45. BURIALS IN SAND MOUNDS OF THE DELTA REGION OF THE SACRAMENTO - SAN JOAQUIN RIVER SYSTEM

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Outline of Mound Complex

From Tyler, Bradford, Holland and Bethel Islands, together with nearby mainland tracts, a series of sixteen sites have been recorded by the University of California Archaeological Survey. These sites, despite wide divergence in individual character, possess one feature in common: they are all located in or on small mound-like soil bodies which consist primarily of compacted sand which, with one or two possible exceptions, may be attributed to the formation known as Piper fine sandy loam.

Piper fine sandy loam, together with related soil types, has been described by Cosby (1941) and its distribution is shown in detail on his map. It occurs in isolated patches along the west side of the delta from the vicinity of Byron northward to a point southeast of Isleton. Cosby's Survey shows two or three small areas near Werner in the Orwood Tract, a heavy concentration of exposures in the Veale, Hotchkiss and Holland Tracts, an almost continuous expanse on southern Bethel Island, ten or more areas on Bradford Island and seven locations on the Webb Tract just to the east of Bradford Island. Separated from the latter region by approximately seven miles air-line are two outlying sand mounds on the southwestern end of Tyler Island. The Piper profile is also shown by Cole, Koehler, Eggers and Goff (1943) to occur near both banks of Old River along the southwestern edge of Union Island.

The physical appearance of these soils is best described in the words of Cosby (1941, p. 25):

> "The Piper soil occupies low mounds and ridges that have a roughly aeolian configuration and appear to represent a comparatively recent emergence of dunes and similar wind-modified bodies of sands somewhat related to the nearby bodies of Oakley sand. At some time in the past these emergent minor elevations probably were covered to varying depths by a mantle of peat, which gave the original terrain a more or less smooth, almost flat, configuration. The level of ground water undoubtedly was much higher than at present. Now, however, Piper fine sandy loam is well drained to almost droughty, especially on the higher ridges. A thin cover of saltgrass and herbaceous annuals has replaced the former tule-reed vegetation."

The typical profile shows a relatively thin surface layer of grayish fine sandy loam with a high organic content and considerable lime. This grades into subsoil layers with diminishing organic content but still heavily calcareous. Ultimately, at from 2-1/2 to 5 feet the unweathered substratum is seen to consist of a light colored, heavily indurated sand. There are many local variations in both the thickness and appearance of the individual layers and in certain localities the Piper series grades extensively into other soil types, thus presenting many transitional

aspects. In particular the Piper grades into the Egbert soils generating what Cosby calls the "Piper-Egbert Complex." The Egbert soils are predominantly derived from peat deposits (see Cosby's discussion on pages 19 to 22). Hence the Piper-Egbert Complex is characterized by conspicuous masses of compacted sand with intervening layers of almost unaltered peat. This composite horizon, as shown by Cosby, is developed almost exclusively on Bethel Island and the adjacent southeast corner of Jersey Island.

Of the northern sites, which are found on Tyler Island, the most thoroughly excavated is Sac-104. It lies on the eastern end of a fairly large and quite conspicuous sand mound. Although it has been almost entirely destroyed by agricultural operations, sufficient has remained for archaeological investigation. In the exposures examined (Fenenga, n.d.)* it is clear that a layer from several inches to a few feet deep of Late Culture deposit covered the top. The material is black, heavily impregnated with charcoal, and filled with bone fragments, shell fragments and obsidian chips. It therefore differs in no essential respect from many other deposits of recent habitation midden.

The Late habitation midden rests unconformably on the indurated sand base characteristic of the Piper fine sandy loam profile. It is probable therefore that the surface of the Piper formation was bare when the deposition of the upper habitation material began. Nevertheless a number of burials have been found within this sandy base. According to Fenenga (op. cit.) at least one of these burials is intrusive. On the other hand, regardless of whether or not they are intrusive, the cultural period represented must be entirely different from, and antecedent to, that during which the late midden was deposited.

In the files of the U.C.A.S. site Sac-45 is described as a cap of habitation deposit on a Piper fine sandy loam base. The thickness of the cap has been stated to be three feet, and burials have been removed from it. No burials, on the other hand, are known from the sandy base.

Site Sac-162 is located about one-half mile to the northeast of Sac-45 in a cultivated field. It is described (U.C.A.S. site record file) as consisting of "yellow sand with dark sandy loam beneath." There is little occupation deposit on the surface yet artifacts were found and also "some fragments of charcoal; mammal bones; river mussel." Possible "intermittent occupation" is conceded. The mound has never been excavated and therefore no burials are known. On the whole, allowing for a much lighter occupation, Sac-162 appears to be of the same type as the sites previously mentioned.

Southward from Tyler Island the next known sites are on the western shore of Bradford Island. These were recorded relatively recently and have been designated CCo-2 and 17. The latter is located 100 yards east of the levee at approximately the midpoint of the western shore line in an area comprising several acres of mixed Piper fine sandy loam and Oakley sand. The site itself is probably on Piper, rather than Oakley, formation

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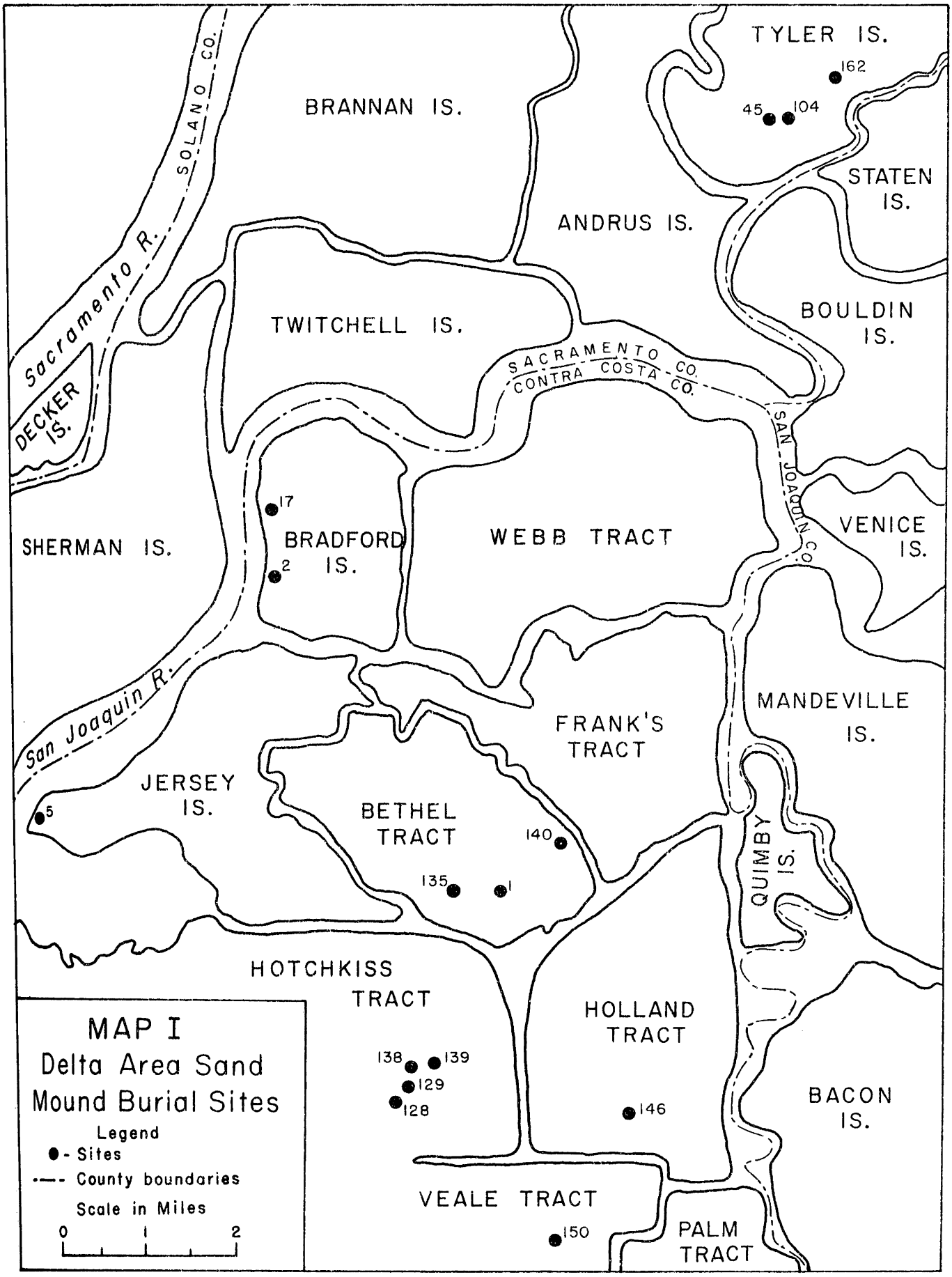
* UCAS Ms. and Site Records on file at UCAS office, Univ. of Calif., Berkeley.


TYLER IS.
162
45
104
BRANNAN IS.
SOLANO CO.
Sacramento R.
STATEN IS.
ANDRUS IS.
TWITCHELL IS.
BOULDIN IS.
SACRAMENTO CO.
CONTRA COSTA CO.
DECKER IS.
SAN JOAQUIN CO.
17
SHERMAN IS.
BRADFORD IS.
2
WEBB TRACT
VENICE IS.
San Joaquin R.
FRANK'S TRACT
MANDEVILLE IS.
JERSEY IS.
5
BETHEL TRACT
140
135
1
QUIMBY IS.
HOTCHKISS TRACT
HOLLAND TRACT
138
139
129
128
146
BACON IS.
VEALE TRACT
150
PALM TRACT
MAP I
Delta Area Sand Mound Burial Sites
Legend
- Sites
County boundaries
Scale in Miles
0
1
2

and consists (or formerly consisted) of a relatively deep deposit of probable Late occupation midden from which numerous burials were taken by the local inhabitants, together with stone and bone artifacts, none of which are now available for description, obsidian chips, and other characteristic debris. There is no authentic record of any skeletons having been found in the underlying sandy base at this point.

The second locality (CCo-2) on Bradford Island lies close to the southwestern tip of the island, just behind the levee, where roughly an acre of Piper fine sandy loam is exposed. According to an apparently reliable report a workman digging a ditch through the sandy base discovered a skeleton, the bones of which have long since been lost. Although it is claimed that a metate was found on the surface of this sand mound, there is no real evidence that it was subjected to occupation in the Late Horizon. In fact, examination of the soil profiles exposed by farming operations indicates no midden deposition whatever.

South of Bradford are Jersey and Bethel Islands. On the former, although there are extensive exposures of Piper fine sandy loam, only one site has been recorded, CCo-5. This was found and recorded by U.C.A.S. in 1953. It was placed on the south bank of the San Joaquin River, three miles above Antioch, on the exact western tip of Jersey Island. The site could not be examined thoroughly and no clear description could be obtained except that, due to river erosion, burials were washing out of the sandy soil. Three burials had been noted, of which two were recovered, together with one pestle and two mortars. The soil map of Cosby shows no Piper sand at this locality; indeed the entire western end of Jersey Island is delineated as Staten muck. However, it is quite likely that a small body of sand existed here which escaped the notice of the soil survey. At any rate, it is clear from the report that the skeletons were washed out of sand of some sort.

On Bethel Island CCo-135 is located one-half mile north of Farrar Park, in the southeast corner of the junction of the Bethel Harbor Road and the road running east to Frank's Tract. It consists of the now almost completely destroyed remains of a small mound of Piper fine sandy loam. It was visited in 1952 by the U.C.A.S., and it was noted at the time that an exposed cut shows a 14-inch band of occupation midden lying beneath 32 inches of sterile sand. The base consisted of the typical indurated calcareous sand. Burials had been reported from the portion of the mound which had been bulldozed.

A more recent examination made in 1955 indicated that some revision of the earlier report was necessary. It was found by the present writers that a small portion of the south rim of the site is still intact. The profile exposed demonstrates three clear horizons. The uppermost is composed of two or three feet of loose gray sand, without stratification and apparently laid down by wind action. The second horizon is made up of eight to twelve inches of black, semi-carbonized peat mixed with sand. The structure of the organic material is unquestionably that of peat and there is no indication whatever of any occupation debris within it. The peaty layer rests unconformably on the third horizon, a deep, heavily compacted, brownish-gray calcareous sand.

The structure described, with minor variations of dispersion and depth in the peaty layers, and with the frequent occurrence of ashy layers, was found to be very common over the southern portion of Bethel Island wherever road or ditch construction has exposed a profile. Moreover, in all its features this formation corresponds closely to the descriptions given by Cosby for the same area.

From the foregoing it must be concluded that the site designated CCo-135 was not occupied in the Late Horizon of Central California and that the burials disinterred by bulldozing came from the underlying sand.

Half a mile east of the preceding site is a large sand mound covering several acres. It is shown on the soils map as an island of Oakley sand lying surrounded by an extensive area of intermingled Piper fine sandy loam and Piper-Egbert Complex. The Oakley sand forms a large, dune-like mass to the south of the highway, which almost reaches the dimensions of a low hill. Into the north face of this mass a sizeable excavation for sand has been carried, while the road itself has been cut through the northernmost outlyers of the mound as a whole. The exposures along the highway (Frank's Tract road), along the face of the bulldozed sand pit, and along the small dirt road on the west slope of the mound all have been examined by us. The profiles nowhere give any indication of occupation. The Oakley sand mass is poorly differentiated as to distinguishable layers. The Piper and Piper-Egbert Complex soils on the periphery display numerous peaty and ashy horizons overlying the normal indurated sandy base.

The description of site CCo-1 in the U.C.A.S. records notes: ". . . occupation area indicated by darkened soil and burials. . . ." It has been pointed out above that the darkened soil in this region is often due to frequent peaty layers, not to habitation midden--the dark soil at CCo-1 seems also to be derived from peat. The cultural remains are reported to have consisted of 2 pestles only. Four burials were in "subsoil" at a depth of 4 feet, and in a matrix of sterile sand.

The site known as CCo-140 is a sand mound covering perhaps 2 acres and located on a side road approximately three-quarters of a mile north-northeast of CCo-1. Its surface, on which stands a house and barn, is composed of a compact light gray sand, with no sign of cultural occupation. It has never been excavated but since it is a Piper formation its structure may be assumed to resemble that of the many similar mounds in the vicinity. An interview with the present owner disclosed only that the disinterment of skeletons in former ditching or bulldozing operations had been reported.

About a mile and a half south of Farrar Park, in the Hotchkiss Tract, is the well-known group of sites, of which CCo-138 is the largest. This Late Horizon site, which has been thoroughly excavated and has been discussed briefly (Lillard, Heizer and Fenenga, 1939, pp. 70-72; Chard et al, n.d.) has a very deep deposit of habitation midden.

About 350 yards directly east of CCo-138 stands a mound which was recorded in 1939 and subsequently designated CCo-139. It was reported to have gray-brown soil and showed several house pits. It probably was

of Middle culture, with, perhaps, Late culture occupation on the upper surface.

CCo-128, recorded in 1949 by U.C.A.S. as being one-quarter mile southwest of CCo-138, is in an area which has been long cultivated--nevertheless bones and artifacts were found there at the time of investigation. The soil is "sand" and the site was considered to be ". . . a campsite on top of sand dunes. . . ." Since no evidence was found of occupation deposit, it is not unreasonable to regard this site as being basically different from CCo-138, i.e., as a site which did not have a cap of Late midden deposit overlying the sterile sand.

Another locality ". . . 150 yards south of Hotchkiss site . . ." also recorded in 1949 by U.C.A.S., was given the designation CCo-129. This spot was also cultivated in 1949 but the recorder of the site states that burials and artifacts had been removed from "indurated sand dune." The burials were "mineralized skeletal material obtained by private collectors."

The Hotchkiss area is shown by Cosby (op. cit.) on his map as comprising outcrops of Oakley sand, and Piper fine sandy loam bordered on the east by Egbert muck and on the south by Sacramento clay loam. The locations of the recorded sites show that the aboriginal inhabitants evidently took advantage of the sandy knolls which must have risen above the neighboring soft and saturated soils. Of these sites, two appear to have been extensively used for habitation during the Late culture period (CCo-138, 139), whereas the other two (CCo-128, 129) must probably be classed as burial mounds, without any habitation deposit.

Not far to the southeast of the Hotchkiss Tract is Holland Island, on which occur numerous exposures of the Piper fine sandy loam. Most of these have been examined, and two have been recorded as archaeological sites, CCo-146 and CCo-147. CCo-146 lies in the south central part of the island about half a mile north of Rock Slough. The eastern portion of the mound was recently removed by bulldozing, and a cut face several feet in height was made visible. In 1954 a group of students in the archaeological methods field course at the University of California removed a number of burials from this exposure. Examination of the mound shows a surface layer of dark gray sandy material, rather loose in structure, lying unconformably on a light colored indurated sandy base. The general organization resembles closely the Piper mounds of Bethel Island, and it is clear that the upper layer cannot be occupation deposit. The burials were all taken directly from the compact sand of the base, and in this instance there was unmistakable evidence that they were not intrusive.

The site of CCo-147, now destroyed, is situated roughly 1,000 feet north of CCo-146 and is probably of the same type as CCo-146. It was reported in 1943 by a local citizen and very little is known about it. Definitely it was not a Late culture occupation mound and any skeletons which have been found must have been derived from the sandy base. Whatever the case, in view of the paucity of data on this site, it will not be included in our considerations here.

Due south of CCo-146, and about one mile south of Rock Slough in the Veale tract, is the southernmost "Piper" site considered here: CCo-150. This site was recorded in 1939 and is described as lying on an S-shaped sand ridge, a ridge which is shown by Cosby on his map as being composed of Piper fine sandy loam. The site, and the underlying ridge, lie in a cultivated field, and are now completely destroyed. However the area was seen and described by Lillard, Heizer and Fenenga (1939), who state that there was a habitation deposit on the surface, with a maximum depth of three feet, and attributable to Phase 1, Late Culture period. They found no burials from the underlying sandy base.

Not shown on Map 1 is site CCo-141, which is located on the west central edge of the Palm Tract. Although this area is within the range of occurrence of Piper fine sandy loam, Cosby's map does not show any specifically sandy type soils whatever on the Palm Tract. Site CCo-141 nevertheless is described as located on "a long narrow sand ridge," with a mound mass much like that of CCo-150 (see above) "except that it is more indurated" (Ibid., p. 54). Although there was material of Late Horizon association on part of the site, definite Middle Horizon artifacts recovered indicate that the latter was the predominating culture present (Ibid., p. 55). Field notes from the excavation (Krieger, n.d.) describe removal of burials from a very hard matrix, so hard that "only enough was removed to clear immediate burial earth." While it is not established whether Piper fine sandy loam was involved here, it is plain that some type of hardened, sterile-appearing soil, containing burials, was overlain by a softer, sandy cap of midden, representing a later period of time.

The preceding descriptions demonstrate that many of the small sand mounds of the western delta region were formerly occupied by man. These mounds are numerous and all have by no means been examined intensively. However, surveys through the last two decades have revealed enough data to warrant certain tentative conclusions with reference to the age and type of habitation. Discussion must center around two primary features of the sites under consideration.

1. In the period immediately preceding the Spanish conquest of California the region in which most of the Piper sand mounds occur was a portion of the inundated "Tulares," or Great Tule Swamp. The land surface was flat and was at, or only slightly above, sea level. Hence the area was subject to periodic flooding, either daily at high tide, or annually through the flooding of the rivers. For permanent habitation, or even prolonged camping or fishing, protection from the open water was necessary. For this purpose the sand mounds must have been ideally adapted. It is therefore not in the least surprising to find extensive recent habitation remains at the Tyler Island group (Sac-45, Sac-104, Sac-162), on Bradford Island (CCo-17), near Rock Slough (CCo-138, CCo-139, CCo-150), and in the Palm Tract (CCo-141).

The intriguing problem is why such occupation sites were not more numerous. The opportunities for occupation were nearly without limit. South of the San Joaquin River there are dozens of entirely suitable small eminences, raised well out of danger from the severest flood. Yet in only four localities, as far as is known at present, was use made of

these habitation facilities during Late Horizon times. Only the negative deduction is possible that in the marshy western border of the delta flood-proof terrain was not the limiting environmental factor, and that other pressures, such as food, housing, and the like determined the density of settlement. The nature and interaction of these influences must be left to future study.

2. In ten of the sixteen sites recorded prehistoric burials were found in the heavy, compacted, unweathered base of the Piper formation or similar mound. The occurrence of these deep burials probably bears no relation to the presence of habitation deposit nearer the present surfaces of the sites. In fact there are only two sites, Sac-104 and CCo-141, in which human remains of both types, i.e., those in sterile sand and those in midden soil, have been found. At Sac-104 one burial appeared to be intrusive in the sterile sand, indicating activity by people existing after the final formation of the mound or dune. Other burials at the same site were non-intrusive, as were all of those at CCo-146. The situation at CCo-141 is not quite clear in this respect. At CCo-2, CCo-5, CCo-135, CCo-1, CCo-140, CCo-128, CCo-129 and CCo-146 bones and skeletons were removed from sandy soil at points where there was no known late habitation.

One purely physical consideration is nearly decisive. If the inhumations in the sandy deposits, Piper or Oakley, were performed by inhabitants of the Late Horizon, or indeed by any inhabitants subsequent to the formation of the modern soil profiles, it would have been necessary to excavate large openings in the sandy base. This material is now and probably for a long time has been so densely compacted that to penetrate it is extremely difficult. It can be done with great labor with pick and shovel, but with any bone or wooden tool known to the aboriginal occupants it would have been almost impossible. One is driven to the alternative that the skeletons found their resting place when the sand was soft and burial easy.

The conclusion is therefore reached that the numerous scattered burials in sand represent a much earlier and quite different phase of human activity than do the occupation middens previously discussed.

This early phase appears to have been widely dispersed and may have reached a considerable density of population. Let us note two considerations: (1) The Late habitation sites consist of relatively conspicuous areas of unique physical composition. They are easily found and recognized. Allowing for a great deal of destruction of these sites in the past century, nevertheless it is probable that we know about a very large fraction of those which existed one hundred years ago in the western delta region. (2) With but one exception (CCo-141) the burials taken from the ten sandy deposits mentioned here were discovered by accident, and were reported at the time or afterward to inquiring archaeologists. The accidents involved leveling or ditching operations carried out for agricultural or irrigation purposes. Hence, what has been recovered is a nearly random sample of what was originally present, and what has been reported must be a very small fraction of what has been discovered. Any attempt at computation of the number of burials, in the absence of

adequate data, would be useless, but it would not be inappropriate to state that there must once have been and probably still are a great many thousand skeletons entombed in the sand mounds. If so, even if the total span of time during which they received burial was extensive, a considerable population must once have inhabited this region.

With respect to actual antiquity, we can do little more than speculate. As reported recently (Cook, 1951), chemical analysis of bones from Sac-104 indicated an age dating prior to the Late culture period, but no exact date could be given. The best evidence is, perhaps, derived from the stage of soil development.

Fenenga (op. cit.) refers to the induration of the sandy base at site Sac-104: ". . . This process of hardening would unquestionably have required some period of time, but Prof. Storie regards the soil profile exposed as an immature one. The age of the burials, therefore, must be great enough to permit the hardening of the soil but not great enough to permit the development of a mature soil profile. . . ." We may add comment concerning CCo-135 and CCo-146.

In both of the latter sites there was no habitation midden and no evidence of intrusion. The bones came from well within the compacted sandy base. In both sites the sandy base was not in conformity with the layer above. At CCo-135 in certain spots thick peat layers overlaid the base. In both sites the top layer consisted of a weathered, gray, moderately loose sand. These findings require a minimum of interpretation. Subsequent to the formation of the original dune (undoubtedly by wind action) there was a period of erosion. At this time, or prior to it, the transfer of calcium salts had proceeded far enough to give great solidity to the structure, because the present upper surface of the base itself is as highly indurated as the lower levels.

After a period of erosion, the water table rose, or the land sank so as to cover the surface of the dune with water for a long enough time to accumulate what amounts in some places to a foot or two of peat. The cause of such oscillations of land or water is quite unknown, although Cosby (1941) has discussed the problem, as has also Weir (1950). The final stage embraces the emergence of the mound from the level of seasonal or perennial water and the deposition by wind action of from one inch to several feet of sandy soil on top of either the peat layers or the old eroded surface of the indurated base.

That these processes must have consumed considerable time cannot be gainsaid. Although no exact span of years can be assigned we must be reckoning in terms of several to many centuries. It must be reiterated that the temporal element confirms the deductions based upon the distribution and the physical nature of the mounds, viz. that the burials in the deep sand represent a population and a culture far antecedent to that which deposited the Late period habitation middens at Tyler Island, the Hotchkiss and Palm Tracts.

Artifacts Associated with Burials

Table 1 summarizes the data gathered from the various sites in question. It may be seen that a majority of the sites which exhibit a definite midden deposit overlying the indurated sand are classified on the basis of artifact types and general soil quality as Late Horizon sites. The exceptions are CCo-17, where no artifacts have been identified, and CCo-139, which appears to have Middle Horizon associations in the midden deposit (e.g., type 3b2 Olivella beads; Beardsley, 1954, p. 45).

Since no burials were recovered from the sterile sandy base of CCo-139, no problem yet exists concerning its generic relationship with sites where burials were taken from this sand. The inference here is that there is no necessary relationship between indurated sand burials and the definite occupation midden which sometimes overlies them. In two instances only, at Sac-104 and CCo-141 as mentioned above, was there noted a co-occurrence of sand burials and overlying midden; the midden in these cases appears, consistently enough, to have been deposited in the Late Horizon. Thus it is possible that the first actual occupants of the site had no idea that the spot had already been used as a burial place. Also, some of the burials in the hardened sand presumably must have been made at a time when the sand had not yet become hard (during the 1946 excavation at Sac-104 geologist's picks had to be used to expose the burials). In addition, no great amount of sand subsequently accumulated above the mean burial level at Sac-104, and the pits did not contain any soil identifiable as the same kind which composed the Late midden deposit.

A review of the cultural material associated with burials in the indurated sand suggests that Middle Horizon forms might be represented in all cases. However, of the ten sites which contained sand burials, only three, CCo-141, CCo-146 and Sac-104, showed artifacts of reasonably definite Middle or even Early Horizon affiliation - the remainder of the sites contained material which cannot be positively placed in a temporal sequence. Thus the validity of the temporal identification rests on (1) the non-presence of positively diagnostic Late type artifacts associated with any of the burials in the hard sand, and (2) the assumption, from the evidence of the general similarity of the burials, at least insofar as they occur in indurated sand and show fairly advanced permineralization, that all such burials are approximately of the same age.

The artifacts recovered from sites other than Sac-104, CCo-141 and CCo-146 have been mortars and/or pestles, and these were not positively associated with the burials. In any case, neither mortar nor pestle types afford very clear temporal distinctions in Central California. Only one type of mortar, that which is fully dressed and carefully shaped, appears to have a definite association with the Late Horizon (Type A1: see Beardsley, 1954, p. 31); this type has not been reported from any of the sand mound burials.

Table 1

Burial Occurrence in Sixteen Sand Mound Sites in the Delta Region

Site No.	Burials in Indurated Sand	Midden Deposit Overlying Indurated Sand	Artifact Types in Midden Deposit	Artifacts Assoc. with Burials in Indurated Sand	Reference
CCo-1	X			pestles	UCAS Site Record*
CCo-2	X			none reported	(ditto)
CCo-5	X			pestles, mortars	"
CCo-17		X	not identified		"
CCo-128	X			no definite association	"
CCo-129	X			(ditto)	"
CCo-135	X			"	"
CCo-138		X	Late Horizon		Lillard, Heizer & Fenenga, 1939.
CCo-139		X	Middle and Late Horizons		UCAS Ms. No. 49
CCo-140	X			none reported	UCAS Site Record
CCo-141	X	X	Middle? and Late Horizons	Middle Horizon	Lillard, Heizer & Fenenga, 1939
CCo-146	X			See Pl. 1, Fig. 1.	This report
CCo-150		X	Late Horizon		Lillard, Heizer & Fenenga, 1939
Sac-45		X	(ditto)		(ditto)
Sac-104	X	X	"	See Page 34, this report	UCAS Ms. No. 65
Sac-162		X	Prob. Late Horizon		UCAS Site Record

* Site Records and Numbered Ms. on File in UCAS Office.

Artifacts from CCo-141 and Sac-104

Excavation at CCo-141 and Middle and Late Horizon artifacts recovered therefrom, have been described by Lillard,Heizer, and Fenenga (1939, p. 54).

At Sac-104, four projectile points and fragments were the sole artifacts associated with the nine burials recovered, except that at the knees and pelvis of one burial an orange-colored mineral was present. It may be noted that the practice of sprinkling powdered red ocher over burials was most common during the Middle period in the Lower Sacramento Valley (Ibid., p.78).

Of the projectile points, only one specimen (Fig. 1h) is distinctive enough to be classified. This specimen, of whitish gray chert, has a weight of 10.5 grams, is 76 mm. long, and 24 mm. wide. Similar forms have been noted at sites Sac-60 and -66, both of which have levels identified as solid representatives of Middle Horizon sites. (Ibid., Pl. 24c, d)

Artifacts from CCo-146

There can be little doubt about the Middle Horizon associations of this site. For example, Olivella beads, type 3c (Beardsley, 1954) were found with three of the seven burials recovered (see Table 2). Further, the analysis of the Haliotis ornaments (below) indicates beyond question the relationship of this site with other positively determined Middle Horizon sites.

Three traits appear at CCo-146 which are relatively rare or unique in Central California. These are (1) conically drilled clam-shell disk beads, (2) patterned arrangement of bone pins or rods over skulls, and (3) grooved hammerstone or maul.

Clam-shell beads. The clam-shell disk beads of the late prehistoric (Phase 2, Late Horizon) and historic periods have characteristically biconically drilled holes, and were mostly made from Saxidomus sp. They are thus readily recognized and have become known as definite time markers. In contrast, conically-drilled clam shell beads have been found at only two other sites besides CCo-146: Sac-73 and CCo-137, both of which have been identified as deriving from Middle Horizon times (Heizer, 1950, p. 10). In all cases the condition of the shell was poor--the genus of the shell could not be exactly determined. Only 4 such beads were found at CCo-146, with Burial 7. Their dimensions, from 8 to 9 mm. in diameter, and general appearance make them coincide closely with the specimens from the other two sites. (See Fig. 1e).

Bone pins or rods. With two burials, numbers 6 and 7, were found what appear to be "mats," composed of parallel bone rod or skewer-like objects, 33 specimens with Burial 6 and 21 with Burial 7. The bones were most likely fastened together with cordage or thongs to form the mats. No traces of this fastening remained--only the regular parallel position of the rods gives evidence of their presence. The rods are of about equal length (ca. 26 cm.), flattish to ovoid in cross-section, about 5 mm. thick and 10 mm. wide. Wherever rotting of the bone has not obliterated the evidence, the rods are pointed at one end and rounded or squared off at the other. Most of the bones are polished, hence identification of species

Table 2

Summary of Burials Exposed at CCo-146*

Burial No.	Depth	Position	Artifacts Associated	Remarks
1	64"	?	Numerous bone ornaments or implement frags. (Fig. 1)	Parts of mass burial - skull only recovered.
2	63"	Probably loose flex.	Olivella beads, type 3c. Haliotis c. ring ornaments.	Part of mass burial - lower arm bones, pelvis, legs missing.
3	72"	loose flex.	--	Burial disturbed by bulldozer excavation.
4	63"	unknown	--	Burial disturbed by bulldozer excavation - possibly part of mass burial.
5	40"	loose flex.	Mortar	Probably associated with Burial 6 (infant).
6	46"	extended	Olivella beads, type 3c. Haliotis c. ring ornaments. Bone pins or rods	Burial removed as a unit, with artifacts cemented naturally to bones.
7	59"	extended (r. side)	Olivella beads, type 3c. Clam shell disk beads. Triangular bone object. Bone pins or rods.	Skull removed with bone pins or rods still naturally cemented to it.

* All burials except No. 6 were of adults.

is not easily made. Probably sections of the long bones of elk or deer are represented.

In both burials the rods were covering the skulls. With the adult burial, No. 7, the rods symmetrically cover the facial portion of the skull, extending upwards from the lower part of the mandible, with the points up (Plate 1a).

Such arrangement of bone pins or rods has not previously been recorded archaeologically in Central California. A possible ethnographic parallel may be seen in the use of wooden sticks or pins used in the Wekena dance of the Central Miwok group (Gifford, 1955, p. 288):

> "The men dancers wear hair nets and flicker headbands that project on both sides. About twenty straight sticks, a foot long, pointed at each end and painted red, are thrust from left to right through the hair net. Set parallel and closely they form a sort of mat running from the forehead to the nape of the neck, the ends projecting on each side."

The possibility of any relationship is offered with great reservation, however. The bone pins in both of the burials at CCo-146, besides not lying in the same position with reference to the face, as in the Miwok example, appear deliberately to have been placed over the face as a sort of shroud, indicating a fairly definite burial practice rather than one connected with a non-mourning type dance ceremony.

Similar specimens, though not occurring in the mat pattern, have been found at Sac-107, with Early Horizon burials (Lillard, Heizer and Fenenga, 1939, Pl. 10g; Heizer, 1949, Fig. 17d, 19a). A bone pin which Gifford (1940) has called type T1c is circular in cross section at one end and flattened at the other, but is bi-pointed. Type T1c occurred on the Southern Coast of California, in two S.F. Bay Region sites, and at Sac-142, an Early Horizon Delta Region site.

Grooved hammerstone or maul. One specimen only recovered, at a depth of 20 inches, in indurated sand, but unassociated with the burials. The specimen (UCMA No. 1/145695) appears to have been fashioned from an andesitic cobble, to a length of 11.5 cm.; its ovoid cross section measures 6 cm. in short diameter at both ends and tapers from a long diameter of 7 cm. at one end to 6 cm. at the other (Plate 1e, Fig. 1i).

Two transverse grooves, 12-15 mm. wide and about 3 mm. deep are each about 15 mm. from the ends of the specimen. The grooves extend slightly more than half way around the specimen. The ungrooved side and ends show signs of having been pecked. Evidence of grinding, if we assume the specimen was originally meant to be a pestle or mano, is minimal. If the object is truly a hammerstone or maul, the grooves would serve either for allowing a tight hand grip or for the fastening of a wooden haft on the ungrooved side. There are no traces of wear from such hafting on this surface.

Grooved stones of this kind have not thus far been recorded from Central California. There is little possibility of relationship between

this form and the type of grooved stones sometimes called "sinkers," for example, those found in the S.F. Bay Region (Beardsley, 1954, p. 38). Resembling more closely our specimen are two objects in the collections of the University of California Museum of Anthropology. These were recovered in San Benito County, near the town of Hollister. No site association was recorded at the time of collection. Both of these specimens are also of andesitic material, but have 2 full grooves each encircling them, as shown in Fig. 1j, k. Specimen No. 1/25132 (Fig. 1j) however, has a longitudinal groove along its entire length, while in specimen No. 1/25131 (Fig. 1k) the longitudinal groove lies between the encircling grooves. Specimen No. 1/25132 has pecking marks on all surfaces, and could, like the CCo-146 specimen, have been utilized as a hammerstone or small maul. On the other hand, specimen No. 1/25131 was evidently formed from a river cobble; except for the grooves there is no sign whatever of modification on it. There is thus a faint suggestion here of a crude phallic charmstone.

Besides the rare or unique artifacts noted above, associated with the burials at CCo-146 were numerous artifacts which were thought to be either non-specific enough (bone artifacts) or closely identified with forms known elsewhere (shell beads and ornaments) to require description apart from the rare or unique specimens. This in no way implies that any cultural separation existed between the various artifacts, i.e., that they were used at different times or by different groups.

Bone Artifacts. Associated with Burial 1 were at least 8 tabular or spatulate bone implements or ornaments, tightly cemented together by natural means. Since detachment of any individual specimen from the cemented mass would probably result in destruction, only the positively identified specimens will be mentioned here (See Fig. 1b, c, d, f, and g). Hidden by the mass itself are perhaps 6 or 8 additional pieces, not described. The tabular aspect of the specimens suggests that they might have been modified from rib or scapular parts (deer or elk?). All the specimens have holes at one end, biconically drilled where observable. One specimen has incisions along its edges (Fig. 1b). The latter, and one other specimen (Fig. 1g) only, appear to be whole pieces; the others are all fragmentary.

The function of these bone specimens is questionable. Ethnographically, similar type specimens have been called strigils, sweat scrapers, head or face scratchers. The possibility even exists that they were used as bull-roarers. Baumhoff (1955, p. 53) describes how similar and even smaller specimens from Tehama County were tested successfully for this function. Alternately, they could be ornamental pendants. Similar archaeological specimens have been described by Gifford (1940, p. 175) as pendants or possibly toilet implements. Although correspondences in form are not exact, it may be stated that our specimens are most like Gifford's Q3 and Q4. These types, besides occurring on the Southern Coast Region of California, have been found at the Emeryville and Ellis Landing sites in the S.F. Bay Region.

Still other occurrences of the type are at sites Mrn-242 and Mrn-266. In these sites the specimens, called spatulate bone pendants, both

occurred in Coastal Province Middle Horizon contexts (Beardsley, 1954, p. 48).

Finally, there is a resemblance in form, at least, between the CCo-146 specimens and certain bone pendants from Early Horizon sites in the Central Valley. The latter, however, are made from turtle carapace and have Haliotis beads attached to one surface with asphaltum (Lillard, Heizer, and Fenenga, 1939, Pl. 11).

With Burial 7 was found a flat strigil or spatula, ca. 20 cm. in length and 2-3 mm. thick (Fig. 1a). This appears to have been fashioned from a scapular part (deer or elk?) rather than antler, from which a quite similar specimen from site Sac-56 (Early Horizon) was modified (Ibid., Pl. 10j).

Shell Artifacts. Shell beads of Olivella (type 3c) and disk beads of clam (conically drilled) have been discussed above. Discussion here will therefore center on Haliotis ornaments. Twelve "ring" ornaments were recovered, 7 with Burial 2 and 5 with Burial 6. All of these are of H. cracherodii. Outside diameters of specimens range in size from 44 mm. to 100 mm. Diameters of central perforations likewise are variable, from 18 mm. to 40 mm. There is no constant relationship displayed between the size of the central perforation and the outside diameter of the specimen, i.e., some specimens represent proportionally thicker rings than others. One specimen (No. 1/145701) for example, has an outside diameter of 45 mm., while its central perforation is 30 mm. in diameter.

These ornaments mostly are of type C.(1)., (Ibid., p. 15) i.e., circular ornaments with one central perforation (Pl. 1d). One specimen (Pl. 1b), however, has also a peripheral perforation, hence is of type C. (1). 1., while another (Pl. 1c) displays edge incising, and is type C.(1).a.

Type C.(1). ornaments, and variants as noted, occur frequently in Central California and may be definitely called a characteristic trait of Middle Horizon deposits (Ibid., p. 78). Other occurrences are in the Southern Coast Region of California (see, for example, ornament types J2a, J2b, and J3a in Gifford, 1940). Also representative of this type are specimens which have recently been excavated at the Rose Spring site in Inyo County (Riddell, n.d.).

Table 3 summarizes known occurrences in the Lower Sacramento Valley and the San Francisco Bay Region (Source: UCMA collections and Gifford, 1940). Specimens less than 15 mm. in diameter and with perforations less than 5 mm. have not been included in this table. It has been thought more practicable to refer to the latter as beads rather than as ornaments.

In analyzing the distribution of Haliotis ornaments and conically-drilled clam shell beads (Table 3), it has been noted that a peculiar relationship exists between sites CCo-137 (Concord site), CCo-146, and Sac-211. The latter site contains artifacts of certain Middle Horizon affiliations, including type C.(1).1. Haliotis ornaments and "reel-shaped" ornaments of the same material. At CCo-137 occurred similar

reel-shaped ornaments, type C.(1). ornaments, and conically-drilled clam shell beads. Finally, at CCo-146 were found conically-drilled clam shell beads, and ring ornaments, types C.(1).a. and C.(1).1.

Table 3

Occurrences of Type C.(1). and Related Types of Haliotis Ornaments

Type	Sac-59	Sac-99	Sac-107	Sac-211	Ala-309	Ala-329	CCo-137	CCo-146	CCo-295	SFr-7	SCl-1
C.(1). H. crach.			x		x	x	x	x			x
C.(1). H. rufes.					x						
C.(1). Unident. species	x		x							x	
C.(1).a. H. crach.					x[1]			x	x[2]		x
C.(1).1. H. crach.			x	x				x			x
C.(1).1.a. H. crach.		x									

1 unidentified species
2 H. rufescens

For the purpose of further clarifying this relationship a description of the reel-shaped ornaments is presented here. Three specimens, of H. cracherodii (one illustrated in this report, Fig. 2a) and 2 ring ornaments (Type C.(1).) were found with the same burial at CCo-137. At Sac-211, 6 reel- and 2 ring-shaped ornaments (Type C.(1).1.) were found, also with the same burial. Four of the reel-shaped specimens are of H. rufescens; the species of the other 2 is unidentified. The 6 ornaments, 2 of which are fragmentary, are graded in size, from 5.3 to 12.8 cm. in length and 3.7 to 8.3 cm. in width. The position of these ornaments in the burial suggests that they

were used as a large decorative ensemble; their sizes further point to use in paired sets, each set consisting of three ornaments each: large, medium, and small. The largest and smallest are shown in Fig. 2b, c.--all of the specimens, even though of different sizes, are of about the same relative proportions. One of the larger fragments is evidently the unperforated half of a complete specimen; the entire long outer edge of this specimen shows regular decorative incision. The other specimens do not retain traces of edge incising.

All of the known perforated specimens, from CCo-137 and Sac-211 together, have 2 conically-drilled holes each, from the outer part of the shell. In the almost exactly comparable specimens from these sites (see Fig. 2), the position of the two holes on the body of the shell and their distances apart from each other are slightly different.

Burial Posture

At CCo-141, of the twenty-five Middle Horizon burials, eighteen were extended, four ventrally and fourteen dorsally (Lillard, Heizer and Fenenga, 1939, p. 55).

At Sac-104, of nine burials, five were in extended posture, three dorsally, one ventrally; three were in semi-extended position, and one tightly flexed. Orientation was variable, and seemed to have no correlation with burial position.

Of the seven burials exposed at CCo-146 (see Table II), only two, Burials 6 and 7, were in extended posture. Burial 6, however, was an infant, and was associated with an adult (Burial 5) which was in a loosely flexed position. The remainder of the burials, where it could at all be determined, were flexed. Orientation evidently was variable, and not correlated with position.

Extended burials appear to be a predominantly Early Horizon trait, but even here flexed burials do occur (Heizer, 1949, p.13). In addition, extended burials sometimes occur in the Central Valley as a holdover trait in the Middle Horizon and even occasionally in the Late Horizon (Lillard, Heizer and Fenenga, 1939, pp.77-79). Thus so far as burial posture is concerned, Sac-104 and CCo-141 would seem to be suggestive of an Early Horizon context, while the evidence at CCo-146 would be inconclusive in this direction.

Summary and Conclusion

Both the geological and archaeological factors involved in the problem of the sand mound burials point to a fairly ancient custom, which may be called simply detached cemetery burial on what were probably then small islands of relatively loose sand.

If there is not sufficient cultural evidence to indicate that all of the burials in the sites mentioned are approximately of the same age, the physiographic, or more specifically the pedologic, evidence on this point

is hardly to be doubted. In fact, the progressive hardening of the soil and the mineralization of the skeletal remains suggest linking the sand mounds in these respects to the already defined Early Horizon sites. To be noted also is that at least two of the defined Early Horizon sites appear to have been used exclusively as cemeteries (Heizer, 1949, p. 16). On the other hand, the cultural evidence, such as it is, raises the question of whether the sand mound sites were used as burial places in the Early or Middle Horizons. While most of the identifiable artifacts from Sac-104, CCo-141 or CCo-146 are comparable to specimens which occur elsewhere in Middle Horizon sites (e.g., Olivella and conically drilled clam shell disc beads, one projectile point, and several types of Haliotis ornaments) the bone artifacts of CCo-146 and the burial posture trait at all three sites seem to be direct holdovers from the Early Horizon.

The evidence taken as a whole leads us to conclude that the sand mound burial sites were utilized in the early part of the Middle Horizon, probably at a time when they were small sandy knolls, surrounded by water. In numerical terms, this is estimated to be around 1500 B.C. If there are, as we suspect, many more skeletons entombed in these or similar mounds, an account must be given of the point of origin, i.e., the former habitation spots proper of these people. Since the number of known habitation spots within useful distance of the burial spots seems to be far too few to fit the known facts, it is necessary to rely on the strong possibility that there yet remain undiscovered a great number of buried occupation sites in the region under discussion.

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Explanation of Illustrations

(Numbers are U.C.M.A. Catalogue Numbers)

Plate 1.

a. CCo-146: Burials 5 and 6. Note bone pins over upper part of infant skeleton.

b. Ring ornament, type C.(1).1. (No. 1/145701).

c. Ring ornament, type C.(1).a. (No. 1/145703).

d. Ring ornament, type C.(1).(No. 1/145700). (Specimens b, c, d are all from CCo-146; scale is 1/2, and material is H. cracherodii).

e. CCo-146: Grooved hammerstone or maul - length 11.5 cm. (No. 1/145695).

f. and g. Stone objects from San Benito County, California. Length of g.- 11.5 cm. (No's. 1/25132, 25131).

Figure 1. (All specimens actual size except i - k, which are ca. 1/2 size)

a. CCo-146: Flat bone strigil or spatula. (No. 1/145712).

b - d. CCo-146: Tabular bone objects (No. 1/145719).

e. CCo-146: Conically-drilled clam shell disk bead.

f - g. CCo-146: Tabular bone objects (No. 1/145719).

h. Sac-104: Chert projectile point. (No. 1/68346).

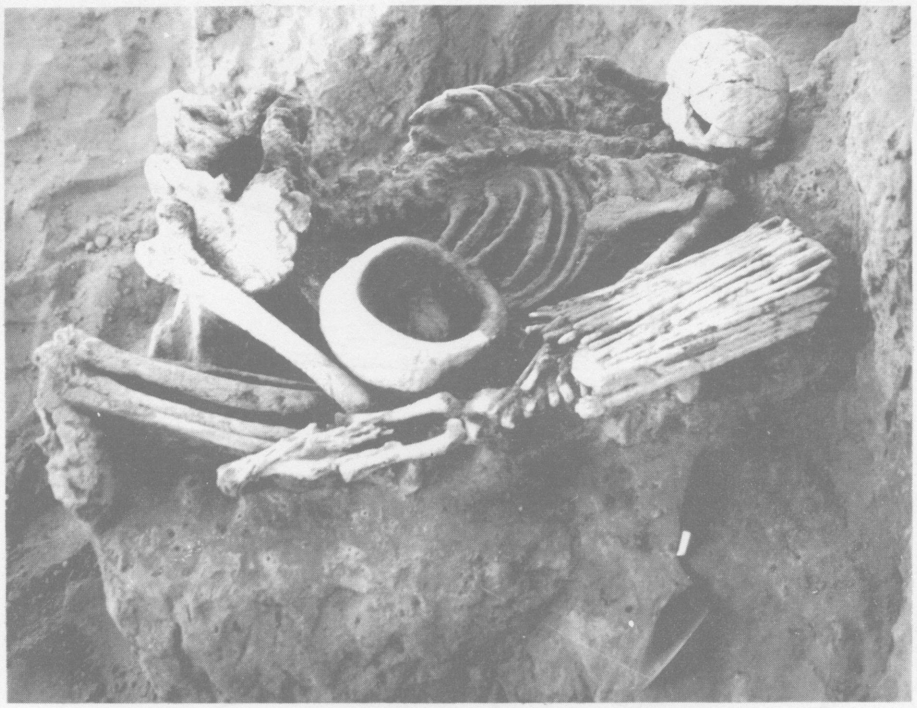
i - k. Stone objects pictured in Plate 1e- g., showing groove patterns.

Figure 2. (All specimens actual size)

a. CCo-137: Reel-shaped ornament, H. cracherodii. (No. 1/68308).

b., c. Sac-211: Reel-shaped ornaments, H. rufescens.

d. Sac-211: Ring ornament, type C.(1).1.



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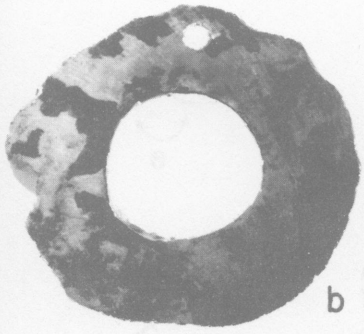

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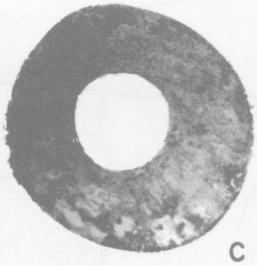

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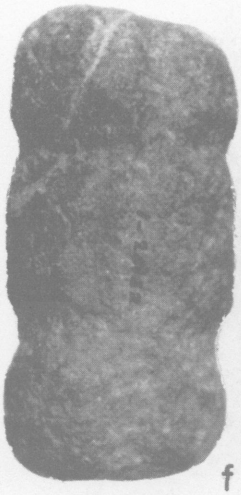

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Plate I

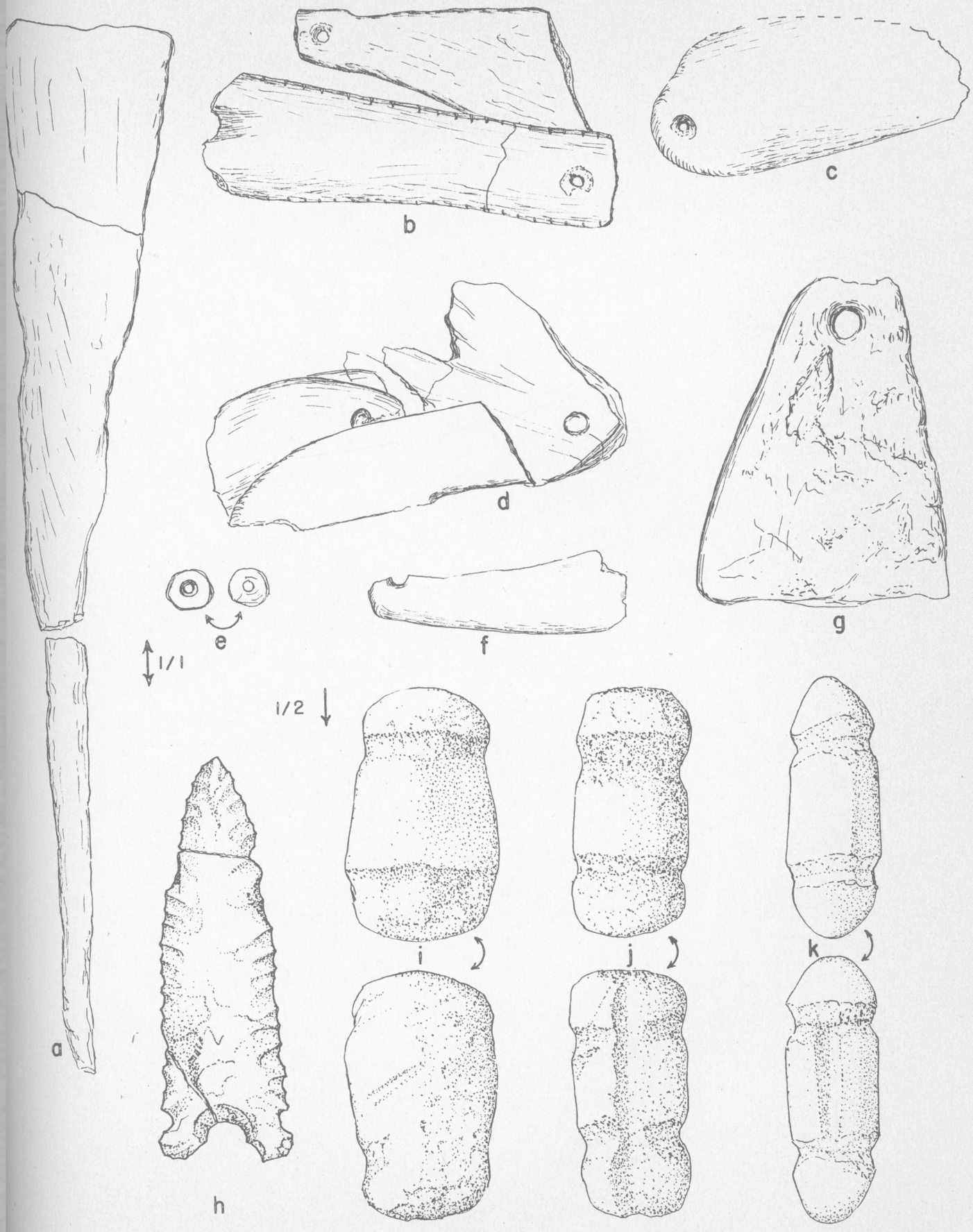

Fig. 1

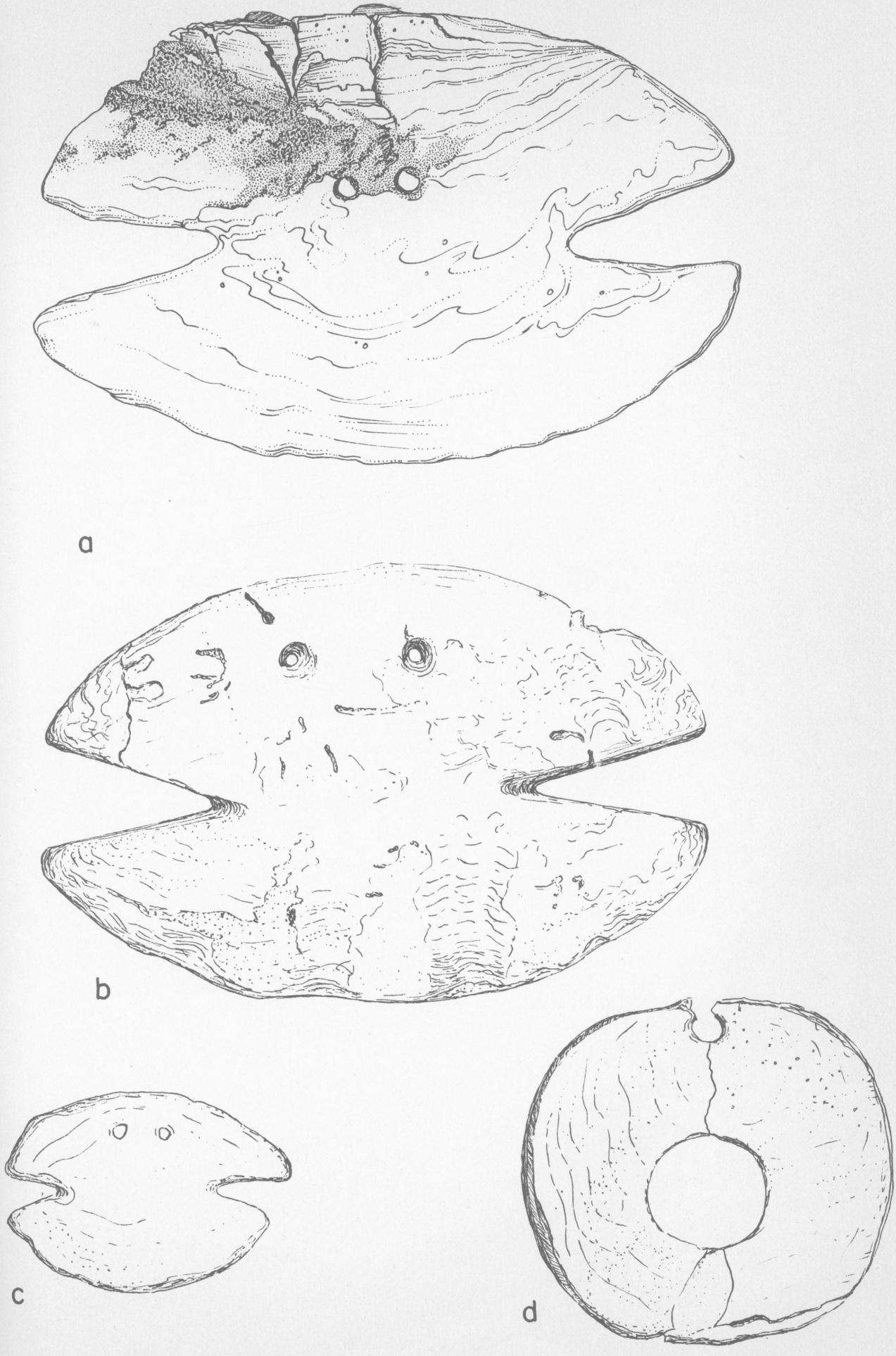

Fig. 2