probably a rancheria of the Chunut who lived on the eastern shore of Tulare lake.

Wars were rife between the Wowol and their neighbors, which confirms Garcés' previous report. All the tribes had had enough experience with the Spaniards to hide their women from them. Already the population was badly affected by venereal disease introduced by the Spaniards.

1806: *Zalvidea*. In 1806 a Spanish exploring expedition from Santa Barbara, reported by Fray Zalvidea, came into the valley from the west via Cuyama valley. It skirted the Buena Vista and Kern lakes to Kern river, then crossed the Tehachapi, apparently through Fremont's pass. The data which Zalvidea recorded north of the Tehachapi are reproduced. The probable Yokuts names and locations as identified by us have been added in parentheses.

TABLE 1  
VILLAGES REPORTED BY ZALVIDEA IN 1806

<i>Rancheria</i>	<i>Huts</i>	<i>Men</i>	<i>Women</i>	<i>Chil- dren</i>	<i>Total</i>	<i>Location</i>
Malapoa (Hoschiu).....		29	22	8	59	Bitterwater cr.
Buena Vista (Tulamniu).....		36	144	38	218	W. end B. V. lake
Sisupistu (Pohalin Tinliu).....	28	50-60			?	E. end Kern lake
Tupai.....					?	Tejon ranch
Tacui (Tecuya).....					23	Tecuya creek
Yaguelame (Loasau or Woilo)...		92			300	Kern river
Taslupi*.....	5		Deserted			Tejon cañon
13 villages of the Pelones (Paleuyami)						N. of Kern river

\* Kroeber locates a Chumash village called in Yokuts Tashlibunau at San Emidio, Kern county. See B. A. E., Bull. 78, pl. 47, 1925.

Zalvidea's expedition went to *all* rancherias near their route, not simply traveling in a straight line. This is not specifically stated in the text, but the reconnaissance trips described so indicate, as well as general probabilities.<sup>7</sup> Hence they would have encountered the bulk of the population in the region. They found the population concentrated at: a. The shores of the Buena Vista and Kern lakes, where however, there were only two villages and some 500 inhabitants. b. On the Kern river. c. In the Sierra Nevada foothills.

The percentage of children is remarkably small. This points towards a decadent population, possibly sterile from diseases introduced by the Spanish. This is somewhat in accord with Dr. Jones' belief in the indication of syphilis in the bones excavated by him.

Zalvidea's diary indicates that the people on Buena Vista lake were at enmity with those on Kern lake. This recalls Garcés' report which made the people on the northern foothills of the Tehachapi mountains of Shoshonean affiliations and those on Buena Vista lake, Yokuts. The people on Kern lake Zalvidea found harvesting "guala." This was also being done by the people of the Mohave desert.

Zalvidea further notes that the Buena Vista people had balsas on which they traversed the lake, and bows and arrows.

1806: *Moraga*. The year 1806 saw another expedition pass through the Tulare and Buena Vista basins. This was headed by Moraga. It came from the north and kept to the foothills of the Sierra Nevada. Of the villages named only four seem to be within our present limits. These are indicated below with the probable equivalent Yokuts designations.

Tunetache (Chunotache, i.e., Chunut. East shore of Tulare lake. Also reported by Martin). Population 250.

Coyehete (Koyeti—village of Chokowisho near Porterville). Population 400.

Tahualamne (Yaelmani—Kern river. Probably reported by Garcés and Zalvidea). Population 200.

Hual (Bubal—Wowol? Southeastern shore of Tulare lake. Reported by Martin.) Population 400.

1812: *Pico*. The Indians of the Tachi (Tulare lake) are reported to have pits from which they discharge their arrows. They ambushed horsemen in this way.

1813: *Espinoza*. A Spanish expedition was made to Tachi.

1814: *Cabot*. A Spanish expedition left San Miguel Oct. 2, 1814. Arrived that night at the edge of the San Joaquin valley. Next day reached Tulare lake at the rancharia of Bubal (Sukwutnu) which had a population of 700. Then nearly a day's march across the tule marsh to the rancharia of Sumtache (of the Chunut) of 700 population. Bubal and Sumtache were at enmity. To Kaweah river. To rancharia Guchame which was abandoned. To rancharia Tache of 1000 population near the Kings river. Returned to San Miguel by a northern route. This Cabot account is the second definite report concerning Tulare lake.

1815: "Grandes expediciones" were sent from San Francisco and from Santa Barbara into the San Joaquin valley to capture fugitives from various missions.

<sup>7</sup> Our remarks concerning Zalvidea's trip are based on our interpretation of his account as given in the Santa Barbara Archives, Tom. IV, 1806-1821, and a careful plotting of his movements on a modern map. This indicates a route different from that assumed by Bancroft.

1816: *Martinez*. He mentions several villages and gives some sketchy data concerning them.

Buena Vista (Tulamniu)—On the shore where the plain reaches the lake there is a large grove of poplars growing over more or less sandy soil about one league in width.

Lucluc—28 leagues from San Luis Obispo. Found 50 Indians with their families and traded blankets, glass beads and meat for a small boy.

Deserted village—Inhabitants had fled into the marsh at their approach. 10 families and 70 men finally returned.

Gelecto—Of which nothing was left but the graveyard. The village had been destroyed by the wars.

Telammi (Telamni).

Lihauhilami—300 huts.

Quilhuame—Where the captain, an apostate, had fled to the mountains.

Thuohuala (Sukwutnu)—When six leagues from Telame resolved to return to Thuohuala which was one league. Called, in Migueleño, Bubal. This village was deserted, the people having gone to one called Pusas. Spanish burned Thuohuala.

Distances given: San Luis Obispo to Lucluc, 28 leagues; to Thuohuala, 9 leagues; to Gelecto, 18 leagues; to Lihauhilami, 19 leagues; to Quilhuame, 7 leagues on the banks of a great river which flows into the lakes of Buena Vista, Thuohuala (Tulare), and Gelecto (Goose lake?).

1816: *Payeras*. Claims some 4000 souls in the Telame district, on the Kaweah river northeast of our area.

1818: *Cabot*. Mention is made of numerous runaways all the way from Santa Barbara to San Miguel. These are reported as being mostly in the following rancherias in the San Joaquin valley: Telame, Bubal (Sukwutnu), Quiamine, Yulumne, Choinoc. In this same year there was a fight between the Spanish and Mohave at San Buenaventura. The Spanish were much afraid of a general raid from the Colorado river tribes about this time.

1819: A report says that in the San Joaquin valley all ride, even the women, and that regular fairs are held for the sale of horses.

1819: *Estudillo*. A Spanish expedition went from Monterey to San Miguel, via the San Joaquin valley. There was apparently nothing done and no report.

1824: *First Expedition*. Indians of the Missions of Purisima, Santa Inez, Santa Barbara, and San Fernando revolted and fled to San Emigdio (south of Buena Vista lake). It is reported that a Russian was here instructing them in the use of firearms. On April 9th and 11th battles were fought between the Spaniards and the refugees, one near San Emigdio and the other near Buena Vista lake. The casualties were few.

There is a report that at about this time the Indians killed an American in this district.

1824: *Second Expedition*. This party, led by Portilla, apparently went from Santa Barbara via Ventura, Santa Clara river, and Tejon pass to San Emigdio where it joined the first party which had come in via San Miguel. The parties returned via Cuyama valley. Kern lake is mentioned as Lake Misjamine. The refugees from the missions whom they were seeking were reported at San Emigdio with plenty of cattle. Mention is made of the rancherias of Tulali (Tulamniu), and Malapica (Hoschui).

1826: *Jedediah Smith*. Smith, perhaps the first American to enter the region, crossed the Great Basin from the Salt Lake region. He then traversed the upper San Joaquin valley. His visit is important since it marks the coming of the trappers from the interior of the continent. Doubtless many a trapper subsequently visited the region but left no written record. Smith's account of the region is brief. From San Gabriel, near Los Angeles, he traveled "300 miles in that direction [northwest] through a country somewhat fertile, in which there was a great many Indians, mostly naked and destitute of arms, with the exception of a few bows and arrows, and what is very singular among Indians, they cut their hair to the length of three inches. They proved to be friendly; their manner of living is on fish, roots, acorns and grass."

1830: "*Peg-Leg Smith*." About this date this American renegade and horse thief is reported to have made the San Joaquin valley his headquarters.

1830: An American named Ewing Young trapped in the San Joaquin valley.

1833: A terrible pestilence, an intermittent fever often prevalent in milder form, is reported to have almost depopulated the whole San Joaquin valley.

1834: Walker's pass was discovered by white men who began to enter the valley via that route.

1837: The San Joaquin valley was headquarters for American trappers who stole horses and cattle from the coast settlements and missions. These thieves were allied with the San Joaquin valley Indians. The stolen animals were sent east via New Mexico.

1844-5: *Capt. J. C. Fremont*. In April, 1844, Fremont traversed the upper San Joaquin valley, keeping along the eastern side and leaving via Tehachapi pass. His general report of the country is much the same as might be written today, the exceptions pertaining to the Indians and game, which he notes. Near the Kings river he speaks of droves of wild horses, of frequent wolves, and of numerous antelope. There were flocks of blackbirds near the streams. No other game is mentioned. Concerning the Indians in about the same district, he says: "The Indians of the Sierra make frequent descents upon the settlements west of the Coast range which they keep constantly swept of horses; among them are many who are called Christian Indians, being refugees from Spanish missions. The Indians brought otter skins, several kinds of fish, and bread made of acorns to trade. . . . They live principally on acorns and roots of the tule of which their huts are made."

In his trip of the following year (1845) Fremont speaks of "the Indians of the horse thief tribes" and of "multitudinous herds of elk, antelope and wild horses." He also reports that according to the Indians the Tuolumne river is the southernmost stream in which salmon are found.

1850: *Lieut. G. H. Derby*. Derby made a trip from San Miguel through the region. Twenty-four miles east of the sink of Avenal creek, on May 4th, he crossed the slough at the southern end of Tulare lake, with the assistance of the "Rancheria of Sintache, which we found established at this point." This crossing was in the vicinity of the Sand ridge, and, in considering it, it is well to bear in mind that 1850 was a period of high water and that later, in the Visalia region, Derby was informed by an old Indian that he had never seen the water so high. In the Sintache rancheria there were about one hundred inhabitants, mostly clothed.—"The captain was an old Indian from the San Luis Obispo Mission." Twelve and a half miles east of this village "we found another small rancheria called the Tinte Taches [Chumtache of Martin, Moraga and Cabot?] living like

the others principally on fish and reptiles and numbering about fifty. The captain originally belonged to the Mission of San Miguel. He informed me that the Tache Indians numbered about 800 in all and were settled on the shores of the great lake, but their principal rancheria, containing about 300, is situated at its northwest extremity." In another fifteen miles they reached Deer creek.

Derby then went south to the Bakersfield neighborhood, thence to the shores of Buena Vista lake, or Kern lake, which he describes as ten miles long by four to six miles wide, with a heavy growth of willows on its north and east banks. There were swarms of mosquitoes. Buena Vista and Kern lakes were apparently not high enough to form a single lake in spite of the extra high water reported in the north.

Returning up the east side of the valley he explored the Kaweah-Kings-San Joaquin river region. He reports little game, but many wild horses. He reports further about seventeen rancherias in this district northeast of the Tulare lake, with a population of about 3000. His total population for the Tulare-Buena Vista Basin, is 4000. Many Mission Indians are mentioned as among those seen. On the west of the slough connecting Tulare lake with the San Joaquin river he saw no Indians except one village of the Tinte Taches which was on the northwest extremity of the lake and contained 250-300 inhabitants.

Skirting Tulare lake on the west he returned to Avenal creek and back over the Coast range to San Miguel.

## CONCLUSIONS

### *Size of Population*

From the earliest times to 1850 the population does not seem to have varied greatly in numbers. The basins south of Tule river (T 21) probably never had a population in excess of 2000. However in historical times this number was maintained by an influx from the coast due to Spanish pressure. The earlier population was largely reduced by wars and disease, but as the area was in general isolated and unsuited for whites, it formed a place of refuge into which the Indians fled who were driven out of other areas.

### *Location of Population*

It is seen that the population tended to cling to certain spots, such as the Sand ridge. This historical confirmation of geographical probabilities makes it reasonable for us to assume that such localities were also the population foci in prehistoric times. Hence the determination of such spots is important. From the historical data a schedule has been drawn up which indicates the Spanish reported name, the probable Yokuts equivalent according to Kroeber's data, and the probable

location in present day nomenclature. This includes only the region south of the Tule river (T 21), and west of the Sierra Nevada foothills (R 28).

TABLE 2  
PRINCIPAL ABORIGINAL RESIDENTIAL SITES ON THE FLOOR OF BUENA VISTA AND TULARE BASINS

<i>Spanish name</i>	<i>Kroeber's Yokuts name</i>	<i>Location</i>	<i>Noted in</i>
Malapoa or Malapica	Hoschiu	Bitterwater creek, near Cuyama valley (T 10 N, R 24 W, San Bernardino Base and Meridian)	1806; 1824
Buena Vista or Tulali	Tulamniu	SW end of Buena Vista lake (T 32 S, R 25 E, Sec. 6)	1806; 1824
Sisupistu	Pohalin Tinliu or Loasau	SE shore of Kern lake (Sec. 17, 19, 30, T 32 S, R 27 E) or NE of Kern lake (Sec. 24, T 31 S, R 27 E)	1806
Yaguelame	Loasau or Woilo	Ditto or Near Bakersfield (Secs. 24, 25, 35, or 36 T 29 S, R 27 E)	
	Tsineuhiu	Kern river, north side, above Bakersfield	1776?
	Konoilkin	Ditto	1776?
Bubal or Hubal or Thuohuala	Sukwutnu	Atwell's island, near Alpaugh (T 23 S, R 23 E)	1804; 1814; 1816; 1818 1850?
Sumtache	?	East shore Tulare lake	1814; 1850
?	Walna	West shore Tulare lake	1850
		<i>Probably in the area but location uncertain</i>	
Lucluc		Western part of basin	1816
Gelecto		Goose lake region (?)	1816
Lihuahilame		?	1816
Quilhuame		On Kern river (?)	1816; 1818

### *Composition of Population*

It seems evident that after 1800 the southern San Joaquin valley was the scene of a great mixing of peoples. In the first twenty-five years ten recorded Spanish expeditions entered the area. In the second twenty-five years the records are less exact and official expeditions were fewer. But the unrecorded unofficial visitors must have

been greater. Russians, Spaniards, Americans, and French are mentioned. In many instances these men were accompanied by camp-followers. Every report shows that the conduct of all comers was such as to have left some evidence in posterity.

So much for Caucasians alone. In addition the historical record is almost a continuous account of the fleeing to the region of coast peoples. In a generation these must have numbered many hundreds; for example note the increase in the population of Bubal, which was reported as 400 in 1806, and as 700 in 1814. In short, a skeleton dug up on the shore of Buena Vista lake, if buried since 1800, is as likely to be that of an individual born on the coast as not.

In addition to affecting physical types, this mixing of people must have caused cultural changes. For example, horses and cattle were introduced and used. Evidence for other changes is not great in total amount, but when proportioned with the total evidences of culture looms large. For example, no evidence is available which makes it logically possible to say that steatite vessels or sherds were introduced into the region prior to the influx of the coast people. But this is better discussed in the archaeological section.

After Derby's time (1850) the Indian seems simply to have faded away. Overland immigrants began to come through the valley from Walker's and Tehachapi passes. By 1853 there was a regular road from Los Angeles to the north along the western shores of Tulare and Buena Vista lakes. Settlers entered. The Indians were crowded back into the mountains and became so unimportant that the Indians of the valley receive little or no mention in the annals from 1860 onward.

Since that time the principal data concerning them have been the ethnological information collected from the Indians themselves. These have been set forth by Prof. A. L. Kroeber in his *Handbook of the Indians of California*.<sup>8</sup>

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<sup>8</sup> B. A. E. Bulletin 78, chapters 32-35.

## ARCHAEOLOGICAL SITES

In the winter of 1923-4 excavations were made in nine sites. A number of surface camp sites were explored and the principal private collections examined, photographed and described. The material and data obtained are set forth under suitable headings hereinunder.

The "area" as used by us hereinafter will include the entire valley floor from the southern line of T 21 south to the Tehachapi mountains. This floor will be divided into three regions, namely:

Alpaugh region, extending from T 21 to southern line of T 25.

Slough region, extending from T 25 to southern line of T 30; i. e., between the Alpaugh region and the Lake region.

Lake region, extending from T 30 to Tehachapi mountains, i. e., the Buena Vista and Kern Lake basins; and the Kern river near Bakersfield.

## ALPAUGH REGION

In the Alpaugh region all sites of aboriginal residence which have been recorded are in the eastern part. Such spots identified by us, or reported on good authority, are summarized below. Probably finds have been made in other places of which we have not heard. Certainly the list would appear more impressive were it possible to locate each place in the immediate vicinity of Alpaugh village, where valuable specimens have been collected.

TABLE 3  
ABORIGINAL SITES IN THE ALPAUGH REGION

<i>Site No.</i>	<i>Location</i>	<i>Remarks</i>
23	T22, R23, S22	South of Angiola on Santa Fe Ry. sand pit. Skeletons in railway cut.
24	T23, R23, S19 (East ½)	Ranch of T. Riley. Surface finds.
21	T23, R23, S15	Alpaugh-Stoll region. See below.
25	T23, R23, S28 and environs	Alpaugh (probably Sukwutnu, p. 000). Mayer-Fry collections.
20	T24, R23, S19 and environs	Kings-Tulare Co. line. Surface finds.
22	T24, R22, S17	La Hacienda Ranch. Artifacts plowed up.
26	T24, R21, S28 approx.	Village in 1850. Lieut. G. H. Derby.
27	T24, R23, S27 approx.	Ditto.
28	T25, R23, S14 (NW ¼)	Village in Oct. 1854. Andrew J. Coffee survey.
12	T25, R22, S13	Westfield Ranch.

From the map it will be noted that the sites are generally above the 208-foot level and on the high land known as the Sand ridge, and hence the population indicated by archaeology was grouped about as we anticipated in our geographical survey and in considering the historical evidence. This Sand ridge, or Bubal, or Wowol or Sukwutnu archaeology, seems to focus in T 23, R 23. Here at the modern village of Alpaugh we seem to have the center of the aboriginal life, and hence we have taken the name to cover the region.

The material remains of this culture are well represented by the two splendid collections of Mr. Samuel Fry and Mr. A. F. Mayer. Mr. Frank Smith of Angiola has a considerable collection from this region, but we did not see it. Nor have we included in this survey the collection of Dr. E. H. Smith of Laguna Beach, which is on display in the Southwestern Museum, Los Angeles. Our consideration of the region is based almost entirely on the Fry and Mayer collections.

Fry and Mayer came to Alpaugh when it was founded in 1896 and began collecting in 1898. They heard rumors of better Indian relics having been found before their time. This seems doubtful. They collected entire articles only and hence some evidence may have been lost because of its fragmentary form. Practically all their collecting was done from the surface, or from fields after plowing. All their material comes from within easy walking distance of their homes in the center of Alpaugh—probably within a radius of six miles.

Mr. Mayer reports that most of the finds were made to the northwest, northeast, and southwest of Alpaugh. Collections from each of these directions possessed characteristic features.

#### *Northwestern District (Site 25)*

This is the direction of the greatest slope from the high point (212 feet) of "Atwell's island" to the lake bed. In one and one-half miles there is a fifteen-foot drop to 197 feet, and in five miles the 192-foot line is reached<sup>9</sup>. The collecting area was about four miles from town (southwest part of T 23, R 22). Finds are characterized by very heavy lacustrine incrustations. This is to be expected as the area must have been frequently below the lake level. Further, few beads and no steatite sherds have been found. Mr. Mayer reports large quantities of burnt clay, perhaps due to tule fires during the low stages of the lake. If the 192-197 foot level of the lake was constant for considerable periods, a part of the population, centered on the eastern end of the Sand ridge, would probably move to the northwest with the retreating lake and back again as the state of the lake changed. This hypothesis explains only the presence of artifacts and not the characteristic differences between those of this place and elsewhere.

<sup>9</sup>The old shore line is shown in map of Homeland Reclamation District No. 780, issued by Max W. Enderlein, engineer, Sept. 1923.

*Northeastern District (Site 21)*

Three miles northeast of Alpaugh, on the "Sand ridge," towards Stoll station on the Santa Fé railway, perhaps centering in section 15, the flat surface of the ground is sprinkled with mortar and pestle fragments, mullers, and steatite sherds. This is practically the only region in the vicinity of Alpaugh in which such sherds were found. The striking difference between the finds here and to the northwest suggests two hypotheses: (1) That the northeastern region represents a later culture; on the basis that steatite sherds are usually found on the surface, rather than in the ground, throughout the area. (2) That the difference in the artifacts is occupational. The northeastern remains characterize a residential site. The points, "sinkers," and plummet-like stones, of the northwest may represent the occupations of hunting and fishing, and have been lost by people from the northeastern high area while engaged in these occupations at the northwestern site when it was submerged.

There is a possibility that the northwestern type of objects represents burials and that bodies were disposed of in this district by people living in the northeastern district. However, skeletal data are wanting. If cremation were practised as in the Yokuts area to the north skeletal remains would be unlikely.

*Southwestern District*

The most fertile field for artifacts (excepting steatite sherds) was to the southwest at the Kings-Tulare county line in T 24 (i.e., T 24, R 22, S 24-35 and T 24, R 23, S 19-30), designated as site 20. Although on the "island" it is not near the lake and it seems hard to determine why this should have been a chosen locality unless it was used before the accumulation of the sand dunes in front of it on the lake side. If this were true the site would be an old one.

A number of specimens were found in the vicinity of the headquarters building of La Hacienda ranch (site 22), eight miles southwest of Alpaugh. At La Hacienda the Sand ridge is not apparent, but spreads out as a low rise of ground. This ground has been plowed, revealing not only Indian artifacts but objects of Caucasian manufacture.

*Site 12*

Site 12 is located just west of the center of S 3, T 25, R 22, on the Westfield ranch. This is just within the 220-foot level of Tulare lake near its junction with the Buena Vista Slough marsh land. (See Map 1.) The site is about seven miles south of the Sand ridge. About five miles east of the site, in S 14, T 25, R 23, on the 220-foot level, an Indian village of some fifty inhabitants was in existence when the land survey of 1853 was made.

With the possible exception of the thin pockets of shell fragments and certain of the surface material, the site gives no evidence of having been added to by human agency. It is a natural accumulation of organic soil upon a calcareous clay base with only natural stratification.

The site was disclosed to us by a Mr. Buttles, who with his brother had made excavations in it several years previously, and who had thus discovered burials and obtained a mortar, but little else.

In addition to wind-blown hummocks, mounds and burrows of rodents or other small mammals were numerous here. However, even allowing for these elevations and depressions, other depressions were noted which are probably of human origin. Eight of these are reasonably obvious and probably the most recent; others are much less so. The eight referred to appeared to be house-pits. They are usually roughly circular in form, and range from twelve to fifteen feet in diameter, and are grouped along the swale bank about the center of the area in which artifacts were found. The hummocks about seventy yards to the south of the house-pits constituted the burial ground. The soil here was easily dug, while that about the house-pits was very difficult to dig.

Our party dug ten pits. The earth removed was 693 cubic feet.

We exhumed five bodies at this site. A few artifacts were found on the surface, including glass beads and potsherds. We concluded that this was a relatively recent camp site on a slight natural elevation, possibly connected with the groups reported by Derby and Coffee from the vicinity.

#### SLOUGH REGION

Evidences of aboriginal life in the Slough region were found mainly along Buena Vista slough, with concentrations at Goose lake and along the southern portion of the slough, chiefly from Buttonwillow southward. Neither the historical data nor Kroeber's account permit the determination of a named focus of population in this region.

TABLE 4

#### ABORIGINAL SITES IN THE SLOUGH REGION

<i>Site No.</i>	<i>Location</i>	<i>Remarks</i>
.....	T26, R22, north	"4 or 5 mounds." Reported by Mr. Buttles.
11	T27, R22, Sec. 11	Near Horner's ranch.
.....	T27, R22, Sec. 13(?)	"2 mounds." Mr. A. C. Crites. See page 35.
10	T27, R22, Sec. 15	
19	T27, R22, Sec. 20, NE quarter	Jones' "Adobe Holes" site.
9	T27, R22, Sec. 26	
8	T27, R22, Sec. 26	
29	T27, R23, Sec. 34	Porterville Land and Cattle Company.
30	T27, R23, Sec. 31-32	Cedar post burials reported by Mr. W. R. Dumble.
31	T27, R23, Sec. 25-26	Sand dunes reported by Mr. W. R. Dumble. See below.
7	T29, R23, Sec. 28	Elk Grove ranch.
6	Ditto	Ditto.
5	Ditto.	Ditto.
18	T29, R23, Sec. 10, NW quarter	Jones' Buttonwillow mounds.
17	T29, R23, Sec. 13	Depue ranch, 1 mile NE of Buttonwillow.

*Site 11*

Site 11 is near the center of S 11, T 27, R 22, just south of the ranch of W. Y. Horner, Jr. It was about one half mile from the shoreline of Buena Vista slough where it widened towards the east into the Goose lake marsh.

The site consists of a simple cone. It rises about six feet and is eighty feet in diameter. The mound, as well as the surrounding country, is a light, fine, yellowish sand, covered with sparse sage growth. It is inconspicuous, yet obviously not an ordinary feature of the landscape, there being nothing of even approximate similarity in the vicinity. The mound is surrounded by a depression about twenty feet wide by ten inches deep at its deepest point. This depression at present does not indicate a sufficient volume of earth from which to have built the mound, but allowing for the wearing down of the mound by erosion and the consequent filling of the depression, it offers strong evidence of the mound's artificiality.

The mound had been excavated to some extent by Mr. Horner's household and certain specimens obtained were kindly presented to the University. Other people had also excavated from time to time.

Our excavations resulted in the recovery of a few artifacts and six badly disintegrated human skeletons. The mound seems too small for a residential site, there is a remarkable scarcity of articles to be expected in a kitchen midden, and it contains a sufficient number of bodies to have warranted its erection for purposes of burial or to account for its accumulation through process of heaped-over burials.

On the northern or northwestern shores of Kern lake similar sandy mounds and similar artifacts have been found. The distribution from Kern lake along the northeastern shore of Goose lake slough to site 11 would be a natural one.

*Site 10*

Site 10 is in S 15, T 27, R 22, 150 feet west of the 14-15 section line and one half mile south of the 10-15 section line. This was almost in the center of the entrance of old Goose lake into Buena Vista slough marsh.

The site contains a single low mound which shades off almost imperceptibly into the low hummocks of the surrounding country. It is about seventy-five yards from east to west and forty-five yards from north to south. The slope to the south is about nine degrees, while the slope to the southeast is only three degrees; to the north it was even less. The top of the mound is about six feet above the lowest part of the adjacent swale. Owing to its location it must have been at times entirely under water.

This mound, as well as the similar mounds which are plentiful in this formerly inundated portion of the country, are conspicuous on account of the white crust or "alkaline sweat" which gives them the appearance of being partially covered by a light snow.

This mound, like others in the vicinity (8, 9, 19) is composed of blackish organic soil. No difference between the soil of the mound and of the surrounding country was observed, and there is no reason to believe that the mound is artificial. The mound itself has been plowed, and so shallow were the burials, that this plowing disclosed human bones. In addition to the plowing, this mound had been dug into at its highest point and many bones scattered around. Nothing but disturbed burials was found by us in excavating. The preservation of the bones would seem to indicate no great antiquity for the interments.

### Site 9

Site 9 is in S 26, T 27, R 22, on the northern line of S 26, 1056 feet east of the line between S 26 and 27. This places the mound on the southern bank of old Goose lake near its junction with the Buena Vista slough marsh.

A drainage ditch has been cut through the northern section of the mound, and it seems obvious that the location was within the high water line of Goose lake. South and southeast the land rises gently to a sandy plain which extended between the marsh of old Goose lake and that of Buena Vista slough.

The mound is characteristic of the formerly inundated land of this region. At one end it merges very gently and almost imperceptibly with the surrounding country, while at the other, towards the north and west, there is a rather abrupt drop. Nearby are two mounds (site 8, and mound C). The three should no doubt be considered a unit for human habitation.

On account of the indeterminate edge of mound 9, probably no two people would give it the same dimensions. We have taken them as 180 feet from northeast to southwest and 260 feet from northwest to southeast. The maximum height is seven feet.

The soil of the surrounding country and of the mound is in general of an organic nature lying above a highly calcareous clay base. Sites 8, 9, and C are conspicuous on account of the alkaline white crust. The soil is a dark gray rather than a deep black, and in all cases becomes much paler in drying. There are scant traces of mussel shells, very finely broken which appear to increase with depth to sixty inches. At this depth the dry clay is almost white and of a chalky character. Hard lumps, probably due to lime, are found throughout the soil as deep as thirty-six inches. *Planorbis ammon* shells were found as deep as forty-eight inches.

Our general conclusion is that site 9 was used as a burial mound only. It is a natural mound and there is practically no evidence of its having been used for residential purposes. It may be that articles of utilitarian nature left on the surface were removed by previous excavators, but even then it would seem reasonable to expect more charcoal than the few traces we found, and something in the nature of fire places and house pits. It is possible that site 8, on somewhat higher ground, was the location of the living quarters of the people who used site 9 as a burial ground.

### Mound C

Just 275 feet west of site 9 lies mound C, of the same general character, slightly smaller, and four feet high. This mound is worthy of emphasis, since in appearance it is just as likely a place for burial or residence as site 9, and a more likely location than site 10. However, investigation shows that it was used for neither human burial nor habitation. It thus supports our general conclusion that the many mounds of this nature are natural mounds and that none can be assumed to have any reference to Indian occupation unless investigation shows such to have been the case, a conclusion also reached by Dr. P. M. Jones as a result of his survey in 1899.

*Site 8*

Site 8 is in S 26, T 27, R 22, 650 feet south and 275 feet west of site 9.

This mound is just about at the shore line of old Goose lake marsh. It is on somewhat higher land than site 9, but it seems probable that at highest water site 8 was inundated as well as site 9. On the other hand site 9 must have been inundated during times when site 8 was dry.

In its general aspect this mound is the same as site 9. Its slopes are less abrupt but again steepest to the north and northwest. The long axes of site 8, of site 9 and of mound C were all in the general direction of the flow of the waters in Goose lake slough, i.e., southeast to northwest. Moreover the steep ends of the mounds were downstream. Hence it seems possible that they were formed by stream action.

The soil is the same as that of site 9 except that the upper soil is generally darker, possibly due to the fact that this higher mound furnished a more suitable habitat for tules and marsh grasses, or to a greater amount of charcoal and ash.

Mr. Crites apparently dug in this mound as well as mound 9 in 1917. One or more parties had preceded him. After him came Mr. Arling Steinberger who did some excavating and presented the University with some of the material recovered.

Our party dug two pits, as near the highest portion of the mound as previous excavations permitted. Our digging revealed that less is found as the distance from the highest point increases. Consequently the first excavators must have found more per cubic foot of soil than we discovered. Further their material seems to have been richer in quality. We turned 375 cubic feet of material and reached a maximum depth of fifty-six inches.

We deem site 8 a natural mound altered little if any by man. Forty to fifty bodies may have been buried here, judging from the appearance of the mound and the nine bodies we disinterred. Evidence indicates that this mound was used as a residential site as well as a burial place.

Site 8 was a remarkably good location, being between two sloughs and near Goose lake, the only likely perennial water supply within a radius of twenty miles. Both sites 8 and 9 were above ordinary high water and only the most unusual floods would have inundated site 8. The greater amount of mussel shell at site 8 would seem to indicate a greater residential use of the site. The soil shows more evidence of fire. It is definitely blacker and has a different "feel" from that of site 9. This a soil expert (Professor C. B. Lipman) explains as possibly due to fine charcoal and ash. More charcoal was found at 8 than at 9, but in neither case was the amount large enough to indicate many fires. The utter absence of timber must be borne in mind in this connection. Steatite blackened by fire was found at site 8 but not at 9. It is reported that more mortars and pestles have been uncovered at site 8 than at site 9. Further Mr. Steinberger reports "pottery" there.

From the considerable amount of surface finds reported, from the rather shallow burials, from the fairly preserved textile fragments and seeds which have not utterly decomposed in damp soil, we judge that the last occupation of this mound was not very remote, probably not more than 150 years ago.

*Elk Grove Sites (7, 6, 5)*

Three sites constitute a unit known as the "Elk Grove mounds." They are in S 28, T 29, R 23, in the vicinity of Buttonwillow or about half way between Buena Vista lake and Goose lake, near the entrance to the Elk Grove ranch of Miller and Lux.

This locality on the eastern bank of the present Buena Vista ditch is near the northern limit of the area which ordinarily received perennial water from Kern river via the old Buena Vista slough. Here the first natural trees of any size are noted as one comes from the north. A few large cottonwoods are still present within a radius of a half mile or so. These are probably the remnant of the original Elk grove. We have reached an area more congenial to permanent human habitation.

West of the mounds the land is of sand and gravel, and slopes immediately though gently upward to the Elk hills. This land was never inundated or swampy. To the east the land is very flat, is composed of black organic soil, and was formerly covered with tule marsh, ponds, and small sloughs.

The northernmost mound is site 7. Four-tenths of a mile south is site 6. One-eighth mile south of site 6 is site 5.

The three sites admirably fit the ordinary conception of mound. They are unexpected, they do not seem a normal part of the landscape, and they are distinctly mounds. They are oval in plan with sides that seem abrupt. The slope actually varies from 4° to 18°. Their white alkaline incrustation is heavy and increases their conspicuousness. There is no shrubbery on them but a very scant growth of marsh grass. In sites 7 and 5 the long axis is generally north and south; in site 6 it is northwest and southeast.

The sizes of the mounds as indicated by their major axes are as follows:

Site 7: 80 feet by 60 feet, 4.5 feet high, 60 feet to levee.

Site 6: 160 feet by 70 feet, 6 feet high, 80 feet to levee.

Site 5: 150 feet by 130 feet, 6 feet high at levee.

All these mounds present the same exterior and are presumably much the same in internal composition. They have been comparatively little abused by relic hunters. Site 5 was half removed by the ditch builders, disclosing burials. Sites 6 and 7 each had one pit sunk in them. In all cases burrowing animals had been active.

*Site 6.* The top of this mound is a plateau of about 8800 square feet sloping down gently to the northwest. It is highest at its eastern edge and at the east its slope is steepest.

At the very eastern rim a pit eight feet square had been dug by previous excavators. This had been used by a burrowing mammal. Other burrows were observed particularly at the eastern end where we discovered all of our burials. It would almost seem that given any choice within an area these burrowers choose the ground loosened by burials. These burrows were occupied, since paper left by us was later discovered thirty-six inches below the surface.

The surface of the mound was covered with a heavy white alkaline incrustation. The soil was quite dark in color and broke rather readily into chunks to the depth of a couple of inches. This dark color grew gradually lighter until at fourteen inches there was a noticeable difference. At twenty-four inches the color was grayish. From there down change was less marked, but at fifty-two inches the color was a light brownish-gray, which continued unchanged as deep

as we dug—sixty-six inches. Here and there in the upper portion were hard lumps of soil apparently cemented together by lime. All of this soil was very light in weight and loose in texture, and very calcareous, but this was perhaps most noticeable in the lower portion. Although everywhere observable, shell fragments were exceedingly scarce. Apparently the mound consists of a highly calcareous clay base upon which a constantly increasing amount of organic material has been imposed. It appears to form a homogeneous mass, shows no lines of stratification, and offers no evidence of artificial accumulation other than certain intruded material discussed below.

In this mound we dug five pits, all on the top plateau, but scattered enough to give some indication of the character of the entire mound. The total earth turned was about 360 cubic feet.

Pit 1. We dug this pit in the most promising section of the mound, i. e., at the highest portion, near the edge of the slope. In no other mound were we able to do this, because of the work of relic hunters. The fact that all diggers operate on the basis of this location being the most productive is evidence of a considerable uniformity in the burial methods.

The first skull was encountered at four inches, and between this and twelve inches eight bodies were distinguished. Bone "skewers" were among the human bones but in no uniform association. "Charmstones" also were among the human bones—four in one pocket two feet square. Beads were found level with and below the skulls, but as many away from the bodies as among them. The eight bodies were so placed as to suggest simultaneous interment, and it is not impossible that they may date from an epidemic, perhaps that of 1833.

Below the 6-inch level were charcoal and evidence of fire. Firestones were especially prevalent from eighteen inches to thirty inches and were about evenly distributed.

Pit 2. At twenty-four inches, on the level with a skeleton (12-3525) and twenty inches from the feet, was apparently a fireplace. This consisted, in cross section, of a thin crescent of charcoal tapering at the ends. In plan it was circular and about thirteen inches in diameter, and contained some fifty "firestones" totaling 181 ounces in weight.

In this pit was found a small pocket (twelve inches by twelve inches by one inch) of broken river-mussel shell (*Anodonta oregonensis*) at a depth of twenty-four inches.

The soil attained a pale color at a higher level than in pit 1. The organic matter from the bodies alone might account for the greater depth of dark soil in pit 1. At twenty-four inches in pit 2 it is as pale as at fifty-two inches, while there is a darker soil at thirty-six inches with a shading away both above and below that level, but hardly a stratum in the ordinary sense.

Pit 3, connecting pit 1 and pit 2, yielded nothing characteristic. There was under skeleton 12-3535 some indication of a fine gravelly soil such as was found west of the slough. At 20-22 inches was an accumulation of firestones, and from 18-28 inches charcoal was found.

Pits 4 and 5. Pit 4 yielded one artifact and pit 5 neither artifact nor skeleton. However, both yielded a proportionate amount of the usual stone fragments. Neither pit developed anything new in the way of soil structure. Pit 4 was twenty feet and pit 5 sixty feet from pit 1, so that the mound to a depth of five feet may be considered fairly well disclosed.

Conclusion. At sight the Elk Grove mounds appear artificial. However, the soil was the same as the surrounding country and no stratification was noted. In the upper two feet the firestones may be considered as pointing to artificiality,

or they may represent fireplaces in dug holes. Additions to the original heights were perhaps made by human residence and burials.

The location of the mounds near an ample water supply, near the marshes, and adjacent to the plains for antelope hunting, is so exceptionally favorable that one would expect it to be a long used residential site. The only evidence bearing out such an expectation, however, was a very few shells and the firestones. The other material found could more reasonably be considered as associated with burials. Finally there are not enough burials and not evidence enough of superposing to indicate long residence. In short, they seem to have been natural mounds, used for some years perhaps as a place of residence by a few families, who buried their dead in the mound.

#### *Site 17*

In 1921 Mr. J. E. Depue of Bakersfield donated to the University several articles found on his ranch in the northern half of S 13, T 29, R 23, about five miles northeast of the Elk Grove mounds. All were found on the surface and consist almost solely of steatite sherds of the coarse, green, large grained type so abundant at site 4 on the shore of Buena Vista lake.

#### *Dr. Jones' Investigations*

In December, 1899, Dr. Philip Mills Jones of the Department of Anthropology traversed the length of old Buena Vista slough and marshes from Buttonwillow station (center T 29, R 23) to Adobe holes some twenty miles northwest at the confluence of Goose lake and Buena Vista sloughs (center T 27, R 22).

Dr. Jones reports one hundred to one hundred and fifty mounds, a number of which were examined by him and he concludes that these are natural mounds. When we recall that his area must have been inundated frequently and for considerable periods, we may suggest the further probability that these natural mounds, if and when used by man, were simply temporary camp-sites containing such bodies as happened to die during the term of the camp.

Dr. Jones brought back skeletal material and artifacts from two locations. These two should be carefully differentiated since they are twenty miles apart. One is called the Buttonwillow site (site 18) and the other the Adobe Holes site (site 19).

#### *Site 18*

This group of mounds was in S 10, T 29, R 23, about two miles northwest of the Depue site and three miles north of the Elk Grove group. Dr. Jones' findings in the one he excavated may be summarized as follows:

1. Burials at highest point of mound.
2. Burials shallow.
3. No burials or other "extraneous material" below "hard stratum," 18-36 inches deep.
4. No indication of fire.
5. No regularity of burial method.
6. Few artifacts.
7. Skeletal material was found as follows: Number 1, adult; 2-4, adult males; 5, old woman (bone perhaps showing signs of syphilis); 6 and 7, children; 8-10, fragmentary.
8. A natural mound used temporarily as camp site and burial ground.

*Adobe Holes (Site 19)*

This site is in S 20, T 27, R 22, three miles southwest of site 11, two miles southwest of site 10, and three miles northwest of sites 8 and 9. Hence, it should more properly be considered with our sites 8, 9, and 10. The Adobe Holes location was subject to deep inundations until quite recent times. Hence Dr. Jones' conclusion that it was but a temporary camp site may be readily endorsed. He found no burials and few artifacts.

Dr. Jones reports that he examined all the mounds within several miles but "failed to find burials;" but it will be noted that our sites 8, 9, 10 and 11 were all within three miles.

*Miscellaneous Sites*

Mr. A. C. Crites dug in two mounds in 1917, which he describes as follows: "As nearly as I can locate these mounds by the map, they are on S 13, T 27, R 22. One of these mounds was about fifty feet across, the other about eighty feet. We did some excavating and found the skeletons of some twenty Indians. Apparently there must have been either a massacre in this vicinity or an epidemic, for these skeletons are piled one on top of the other. There were several other mounds in this vicinity bearing resemblance to the mounds in which we found the skeletons but we did not dig in them to see if they also were burying mounds. We found no Indian utensils excepting four little square stones with a hole through the center. We also found some broken pottery and a broken mortar on top of the mound. I have been told, however, that the party who originally found these mounds did considerable excavating and found a number of Indian arrows, Indian beads and Indian pottery." The skeletal material was sent to the University.

*Porterville Land and Cattle Company.* The ground is of sand and gravel and slopes up from the north side of the Goose lake bottoms. We found a number of flint artifacts on the surface. In the Coffee survey of 1854 an "Indian trail" is reported as running from S 33 of T 27 R 33, northwestward to S 6.

*Other Sites North of Goose Lake.* Messrs. Horner, whose ranch is in T 27, R 22, S 2 and who have lived there for some thirty years, report many human bones and artifacts in this general region.

Mr. H. S. Allen of the Kern County Land Company reports "a great number of camps and one possible burial mound in Townships 24, 25, 26 of Ranges 21-22."

*Sites South of Goose Lake.*—Mr. W. R. Dumble, superintendent of the Electric Water Company of Bakersfield states that artifacts and bones could be noted some years ago, in many spots in this area. Mr. Dumble is a careful observer and has been over the ground many times in the course of his work and in hunting. His parents and grandparents have lived in this region and he has collected Indians relics. Two sites he particularly mentions:

One is in T 27, R 23, S 31-32, where burials were uncovered that had been arranged about as follows: A cedar post had been placed in the ground and bodies buried clear around it with the heads close to the post. Over the bodies a layer of "cedar bark" had been placed. Then came another layer of bodies and "cedar bark." This was repeated until three layers of bodies were in place. It seems likely that the "cedar bark" was tule (see page 50).

The second is in T 27, R 23, S 25-26. In the sand dunes of this region Mr. Dumble picked up a large number of relics. He thinks that this must have been a definite camp site.

## LAKE REGION

For information concerning this region we are particularly indebted to Mr. Hugh S. Allen, chief engineer of the Kern County Land Company, and Mr. W. R. Dumble of Bakersfield. The professional duties of both men have led them to acquire an unusual knowledge of the territory.

TABLE 5  
ABORIGINAL SITES IN THE LAKE REGION

<i>Site No.</i>	<i>Location</i>	<i>Remarks</i>
<i>Near Buena Vista lake:</i>		
33	T32, R25, Sec. 6	Buena Vista or Tulali or Tulamniu. See tables 1 and 2. Close to center of section 6.
15	T31, R24, Sec. 15, NE corner	Described by W. D. Strong.
14	T31, R24, Sec. 14(?)	Described by N. C. Nelson.
4	T31, R25, Sec. 22-23(?)	Pelican island.
32	T31, R25, Sec. 14(?)	Mound north of Pelican island.
37	T31, R25, Sec. 18	Near Bakersfield-Taft road. Reported by W. W. Hill, G. M. Stirling, W. L. Warner.
<i>North shore of Kern lake:</i>		
3	T32, R27, Sec. 3	
34	T32, R27, Sec. 9-12	Area of much archaeological evidence. Reported by Pryor, Dumble, and Allen. Dumble collection. In section 9, about one-quarter mile south of the north quarter corner, is a shellmound one hundred feet in diameter, according to Allen. Loasau and Woilo reported by Zalvidea and Kroeber were along this north shore.
38	T31, R27, Sec. 10	Burial ground on McKittrick ranch, reported by J. B. Stevens.
<i>East and south shores of Kern lake:</i>		
1 and 2	T32, R28, Sec. 17	
35	T32, R28, SW part	Much archaeological evidence reported by Dumble and Allen. This is probably the location of Pohalin Tinliu reported by Zalvidea and Kroeber.
16	T32, R28, Sec. 29	1½-2 miles S. of site 2. Reported by Hollis Parker.
<i>Near Kern River above Bakersfield:</i>		
13	T28, R28, Sec. 34	Reported by Charles Morrice.
36	T29, R28, Sec. 2-3	Mesa north of river. Reported by H. S. Allen. Tsineuhiu and Konoilkin reported by Garcés and Kroeber could be expected in this vicinity.

*Near Buena Vista Lake*

*Site 33 (Tulamniu)*, according to the report of W. D. Strong who visited it in January, 1926, is located at the edge of the old lake shore, its upper levels above high water, its lower shell layers evidently being in the lake when it is

high. The hills are immediately behind the camp site, which curves around a point for half or three-quarters of a mile. The shell, mixed with black earth, is thicker in some places than others. At the southeastern end the shell layers are covered with four or five feet of black soil. The shell layer here is about five feet thick, shelving down into the lake. At the southwestern end the shell is on the surface and appears to be about six feet deep. The average width of the camp débris, between lake and hills, is about seventy-five to one hundred feet. Few artifacts save shell beads appear on the surface. Several blue glass beads were picked up. Careful search revealed about ten fragmentary arrowheads, two small stone artifacts, and little else. No steatite was seen on the surface, but several broken pieces were found on the hills behind the camp site. A few crumbling human bones have apparently been dug out of the central part of the shell débris. There are a few blackened firestones on the surface. No signs of burials in the hills were found, though considerable search was made.

*Elk Hills Sites (14 and 15).*—At the northwestern corner of Buena Vista lake is a range of sandy hills in which two burial places have been discovered.

The first (site 14) was investigated by Mr. N. C. Nelson in 1909 and yielded a series of skeletal remains and artifacts, the latter being in large part textiles. Unfortunately Mr. Nelson was unable to map this site definitely. Our party and Dr. A. L. Kroeber endeavored in vain to locate it on the ground.

Concerning this site, Mr. Strong, who investigated site 15 in November, 1924, writes: "Site 14 was evidently very close to site 15. The elevation of site 15 was from one hundred and fifty to two hundred feet above the lake floor. That of site 14 was evidently less. Site 14 was slightly north and east of site 15. There is a broad gully near site 15, answering to Nelson's description. Part of its southwestern face has slid off and there are some very slight signs of excavation there. I have selected T 31, R 24, S 14 as possibly his exact location, and a close approximation of his general location.

Site 15. This site, comprising only two burials, which yielded a few artifacts including textile materials, is located just over the crest of a ridge, on the south slope—about 330 feet south of the northeast corner of S 15, T 31, R 24. The University is indebted to Messrs. Flowers and MacDowell of Taft for the opportunity to examine these interments, which they discovered while surveying.

*Site 4 (Pelican Island).*—Site 4 is in about S 22-23 of T 31, R 25, north of Buena Vista lake, between the Old River and New River mouth of Kern river. At present (1924) the surplus waters of Kern river enter Buena Vista lake in about S 16-17, T 31, R 25. The exact location depends upon the level of the lake. A few yards west of this Kern river channel, and generally parallel to it, is the outlet channel of Buena Vista slough. Both of these channels have been artificially deepened and straightened. When the stage of the lake rises to about the 291 foot level, this exit and this entrance move north to about S 9, and at 295 feet they would be something over a mile still further north in S 4.

In January, 1924, this location was two hundred yards from the actual water of Buena Vista lake. The lake margin was soft mud and it was not possible to reach the water without going in over one's knees. Beyond, the lake was very shallow and duck hunters were wading out several hundred yards farther.

To the rear the ground rose possibly ten feet in three miles. This region was treeless but partially under the plow, and gave some evidences of having been a tule marsh. The "island" itself supported a scattered growth of very small willows, some brambles, and some annual plants. Along the lake front were

dense but limited clumps of tule, and along the slough considerable growth of willows and larger shrubs.

Water fowl of many kinds, including ducks, geese, pelicans and waders, were much in evidence. In ancient times the spot must have been frequented by tremendous numbers of such birds.

When the level of the lake was at 295 feet or thereabouts the island was at least a mile from the north margin of the lake and a true island. The other extreme—say a lake level of 282 feet—left the spot quite a distance from the water. Mr. Hugh S. Allen reports that for some time prior to 1888 the lake level was so low as to make the "island" dry. In that year the levee was built on the east side of Buena Vista lake and the water level was raised some four feet, which at least subjected the southern side of the "island" to wave and wind action even if it did not make it a complete island.

In all, this was an extraordinarily favorable location. It was among the perennial channels of the Kern river, adjacent to a lake containing fish and frequented by vast flocks of waterfowl, and high enough to be above all but the highest floods.

*Size and Appearance.*—The island is an S-shaped portion of shore line, some five hundred yards long by some thirty yards wide (at the widest part) and perhaps seven feet above the land to the north. The "island" is highest near its center point. It is composed very largely of river-mussel shells and is simply a large shell heap with mud deposited over its lower slopes on the southern or lake side.

The island, particularly to the west, is literally covered with steatite sherds, flint worked and unworked, hammerstones, sandstone mortar fragments, etc. A wagon load of such material could readily be accumulated, this after collecting has been done from its surface for years.

*Character of the Mound Material.*—Over the top to the depth of about three inches is a stratum consisting largely of sand. Below this is a layer some thirty inches thick consisting almost entirely of river mussel (*Anodonta oregonensis*), broken, but otherwise in its natural state, and a few *Physa humerosa* and many *Planorbis ammon*. There is an admixture of calcined shell in small quantities, traces of charcoal, some sand, fish, animal, and occasional human bones and some artifacts. Below this stratum the shell becomes scarcer and a black organic soil with a large quantity of yellowish sand becomes more noticeable. The shell is generally disposed in well defined layers of alternating coarser and finer texture, from three inches to six inches thick. These were not regular throughout the entire mound. The structure disclosed in our pit 3 may be cited as typical. The following table shows it from top to bottom:

<i>Thickness of layers</i>	<i>Estimated constitution of layers</i>
4 inches	70% sand: 30% fine shell fragments.
2 inches	30% sand: 70% shell fragments.
4 inches	Sand with small amount of shell.
5 inches	90% shell. Many whole shells at bottom of layer.
8 inches	70% sand: 30% shell. Solidly packed.
5 inches	25% sand: 75% shell.
2 inches	50% sand: 50% fine shell fragments.
6 inches	90% shell.
6 inches	80% sand with many whole shells.
?	Blackish clay with yellowish sand.

Generally in the mound the layers were not horizontal but were tilted upwards towards the south. The degree of tilting seemed to be about 18° in most walls examined. Moreover, in some layers the broken shells were disposed vertically instead of horizontally, as they might have been placed by wave or wind action.

To the north the "island" slopes abruptly and the shell structure gives place to the soil of the surrounding country. Towards the northwest in our pit 3 at thirty-six inches depth, layers of river mussel shells, practically whole, were found in large quantities. Both valves were usually present and joined. They seemed to indicate a natural, growing habitat. Further to the northwest (fifteen yards) this same layer of whole shells is found on the present surface of the ground. These facts suggest that here was an original bed of mussels which was visited by aboriginal people who gradually accumulated the balance of the heap now constituting the "island."

To the south, towards the lake, the shells of the "island" became more or less covered with silt and it is difficult to determine whether or not the "island" presents as artificial a character as to the north.

We were not able to locate any other shell mounds. Mr. Allen writes us that "Pelican island is the only extensive shell mound I know of. There were a few small shell mounds, now plowed up, principally in S 10, T 9, R 26. These were, roughly round, about twelve inches thick and the shells were stacked."

*Excavations.*—On Pelican island we dug four pits turning over about four hundred cubic feet of material.

*Skeletal material.*—Several men of the region have told us that human bones were once plentiful on Pelican island. We saw a few traces but obtained no specimens. In December, 1925, however, Messrs. W. W. Hill, G. M. Stirling, and W. L. Warner excavated two skeletons.

### *Near Kern Lake*

*North shore of Kern lake.*—We feel little doubt that the historical sites of Loasau and Woilo are in the region described below.

In S 12 to 9, T 32, R 27, the north shore of the lake consists of sand dunes rising rather abruptly six or ten feet above the lake bottom. This sand is subject to great wind movement. A district will be uncovered to the depth of several feet only to be covered again the next season with a shift in the wind. This movement of the sand has laid bare many skeletons and artifacts which have been collected and reported to us mainly by Messrs. Allen, Dumble, and Pryor.

Mr. Pryor reports his collection from two villages on the high land just above the former water line of Kern lake in T 32, R 27. These sites were about a mile apart and between two of the mouths of Kern river. Mr. Pryor also reports a "battlefield" south of the lake in T 32, R 28, but has no specimens from that region.

Messrs. Allen and Dumble have covered the same ground and most of the data will be set forth in describing Mr. Dumble's collection. Mr. Allen also reports that in S 9, T 32, R 27, about one-quarter mile south of the north quarter corner, was a mud fireplace about five feet in diameter, a shell mound one hundred feet in diameter, broken mortars, human bones, etc. This site was uncovered by the wind and is now almost if not quite obliterated.

About one mile north of this place is our site 3 in S 3 (NW quarter), T 32, R 27, on the property of the Kern Lake Gun Club. There is no mound. A narrow sand dune, a few feet high, stretches in a northeast-southwest direction. One

hundred and fifty yards to the southeast is a slight depression where in the brownish sandy soil is a burial ground apparently rifled, though this appearance may be partly due to wind action.

One-half mile northeast of this site is a burial mound, according to William Slay, a Kawaiisu Indian.

Near the corner of S 10, 9, 4, 3, T 32, R 27, interesting burials were found by Mr. Dumble. An irrigation ditch runs along the western line of S 10 and at about the corner mentioned is the old shore line marked by rather high dunes with an abrupt slope covered with a dense growth of greasewood. About 1922 a check gate went out in this ditch above the point, causing excessive wash and caving of the banks where the ditch cuts through the dunes at the shore line. This disclosed three skeletons. The lowest one was about six feet deep, the second one about three feet, and the third one quite near the surface. The cut seemed to show two camp floors at this point, one about two feet below the present surface and the other about four feet.

In this same Section (10) after a high wind storm Mr. Dumble observed a fireplace consisting of a layer of blue, lake clay, about three and one-half feet in diameter and somewhat concave. Leading from this to the northeast and to the northwest were narrow paths. In fifteen feet or so these came to circular clay floors about twelve feet in diameter. A number of artifacts were found in the vicinity.

*South and east shore of Kern lake.*—We believe that the archaeological evidence confirms the location of Pohalin Tinliu in T 32, R 28, in the general territory of S 17 and 30. This probably includes Mr. Pryor's "battlefield." It also includes our sites 1 and 2.

*Sites 1 and 2.*—These are in S 17, about eighteen miles south of Bakersfield, on the Los Angeles highway, just south of the entrance to a ranch of the Kern County Land Company. Site 1 is about 250 yards from the highway and is a circular mound about two and half feet high by fifty feet in diameter. The mound is of a sandy soil similar to the neighboring land, and is surrounded by a shallow depression as though the earth for the mound had been dug from it. The mound has been badly turned over by relic hunters.

Site 2 is one-fourth mile east of site 1 and is elliptical in shape, one hundred feet northeast to southwest and sixty feet wide. It is about three feet high and of the same material as the surrounding country.

Mr. Allen reports burials from the same Section (17) which are probably from these mounds. He says the skeletons were piled, without order and that the orbits were covered with pieces of abalone shell about the size of a dollar.

*Site 16* lies in sand dunes a mile and a half to two miles south of site 2 and east of the Los Angeles highway. It is alternately covered and uncovered by shifting sands. Mr. Hollis Parker has sent the University fragments of human bones and of soft twined bags from this site.

Some fifteen years ago Mr. Dumble, in what he now thinks was S 20 (i. e., about one mile south of site 2), found a place about one hundred feet square covered with bones and a great quantity of stone, etc., which had been uncovered by a high wind. Mr. Allen has looked for this find for several years, not being able to make sure of it because the wind changes the topography. He found what he considers to be a part of the same location in S 30, about a mile southwest. He also found evidence of another camp site in the southwest quarter of S 36, T 32, R 27, another mile southwest. In short, there seems considerable evidence to locate quite a population in this region, where a village was reported by the early Spanish explorers, and by Kroeber. The

region at present is so arid that one finds it difficult to believe that a village could have existed here. Water could have been secured only from the lake, the shore line of which is some distance away. However, the Indians may have found it advisable to move to some distance from the lake on this dry side to be freed from the mosquito pest. Further, as Mr. Allen has pointed out, the water situation in aboriginal times was more favorable for the location of a village here. The Kern river flowing south from the Bakersfield region entered the lake at about the east side of S 7, T 32, R 28, so that no doubt a current of fresh water would have flowed past the center of S 19-30 turning west at about this point.

#### *Near Kern River, above Bakersfield*

It seems probable that the historical sites of Tsineuhiu and Konoilkin are identifiable with the Morrice and Allen sites 13 and 36.

In sending certain specimens to the University on April 23, 1924, Mr. Morrice writes, "This is the remnant of a collection made some twelve years ago, of Indian relics from a mound about 100 yards from the Kern river in T 28, R 28, S 34. So far as I could learn at the time I made the collection they belonged to a branch of the Tejon Indians. . . . Many arrowheads, stone implements, etc., have been taken from the same mound since I was there."

Mr. Allen, on March 4, 1924, wrote: "On sections 2 and 3, T 29, R 28, on the mesa north of Kern river, is a burial ground and extensive camp site. The camp relics are buried by two feet of overburden and are found in the bands of washes, sometimes in places about two feet from the surface."

## DISPOSAL OF THE DEAD

### ALPAUGH REGION

Our information regarding the disposal of the dead in the Alpaugh region is very limited. Burials have been disclosed in T 22, 24 (site 22), and 25 (site 12). But we are able to present data of the last named place only.

Whereas the greater number of artifacts were from T 23 not a single burial is reported from there. This absence of burials may be due to the fact that cremation was practiced as among the modern Yokuts further north. However, it seems as likely that it is simply due to a lack of thorough investigation. Mayer and Fry, to whom the collections are due, never dug. It might also be conceived that the site 22 burials were due to Christian influence since articles of European manufacture were found at this site. Further, site 12 might be taken as more properly belonging to the Slough region. However, the case for cremation is not strong and not a bit of direct evidence supports it. The lack of an adequate supply of firewood (noted by the Spanish traveler Martin in 1804, as well as being a modern fact) must have militated against the practice.

The data for site 12 follow :

In pit 1, two skeletons were found (U. C. M. A. 12-3514 and 12-3515), one of a man of forty-five, the other of a woman of forty. Number 12-3514 was resting partly on its right side with its knees bent in such a manner that the toes were under the pelvis. Number 12-3515 was lying on its back with its knees bent in a similar fashion. Both heads were towards the north. The knees of 12-3514 and 12-3515 were touching. In both cases the remains were in the same horizontal plane throughout. Both skeletons were generally undisturbed. The bones were in good condition, probably due in part to the alkaline character of the soil. The skull of 12-3514 was ten inches below the surface and 12-3515, 11½ inches. We judge these bodies to have been buried at the same time. One olive shell bead was found closely associated with 12-3514.

In pit 3, were found traces of a skeleton which had been very much scattered (12-3516), apparently by animals. There was another skeleton somewhat more complete, though still very fragmentary (12-3517). Apparently it had been placed with the head towards the west, with the knees drawn up to the chest. Bones were found which indicated a third even more fragmentary skeleton (12-3518). No artifacts of any kind were found in the pit with these skeletons. Pit 3 was sunk in what we have previously described as "hummocks" (see page 32).

#### SLOUGH REGION

No direct evidence of cremation was discovered and very few artifacts were found on sites which did not disclose burials. It seems safe to conclude therefore, that burial was the main, if not the sole, method of disposing of the dead.

All graves recorded were situated in low mounds. The mounds are natural formations with the possible exception of site 11. In some cases the height may have been increased by human agency. Burials were most numerous at the highest parts of the mounds.

This suggests the hypothesis that burials may have been made by heaping material over the corpse instead of digging a pit into which the corpse was placed. It does not seem reasonable that burials were made in the highest parts of mounds to be above high water, for on the tops of the mounds the differences in elevation are small and in many cases inconsequential. For example, sites 8 and 10 were entirely below high water. Further, in doubtful cases, such as sites 9, 7, 6, and 5, there was nearby high ground which was certainly never inundated. The places of burial were convex as would be expected from a heaped-over burial and not concave as would be expected from a pit. At site 6 the bodies were above the firestones of the hearth. This might be taken as indicative of two periods. But it would also be explained by the fact that the bodies had been placed on the surface of the ground lived on and covered with earth. If site 11 is an artificial

TABLE 6  
BURIALS IN THE SLOUGH REGION

Site	Museum No. 12-	Depth	Head Orientation	Side	Flexed	Sex and age	Bones	Remarks
11	3519	20"	S	R	?	Adult	Rotten	With few beads; two points.
11	3520	18-30"	S	Back	Yes	Adult	Rotten	With two bone artifacts. Decayed mat (?) beneath.
11	3521	?				Adult	Rotten	Fragmentary.
11	3522	54"	NE	L	Yes	Adult	Rotten	With decayed mat (?) above.
11	3523	69"	SW	Back	Yes	Adult	Rotten	With bone fish-hook. Mat (?). Beaks and claws of red-winged blackbirds.
11	3524	18-28"		Sitting	Yes	Adult	Rotten	With decayed mat (?) between flexed knees and chest. Facing N.
9	3501	18-25"	SE		Yes	F 55	Good	
9	3502	25"	NW		Yes	M 60	Disturbed, good	
9	3503	23"	E		Yes	F 50	Disturbed, good	Across 3502. Nearly upright.
9	3504	20-23"	N	R	Yes	M 55	Disturbed, good	
9	3505	12-23"		R	Yes	M 60	Disturbed, good	
9	3506		E x S	L	Yes	8	Good	With, and facing chest of, 3505.
8	3507	15"	W	R	Yes	M 60	Disturbed, good	
8	3508	30"	W	R	Yes	M 40	Disturbed	
8	3509	30"	NW	Back	Yes		Disturbed, good	Skull on knee of 3507.
8	3510					F? 55	Disturbed	On pelvis 3509. Skull only.
8	3511	30"				Child	Disturbed	With 3512. Possibly buried in arms of 3512.
8	3512	33"	W	Back	Yes	Adult	Undisturbed	Under 3511. Olivella discs in mouth and ears. Necklace.
8	3513		N	L		Adult	Disturbed	Under 3509.
6								
18								10 burials. No regularity. See page 48.

See detailed description.

mound it would support a heaped-over burial theory. In many cases (sites 11, 14 and 15 excepted) the earth below the bodies was such that it would have been very difficult to dig a pit in it even with steel tools. On the other hand the surface material to a depth of three inches or so could be removed rather easily. The disturbed condition of many bodies is perhaps to be connected with too shallow burial, either pit burial or heaped-over burial. The chances for disturbance through weathering would seem to be greater with the latter method, however, as there would be no restraining pit walls to prevent the movement of the bones.

Details of burials noted in the Slough region are recorded in table 6 and in the following paragraphs.

*Skeletal Material in Site 6.*—In pit 1, in an area four feet by three feet, and from four inches to twelve inches deep, were found the following individuals:

Individual	Depth in inches	Individual	Depth in inches
12-3526.....	4	12-3530.....	8
12-3527.....	6	12-3531.....	8
12-3528.....	4	12-3532.....	10
12-3529.....	7	.....	9

With the possible exception of 12-3526 there was no positive association in situ between skulls and bones. The bodies had not been systematically arranged. Evidently they were simply piled together for burial. At about eight to twelve inches the hard lumps of clay were apparently more abundant. This may have been a bed prepared for the bodies or might indicate the one-time surface of the mound.

Pit 2 contained only skeleton 12-3525, on its back at twenty-four inches. The knees were bent so that they were but seven inches from the surface. The skull was at fourteen inches. The head was southwest by west. A burrow had passed directly through the chest, so that the ribs and most of the vertebrae were missing. Long-bone fragments believed to belong to the body were found below at forty inches. This body had associated artifacts.

Pit 3. Skeleton 12-3534 was on its right side, facing south, head to west. Many bones were missing showing disturbance by mammals. No artifacts were found. Skeleton 12-3535 was also in this pit about five feet west of skeleton 12-3534. It was on its back, the knees flexed back and the arms crossed under the legs. The head was towards the northeast.

Skeleton 12-3540 was between pits 1 and 3. It was on its back; head towards the north; arms extended at sides; leg bones much mixed up. The knees were three inches deep; the skull five inches. The bones were in a very crumbly condition. Grass was growing through the skull. Charcoal was noted under the skeleton. In the vicinity of the head was found a bone skewer eight inches deep and a bird bone whistle six inches.

Contemplation of these data suggests the following conclusions. The number of children is very small. Considering the high infant mortality among ordinary aborigines this seems extraordinary and may have a bearing on the

historical information that sterility was very prevalent. In such an event the inference would be that we were dealing with a modern or else a transient population. Except for flexing, there was no regularity of burial method. The number of accompanying artifacts is extraordinarily scant and implies a very poor population.

The confused burial of several bodies at site 6 and the state of affairs described by Mr. Crites (see page 35) suggest hasty interment. It is possible these burials actually date from the epidemic of 1833 (see page 25), even bearing in mind the popular tendency to attribute confused burials to wars and epidemics.

#### LAKE REGION

So far as the evidence shows burial was the method of disposal of the dead in this region.

*Site 14.*—The burials at site 14 appear to differ from others in the area as regards location, preservation, cranial type, and associated artifacts.

These burials appear to have been made in the side walls of a dry arroyo. The location is not a suitable place of habitation. This may indicate the custom of burying in the hills some distance from the residences, or it may be taken to suggest intruders buried, through necessity, in an out of the way place.

At site 14 an individual's hair, his mink skin head and face covering, tule mats, cotton cloth, basketry, and wooden articles were well preserved. Similar perishable materials were not preserved elsewhere except at sites 15 and 16. The climate is practically identical for the area. The preservation then would be due to the local situation, or to the fact that the burial was a recent one.

There were five individuals in site 14. Of these, four crania were measurable. All were of the Buena Vista cranial type. Only two other Buena Vista type skulls were found in the entire area. Such a concentration at a single spot suggests an unusual group.

The principal objects found at site 14 were:

1. An arrow shaft penetrating a human orbit (see present series, XIII, pl. 60, 1923).
2. A painted slab of yellow pine (see pl. 1).
3. A white cotton blanket (see pl. 2; also pl. 72 of B. A. E. Bull. 78).
4. Cordage of vegetable fibers and human hair (see pls. 3 and 4).
5. Three ply cordage (see pl. 4).
6. Tule mats (see pls. 5 and 6).
7. Basketry bags decorated with human hair (see pls. 7, 8, 9, 10; also pl. 63 of B. A. E. Bull. 78).
8. Nets, including hair nets containing human hair (see pls. 11 and 12; also pl. 72 of B. A. E. Bull. 78).
9. Human hair in pencil-like locks as well as loose (see pl. 72 of B. A. E. Bull. 78).
10. Abalone ornaments over the orbits of two crania (see pl. 81 of B. A. E. Bull. 78).

11. An eagle's skull with abalone ornaments cemented over the orbits with asphaltum (see pl. 13).

12. Limbs wrapped with tule fiber, tule stems, and cordage (see pl. 13; also pl. 41 of B. A. E. Bull. 78).

Attention is called mainly to the inference to be drawn from the lot being together. Item 1 implies a violent death which Dr. Saxton T. Pope has fully described.<sup>9</sup> Item 2 is from the Sierra Nevada or the mountains south of our area. The cotton blanket has been identified as of the Pueblo type. The use of human hair as far as other evidence goes is alien to the area. So is three ply cordage. The pencils of human hair have not previously been described north of the Mohave. In short there are collected here a number of cultural features which may have been common to the area but which, if so, are supported by the single instance. The other alternative is that site 14 (and perhaps site 15) represents the burial of a portion of a group not regularly of the area. The burial in an out of the way place, the violent death, the presence of one and possibly more intrusive articles, the unusual crania, the hair pencils, and the knowledge that parties from other regions did visit the area make such an assumption not unreasonable. The historical data collected show a great mixture of peoples here and the preservation of the materials in this burial might well bring site 14 within historical times, when the possible confusion indicated by the burial would be naturally explained.

In one burial the feet, ankles, and thighs had been wrapped with cord, beneath which on one ankle were some yellowish white vegetable fibers and the hair of a small rodent. Some of the tissue and skin still cling to these bones.<sup>10</sup> In another skeleton one arm had been wrapped with tule fiber and the other with tule stems. This is illustrated in our plate 13. This burial gives indications that the body itself was also wrapped in tule mats, and perhaps in the cotton cloth, for interment. At site 15 bodies wrapped in mats were definitely discovered and in site 11 a very thin brown layer suggested a mat. A similar practice was followed in the Santa Barbara region.<sup>11</sup>

*Site 15 (as described by Mr. Strong).*—The burials were originally covered by about three feet of soil, and were probably six feet below the crest of a ridge. The soil is nearly two thirds gypsum, and is superimposed on a bed of water-worn gravel, which is unusual in the Elk Hills. There is some coarse sand and a few shells.

There were two bodies (to judge from the fragmentary mastoid processes, male and female), apparently both flexed, and the female facing the back of the male. One wrapping nearly three inches thick enclosed both. On the outside this was a heavy layer of loosely woven whole tules, which looked like bark, and inside, next to the body, a soft twined basketry, in places adhering to the bones. This wrapping was crumbly and not pliable, save in small pieces. Its edges had decomposed into a thin brown line of powder, like a line over the bodies in site 11. Where the material was thicker, it seemed to remain intact.

The bones were powdery and broke into fragments without any pressure. The slide which exposed the burials disturbed and broke the bones, and they

<sup>9</sup> A study of bows and arrows, present series, XIII, pl. 60, 1923.

<sup>10</sup> B. A. E. Bull. 78, pl. 41.

<sup>11</sup> Rept. U. S. Geog. Surv. W. of 100th Meridian, VII, 37, 1879; Bull. U. S. Geog. Surv. of the Territories, III, 38, 1877.

were in place only because of the thick covering of matting. The heads were pushed down over the shoulder blades and smashed flat.

The female skeleton (12-3819) had no artifacts associated with it. On the face of the male skeleton (12-3820) and just below it were two *Haliotis* ornaments, which had probably covered the eyes. On top and in back of the head were a few *Olivella* disk beads, in the mouth and below the chin were a number of cylindrical clam shell beads. Around the breast and scattered down to the pelvis were several arrowheads, all of the unnotched type, mostly of gray brown flint, but two of black obsidian. Most of them were broken. Midway down the body, just under the back bone, was a dull black obsidian blade. In this same region, but above the backbone were a few lumps of pinkish mineral pigment. Near the face were three small cylindrical bone tubes.

*Site 4 (Pelican island)* yielded no skeletal material in our excavations. Two skeletons unearthed by Messrs. Hill, Stirling, and Warner were found one above the other. "Four feet and four inches from the surface the broken shell strata ceased and a layer of clay two or three inches thick appeared. Below this we found skeleton number 1 (12-3851), and just below it we found skeleton number 2 (12-3852). Skeleton 1 was on its back with legs bent back so the knees were on the chest and had a large number of *Planorbis ammon* shells about it. Skeleton 2 had a perforated coyote (?) tooth with it. From the appearance of the clay about skeleton 1 it looked like a burial in the clay and below into the next shell stratum (which went down to seven feet six inches)."

*Site 38.*—In January, 1926, Mr. Strong was taken to site 38 by Mr. John B. Stevens who, with a party, had first visited it in 1923 and had unearthed six skeletons. The bones were very friable, stained dark red, and with a reddish deposit around them. Two bones had small arrowheads imbedded in them. Eight other arrowheads were found in the excavation. In 1926 friable bones of three disarranged skeletons and two arrowheads were unearthed at a depth of two feet. Shell beads were collected on the surface. The site is a bare sandy stretch on the plain, perhaps fifty feet in diameter. No eminence is noticeable. Obviously these were not mound burials, though a passer-by said there were mounds in the vicinity.

## CRANIAL TYPES

In view of the cultural conclusions given later in this paper, the question of cranial types is of particular interest. However, the data for the determination of such types, particularly from the point of view of geographical or regional comparison, are exceedingly scant: Alpaugh region, 4 crania; Slough region, 27 crania; Lake region, 9 crania. The measurements are presented in another paper.<sup>12</sup> Here it may be stated that they disclose two types, the San Joaquin subtype of the Californian type, and the Buena Vista type. The San Joaquin subtype is relatively short-faced and broad-nosed; the Buena Vista type, relatively long-faced and narrow-nosed.

<sup>12</sup> Californian anthropometry, present series, XXII, 379-382, pls. 49-53, 1926.

The San Joaquin subtype is dominant in the area and the six crania which certainly represent the Buena Vista type are perhaps exceptional, since four of the six are from site 14, where the San Joaquin subtype was not found. The other two are from sites 8 and 9. From the regional viewpoint we have of definite Buena Vista type crania, four from the Lake region, and two from the Slough region. In its great size the Buena Vista type suggests the living Mohave Indians. These people did frequently visit the area and the single group at site 14 might represent an intrusion, but the distribution otherwise rather militates against this interpretation.

The San Joaquin subtype is found to be scarcely distinguishable from subtypes prevailing from San Francisco to San Diego on the coast and throughout the San Joaquin valley. Since the relationship is so close as to render identification of single skulls with one subtype or the other uncertain, it is obviously impossible to determine from the cranial data whether autochtones or the intruders of Mission times are represented by the well preserved crania.

#### MATERIAL CULTURE

In this discussion we include not only material recovered by ourselves but also that in private collections, where we are satisfied that the locality from which the specimen came was known. Such collections are notably Messrs. Fry's and Mayer's in Alpaugh; and Mr. W. R. Dumble's in the Lake region. The last named collection originated almost entirely at site 34, in T 32, R 27, S 9-12.

In order that as many types as possible may be illustrated, we have endeavored not to reproduce our own photographs, when illustrations representing the type could be referred to in easily available publications. For convenience we have further endeavored to confine such references to the fewest possible works. That to which we most frequently refer is the admirable work by Mr. George G. Heye, entitled, "Certain Artifacts from San Miguel Island, California."<sup>13</sup> A few references are also made to illustrations in the papers on the Santa Barbara culture in the *Archaeology* volume (VII) of the Wheeler Survey.<sup>14</sup> These references appear as "Putnam, plate or figure —."

<sup>13</sup> *Indian Notes and Monographs*, Museum of the American Indian, Heye Foundation, VII, No. 4, 1921.

<sup>14</sup> Rept. U. S. Geog. Surv. W. of 100th Meridian, 1879.

Our main grouping is based on material. Under materials divisions are made according to usage when such is known; otherwise according to form. Both main divisions and subdivisions are arranged alphabetically.

#### ARTICLES OF ASPHALTUM

A mortar in the Lake region had around the edge of its very shallow hole a quantity of asphaltum which had apparently been used to fasten a basket hopper to the stone. From site 15 came also asphaltum-coated twined basketry.

A lump of asphaltum or of impure rosin was also recovered from site 13 in this region. Asphaltum was found over the eyes of the burials at sites 14 and 15.

The clamshell beads from the Slough region, illustrated in plate 15, apparently have asphaltum in the decorative incisions.

Since asphaltum was used in such an ordinary way as the mortar hopper would imply, it seems likely that the material was well known in the Lake region at least. The cleaning of pieces by private collectors would eliminate all trace of it from such articles as points and "charmstones." The low hills bordering the area on the southeast and west have asphaltum beds on the surface in many places.

#### ARTICLES OF BONE AND HORN

All bone artifacts recovered were from below the surface. This may explain their practical absence in the Alpaugh region, since the Mayer and Fry collections were gathered almost entirely from the surface. The only bone artifact which they had was a small, flat, squarish fragment with two edges notched.

##### *Antler*

The only piece of horn observed in the entire valley floor was an antler tip in the Dumble collection. It was from the vicinity of Kern lake.

##### *Awls*

An awl in good condition was found at site 6, Slough region. It was made from the right radius of a canine animal, probably a coyote. Hence the awl is hollow. The bevel is clean cut and produces a sharp strong point (see pl. 14*b*).

### *Fishhooks*

A fragment of a bone fishhook (or possibly spear head) was found at site 11 in the Slough region (see pl. 14*d*). Many similar pieces are found in the Delta region.

### *Pendants*

From the shore of Kern lake, Mr. Dumble secured a bear claw drilled near its base for use as a pendant. From site 4 (Pelican island) is reported a coyote tooth similarly perforated. A bear claw necklace has been reported from the Slough region and Mr. T. V. Little has submitted for inspection a bear claw drilled at the base and with a chord length 100 millimeters from tip to base. The drilling is from side to side.

### *Pins*

Six pins were found at site 6 in the Slough region. These range in length from 175 to 193 millimeters and apparently are identical in type with the object shown in Heye LVI, *a*. They are of solid bone, apparently the cannon bone of a large mammal—elk, cattle, or horse. They taper more towards one end and this long taper terminates in a sharper point than the other end. Tool marks on the pins are encircling. Possibly these pins were hair ornaments, possibly they were used for cooking fish, or yet again they may have served some other purpose.

### *Tubes*

Site 14, Lake region, yielded four bone tubes—one fragmentary. These are of mammal bone, perhaps deer, and resemble Heye LVIII, *e*. All the rims are rounded and slightly bevelled. In one tube both rims are incised in a decorative manner. In two the inside has been finished at one end as in Heye figure 17, with the addition that longitudinal interior striations, perhaps tool marks, are prominent.

### *Whistles*

Whistles found were made of bird bone and are illustrated in plate 14. The ends are cut off square and the bone is in good condition. The larger example is made of the ulna of *Grus canadensis*(?). One specimen (fig. *c*) was obtained from Adobe Holes (site 19) and one (fig. *a*) from site 6—both in the Slough region.

## ARTICLES OF CLAY

Artifacts of clay were scarce and are of six types.

1. A keeled (or convex sided) spindle-whorl shaped disc. Five specimens were discovered. One is from Alpaugh (Fry collection) and is of burnt clay with the hole of such even diameter as to appear moulded. Another (pl. 14*k*) was found by Mr. Pryor on the shore of old Kern lake, and is like the first except as to being of unburnt clay. Three similar discs were found by Mr. Dumble in the same region. In the J. A. Barr collection in Stockton are three from a spot eight miles southwest of Tulare. They were found in 1897 in digging a ditch on the ranch of G. H. Castle.

2. The second type is very similar to the first except that the disc has flat sides and a biconically drilled hole. It is represented by a single specimen from Alpaugh (Mayer collection). There is a possibility that this specimen is composed of shale.

3. The third type is represented by a small, crude, grey, unbaked-clay bowl with a side perforation like a modern tobacco pipe and with traces of white paint (?) on the exterior. It is from the Goose lake region and is in the Dumble collection.

4. A fragment of burnt clay tube with evidence of smoke within was found by Mr. Dumble near Kern lake. It may have been part of a tobacco pipe.

5. This is a small piece of sun-baked clay with a design of punched indentations. In this respect it resembles some clay objects from the vicinity of Stockton. The specimen is in the Dumble collection and was found in S 9-12, T 32, R 27, on the northern shore of old Kern lake.

6. Pottery was forthcoming in two areas. From the surface of site 12 (southeast of old Tulare lake) we gathered a score of small sherds (which were all we could find) of gray pottery, without slip, and about five millimeters thick. Mr. Hollis Parker sends us, apparently from site 3, on the northern shore of old Kern lake, sixteen small sherds without slip. Ten of these are similar to the site 12 material, and six of a thicker ware, dark gray on one side and reddish brown on the other. On the neighboring, Kern lake site 34, about a mile from site 3, Mr. Dumble found many sherds with a pale brown slip showing a dark brown band and black linear design. Moreover, from

this same place Mr. Dumble obtained a complete small vase with a swastika design, probably of modern manufacture.

The potsherds of both the Alpaugh and Lake regions appear more like southern Californian than modern Yokuts ware. The potsherds from the Alpaugh region are scant (it being quite possible for those found to represent a single vessel) and are all from the surface, so that it seems unsafe to conclude anything other than that pottery in this region was probably a post-Caucasian intrusion and no factor in the ancient culture.

In the Lake region it again seems unlikely that the pottery was made where it was found. As has been shown in the historical section, this area in particular was subjected to an influx of people driven in by the Spaniards from the coast and southern California. Considering this and the fact that other articles of certain Caucasian origin (Spanish coins, glass beads, for example) are found under similar conditions in the same locality, it seems most likely that pottery was also a late intrusive factor, of little or no importance.

The large lumps of burnt clay found on the surface of the ground, particularly in the Alpaugh region, have been mentioned. From site 6, Slough region, comes a lump of unbaked clay (1-24609) with a negative basketry impression shown positively in wax in plate 14*m*.

#### ARTICLES OF EUROPEAN MAKE

At sites like La Hacienda (site 22) where ranch houses existed upon apparently aboriginal sites, articles of European manufacture were not collected, since it would be utterly impossible to say when and how they arrived.

On the other hand a number of European articles which have an interest have been collected—particularly by Mr. Dumble in the Lake region. He has a great variety of glass beads, globular and tubular, and of various colors; a small copper button of antique type with prongs for fastening it to the garment; a number of Spanish copper coins, one dated 1816, one of Ferdinand VII(?) dated 1812(?), one of Charles III dated 1776, and he reported still another dated 1712; a broken copper knife blade, 910 mm. long; a copper kettle of Russian design, which casts an interesting light on the Spanish report of 1824 (page 24); and fragments of a porcelain doll's arm and a crucifix. As most of these objects were found in the same general locality as the balance of the Dumble collection, it would be simple to say that they

determine that collection as post-Caucasian. Such a generalization would be to some extent supported by historical and archaeological facts which are developed in the course of this paper, but the general tenor of our discussion makes it obvious that the situation is by no means so simple.

Owing to shifting sand, particularly in the eastern Lake region, it cannot be stated whether any of the European articles were associated with burials. In the Slough we found no such articles but this fact is obscured by the consideration that other material remains indicate this to be the backward area where European articles would be least expected.

Finally it is possible that specimens influenced by European ideas have been unwittingly included as aboriginal.

Plate 16*ad* shows a glass bead from Alpaugh.

#### PAINT

A number of burials furnished traces of red "paint." As we have no burials from Alpaugh or the major portion of the Lake region no comparison can be made. The "paint" was the ordinary hydrous iron oxide used widely in California.

From site 15, however, comes a lump of pink pigment, probably ocher. From a site on the shores of Kern lake, Mr. Dumble obtained a lump of yellow pigment.

#### ARTICLES OF SHELL

We have classified shell artifacts as follows:

I. Discs with a more or less central perforation and less than seventeen millimeters in diameter we have called "beads."

II. Discs of general circular form, more than seventeen millimeters in diameter and with or without perforations, are called "discs."

III. More or less irregular shaped artifacts with perforations off center are called "pendants."

IV. Longitudinally perforated objects where the length is several times the diameter are called "tubes."

### Beads

The principal objects made from shell were beads. Our own excavations did not produce very many of these, but all private collectors emphasize their relative abundance. Such collections do not however show this since all the beads seen are never gathered, and those gathered are frequently given away.

(a) *Beads of clamshell*.—The clamshell beads were mostly made from the shell of *Tivela crassatelloides*. This is a southern species found notably in the region of Pismo beach and on the Santa Barbara channel. No clamshell beads found could be considered as made of *Saxidomus nuttallii*, the species which furnishes the material for the beads found in vast quantities in the delta region of the San Joaquin river.

Heye (pl. cxiv) illustrates typical clamshell beads as found by us. They range from thin discoidal beads to cylinders with lengths equal to two diameters. The minimum diameter noted was four millimeters, the maximum forty-two millimeters. The larger ones are discussed as discs. No globular, ovate, or other forms were found. The workmanship is fair with some well drilled holes, most of which are biconical. Neither blanks nor raw material were obtained. The inference is that these beads were imported in finished form from the Channel district. Such beads were found throughout the region under consideration. (See plate 16*ai*).

Sixteen clamshell beads (pl. 15) tastefully incised, were collected in the Slough region by Mr. T. V. Little of Shafter, California. Traces of asphaltum (?) in the incisions suggest that originally the incised designs may have been entirely in black. On the edges of some there is milling. The beads range from ten to fifteen millimeters in diameter. These specimens reveal more delicate workmanship than the San Miguel Island specimens figured in Heye, cxv and cxvi.

(b) *Beads of Olivella shell*.—Two species of *Olivella* shells were used.

1. *Olivella boetica* or *intorta* was used only as a whole shell with the spire ground off, probably because too small to be used otherwise. (Heye, fig. 33*a*).

2. Adult as well as young shells of *Olivella biplicata* were treated in the same way (Heye, fig. 33*c*). Beads "a" and "c" were found

throughout the area. As collected, they were not over ten per cent as numerous as the *Olivella* disc beads.

3. A very rare type of *Olivella* bead is one in which both the spire and base are ground off, leaving the barrel-like central portion as the bead (Heye, fig. 33b). We obtained one from the Lake region (site 4), one from the Slough region (site 8) and the Mayer collection contains two from the Alpaugh region.

4. In the Fry collection was a whole *Olivella biplicata* with the aperture side ground off to leave two large holes, one in part the natural aperture, the other in the second whorl of the spire.

5. The *Olivella biplicata* half-shells (i.e., the entire side of the shell, one edge of which forms the lip) were far more abundant in the Alpaugh region than any other type of bead (pl. 14ef). Some have punched holes and some drilled holes. The relative abundance of half-shells and discs (type 7) in the Alpaugh region, is as follows:

Half-shells with punched holes, 1039; *Olivella* discs with punched holes (type 7), 17; half-shells with drilled holes, 2; *Olivella* discs with drilled holes (type 7), 49.

Both sorts of half-shells were found in the Slough (particularly at site 6) and Lake (site 4) regions. Half-shells with drilled holes were scarce, except at site 11 where all had drilled holes.

One hundred and ninety-four *Olivella biplicata* half-shell beads were sent in by Mr. Charles Morrice from the Lake region (site 13). Nineteen had punched holes, the balance drilled.

Except in the Alpaugh region, *Olivella* discs existed in many times the quantity of *Olivella* half-shells. For example, in the Dumble collection (Lake region):

Half-shells with punched holes, 25; *Olivella* discs, 3224.

Thus the half-shell and disc situation in the Lake region reverses that in the Alpaugh region.

The drilling in half-shell beads is good, but the thin walls make it difficult to determine its style. In general it appears biconical. Some of the beads classified as with punched holes were originally drilled but have had the holes worn until they appear punched.

It is possible that the *Olivella biplicata* half-shell beads are not a finished product, but represent a stage in the manufacture of the disc beads discussed below.

6. A single half-shell, *Olivella biplicata*, with the convex side ground off to leave a large opening was obtained at site 8, Slough region.

7. Disc beads made of the *Olivella biplicata* are common to the entire area. These range from two to fifteen millimeters in diameter. In thickness they vary with the shells used. Some have an irregular edge as though blanked out roughly from the shell. Others have the edge ground smooth and practically circular. No square or rectangular *Olivella* beads were found. Discs appear to be made from two portions of the shell. The great majority, including some of the smallest and all of the largest, are made from the main wall of the shell near the lip. The minority, small in diameter, exceptionally thick, and decidedly concave-convex are seemingly made from a thick portion of the shell, near the base of the columella, or where the lip joins the body whorl.

Our *Olivella* disc beads are of the type shown in Heye figure 31, lower nine specimens.

The disc beads with punched holes are so few that it seems probable that these are due to minor fractures in drilling or are drilled holes worn by use. All drilling appears to be biconical. Holes in general are centrally placed and are not over two millimeters in diameter, and not under one millimeter. No disc was found containing more than one hole. A single variant in the Mayer collection has the hole formed by sawing transversely on the convex surface.

In color these beads are natural except for weather wear and soil stain. A few gray calcined beads were found at site 4.

Certain specimens, in which the diameter is two millimeters and the hole one millimeter, are in reality rings which are quite different from the large discs. Such rings may have been made for inlaying or bushing, as on the Santa Barbara coast.

As indicated above (under 5) these beads were present in proportionally larger numbers in the Lake region than in the Alpaugh region.

(c) *Beads of mussel shell* (*Mytilus californianus*).—A mussel-shell disc-bead was found in the Slough region, site 8 (Heye, fig. 30*b*). In the Dumble collection were nineteen from Kern lake.

(d) *Beads of abalone shell*.

1. The shell mostly used is the salmon-pink epidermis of the *Haliotis californiensis*. The beads are circular discs ranging from four to ten millimeters in diameter and from two to four millimeters

thick. The thickness of individual beads generally varies, perhaps on account of the raw material. We collected eight specimens at site 4 and there are thirty-eight in the Dumble collection. The type was not found in the Alpaugh and Slough regions. Our beads are of the type illustrated by Heye figure 30c, but our material is *Haliotis*.

2. We also found at site 4, Pelican island, a small disc-bead (1-24755) perhaps made of the epidermis of *Haliotis cracherodii*. A fragment of such shell was found at this site and an undoubted *Haliotis cracherodii* bead was found on the small knoll a mile north.

3. Another type of bead closely resembled the abalone discs or pendants except in the matter of size. One was found at site 6 in the Slough region and two at site 15, Lake region. All are made of the nacreous portion of the abalone shell, are circular in form, and have two holes. They resemble modern buttons. The two beads from site 15 are decorated with short incisions entirely around the edge of one face. See plate 14g-h.

(e) *Bead of Natica shell*.—A single small, beach-worn *Natica* shell with a hole drilled in the broad lower whorl was among the specimens from site 13 donated by Mr. Morrice.

(f) *Bead of cowry shell* (*Cypraea spadicea*).—There is in the Mayer collection one disc bead made of cowry shell, one edge being formed by a toothed lip of the shell.

(g) *Beads of keyhole limpet shell* (*Lucapina crenulata*).

1. Among the specimens collected by Mr. Morrice at site 13 are seven ornaments (four complete and three fragmentary) made from keyhole limpet shells. These are similar to Heye cxix except that the edges of our specimens have been ground down, more or less maintaining the original shape, and no perforations have been made. The type was found nowhere else.

2. Ornaments consisting of the natural heavy ring around the central orifice of the keyhole limpet shell were found in the Alpaugh region (three), in the Slough region (four at site 8, one at site 10), and in the Lake region at site 13 (three). With the exception of one Alpaugh specimen, these are of the types shown in Heye cxxi, four lower left figures, and designated as inlays. The exceptional one is like the upper left figure. An illustration of the value in which these were held by aboriginal man is furnished by an imitation in the Mayer collection made from clam shell (pl. 16am). Beside it is a true keyhole limpet ring (pl. 16an).

### *Bushings and Inlays*

See Beads, b7, page 60.

#### *Discs*

(a) *Discs of clamshell*.—Most of the discs obtained were of this material. In the Alpaugh region were sixteen specimens varying from seventeen to sixty-five millimeters in diameter. These are all plain circular discs, relatively thick, say seven to ten millimeters. All have drilled holes. In four cases the holes are so large compared to the diameter that the specimens might be termed rings. In all other cases the holes are relatively small. One has two holes. Another disc in the Mayer collection is worthy of note because of its unusual perforation. Instead of being drilled from flat side to flat side it is drilled from edge to edge through the center, i.e., the length of the hole is the diameter of the disc (about twenty-five millimeters). See plate 16*ag*.

Along the Buena Vista slough none were found.

In the Lake region Mr. Dumble obtained four specimens, two fragmentary. One specimen is notably large, seventy-six millimeters in diameter. One is forty-two millimeters and another twenty-eight millimeters. All have central biconically drilled perforations. We obtained, near site 4, a portion of a perforated disc, forty-two by nine millimeters, with decorative incisions around the edge (pl. 14*i*). Mr. Hollis Parker obtained at site 16, a disc about fifteen millimeters in diameter with nicking on the rims of the two faces and decorated on the edge with crossed lines forming diamonds.

(b) *Discs of abalone shell*.—These are represented in the Alpaugh region by a single specimen. This is of the nacreous portion of the shell, drilled, thirty-three millimeters in diameter, and with shallow V-shaped notches entirely around the edge.

Jones secured from site 18, Slough region, a lustrous abalone disc fifty millimeters in diameter with two drilled holes on either side of the center and with evidence of a third hole near the edge and in line with the other two, resembling Heye LXXXIII*c*.

The Lake region furnished three specimens to the Dumble collection, two fragmentary, twenty-one and forty millimeters in diameter, and the third entire and twenty-one in diameter. All are of circular form and perforated at the center.

### *Pendants*

(a) *Pendants of clamshell*.—These were found only in the Alpaugh region.

1. Bar-shaped. These pendants are unusual. They are roughly square in transverse cross-section. In the Fry collection is a single specimen, twenty-four by six millimeters. In the Mayer collection are three specimens, pl. 16*n-p*. Figures *n* and *o*, and the Fry specimen, are not only drilled from side to side, but from the end to meet the transverse hole. The Fry specimen is drilled at one end only, both the others at both ends, and in both cases the transverse hole does not extend through the specimens, but only to meet the end hole. Figure *p* has no end drilling, but is transversely drilled near both ends. It is, moreover, notched at both ends, perhaps for holding in position thread which bound it to some fabric or garment.

2. Broad pendants. In the Fry collection is an irregular, rectangular pendant, fifty-two by twenty-one millimeters. Mayer has seven shell ornaments, believed to be of clamshell and falling under the present classification. They are all irregular in outline and vary from roughly rectangular to roughly circular. All are perforated with a single hole near an edge. See plate 16*a-g*. Some are worn very smooth. Figure *d* is of a beautiful ivory color.

3. The specimen shown in plate 16*g* is unusual in being formed of the hinge portion of a clamshell, drilled at one end.

(b) *Pendant of Arca shell*.—Only one example was seen, this being in the Mayer collection at Alpaugh. It consisted of a complete valve drilled near the hinge (pl. 16*k*).

(c) *Pendant of Cardium corbis*.—Three roughly triangular pendants (maximum dimensions fifty-five millimeters) of this large cockle shell are in the Mayer collection (pl. 16*h-j*). These are biconically drilled near the apex.

No pendants of this type were found elsewhere, though unworked fragments of *Cardium corbis* were found at site 6 in the Slough region and site 4 in the Lake region. A complete valve found at site 6 may have served as a paint container.

(d) *Pendant of Hinnites giganteus*.—This type is represented by a single specimen from the Alpaugh region (pl. 16*m*). It is made from the hinge portion of the shell and shows the characteristic purple coloring.

(e) *Pendants of abalone shell.*—No abalone pendants were noted from the Alpaugh region.

Pendants of this material may be conveniently divided into two types.

1. The rim type is made from a portion of the heavy, flat, reflexed rim of the abalone shell. No complete specimens were seen, but the fragments indicate articles similar in appearance to Heye LXXVII, *a*, *b*, and *d*, but not drilled, and to the four right hand pieces Heye LXXXVIII.

In the Slough region the type is represented by two fragments: one is eight by twenty-one millimeters, with four small notches on one edge (1-24521), from site 9; and another is seven by twenty-three millimeters (1-24501) with traces of asphaltum (?), from site 11.

There are fragments representing three specimens from the Lake region, site 14. The longest piece is a medial fragment seventy-five by thirteen millimeters. The other fragments are drilled at one end (Heye LXXVIII.) The former, and one of the latter pieces, were thrust almost out of sight into the left nostril of a skull (12-1734), the other piece being in the right nostril (see A. L. Kroeber, B. A. E., Bull. 78, pl. 81). This skull also had a rectangular abalone pendant over each orbit. Another skull (12-1735) from this same site was found with its "nose filled with curved pieces of abalone" which were probably of the same type as those in 12-1734. There are two short rim-type pendants in the Dumble collection. A drilled rectangular fragment from site 4 seems to represent an indeterminate pendant of this type.

2. The broad type includes pendants made from the flatter, lustrous portion of the shell. They are generally roughly circular or rectangular in outline, thin, and of various sizes.

Only two specimens were found in the Slough region: one, a small, ovate, two-holed specimen (1-24537), from site 8, the other a fragment showing the notched rim of a circular pendant (1-24592).

As mentioned above two fine rectangular specimens were found over the orbits of skull 12-1734 at site 14. Each has two perforations near the corners at one end. One piece is notched along the two sides. The pieces are lustrous on both sides and are so well preserved as to suggest their being relatively recent. From the same site comes a bald (?) eagle's skull (12-1738) with a circular abalone pendant fixed over one orbit by means of asphaltum (pl. 13). This has two perforations, not far apart, near the circumference, and possesses the same lustrous qualities and state of preservation as those over the

human eyes. From nearby, site 15, have been obtained two large rectangular specimens, 1-26279 and 1-26280. The largest is forty-four by sixty-six millimeters. It has two perforations near the corners of one end. The other specimen seems to have been similar, but is damaged. Both seem to have been lustrous only on one side originally, but at present are very badly deteriorated, offering a striking contrast to the specimens 12-1734 and 12-1738 just cited. Site 4 yielded fragments of a rectangular pendant with notched edges and two or more holes (1-24636), also one small piece of another specimen (1-24756). From Kern lake Dumble had one roughly triangular piece drilled at the apex and a square one apparently once drilled near the four corners and at the center of one side. These corner holes have all had their outer walls broken out so as to give the piece the appearance of a very short-armed, solid, square-cross. This piece has five perforations, the maximum number seen.

### *Tubes*

(a) *Nose sticks*.—In the Fry collection (Alpaugh region) was a cylindrical artifact apparently of clamshell. This was thirty-six millimeters in length, five and one-half millimeters in diameter, and perforated for its entire length with a hole two millimeters in diameter. This was possibly a nose-stick. A similar specimen in the Mayer collection was thirty by five millimeters (pl. 16z). In the Dumble collection (Lake region) are four pieces apparently of this nature, about five to six millimeters in diameter, and the longest one forty-three millimeters in length. Also from Kern lake is a fragment of the same type (1-25294).

(b) *Dentalium tubes*.—In the Mayer collection was a *Dentalium* tube (pl. 16ac.) This was the only *Dentalium* encountered in the entire area.

(c) *Miscellaneous*.—Other shell tubes were one in the Mayer collection and six in the Dumble collection. These are as small as four millimeters in diameter and nine millimeters in length. One of Dumble's specimens forms an obtuse angle, but is longitudinally drilled, nevertheless. A transverse cut at the inner angle of the bend probably facilitated the drilling from each end. Mr. T. V. Little collected in the Slough region, two slightly curved shell tubes (pl. 15), seventy-seven and seventy-five millimeters in length, and eleven and eight millimeters respectively, in diameter.

Plate 16*ab* shows a split shell tube with the drilled hole revealed.

### Vessels

In all three regions occasional shells or fragments of shells were found which had served apparently as containers. In the Alpaugh region the Mayer collection contained a blackened clam shell fragment, forty millimeters in length, which had apparently been so used (see pl. 21*p*). At site 8 (Slough region) we found a small abalone shell (*Haliotis cracherodii*) with most of the natural holes therein plugged with asphaltum (1-24548). This seems to have been done to adapt it for use as a receptacle or scoop. (See Heye figure 22 and plate LXXIV.) A *Cardium corbis* valve possibly adapted to the same purpose was found in site 6. It has a yellowish brown incrustation within. At site 4 was a roughly rectangular piece of abalone shell (1-24637) which from its poor quality was apparently a rejected piece from a large shell, the rest of which had been utilized.

### ARTICLES OF SKIN

Over the head and face, and partly adhering to the cheek bones and nose, of one of the skulls (12-1734) from site 14, was a mass of mink fur (*Mustela vison*). (B. A. E. Bull. 78, pl. 81.) In the present condition of the specimen it is impossible to state whether this constitutes a cap or other formed article. Its under surface was covered with red paint.

### ARTICLES OF STEATITE<sup>15</sup>

This material is generally so characteristic as to admit of ready identification within the limits mentioned below. There appear to be two types. One is of compact grain, smooth and soft, and generally of a whitish gray color. The other has a coarse, fibrous grain, is inclined to be gritty, and is usually characterized by a greenish color, rarely stained reddish by iron. Both are distinguished by a greasy luster and feel.

On account of the importance of this material in the neighboring Santa Barbara channel culture it may be pointed out that steatite is found in Kern, Tulare, Santa Barbara, Fresno, and Los Angeles counties (i.e., most of the area surrounding that involved in this paper) as well as in other parts of the state. Hence the material itself gives little clue to its point of origin.

<sup>15</sup> Hydrous silicate of magnesium,  $H_2Mg_3Si_4O_{12}$ .

Under the heading of "steatite" we also include serpentine. It is very similar to steatite though somewhat harder, takes a higher finish, and is characterized in most of the artifacts by a black color. Serpentine is found throughout the Coast Range.<sup>16</sup>

#### *Arrow-straighteners*

In the Fry collection, Alpaugh region, was a piece of steatite, oval in shape, sloping at the two ends, curved on top, and with a flat base, (eighty by one hundred and twenty millimeters). Transversely across the top was a deep U-shaped groove (pl. 17*o*). On either side of the groove was an area of diagonally incised parallel lines giving a file-like surface. This may have been for the purpose of ornamentation, but seems more likely to have been of service in abrading arrows during the straightening process. Another specimen in the Fry collection appears to be an unfinished arrow-straightener (pl. 29*d*). Mayer had a piece of similar character (fifty by seventy millimeters) but rhomboidal in shape (pl. 17*j*). The top was covered with a roughening diagonal cross-hatching.

No specimens were noted for the Slough region.

From the Lake region Pryor had four of the oval type, at least one of which had the striated surface near the groove. Pryor had a further small piece (thirty-six millimeters square) of steatite with the same type of groove, but which seems on account of the size to have been better adapted for smoothing than straightening. Dumble had fragments of three straighteners of the oval, striated type. He also had what appeared to be an unfinished piece of this kind. The two others without striations, but one of them with three grooves, are in Dumble's collection.

In several of the steatite sherds found at site 4, grooves were observed which might have been used for smoothing, but certainly they were not so convenient as the articles described above.

All pieces seen were of steatite and gave evidence of much use. Probably half of them were made of the hard variety of steatite, or of serpentine.

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<sup>16</sup> An interesting account of the working and use of steatite, written by Professor W. H. Holmes, may be found in the Fifteenth Annual Report of the Bureau of Ethnology, pp. 106-133, 1897.

A detailed description of their use in the Santa Barbara region is given in the report of the U. S. Geographical Survey west of the 100th Meridian.<sup>17</sup> Mason reports their use among the Salinan Indians<sup>18</sup> and Sparkman among the Luiseño.<sup>19</sup>

### *Beads and Tubes*

Mayer has several beads from the Alpaugh region. Two are tubular, ten by fifteen millimeters, drilled longitudinally (pl. 16*w-x*). Three are globular, flattened at the ends (pl. 16*aj, ak, al*). Specimen *ak* is pale green, the other two black. All are highly polished. Mayer also has four steatite tubular pieces (pl. 16*s-v*) which were apparently used as beads. All are longitudinally drilled. One piece (fig. *v*) is further characterized by having a transverse notch near the middle, cut through to the longitudinal hole, and a hole through one side to the central hole. The other three have grooves worn in the edge at both ends on the same side, as though cut by the cord of a necklace of which they formed the lowest part.

From site 11 (Slough region) comes a dark, highly polished cylindrical bead, seventeen by twenty millimeters. On one side both ends have been beveled nearly to the center (pl. 14*j*). At site 19, Jones obtained a larger bead of the same type, twenty-seven by fifty millimeters. This was not beveled but showed string wear (pl. 18*c*).

From site 4 we have nine steatite beads of the disc type (Heye xxxii, xxxiii *c*). These range in diameter from four to eight millimeters. The same kind of bead was frequent at Kern lake. Pryor had thirty (from site 34) and Dumble 638. (It is possible that other stone besides steatite was counted in this 638). An occasional one of these Kern lake beads has the edge coarsely milled.

Dumble also had eight tubular beads, like those of Mayer, nine millimeters in diameter and from nine to twenty-three millimeters long. He reported that he had found steatite tubes, some one hundred and fifty millimeters long, with longitudinal holes twenty millimeters in diameter.

<sup>17</sup> Report upon United States Geographical Surveys west of the one hundredth meridian, in charge of Lieutenant Geo. M. Wheeler, vii, *Archaeology*, 197, 1879.

<sup>18</sup> J. Alden Mason, *The Ethnology of the Salinan Indians*, present series, x, 140, 1912.

<sup>19</sup> Philip Stedman Sparkman, *The Culture of the Luiseño Indians*, present series, viii, 206, 1908.

Steatite beads of the disc type occur only in the Lake region, and on the basis of the Dumble collection are about one-fifth as numerous as *Olivella* disc beads, whereas the tubular type occurs in all three regions, but is quite scarce in all.

#### “Boat-shaped” Stones

In the Alpaugh region only (Mayer collection), were steatite objects which Holmes<sup>20</sup> classifies as above. These varied from spindle to boat shape with rather bluntly pointed ends. One side was slightly convex, the other made more or less concave by a broad longitudinal groove. Across each end on the convex side only, was at least one narrow groove. In size the objects range from eighty to one hundred and fifty millimeters in length and from twenty to forty-five millimeters in width. Plate 19*a-g* shows the seven entire pieces in the collection, convex side up; *h* to *j* show fragments of similar articles; *k* showing the reverse of *a*, displays the longitudinal groove and the absence of the terminal grooves on the concave side; while *l*, a side view of *b*, indicates the boat-like appearance of the pieces. It is possible that *a*, *c*, and *e* are not steatite but some other soft material. No objects of this type in other than relatively soft stone were found.

Even allowing that these pieces originated on the Santa Barbara coast where boats were known, it seems to us improbable that they were intended as representations of boats. Heye pictures (pls. XI-XIII) stone fishline sinkers which somewhat suggest these. However, the Mayer pieces were not circular in cross-section as are Heye's, and the transverse grooves do not extend around the pieces as would be needed for the attachment of a fish line. Considering the concave, longitudinally grooved side, it seems more likely that they were intended for binding on to something in the nature of a small cylindrical object such as a stick, cord, or fishhook. A composite fishhook which required a backing of this type was widely used in Oceania.

#### “Charmstones”

From the entire area comes but a single specimen (pl. 20*j*) of a charmstone of steatite. This was in the Mayer collection. It is of a type found in other materials and discussed more fully on pages 93-97.

<sup>20</sup> W. H. Holmes, *Handbook of Aboriginal American Antiquities*, Part 1, B. A. E. Bull. 60, 66, 1919.

### *Discs*

All were centrally, biconically drilled. Fry had one steatite disc, forty-five millimeters in diameter and slightly concavo-convex. Mayer had a disc of the same type, but one hundred millimeters in diameter. Another of greenish steatite, ninety millimeters in diameter had four centrally placed holes so evenly drilled as to barely show biconical drilling. Of flat discs, Mayer further had eleven specimens ranging from thirty to sixty millimeters in diameter. Some of these had small (six-millimeter) holes, while some had larger (twelve millimeter) holes, apparently not biconical. Several seem to be sherds reworked into discs without great care.

There were no discs in the Slough region and only two in the Lake region. One, in the Dumble collection, was thirty-eight millimeters in diameter; and one from site 4, twenty-six millimeters in diameter (1-24773).

### *Groove-edged Objects*

A number of steatite pieces, flat, of irregular form, with the greatest dimension ranging from forty to eighty-five millimeters were noted. These were distinguished by a definite groove encircling the edge of a part thereof. In some cases this was merely a heavy scratch, in others the groove was a deep V-shaped one (pl. 18*g*, specimen 1-24779). That these objects were made for a definite purpose and should be separately classified seems certain. But they shade into pendants and spool-like objects on the one hand and into sherds on the other hand in such a manner as to render their probable use highly speculative. Indeed some of them seem to be only sherds which have had their edges grooved. Possible uses which suggest themselves are that some of the grooves may have served as guides for string or thread, that others may have served for creasing tule stems preparatory to sewing. This second use is suggested by an elaborate modern steatite specimen (2-10996) from Oregon which is reported to have been so used. A further possibility is that they were used in the manufacture of twine or to consolidate the fibers of cords somewhat as a shoemaker uses beeswax.

From Alpaugh, Fry and Mayer each had three (pl. 21*m-o*). There were none from the Slough region. Four were found at site 4, Lake region, and Dumble had two.

*“Pencil”*

Mayer had a piece of steatite, thirty-five millimeters long, and rectangular in transverse cross-section. The piece is definitely shaped and tapered at one end so that it resembles in form a carpenter's pencil (pl. 21s).

*Pendants*

The Alpaugh region yielded two steatite pendants, both of the black, highly polished type. One was rectangular (twenty-two by thirty-eight millimeters) drilled in the middle of one end. The other, about the same size, but triangular in shape, contained no less than ten holes (pl. 16q-r). What is perhaps an unfinished pendant is shown in plate 21q. At site 12 was obtained a ring, twenty millimeters in diameter, with a broken, tapering (?) projection from one side (pl. 14l, 1-24439). Similar spike-like pieces have been noted from the Santa Barbara region.

From site 4, Lake region, comes a flattened, pear-shaped object, thirty-five millimeters long, with a hole near the broad end (pl. 14n, 1-24774). On account of the shape and the hole it is classed as a pendant. However, on account of a groove encircling the edge it strongly suggests the reel-like objects described below. From the vicinity of Kern lake comes a fine circular steatite pendant, seventy-three millimeters in diameter, with one central perforation and five other perforations around the central hole, three grouped on one side, two on the opposite side. This piece is in the Pryor collection. In the Dumble collection were two steatite discs (twenty-two and twenty-four millimeters in diameter) which are classed as pendants only because drilled near the circumference instead of centrally. Mr. Dumble also had a rectangular pendant (twenty-two by thirty-eight millimeters) with a cross incised upon one side. The analogy to the modern cross worn as a pendant suggests the probability that this cross was due to Christian influence and therefore does not antedate the year 1770. In the same collection were two thin flat fragments of steatite, both with drill holes and with one or two edges deeply, and apparently ornamentally, notched.

### *Perforated "Sinkers"*

From the Alpaugh region Mayer had one perforated "sinker" (pl. 22*g*), and Fry had one of the same general type, but with an encircling groove below the hole.

For other perforated "sinkers" see page 94.

### *"Perforated Stones"*

Mayer had one steatite ring of the "perforated stone" type. This was of hard, dark steatite or serpentine, ninety-five millimeters in diameter with a twenty-five millimeter hole (Heye xix*f*). Fry had a piece of the same general size and character, but of pale steatite and with a semi-keeled, rather than a rounded edge. Fry had a second ring which was more elaborate, having the sides beveled to a thin keeled edge, which was notched all around (fifty-two millimeters diameter by seventeen millimeter hole. Mayer had half of another "perforated stone," differing from the above inasmuch as the thickness was as great as the diameter, which was forty-five millimeters (pl. 17*h*). A similar, much larger piece is figured by Putnam, figure 46. For other "perforated stones" see page 90.

### *Plugs*

Disks, undrilled and of a thickness relatively great when compared with the diameter, we have termed plugs. None was found in the Alpaugh or Slough regions. At site 4 was one, forty millimeters in diameter by twenty-two millimeters in thickness. The edges and one face are well finished; the finished face is concave, the other rough, (pl. 18*b*, specimen 1-24772). Dumble had seven varying from fifteen to thirty-eight millimeters in diameter. Two of these were concave on one face and one was a truncated cone in shape. Another specimen in the Dumble collection closely resembles a glass stopper with a flat disc top, sixteen millimeters in diameter, and a tapering tang sixteen millimeters long. The purpose of these plugs is problematical. Uses as ear plugs and as stoppers have been suggested to us.

### *Plummet-like stones*

A plummet-like stone of steatite, of the "seine needle" type (wa b2), is in the Mayer collection (pl. 23*e*). See page 94.

### *Spool- or Reel-like Objects*

Closely related to groove-edged objects are steatite pieces in the form of rough spools. These may be cylindrical, or they may be flat with the grooves in opposite ends of the flat side like reels. Fry had two and Meyer had ten of the flat type (pl. 21*b-l*). These vary in symmetry and finish. Most are rather irregular, but some show great care and a high polish. One specimen has a hole in one side, giving the piece some resemblance to a rough effigy of a bird's head (fig. *k*). They vary from thirty-five to seventy millimeters in greatest dimension.

Nothing of this class came from the Slough region.

In the Lake region we found at site 4 one of the cylindrical type (pl. 18*d*, 1-24777). Dumble had five, more or less fragmentary, of the flat type.

### *"Tomahawk"*

A perforated, black, highly polished steatite piece, elliptic-lanceolate in outline, fifty by one hundred millimeters, was in the Mayer collection (pl. 17*a*). This resembles in appearance the double-pointed stone tomahawks of the Plains Indians, but evidently should only be regarded as an aberrant form of the perforated stones, page 90 and plate 17. A somewhat similar form is to be seen in a small piece, seven by twenty-eight millimeters, in the Dumble collection, which however is not perforated.

### *Vessels and Sherds*

The only steatite vessel complete enough to reveal exact information as to form, was a large olla in the Dumble collection (pl. 24). This was very nearly globular in form (410 mm. greatest diameter by 375 mm. high). The opening was but 178 millimeters in diameter and without lip or flange. Otherwise this specimen was the same as those on page 95, Putnam. The walls were about eighteen millimeters thick. The outside was more or less blackened by fire. The form of this vessel, reminiscent of the pottery ollas of southern California, suggests the inter-relationship of the pottery and steatite industries which in California are geographically exclusive.

Steatite sherds were found in varying quantity throughout the entire area. All sherds were too fragmentary to permit the recon-

struction of the original vessels, but seem to indicate that most vessels were of the open bowl type rather than of globular form. Some forms suggested by the sherds are ollas, flat shallow dishes, basin-like bowls, small bowls or cups, and deep, tubular vases. These vessels seem to have ranged from a few inches to perhaps two feet in greatest dimension, and in thickness from seven to thirty-three millimeters.

The sherds show that all kinds of steatite, excepting serpentine, were used in vessel construction. However, the coarser-grained variety was apparently more characteristic of the larger vessels and of the Lake region.

The sherds may be divided into two classes, i.e., parts of bottoms, or walls (undrilled, 1-24791, drilled, 1-24792) and rims (undrilled, 1-24789; drilled, 1-24790). The rims are usually beveled or tapered to a rounded edge which is considerably thinner than the main wall. But in a few cases flat edges as thick as the wall were noted. These were all of fine-grained steatite.

*Tool marks.*—In some cases, particularly in the larger, coarse-grained material, the tool marks are very evident. A coarse-grained piece, shown in plate 18*a*, has vertical tool marks on the convex face, and none on the concave face; a smooth-grained piece has horizontal tool marks on both faces (pl. 18*e*). These are both fragments of bowls.

*Drilling.*—A conspicuous feature of many of the sherds (pl. 25*a-h, p, q*) is the presence of one or more holes, sometimes five in the space of a few centimeters. The average hole tapers from eight to twelve millimeters in diameter, giving an appearance of deep countersinking. The maximum diameter noted was seventeen millimeters. Most holes appear to have been biconically drilled. In the majority of cases the major part of the drilling seems to have been done from the concave side, i.e., the inside of the vessel. This suggests the possibility that the holes were made after the vessel had been broken. But at times the hole is drilled on such a slant as to indicate that the difficulty of working in an awkward position inside a vessel made the slant necessary.

*Grooving.*—On some sherds (pl. 25*i-k, n-p*) grooves are found. They vary from shallow scratches to broad, deep grooves. In practically all cases they are on the outer or convex face. Many of the drilled holes are at the deepest part of a groove (plates 18*f* and 25*p*), suggesting that the grooves were to protect thongs which, passing

through the adjacent holes, were used in repairing broken vessels. Grooves on the inside as well as outside of certain pieces (1-24790) would seem to confirm this purpose. Yet, in at least one case, a completed groove was noted to an unfinished hole, which might indicate priority of purpose for the groove. In other cases (pl. 25*i, n*) the even, shallow depth of the groove and its sweep rather suggest that it was to prevent the slipping of a cord used in carrying the vessel. In still other cases the groove suggests that the fragment had been used as an arrow-smoother. However, the association of the deep, clean-cut, v-groove with a hole is so constant as to leave little doubt that they were jointly used for a single purpose—probably repairing.

*Cutting or sawing.*—A number of sherds were noted (p. 25 *j, l, m, o*) where edges showed the cuts by which the material was divided. These cuts do not show tool marks, but rather appear as one wall of a deep groove with smooth sides. When this was worked part of the way through the piece the material was evidently broken off—the deep groove guiding the break. That such cuts were not accidentally broken grooves is indicated by the fact that they outline at times fairly definite blocks of steatite (pl. 25 *m*). These cuts seem to have been made from both concave and convex sides of a sherd.

*Incising or indenting.*—Irregular lines appear on some sherds and can only be regarded as random scratches (1-24789). In a few cases these are more regular (pl. 25 *k*) and may have been intended as decorative. However, no regular design appears and the pieces are too small to make a decorative idea at all clear. One piece (1-24421) from La Hacienda showed a series of pittings in a line which would seem to have been deliberately made and to serve no utilitarian purpose.

*Decorated rim edges.*—The edge of the vessel was frequently shaped. In some cases a further attempt was made to distinguish it by decoration. 1-24783 shows a row of incised lines and 1-24784 a series of notches.

*Secondary usage.*—Consideration of these sherds shows that frequently they were put to secondary uses. We have spoken of arrow-straighteners, and of squares or blocks which could well have been pendants and reels in process of construction. The presence of so very many sherds and only one nearly complete vessel is puzzling and suggests the possibility that a good percentage of the sherds were imported as such and were never used or intended for use as vessels

by the Indians of our area. They might have been used as griddles on which to cook, etc. The holes in this case would be used for drawing the pieces out of the fire when hot, by means of a stick. Such sherds as well as more elaborate plates were certainly used for this purpose in the Santa Barbara region (Putnam, p. 99). A further possible use would be as net-sinkers, although a more probable method of fishing without nets is described on page 111.

Mr. Dumble has a large thick sherd of smooth grained steatite, one edge of which has been nicely squared adjacent to a row of drilled holes. This may have been intended for repairing the original vessel, but the straightness of the squared edge suggest the possible attachment of a similarly squared and perforated companion piece.

### *Distribution*

Steatite was met with in all three of our regions, though within each region we found sites where it was entirely absent. It appeared most plentifully in the Lake region and was most scarce in the Slough region.

In the Alpaugh region comparatively little steatite was found in the collections, but there was considerable at site 21, northeast of Alpaugh. Also we found a number of sherds at La Hacienda, site 22, and obtained thirty-nine small sherds at site 12. All are of the fine-grained type, which thus seems to be characteristic of the region. Several of the pieces from northeast of Alpaugh (e.g., 1-24383) show a thick calcareous incrustation (see pl. 21 *a*). Such incrustation was not found on specimens from elsewhere. It has been formed since the vessel was broken, since it is over the broken edge in part. While such an incrustation might have accumulated in a short time it seems rather to suggest a considerable antiquity.

In the Slough region steatite was noted from site 11 (one serpentine bead), site 8 (three fine-grained sherds), site 6 (one fine-grained sherd), site 17 (twenty-two fine and coarse-grained sherds). Since the sherds at each site might well represent but a single vessel, it will be seen that the occurrence of steatite was extremely rare. Dumble was also over the region frequently and succeeded in finding but few steatite artifacts. Perhaps the comparative scarcity was due to the people of the region not being situated advantageously with reference to the routes to the Coast, where were presumably the sources of

supply. The Alpaugh region had direct access to the coast via San Miguel and the Lake peoples via the several passes previously described. On this hypothesis the people of the Slough would be dependent on Alpaugh or Buena Vista lake for their steatite. To some extent this theory is confirmed by the finding of fine-grained steatite (typical of Alpaugh) in the northern part of the Slough region, and a preponderance of the coarse-grained type (typical of the Lake region) in the southern part.

At site 4, Lake region, steatite sherds were exceedingly abundant. Dumble's Kern lake sites yielded few steatite artifacts. Site 3 yielded a small quantity; site 2 none; and site 1, one sherd. In the region the coarse-grained type predominated.

Into vertical distribution, practically all steatite was found on the surface in all three regions. But in the Alpaugh region *all* artifacts are from the surface of the ground. Therefore, the surface finds of steatite lack the stratigraphic significance of those in the Slough and Lake regions. Moreover, as the calcareous incrustation of steatite articles in the Alpaugh region is as heavy as the incrustation of articles of other materials, it seems likely that the use of steatite in that region has an antiquity as great as that of other stone materials. In none of the forty-five burials examined was steatite present. This non-association would help to explain why other artifacts which were associated would average greater relative depths. If steatite was not placed in graves its presence underground would be practically limited to cases where it had been accidentally covered up in human deposits or accumulations. But such human deposits were dug by us probably only at sites 4 and 11. A further, and perhaps the most plausible explanation, for the finding of nearly all steatite on the surface is the ascription of it to a relatively recent date. A certain number of artifacts of the serpentine bead type might have entered in trade, but the large mass of surface sherds in the Lake region perhaps came with the influx of coast Indians after the advent of Caucasians, as discussed in the historical section of this paper.

## ARTICLES OF CHIPPED STONE

*Materials*

As many of the articles of chipped stone had to be inspected in the field no opportunity was offered for exact identification. This was rendered further difficult by the fact that many specimens were still covered by a heavy patina or incrustation. However we make three groups—articles of obsidian, of schistose or slaty material, and of flint.

Obsidian is readily and accurately identifiable and is kept separate throughout this discussion. This seems the more desirable because it must have been obtained from afar, whereas the other materials used could be readily obtained in quantity near at hand.

Under schistose are included practically all materials which are neither obsidian nor flint. An exception is quartz which is included with flint and which was very rare. The schistose group is quite homogeneous, being almost all of a dark grey, slaty material.

As herein used the term "flint" includes a wide range of beautiful chalcedonies of various colors, quartz, silicified wood, chert, flint, and allied minerals. These minerals occur in considerable quantities in the mountains bordering the area and there is nothing sufficiently distinctive about those observed to permit any deductions as to importation. Emphasis should be placed on the fact that the quality and color of the material made many of these articles very beautiful specimens. It is presumed that the greater part of this material was obtained in the form of pebbles or nodules. However quite a noticeable proportion was of the type formed naturally in thin strata with even thinner layers of white calcareous material deposited upon the sides thereof. This calcareous deposit was frequently not removed from the artifact during the process of manufacture and appears upon the flat sides of the finished product where it should not be confused with incrustation or patina also noted and hereinafter discussed as a time index.

We have been able to examine about 2600 specimens of chipped stone from the entire area, 600 being from Alpaugh, 2000 from the Lake region. On this basis the raw materials were used in approximately the following proportions:

	<i>Whole area</i>	<i>Alpaugh region</i>	<i>Lake region</i>
Flint.....	63%	70%	61%
Obsidian.....	26%	27%	26%
Schistose.....	11%	3%	13%

### *Workmanship*

The technique of the points is the Solutrean style of complete retouching. It may be generally said that in the manufacture of chipped stone a very high degree of skill was shown. Forms and proportions are graceful and pleasing. Small and delicate pieces are found and where thinness seemed desirable it has apparently been attained without difficulty. Aside from the matter of skill, some of the pieces made from the stratified flint are extraordinarily thin, and broad, e.g., 1-24716, of which only the half remains, was some six millimeters thick but probably 120 millimeters wide. Our field measurements do not permit us to give details of thicknesses. The general statement that many of them were beautifully thin will hold. Summarizing, it can be said that the chipped stone would appear to disclose a single cultural level.

### *Size*

There is great variation in size even within the same type. The pieces most consistently small were the triangular points running down to six and five-tenths by thirteen millimeters. The largest piece was a flint blade 165 millimeters long by 55 millimeters wide by 15 millimeters thick. The sides were parallel, the point rounded and the base straight. Small pieces may predominate because the larger pieces, being more conspicuous, were more quickly collected and dissipated by curio hunters. Also large pieces were far more likely to be broken by cattle and sheep which have grazed for years over the area.

### *Form*

For the purpose of the description and discussion of these articles the scheme of classification indicated below has been drawn up. It is realized that just diversity of opinion can arise as to the proper classification of some specimens, and that owing to transitional forms between the various types it is almost impossible to classify others. With all reservations, however, there seem to exist broad groupings into which artifacts of this kind may be advantageously divided.

Of the 2600 specimens examined for the area, 2023 were classified and the percentages of frequency of occurrence on these 2023 are :

Group I.	Arrowpoints, spearheads, and (or) knives.....	94.56%
Group II.	Scrapers and (or) knives.....	3.06
Group III.	Perforators or drills.....	1.78
Group IV.	Hammerstones.....	.15
Group V.	Miscellaneous.....	.45
		100.00

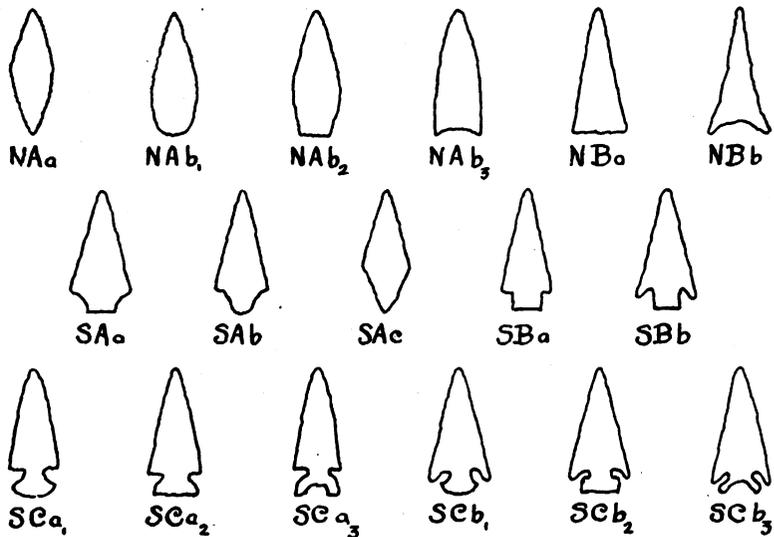


Fig. 1. Arrowpoints, spearheads, and (or) knives.

#### *Arrowpoints, Spearheads, and (or) Knives*

This group has been subdivided into 17 types. The basis for the division is that adopted by Mr. Thomas Wilson.<sup>21</sup> We have somewhat departed from his scheme, since such a departure seems more suited to the material with which we had to deal. But it is believed that the two plans are so nearly the same that the connection between them will be clear and reference to Mr. Wilson's scholarly discussion and beautiful, pertinent illustrations permits the minimum of explanation and photographic reproduction here.

<sup>21</sup> Report of the U. S. National Museum for the year ending June 30, 1897, Part 1, 887-944, 1899.

*Schedule of Classification of Group I.*—For each type distinguished in the following schedule, a diagrammatic drawing to show its salient features of form is inserted in text figure 1. It must be emphasized that these drawings are entirely without reference to size, and make no attempt to indicate ranges in proportions within a type—they simply show characteristic outlines.

ARROWPOINTS, SPEARHEADS, AND (OR) KNIVES

N. Not stemmed

A. Leaf-shaped

- a. Pointed at both ends
- b. Pointed at one end
  - 1. Convex base
  - 2. Straight base
  - 3. Concave base

B. Triangular

- a. Straight base
- b. Concave base

S. Stemmed

A. Contracting stem

- a. Shouldered only
- b. Shouldered and barbed
- c. Neither shouldered nor barbed (lozenge)

B. Parallel sided stem

- a. Shouldered only
- b. Shouldered and barbed

C. Expanding stem

- a. Shouldered only
  - 1. Convex base
  - 2. Straight base
  - 3. Concave base
- b. Shouldered and barbed
  - 1. Convex base
  - 2. Straight base
  - 3. Concave base

In the Alpaugh region, flint and obsidian articles of this group may be classified according to table 7. On the basis of material the points of the region can be classified as flint, about sixty-five per cent, obsidian about thirty-two per cent, and schistose three per cent.

TABLE 7  
ARROWPOINTS, SPEARHEADS, AND KNIVES IN THE ALPAUGH REGION

Part I. Flint	Length		Width		Ratio*		Quantity	Type % of regional flint points (326)	Type % of all regional points (498)
	Max.	Min.	Max.	Min.	Width : Max.	Length : Min.			
N Aa	160	40	40	15	1:2.2	1:6	41	12.5	8.2
N Ab1	135	35	55	20	1:1.4	1:4.8	82	25.0	16.4
N Ab2	145	45	55	15	1:1.5	1:4.6	26	8.0	5.2
N Ab3	65	32	32	22	1:1.4	1:2.1	7	2.1	1.4
N Bb	50	20	25	10	1:1.6	1:2.5	7	2.1	1.4
S Aa	100	40	42	21	1:1.6	1:4	27	8.3	5.4
S Ab	115	47	42	26	1:1.6	1:2.7	20	6.2	4.0
S Ac	110	60	44	25	1:2.4	1:2.5	2	.6	.4
S Ba	80	45	45	20	1:1.5	1:3.5	18	5.5	3.6
S Ca1	130	35	40	22	1:1.5	1:3.5	38	11.8	7.7
S Ca2	115	35	30	20	1:1.1	1:4.4	28	8.6	5.6
S Ca3	85	30	35	15	1:1.4	1:3.3	26	8.0	5.2
S Cb1	90	65	45	30	1:1.6	1:2.8	4	1.3	.8
							<u>4</u>	<u>1.3</u>	<u>.8</u>
							326	100.00%	65.3
Part II. Obsidian								Type % of regional obsidian points (158)	
N Aa	85	45	25	16	1:1.7	1:4.2	20	12.7	4.00
N Ab1	120	35	30	22	1:1.4	1:4.8	17	10.8	3.4
N Ab3	135	50	40	16	1:1	1:4.5	50	31.7	10.0
N Ba	100	30	37	15	1:1.1	1:3.5	20	12.7	4.
N Bb	37		8			1:4.5	1	.6	.2
S Aa	85	35	32	15	1:2.6	1:2.6	5	3.2	1.0
S Ac	40		20			1:2	2	1.2	.4
S Ba	80	25	35	15	1:1.3	1:2.3	5	3.2	1.
S Ca1	80		32			1:2.4	4	2.5	.8
S Ca2	85	43	37	15	1:1.4	1:2.8	7	4.4	1.4
S Ca3	90	21	40	20	1:1	1:2.5	15	9.5	3.00
S Cb1	90		35			1:2.5	1	.6	.2
S Cb2	70	40	40	25	1:1.3	1:2.3	7	4.4	1.4
S Cb3	54	32	32	27	1:1	1:1.8	4	2.5	.8
							<u>4</u>	<u>2.5</u>	<u>.8</u>
							158	100.00%	31.6

\* To indicate form; shows relation of width (1) to length in individual pieces.

Schistose specimens are unimportant in the matter of form as in quantity. Those determined were one each of types NAb2, NAb3, S Aa, S Ba, two of type S Ca2, and eight of S Ca3.

Obsidian blades are scattered over 14 types of which NAb3 is decidedly the most numerous (31.7%). If the other leaf-shaped pieces (N Aa and N Ab1) are combined with this, the preponderance of this form is very striking (55.2%). The leaf shaped blade with one end pointed and one end concave (NAb3) is further distinguished

by the fact that, while it is the predominant obsidian type, it hardly appears at all in flint. Of the "flint" shown in this type half was quartz. Hence the suggestion is strong that here the type and the material are correlated and that it was the glassy similarity of the quartz to obsidian that led to an endeavor to use the former material for the characteristic obsidian form. This is borne out by the fact that the obsidian blades show good workmanship, whereas the quartz is crude. Straight based triangular points (NBa) and expanding stemmed, concave-based points (SCa3) are the next most popular forms. Other types seem to trail off rather unimportantly. About 7 per cent of the obsidian blades had very deeply serrate edges. Some could perhaps be classed as drills, though there was nothing other than the unusual serration to distinguish them from other points.

In flint, leaf-shaped forms (NA) are again the most numerous (47.6%); but this time the convex-based form (NAb1) is predominant (25%). Triangular forms are remarkable for their almost total absence (2.1%). Otherwise table 7 shows a rather even division among the thirteen types represented.

Of these pieces 15 (4.5%) have deeply serrate edges, of which thirteen are of type N Aa alone, which does not suggest perforators.

Our own efforts in the Slough region produced very little chipped stone. Private collections show the same paucity. They may be briefly summarized. Obsidian: four certain artifacts, namely one each types S Bb and S Ca3 (site 11), S Ca3 (site 8), N Ab3 (site 18). Flint: eight pieces in all, namely one each types NAb3 (Poso creek), N Bb (site 8), N Bb, N Ab3, S Ba (site 18), S Ba (site 11); and two N Abl (site 18). The piece from Poso creek came from the sink of that creek and is an exceptionally large specimen, i. e., 145 millimeters long.

Table 8 shows the classification of these objects from the Lake region. Of the chipped stone artifacts in the region we grouped 1415 as points, but of these we segregated as to type only 1046.

The small proportion of obsidian that was classified (74 out of 519 pieces) must be borne in mind in considering the percentages of materials for the classified points. However, even if all the obsidian falls in the point class the schistose points would constitute about thirteen per cent of all points. This is certainly a radical increase over the total of three per cent in the Alpaugh region. All the schistose points fall into two types with the same general range of dimensions as those of similar flint types.

TABLE 8  
ARROWHEADS, SPEARHEADS, AND KNIVES IN THE LAKE REGION

## Part I. Flint

Type	Length		Width		Ratio Width : Length		Quantity	Type % of regional flint points (726)	Type % of all regional points (1046)
	Max.	Min.	Max.	Min.	Max.	Min.			
N Aa	62		22		1:2.8		1	.14	.1
N Ab1	113	13	40	6.5	1:2.3	1:5	210	28.8	20.
N Ab2	145	60	36	18.	1:2	1:5	11	1.5	1.1
N Ab3	100	40	36	27	1:1.5	1:2.8	2	.28	.5
N Bb	77	17	16	10	1:1	1:5	473	65.3	45.
S Aa	85	30	36	14	1:1.4	1:2.1	6	.83	.6
S Ab	67	43	43	29	1:1.5	1:2	8	.41	.3
S Ac	16.2		9.4		1:7		2	.27	.2
S Ba	115	23.5	33	9.5	1:2.2	1:3.4	5	.7	.5
S Ca2	36		31		1:1.1		2	.27	.2
S Ca3	25	14	14	7	1:1.3	1:3	11	1.5	1.1
								100.00%	69.6%

## Part II. Schistose

Type							Quantity	Type % of regional schistose points (246)	Type % of all regional points (1046)
N Ab1	All within the flint limits								
N Bb	Ditto						130	52.8	12.4
								100.00%	23.4%

## Part III. Obsidian

Type							Quantity	Type % of regional obsidian points (74)	Type % of all regional points (1046)
N Ab1	50	25	25	10	1:1.6	1:5			
N Ab3	90	60	35	30	1:1.8	1:2.5	3	4.	.3
N Ba	20		10		1:2		1	1.4	.1
N Bb	55	15	35	10	1:1	1:4	23	31.2	2.2
S Ac	55	40	20	17	1:2.3	1:2.7	2	2.7	.2
S Ba	40	17	25	10	1:1.6	1:3.6	8	10.8	.7
S Bb	40	30	30	20	1:1.3	1:1.7	3	4.	.3
S Ca2	55	50	40	30	1:1.1	1:1.8	2	2.7	.2
S Ca3	30	12	20	10	1:1.2	1:2.2	15	20.2	1.4
Asymmetric							4	5.4	.4
								100.00%	7.0%

Most (69%) of the obsidian falls into the same two types as schistose, plus type S Ca3. Type N Ab3, the most popular in Alpaugh, is very scantily represented (4%). Only nine regular types are represented. In addition we find at least four asymmetric points. text-figure 2).

In flint, as in the preceding materials, we again find types N Bb (65.3%) and N Ab1 (28.8%) the popular types of the region. Indeed the total of the other nine types represented is so small (5.9%) that they may almost be said to represent exceptions.

Only one point was observed with a deeply serrate edge.

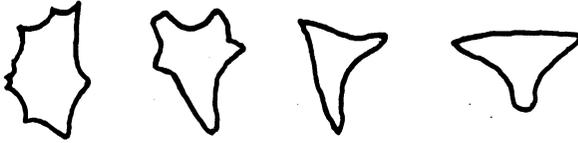


Fig. 2. Asymmetric points from the Lake region.

*Summary.*—Comparing the Alpaugh and the Lake regions, we distinguish interesting differences. The Lake region favored a triangular type (N Bb) very feebly represented at Alpaugh, where in turn there was a marked numerical superiority of leaf-like points (N A). The triangular Lake points (N Bb) are deeply concave at the base—so deep as to practically form barbs. They rather tend to divide into two subdivisions, one long, slender and more or less circular in transverse cross section, the other shorter and quite thin. If the view of Moorehead and others is true that this type was a war point, its abundance in the Lake region may be correlated with the historical information. A large number of unsettled people driven in from the coast would be likely to engage in thoughts of war and to manufacture and use arrowpoints. In support of such a supposition it may be recalled that most of these points came from locations yielding 18th century Spanish coins, glass beads, and other articles of European manufacture. The larger leaf-like Alpaugh points suggest knives and spearheads rather than arrowpoints. No suggestion can be offered as to the greater use of schistose in the south, except the very speculative one that a condition such as outlined above might result in a requisitioning of unusual raw materials.

#### *Scrapers and (or) Knives*

The term “knife” is again used in this group, but it is not intended to include thereby the same type of knives as was included in Group I. The possible knives included here are those, which, although resembling the forms used as scrapers, might have been used as knives.

The small total of articles of this group suggests that a fuller knowledge of actual uses would cause a considerable rearrangement of Groups I and II.

Articles of Group II have been classified as follows:

- R. Without a shaft or handle, i. e., more or less circular.
  - A. Retouched to an edge all around.
    - a. Crescent shaped (pl. 26 *i-w*).
    - b. Butterfly shaped (pl. 26 *a-f*).
    - c. Other shapes.
  - B. Not retouched to an edge all around (pl. 27 *g*).
- G. With a shaft or handle, i.e., more or less chisel or gouge-like (pl. 27 *a-f, h, i*).

Ninety per cent of all articles of this group which we observed, came from Alpaugh; the balance from the Lake region. The Alpaugh specimens are classified thus:

Type	Made of		Total Quantity
	Flint	Schistose	
R B.....	7		7
R Aa.....	17	3	20
R Ab.....	12		12
G.....	17		17

The "crescents" (R Aa), plate 26 *i-w*, and the "butterflies" (R Ab), plate 26 *a-f*, are generally fine examples of chipped stone work. Most of them are finished all over and are as thin as Group I points of the same size. This is in marked contrast to other scrapers which are usually quite thick. In the "crescents" the convex edge is sharper than the straight edge which would appear to have provided the place for a handle or grip to suit the artifact for use as a curved knife. The "butterflies" might well be taken as wide crescents with a "bite" taken out of the center of the convex side, leaving a concave (sometimes straight) edge. It should be stated, however, that this resulting edge is always retouched. One of the specimens made of green slate was ground down until quite smooth (pl. 26 *w*). Dr. E. H. Smith of Laguna, California, has a large number of similar specimens from the same general locality (southeastern shore of Tulare lake). The University has a series from Santa Rosa island.

A piece, type G, plate 27*h*, in the Mayer collection is of flint, 115 by 50 millimeters, and somewhat resembles an adze. The butt end is quite thick and its side edges have been worn quite smooth, either by use or intentionally, to form a good hand grip. Two other pieces of

type G were observed in the Fry collection. The large size and good workmanship of these makes them particularly interesting. The larger one was 165 millimeters long, 56 millimeters wide, and 15 millimeters thick in the center.

The specimens in the Lake region are of flint. None are particularly noteworthy. They may be thus classified: Type R Ac, 4; G, 2.

### *Perforators or Drills*

Considering the many evidences of drilling it seems remarkable that so small a portion (1.78%) of the chipped stone should fall in this group. It is possible that specimens placed by us in Group I should be placed here. This is particularly true of points with serrate edges. A deeply serrate edge is a desideratum in a drill. However serrate edges appeared on too great a variety of shapes to use them as a criterion in classification.

The feature taken by us to distinguish a perforator or drill is the bore or pile. All drills must definitely show this pile. It is usually more or less circular in transverse cross-section and can be distinguished from the base. The base varies from a tang-like projection (giving a file-like appearance to the perforator) to a broad leaf-like form (giving a fan or leaf appearance). The base types range from plainly differentiated bases to those merging into the pile and thus approaching an arrowpoint.

In Alpaugh were twenty-five flint drills. In the Lake region were eleven, of which six were flint, four schistose, and one obsidian.

### *Miscellaneous*

In both the Alpaugh and Lake region pointed, curved blades of flint were noted (pl. 26*h*). In Alpaugh were two complicated flint pieces, rather suggestive of effigies. Both were broken (pl. 26*g*).

Four other uncertain forms were grouped under this head.

### *Summary*

At Alpaugh seventy per cent of the chipped stone implements were formed of flint, twenty-seven per cent of obsidian, three per cent of schistose; in the Lake region the corresponding figures are sixty-one for flint, twenty-six for obsidian and thirteen for schistose.

Obsidian was equally used in the two regions; while the greater use of schistose in the Lake region was at the expense of flint. Possibly the stability of obsidian is due to equal remoteness from sources of supply (probably Sierra Nevada). Why the use of schistose should increase at the expense of the apparently more satisfactory flint is not clear. Of the three materials, obsidian, flint and schistose, obsidian is the most easily worked, schistose the most refractory. Upon this basis a preponderance of obsidian implements, instead of only about twenty-five per cent, would be expectable. Probably inaccessibility to supply is the limiting factor.

There were very few chipped implements that would not be classed as arrowpoints, spearheads, or knives. And of these the non-stemmed leaf-type was predominant in Alpaugh and the triangular non-stemmed type in the Lake region. Neither region seems to accord with Mr. Wilson's conclusion that points of the stemmed, shouldered, not barbed type "are more numerous than those of any other division."<sup>22</sup>

#### ARTICLES OF GROUND STONE

##### *Arrow straighteners*

A bit of quartz (?) was noted in Alpaugh with two sides grooved with the type of groove noted in arrow straighteners. See page .....

##### *Balls*

Balls of stone of various kinds were noted which had possibly been collected for raw materials. Practically all were in the Alpaugh region. In some cases they showed the beginning of a mortar. In others perforated stones were suggested. In still others a shallow groove placed them as sinkers. Finally, it is possible that they served some purpose as balls, though their variation in size, twenty to one hundred and twenty millimeters, seems to preclude this.

##### *Beads and Tubes*

Disc beads of marble, limestone, and slate, similar to the medium sized shell disc beads, were noted in very limited quantities in Alpaugh. A bead of unidentified stone was found at site 4 (Lake region). Steatite beads have been described.

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<sup>22</sup> Wilson, *loc. cit.*, 917.

Mayer has a cylindrical bead (40x15 mm.) that appears to be of cream-colored limestone. This bead has a peculiar interest since it is one of very few specimens of any kind with a decorative design. The incised design is shown in plate 16y. Two pairs of lines encircle the tube. Between each pair and the end are zigzag V-shaped figures.

There is a smaller undecorated stone tube (pl. 16aa) and three spherical stone beads (pl. 16ae, af, ah) in the same collection.

### *Bowls*

Mr. Hill, manager of the Kern County Land Company's Lake ranch, has a very interesting quartzite bowl from site 1 or 2. It is four and one quarter inches outside diameter, by three and one-half inches inside diameter; circumference at rim thirteen and three-eighths inches; bottom diameter two and one half inches; outside height two and one quarter inches; inside depth one and five-eighths inches. The rim is flat, the bottom is rounded into the sides.

A fragment of a bowl of fine sandstone, from the Alpaugh region, is shown in plate 27o.

### *Ceremonial Stones (Miscellaneous)*

Such articles as the steatite "pencil" (pl. 21s) and one of impure limestone (pl. 21t), may represent selection by the white collectors, but they suggest ceremonial objects.

### *Crescentic Stones*

In Alpaugh, but not elsewhere in the area, were noted seven crescentic stones, four very highly polished (pl. 28a-c, e) and three heavily incrustated (pl. 28d, f, g). One specimen was of marble (e) and two of diorite or serpentine (a, b). There is a specimen possibly of sandstone (pl. 27 n), made from a mortar fragment. These specimens suggest the crescentic stone used by the Diegueño in the girls' puberty ceremony. They are, however, very small in comparison with the Diegueño example (1-13747)<sup>23</sup> in the University's collection. A crescentic stone, "found on a ridge between Poso creek and Kern river," is figured in a paper by Horatio N. Rust.<sup>23a</sup>

<sup>23</sup> T. T. Waterman, The religious practices of the Diegueño Indians, present series, VIII, 286, pl. 21, 1910.

<sup>23a</sup> A puberty ceremony of the Mission Indians, Amer. Anthr., N.S., VIII, pl. 7, fig. 3.

*Digging-stick Weights and (or) "Perforated Stones"*

Articles of this class were found only in the Alpaugh region. These stones are about 100 mm. in diameter and have a large hole through the center so that they resemble doughnuts (pl. 17*b-g*). In outline they are generally circular, though two specimens were elliptical. The edge varies from thick rounded to sharply keeled which in three cases had been notched. Of the nineteen specimens noted three were of steatite. Granite, marble, limestone, and basalt were also noted. For a detailed discussion the reader is referred to Putnam.<sup>24</sup>

In addition to the pieces with the hole in the middle, eight pieces were noted where holes had been started on each side, but had not met (Heye xviii *b*). Some of these semi-perforated stones were very highly polished and it seems rather odd that this should be true if they were indeed only uncompleted "perforated stones."

A single specimen of a somewhat ovoid pebble with the perforation along the longest axis was also noted (pl. 17*h*).

A specimen (1-14082) somewhat similar to this is at the University, recorded as from the "Yokuts, Tulare lake." The hole in this piece, which is of coarse sandstone, is slightly smaller in diameter than the largest diameter of the average "charmstone." The bore is quite smooth and countersunk, as could result from using it for grinding "charmstones" into shape. It seems possible that this was the purpose of this type of object.

The utter absence of these stones from the Slough and Lake region seems remarkable.

*Hemispherical Stones and Discs*

Twelve stones in the Alpaugh collections were about the size of mullers and generally of the same material but of quite different form. These were circular in plan with a flat or concave base and a decidedly convex top (pl. 29*a-c*). They are polished all over and the flat bottom would appear to have been developed by using them as rubbing stones. The concavity in many bases suggests wet grinding which probably could not apply to food stuffs. On the other hand the type of wear would imply rubbing a flat surface at least as wide as the stone (one hundred millimeters average) and no such polished

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<sup>24</sup> Plate x, pp. 135-189.

artifacts are known. The object shown in plate 29*e* may be an unfinished hemispherical stone. Like 29*a-c* it is of granite material.

Plate 17 *k-n* reveals four flattish discs more or less worked and polished. The stone in each case appears to be granitic in character. Plate 17*p-y* shows how these worked objects seem to grade off into unworked pebbles.

#### *Mortars and Metates*

In the Alpaugh region, although a number of artifacts were noted which had been made of mortar fragments, only four mortars were seen. Two of these were from four miles northwest of Alpaugh. One was a small irregular, sandstone mortar (125 mm. diameter). The other was a basaltic pebble 315 by 240 by 155 millimeters (last dimension is height), with a hole therein 185 by 165 by 55 millimeters (last dimension is depth). The third specimen, from two miles southwest of Alpaugh, was of sandstone, finished inside and out, and tapering (maximum diameter 320 mm., maximum height 260 mm.; depth of hole 160 mm.). The fourth specimen was from site 22 and was an irregular basaltic boulder with a bowl diameter of two hundred millimeters. This scarcity of mortars is certainly not to be expected and we can only suppose that the collections are not representative, or that wooden mortars were used as on the north shore of Tulare lake. Only one metate was found, although we found an abundance of mullers. This metate is of granite, 405 millimeters long, and has been deeply worn on both sides (pl. 30). Some remarkably even slabs of sandstone were observed at site 22, but they did not exhibit the wear one would expect in metates.

In the Slough region two mortars and one metate were noted. One mortar, from site 10, was a granite pebble, 205 millimeters in diameter by 130 millimeters in height, with a hole 120 by 30 millimeters. The other, from the surface of site 6, was of gray sandstone, fashioned inside and out, and 320 millimeters in diameter. The metate was of slaty material and from site 17. A flat sandstone slab was also found at site 5.

Mortars were markedly more numerous in the Lake region. Five were of sandstone, internally and externally fashioned, five of granite pebbles and two of basalt, internally and externally fashioned. In addition there were in the collection of Mr. J. F. Morris, who lived eight miles south of Bakersfield, some two hundred specimens, most of

which belonged in this region. Owing, however, to Mr. Morris' death these cannot be given locations, and inferences drawn from them would be uncertain.

Under this heading may also be noted fragments from Alpaugh and Pelican island (Lake region) of nicely worked sandstone pieces that suggest small bowls rather than mortars.

#### *Mullers*

Closely associated with the smaller pestles, from which it is often difficult to distinguish them, are the rubbing stones or mullers. These are ovoid pebbles about one hundred millimeters long, the sides and one or both faces of which have been worn smooth by use (pl. 31). They are generally made of granite. In the Alpaugh region were seventy-nine, in the Slough region one, and in the Lake region none. This utter absence in the last named region is remarkable, especially when pestles which might be supposed to replace them are likewise scarce. The first thought is that the collections are not representative. Still, fragments of various sorts practically littered the ground at site 4 and yet among them we did not find a single muller. The one specimen found in the Slough region came from a depth of twenty-five inches (site 9). As the data stand, the inference must be that seed foods requiring no grinding played a greater part in the diet of the Alpaugh people than of the Lake people.

#### *Pendants and Discs*

Articles of this nature made of various kinds of stone were very scarce and were found in the Lake and Alpaugh regions. Those of steatite have been described (pages 70, 71). Marble and limestone were the principal other materials used (see pl. 161). Such artifacts present no characteristics different from similar shell articles.

#### *Pestles*

From Alpaugh forty-seven pestles and four fragments were observed, from the Slough region one, and from the Lake region twenty-two specimens and eleven fragments. No difference in type can be correlated with difference in locality.

The pestles tend to fall into two types. One is tapering (Heye ix a, c). The other is more nearly cylindrical, generally shorter and

usually rounded by use at both ends (Heye x *d*). No ornamental, knobbed, or specialized ends were observed. The largest specimen was 410 by 70 millimeters.

Granite appears to have been the favorite material, though one pestle of petrified wood was noted and a number of sandstone. Some of these latter were apparently fragments of mortars.

A small granite, cylinder with rounded ends, perhaps used as a paint pestle, is shown in plate 17*i*. A pestle-like object shown in plate 22*p* may be an unfinished plummet-like stone.

#### *Pipe or Tube*

Fry (Alpaugh) had a tube of uncertain stone material, which was heavily incrustated. The piece is about eighty-five millimeters long, more or less tapering (end diameters twenty-five and thirty millimeters) and with convex sides. It is bored longitudinally by a hole seventeen to twenty-three millimeters in diameter. Heye LXXVIII*a* has the same form. This was possibly a pipe, although there is no evidence of its having been used as such, and it would be the only example from the entire area.

The absence of stone tobacco pipes is probably not to be regarded as indicating the non-use of tobacco, but rather the use of wooden pipes.

#### *Plummet-like Stones and (or) Charmstones*

*Material.*—A very wide range of materials appears in these articles. From steatite, soft shale, and an argillaceous limestone almost as soft as indurated clay, all degrees of hardness are met with up to granite, marble, quartz, and silicified wood. In selecting the raw material great care and artistic judgment were exercised, for the deep solid colors on the one hand and the striking grained effects on the other are really quite wonderful. Some pieces appear to be made of petrified wood. Specimens of this raw material exist in the area.

*Workmanship.*—It might be expected that soft materials would have been the first used, and that the oldest specimens would appear in them. However, the soft materials do not exhibit cruder workmanship as should be the case if this were true. These articles represent a skill which cannot be too highly praised. The symmetry, the form, the polish unite to produce a true work of art. Combined with the choice of materials they exhibit the highest aesthetic sense in the area.

Most of the specimens found in the Alpaugh region were covered with a heavy white incrustation when found. When left on the specimen it completely obliterates all indications of material or finish. In the majority of cases it has been removed and the pieces repolished by the collectors. This repolishing possibly makes us exaggerate the excellence of the original finish.

*Size.*—There is great variation in size. The longest specimen noted was 230 millimeters in length, the shortest forty-two. The diameters range from fifty-two to twenty-four millimeters, the smaller diameters as frequently as not belonging to the longer pieces.

*Form and usage.*—An attempt has been made to classify these artifacts according to form. It might be desirable to make the classification on the basis of usage, especially since the form variation is so great as to strongly suggest different uses. However, so little is known of the uses to which these stones were put that such a classification would be entirely too controversial.

#### PLUMMET-LIKE STONES AND (OR) CHARMSTONES

##### D. Perforated (pl. 22 *a-m*)

##### W. Not perforated

##### A. No pile (i.e., no secondary curves at end)

##### a. Spherical or egg-shaped (length not more than twice width)

1. With longitudinal groove (pl. 32 *a-h*; pl. 29 *g-i*)
2. With notched ends (pl. 32*k*)
3. Neither grooved nor notched (pl. 32 *i, j, r, s*)

##### b. Spindle-shaped (length more than twice width)

1. With transverse groove (pl. 22*o*)
2. With notched ends (pl. 23 *a-f*; pl. 32*o*)
3. Neither grooved nor notched (pl. 32 *l-n, p, q*)

##### B. With pile (i.e., end or ends with secondary curves)

##### a. Pile at one end

1. With transverse groove (pl. 22*n*)
2. Plain (pl. 22 *s-u*; pl. 33 *j-n*)

##### b. Pile at both ends. One end always plain and the other end—

1. Plain (pl. 22*q, r*; pl. 23*g*; pl. 34 *a-q*)
2. With shoulder (pl. 20*a*; pl. 34 *r-ab*)
3. With button (pl. 33 *a-i, o*)
4. With nipple (pl. 20 *b-m*; pl. 33 *p-aa*)
5. Notched (pl. 23 *h-j*)

##### C. Special

The perforated pieces (D) are not only clearly separated from the rest but bear a strong resemblance to one another. They are all biconically drilled near one end, are somewhat cruder in workmanship and altogether present a rather utilitarian appearance. One would probably not be far off in regarding them as sinkers for fishing.

The second feature used by us as a criterion for division is the presence or absence of a clearly differentiated point or file. The simple forms (WA) entirely lack this. Beginning with the egg-shaped forms (WAa) they grade into the simple stone balls on the one hand and range into long, delicate spindles (WAb) on the other hand.

Type WAa1 is encircled longitudinally by a broad, shallow groove, such as would be useful in keeping a cord in place. The hole in type D is recalled and sinkers are again suggested.

Type WAa2 is a radical departure from the above. It differs from Type WAb2 only in the relation between width and length and so far as usage was concerned the two must have constituted a single type.

Type WAa3 is similar to WAa2 except that it does not have the notches in the ends. It agrees with Type WAb3 except for being relatively thicker. One is inclined to suppose that all four types (WAa2, WAa3, WAb2, WAb3) constitute a single group characterized by notched ends. In this case WAa3 and WAb3 would represent unfinished pieces in which the notches had not yet been cut. The objections to this are the high degree of finish shown by the WAa3 and WAb3 pieces and the fact that they appear in larger quantities than the notched types. These notches are small cuts in the extreme ends. They are too small to hold cords. The pieces vary too much in size to suggest their use for a standardized operation—such as net making. (We have heard the pieces spoken of as “seine needles”.) In fact many of the specimens are so long and delicate as to banish all utilitarian ideas. It might further be noted that somewhat similar notches appear in rare specimens that have the other end differently specialized.

Some of the pieces (WB) have a pile at one end only while others have it at both ends. In a single case (WBa1) there is an encircling groove near one end which would have accommodated a cord. Those with plain ends (WBa2) generally have a smooth, spherical base which gives the pieces a bulbous appearance. The long slender pieces might have been used as paint or tobacco pestles, but such usage seems unlikely for the almost spherical specimens.

Types WBb, pieces with more or less of a point at both ends, are decidedly dominant, and among them those with both points plain predominate (WBb1). The end which becomes differentiated is usually that nearest the center of gravity. The change from the plain end (WBb1) to the shouldered end (WBb2) is gradual, and intermediate forms are found. A few shouldered forms show an incipient nipple, but generally both nipples and buttons are on unshouldered pieces. The button of type WBb3 would serve to hold a cord fastened to the pieces but since otherwise similar forms apparently had no need for a cord it seems more likely that such was not the use of the button. No utilitarian purpose can be imagined for the nipples (WBb4). It has been suggested that they have a phallic implication but no evidence supports the theory. The notched ends (WBb5) suggest relationship with the pieces with both ends notched (WAa2, WAb2). In WBb5 the notched end is somewhat swollen to form a slight knob. In two instances this notched knob appears on otherwise specialized pieces, e.g., a fine, symmetrical specimen in the Mayor collection (pl. 20f) has one end fully nipped and the other end swollen and notched. A similar piece in the Fry collection is still further differentiated by a keel around the middle.

In no type is the position of the center of gravity or the relation between length and diameter constant. This variation indicates that the use for which they were intended did not require a nice standardization of form. This suggests that the further differentiation into different styles of ends did not denote different usages.

From the viewpoint of usage it seems that the pieces might fall into three classes. First are the sinkers, type D and the simpler forms of WA. Then come the double notched pieces, or at least symmetrically ended pieces of the same general appearance, which constitute class WA. Finally there is the third class WB, of highly specialized forms. These most strongly suggest ceremonial usage. However, the term "charmstone" with its ordinary connotation seems in its origin and application too strongly suggestive of mediaeval "thunderbolts" to justify its scientific adoption or use.

Kroeber reports "cylindrical stones, 6 to 8 inches long, pointed at one end" used as charms for producing rain by the historic Yokuts weather shamans of our area.<sup>25</sup>

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<sup>25</sup> B. A. E., Bull 78, p. 518.

*Distribution.*—Table 9 shows the details of the various types found in the Alpaugh district. It will be noted that 162 specimens were observed.

Turning to the Slough and Lake regions we are struck by the scarcity of this highly developed cultural feature. From the Slough we noted ten specimens: WBa2, 1; WBb3, 1; WBb4, 6; too fragmentary for identification, 2.

From the Lake region we saw twelve specimens, one each of types WAb3, WBa2, WBb1, WBb2, and eight specimens too broken for classification.

This great difference in the relative abundance of plummet-like stones in the three regions seems to mark a cultural difference. In the Lake region where a number of indications suggest recency these articles are scarce. Their abundance in Alpaugh might suggest a more ancient culture. The fact that supernatural qualities are attributed to these stones by modern Indians, who do not make them tends to bear out the fact that they belong to an older era.

TABLE 9

## PLUMMET-SHAPED STONES AND (OR) CHARMSTONES IN THE ALPAUGH REGION

Type	Length		Width		Ratio*		Quantity	Type % of Total
	Max.	Min.	Max.	Min.	Max.	Min.		
D.....	90	42	40	25	1:1.5	1:2.5	16	9.9
WAa1.....	70	57	54	40	1:1.2	1:1.7	8	4.9
WAa2.....	81	80	50	46	1:1.6	1:1.7	2	1.2
WAa3.....	75	40	50	32	1:1.1	1:1.7	11	6.8
WAb1.....	101	100	47	37	1:2.1	1:2.7	2	1.2
WAb2.....	230	81	45	26	1:2.2	1:8.8	9	5.6
WAb3.....	135	70	47	24	1:2.6	1:4.4	11	6.8
WBa1.....	102		40		1:2.5		1	.6
WBa2.....	125	65	47	37	1:1.5	1:3.2	13	8.0
WBb1.....	170	63	52	29	1:1.3	1:5.8	39	24.1
WBb2.....	150	105	44	36	1:2.3	1:3.8	11	6.8
WBb3.....	175	115	40	31	1:3	1:5.5	12	8.0
WBb4.....	168	83	47	31	1:2	1:5.4	21	13.0
WBb5.....	175	100	37	26	1:2.8	1:6.2	5	3.1
							162	100.00%

\* See table 7.

*Polishing Stones*

Three examples of supposed polishing stones are in the Mayer collection from Alpaugh (pl. 21w-y). The first is of very fine-grained cream-colored sandstone and is definitely shaped, though broken off at one end. The other two are of marble.

### *"Snake Heads"*

In the Alpaugh collections were twenty-seven artificially shaped stones of various kinds that resemble snakes' heads as much as anything else (pl. 19*m-af*). The characteristic shape, the small variation in size (45-60 millimeters in length by 15-20 millimeters in diameter), the pointed ends, and their polish all point to human manufacture or at least to human selection. It is possible that they were fetiches or ceremonial stones.

A number of stones of about the same size (pl. 19*ag-aj*) were also polished and pointed, but were more cylindrical. These suggested tubes or "snake heads" in course of preparation.

Reference may be made here to the presence of a piece similar to Heye xxx *l, m, n* which he terms "grooved beads." The piece we noted was not the same at both ends, but one end tapered to a button so that the piece bears a striking resemblance to the rattles of a rattlesnake (pl. 21*r*). This conclusion suggested itself also to Dr. Abbott.<sup>26</sup>

## ARTICLES OF UNWORKED STONE

### *Anvils*

A few stones which had apparently been used for anvils were noted. Two examples from Alpaugh are shown in plate 29*j, k*.

### *Firestones*

Pebbles and fragments of stones used as firestones are not likely to be gathered by private collectors. They were noted below burials at site 6 and scattered about the surface at site 4. Doubtless they existed throughout the area.

What may well have been a small earth oven was found in site 6 and is described on page 37.

### *Hammerstones*

Some pebbles and fragments which had apparently been used for hammerstones were noted. Three such nodules of chalcedony are shown in plate 27*j-l*. They are in the Mayer collection at Alpaugh.

<sup>26</sup> Putnam, p. 211.

### *Mica*

Flakes of mica were found on the surface of site 16. This is the only example from anywhere in our area.

### *Quartz Crystals*

Complete or fragmentary quartz crystals, perhaps the possessions of ancient shamans, were found in all three regions: three in the Alpaugh region (see pls. 21 *u*, *v* and 27 *m*), one at site 6 in the Slough region, and three in the Lake region.

## TEXTILES AND CORDAGE

No textile indications whatsoever were secured in the Alpaugh region.

From the Slough region we have a little evidence. At site 11 textile impressions on reddish material were noted and there also appeared decayed remains of fiber—fragmentary, but still discernable. The first appeared to indicate a two-strand, soft, twined textile—possibly a small bag or pouch. The fibrous remains might have been tule mats used in burying the dead. Probably the “cedar bark” mentioned by Mr. Dumble (see page 39) as covering burials in this same vicinity was in reality tule mats. Aside from the absence of cedar within many miles decayed tule mats might be mistaken for bark. At site 8, two-ply, soft twined textile fragments of bast fiber were noted. These were associated with skeletons and one contained black seed. At site 6 a clay mould showing a twined basketry fragment negative impression was discovered. This is shown positively in plate 14*m*.

In the Lake region we have a number of textile and cordage specimens from sites 14, 15, and 16. The specimens from sites 15 and 16 are very much decomposed. Those from site 14 are fragmentary, but are in a fair state of preservation. The specimens described below are from site 14 unless otherwise stated.

### *Cordage and Fibers*

*Fiber of tule.*—Specimen 1-14597 consists of a mass of tule fiber which gives no evidence of having been twisted. It may have been intended as wrappings for the limbs of the dead as in one of the burials, 12-1732 (pl. 13).

*Cordage of tule stems.*—Specimen 1-14588 (pl. 4*d*) consists of tule stems loosely twisted upon one another, with new stems frequently introduced, so that the piece looks spliced. It is two-ply with the twist to the right. Each ply is composed of from two to six tule stems. Apparently very thin tules or only the outer coverings of tule stems were used. Its length is six and one-half feet and it is incomplete. The diameter is twenty to twenty-five millimeters.

Specimen 1-14586 (pl. 4*b*), more tightly twisted than 1-14588, ten to fifteen millimeters in diameter, illustrates a method of securing the end by wrapping about with a bit of the tule skin, the ends of which are inserted in the twist of the rope to prevent untying (see lower part of illustration). This tule skin is apparently not part of the rope. The plate also shows the ends of pieces of tule projecting from the twist, thus indicating where pieces have ended and new pieces have been inserted. This rope was folded and tied about the middle with one end. Two medial loops (not visible in the plate) appear as though they had been fastened around something which chafed off the outer skin of the tule, thus exposing the fiber. The entire specimen consists really of two pieces tied together with a granny knot. The two ends so tied are kept from ravelling by each being tied with a simple overhand knot formed of the end of one piece of the twisted tule that forms the rope (not shown in illustration). This tied piece then continues on to form with the other fibers the end of the rope. This rope has at least one tule stem in each ply and perhaps two or three stems in parts. The total length of the two tied pieces is about twenty feet. The two pieces show a marked uniformity in diameter. The rope is two-ply and the twist to the right.

Specimen 1-14587 (pl. 4*c*), similar to 1-14586, lacks knots and terminal fastenings. It is about eight feet long.

*Three-ply rope.*—Specimen 1-14585, illustrated in plate 4*a*, is comprised of two short pieces of three-ply rope, composed perhaps of yucca or agave fiber, but of neither sisal nor Manila hemp, according to S. T. Henshaw, a cordage expert, the whole left-twisted. One piece tapers from ten millimeters to two millimeters in diameter, the tapering being abrupt. This piece has a simple knot tied near the tapered end, perhaps to prevent ravelling. The second piece, ten to thirteen millimeters in diameter forks into two three-ply cords at one end. The base of the fork is tightly and neatly wrapped with a small portion of the fibers which are worked in under the binding so that no end appears.

*String.*—Fourteen two-ply cords ranging from two to four millimeters in diameter constitute specimen 1-14583. They are all of plant fibers, apparently of two sorts. These cords comprise three pieces of right twist and eleven pieces of left twist. Some pieces definitely taper. One example of right twist and three of left twist are shown in plate 3*a*. A string, diameter about one millimeter, is wound about the piece of tule braid shown in plate 3*d*. The twist of this string is to the right. Among the string fragments from site 15 are two examples of 2-ply cord of twisted tule fiber, two millimeters in diameter.

A piece of two-ply hair cord thirty-three inches long (1-14584), is figured in pl. 3*c*. The diameter is two to three millimeters, the twist to the left. The hair is apparently human, probably originally black, but faded to a dark ruddy brown. A piece of considerably smaller diameter, very short and fragile, was found in the mass of human hair and mink skin which capped skull 12-1734. This fragment is tied in a double bow knot and may have been part of the binding that held the mink-skin head covering in place. A piece of thicker 2-ply cord made of coarse vegetable fiber was also included in the mass. A fragment of 2-ply hair string containing a netting knot is recorded from site 15.

Human hair string plays an extensive part in the decorative designs of the soft basketry bags from site 14 (see pls. 7-10, 12).

*Braid.*—A three-strand braid of tule skin is illustrated in plate 3*d*. It is 280 millimeters long and about nine millimeters in breadth. Tule braid is used by the modern Yokuts for edging tule mats, and tule beds of cradles.

Twelve pieces of flat six-strand braid constitute specimen 1-14582. Two of these are shown in plate 3*b*. The longest is seven feet in length. The average width is seven millimeters. The string used to make the braid has a right twist, and is two-ply. One piece twenty-eight inches long has its ends tied and forms a loop that exactly fits the authors' heads and suggests that it may have formed a head band. It is tied with a granny knot with one end of the braid tucked into the knot and the other hanging pendant five or six inches. It is possible that all of the flat six-strand braid represents material for head bands.

### *Bags of Needle-stitched Braid*

Plate 10 shows one of the two examples of work in needle-stitched braid forthcoming from our area. It is a fragmentary, closely worked bag of thick vegetable-fiber string from site 14. The bag is made of bands of needle-stitched braid (built by stitchery similar to buttonhole stitchery). These bands of braid, which are in two-ply bast-fiber string, are joined together with ball stitchery of two-ply human hair string. The bands of braided material vary from twenty-five to fifty-five millimeters in width, while the portion forming the bottom of the bag is composed of a disc 140 millimeters in diameter. The broadest band has stitched in and out along its middle a two-ply human hair string. The edge of the bag is encircled by a two-ply, right twisted string, which is tied into the bag at regular intervals and perhaps served to hold a puckering-string. The bag has the same appearance inside as outside. From site 15 comes a rotted fragment of finer material in the same technique.

The household arts department of the University of California possesses a Pomo tule mat made in the same technique as the above described bag.

### *Bags of Soft Twined Weaving*

The collection from site 14 contains four tightly twined basketry bags of string. Both warp and woof are of vegetable fiber string, with ornamental courses of human hair string introduced for decorative effect. Most of the string is right twisted, but here and there a left twisted piece is discernible. Three of the bags are illustrated in plates 7 to 9. All four bags have the two twining-elements twisted to the left.

Specimen 1-14570 is illustrated in plate 63 of the Bureau of American Ethnology Bulletin 78. The warp elements are strings of quite stiff fiber, while the woof elements are of string of a finer, softer fiber. This was a large piece, measuring from center to edge thirty-two inches. In its present dilapidated condition it suggests a circular rug rather than a bag. The technique is two-strand twining which makes the pattern on both sides identical. The pattern is in black human hair string, pink string and olive brown string. For example, the seven outermost courses are of pink and natural gray strings, producing a vertically striped effect alternating pink and gray. In the same way the black hair and the gray fiber string are alternated in three

broad concentric bands of decoration. The pink string seems to be composed of the same fine fiber as the gray string and suggests therefore that it is dyed. An examination of the illustration will show an *Olivella* disc bead sewed upon this specimen with human hair string.

The three remaining bags are of a rougher and coarser pale brown vegetable fiber, warp and woof alike. The patterns are revealed in plates 7 to 9, and in every case contain human hair string.

Bag 1-14573 (pl. 9) has an encircling cord sewed into the edge of the basket about every fifty millimeters, perhaps as a guide for a puckering-string. The five upper courses of twining, measuring five millimeters in width, are pink in color, suggesting the pink courses in 1-14570. The ravelling of the pink string makes it obvious that it was dyed, for internal portions are of the natural yellowish-brown color, and that the process of dyeing took place after the string was made, but presumably before it was incorporated in the basket. The original size of this specimen is indicated by the fact that from the rim edge to the lowermost circle of ornamentation the distance is 255 millimeters.

Specimen 1-14574 (pl. 8) is exceedingly fragmentary. It is 750 millimeters from near the original center to near the original edge. Seven courses of red twining form the edge of the bag and directly above is the black pattern of human hair string.

Number 1-14571 (pl. 7) is somewhat more finely woven than the two preceding. Nine upper courses are dyed pink. The radius from the pink edge to what is probably the center of the bag is 675 millimeters. The center was started with a bundle of human hair string, as was also the case with 1-14570.

Numerous fragments of twined basketry bags, all soft and flexible, like those described from site 14, were found in the wrappings of the burials at site 15. They show a greater range of texture than the more complete specimens from site 14. Pattern is lacking in the fragments, although a few shreds of pink-dyed fiber are discernible. With these soft twined fragments was also found a trace of reddish powder which may possibly be the substance used as coloring matter.

Yet another type of soft twined basketry was yielded by site 15. It consists of very fragile openwork material with interstices of about two millimeters. In this specimen, of which we have only a very small fragment, the two warp elements are alternately separated to combine with each course of twining.

### *Bags of Soft Twined Weaving, Asphalted*

From site 15 comes a number of fragments of asphaltum-coated basketry bags. The basketry itself is of the soft, twined technique hitherto described. These fragments suggest one of the types of asphaltum-coated baskets of the Chumash region. The presence of both asphaltum and tule in the border region of the Yokuts and Chumash areas leaves the decision in doubt as to which people may have been inventors of this practice. It should also be borne in mind in this connection that the coating of baskets with pine pitch is a widespread Arizona, Great Basin and Tehachapi custom. Doubtless the respective uses of pitch and asphaltum are but local variations of a single generic process.

From site 13 and 16 come lumps of either pitch or asphaltum which may very well represent the raw material used for basket coating.

### *Cotton Cloth*

An obviously intrusive article (1-14575) found with the wealth of textile materials at site 14 is a rectangular, uncolored, thin, cotton cloth, illustrated in pl. 72 of Bulletin 78 of the Bureau of American Ethnology and in pl. 2 of this paper. The width of this cloth was fifty-eight inches. Its length is indeterminable because of one ragged edge. This blanket is probably of Pueblo origin, so both Drs. Walter Hough and A. V. Kidder affirm. Dr. Kidder writes: "The textile fragment would have caused me no surprise had I found it in a cliff-house. In other words it is regular Southwestern cotton cloth with typical multi-strand rolling side-selvage (the end-selvage is missing). I compared it with specimens from Pueblo Bonito, Pecos, and the Mesa Verde. It is fairly late stuff, i.e., not Basket Maker, as both selvage and material are foreign to Basket Maker textiles. I would think that cloth of this sort might have had a very wide trade distribution. How late this sort of cloth might be I have no idea. It might not be over a century or two old, for I have found practically identical material in 18th century rooms at Pecos. Modern Hopi cottons, however, are much coarser than this piece."

Miss Anne Swainson, Associate in Textiles, University of California, states that it is tabby woven from handspun cotton yarn. The cord at the selvage indicates that the specimen was woven on a crude

hand loom. It was not possible to use the reed in making this as on the characteristic modern Hopi loom. At the time of the Spanish conquests in America, the looms of Europe were arranged to produce better fabric (with compacted warp selvage) than that of the specimen under discussion. The peculiarity of the selvage edge is fairly illustrated in plate 2.

The presence of this cloth, which is clearly not of Californian manufacture, had led certain of our colleagues to regard all of the textile materials from site 14 as perhaps intrusive. This view, however, seems unwarranted, as evidence of soft, twined textiles is forthcoming from other sites, notably 15, 16, 8 and 11.

Two holes cut in the specimen might be arm holes. They have been unskillfully cut, leaving ragged edges. When the cloth is folded longitudinally they coincide and apparently were cut through the two thicknesses at one time. These holes perhaps represent a crude attempt to adapt it for use as a garment. On the other hand the piece may have been used as a shroud and the holes may have been cut at that time.

Several rents in the cloth have been repaired by darning. This darning was done with bast fiber, thus confirming the intrusive nature of the cloth. On one darned place are sewed two *Olivella* disc beads of the bushing type.

#### *Tule Mats*

Mat 1-14591, plate 6, is sewed instead of twined. It is fourteen inches in width by nineteen in length and is not complete. The lower end is quite frayed so that the fiber of the tule is very apparent. Whether this freeing of the fibers from the tule stems was intentional is not clear. Neither is the purpose of the mat clear; whether it was used for bedding or flooring, clothing, or house covering, is uncertain. That it may have formed part of the outer covering of a hut is suggested by the fact that it is sewed instead of twined. Barrett states for the Klamath Lake region that such sewed mats are used as exterior house coverings because of their water shedding qualities, there being no twining to interfere with the run-off.<sup>27</sup> The sewing is done with two-millimeter, two-ply string in courses sixty-five to seventy millimeters apart. The string with which the sewing is done is a vegetable fiber and is twisted to the right. This mat has no definitely finished edge.

<sup>27</sup> Present series v, 290, 1910.

Another type of mat with twined binding of tules is 1-14589 (pl. 5 *b*). It is twined to the right. The method of binding is by plain twining. The twining passes around each stem or around two or three stems so tightly compressed as to appear like one. The distance between the parallel courses of twining is from 85 to 110 millimeters. The top and bottom of this piece have no finished edge. One side of the piece, however, has a distinct finish formed by a number of stems of tule, at least three being bound with a spiral winding of tule as shown in plate 5*b*. This spiral winding which consists of a single strand of tule is really a continuation of one of the twining elements in the uppermost or first course of twining. This fact would seem to indicate that the upper edge of the mat, which consists of short, projecting, tule stems is really complete. The second of the two twining elements of the first course of twining is turned down and bound into the thick spirally wound side. The second, fourth and sixth course of twining form loops over the edge of the mat. The third and fifth courses, like the first, furnish binding material for the edge of the mat. This alternation suggests that the opposite edge of the mat which is missing would have shown a similar alternation.

Specimen 1-14590 (pl. 5 *a*) is composed of parallel tule stems bound together by simple twining to the right with right-twisted two-ply fiber string about one and one-half millimeters in diameter. The courses of twining are sixty millimeters apart. No definite edges are discernible. Traces of twined tule mats with tule warp and woof form part of the wrappings of burials at site 15.

### *Nets*

Nets from site 14 vary from very large mesh nets, which may have been utilized for snaring birds or carrying burdens, to quite fine meshed hair nets. Of the former type is specimen 1-14579, about five feet in length. It may have been originally of considerable greater extent for the specimen is very ragged. Stretched tight, the maximum length from knot to knot of the mesh is one hundred and thirty millimeters. The two-ply string of which the net is made is of vegetable fiber, and is twisted to the right. The diameter of the string is one millimeter.

A small and well-preserved net is number 1-14581, which when stretched tight, has a maximum length of fifty-three inches and a maximum width of thirty-seven inches. The stretched length of the

mesh, from knot to knot, is one hundred and twenty millimeters. This specimen is in much better condition than the preceding one. It is illustrated in part in plate 11*a*. It is in such a fine state of preservation that it takes quite a hard pull to break the string. The string of which it is composed is two-ply, perhaps of milkweed fiber, and is twisted to the right. The diameter of the string is one millimeter.

Illustrated also in plate 11*b* is net 1-14580 which is made of slightly finer string than the preceding, but like the preceding has no definite edges. The length of this piece is forty-seven inches stretched and the width about seventeen inches. From knot to knot the meshes stretch one hundred and ten millimeters. The string of which the net is made is two-ply, twisted to the right and appears to be of different material from the string of 1-14581. It is quite gray in appearance.

Specimen 1-14578 (pl. 11*c*) seems to give some clue to the manner in which nets such as those just described were used. This net was fastened to a rather stout left twisted cord of vegetable fiber, three to four millimeters in diameter. The net itself has a mesh, which, stretched from knot to knot, measured 125 millimeters. The string of which the mesh is made is of vegetable fiber and right twisted. Its diameter is about one half millimeter. The portion of the end of the net bound together by the thick cord appears to represent its complete width.

Specimen 1-14577 illustrated in Kroeber's Handbook of the Indians of California, plate 72, is without question a hair net, for it is found around a number of pencil-like locks of hair evidently formed by gumming. This net is made of very fine right-twisted string which stretches from knot to knot thirty-seven millimeters. The diameter of the string is slightly less than one half millimeter. It is impossible to determine the exact length and breadth of this net without damaging the specimen. One of the pencil-like locks of hair has a piece of right-twisted, two-ply string about one millimeter in diameter wound tightly around it, one end of the cord being inserted under the winding end, the other end of the cord being turned under the last wind and projecting outward from it. Presumably this string was attached to one end of the net and would seem to indicate that the net was attached to the head by thus winding around one of the pencil-like locks of hair. As shown by the illustration, both ends of the hair net are bunched together and wound around a series of pencil-like hair locks, which may represent the locks on two sides of the head. Pre-

sumably the body of the net between the two ends covered the head of the wearer. This type of hair net is central Californian, whereas the style of wearing the hair in long pencil-like strings is limited among living Indians to men of the Colorado river.

Another hair net, badly deteriorated (1-14598) stretches about twenty-seven millimeters from knot to knot. Its string is slightly finer than that of the preceding hair net. Along with the net is some of the hair and scalp of its probable wearer. Mingled with the black hair are a number of gray ones. The hair in this case gives no evidence of having been gummed together in pencil-like strings or locks.

No examples of nets were found with the burials at site 15, unless we accept the single fragments of human hair string tied with a netting knot.

### *Netting Bag*

Netting bag 1-14576 (pl. 12) has the upper edge provided with a series of long loops which stretched tight measured about forty-seven millimeters from the top of the loop to the two knots which border its lower end. A heavy two-ply left-twisted vegetable fiber cord, doubled and right-twisted on itself, ran through these loops and made it possible to completely pucker the top of the bag. The cord of two to three millimeters diameter, of which the bag is composed is exceedingly rough and bristles with projecting fibers. The stretched meshes measure from knot to knot about twenty-five millimeters. The bag had at least six ornamental concentric bands of black human hair string, two-ply, right twisted in some cases, left twisted in others. This human hair string is in some cases slightly smaller, in other cases fully as thick as the fiber string. All encircling bands of human hair mesh are right twisted, except the second. In no case do the bands of human hair form a complete diamond mesh in themselves, but only two sides. The total length of the edge of this specimen, stretched to about half its maximum length, is about thirty-six inches, indicating that it must have been a bag of very considerable capacity.

### ARTICLES OF WOOD

Only two articles of wood were recovered from the area, both from site 14. The preservation of such articles in good condition again suggests recency.

*Arrow Shaft*

In the orbit of skeleton 12-1731 was a portion of an arrow shaft. It is about five inches in length, consisting of the greater portion of a foreshaft of hardwood, and the spliced joint of the shaft. This shaft and the death which it dealt have been most vividly described and pictured by Dr. Pope.<sup>28</sup>

*Painted Board*

A board-like piece (pl. 1) of yellow pine was among the artifacts from site 14. The surface shown in the picture has the two ends painted red and each bordered by a black transverse stripe on the inner side as indicated by the difference in shading in the photograph. A certain amount of rotting has taken place in the piece in question, but whether from exposure or age could not be ascertained.

As to the use of this piece of wood we can say nothing definite. It may have been a marker for a grave like those reported from the Santa Barbara region.<sup>29</sup>

*Rabbit-stick*

A curved throwing stick, such as is commonly used in southern California, was obtained from a grave on the south side of Kern and Buena Vista lakes by Mr. J. H. Jones. The specimen was identified as a rabbit stick by Professor G. G. MacCurdy of Yale University. This object was buried with a skeleton which still possessed an abundance of hair which hung straight down all around the head. Over the chest and forearms was a net. As no curved throwing sticks have hitherto been reported from central California, it seems a fair assumption that this article is intrusive.

## SUMMARY OF MATERIAL CULTURE

In every case except in articles of bone, the Slough region presents by far the smallest quantity of material. This suggests that it was a marginal or backward area. Moreover it would seem that in the northern portion of the region there was a similarity to Alpaugh

<sup>28</sup> Saxton T. Pope, *A Study of Bows and Arrows*, present series, XIII, pl. 60, 1923.

<sup>29</sup> H. C. Yarrow, *Rep. U. S. Geog. Sur. W. of 100th Meridian*, VII, 38, 1879.

articles and in the southern portion to the Lake region artifacts. Recalling what was said about the probable undesirability as a place of residence of most of this region, it would seem safe to follow the material culture evidences so far as to consider the Slough an intermediate, perhaps somewhat backward region with either a smaller population than the other two regions or with a population consisting of seasonal hunting and fishing parties from those regions.

The material cultures in the Alpaugh and Lake regions offer as marked differences as might be expected from two such simple cultures. Leaving aside minor differences as too vague for discussion some of the major ones may be tabulated.

TABLE 10  
OCCURRENCE OF PRINCIPAL ARTIFACTS

	<i>Alpaugh Region</i>	<i>Lake Region</i>
Clay (Pottery)	At site 12 only (rare)	At site 3 only
Shell	Very little abalone Very few olivella disc beads	Abalone relatively plentiful Olivella disc beads relatively plentiful
Steatite	No disc beads "Boat-shaped" stones No plugs Few sherds	Disc beads No "boat-shaped" stones Plugs Sherds exceedingly plentiful
Stone (Chipped)	Very few in schistose material Leaf-like points predominate	Schistose material definite Triangular points predominate
(Ground)	Crescentic stones Perforated stones Plummet-like stones very plentiful "Snake heads"	No crescentic stones No perforated stones Plummet-like stones scarce No "snake heads"
Textiles	None preserved	Woven, braided, twined

The greater abundance of pottery, abalone, *Olivella* disc beads and the greater bulk of steatite in the Lake region might be taken to imply a more definite and constant intercourse with the Santa Barbara coast the probable source of such items (except pottery). Such an assumption is strengthened by geographical considerations, the Lake region being nearer that part of the coast.

The *ensemble* of what we have in the Lake region could possibly be safely dated after 1800. But when individual factors or specimens are considered the story is different. Artifacts from both the Lake and Alpaugh regions have their counterparts in the Santa Barbara area, in the northern San Joaquin valley, and elsewhere in California.

## MISCELLANEOUS ABORIGINAL ACTIVITIES

## CULT INDICATIONS

Spiritual suggestions are speculative. The number of possible ceremonial stones (including charmstones) has been noted, and if these were indeed of a ceremonial nature the conclusion must be that spiritual affairs played considerable part in the life of the people. No indication of their specific expression is given except by the crescentic stones. If these have been correctly identified they enable us to postulate for Alpaugh at least a puberty ceremony akin to the "roasting of the girls" practiced in southern California and in which, at least among the Diegueño, a crescentic stone was used.<sup>30</sup>

The treatment of the eagle in the burial at site 14 (pl. 13) indicates that the bird was held in great respect. This suggests the eagle ceremony practiced by the Diegueño<sup>31</sup> and like it is probably a manifestation of the bird cult of California south of the latitude of San Francisco.

## FISHING

Two accounts of fishing for our area have been recorded. Powers says that on Tulare lake they fished from tule balsas.<sup>32</sup>

From Kern and Buena Vista lakes Mr. W. R. Dumble has given us the following account of what was observed by his grandparents who settled in the Bakersfield region in 1850. At that time there were still many Indians living on the shores of the lakes. Diverging wings (fences) of wickerwork (twining perhaps) were set up in the lake, forming a funnel-like approach to a satisfactory shallow stretch of water along the shore. However, the funnel was not very narrow and the narrow end was the shore line itself. The group of Indians would then proceed into the water and advance towards the funnel, splashing and making as much noise as possible. This would drive the fish into the shallow water where they would be prevented from escaping to either side by the wings. In shallow water they would be caught by placing a "wicker" (twined probably) hopper over them

<sup>30</sup> T. T. Waterman, *The Religious Practices of the Diegueño Indians*, present series, VIII, 286, pl. 21, 1910.

<sup>31</sup> *Ibid.*, 314-320.

<sup>32</sup> Stephen Powers, *Tribes of California*, Contributions to North American Ethnology, III, 376, 1877.

and reaching through the small end and grasping the fish. Such methods may help account for the absence of fishhooks and net sinkers in the Lake region.

#### FOOD OFFERINGS

The only evidence which seems to indicate food offerings consists of the beaks and claws of perhaps a dozen red-winged blackbirds (*Agelaius phoeniceus*) found with skeleton 12-3523 at a depth of sixty-nine inches in site 11 in the Slough region. Professor Joseph Grinnell who identified these remains, says that he knows of no predatory burrowing animal that would have been likely to have carried them down into the mound. It seems possible therefore that they were buried with the deceased with whom was found also a bone fishhook.

#### HABITATIONS

The only trace of aboriginal habitations observed in the entire area consisted of the supposed house pits at site 12 in the Alpaugh region. These were circular in outline, thus indicating one of the known types of aboriginal houses of Yokuts Indians.<sup>33</sup>

#### HAIR DRESSING

From site 14 in the Lake region evidence is forthcoming as to aboriginal hair dress. One skeleton, 12-1734, was accompanied by long loose hair more or less tucked under a covering of mink fur. Hair of a second individual was in long, gummed, pencil-like locks, similar to those worn by men among the modern lower Colorado river tribes. These locks, however, were accompanied by a hair net of central Californian type (pl. 72, Bulletin 78, B. A. E.). This suggests that in our region the two methods of hair dressing may have been in vogue for men or that one method is intrusive. Hair of a third individual is accompanied by a net, but is not in gummed locks.

In a burial south of Kern and Buena Vista lakes the abundant hair was intact and hung straight down all around the head.

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<sup>33</sup> A. L. Kroeber, Handbook of the Indians of California, B. A. E., Bull. 78, p. 522, 1925.

## CULTURAL RELATIONS

The archaeology of most of the immediately adjacent areas has not been described. Such data as exist indicate a generic resemblance between the culture of our area and that of the Santa Barbara area. The extent of such resemblance is in part revealed by the number of instances in which we have been able to cite Heye's San Miguel illustrations as applying also to the upper San Joaquin valley artifacts. In addition to these common similarities, the Alpaugh and Lake regions have certain mutually exclusive traits which are nevertheless in both cases shared with the Santa Barbara region, implying independent lines of transmission between Santa Barbara and these regions. In discussing Articles of Chipped Stone the possibility of Alpaugh culture being of an earlier date than that of the Lake region was brought out. If this were true the Alpaugh and Lake cultures would in part represent different periods of the Santa Barbara culture.

The wealth of types of stone artifacts yielded by the Alpaugh region seems to indicate it as a culture center. This culture differs somewhat from that of the nearest known culture center to the north, the rich delta region of the San Joaquin and Sacramento rivers. Certain of the Alpaugh types absent in the Lake region, but identical with those of Santa Barbara, are "perforated stones," "butterfly" and crescent flints, drilled stone discs, and crescentic stones. The Lake region, many miles nearer the Santa Barbara region than Alpaugh, shows far fewer resemblances in stone artifacts. However, an examination of Salinan culture as set forth by J. Alden Mason<sup>34</sup> reveals no such wealth of stone objects as the Alpaugh region has yielded and thus makes it seem unlikely that the Salinan were the medium of an interchange between Santa Barbara and the San Joaquin valley. That the diffusion of the traits in question was the result of direct contact of Tulare lake dwellers and Santa Barbara people seems the most likely explanation. The scanty evidence available indicates that the type of material culture revealed at Alpaugh extended north-eastward into the Sierra Nevada foothills.

In the Lake region the abundance of steatite, the presence of soft twined basketry, the use of asphalt on basketry, and the practice of

<sup>34</sup> The Ethnology of the Salinan Indians, present series, x, 97-240, 1912.

interment all suggest Santa Barbara culture. Resemblances with neighboring regions to the eastward would probably be forthcoming were more material available. At any rate the practice of interment, of coating baskets with pitch, and pottery in the southern Sierra Nevada and Great Basin regions may be cited. Farther eastward, the non-contemporaneous Basket-maker culture of southeastern Utah, as set forth in Nusbaum's paper<sup>35</sup> has certain features in common with the Lake region culture, notably (1) soft twined basketry bags, (2) human hair string employed for patterns therein, (3) three-ply cordage.

From adjacent southern California across the Tehachapi mountains we have nothing for comparison. Resemblances with farther southern California are suggested by (1) a Diegueño soft twined basketry bag, apparently similar to the Lake region specimens, from Mesa Grande, San Diego county;<sup>36</sup> (2) the bags or wallets of bean and other fibers woven by the Mohave;<sup>37</sup> (3) ceremonial use of human hair cordage and the association of hair with the human soul among the Luiseño; (4) pottery; (5) ground crescentic stones for girls' puberty ceremonies.

## TIME PERSPECTIVE

### DISTRIBUTION

Deposits examined were too shallow to yield much information as to cultural change with the passage of time. Perhaps the only cultural feature whose vertical distribution seems to indicate change is steatite, which was largely limited to the surface of sites. Its non-occurrence below the surface of mounds in the Slough and Lake regions would seem to indicate recency. The complete or near absence of steatite on many sites in these regions possibly implies that the sites were abandoned before the use of steatite became general; or that its use never became general.

<sup>35</sup> Jesse L. Nusbaum, A Basket-maker Cave in Kane County, Utah. With Notes on the Artifacts by A. V. Kidder and S. J. Guernsey. *Indian Notes and Monographs*, Museum of the American Indian, Heye Foundation, 1922.

<sup>36</sup> Otis Tufton Mason, *Aboriginal American Basketry; Studies in a Textile Art Without Machinery*, Rep. U. S. N. M. 1902, p. 487, pl. 203, 1904; also Constance Goddard Du Bois, *The Religion of the Luiseño Indians of Southern California*, present series, VIII, 170, 1908.

<sup>37</sup> A. L. Kroeber, *Handbook of the Indians of California*, B. A. E., Bull. 78., 738, 1925.

<sup>38</sup> *Ibid.*; 665.

In the Alpaugh region steatite articles, like all others, are from the surface of the ground. Therefore, the surface finds of steatite lack the significance of those in the Slough and Lake regions. Moreover, as the calcareous incrustation of some of the steatite articles in the Alpaugh region is as heavy as the maximum incrustation of articles of other materials it seems likely that the use of steatite in that region has an antiquity as great as that of other stone materials. It should again be mentioned that the Alpaugh steatite is all fine grained.

Possibly controverting the above hypothesis of the antiquity of the use of steatite in the Alpaugh region is the fact that only one of the large series of charmstones from the Alpaugh region is of steatite. The remainder are of harder stones. Steatite charmstones are known from other parts of California, but nowhere are they common. It is entirely possible that the use of the charmstone, or the sentiments entertained about it, militated against its being made of steatite. If such were the case, the absence of steatite charmstones in the Alpaugh region would not controvert the theory of the antiquity of the use of steatite there.

Potsherds, like steatite sherds, were limited to the surface in the two sites (3 and 12) where found and seem to be relatively recent in origin.

#### INCRUSTATION

Most of the stone articles, including some of the obsidian and steatite which Messrs. Fry and Mayer have found, especially in the northwestern part of the Alpaugh section, are heavily incrustated with what appears to be a calcareous deposit from water in which they may have lain. On some of the charmstones, for example, this attains a thickness of about two millimeters. When this is removed the surface of the stone below is found to have retained its original polish. Unless it is removed no idea can be formed as to the character of the stone. In these collections this incrustation has generally been removed. It probably indicates a considerable time interval, but so long as we do not know the varying strength of the solution and whether or not each object was immersed continuously or only at long intervals as the lake rose and fell we can form no estimate as to what this interval was. Geologists will pass no opinion.

## PATINATION

Flint originally deposited in a stratified state is interlarded or overlain with thin strips of white and such deposit may not be entirely removed in the manufacture of a point. Certain types of flint appear however, upon exposure to the air, sunlight, and (or) water, to have turned white. We find entire artifacts that have turned white. If these are broken open it will be found that the change has occurred only on the surface (see pl. 26s). The depth to which the change has reached would appear to depend on the time of exposure. In a broken point (1-26277) it is between one and two millimeters thick, extending evenly over the entire point. In addition this piece shows traces of the above mentioned original white deposit which was not flaked off when the implement was manufactured. In a broken "crescent" (1-26276) the depth of the color change is not more than half as thick. This "crescent" is of a light, greenish-gray opal, while the point referred to above is of a chocolate-brown Monterey opal. That the patination has occurred in each case after the artifact was made is evident. In another case the fractured end of a point has turned white as well as the rest of the point, showing that patination took place after breakage. From site 11 comes a charmstone (1-24486) of Monterey limestone with marked patination, which has altered the color of the stone inward for two to four millimeters. Professor Louderback, geologist, states that it took a "long time" for the alteration to take place. This particular "charmstone" would therefore seem to be quite ancient, and being found in mound 11 would seem to indicate that as quite ancient. However, the possibility that it was brought to site 11 after patination was well advanced must not be overlooked.

## STRATIFICATION

The only mounds examined which had burials at more than one level were sites 11, 9, and 8 in the Slough region, and 4 in the Lake region. The few inches difference in level in sites 8 and 9 (see table 6) suggest no great lapse of time. Site 11 suggests a longer interval but the evidence is inconclusive.

In the Alpaugh region Mayer found a charmstone four feet underground, also an arrowpoint and another charmstone several feet below the surface. Considering these finds and the fact that many

other artifacts were turned up in plowing, it would seem reasonable to suppose that for a considerable depth the earth would yield artifacts—thus evincing a very respectable antiquity for the human habitation of the entire region. The desirability of further evidence on this point was appreciated, but to excavate in order to obtain it would have taken more time than we could devote to the work, for there are no mounds, no higher spots that would appear likely places in which to excavate. Mr. Mayer says that there never have been such spots to his knowledge. These exceptional finds present no appreciable difference from the surface material.

#### PRESERVATION

The state of preservation of bones would appear at first thought to be a clear indication of relative antiquity of various burials. Actually, character of soil, slope of surface, amount of moisture, and probably other factors affect the rate of decomposition. Thus, adobe soil and alkali preserve bones longer than sandy soil, so Mr. Louis R. Sullivan informed us. This means that probably in some cases, poorly preserved bones from sand mounds are no older than better preserved bones from black soil alkali mounds. In spite of this factor we believe nevertheless, that the burials in the sand mound site 11 in the Slough region are of greater antiquity than those in the neighboring black soil mounds (8, 9, 10). So exceedingly deteriorated were the bones in site 11 that they went to pieces in the mere process of handling. Site 11 is the mound we have specifically referred to as being apparently heaped up by excavating the surrounding soil. It seems possible, therefore that the use of this type of mound is older than the use of the presumably natural black-soil mounds.

In sites 14 and 15 (Lake region) under apparently identical conditions, two lots of burials were uncovered. One lot contained well preserved bones and artifacts of textile materials and wood. The other lot contained badly deteriorated bones and fragmentary rotted textile wrappings. Probably these cases represent two periods in the history of the culture of the region. The presence of similar soft textiles in each indicates a stability of culture over a considerable period of time.

## CONCLUSION

In no aboriginal sites excavated by our party were animal bones found in abundance. Indeed, when compared with the prevalence of animal bones in San Francisco Bay shellmounds, this paucity, with its corollary of scarcity of artifacts, probably indicates a short time residence of aborigines at the excavated sites. It is even possible that some sites were burial sites only and were never used for residence. If such were the case animal bones in the deposit would hardly be expectable.

To conclude, then, there is evidence of the relative antiquity of certain of our specimens and of the relative recency of others. Nevertheless, the only discernible change in, or addition to, the culture is represented by steatite in the Slough and Lake regions.

There appears to be no geographical reason why men could not have inhabited the area from the most remote times, but the material culture recovered would seem to be as readily assignable to the last century as to the last millenium.

## EXPLANATIONS OF PLATES AND MUSEUM NUMBERS OF SPECIMENS

Unless otherwise stated, the numbers refer to the catalogue of the University of California Museum of Anthropology.

Plate 1. Painted slab of yellow pine.  $\times .30$ . 1-14593. Pp. 49, 109.

Plate 2. Cotton cloth.  $\times .50$ . 1-14575. Pp. 49, 104, 105.

Plate 3. String and braid.  $\times .50$ . *a*, vegetable-fiber cords, 1-14583; *b*, six-strand braid, 1-14582; *c*, human-hair string, 1-14584; *d*, tule braid, 1-14592. Pp. 49, 101.

Plate 4. Cordage.  $\times .39$ . *a*, three-ply rope, 1-14585; *b-d*, two-ply rope of tule stems, 1-14586 to 1-14588. P. 100.

Plate 5. Twined tule mats.  $\times .32$ . *a*, 1-14590; *b*, 1-14589. Pp. 49, 106.

Plate 6. Sewed tule mat.  $\times .26$ . 1-14591. Pp. 49, 105.

Plate 7. Twined basketry bag.  $\times .25$ . 1-14571. Pp. 49, 101, 102, 103.

Plate 8. Twined basketry bag.  $\times .10$ . 1-14574. Pp. 49, 101, 102, 103.

Plate 9. Twined basketry bag.  $\times .28$ . 1-14573. P. 49, 101, 102, 103.

Plate 10. Bag of needle-stitched braid.  $\times .32$ . 1-14572. Pp. 49, 101, 102.

Plate 11. Nets.  $\times .33$ . *a*, 1-14581; *b*, 1-14580; *c*, 1-14578. Pp. 49, 107.

Plate 12. Netting bag.  $\times .31$ . 1-14576. Pp. 49, 101, 108.

Plate 13. Wrapped human bones and eagle skull with abalone ornament.  $\times .31$ . *a, c*, 12-1732; *b*, 12-1738. Pp. 50, 64, 99.

Plate 14. Objects of bone, shell, clay, steatite, and basketry.  $\times .50$ . *a*, bone whistle, 1-24589 (p. 54); *b*, bone awl, 1-24627 (p. 53); *c*, bone whistle, 1-4401 (p. 54); *d*, fragment of bone fish hook, 1-24507 (p. 54); *e*, olivella half-shell bead with punched hole, 1-24752 (p. 59); *f*, olivella half-shell bead with drilled hole, 1-24497 (p. 59); *g*, abalone bead, 1-14595 (p. 61); *h*, abalone bead, 1-14594 (p. 61); *i*, clam shell disc, 1-24808 (p. 62); *j*, serpentine bead, 1-24487 (p. 68); *k*, perforated whorl of clay, 1-25300 (p. 55); *l*, ring of steatite, 1-24439 (p. 71); *m*, wax positive impression of negative impression in clay of basketry fragment, 1-24609 (pp. 56, 99); *n*, steatite pendant, 1-24774 (p. 71).

Plate 15. Incised shell beads and tubes.  $\times .66$ . In collection of T. V. Little, Shafter, California. Pp. 53, 58, 65.

Plates 16 and 17 (except *o*), objects in collection of A. F. Mayer, Alpaugh, California. *o* is in collection of Samuel Fry, Alpaugh, California.

Plate 16. Pendants and beads.  $\times .50$ . *a-g*, clam shell pendants (p. 63); *h-j*, pendants of *Cardium corbis* shell (p. 63); *k*, pendant of whole valve of *Arca* (p. 63); *l*, pendant of marble (p. 92); *m*, pendant of shell of *Hinnites giganteus* (p. 63); *n-p*, bar-shaped pendants of shell (p. 63); *q-r*, black steatite pendants (p. 71); *s-x*, steatite tubes and beads (p. 68); *y*, tube of limestone or chalk with incised design (p. 89); *z*, shell "nose-stick" (p. 65); *aa*, stone tube (p. 89); *ab*, split shell tube showing drilling (p. 65); *ac*, dentalium shell (p. 65); *ad*, barrel-shaped bead of porcelain-like material (p. 57); *ae-af*, marble beads—the first is drilled from one side only (p. 89); *ag*, shell bead drilled diametrically (p. 62);

*ah*, limestone bead (p. 89); *ai*, clam-shell bead (p. 58); *aj-al*, stone beads—*aj*, and *al* black, highly polished; *ak* of light green steatite (p. 68); *am*, imitation keyhole limpet ring made of clam shell (p. 61); *an*, keyhole limpet ring (p. 61).

Plate 17. Perforated stones, discs, and arrow straighteners. × .42, except *c*, which is × .20. *a*, black steatite piece resembling tomahawk head (p. 73); *b-h*, perforated stones, complete and fragmentary (p. 90, *h*, also p. 72); *i*, small granite pestle(?) (p. 93); *j*, arrow straightener (p. 67); *k-n*, *p*, discs of granitic stone (p. 91); *o*, arrow straightener (p. 67); *q-y*, natural flattish pebbles (p. 91).

Plate 18. Articles of steatite. × .35. *a*, coarse-grained potsherd showing tool marks on exterior, 1-23247 (p. 74); *b*, plug or disc, 1-24772 (p. 72); *c*, steatite tube, 1-4423 (p. 68); *d*, spool-like object, 1-24777 (p. 73); *e*, fine-grained steatite potsherd showing tool marks on interior, 1-24272 (p. 74); *f*, sherd showing drilling and grooving, 1-24788 (p. 74); *g*, groove-edged object, 1-24779 (p. 70).

Plates 19 to 23, inclusive, collection of A. F. Mayer, Alpaugh, California.

Plate 19. "Boat-shaped" stones and "snake heads." × .42, except *k* and *l*, which are × .20. *a-l*, "boat-shaped stones" (p. 69); *m-af*, "snake heads" (p. 98); *ag-aj*, perhaps incipient "snake heads" (p. 98).

Plate 20. Plummet-like stones and (or) "charmstones." × .42. *a*, shouldered "charmstone" (p. 94); *b-m*, nipped "charmstones" (p. 94); *f* also p. 96, *j* also p. 69).

Plate 21. Steatite objects, quartz crystals, polishing stones. × .43. *a*, flattish steatite sherd showing calcareous incrustation over a surface apparently blackened by fire (p. 76); *b-l*, spool-like and reel-like objects of steatite (p. 73); *m-o*, groove-edged steatite sherds (p. 70); *p*, calcined fragment of clam-shell vessel(?) (p. 66); *q*, steatite object with incised lines, perhaps an undrilled pendant (p. 71); *r*, steatite object, perhaps representing a rattlesnake's rattle (p. 98); *s*, pencil-shaped object of steatite (pp. 71, 89); *t*, pencil-like object of limestone (p. 89); *u-v*, quartz crystals—second has been blackened and partly fused by fire (p. 99); *w*, polishing stone of fine-grained sandstone (p. 97); *x-y*, polishing stones(?) of marble (p. 97).

Plate 22. Plummet-like stones and (or) "charmstones." × .41. *a-m*, perforated plummet-like stones, all biconically drilled and finely polished—*a*, *c*, *e* are of marble, *b* is of granite, *d* is heavily incrustated, *f* is of schistose material, *g* is of black steatite, *h* of heavily incrustated quartz or marble, *i-j* of marble, *k* of whitish limestone, *l* heavily incrustated, *m* of quartz (p. 94, also *g* on p. 72); *n*, plummet-like stone of limestone with pile and transverse groove (p. 94); *o*, spindle shaped plummet-like stone of highly polished, cream-colored limestone with transverse groove (p. 94); *p*, pestle-like object of basaltic stone (p. 93); *q-r*, plain plummet-like stones with pile at both ends—*q* is heavily incrustated, *r* may be of marble (p. 94); *s-u*, plain plummet-shaped stones with pile at one end—*s* is of black basaltic stone, *t* is of granitic stone, *u* is of schistose (p. 94).

Plate 23. Spindle-shaped "charmstones." × .42. *a-f*, spindle-shaped "charmstones" with notched ends—*a* of fine greenish sandstone, *b* of same material as *a* but darker, with handsome graining, *c* of dark gray fine sandstone with black streaks, found 18 inches underground, *d* white marble or quartz, *e* of steatite, *f* of fine grained sandstone with black streaks (p. 94, also p. 72 for *e*); *g*, plain plummet-like stone with pile at both ends, of brownish limestone(?), depressions on side which might be finger holds (p. 94); *h-j*, plummet-like stones with pile at both ends and notch at one end—*h* of dark green basaltic stone, *i-j* of dark gray schistose (p. 94).

Plate 24. Steatite olla.  $\times .20$ . In collection of W. R. Dumble, Bakersfield, California (p. 73). This specimen is broken and was bound together with a modern strap for photographing.

Plate 25. Steatite sherds showing cutting, drilling, and grooving.  $\times .34$ . *a*, 1-24792; *b*, 1-24790; *c*, 1-24786; *d*, 1-24696; *e*, 1-24692; *f-g*, 1-24790; *h*, 1-24792; *i*, 1-24788; *j-m*, 1-24787; *n*, 1-24788; *o*, 1-24787; *p*, 1-24788; *q*, 1-24792. Pp. 74, 75.

Plates 26 and 27, collection of A. F. Mayer, Alpaugh, California.

Plate 26. Chipped stone objects in the form of "crescents" and "butterflies."  $\times .42$ . *a-f*, "butterflies," all of chalcedony (p. 86); *g*, effigy-like scraper(?) of chalcedony (p. 87); *h*, portion of curved chalcedony blade (p. 87); *i-w*, "crescents," all with sharp convex edges and all of chalcedony except *j*, *w*, which are of schistose, *w* which is of greenish slate and is not only chipped but also ground, and *v*, *s*, which are heavily incrustated (note broken end of *s*) (p. 86).

Plate 27. Scrapers, hammerstones, crystal, crescent, and bowl.  $\times .41$ . *a-i*, scraper and (or) knives, all of chalcedony—*h* is unusual in that the sides have been worn down, perhaps intentionally to afford a hand grip, or perhaps as a result of wear (p. 86); *j-l*, chalcedony nodules probably used as hammerstones (p. 98); *m*, quartz crystal, very clear, broken (p. 99); *n*, crescentic stone, made from piece of sandstone mortar, inner surface of mortar plainly visible in picture, but crescentic shape not apparent (p. 89); *o*, fragment of bowl, of fine sandstone (p. 89).

Plate 28. Crescentic stones. *a-c*,  $\times .26$ , collection of A. F. Mayer; *d-g*,  $\times .50$ , collection of Samuel Fry, Alpaugh, California. *a*, of very smooth, highly polished, black stone; *b*, similar, but more greenish; *c*, of gray schistose; *d*, of granitic stone, incrustated; *e*, of very smooth, polished marble(?), containing sparkling bits like mica; *f-g*, of sandstone. P. 89.

Plates 29 and 30, collection of Samuel Fry, Alpaugh, California.

Plate 29. Hemispherical stones, arrow straightener, plummet-like and grooved stones.  $\times .50$ . *a-c*, *e*, hemispherical biscuit-shaped granitic stones, polished all over, with flat sides exceptionally smooth and slightly concave—*a* with flat side up, *b-c* with rounded side up, *e* unfinished (pp. 90, 91); *d*, uncompleted arrow straightener(?) (p. 67); *f*, probably an uncompleted perforated plummet-like stone of granitic material; *g-i*, plummet-like stones with longitudinal groove—*g* is of quartz and grooved on two sides, *h* is an egg-shaped stone with a longitudinal encircling groove, of granite, *i* a cylindrical stone with broad longitudinal encircling groove, of granite (p. 94); *j-k*, probably anvils (p. 98).

Plate 30. Metate, of granite.  $\times .42$ . This specimen is unusual in having been used on both sides, there being a similar depression on the reverse side to that shown in the plate. P. 91.

Plates 31 to 33, inclusive, collection of A. F. Mayer, Alpaugh, California.

Plate 31. Mullers.  $\times .41$ . All are of granitic material. P. 92.

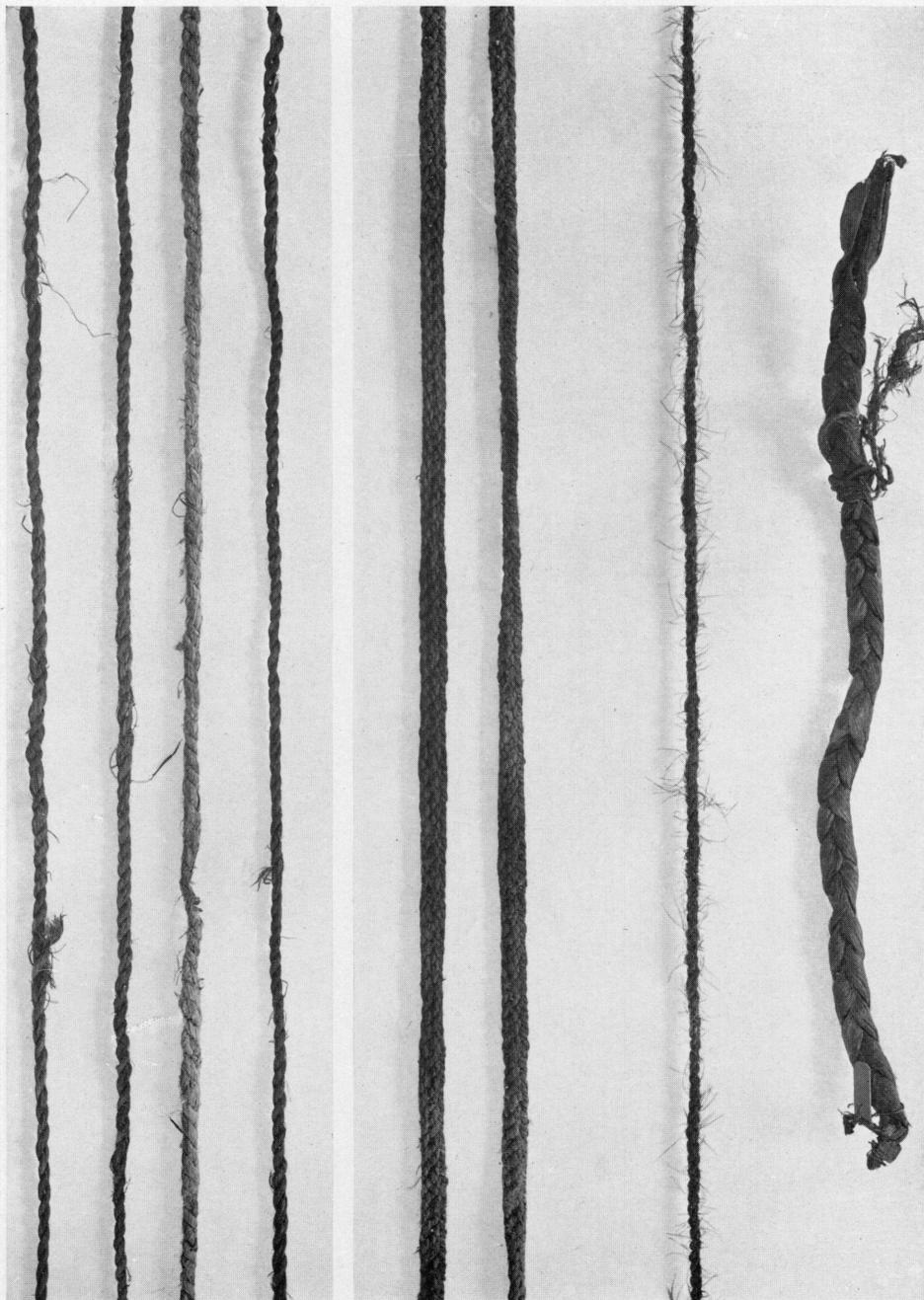
Plate 32. Egg-shaped "charmstones."  $\times .38$ . *a-f*, of granitic stone; *g*, of quartz; *h*, of mineral ore, very heavy; *i-j*, granitic; *k*, granitic; *l*, of soft shale; *m*, of brown limestone; *n*, of marble; *o*, of white quartz; *p-q*, of granitic(?) stone; *r*, of basalt, perhaps unfinished; *s*, of granitic material, probably unfinished. P. 94.

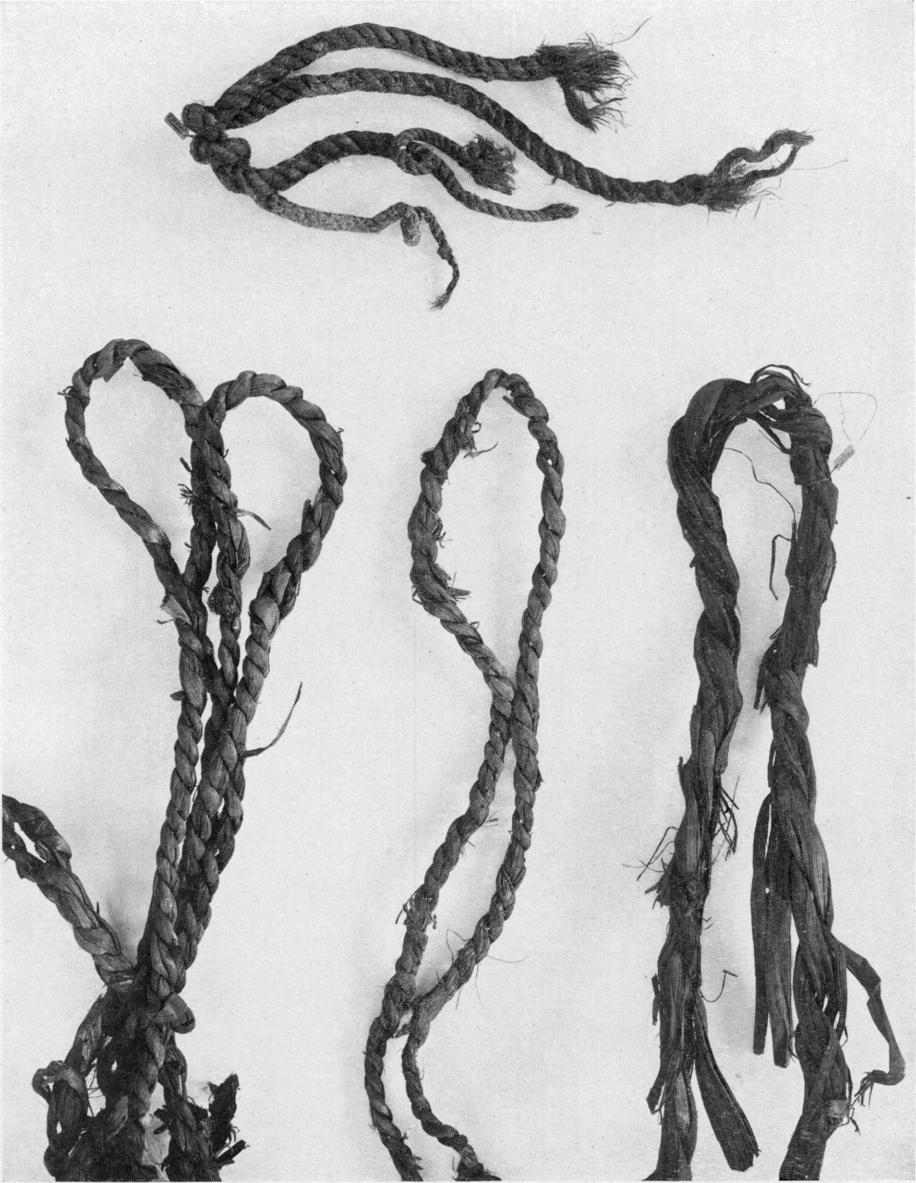
Plate 33. Plummet-like stones, buttoned, plain, and nipped.  $\times .20$ . Collection of A. F. Mayer (*a-n*) and Samuel Fry (*o-aa*), Alpaugh, California. *a-i, o*, with incipient, to fully developed button; *j-n*, plain, with pile at one end only; *p-aa*, with nipple; *a*, black and white granite, not incrustated originally; *b-c, f*, of "petrified wood"; *d-e, g*, of brownish limestone(?), more or less banded; *h*, of black, highly polished, hard basaltic(?) stone; *i*, of very fine-grained sandstone, a beautiful shaded brown; *j*, of gray shale(?) *k*, of "petrified wood"; *l*, of dark cream-colored limestone; *m*, of brown limestone; *n*, of brownish-green basaltic(?) material; *o*, of schistose; *p, t*, of "petrified wood"; *q*, tip of a "charmstone" similar in shape to *r*, presumably; *r*, of greenish basaltic stone, highly polished; *s*, of reddish brown, speckled stone; *u-v*, of gray stratified limestone; *w, y, aa*, of "petrified" wood; *x*, of schistose; *z*, of grayish-green basaltic stone. P. 94. (Note.—*o-aa* were all heavily incrustated originally and were cleaned by the collector, Samuel Fry.)

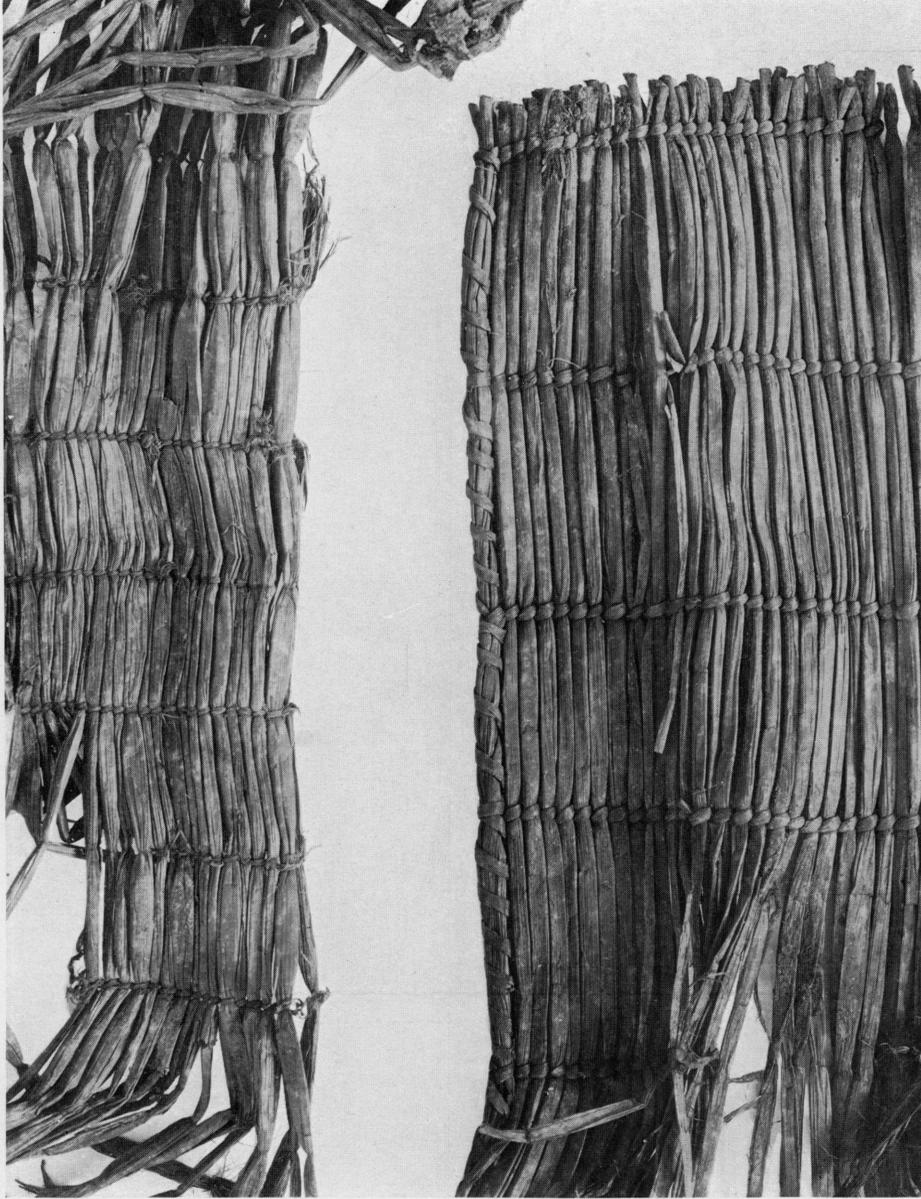
Plate 34. Plain and shouldered plummet-like stones.  $\times .19$ . *a-g*, plain plummet-like stones with pile at both ends; *r-ab*, shouldered plummet-like stones with pile at both ends; *a*, of "petrified wood"; *b*, of black "petrified wood," flat on two sides; *c*, of gray schistose; *d*, of fine-grained cream-colored limestone; *e*, of brownish-gray limestone; *f*, of cream-colored limestone with brown graining; *g*, of "petrified wood"; *h*, of shale with cream-colored and brown graining; *i, k, m*, of cream-colored limestone; *j*, similar to *h*, but with vertical graining; *l*, of "petrified wood"; *n*, like *h*, but with vertical graining; *o*, of fine-grained, gray sandstone; *p*, of very dark brown fine-grained sandstone; *q, s, t*, of light brown limestone; *r*, of black and white granite, found four feet underground, not incrustated when found; *u*, of light brown limestone; *v*, of light and dark gray stratified limestone(?); *w*, of black and white granite; *x-y*, of "petrified wood"; *z*, of dark cream-colored limestone; *aa-ab*, covered with a heavy white incrustation. This is the condition in which most of the plummet-like stones were found, the incrustation being removed by the collectors Mayer and Fry. P. 94.



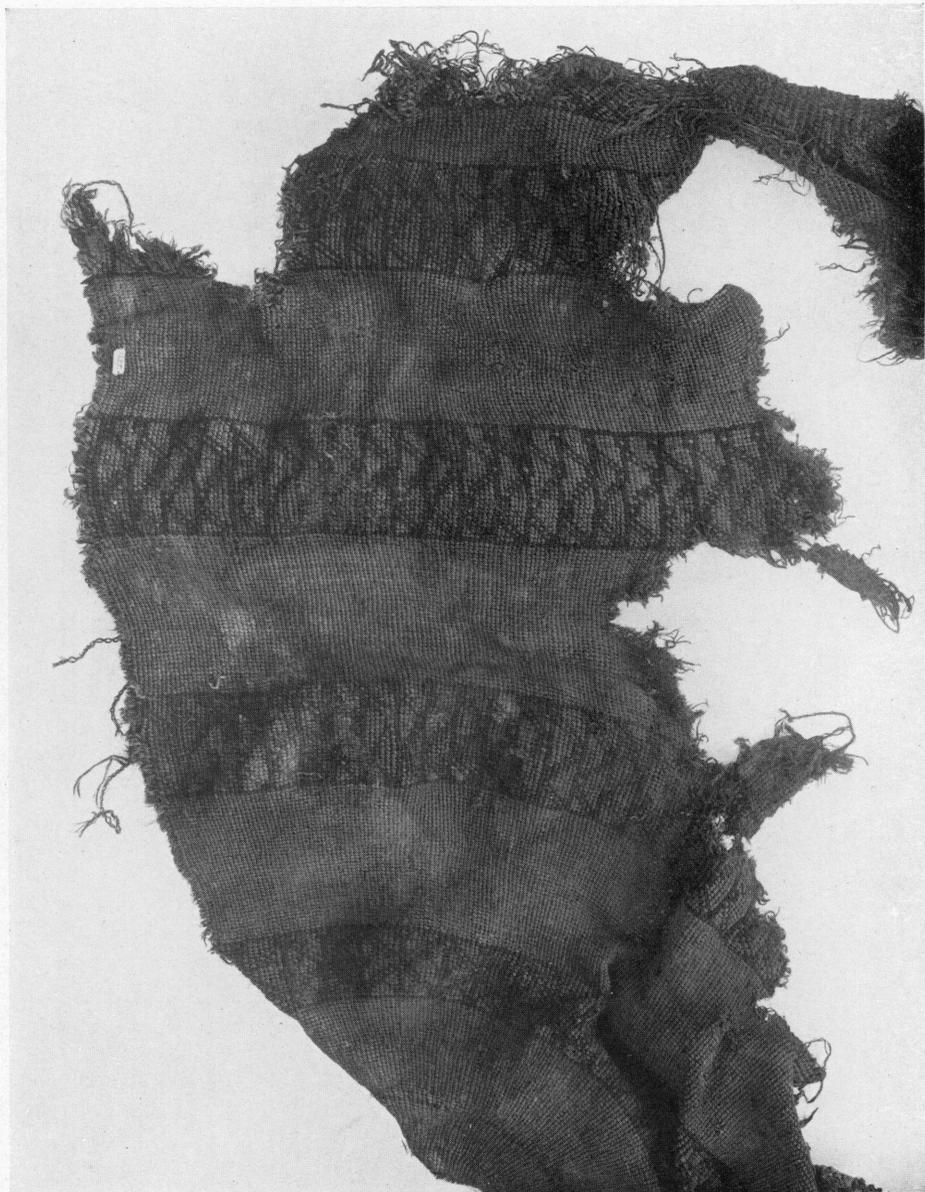


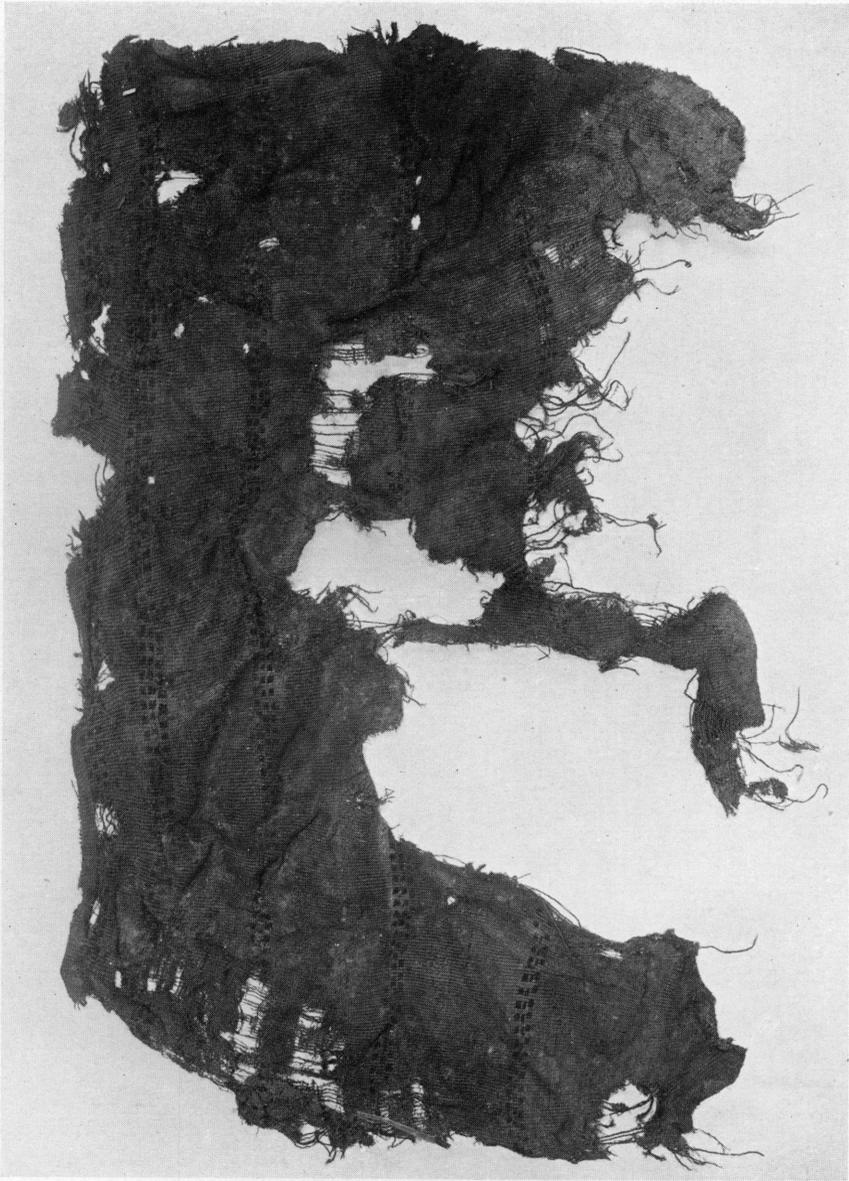




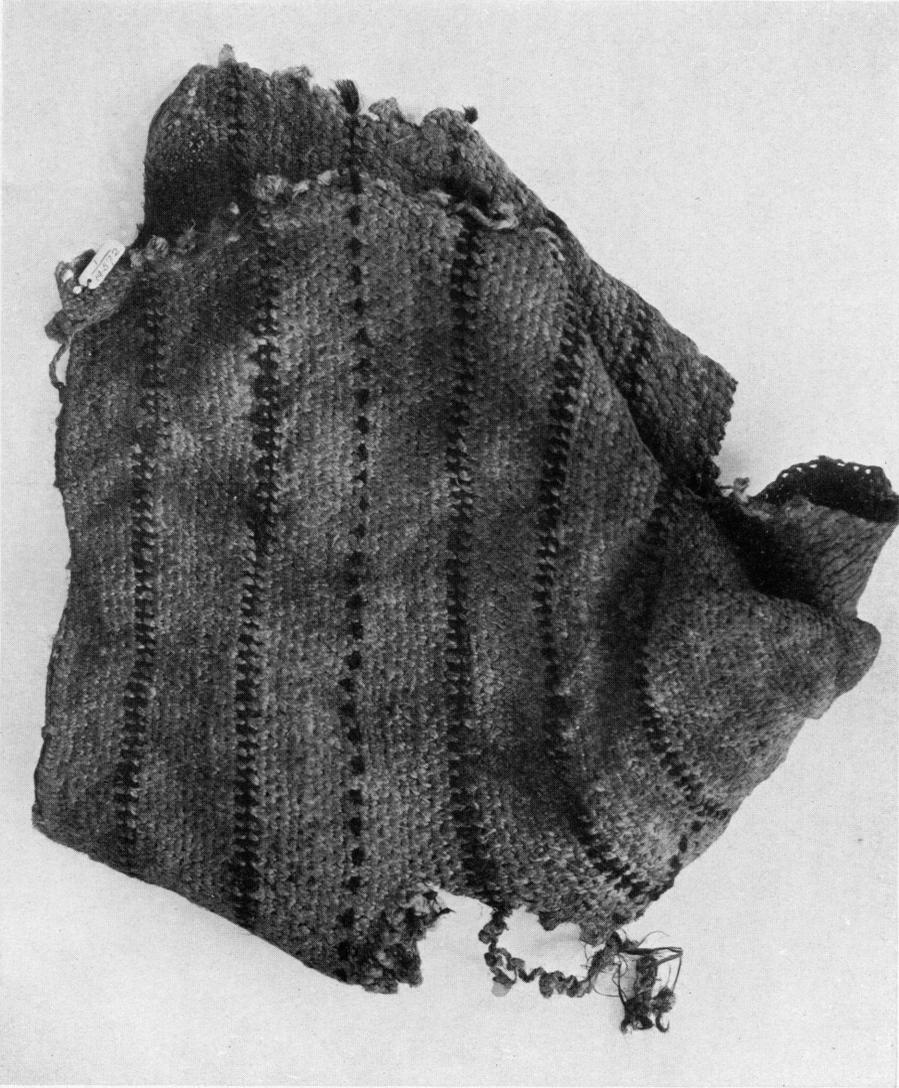


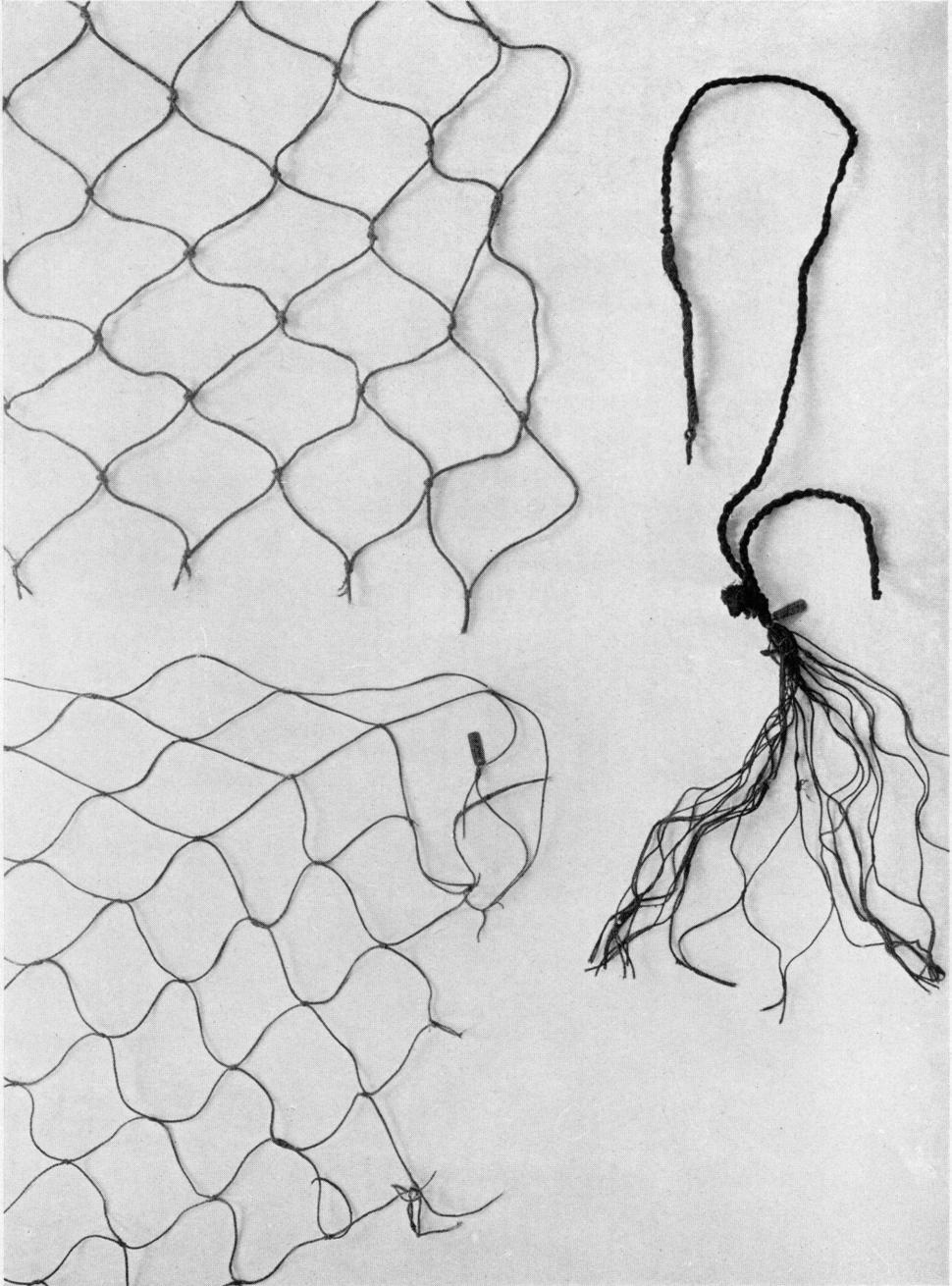


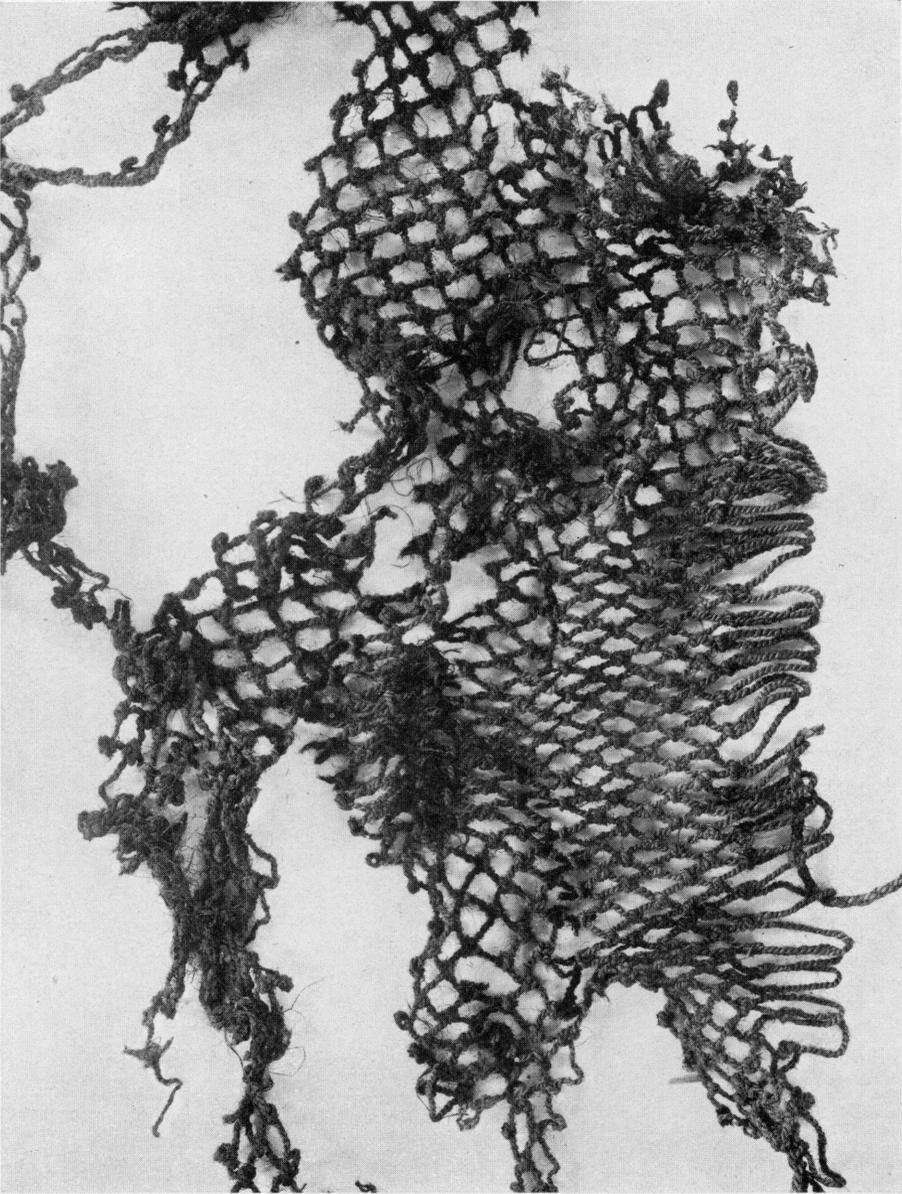


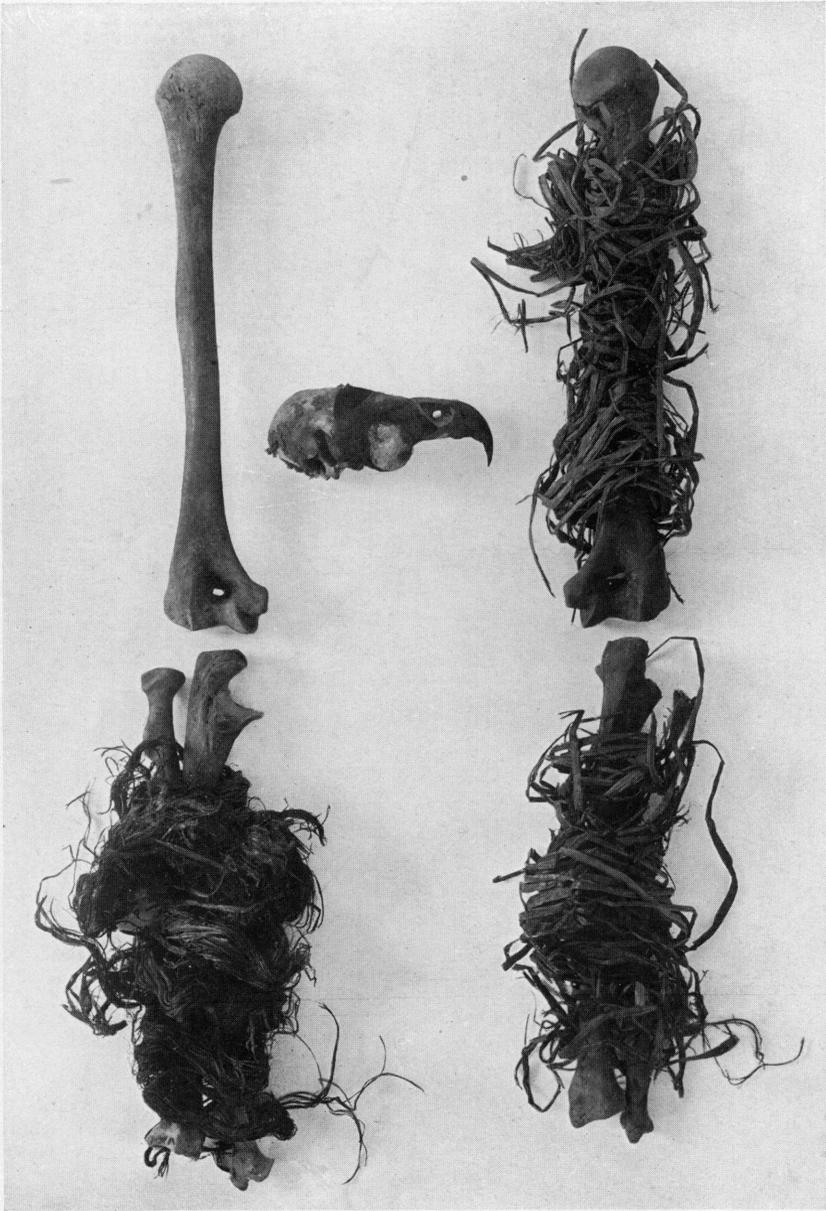


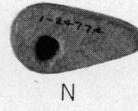
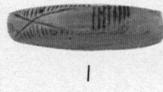


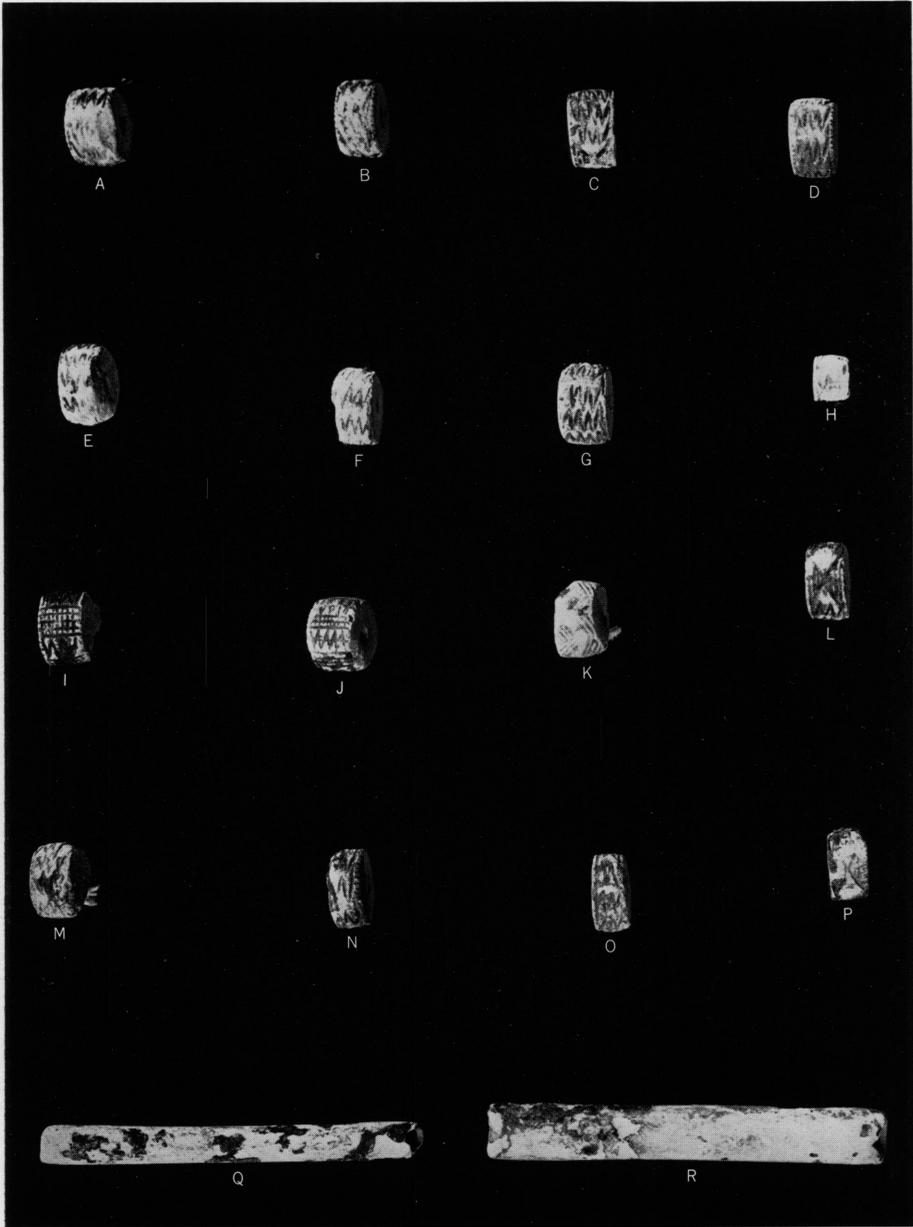


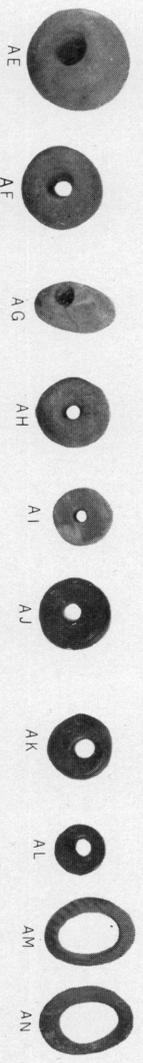
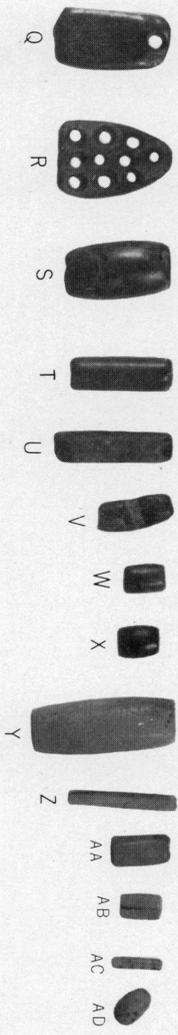
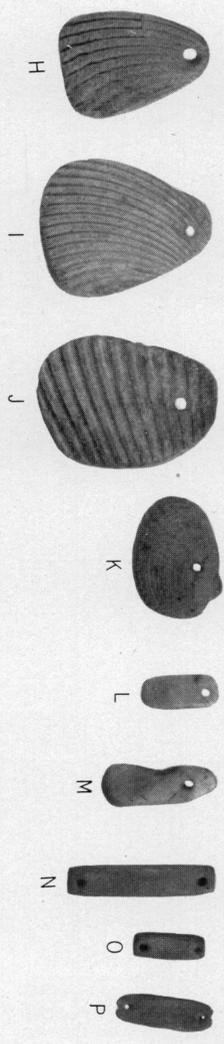
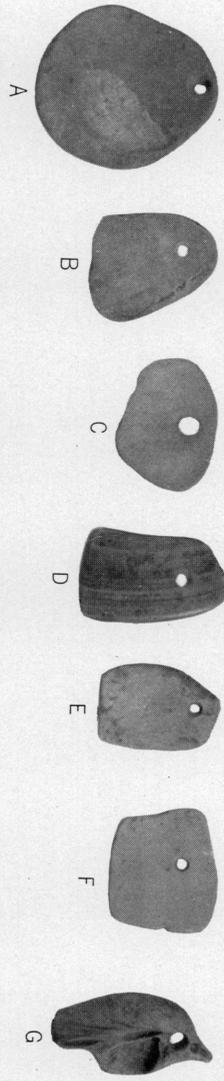


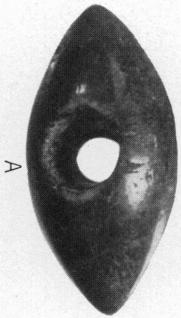




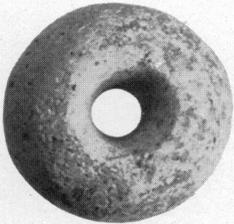




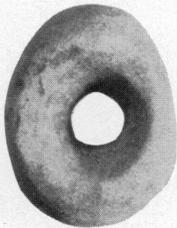




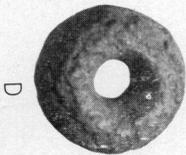
A



B



C



D



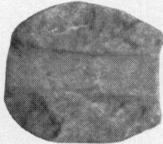
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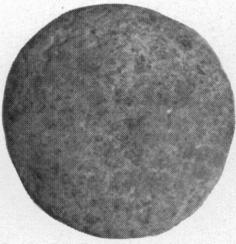
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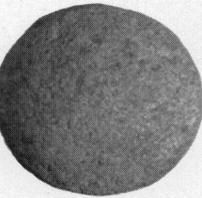
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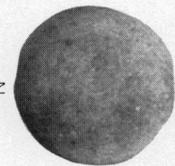
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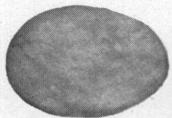
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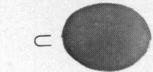
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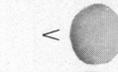
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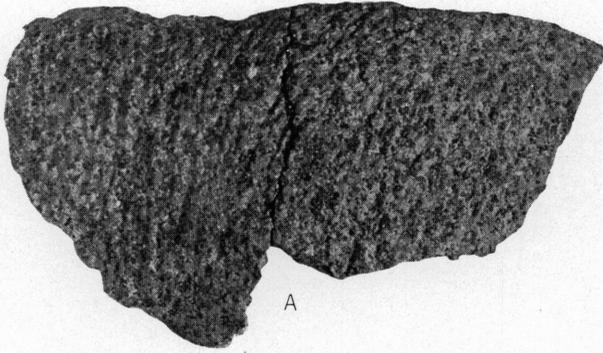
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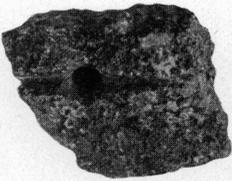
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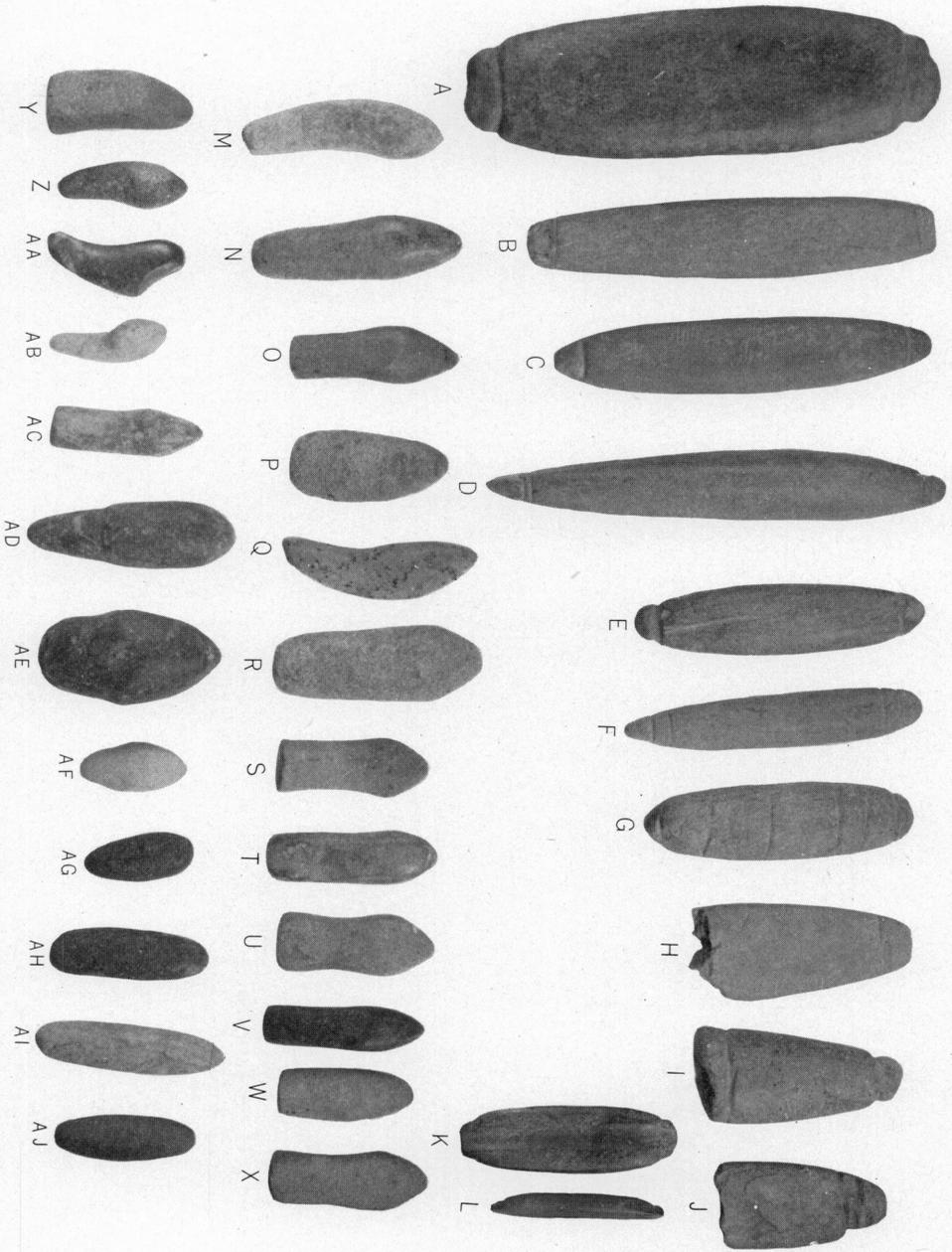
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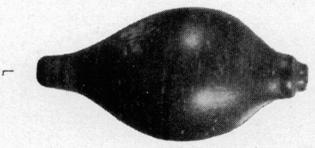
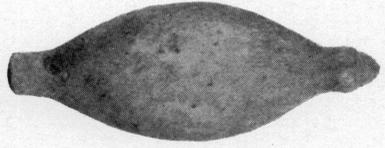
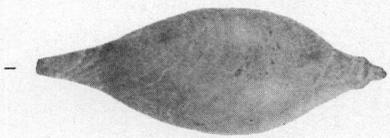
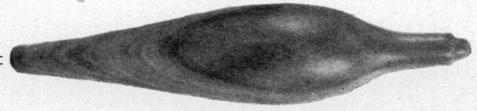
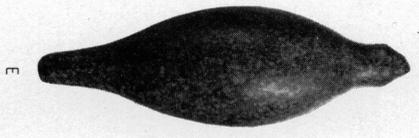
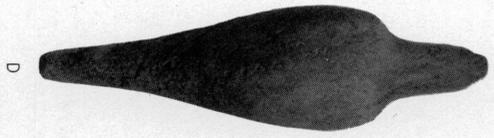
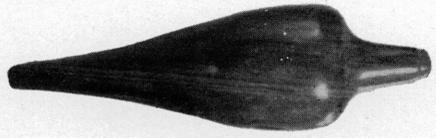
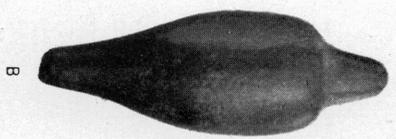
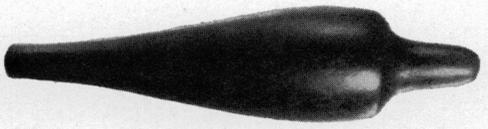


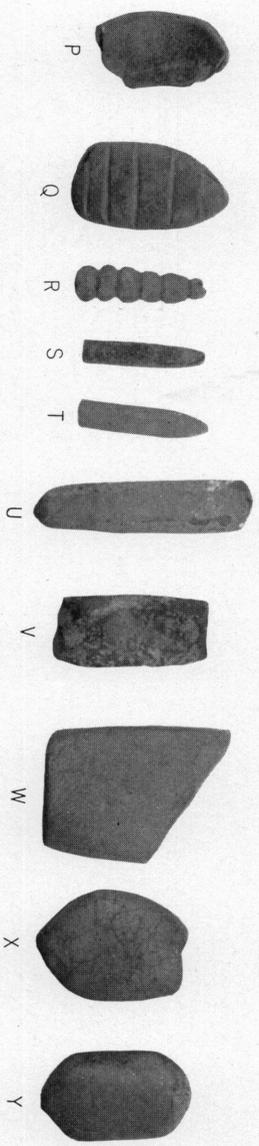
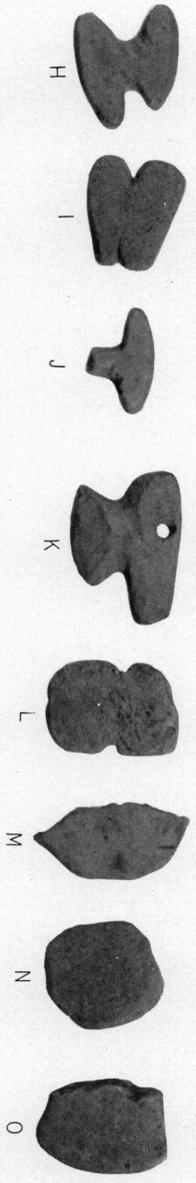
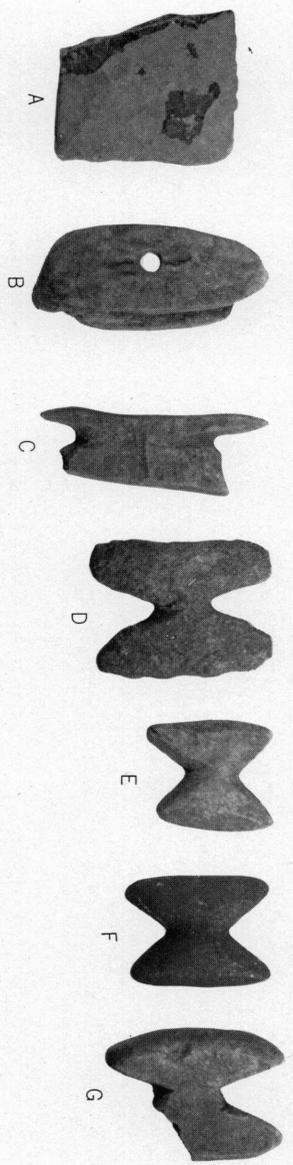
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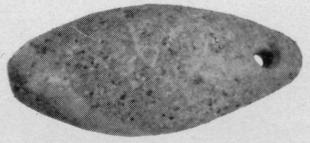








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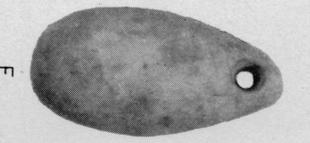
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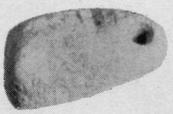
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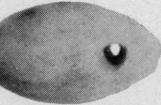
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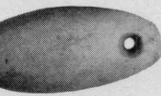
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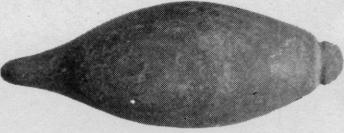
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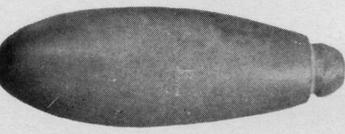
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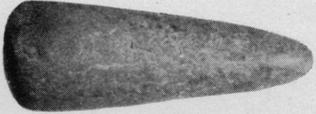
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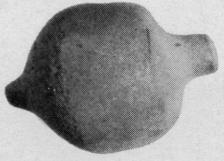
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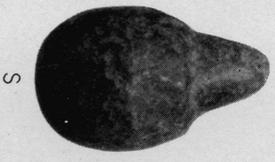
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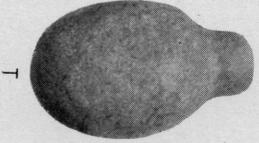
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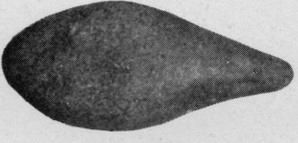
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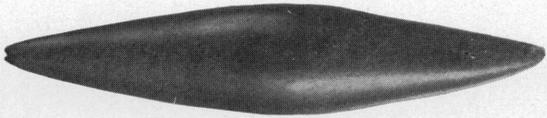
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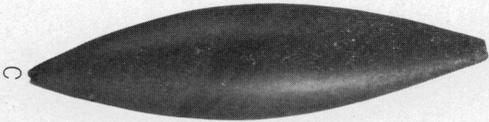
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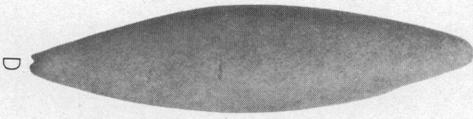
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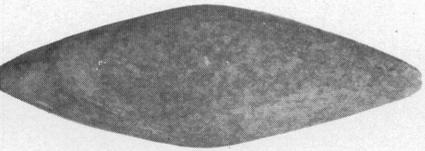
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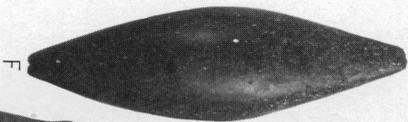
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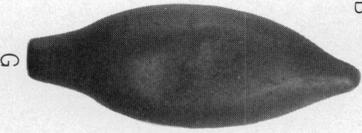
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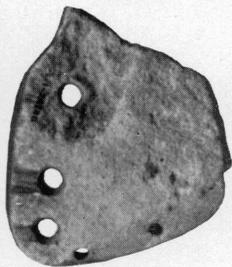




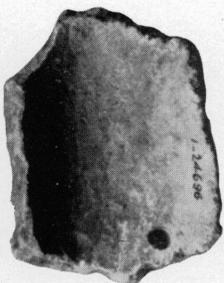
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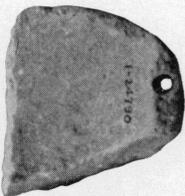
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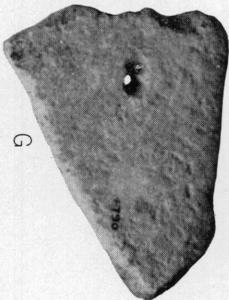
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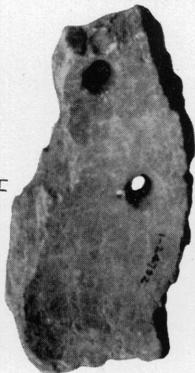
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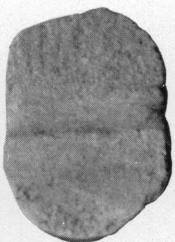
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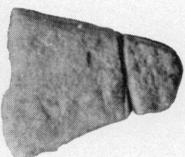
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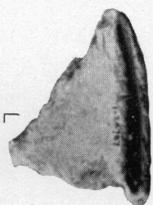
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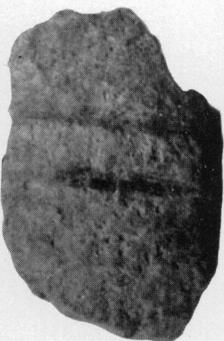
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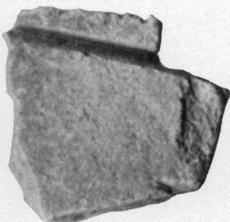
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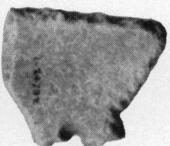
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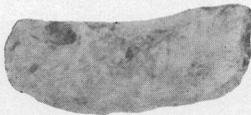
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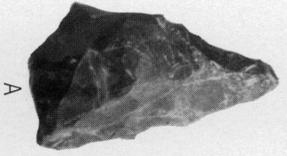
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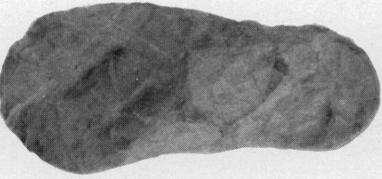
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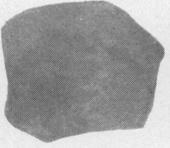
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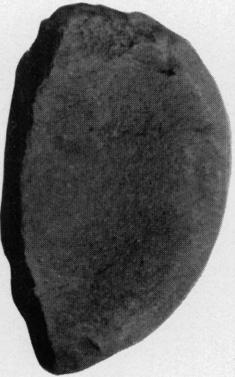
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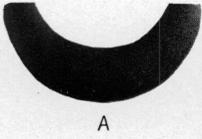
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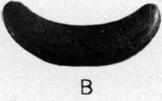
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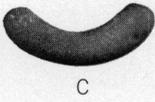
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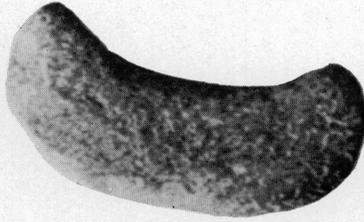
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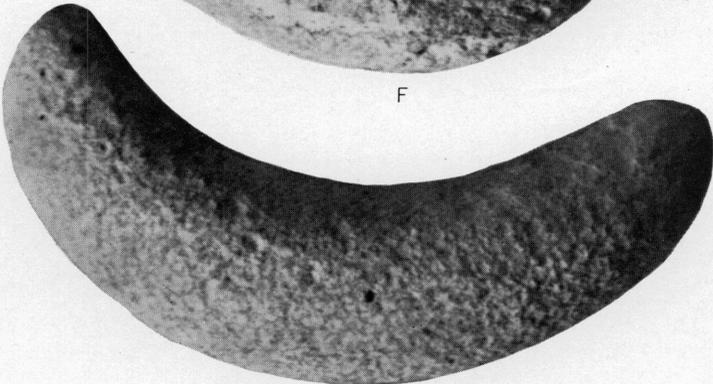
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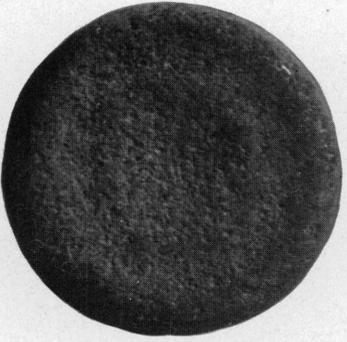
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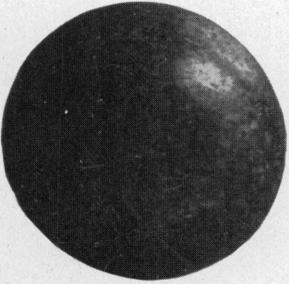
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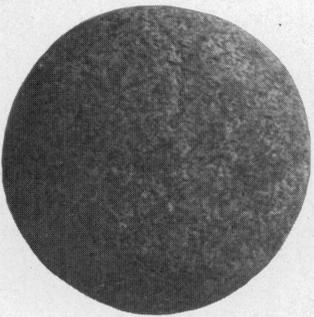
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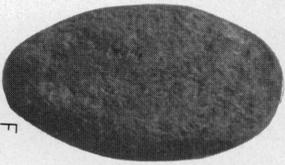
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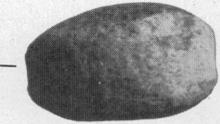
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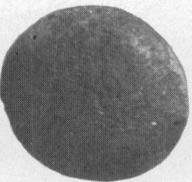
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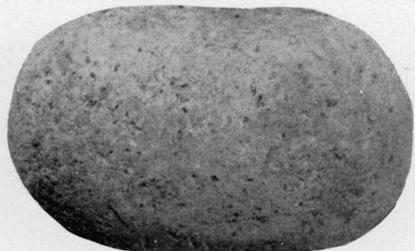
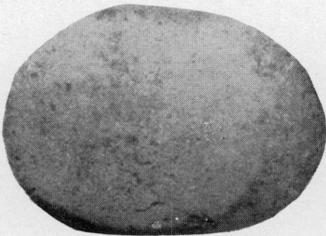
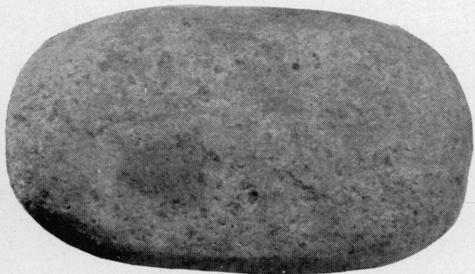
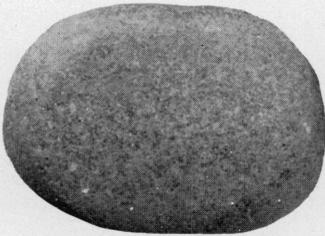
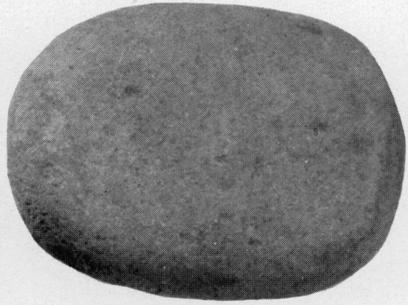
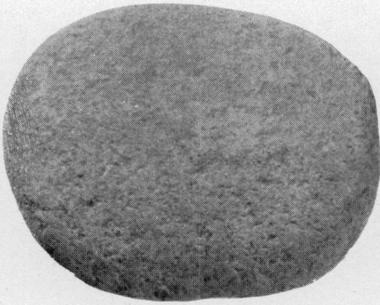


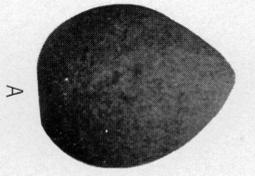
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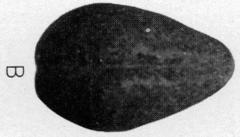
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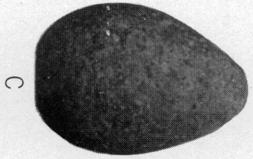




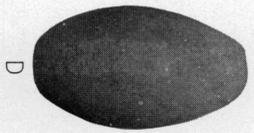
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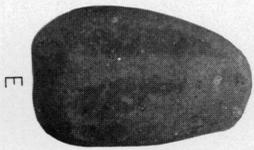
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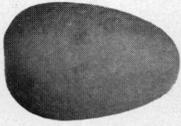
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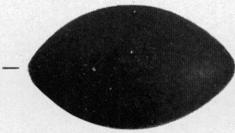
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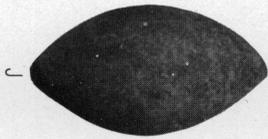
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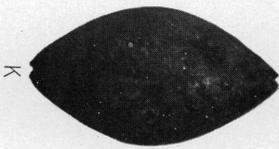
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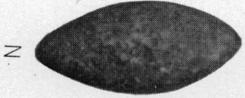
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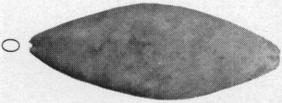
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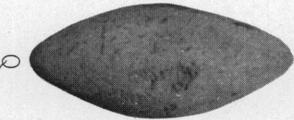
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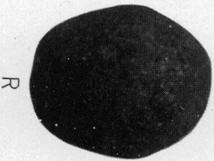
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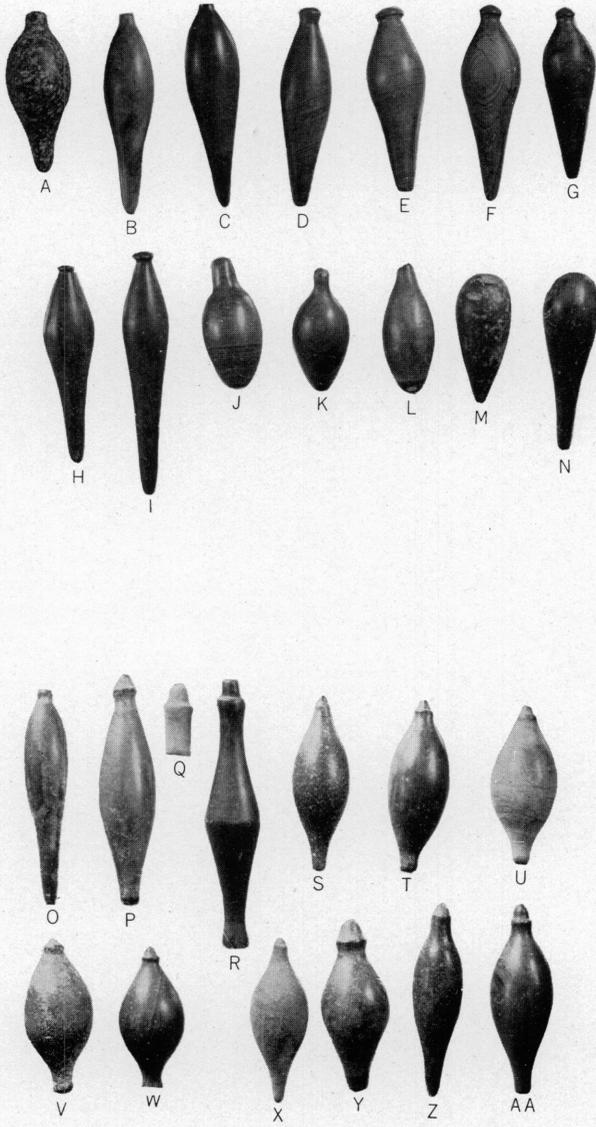
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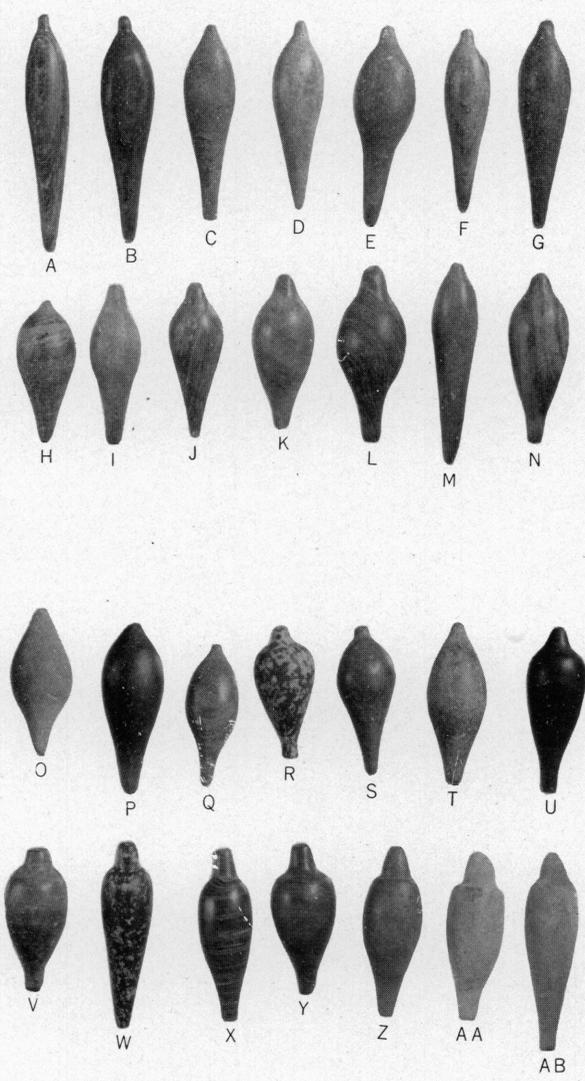


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