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TEMPORAL AND AREAL RELATIONSHIPS IN CENTRAL CALIFORNIA ARCHAEOLOGY

PART TWO

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**Not reproduced, but published earlier in B[redacted]dsley, 1948, and/or Heizer and Whipple, 1951. (See Footnote 4, Part One, UCAS R 24).

Chapter IV

Archeology of the Lower Sacramento Valley

The following account briefly summarizes the three archeological horizons identified in the Great Central Valley of California lying east of San Francisco Bay. The data are derived chiefly from the synoptic site by site report which first presented the details of archeological succession in this area in 1939.[95] While earlier workers had intimated the existence of cultural changes[96] or attempted to define them in terms of trait complexes and burial associations,[97] the concept of a threefold division of the data which is followed here did not appear until a summary statement by Heizer and Fenenga disclosed the results of their work in a brief paper shortly before release of the more detailed report.[98]

It is worth emphasizing here the greater abundance and richer variety of archeological materials from each horizon in the valley area than is known from coastal sites. To work from the Valley toward the Coast is to progress from abundance and variety to rarity and simplicity. Sacramento Valley information has been cited in a few instances where coastal items have occurred too rarely to be sure of their cultural context. It is, then, as the kingpin of culture sequence that the Sacramento Valley area is now taken up for consideration.

Physiographic and Climate Background: Nature of Sites

Three major physiographic sections run through Central California from north to south. The westernmost of these, the California Coast Ranges, is a complex series of steeply eroded mountain ranges generally oriented northwest-southeast. It is broken only by one major gap, the point near the center where the Sacramento and San Joaquin Rivers join and flow to tidewater in San Francisco Bay. The central physiographic section is the California Trough or Great Valley of California composed of the drainages of the Sacramento and San Joaquin Rivers. The Great Valley, together with the Coast Ranges, forms the Pacific Border physiographic province. The easternmost province is the Sierra Nevada section of the Sierra-Cascade Mountains. The archeological remains discussed in this paper lie in the Great Valley and Coast Ranges sections; the sites surveyed in this chapter are confined to the Great Valley.

River channels and sloughs are the principal physiographic landmarks on the monotonously flat valley floor, which is up to fifty miles broad. Snow-fed rivers flowing from the Sierras emerge from the foothills onto the valley floor and cross their own alluvial fans before joining the two great arteries, the Sacramento and the San Joaquin Rivers. The Sacramento River, flowing south, meets the San Joaquin River, flowing north, east of San Francisco Bay, and their commingled waters branch into a complex network of channels which become brackish from tidewater flowing

through Carquinez Straits from San Francisco Bay. The natural marshland thus formed, which is the heart of archeological area considered here, is called the Delta Tidal Plain. It has been much altered by artificial levees and other works to permit agricultural reclamation of the fertile islands of alluvium between the channels, but was once a wilderness of tule marsh and tidewater sloughs. The river channels upstream from this sea level district have also been confined by flood control levees built on top of the natural river levees along which most of the archeological sites are found.

Under natural conditions, much of the valley was subject to spring flooding from the snow fed rivers, augmented on occasion by heavy winter rainfall. The rainfall, between 18 and 20 inches annually in the area south of the city of Sacramento, is concentrated in the months of December to February.[99] From spring through summer, temperatures pile up in both directions from Carquinez Straits, which is the only gap through which ocean fogs can exercise a moderating influence. Lack of summer rain and high summer temperatures contribute to the continental climate which was classified as steppe-desert by Russell, but modified to CSa (hot Mediterranean) in the Köppen climatic classification system by Kesseli.[100] The floods and perennial wetness along stream channels are reflected in thick growth of tule and swamp plants in low areas, whereas the heat and dryness of higher land supports grass or oak groves, which reach toward the foothills to interdigitate with the chaparral that clothes the dry hill slopes. This complex of vegetation, classified as Lower Sonoran by Merriam,[101] provided a variety of food resources among which the heavy acorn crops of the valley oak were preeminently utilized by the Indians. Abundant bird and animal life contributed toward making the Sacramento Valley a food-rich habitat for non-agricultural peoples.

Archeological remains are midden accumulations at permanent village sites. These appear on the ground surface as low-domed mounds rising from one to ten feet or more above the surrounding land. The elevation of village sites is enhanced by their situation atop natural elevations which lift above the general level or on natural levees bordering the streams of the bottom lands; such natural elevations provided refuge during seasonal floods and were almost invariably utilized for habitation if near water, an oak grove, or some similarly advantageous features. Character of the deposi- varies somewhat with the immediate environment.[102] Stone is found in abundance only in sites near the foothills; ash and charcoal, fish, animal, and bird bones as well as river shells occur consistently except in the special sites known to be components of the Early Horizon. The Early sites are almost completely buried by river sediments; deposit of other sites may extend to greater or lesser degree beneath the present land surface as the result of sedimentation covering the foot of the mound. Within most deposits occur all the cultural items archeologically known within the area; domestic refuse, whole, broken, and unfinished artifacts, house remains and burials of the dead. These localized deposits, in other words, are full communities,[103] with traces of all important community activities. Since a good camp site was apt to retain its advantages, many sites were re-used in later horizons. Artifact collections not infrequently show culture sequence even where stratigraphic breaks in deposit are not clearcut. The complete column of culture horizons identified to date is known only from Windmiller Site (C107).

The Early Horizon: Windmiller Facies.[104]

Four sites belonging to the Windmiller Facies provide our knowledge of the Early Horizon in the Sacramento River-Delta Plain area of the Sacramento Valley. Three of these, Blossom (Site C68), Phelps (Site C56), and McGillivray (Site C142), lie clustered within the "big bend" of the Moquelumne River just downstream from its juncture with the Cosumnes River on the edge of the Delta Tidal Plain. The fourth and type site, Windmiller (Site C107), is the basal component of a large stratified site 16 miles up the Cosumnes River. It is located on a subsurface knoll in the overflow area of the river bottom. No further sites of this horizon have been located elsewhere.[105] Without exception, they are composed of highly indurated soils, and are located on subsurface knolls rising above the original surface of the plain; overflow deposits of alluvium have covered various portions, so that in the "big bend" region only a small proportion of the total mass is exposed above the present land surface. This sedimentation is one result of an apparent isostatic sinking of the valley floor as sediment loads accumulated there, correlative with the unloading and uplift of the mountain area to the east. Such a physiographic change permits the assumption of considerable age, as does the fact that McGillivray and Blossom components in particular are unfavorably situated on the edge of an ancient water course 1.2 miles away from present day water supply.

While each of the sites is highly indurated and compact, there are puzzling features and differences in nature of site deposit to be noted. The Early stratum of the Windmiller site is not, properly speaking, an occupational deposit. Some gray ash staining the fill of burial pits contrasts slightly with the generally sterile red clay of the natural knoll in which burials were interred,[106] but persistent occupation seems not to have occurred before subsequent cultures inhabited the knoll; later deposits average 36 inches depth above the crest of the elevation. Unless an original thin deposit layer were eroded away in the time gap intervening before occupation by succeeding people of Middle and Late Horizons, use of this knoll principally for burial of the dead seems the most reasonable inference. The second possibility finds support in the virtual absence of animal bones and other habitation refuse in McGillivray Component, although it contains finely divided charcoal and ash to a depth of forty inches. But in the equally compacted deposits of the Phelps and Blossom Components are greater numbers of animal bones and unworked stone fragments, implying that occupation of the knolls to avoid flood waters or for longer periods of the year did occur.

Most knowledge of the Windmiller Facies comes from burials and burial associations: 267 burials are known from all sites, and 187 of these were accompanied by artifacts. Of the total, 191 burials were excavated between 1935 and 1938 by field parties from the University of California or the Sacramento Junior College, the remainder having been collected from Blossom Site by Elmer J. Dawson in 1921. Burial position and orientation are among the most strikingly consistent features of the Early Horizon. Except for 6.3% in slightly variant disposition or posture, bodies were found fully extended face down, arms at the side, and hands beside the innominate or brought together under the pelvis on the front side. Legs were tied

together at the ankles, hands apparently sometimes bound. They were oriented within five degrees of true west in 87% of the recorded cases, the exceptions being almost invariably directed westerly. A few headless interments were found. Artifacts accompanied 78% of all burials for which clear records exist (187 grand total); shell beads, flaked projectile points, and quartz crystals are fairly common, but in general a high degree of elaboration and variety of grave goods is noteworthy. The intrusion of burials into older grave pits hints that the exceptionally regular interment posture was a pattern independent of grave markings or cemetery outlines.

The physical type of Early Horizon people is strikingly distinct from that of the recent tribes of the area. Complete measurements and observations have not been made of the available series, so that only cranial index of fifty-three individuals and nasal index for thirty of this group can be cited.[107] These measurements show a dolichocephalic, platyrrhine average, with considerable homogeneity. One's visual impression from the skeletal material is of a tall, rugged type contrasting strongly with the round headed, medium to short, light-boned Indian of the Late Horizon and historic times.

It should again be emphasiced that shell bead types and shell ornament types serve as reliable "time-markers" in typological segregation of artifacts of Central California cultural horizons. The characteristic Early Horizon Olivella bead types are type 1a[108] and type 2b, found in 49 and 22 burials respectively. Haliotis bead type 1a (71 burials) and type 2 (4 burials) are also important as guides. Rare in Early Horizon are Olivella type 1b (found also in Middle and Late) and 3b (typically Middle) and Haliotis bead type 3 (typically Middle). In Haliotis ornaments a roughly circular shape with one or two central perforations and peripheral incised lines radially arranged is most characteristic; the twin perforations occur 32 times versus 13 occurrences of a single perforation. Less frequent are similar shapes without incision, with an added perforation at the edge, or with three central perforations. Rectangular ornaments, also often centrally perforated, are rarer, although a special type with pinched-in sides occurs uniquely in two of the Early components. The circular ornaments are often in matched pairs, and are found beside the mastoid processes of burials; the perforations of these ornaments are blocked with asphaltum, arguing that they were attached to something such as wooden earplugs, in which use the holes were functionless. Similarly, rectangular perforated Olivella beads have been found set on turtle carapace pendants as applique, with asphaltum or other mastic.

Ornamental use of red ocher, perhaps as body paint, is inferred from its presence in several graves. A rectangular stone palette with flat base and top and squared edges, bearing a rectangular, straight-sided depression, was found encrusted with ocher, and is presumed to be for grinding and mixing pigment. Pendants of turtle carapace, a few perforated biotite ornaments, rectangular perforated pendants of slate, and prisms of obsidian (average length 11 cm.) which exhibit surfaces clouded from burning or other process and were used as tinklers,[109] are ornamental objects supplementing beaded ornament. Beads were frequently used as sequins, and from their position at neck and arms, Heizer suggests, it is possible to infer costume possessing a definite neckline and sleeves.[110]

Earplugs of wood are inferred from asphalt-backed Haliotis discs found at ears. Of eleven instances of canid teeth known from graves of the four components, two are perforated, perhaps for ornamental use.

Charmstones had ceremonial implications in Early times which have persisted, though perhaps in modified expression, through all the prehistoric levels of California cultures into the ethnographic present. They are numerous and varied. Distinctive materials are used such as amphibolite schist, mottled limestone, diorite, and even a ground quartz crystal; shapes are carefully balanced, and the pieces are beautifully finished. It is apparent from the absence of breakage or evidence of abuse that these were treasured as important objects worth much care in manufacture and handling. Considerable inventiveness is displayed in the manifold variety of shapes; these have been reduced to no fewer than fourteen types. A bilaterally symmetrical spindle shape predominates, with two conspicuous variations: one is fairly short and flattened in cross section (Olivella beads have been found in rows of applique on one surface); the other, similarly flattened, is symmetrically elongated from a central bulge. Phallic charmstones, which occur again only in Late horizon, are known in double-ended and single-ended versions from Early components. Perforation at one end with a biconical hole is so frequent as to be almost normal. Quartz crystals, either with unmodified facets or with the angles artificially or naturally chipped, are exceedingly numerous; an average of 25% of all graves contained crystals, which frequently were in quantity in single graves. Although their occurrence is not significantly correlated with that of charmstones, they are assumed to have had ceremonial significance. It is likely that the same is true of numerous finds of unworked animal bones, of which bear, deer, beaver, coyote, raptorial birds, and duck or goose have been identified. Even human bones were utilized for various implements with non-utilitarian connotations. A "skull cup" was made from a human calvarium by trimming down the rough edges; when found in burial association it contained two charmstones. Also found were a dagger made from a human fibula and a whistle made from a human radius. Unworked quartzite pebbles probably preserved as curiosities or for ceremonial or magical connotations have been recorded from every site. Their use as throwing stones is possible in the stoneless area of the Delta Plain, but seems unlikely from the small numbers found.

In contrast to the abundance of ornamental and ceremonial objects found as grave goods on these sites, material related to the economic phase of Early life is relatively sparse both from burials and from the deposit mass. There is still some doubt, consequently, of the principal economic orientations of culture. Three grinding stones or metates are recorded and only as many mortars. The latter are fragmentary examples of a deep mortar with shaped exterior and a rounded lip; they have been found only on the Blossom Component. From the Windmiller Component, additionally, comes a small cobble mortar interpreted as a paint grinding mortar because of the incrustation of ferric oxide on its surface, as well as a problematical mortar-like object with an elongate round-bottomed trough cut through a smooth metate-like surface. Several possible pestles are essentially slightly modified river cobbles, and possible mullers are known especially from the Windmiller Component.

If these dozen articles as evidence of a seed-gathering pattern of food preparation are balanced against the incidence of 128 knife and projectile points as evidence of hunting patterns (plus warfare), a different picture of economy is presented from that of subsequent horizons in which seed-grinding apparatus occurs in much higher ratio. Large, heavy, chipped stone points, of which slightly over 50% are obsidian, predominate. Fifty-six are unstemmed; while of the 72 classed as stemmed, 32 have a contracting stem, generally with sloping shoulders, and 25 more have straight stems and square shoulders. The dominant shapes are a blade with curving edges, a rounded or straight unstemmed base, or a base with ill-defined stem. A weight average as high as 6 to 7 grams confirms the probable absence of the bow; although no direct evidence of the atlatl is known from this horizon, the weight of projectile points suggests its use. Percussion flaking, the predominant mode of preparation, may account for the high percentage of non-obsidian materials despite the apparent availability of obsidian through trade from the Napa region in the Coast Ranges. Only one hammerstone, such as might be used for flaking, is known. The general emphasis on stone-polishing techniques is perhaps reflected in the occurrence on each site of a chipped stone implement with facets abraded by secondary polishing.

Bone implements classifiable as awls are rare (14 found) and varied in shape, in sharp contrast to later periods. Resemblance of these to the sharp pointed awls associated with manufacture of coiled basketry in ethnographic times and extending back to Middle Horizon deposits, is virtually lacking. Among other pointed bone tools are heavy split bone implements and a long cannonbone "dagger." More numerous are flattened long needles (6 found) believed to be utilized for making mats or for thatching; only one cylindrical needle is known. Bone objects of miscellaneous uses include half a dozen flattened tools with blunt ends, bipointed cylindrical pins, a short bipointed pin (gorge hook?), and 10 bone tubes.

Use of a bluntly pointed bone notched at the opposite end is suggested by its occurrence tangent to the back of a single-piece, curved bone hook, although its precise function remains a mystery. Fishing by hook and line, attested by the gorge hook and curved hook, was also practiced, using a trident spear armed with slightly curved and rabbetted bone points, but no net sinkers to indicate net fishing are known.

There are five occurrences of "bevel-based pins," possibly used as projectile points; they are pointed at one end and taper from the middle to a wedge shape at the other. Use as projectile points also has been conjectured for small, pencil-like, pointed slate rods, though doubt is cast on this use by the occurrence of a larger but rarer variety (9 graves versus 2 graves). Three occurrences of perforated slate cylinders suggest another use as pendants. Spatulate, round-ended bones with unusual polish, known as strigils or sweat scrapers, appear in four somewhat dissimilar examples. Short, tubular, conically perforated, stone "pipes" were found with two atypical dorsally extended burials on McGillivray Component; since they show no burning or dottle to evidence smoking, they might be considered comparable to "cloud blowers" of the Southwest, for use such as sucking tubes by shamans.

Baked clay objects, though common in later horizons in the Valley, are both extremely rare in the Early Horizon and extremely interesting. A unique form is a small pecan-shaped piece, longitudinally grooved, of which nine examples are known from Windmiller and Blossom Components. From the latter comes a ball, while perforated baked clay "discoidals" are known from both. Most interesting is a squared fragment and a whole piece with basketry impressions indicating the existence of close twined basketry.

From the material thus summarily discussed, it is apparent that aspects of life in the Windmiller Facies of Early Horizon other than ornamental and ceremonial are but weakly attested despite the fact that occupational sites have been excavated. The evidence of abundant and large projectile points leads to inference of hunting as a means of subsistence; although scarcity of animal bone cautions against unqualified reliance on this, the variety of identified species is fairly large. Fishing certainly supplemented the economy, as also, presumably, did seed gathering. A number of features, direct and inferential, argue against utilization of seeds and acorns in a manner comparable to later times:[111] scarcity of grinding implements; scarcity of fire-cracked stones in deposit; and virtual absence of the greasy organic charcoal in deposit such as characterizes later sites with good evidence of reliance on grease-rich acorns as a staple. Although many projectile points occur in grave association, none is embedded in the bone of the skeleton (a feature common in Middle Horizon), nor is there much alternative evidence that warfare played any significant role in the Windmiller Facies community relations with each other or with outsiders, except for the burials found without skulls, which may evidence head taking (by another people?). Utilization of human bone artifacts can equally well be assumed to be one aspect of the ceremonialism which, to judge from burials and their contents, dominated the culture with a rigor never quite equalled in later times. The quantities of quartz crystals, the variety of laboriously polished charmstones, the high percentage of burials favored with grave goods, and finally, the extreme adherence to a most uncommon burial posture requiring extra labor in pit digging, all combine to argue a fervor of attention focussed on supernatural aspects of death which must have permeated most of the aspects of community life. In this, the distinctive flavor of the culture appears to lie.

The interest of the community in certain materials for ornamental or ceremonial objects stimulated them to look afield. By expedition or by trade, they got seashell beads and ornaments from the coast, obsidian and amphibolite schist from the Coast Ranges, and quartz hornfels, limestone, and other materials probably from the Sierras. Their utilization of perforated beads and shell ornaments for applique, for which perforation was not only useless but apparently objectionable enough to disguise with asphaltum, strongly suggests trade with contemporaries living nearer the sea. To quote Heizer, "We can postulate a coastal population coeval with the Early period valley dwellers, since it is improbable that people would migrate to the seacoast, manufacture a few sea shell beads and return with no raw shell materials, sea-mammal bones, etc." [112] This point will assume importance in discussion from the viewpoint of evidence for Early Horizon communities in coastal sites.

No mention has been made of the problem of the antiquity attributable to the Early Horizon. This problem is under particular investigation and the knowledge thus far obtained is summarized by Heizer.[113] Most important evidences for considerable age of the sites in which Early components are found include their position under sediments on the valley floor, their extreme compaction, patination of stone, and incrustation of bone, as well as extreme mineralization of all bone. For the purpose of the present paper it is sufficient to point to the basal stratigraphic position of the Windmiller Component in a site containing the full column of cultural horizons reaching to recent times.

Topographic changes which have levelled out the surface features of knolls and rises in the lower Sacramento Valley to produce a completely flat plain suggest that associated changes in plant cover and animal species may be the key to increased emphasis in later times on grass seed and acorn grinding for food.

Although undiscovered Early Horizon sites may lie completely buried beneath silt accumulation in other parts of the Valley where the protection of the encircling bend of the Moquelumne River was lacking, the limited number now known suggests a similarly limited population in Early times. Yet cultural remains show this was not a new immigrant group, but a well integrated culture with definite tradition and living patterns closely accommodated to the specific environment of the valley in which they lived. Heizer has summarized the processual significance of the situation succinctly, writing: "The Early culture is a developed culture which has already achieved a distinctive Central California tenor . . . It is the oldest culture yet found in the Sacramento valley plain . . . but it is certain that the search is not ended -- we must look for earlier horizons than the Early culture. Just as we would not understand the transitional culture (Middle Horizon) without a knowledge of its parent, the Early culture, so we cannot understand the Early culture when its antecedents are unknown."[114]

Middle Horizon, Interior Province.

Whereas components of the Early Horizon are limited to a tight little group in the heart of the Great Valley comprising the Windmiller Facies, Middle Horizon communities are spread the width of the Valley over an area eighty miles from north to south, which is to say, as far as adequate exploration has yet reached. These communities form the several facies of the Interior Province, which are balanced by Coastal Province facies west of the Coast Ranges. Altogether, a fair amount of information from a wide area bears on problems of the Middle Horizon. The distribution of components of the Interior Province, from Knight's Landing above the Sacramento-Feather River junction to somewhat south of Stockton, is shown on Map 3 of the Sacramento Junior College publication on which the present discussion principally relies.[115] I am not undertaking to distinguish between separate facies within the province. I am indebted to Mr. Fenenga for his generosity in sharing with me his knowledge of this horizon and its cultural problems.

The Middle Horizon in the Interior Province was not recognized as an entity distinct from Early or Late Horizons until excavations by Sacramento Junior College in 1937 at Morse Component (C66), a pure site, revealed new traits combining with known traits in a consistent nexus differing from the two previously known horizons. Its temporal position was indicated in the field by bone mineralization intermediate between Early and Late conditions as well as by moderate (compared to extreme or minimal) induration of soil matrix. This was confirmed by vertical stratigraphy when reanalysis of previous excavations at Windmiller Site (C107) successfully segregated burials with appropriate traits occurring at greater depths than Late but not as great depths as Early burials. Subsequent excavations, conducted principally by the Sacramento Junior College under Fenenga's supervision, by 1939 brought the total to twelve components in separate or in stratified sites. The newly defined phase was tentatively christened "Transitional Period" in recognition of its cultural links to earlier and later cultural periods.[116] At this writing, more than twenty components in the Interior Valley zone are identifiable as belonging in or closely related to the Interior Province, Middle Horizon, which is the label used in this study for the "Transitional Period" of previous papers. The seven components described with itemized burial data in the principal publication[117] are the only ones treated in the following survey of the culture, except in the case of a few items mentioned from other sites, which are specifically so noted.

Five of the seven sites mentioned provide the main body of data; these are Morse (C66), Hicks C (S60), Deterding (S99), Brazil (S43), and Need (C151). The seven components summarized here do not include Brazil or Need, but instead include Windmiller B (C107), McGillivray A (C142), and one from the north end of the province known as Miller B (S1) near Knight's Landing. From these seven components, the total number of burials with information is 261; of cremations, 18. Sites having Middle Horizon components are almost without exception permanent habitation sites, located on the valley floor conveniently near watercourses or ponds, and built to depths ranging from 36 inches to over 100 inches. Intensive occupation is obvious from the ash and charcoal permeating deposit in flecks and lenses, from burned and fire-cracked stones, and from animal, bird, and fish bones in the soil. A perceptibly greasy texture (strongly characteristic of later deposits) is evident in the soil, which is invariably compact and indurated to a moderate or extreme degree. The hardness may be expressed, in default of a scale of measurement, as intermediate between that of midden matrix in Early and Late Horizon components.

Such data as exist on physical characteristics of Middle Horizon folk of the Interior Province (head length and breadth, nasal height and breadth, plus indices for 125 individuals from three sites) indicate strong persistence of a dolichocephalic and platyrrhine strain like that dominant in the Early Horizon, but with short-headed and narrower nosed factors entering to raise the cranial index to low mesocephaly with slightly less platyrrhinity than in the Early population. Greater variation between extremes is the rule, and the trend is directly toward features characterizing Late Horizon populations in the Central Valley.

Interior Province components show certain traits which appear to have carried over from the Early Horizon, add new traits to certain of these which last into Late Horizon, and in addition are marked by a

series of distinctive elements appearing elsewhere only in the Coastal Province equivalent of this horizon.

The characteristic burial posture of the Early Horizon as expressed in Windmiller Facies is weakened to the point of extinction. Out of 243 burials with observable position, ventral extension appears in only eight cases; a tightly flexed posture on the back, side, or occasionally the face, is dominant (214). Looser flexure, flexure only of the knee joints, or full extension on the back distinguish the remaining 21 cases. Orientation of burials, while highly variable from one component to another, swings most often between south and west, the deviation from the mean being from ten to sixty degrees for 50% of the burials. The new custom of cremation enters and is practiced to a slight extent (18 occurrences). While every cremation has artifact associations of some sort, only an average of 41% of burials are so favored.

Within this horizon, attitudes toward the dead no longer require the frequent inclusion of charmstones, quartz crystals, or similar ceremonial objects in the grave. Much more common are ornamental items, most indicative of cultural affiliations, such as shell beads and shell pendants. The Olivella bead types 3b, 3b2, and 3c, as well as 3b1 from Orwood Component southwest of the area, are found only in components of the Middle Horizon (one possible exception was mentioned above). These are varieties of the saddle-shaped bead, and the large saucer-shaped bead with a large central perforation. Haliotis bead types 3 and 4 are similarly restricted to the horizon, but the large and small varieties of spire-lopped Olivella (1a and 1b) survive from Windmiller Facies and carry on to be shared with Late Horizon burials. Haliotis ornaments, likewise more numerous and varied than before, are more frequently made from Haliotis cracherodii (green-backed abalone) than from Haliotis refescens (red-backed abalone), the species most commonly or exclusively utilized outside this horizon. Distinctive treatments are variations on a circular or oval shape with a central perforation; to this form, in three components, is added an outside perforation and serration of the edge, or, less commonly, incising of the edge (types C(1), C(1)b, C(1)a, C(1)1, C(1)1b, or C(1)1a). Double perforation in the center and squaring of the outline are also known (C(2)b, C(2)1b, B1b, and B(1)1). All these forms tend to be large. From one to twenty or more examples may occur in one burial. A rarer form, but well distributed (5 components) is a crescent cut from the shell rim with the thicker and perforated (A1). Simple forms common also to components outside the horizon include circular, rectangular, and triangular ornaments with an edge perforation and occasionally incising (B1, C1, C1a, and E1). A few are painted with red ocher.

While other ornamental items occur less frequently, their variety is almost endless, both from burial to burial and from site to site. Common in four sites are perforated and ground slate pendants, of which one or two have scallops along the edge resembling shell ornament decoration; three sites share polished flat stone rings (also attributed in isolated instances to one Late and one Early component). Very thin steatite disc beads with rounded edges, resembling Haliotis bead type 4, occur rarely in three sites. One occurrence each is known of short, tubular steatite beads and of a magnesite bead (a marker of late times

within the succeeding Late Horizon). Cylindrical stone earplugs of steatite are known from the extreme ends of the province, at Miller B Component in the north and Orwood B Component outside the southwest edge, and reported by Dawson for one intermediate site.[118] A notable sort of bone ornament is unique to the Interior Province. It is a long pointed pendant with two end perforations bordered by incision, found in pairs on either side of the head; several varieties are known from two components. Perhaps related are perforated, round-pointed bodkin-like implements, which occur frequently, and usually in matched pairs. These are the closest parallels to the headscratchers and hairpins of Marin County coast sites, but do not actually resemble the latter closely.

Short tubular bird bone beads (generally heavier than their cognates in the Late Horizon) and longer polished tubes or bird leg bone sections occur; the former in one component, the latter in three. Serrated ends distinguish one bird bone tube from still another component. Perforated coyote canine teeth (also known from Windmiller Focus) and perforated bear claws are not uncommon. Perforated ornaments made from roughly trimmed (?) sheets of muscovite mica (listed erroneously as biotite) precisely duplicate mica ornaments from the coast, but occur only once; the perforation is central and the ornaments large, in contrast to the small, edge-perforated ornaments of biotite mica from Early Horizon. One instance of biotite ornament, as well, is known from Middle Horizon.

Ceremonial manifestations of Interior Province Components evidence an orientation toward death and mortuary observances which differs significantly from the preoccupations of Early Horizon folk. New classes of objects appear, and objects of old familiar classes are treated differently. In the latter category are red ocher, quartz crystals, and charmstones. Quantities of red ocher spread through the grave constitute a minor signpost for horizon recognition; although the use of ocher is common to all horizons, it is neither as frequently nor as lavishly bestowed on burials outside of the Middle Horizon. Haliotis ornaments, beads, and plain stream boulders are found occasionally with stains from being painted with ocher. Miniature mortars and pestles, usable for grinding pigment and for macerating small animals, are found occasionally stained with red. Although whole and cracked quartz crystals are still recurrent items, they are found less frequently and in fewer numbers than before. Cracked crystals are greatly in the minority. Charmstones of any type are much rarer than before, and occurrences outside of as well as with burials are recorded for the most common type, the so-called "fish-tail" form, an unperforated asymmetrical spindle with one end flattened to a wedge shape (type D5). Against ten occurrences of the "fish-tail" form in four sites is one occurrence each of the unique perforated types F3 and F4 and three occurrences in two sites of perforated symmetrical spindle shapes (B1 and B1a). Diorite, gneiss, and schist are the materials used. These few charmstones are sometimes intentionally broken in the grave, as are quartz crystals, slate pendants, Haliotis ornaments, obsidian blades, and the utilitarian mortar and pestle. The practice is common in Early times, especially with reference to charmstones, and carries over into the Late Horizon in which utilitarian objects are most frequently "killed." An unusual feature in the stoneless Delta region is described as a stone platform accompanying a burial, composed of from five to fifteen or more stones laid below or above the skeleton. A possible

correspondence with the Early Horizon burial trait of smooth unworked pebbles is the occasional inclusion of differentially weathered stone "curios," chunks of fossil bone or a lump of tufa, which were perhaps preserved as mementos. Whistles with a single aperture placed toward one end, while not common, are found made sometimes of bird bones and several times of mammal bone.

It is clear that economic orientation of the Interior Province people approached the specific patterns known in Late archeological times and in the ethnographic present. Mortars are scarce and specialized for different environments. The characteristic pestle form (D1, from four sites) shows a chisel-like point and striated polish believed to be derived from use in a wooden mortar; it occurs in the overflow area of the Valley where suitable stone is rare. At the Sierra foothills side of the area is found a conical-tipped pestle (A1) and conoid bowl form of mortar (C1). Southward, but still near the hills, is another stone mortar, round bottomed and of stream-boulder origin like the others. Grinding stones, or metates, which were known in Early Horizon, occur in components of all parts of the Province. Bone basketry awls, rare or absent in Early Components, are definitely present in the Middle Horizon, distinguished from later styles by their frequently worked down bases. Here, too, are flakers of antler, a bone knife, and perforated bone needle. Bipointed bones occur which may be gorge hooks or compound hook barbs for fishing. Rectangular bone spatulae of several types, and ground sturgeon plates or tortoise plastron of identical shape, are regarded as mesh-gauges or (from their polish) as strigils or sweatscrapers. The spatulae occur fairly frequently, being noted in three of the sites here reviewed. Fishing is attested again by several forms of a unilaterally barbed implement with curved shank; these may serve as pieces of a compound hook or as half of a two piece fishspear.[119] They are both fairly frequent and widespread; they occur for example at Miller B Component in the north and at Orwood Component beyond the southern edge of the province. Only in the northernmost component, however, have grooved stones interpretable as net sinkers appeared. The large size sinker (15 cm. maximum diameter) suggests a possible use as anchor for a raft or the like rather than attachment to a net. In general, bonework is well finished with a minimum of natural projections and surfaces retained. Partly worked specimens of the favored deer cannon bone are scattered throughout the deposit and not infrequently in burial association. River shells which would serve naturally as spoons are worked into better shape by grinding or removing the hinge; still different types occur in Late context. Steatite pebbles are used as polishing stones.

Projectile points and knives of the Middle Horizon show much closer affiliation with those of the Early Horizon than with the Late. Various materials, including chert and slate, are used in addition to obsidian which predominates. The specimens are large and heavy, weighing more than five grams for complete pieces. Non-stemmed forms are at least twice as numerous as stemmed forms and may be considered typical; bases are sometimes tapered or are occasionally indented in a crescent notch. Corner notching without tang is the typical mode of producing a stem. The face of large blades, which are not uncommon, shows a noteworthy technique in the extraordinarily skillful removal of long diagonal flakes, which produces a wavy "ribbon flaking" pattern unique to the Middle

Horizon. From several components come smallish points which have the flaking facets obscured by grinding. An extraordinarily high incidence of projectile embedded in the bone of burials is found. Recent analysis indicates that over five percent of burials attributable to this horizon have such prima facie evidence of violent conflict. There are in addition among burials of the Middle as of other horizons, burials lacking skulls and burials accompanied by separate skulls to support inference of the practice of head taking.

Implements with uncertain uses include a socketed tool handle (?) of antler, a handled adz-like antler implement (also occurring in an early facies of Late Horizon), and notched, blunt antler points listed as "pseudo-harpoons" (known from one Early Horizon occurrence where it lay against a bone hook). Horn wedges are notably present in Miller Component in the north. Distinctive for the horizon is an elongate, thin, triangular spatula made of elk antler, the function of which was possibly decorative, found in six instances singly or in groups at three components. Short, capsule-like, marked bone dice occur twice. Among miscellaneous worked animal remains limited in occurrence to the Middle Horizon are gouges (?) of beaver incisors and animal rib scrapers with squared ends. Unworked animal remains such as beaver mandibles included in graves are possibly in the same category with interments of partial or complete skeletons of badger, coyote, raptorial birds, etc., which evidence animal ceremonialism;[120] similar ceremonially treated animal remains occur also in the Early and Late Horizons.

Uncertainly classified or miscellaneous stone objects are less numerous. Chrysolite asbestos splinters accompanying burials or unassociated in deposit are to be mentioned because of the link they provide with Early Horizon burials. A flat stone disc, a large perforated oval stone resembling a spindle whorl, and several crudely worked spindle-shaped stones distinguished from charmstones principally by their crudity, are known from Middle Horizon burials. Two separate finds are recorded of small cup-shaped stones perforated at the base, which tentatively are regarded as inserts for a wooden tobacco pipe or bowls for a bone-stemmed pipe.

Baked clay is considerably more frequently encountered in deposit than in Early components, but by no means attains the exuberance of variety and numbers that marks later deposits. Several spool-shaped objects, a tule impressed spool shaped object, a cache of six longitudinally grooved or loaf shaped objects in three matched pairs, and various incidentally baked fragments of wattle work from house walls, etc., are definitely attributable to the Middle Horizon in the Interior Province. Occurrences other than these are somewhat uncertainly placed because of the abundance of baked clay in overlying Late Horizon components at the sites.

Two types of artifact bear separate mention in conjunction with the typically large, heavy form of projectile point. One of these is a conoid button of antler with a small notched step at the broader end (listed as notched antler tine tip), which might have been attached to the tip of an atlatl as the button against which the dart butt was placed. One or several specimens may be found with a single burial. Separately found is a stone artifact much like the "boat-shaped" stones described for

the southern San Joaquin Valley;[121] one was found in Deterding Component of Morse Facies, the other, which is fragmentary, in an unplaced component of the Middle (?) Horizon). These and the San Joaquin specimens are larger than similarly shaped "boatstones" from the southeastern states; nonetheless, the correspondence in shape suggests a correspondence in function, as atlatl parts.

Several consistent details of technique or fashion prevalent in various components of the Middle Horizon may be mentioned briefly as "modes" distinctive of the horizon. Bone decoration occurs very infrequently but consistently involves groups of two or more broad incised lines transecting the object, with one or more crosses between groups; this is perhaps extended to stone or other materials. Smearing of objects or areas of objects with ocher has been noted above. Scalloped edging is noted on shell ornaments, shell "spoons," notched, blunt antler points, and stone pendants, although it does not exclude radially incised edging of ornaments. In another line, fastidious trimming of bone objects is applied to utilitarian basketry awls as well as to ornamental pieces and others of uncertain function. Skillful "ribbon flaking" of obsidian blades has been mentioned. Use of asphaltum as an adhesive is recorded. Olivella beads are found in shingled rows or rows of separate beads used as sequins. Although ocher smearing and ribbon flaking have not been noted elsewhere, the rest of these modes appear in Middle Horizon of both facies of the Coastal Province.

Late Horizon: Cosumnes and Colusa Provinces.

Items from Late Horizon communities of the Central Valley area are plentiful in museum and private collections. The sites are numerous and prominent in the landscape, and have suffered much damage from looting by the curious and from "improvement" by roadcrews and irrigation-minded ranch owners. These activities have brought many hundreds of artifacts above ground which some day will greatly supplement systematic excavations.

Trait carry-overs show the beginning of the horizon to be somewhere near the undated termination of the Middle Horizon, but Late Horizon does not end until the fully historic period, when correspondences can be found between ethnographic and archeological sub-groups. Two phases of development, known as Phase 1 and Phase 2 of Late, are discernible in the cultural inventory. In the past a third, Phase 3, has been distinguished using as criterion the inclusion of objects of Caucasian manufacture or evidence of their possession.

The classification used in this paper does not segregate an historic phase. Phase 1 and Phase 2 are marked off in each geographic province as distinct facies of culture within the Late Horizon. Two provinces are distinguishable within the valley confines, Colusa to the north and Cosumnes to the south. Each has an earlier followed by a later facies; in Colusa, Sandhill is followed by Miller; in Cosumnes, Hollister by Mosher. The two adjoining provinces occupy an area seventy miles from north to south. Orwood #2 A, located near the southwest edge of Cosumnes Province, remains unplaced in the scheme; it is a "floating component."

Living sites throughout the area are mounds of midden accumulation comparable to those of Middle Horizon in content of bird and animal bone, fragmented stones, and river shells, ash or charcoal residues and greasy texture of the soil; but they differ notably in degree of compaction and mineralization. Extremely loose, soft dirt is the rule; destructible features such as charcoal flecks, ash lenses, pit lines, and housefloor traces are more distinctly defined in the soil. Depth of deposit has the surprising range of from about one foot (especially topping stratified sites) to more than twelve feet. Baked clay lumps and shaped balls are abundant in a variety of recurrent forms in components of Cosumnes Province, which lies mainly in the overflow area. Shaped objects of baked clay fade out after entering Colusa Province in the north along the Sacramento River; they are scarce beyond Windmiller Component on the Cosumnes River; and they are not found as far southwest as the Hotchkiss Component.

Linked traits give the entire area a certain degree of cultural unity which is rooted in the antecedent Middle Horizon culture. The following traits traceable to the Middle Horizon are especially well noted in the Hollister Facies. Burial and cremation exist side by side; burial is most often tightly flexed (though dorsally extended and semi-extended examples occur) and is on side, back, or face, favoring westerly orientation in somewhat more than half the cases. Artifacts are placed with both types of interment. Simpler shell or ornament shapes (A1, B1, C1a) are retained and radial incision still decorates their edges, as incising techniques decorate bone ornaments. Grave offerings are purposely broken and red ocher is found in interments. Paired bird bone whistles and quartz crystals are known; ceremonial interments of coyotes and inclusion of beaver teeth and unworked mandibles occur. Utilitarian objects of economic significance include basketry awls, baked clay objects (used in place of boiling stones), bipointed pins used as gorge hooks, chisel pointed pestles (type D1, D2) for use in wooden mortars, certain types of shell spoons, and large projectile points which may be knife blades or spear points. At Hollister Component and at Maltby Component beyond the southwestern border, earplugs of steatite link the horizons; the shallow stone pipe bowl insert is found at Hotchkiss Component in the southwest Delta; at Sandhill and Miller Components, in the north, dorsally extended and semi-extended burials carry over.

Many of the foregoing traits, however, are distinguished by new interpretation or are set in novel context. Cremation is more frequent than before, and in Hollister Facies (later, in Miller Facies also) burials are found with charring beneath the skeleton in which are preserved charred basketry, fibers, acorns, etc. This circumstance indicates sacrificial burning of offerings in the grave pit before interment of the body. Artifacts are found in virtually every cremation as well as with a high percentage of burials. Decoration of bone is focussed on tubular hair or ear ornaments of bird bone covered from end to end with repetitive geometric patterns in fine line incision. Utilitarian implements such as mortars and pestles are commonly "killed" instead of ornamental or ceremonial objects. Small ocher lumps occur much more frequently than beds of powdered ocher in the graves. The aperture in bird bone whistles is moved to the center from its earlier off-center position. Such variations as these to which carry-over traits are subjected serve to emphasize that the genetic continuity which binds the Late to the Middle

Horizon was molded in its course by new ideas from sources that introduced completely new traits.

There is no known intervening link for a few traits which occur both in Hollister Facies of Late and in Windmiller Facies of the Early Horizon. These include edge-perforated biotite ornaments, burned obsidian prisms used as tinklers and the technique of setting beads in asphaltum as applique on ornaments.

Certain traits appear for the first time as markers of the Phase 1 of Late Horizon and link Hollister and Sandhill Facies as approximately contemporaneous. They are spread through several aspects of community life, although as usual a shell bead type is particularly well defined. Olivella bead type 2a (small to medium rectangle, sharp edged, with a single central or edge perforation) is customarily linked in burials with type 1b (whole large Olivella with ground off spire), the latter being recurrent since Early Horizon times. For the first time appear tubular schist or steatite pipes sometimes flanged near the mouth or ending in an expanded mouthpiece. Small, side-notched, serrated obsidian projectile points of the type used with the historic bow and arrow are suddenly much more numerous than the heretofore typical large, non-stemmed points and blades.

Areal differentiation is brought to attention, however, by the appearance of traits in an earlier facies of one province than of another. Most of the flow of traits was northward from Cosumnes Province. Traits of Hollister Facies, for example, which are absent from Sandhill Facies components but appear well marked in Miller Facies of Phase 2 include: fully flexed burial in dug grave pits; pre-interment burning in the grave pit; deep, angular serrations of obsidian points; incised bird bone tubes; single-piece, bilaterally barbed fish spears; banjo-shaped ornaments of Haliotis shell (type G, Gla, etc.); general elaboration in forms and decorative styles of abalone ornaments (notably use of precise triangular and trapezoid shapes); and Olivella bead type 3e (small, thick, cupped bead). In the reverse direction come relatively few traits: tubular and disc magnesite beads are found in Sandhill Facies (Miller B Component) as well as Miller Facies, but do not arrive in the Cosumnes Province until Mosher Facies develops. The regularity with which the southern traits occur in Phase 2 Howells Point Component in the north, in contrast to their spasmodic appearance in associated sites of the Miller Facies, has led Heizer to suggest northward migration of a Delta group as a cause rather than simple spread of elements.[122]

Although more extensive excavation in the Cosumnes Province may be a factor in skewing the evidence, it seems evident that the Delta area which largely comprises that province was a focus of innovation in immediately prehistoric times. Artistic, or at least non-utilitarian, upwelling is apparent in the variety of Haliotis ornaments and the involutive growth of baked clay artifact types, which achieved many forms including effigies and tubular pipes by latest times, but without ever quite developing pottery forms.[123] Involution of a single theme is also shown by the manifold but sterile patterns incised on bird bone tubes.[124] Examples of a finely worked mortar with flat bottom, flaring sides, and a sharply bevelled rim appear in Hollister Facies. This and related shapes

with the same artistic touch continue in the subsequent Mosher Facies.

A list of traits present in both Hollister and Mosher Facies in the Cosumnes Province which failed to reach the north includes: large bone beads with constricted center; steatite ring; steatite pendant; "spindle whorl"; complete cremation; beds of red paint beneath burials; whole Haliotis shells in burials or used as covers over infant burials; use of shingled rows of rectangular (2a) Olivella beads on caps; taper ing flat bottomed pestles; the flat bottomed mortars mentioned above, and "killing" of the two last named implements. Charred twined basketry, coiled basketry, string, netting, acorns, etc., are of course preserved by the pre-interment burning practice.

The subsequent phase of the Late Horizon is marked by the sudden introduction in both provinces of disc beads made of clam shell, accompanied by thick steatite disc beads of the same shape which are frequently found alternately spaced in strings with clam disc beads. Simultaneously, there appear tubular beads of steatite, Olivella bead type 3a1 (deeply curved perforated saucer with the shell lip incompletely removed), and decoration of Haliotis ornaments by punctations around the edge and by incised lines on the surface (decoration types c and d). Miller Facies is marked by use of a lozenge-shaped Haliotis ornament (type L). The following traits are restricted to Mosher Facies in the Cosumnes Province: curved obsidian blades with frequent angular dentation ("Stockton curves"), bird effigies of baked clay; a special type of wooden fish hook;[125] flat ovoid and tubular beads of Tivela shell and turquoise disc beads, both probably acquired in trade with the south; net sinkers of baked clay, and net sinkers of flat, notched pebbles. Certain traits uniquely noted from Hotchkiss A Component, situated near the southwest edge of the province near the coast range side of the Delta area, recur in a coastal context and may indicate special contacts between inhabitants of this component and the coast, since similar traits are not noted for inland sites equally near the coast (Orwood #2 A, Maltby, Simone). These Hotchkiss A Component traits are: unilaterally multi-barbed fish spears; flat-bottomed, cylindrical pestles; pestles with flanged, expanded, and cupped ends; large mortars inverted over burials; frequent incidence of flat bottomed, straight sided (type A) mortars; well-made charmstones expanded near one end and frequently displaying a small nodule at the large end; especially variable orientation of burials.

The archeological picture of these people, bow-users and basket-makers, prospering under an economy based on acorn and seed grinding and valley hunting, is practically identical with the picture of native life derived from ethnographic information. The physical type, brachycephalic, mesorrhine, medium short and light boned, is essentially that of the historic Central California type.[126] The historic period shows Late Horizon features side by side with European traits. Abundant quantities of clam disc beads (functioning as money according to ethnographic information), abundant bone and feather ornament, small notched arrow points, cremations, and carbonized textiles from funeral offerings occur together with such European intrusions as glass trade beads, steel-drilled magnesite beads, steel-incised Haliotis ornaments, arrow points of bottle glass, and deep shovel-dug graves. Ethnographic information and archeological findings do not always exactly correspond for this period, but it is nonetheless

certain that the archeological time column extends beyond 1825[127] and that there is practically no time gap between it and the memory of living Indians. Thus we have archeologically a partial picture at least of Indian life in the Lower Sacramento Valley from the ancient, though undated, Early Horizon practically to the present time.

In each of the three horizons of the Sacramento Valley, favored artifact types occur with a frequency which is unparalleled on the coast. The coastal areas around San Francisco Bay and on the Marin County shore have, of course, no known remains comparable to Windmiller Facies of Early Horizon. In succeeding periods, however, ten or more specimens of a given type may be known in the Sacramento Valley for each duplicate example nearer the ocean. This superiority is only partly due to the greater amount of excavation done there, and seems to express superior richness and productivity of the interior region throughout Middle and Late Horizons. Working backward from historic times, the culture climax represented by ethnographic groups seems to have its roots dug into the Valley floor even before the Late Horizon configurations which ended in the historic period had been formed. An impressionistic judgment, however, would not set the Interior Province of Middle Horizon as far above the Coastal Province as it stood in Late Horizon times. Both coast and interior have a respectable number of unique traits, and influence in both directions can be seen. The flow of traits in Late Horizon may have been much more toward the coast. This is suggested most strongly by the data from Marin County coast sites, but finds some support also in sites of San Francisco Bay which are reviewed in the following chapter.

Chapter V

Culture Horizons in the San Francisco Bay Area

1. Introductory

Much of Central California is archeological terra incognita except for isolated scraps of information. There is one area besides the Marin County coast and the Sacramento Valley, however, which offers adequate data from a number of sites. This is the San Francisco Bay area, where some sixteen sites were excavated or at least examined during their destruction before 1938. The sequence of excavations and the published site reports have been described in the Introduction. Here also was noted the development of the dogma which regarded the prehistoric culture of the San Francisco Bay shellmounds as static and changeless.

As opposed to this view, we have seen that significant changes of culture occurred in Marin County, just north of the hills rimming the bay. The similarities between the two horizons, which are the product of a

seashore food gathering economy and of a common Central California cultural heritage, are no more striking than the many sharp contrasts in culture that separate them. Two culture horizons in the Sacramento Valley, moreover, are linked to those of Marin County by trait parallels of very specific nature despite the contrasting environments. It seems not too much to expect that some reflection of these horizons might be found in the San Francisco Bay area, adjacent to both areas and hardly more self-sufficient in ecological potentialities than the Marin County sea coast. The alternative requires us to suppose an enigmatic isolation through generations of cultural cross-currents which permeated the regions around it.

Such isolation is hardly to be expected. In fact, Heizer and Fenenga remarked parallels between published data from San Francisco Bay and their Transitional (now Middle) Horizon of the Sacramento Valley.[128] To learn whether or not such other parallels existed is clearly indispensable to discovery of what happened in central California history, and requires reevaluation of the total of information known from San Francisco Bay shellmounds. An analysis of several sites was published once before by Professor A.L. Kroeber in a short section of his monumental Handbook of the Indians of California.[129] Dr. Kroeber's analysis relied on the depth distribution of artifacts by class, without segregation of types within classes. This procedure convincingly demonstrated the similarity of the culture base from the earliest to the latest levels of each site examined, but it gave no inkling of the sort of changes which are now recognized as important to the mechanics of history in Central California.[130]

The analysis briefly presented in the following pages follows procedures which have been effective in the Sacramento Valley and on the Marin Coast. Burials are segregated on the basis of artifact and trait content, and plotted by depth of occurrence. Separate types of each class of artifacts occurring without association are then examined to provide a more complete picture of culture content. Where separate burial groups indicate stratification of a site (i.e., presence of two or more components), the stratigraphic correspondence or conflict of unassociated artifacts is also examined.

The evidence presented here is chiefly burial data. This shows the facts of cultural succession but lacks the breadth of the cultural picture given by unassociated artifacts. More complete description must be relegated to a future paper. The analysis itself is based on the complete artifact collections and field notes in the Museum of Anthropology at the University of California, as well as on published information. Certain temporary inconveniences prevented full examination of all materials; chipped stone artifacts and much of the collection of ground stone artifacts were being utilized in a museum project and were consequently difficult to examine. Depth of occurrence in older excavations is noted only in feet, not in inches, which is of little consequence in a mound thirty feet deep but of more importance in deposit less than eight feet in depth. Information for certain classes of artifacts at crucial sites is incomplete, etc. Results of the analysis are by so much the less incisive for these gaps or inconsistencies. Nonetheless, unexpectedly clear results have appeared.

As in other areas in Central California, shell beads and shell ornaments in San Francisco Bay sites serve as "index traits" linking sites within a given culture horizon. They provide the most inclusive site to site correlation within the San Francisco Bay area on the one hand and among the various areas on the other. A glance at Figure 10b, which combines some of these ornamental traits with a few others, will show how clearly the separate horizons are distinguished. Difficulties in the way of complete examination of shell artifacts were largely overcome through the generosity of Professor E.W. Gifford, who furnished me with manuscript copy of his study of California shell artifacts.[131]

2. Summary of Culture Horizons

The burials and artifacts from fourteen selected sites around San Francisco Bay permit the definition of three facies in two temporal horizons: in ascending order of recency, Ellis Landing Facies of the Coastal Province of Middle Horizon; and Emeryville and Fernandez Facies of the Alameda Province of Late Horizon. Relationships are in general closer to the Marin coast components than to those of the Sacramento Valley. Fuller study or more compendious information might well permit the splitting of these facies into a larger number, since the material in hand does suggest, for example, differences between north and south sides of the bay, or between components toward the sea and those inland. Relationship of Ellis Landing Facies to McClure Facies on the Marin Coast is so close, on the other hand, that the two might actually better be subsumed under a single name. The data are so variant in quantity and quality, however, that it has seemed best not to merge manifestations in the Bay area with outside areas until more complete information becomes available. But it is to be admitted that the classification of archeological components used here is affected by non-cultural factors such as the quality of excavation data.

Most of the fourteen sites considered here[132] are in some degree multicomponent settlements, with traces or full development of two components. Despite the stratigraphic separation of these cultural components, soil stratification is unnoted for all but one site. The exception is Ellis Landing Site where, curiously enough, only traces of a second component can be recognized.

The sites are well distributed around the shores of the bay. The majority are now destroyed and their immediate environments unrecognizably changed. Descriptive comments must be understood to apply to the aboriginal appearance of the site and its surroundings. The greater number are located near the beach, and often rise out of marshland created by tidal overflow or rainy season overflow of nearby stream courses. Some variety of food resources is noted, but the chief occupation of the inhabitants of most sites was collection of shellfish from the mudflats or rocks of the beach. This food residue served to build up the mounds rapidly to imposing heights of ten to thirty feet. Difference in height may reflect difference in number of inhabitants or the length of time spent at one location, but it is undoubtedly also a product of different

degrees of concentration of shellfish versus other food resources.

A summary of cultural characteristics of successive facies in the San Francisco Bay area may be given here.

Ellis Landing Facies. The people of Ellis Landing Facies buried their dead in a loosely flexed position resembling that of McClure Facies. Instances of semi-extended interment are known from four sites but are rare, as is likewise the practice of multiple burial. Orientation occurs in every direction, although the burials of each component tend to conform to predominant orientation which more closely corresponds to their direction from the bay than to anything else. Powdered red ocher (occasionally yellow) is more frequently and more abundantly found in the grave than any other form of grave goods. A significantly high number of graves contain various unworked animal or bird bones, and have stones piled in or over the grave. Shell beads are seldom more numerous than 300 specimens, but the types are consistent: Olivella 3c, 3b1, 3b2, and 1b. Haliotis bead type 4 occurs more rarely than the Olivella beads. The same is true of larger ornaments of Haliotis shell, which tend to be generalized, long, roughly rectangular, or claw-shaped (triangular) forms except at Emeryville B Component. At Emeryville B Component and exceptionally elsewhere, centrally perforated or ring shapes appear with serrated edges or concentric circles incised on one face; the nondescript rectanguloid forms accompany them.

Implements of bone and horn include a few awls and wedges, and in eight components burials are known with one to ten implements similar to or exactly duplicating the spatulate hairpin, head-scratcher, elongate triangle, mesh gauge, or "shoehorn-shape" forms characterizing McClure and Morse Facies in Marin and the Sacramento Valley. Mica ornaments and prismatic obsidian tinklers occur more rarely.

Beach cobble mortars (type B) and mortars with rounded, shaped sides (types A2a, A2b) are found, and are described upended over the head or foot of the burials they accompany. A few pestles, hammerstones (of spherical shape or pebbles with battered ends) and unworked pebbles or flakes of quartz occur. A few burials are accompanied by small, cylindrical earplugs, and a greater number of charmstones. Charmstone types seem to include none of the symmetrically smoothed varieties (mode b manufacture). The plummet form is certainly present.

Projectile points are not only included as grave goods but are found embedded in the bones of the skeleton. Those identified are nonstemmed, large points (type N2) and include a few chert along with the obsidian examples. Rare finds are whistles of bird or elk bone, stemless stone pipe bowls, rings or spatulate pendants of slate, and quartz crystals, all with examples ornamented by application of type 3c Olivella or type 4 Haliotis beads, which are glued on with asphaltum. Also rare are notched antler tine tips, strigils, needles, and bipointed bone gorge hooks.

This complex of burial-associated traits constituting Ellis Landing Facies clearly ties in with Middle Horizon as manifested in Morse and other facies of the Interior Province and in McClure Facies of the Coastal Province. In addition to the absence of numerous traits of either Late or Early Horizon, general features of Middle Horizon are emphasized, such

as predominating interest in bone, association of artifacts with relatively few burials, use of large, non-stemmed projectile points, evidence of warfare (from projectiles embedded in bone, etc.), and variable position and orientation of burials. Specific elements of Middle Horizon run through all segments of the culture, from bead and ornament types through bone implements, weapons, and household implements to ceremonial objects.

The twelve identifiable components of Ellis Landing Facies are in each case the earliest components of the sites. Four sites show no record of occupation by a subsequent settlement. These are West Berkeley (307),[133] Potrero (283), Stege (300), and Princeton (407). Of Ellis Landing (295), the type site, it has already been observed that only a thin veneer or intrusive evidences of a Late Horizon component are known. Sites capped by more or less well documented components of Late Horizon include Emeryville (309), Bayshore (387), Ponce (356), Greenbrae (76), San Rafael (86c), Fernandez (259), and Newark (328). Total depth of these components has a remarkable range of from twenty-two feet at Ellis Landing Component (absolute depth from surface is four or six to twenty-eight feet) to four feet or less at Newark (depth three or four to seven feet).

Mention should be made here of certain specific trait resemblances to Windmiller Facies of Early Horizon. These have not been taken to indicate presence of an Early facies in the Bay area, because of their rarity and lack of adequate documentation. Although they are treated as variations of Ellis Landing Facies culture, it is nonetheless self evident that there is no logical objection to the presence of a culture equivalent to Windmiller Facies on San Francisco Bay. On the contrary, there is much reason to suppose that one did exist, whether it be discoverable or not. The evidence at hand is in burial position and ornament. A "sub-mound" burial at Ponce Site lay ventrally extended with head north of west, hands at the pubis, accompanied only by an oval stone. Because it lay below the water table (of winter season) it was not completely exposed. The deepest burial in Newark Site was also ventrally extended, but oriented east, without artifacts, in indurated deposit. One of the very deep burials at Ellis Landing was ventrally extended, oriented northwest, and another was dorsally extended.[134] The most common form of Haliotis bead (type 1) in Windmiller Facies shows up in unlocated lots at Emeryville (two instances) and West Berkeley, and West Berkeley is the source of unlocated type C. (2). ___ ornaments, which also characterize Windmiller Facies. According to Schenck,[135] five sub-mound burials are known from West Berkeley Site, their position or disposition unspecified.

Emeryville Facies. Burial position and orientation in components of this earliest facies of Late Horizon carry over without perceptible change from Middle Horizon, except that semiflexure and semiextension are apparently absent. A tradition of cremation and pre-interment grave pit burning penetrates the eastern border of the area (Glen Cove Component, at Carquinez Straits), but is blocked from the main body of the bay, where only the most tenuous evidence of its practice is given.[136] Despite this important disharmony, all components of this facies are linked rather closely by burial artifacts.

Preeminent among link traits is the rectangular Olivella bead type 2a), which is frequently noted in shingled rows on the skull (Headdress?) or on carbonized textile, and is applied to shell ornaments and on a mortar rim with asphaltum. Burials with this bead type often have Olivella type 1b beads as well. More elaborate forms of Haliotis ornament enter concomitantly with greater variety of shapes, including triangular, trapezoidal, and a simple version of the "banjo" genre; these are sometimes decorated with simple incision toward the edges, sometimes with the "split-V" type of incision. Greatest variety of ornament types and greatest abundance of ornaments is known from Emeryville. But even there, although shell ornaments are perceptibly more numerous than in Middle Horizon components, they are still not abundant by Sacramento Valley standards. Red ocher occurs much less frequently than before, and is sometimes present only as a small lump of pigment.

Flanged tubular pipes of schist or steatite occur in groups; so do charmstones, which include symmetrically-shaped, artistically-made forms (piled plummet b, knob-piled plummet b, and asymmetric b) and one phallic charmstone. The type A1 mortar, with squared rim and flat base, appears for the first time, although the pattern of inversion over the skull or feet of the burial carries over from Middle Horizon. Pestles and obsidian points (types not identified), obsidian flakes, small prismatic obsidian tinklers (one instance) and rare quartz crystals complete the inventory of stone artifacts.

Whether many obsidian points are small stemmed points, as expectable, cannot be said until more thorough examination of chipped stone artifacts is possible. The reports on two components speak of small points as being rare in deposit.[137] It seems most likely at present that the trait is only weakly manifested in Emeryville Facies. In this respect, the facies is not in harmony with Hollister Facies (Sacramento Valley) and Mendoza Facies (Marin Coast).

New types of bone artifacts include a bilaterally barbed fish spear, whistles with the stops cut near one end, and one occurrence in fragments of a pair (?) of staves made from whole antelope metacarpals ornamented with fine line incising. Bone awls and flakers, needles and beads are indistinguishable from those of Middle Horizon except in one occurrence of bone beads with constricted waist. It is not certain whether notched deer scapulae and "rasps" made from cannonbone with transverse notches are confined to Late Horizon deposits. They are rare objects in most sites.

In cremations at Glen Cove Component, well-preserved fragments of twined and coiled textiles, netting, cord, matting, and tule fibers are noted. These display both shingling of rectangular Olivella beads and imbrication of feather ornament. Miscellaneous grave goods include cut antler tines and animal or bird bones, viz., a cluster of bird wing bones, an articulated sea otter foot, bear teeth and claws, and eagle claws.

Emeryville Facies is represented in components in all sections of San Francisco Bay. The only single-settlement site is the Glen Cove Component (326). Components which are super-imposed directly upon Ellis

Landing Facies manifestations are Emeryville A (309), Ellis Landing A (295), Bayshore A (387), Ponce A (356), and probably Greenbrae A (76) and San Rafael A (86c). None of these has later settlements or evidence of subsequent occupation.

Fernandez Facies. Evidence in the San Francisco Bay area for the existence of a late prehistoric or protohistoric phase of occupation comparable in trait content to those of the Sacramento Valley or Marin coast is curiously scarce. Two components are known: Fernandez (259) and Newark (328).[138] Each of these is located away from the main body of the bay; Fernandez is sequestered in a small stream valley leading north into San Pablo Bay, and Newark is near the southern limit of the bay, not far from the original Mission San Jose. This scarcity of settlement and its possible meaning to Central California prehistory will be commented on in later pages.

Fernandez Facies is represented by fifteen cremations (Fernandez), one semiextended burial, and perhaps other flexed burials (Newark). This is hardly an adequate sample for comparison of positive and negative traits, but its distinctive traits are clearly linked with Mosher and Miller Facies in the Sacramento Valley and with Estero Facies on the Marin coast.

Clam disc beads and Olivella type 3a1 beads, which are the most important guide traits, predominate among ornamental goods, but are joined with Olivella bead type 1b, which carries over from earlier times. With these bead types are found steatite and magnesite tubular beads, thus completing the familiar clam disc complex.

Mortar types include the A1b form with slanting rim, flaring sides, and flat bottom. A tubular pipe of steatite, small prismatic obsidian tinklers, bird bone beads with constricted centers, bird bone tubes, bird bone whistles, fine-line incised ornamentation, and square serration of obsidian points are traits shared with other facies of Late Horizon. Perhaps carrying over from Middle Horizon are quartz crystals, a small, stemless pipe bowl (Fernandez), and a notched deer scapula (Newark). Haliotis pendants are limited to undistinctive circular, rectangular, and triangular forms. Horn or bone awls and flakers, use of red ocher, unworked pebbles, and a carnivore claw are similarly unrevealing. Charred beads apparently made of wood (Fernandez) are a unique trait.

No evidence of historic contacts with Caucasians is noted, but the traits particularly marking Fernandez Facies are exactly matched in Sacramento Valley and Marin coast manifestations of protohistoric and post-contact dating.[139]

3. Sites of San Francisco Bay

Each site contributing to the outline of culture sequence just presented is discussed as a unit in the following section. The purpose is to indicate the number of components present and their stratigraphic relationship. The amount of excavation performed at each site and the

quantity of data available will be mentioned, with special reference to burial information. Attention is given to features of interest occurring in deposit apart from burial association.

Ellis Landing Site (295).[140] Museum collections include a large quantity of artifacts from the beach or without location in the site, another large group with full provenance data from a trench cut through the site, a smaller number from a shaft sunk to bottom below water level, and a large quantity salvaged when much of the mound was graded. Total is 630 specimens. N.C. Nelson was in charge of excavations, assisted by G. Wepfer.

The site is located in Richmond at the edge of a salt-water marsh, facing a small island and not far from a rocky shore. Its maximum depth is twenty-eight feet, and Nelson concludes that the lower sixteen feet or so are below the present marsh level. In this respect and in details of stratification, the site structure closely resembles McClure Site on Tomales Bay. Nelson several times notes division between a more compact level with finely macerated shell and a looser upper level ending at about eight feet depth.[140a] This stratification is also shown in photographs and diagrammed profile, although Schenk later denied its existence.[141]

Of 160 burials noted by Nelson in trenching and grading, I am able to use only 42 which have artifact association because of uncertainty as to the upper limit of the Ellis Landing Facies deposit. Four burials between 3 and 6 feet depth, including one partial cremation, are probably of Emeryville Facies. This is confirmed by type A1 mortars (some "killed"), small, stemmed projectile points, knob-piled b charmstones, and a bone tube with sloppy fine-line incising, found unassociated between surface and six feet depth.

In the isolated occurrence of a group of clam disc beads at three to four feet, and an Olivella type 3a1 bead at six feet, is a weak hint of the presence of Fernandez Facies in addition to, or instead of, Emeryville Facies, especially since Emeryville Facies bead types are lacking. In either case, Late Horizon material occupies the top six feet of deposit. On the other hand, one example of a two-piece barbed fishspear which is unequivocally of Middle Horizon affiliation occurs at only four feet depth. A "zone of confusion" thus seems to exist between three and six feet depth. Attribution is difficult for five pestles with flanged handles, because they were found at these depths. The same is true of a burial at five feet depth, accompanied by a phallic charmstone, an ear plug, quartz crystal, drilled stone pendant, and two type N2 obsidian points.

Grooved sinkers are noted from one to five feet and again, in relatively greater frequency, from fifteen feet to site bottom. Their presence at shallow depths contrasts with the Middle Horizon context in which grooved sinkers occur in other bay sites. Other Middle Horizon traits, however, are clearly attested at relatively deep locations: metate, miniature mortar (type C), a baked earth basin (?), centrally-perforated Haliotis ornament, mica ornament, head scratcher, hairpin, and possibly the simple plummet charmstone.

One burial of especial interest, found at twelve feet depth, was bedded in ocher and accompanied by large obsidian points and blades, a stemless pipe bowl, large prismatic obsidian tinklers, Olivella type 3b2 and 3c beads, roughly rectangular and triangular Haliotis ornaments, and a notched antler tine tip (atlatl hook?). The association of these traits gives a specific link between Ellis Landing, McClure, and the several Sacramento Valley Facies of Middle Horizon, in the pipe bowl, the obsidian tinklers, and the antler tine tip, respectively.

A feature of components of the Interior Province of Middle Horizon is site-to-site variation, as marked by frequency of types unique to one or two components. The same holds true of components of the Coastal Province facies as well. As one example, grooved sinkers are fairly numerous at Ellis Landing, abundant at Stege and West Berkeley, but rare or absent elsewhere. Spheroid hammerstones, small perforated pebble charmstones (?), obsidian tinklers, and longitudinal scoring of bone awls, etc., are traits peculiar to Ellis Landing B Component in the San Francisco Bay area. In artifact traits and in stratigraphy, Ellis Landing B seems somewhat closer to McClure B on Tomales Bay than to any nearer settlements.

Emeryville Site (309).[142] The mound is situated at Temescal Creek mouth, facing a broad, sandy beach and very shallow water. Its precise shape before the top was scraped level for a dance pavilion is unknown; maximum depth from this artificial surface is thirty-two feet, greatest of any known site in the bay area. The sides slope steeply to make a truncated conical profile. Uhle excavated a broad trench on the west side of the site, and in driving a tunnel toward the center, recovered ten burials. Nelson and others cooperated in sinking a six-foot square shaft to the bottom on the eastern slope, getting three burials. Schenck and others salvaged what they could when the mound was leveled in 1924, recording 651 burials seen or discovered, then obtained 41 more burials from trenches they dug in the deposit remaining below modern ground surface.

Schenck insists that strata observed in deposit are all localized and without stratigraphic significance, but both Uhle's and Nelson's sketches of midden profiles show disconformity in the dip of strata at about fifteen feet depth, the lower strata extruding at a much more nearly horizontal angle than those above.[143] This testimony, for what it is worth, checks with Ellis Landing stratification and that in Marin coast sites, for the cultural cleavage zone is not only higher than the midden disconformity in each case, but higher by about the same proportion of the total distance to surface.

The schematic profile (Fig. 11) on which burial locations are superimposed shows the apparent line of culture cleavage, which runs from about ten feet near the southeast to about fourteen feet depth near the northwest areas of the mound. The 48 burials shown are the only ones out of the 705 burials known which I was able to use in determining the components represented in the site. All have depth data and one or several link traits specifically recorded. I was unable to use 71 other burials with artifact association either because they lacked depth record or because of complacency of artifacts in terms of facies affiliation. The 48 useful burials, however, show unmistakably that two components are represented; 32 belong with Ellis Landing Facies of Middle Horizon,

and 16 with Emeryville Facies of Late Horizon.[144] The trait table for individual burials (Table 12) is included as an example of the method by which components have been isolated in all sites. It will be noted that complete consistency is best shown in the frequently recurrent bead and ornament types.

Uhle claims evidence of cremation in top levels, which Schenck denies, proposing instead a charred group of skeletons at twenty-eight feet as "unquestionable evidence of cremation."[145] I have accepted neither and postulate burial as the sole method of disposal throughout. Other burial traits and associations need no comment, and are as shown in Table 12.

Although unassociated artifacts in deposit generally confirm the cultural succession postulated from burial distribution, certain types are represented by very few located specimens. Type A mortars are extraordinarily numerous, but poorly located; A1a and A1b specimens with known provenance lie above twelve feet, whereas A2a, A2b, and B types continue downward. But almost five-sixths of the mortar specimens found are unlocated. Uhle records an A2b specimen from B Component (Ellis Landing Facies) deposit which is ornamented by vertical lines pendant from an encircling groove; this sort of decoration on stone is unique in Middle Horizon context.[146] He also figures a type D mortar, which is otherwise known only toward the southern end of the bay (Uhle: 44, Figs. 4, 5). As in the case of mortars, information is faulty for projectile points. Schenck claims that small points occur at deep levels as well as higher up, whereas Uhle found them only at shallow depths (Schenck: 239; Uhle, 62). In either case, they apparently are not numerous.

Definitive objects in the upper ten feet without burial association include type G Haliotis ornament, flanged tubular pipes, steatite pendants, charmstones of mode b manufacture, and bird bone whistles with off-center stop. These, added to the burial data, delineate Emeryville A, type site of the Emeryville Facies. In Emeryville B Component deposit are found centrally-perforated Haliotis ornaments with b and d type decoration; simple plummet and nodule plummet charmstones crudely made and battered in the mode a fashion; large obsidian points and blades; bone implements such as the "shoehorn shape" spatula, hairpins, forked head scratchers (with broad-line grooved decoration and perforation), perforated canid teeth, and a fragmentary "ringed dagger"; two-piece barbed fishspears; various specialized gorge hooks or spear barbs with single or double points, etc.

Traits which appear regularly throughout the site include awls, antler wedges, notched scapulae, and notched legbones (rasps?), hammerstones, baked clay (rare).

Emeryville Site as a whole is distinguished from others by greater general wealth, which is most evident in the abundance of shell beads and ornaments. Closest relationship toward the east (e.g., with Hotchkiss Site) is suggested by the numerous ornaments, by the profusion of large, well-shaped mortars (which are reported inverted over head or foot of burials), by the occurrence of baked clay objects, and by certain bone implements such as two-piece fishspears and specialized gorge hook types.

In a few traits Emeryville is more reminiscent of sites at the south end of the bay, viz., numerous notched scapulae, socketed antler knife handles (?), type D mortar, and frequent occurrence of deer ulna awls.

West Berkeley Site (307). This is a fairly large and well known site near the shallow-water shore at Strawberry Creek, Berkeley, but information on its excavation is extremely sketchy. It was at least thirteen feet deep; three or four feet of this total are implied to have been below present ground level. The deposit is now virtually destroyed. Excavations by E.L. Furlong in 1902 produced at least eleven burials, for which burial-by-burial record is lacking. Nine more burials excavated by Joseph Peterson in 1904 are described in his manuscript report; although it is difficult to determine which artifacts of the collection are associated with each burial, all apparently are of the same time horizon. Two additional burials, recovered by E.W. Gifford in 1916, confirm the attribution of the site to Middle Horizon.[147] Depth record for unassociated artifacts is by "layer" of deposit, viz., "layers I to VII."

The eleven burials for which data are available lay at depths of six to eleven feet. Although seven soil layers were distinguished, no evidence of culture stratification exists.[148] A Middle Horizon attribution is confirmed by burials and by the greater number of the artifacts. In addition to Middle Horizon traits, there is an unlocated group of Haliotis type 1 beads (typically Early, in Windmiller Facies) and another of clam disc beads (typically Late, Phase 2, e.g., in Fernandez Facies). Burial artifacts of use in defining cultural affiliation are: type 4 Haliotis beads (2 burials), perforated bone pendant (1), bone strigil (1), red ocher (1), sandstone earplug (1), type B1 mortar (1), grooved stone sinker (3), and large obsidian points (3). Other artifacts with burials are: antler wedge (1), bone awl (1), bone needle (1), and numerous unworked fragments of quartz or quartzite (5).

Unassociated items in deposit include some six hundred grooved sinkers, charmstones chiefly of the asymmetric a series, "shoehorn-shaped" spatula, worked bear tooth, type B, C, and D mortars, and various pestles among which type IIIb is best represented. Except for the thick, cylindrical pestles, which are peculiar to the site, these traits all recur in other Middle Horizon contexts. No hesitation is necessary in assigning West Berkeley Component to Ellis Landing Facies, despite the relative impoverishment of burials.

Potrero Site (283). This shellmound is on the Potrero San Pablo, a peninsula reaching out from the eastern shore which separates San Francisco Bay proper from San Pablo Bay to the north. It stretches more than five hundred feet along shore and reaches one hundred eighty feet and more back from a rock-studded bank eight to ten feet high. Depth at time of excavation by Harold E. Driver and Adan Treganza in 1939-1940 is reported to have been six feet; construction of a paved road, in addition to an earlier railroad cut through the site, has recently entailed removal of at least two feet of deposit. The mound is an exception in the bay area in being only damaged but not destroyed.[149]

Driver's excavations, measuring perhaps fifteen by thirty feet at the beach edge of the mound, yielded twenty burials, of which seven were

accompanied by artifacts. Treganza found one burial with a variety of interesting grave goods. These eight burials have been utilized in analysis, since no data have appeared for the remainder. The burials lay at depths of 30 to 108 inches (depth over about 72 inches may result from failure to discriminate between undisturbed deposit and dirt thrown over original surface from the railroad cut). Artifact associations include: Olivella bead types 3c (4 burials) and 3b2 (1); Haliotis bead type 4 (3); rectangular slate pendant with asphalted applique of Olivella 3c and Haliotis 4 beads (1) undecorated slate pendant (1); perforated mica ornament (1); spatulate bone implement like hairpin type (1); fragmentary antler triangle (?)(1); and lump of baked clay (1). These burials are assigned to Ellis Landing Facies.

The attribution is confirmed by artifacts without association: a stemless "pipe bowl" with asphalted applique of Olivella 3c beads, three grooved sinkers, mortar fragments of A2 and B type, large obsidian point, forked head scratcher, and a human figurine fragment of baked clay. The figurine fragment has not been described previously. It is the only ithyphallic figurine recorded from the area.[150] Its fragmentary length is 34 mm.; it is roughly cylindrical, tapering to a round-pointed base, with a pointed lump of clay near the broken end to represent the male sex organ. No ornamentation is visible on the blackish brown clay. (UCMA # 1-64698)

Artifacts without "time-bearing" connotations include: pestles, hammerstones, bone awls, bird bone tubes, notched scapula, and antler wedge.

Stege Site (300).[151] This mound is the largest of a group of sites bordering salt-water marshland slightly more than a mile east of Ellis Landing Site. Although L.L. Loud and Leonard Outhwaite excavated three burials in situ in 1915, when the mound was being levelled, and A. Treganza recovered two burials from the base in 1942, almost all artifacts were obtained on the beach or from deposit without location. Since 1943 the site has been obliterated by shipyard construction. The published report includes some artifacts from Site 298 (CCo-298) nearby. Although artifacts are merged almost completely with those of Stege Site (300), reports of cremations and material of Late Horizon found in Site 298 since 1940 distinguish it sharply from Site 300, which is unequivocally a component of Ellis Landing Facies.

Burial associations include: a set of obsidian and chert projectile points or knives of types N1 and N2 (1 burial); a half-ring of schist perforated at one end (1); a cylindrical earplug (1); two small pestles (1); a whale tympanic bone (1); an antler wedge (1); a bone awl (1); and abundant red ocher (1).

Unassociated artifacts (mostly without location) include: globular hammerstones; mortar types A1b, B1, B2, and C; pestle types IIa and IIIa; pitted stones; bone awls; horn wedge; numerous charmstones, mostly battered examples of the simple plummet type; a remarkable quantity of grooved and notched stone sinkers (601). These items harmonize in all essentials with traits of Ellis Landing Facies. In the globular hammerstones and perforated half-ring of schist, Stege Component most closely resembles Ellis Landing B Component. Its distinguishing characteristics are the

extraordinary number of grooved and notched sinkers and prevalence of actinolite stone in its charmstone specimens.

Bayshore Site (387)(SFr-7).[152] In 1910 N.C. Nelson supervised excavation at Bayshore Site (alias "Crocker Mound"), largest of a group of mounds near Hunter's Point. The site lay at the water's edge and was sheltered by a hill on the north side. Nelson's trench went down through ten feet of deposit to a base which he considered below high water level. From this trench, extending 100 feet along the south edge, almost 20,000 cubic feet of dirt were removed, yielding 23 burials, at depths of two to eight feet below surface.

Two components are distinguished, although association of artifacts with only five burials provides difficulty in establishing a line of demarcation. Burials of A Component (Emeryville Facies) have: Olivella bead type 2a (3 burials) and type 1b (2); circular, triangular and roughly rectangular Haliotis ornaments with incised edges and single perforation (3); bone whistles in a pair (1) or a group of six or seven (1); obsidian point (1); "eagle" foot bones (1) and a complete Haliotis rufescens shell (2). These burials range from two to five feet in depth. A flanged, tubular pipe of steatite found near the surface is almost the only unassociated article with diagnostic value.

Burial associations for B component (Ellis Landing Facies), from five and a half feet to eight feet depth, include only Olivella type 3c beads (1 burial), Haliotis type 4 beads (1), Haliotis ornaments of ring shape and roughly rectangular and triangular form. Identifiable Haliotis specimens are H. cracherodii, as opposed to the A Component specimens of H. rufescens.

Artifacts without association which cannot be readily assigned to either component occur from two to eight feet depth: bone awls, perforated needle with flat head, ulna flaker, split cannonbone flesher, antler wedge, bone bead, type B 1 mortar, pestle fragments, and pitted hammerstone. A bronze crucifix was found at six inches depth. But since a ranch bunkhouse was occupied near one end of the deposit and the area was apparently continually in use to the time of excavation, an aboriginal connection with the crucifix seems unwarranted. The latest component, of Emeryville Facies, is presumed entirely prehistoric. It is perhaps responsible for more of the excavated depth of deposit than its predecessor, of Ellis Landing Facies.

Ponce Site (356). Ponce Site, alias Mayfield, alias Castro, is an undestroyed mound which measures about 300 by 125 feet, and rises about ten feet above old marshland on the southern San Francisco peninsula approximately three miles from the present shore of the bay. It has much lower percentage of shell than the other sites considered here,[153] and is marked by profusion of Cerithidea Sp. L.L. Loud, working singlehandedly, excavated over 12,000 cubic feet of deposit from a hundred-foot trench along the west side of the mound in the winter of 1911. He reached the base of the mound at a maximum depth of about eight and a half feet, and found fifty burials. Data exist on twenty-four with associated artifacts. R.F. Heizer and F. Fenenga recovered three additional burials in 1946, of which two had associated artifacts. These twenty-six burials are utilized here.

Two components are indicated by burial data. Ponce A, of Emeryville Facies, includes 12 to 17 burials from depths of 12 to 39 or 52 inches; Ponce B, of Ellis Landing Facies, comprises nine to fourteen burials, ranging from 39 or 52 inches to 93 inches (sub-mound). Five burials between 39 and 52 inches share few artifacts, and are of uncertain affiliation.

Emeryville Facies burial associations include: Olivella type 2a (2 burials) and type 1b beads (3); circular and roughly rectangular Haliotis ornaments (2 or 3); shell spoon (1); and one instance each of bone awl, split bone dagger, antler wedge, bone "fishhook" (not seen in museum), obsidian point, and pestle. Well-shaped charmstones (mode b) of piled plummet and knob-piled plummet type occur with one of Loud's burials and, in a group, with one of Heizer and Fenenga's burials. One instance of burned bones is the only possible indication of cremation.

The five indeterminate burials are accompanied by: unworked bird bones, notched scapula, bone awl, jasper fragments, and an unidentified mortar fragment.

Burials attributed to Ellis Landing Facies contain: Olivella type 3b1 beads (1); Haliotis type 4 beads (1); ring-shaped and unperforated circular Haliotis ornament (1); quartz crystal (1); pestle fragment (1); bone awl (2); antler drift (1); and unworked animal bones (1). Two were marked by concentrations of Cerithidea shell and one by oyster shell in a "bed." A ventrally-extended burial accompanied only by an unworked oval stone, lying below the base of deposit, has been discussed before for its bearing on the possible presence of a component of Early Horizon.

A circular housefloor almost twenty feet in diameter was found at four feet six inches depth. Its surface was hard packed and saucer rimmed, but post hole or fireplace positions if present are not described. A smaller floor 24 inches deeper showed holes near its center 1 to 1 1/2 inches in diameter, irregularly spaced, but commonly 18 to 24 inches apart. No clear indication is preserved as to which component these floors belong, although an A Component burial was intrusive through the larger. If these be B Component house floors, they are the first to be delineated in Middle Horizon context.

Unassociated artifacts throw little light on the line of cleavage between components. Types which are rare on the east side of San Francisco Bay appear more commonly here, and apparently have closer relationship to manifestations to the south (e.g., at San Mateo and San Bruno Sites, where data are insufficient to justify their inclusion in this discussion of culture horizons). Such artifacts are: type D1 and D2 mortars, metate or grinding stone (?), numerous notched scapulae, socketed antler segments, and gorge hooks beveled at each end.

In B Component deposit, below five feet depth, there occur one two-piece barbed fishspear and a fragmentary spatula with longitudinal scoring. In A Component is noted a knob-piled plummet type of charmstone similar to those in burial association.

This assemblage of artifacts and burials gives none too strong assurance of the existence of the two facies postulated. The important

feature is its complete consistence with the evidence from other sites, despite the appearance of implements indicating that Ponce Site is near the edge of the culture area to which sites previously considered belong. Investigation has been very slight in the region to the south. If more were known, Ponce Site manifestations now labeled Ellis Landing Facies and Emeryville Facies might rather be grouped with a different set of facies.

Princeton Site (407). Princeton Site, alias "Half Moon Bay Mound," is actually outside the physiographic area considered, near the tip of Half Moon Bay peninsula on the ocean coast about twelve miles west of lower San Francisco Bay. It lies on the fringe of an old lagoon about a thousand yards from the beach. The notes and diagrams of L.L. Loud, who excavated briefly in 1915, indicate that the sandy deposit lies over a low sand dune, covering it on all sides but most deeply in the rear where midden depth reaches six and a half feet. At the crest, over twelve feet high, there was less than five feet of midden. Loud's excavations yielded one semi-extended burial at 34 inches and seven flexed burials between 9 and 33 inches, of which only the former had associated artifacts. These were Olivella type 3b1 and 3b2 beads, an edged bone knife, and nine spatulate bone hairpins (illustrated by Gifford, 1940, as types B3, B1, and AlbII). The artifacts of this burial put the mound into Ellis Landing Facies.

Few materials are preserved from unassociated locations in deposit; whalebone wedges and a multiplicity of large and small examples of the pitted hammerstone occur. The latter recall the numerous pitted hammerstones found at Bear Valley Site, a similar open coast site in Marin County, but they are of little use as a "time index" trait. The only component indicated in Princeton Site, at any rate, is one of Ellis Landing Facies; such complete correspondence in burial artifact types twelve miles from San Francisco Bay and almost ninety miles from the Marin coast sites is a strong argument for the real integration of the culture manifestation defined as Coastal Province, Middle Horizon, even though it is recorded from only a single burial in this southernmost component.

Greenbrae Site (76). The site is on the northwestern side of San Francisco Bay, near Greenbrae in Marin County. It is a fairly steep-sided shellmound almost a mile from the bay shore, toward which a small creek at its edge drains. N.C. Nelson, in 1909, supervised excavation of a trench transecting the hundred and seventy foot deposit on a northwest-southeast axis. He found that the midden, maximum depth of which was seventeen feet, ran three (?) feet beneath ground surface, and rested on a blue clay base. A road cut had just destroyed part of the site at time of excavation; remnants of the midden still exist. No clear stratigraphic division was noted, although the site appears to comprise two components.

Seven burials were obtained from the trench. No cremations are recorded. Five burials have at least one artifact. Four of these, between two and five feet depth, belong with Emeryville Facies on the basis of artifact association: Olivella bead type 2a (3 burials) and type 1b (1); circular, triangular, and roughly rectangular Haliotis ornaments with incised edge (1); trapezoidal perforated ornament of river clam (Margaritifera margaritifera) (1); quartz crystal (1); notched cannonbone rasp (1);

and spatulate bone implements (1). The last item is discordant, being the only instance noted in Late Horizon burials of spatulate tools resembling the "shoe-horn shape" or strigils typical of Middle Horizon components. The other grave goods are strictly within the usual repertory of Emeryville Facies burial associations.

Artifacts of the remaining burial are roughly triangular Haliotis ornaments and a large obsidian point. The burial lay four and a half feet from surface toward one edge of the mound, or almost five feet below the absolute level of the burials nearer the crest. It is regarded as a B Component burial. Better evidence for the presence of B Component comes from unassociated artifact material lying at depths greater than four feet from surface. Mortars or fragments of type B and type C, large obsidian points (including type N6), a spatulate bone implement fragment, a mesh gauge, an antler triangle (?), a bone point with wedge-shaped base, a needle with flattened shaft, and an antler wedge are artifacts consistent with or pointing directly to Ellis Landing Facies associations. In the upper levels, mortar fragments of A1 type point to Emeryville Facies instead.

A subconical fragment of baked clay at nine feet depth is of interest. It is 80 mm. long, 30 mm. thick, circular in cross-section, and tapers from the fragmentary end to a rounded point. Although it bears no marks except the maker's fingerprints and is not carefully finished, its mere presence in Middle Horizon deposit which in Marin has produced no baked clay other than human figurines, suggests that this object also may be a figurine If so, it would correspond in size more to the specimens described by modern Indians than examples previous located in Middle Horizon context.

San Rafael Site (86c). The site is now all but destroyed incidental to expansion from the nearby town of San Rafael. Its maximum diameter was about 260 feet, maximum depth about 10 feet. Excavation of two trenches running from the center toward the edge at right angles, one 130 feet north, the other 79 feet west, was supervised by N.C. Nelson in 1910. Of twenty-one skeleton numbers used, thirteen seem to have been burials in original position, but artifacts are recorded only for three. Nelson's notes hint at stratification: "below three feet, the refuse becomes slightly lighter in color . . ." Burials with grave goods were all below this level, from four to six feet depth.

Grave goods are: seven elk bone whistles inlaid with Olivella type 3c beads (one burial); and large (?) obsidian points (2). Nelson suggests the points are lethal, since they were found within the rib cage. One mica ornament is noted from uncertain depth, probably about six feet. These traits all indicate presence of a Middle Horizon Component.

Late Horizon traces are evident in unassociated deposit above two feet depth, despite the unfortunate absence of artifacts from burials near the surface. Indicative artifacts are: mortar fragments of A1 type as well as A2 type from one foot depth, and asymmetrical spindle mode b charmstone at one and a half feet depth.

The postulation of Late and Middle Horizon components for both Greenbrae and San Rafael Sites is justified by the almost perfect consistency with which artifact and burial depths conform to the situation

observed in other mounds. The scarcity of material, however, does make attribution to Ellis Landing of Middle Horizon, say, instead of to McClure Facies, somewhat hazardous. The sites are almost equidistant from the type sites for these facies. In depth of deposit, however, and in traits such as charmstone and bead types, the site fits better with San Francisco Bay components than with components of the Marin coast. Consequently, San Rafael A and Greenbrae A are assigned to Emeryville Facies; San Rafael B and Greenbrae B are joined to Ellis Landing Facies.

Glen Cove Site (326). A small cove on the north shore of Carquinez Straits shelters the Glen Cove Site, which stretches perhaps 140 feet along the shore and rises, at its peak, more than 15 feet above the beach. In 1912 L.L.Loud excavated a 40-foot trench toward the western edge of the deposit, finding a slope from three to more than eight feet depth toward the center of the mound. His excavation, estimated by him at 810 cubic feet, yielded five cremations, four burials, and three instances of pre-interment grave pit burning, at depths of 12 inches to 78 inches. One skeleton number without data may reflect absence of artifacts, which accompanied the other twelve interments. The single component represented by burials and unassociated artifacts is assigned to Emeryville Facies.

Numerous and varied artifacts occur in the interments. No time difference between burials and cremations is discernible, but it is obvious that the cremations and pre-interment burnings are favored with greater quantities of grave goods than the burials. Grave goods include: Olivella beads of type 2a (7 interments) and type 1b (5); Haliotis ornaments in circular, rectangular, trapezoidal, and a unique thin bar shape, with one to four perforations (6); lumps of red ocher (3); bird bone beads with constricted waist (1); bird bone whistle (1); flat bone needle (1); bilaterally barbed bone fish spear (1); notched scapula (3); split bone flesher (1); bone flaker (1); bone awl (5); cut antler tine (1); notched bone rasp (4); bear claw, tooth, or unworked animal bone (4). Besides miscellaneous or unidentified projectiles and flakes, stone artifacts include: phallic charmstone (1) and plummet charmstone (1), in addition to a series of charmstones in mode b manufacture (4); type Ala mortar (1 or 2); pestle (1); quartz crystal (2); sandstone paint slab (1); and a collection of concretions and odd stone forms (1). Carbonized textiles in three burials include plain twine, overlay twine, coiling, and plaited (?) matting; cord fibers and acorns were also found charred. One piece of textile shows the quill attachments of imbricated feathers. Traits such as fine-line incising and applique of rectangular Olivella beads (2a) are shown. The incised objects are burned fragments of a pair (?) of staves made from antelope metacarpals; the applique of beads is on the undecorated reverse of a circular Haliotis ornament. The same bead types occur in overlapped shingling on a textile fragment.

Since Emeryville Facies traits are so well attested in the beads, mortars, charmstones, etc., of the burials, it is unnecessary to duplicate the information with a recital of similar occurrences in deposit. Pestles are cylindrical (type II) or of unshaped, thin cobbles (type I). Four spheroid hammerstones not unlike the type characterizing Ellis Landing deposit are noted. They occur in depth between three and five feet. A projectile point with angularly serrated edge was found at five feet depth.

Glen Cove Site is at the edge of virtually unexplored archeological territory in Napa Valley. Some of its unique or unusual traits may be echoed farther north, although in some sense they are probably due to proximity of the Sacramento Valley. Cremation might come from either source. Numerous traits recall sites of the Hollister Focus in the Sacramento Valley, such as fine-line incising on bone, multi-perforated Haliotis ornaments, and bilaterally barbed fishspear, etc.; but testimony of integration within a bay area cultural environment is given by charmstone types, use of asphaltum applique, restriction of Haliotis ornament to simple shapes, as well as by the obvious fact that the midden is rich in shells. The site is consequently grouped with other bay components in Emeryville Facies.[154]

Fernandez Site (259). The site is on San Pablo Creek, which drains the inland slope of the Berkeley hills on the east side of the Bay and runs north to empty into San Pablo Bay. It is thus separated from San Francisco Bay proper by a range of hills. It is, furthermore, removed a good five miles from salt water, yet its deposit is almost as rich in shell as any site along the beach. A University of California volunteer student field party spent several week-ends excavating in the site in 1938. They found fifteen cremations between 33 and 72 inches depth, and two burials at 66 and 84 inches depth.

Artifacts associated with all the cremations immediately distinguish them from the two burials and introduce the latest phase of Late Horizon, which is named Fernandez Facies after A Component of this site. B Component is a manifestation of Ellis Landing Facies, Middle Horizon, as demonstrated by the burial association.

In the following recitals of trait associations, new traits are separated from those which occur in the same cremations but are known also from earlier facies; it will be evident from this segregation that the newly-arrived traits are decorative items superimposed on a pre-existing assemblage.

Artifacts which are frequent in the cremations, and at the same time act as link traits for Fernandez Facies, are: clam disc beads (7 cremations); tubular steatite beads (3); tubular magnesite beads (3); tubular Tivela beads (1); and type 3a1 Olivella beads (7).

A greater number of traits with the same cremations is shared with Emeryville Facies of Late Horizon: small, stemmed projectile points (5 cremations--?); square serration of projectile point edge (1); biconically drilled, tubular steatite pipes (2); bird bone bead with constricted waist (1); type A1b mortar (1); small, prismatic obsidian tinklers (2); fine-line incised design on bird bone (2); bird bone whistles with off-center stop (1); and, of course, the tradition of cremation (15).

Carryovers from still earlier horizons noted in these cremations include: type 1b Olivella beads (4); perforated circular Haliotis ornament with incised edge (type C.1.a) (1); red ocher (2); quartz crystal (1); simple plummet charmstone (2); bone basketry awl (2); antler flaker (3); type C mortar (1); unworked animal claw (1); and unworked pebble (1).

Several traits in cremation association appear to be unique to Fernandez A Component: charred wooden (?) beads (1); bead of Cerithidea shell (1); type D2 (small) mortar (3).

With the two burials, which lie deeper than the cremations, are: type 3c Olivella beads (1); Haliotis ornament with serrated edge (1); forked head scratchers (1); spatulate hairpin (1); obsidian scraper (1); and unworked pebble (2). These are artifacts typical of Ellis Landing Facies. Hairpins and head scratcher, however, are unique in being perforated.

Artifacts found without association in deposit occur principally above 45 inches depth, and confirm the Late Horizon status of A Component. A long curved flake of obsidian retouched near the tip resembles but is not identical with the "Stockton curve" of Late Horizon components near Stockton. A bird bone whistle with off-center stop, a bird bone tube, a bird bone bead, and small obsidian points are items expectable in Late Horizon context.

Other traits are shared by both components: type IIA pestle, type B mortar; bone basketry awls, and hammerstones. A smoothed, mano-like stone from 54 inches depth may belong with B Component; it is in harmony with Ellis Landing Facies metates.

Like Glen Cove, Fernandez Site is somewhat removed from the body of San Francisco Bay and open to the Sacramento Valley via Carquinez Straits. Like Glen Cove, it is marked by the presence of Valley traits such as cremation, the "Stockton curve," and relatively abundant obsidian, which are unknown on San Francisco Bay proper. Also like Glen Cove, Fernandez is marked by a certain lavishness in the equipment of the dead which may be a function of Late Horizon traditions or may reflect a certain amount of influence from the interior. This richness is not duplicated in sites on San Francisco Bay proper. On the other hand, in specific traits such as the simple plummet shape charmstone, and the stemless pipe bowl of A Component, as well as in most traits of B Component, closer relationship with San Francisco Bay proper is suggested. As in the case of Glen Cove Site, the shell midden deposit alone is almost enough to force the conclusion that Fernandez Site is a San Francisco Bay manifestation and not an outlying colony of Valley people. The only other Fernandez Facies component is equally distant from the central section of the bay. It is Newark A Component at the far southern end of the bay. The significance of this small number of components and their relative remoteness will be examined in the concluding chapter.

Newark Site (328). Newark Site is a long, oval mound rather deficient in shell situated in overflow land near an old channel of Alameda Creek almost four miles from the bay shore. It is about 320 feet in longest diameter, and 10 feet in maximum depth. It was excavated during week-ends in 1935 by University of California field parties.[155] Twenty-four burials were found in the excavations. Wedel notes that a lower stratum of hard packed, relatively sterile soil begins at 42 to 48 inches depth. The seven burials with associated artifacts fall into two groups, three burials from 10 to 36 inches depth comprising A Component (Fernandez Facies), and four from 48 to 78 inches depth distinguishing B Component (Ellis Landing Facies). Burials were found even below this depth. The deepest, a

ventrally-extended burial without artifacts at 87 inches depth, has already been mentioned as contributing possible evidence for a manifestation of Early Horizon on the bay shore. No cremations were found.

Artifacts with the three burials of A Component are: clam disc beads (1); type 3a1 Olivella beads (1); type 1b Olivella beads (1); triangular and rectangular perforated Haliotis ornaments (1); traces of red ocher (1); notched deer scapula (1); and bone flakers (1).

Artifacts found with the four burials of B Component include: type 3c Olivella beads (2); type 1b Olivella beads (2); type 1a Olivella beads (1); perforated canine tooth (1); rectangular, perforated Haliotis ornament (1); type A2a mortar (1); bone awl (1); antler wedge (1); unworked pebbles (1).

Artifacts supporting the Late Horizon attribution of A Component include: fine-line incising of bird bone head and mode b manufacture of a piled plummet charmstone, noted at depth above 16 inches. From depths below 48 inches, a grooved canine tooth, a spatulate implement of hairpin type, and a tube made of canid tibia are the only items very surely suggestive of Middle Horizon affiliation.

Numerous bone beads (those in upper levels with broken ends, those below with carefully trimmed ends), antler wedges, notched scapulae, awls, elongate pebble hammerstones, and fragmentary pestles are recorded throughout the deposit. Although there are suggestions of decreasing frequency in upper levels for certain of these items, the more forcible suggestion is of frequency of types which are generally characteristic of sites at the southern end of the bay. Notched scapulae and elongate hammerstones are examples.

A few rough lumps of baked clay and two shaped baked clay balls occurred at both shallow and deep levels. These items are extremely common in the Sacramento Valley but exceedingly rare in San Francisco Bay sites. They recur in a site a short distance from Newark (329), which is not treated here because faulty depth data make distinction of separate components uncertain.[156] A fragmentary stemless pipe bowl of baked clay is, however, a noteworthy specimen. It occurs definitely in Middle Horizon context as evidenced by the occurrence also of one example of the two-piece, barbed fishspear, baked earth basin, etc., at similar depth.

The data from burials and deposit of Newark Site provide what would be only a slender basis for the postulation of two components, except that they agree very well with stratigraphic situations described previously. As in the case of Fernandez Site, components of Ellis Landing Facies and of Fernandez Facies are discernible. There is no evidence of an Emeryville Facies component, which would theoretically be sandwiched between. However, the presence of this earlier phase of Late Horizon is indicated by burials and unassociated artifacts from nearby Site 329. It cannot have been absent from the southwestern section of the bay.

Monument Site (CCo-137). In 1946, the discovery of burials at the base of a swimming pool excavation north of the inland town of Walnut

Creek was reported to the University of California. Investigation of the report showed that indurated midden deposit lay buried four feet beneath the sterile estuarine sediments of the valley floor. A field party from the University under the direction of Dr. R.F. Heizer succeeded in recovering ten burials, of which three were accompanied by artifacts. The subsurface location of this and two similar midden deposits within a five mile radius is of extreme interest, especially with regard to the problem of dating prehistoric California cultures. A complete report on the archeological and pedological features of these sites is in preparation,[157] and comment here can be limited to a few words.

Cultural material from burials and from random locations in deposit is limited in quantity and variety, but harmonizes fairly well with Middle Horizon contexts, despite the occurrence in addition of several rare or unique bead and ornament types. It fits poorly with either Late or Early Horizon, and there is no archeological justification for assuming it to be older than Early Horizon. It must be left "floating" within the frame of Middle Horizon, however, since it does not compare closely with any facies of the horizon.

Although over-enthusiastic newspaper accounts early hailed the finds as a new discovery of "fossil man," under the label of "Concord Man," painstaking analysis of the overlying estuarine deposits by pedologists of the University of California has yielded an estimate of 4000 to 8000 years since sedimentation covered the site.

4. Recapitulation

Review of the cultural data from fourteen sites on the shores of San Francisco Bay shows a consistent affiliation of specific artifact types with separate temporal horizons. The stratigraphic sequence shows the same order as in related horizons in the Sacramento Valley area and on the coast of Marin County. In five sites (West Berkeley, Potrero, Stege, Princeton, and Ponce), one horizon is represented by itself, without any mixture; these single-component sites are easily fitted into the temporal sequence demonstrated by cultural stratification in the remaining sites. The evidence from certain sites (Emeryville, Ellis Landing, Glen Cove, Fernandez) is quantitatively sufficient to be considered a representative sample. Consistent recurrence of identical traits in the same stratigraphic sequence at the remaining seven sites provides welcome substantiation of the cultural sequence, even though the data may be available in only small quantities. The conclusions drawn from this evidence follow.

1. The earliest known archeological horizon in the San Francisco Bay area is Middle Horizon. Its components are grouped into Ellis Landing Facies because of their likenesses, and Ellis Landing Facies is linked with the McClure Facies of the Marin coast to form the Coastal Province, because of a greater quantity of specific resemblances to each other than either has to the several facies of the Interior Province.

2. Ellis Landing Facies of Middle Horizon is the most fully represented cultural manifestation in the bay area, having 12 components with 150 identifiable burials on all shores of the bay.

3. Late Horizon culture succeeded Middle Horizon culture in the prehistoric manifestation termed Emeryville Facies, which is clearly represented by seven components with 65 attributable burials and five cremations. The close interrelations of these components link them together in Alameda Province. They apparently are more distinct from Mendoza Facies, Hollister Facies, and Sandhill Facies of neighboring areas, which are separated as early phases of Marin Province, Cosumnes Province, and Colusa Province, respectively.

4. Glen Cove Component of Emeryville Facies is most distant from its sister components and most sharply separated by such traits as cremation, etc., which may reflect cultural influences from the north or east. Emeryville Facies is represented, however, on all shores of the bay.

5. Fernandez Facies is the protohistoric phase of Late Horizon culture following Emeryville Facies on San Francisco Bay. Its temporal position is fixed at a later date than Emeryville Facies by typological comparison with Estero Facies, Mosher Facies, and Miller Facies, which terminate in post-contact times, rather than fixed by actual stratigraphic superposition over Emeryville Facies components.

6. Fernandez Facies is sparsely represented in the bay area by only nine burials and fifteen cremations from two components, each of which is at some distance from the localities most abundantly inhabited in earlier times. Protohistoric or post-contact manifestations are unknown on the shore of the main body of the bay.

Chapter VI

Summary

The principal thesis of this paper has concerned important changes discernible in the prehistoric culture of Central California. The changes mark sequential culture horizons with close and explicit relationships in each of three separate physiographic areas having adequate data. While the attention has been focussed on the Marin County Coast, an area new to archeological literature, culture change observed there has been correlated with culture horizons in the San Francisco Bay area and with horizons previously defined in the Sacramento Valley. A systematic arrangement of both the temporal and spatial variations of culture has been attempted, which recognizes facies and provinces within each time horizon.

1. Summary of Culture Horizons

The longest record of human habitation is in the Sacramento Valley, where Windmiller Facies of Early Horizon exists under circumstances suggesting very considerable antiquity. On the coast, except for traces at the base of certain sites near San Francisco Bay which hint at the presence of Early Horizon components, the remains of this hunting and gathering culture with its elaborately ritualized burial practices remain undiscovered. But the habitation record is not complete even in the Sacramento Valley, for the culture of the Windmiller Facies is distinctly not that of recent arrivals. The ecological integration is too great. These people obtained ready made shell ornaments and beads from the ocean coast, perhaps by trade with contemporaries. They got obsidian, mica schist, biotite, quartz crystals, and other materials from restricted sources in Napa Valley, the Sierras, and the Coast Ranges, and with such regularity that the objects made from these materials were fully integrated into the extremely distinctive and rarely deviating patterns of ceremony and burial. The Windmiller Facies culture of Early Horizon is the farthest removed from the constellation of traits common to Central California cultures in livelihood, handicrafts, and burial customs, but it is too thoroughly accommodated to the local environment to have been the earliest culture in this region.

After an interval of unknown duration, Early Horizon is replaced by Middle Horizon in Central California, a culture of different orientations and interests. Its manifestations are clear not only in the Sacramento Valley, where several separate facies are discernible, but also on the coast, where two facies are sufficiently integrated in a coastal environment to be comprised in a Coastal Province presumably synchronous with the Interior Province. The culture of Middle Horizon is undoubtedly susceptible to subdivisions which have not been attempted here and which may well cut across the present facies divisions, since considerable variations in culture content occur and present tentative datings suggest that the horizon endured for a good many generations. Underlying both temporal and spatial variations, however, is a broad uniformity in the techniques Middle Horizon people used to gather and prepare their food, the weapons they used, and the sociological rating they gave to warfare, the specific articles of ornament with which they adorned themselves, and the conventions with which they approached death. This uniformity testifies to a period of unmolested concretion of the culture configuration setting them apart from their predecessors and successors. They are not intruders independent of earlier inhabitants and divorced from those who replaced them; they carry traits over from Early Horizon and likewise preserve some for transmission to Late Horizon.

In Late Horizon the acorn gathering economic patterns are still more thoroughly consolidated, and traits regarded as fundamental to the ethnographic Indians of Central California are either added to the culture (such as the bow and small pointed arrow) or developed to their modern proportions (e.g., shell ornament). In this horizon, perhaps because of its recency, we see increased evidences of regional differentiation which add appreciably to our understanding of the dynamics of culture growth. In each of the four provinces of Marin, Alameda, Cosumnes, and

Colusa, two sequential facies are delineated. Although the basic patterns of Late Horizon are established in the earliest of these facies and continue with few rejections to historic times, specific trait parallels link the earliest facies of all the provinces into what has been termed Phase 1 of Late Horizon and all the later facies into Phase 2. We have a clearer idea of the nature of development of Late Horizon culture into modern times than of its outgrowth from or replacement of Middle Horizon. Unsolved problems of extreme interest will be touched upon in later paragraphs.

2. Speculations and Problems

Only an opening wedge has been driven into the problems of California archeology with the adumbration of culture horizons. We know that the horizons recur widely and consistently enough to permit, for example, a reasonable guess at the temporal position of an unanalyzed site from only a few traits. But the internal subdivisions of these horizons, their historical relationship to each other, and the nature of connections between provinces and facies are unexplored. The answers to some most perplexing problems are undoubtedly becoming available as fuller analysis of the materials in hand progresses. To many others, the only possible answer is more digging. I hope to be able to indicate briefly some of the problems and speculations which have occurred during the course of this work.

Typological change. There are clear trait differences among the various spatial divisions of culture. But when individual traits such as bead or ornament types, bone implements, or stone utensils are examined, the spatial differences are unimportant when compared to differences in time level. This is especially true of bead types. It may be argued justifiably that minute variations of individual beads are not important per se. Their simple forms, however, lead to recognition of significant and comprehensive changes in culture that are signalized by material traits rare enough in themselves to escape notice unless searched for with the aid of some such guide as bead types. In areas where pottery occurs, it serves to guide analysis of cultural similarity or divergence because of its abundance and consistent traditions; its place in pottery-less parts of California is taken by shell artifacts.

Culture change. Much of the prehistoric development in Central California undoubtedly is derived from the internal dynamics of the respective horizons. Each made its own particular forms of charmstones, shell beads, and ornaments, and other articles, before passing the basic type on to the next horizon for working over. This is equally true of neighboring California areas which have not been specifically discussed but which share most or all of the basic traits. However, some important traits clearly are introductions from an extra-California source. It is difficult to know from which direction they came. Other workers such as Kroeber, Strong, and Loeb, have inspected the Southwest as a possible area of early relationship, especially on the basis of ethnographic data.[158]

It may not be out of order to recall that one or two features archeologically continuous and important from Early Horizon, such as the charmstone, large projectile point sytle without specific knife form, and quartz crystal, share distributions which follow the seaboard on both sides of the continent and continue in South America, as well as occurring sporadically in early horizons from the Middle West to the Atlantic Coast. While the puzzle of such a distribution cannot be answered at this time, there is at least the certainty that what became California culture did not simply intrude into California from the Southwest, and there is some suggestion that California was touched by a wide dispersal of elements antedating the integration of the Southwestern culture sphere.

The change in physical type from the Early Horizon to the Late Horizon in the Sacramento Valley parallels the replacement of dolichocephalic by brachycephalic types in widely scattered areas of the New World. It is tempting to view the Sacramento Valley instance as supporting the hypothesis of continent-wide migrations replacing long-heads with round heads.[159] But the more scanty evidence from the coast shows a consistently mesocephalic population in both Middle and Late Horizons.[160] The marked change continuing in the Sacramento Valley from Middle to Late Horizon, then, might be local and have no relation to parallel changes elsewhere. We still know little about what sort of connection in time and culture may exist between many of these New World instances. Central California has plenty of artifact associations but little chronology; we need some means of dating for California, or we need more artifacts definitely associated with early longheads in other areas in order to establish relationships.

The dynamics of culture change in Central California are but poorly understood. The dominance of Valley over Coast is well indicated by greater quantities of shared items and higher frequency of unique traits in the Valley, although the role of initiator versus receptor appears to be less sharply defined in Middle Horizon than in Late Horizon. The Interior Province of Middle Horizon achieves superior rank less through blocs of peculiar traits than through more frequent display of traits which are common to both provinces. The ethnographic culture climax area postulated by Kroeber[161] among the Patwin of the lower Sacramento Valley is prehistorically in the same location, or shifts somewhat south into territory lacking ethnographic detail. This sort of qualitative areal relationship will be much more readily evaluated when excavation has revealed the standing of intervening areas, especially the Napa Valley and the coast range valleys west of the delta.

Time relationships and absolute dating. The problems of duration and absolute antiquity of the respective horizons have been extremely difficult to approach in California, but promising beginnings have been made from several approaches. Nelson and Gifford made total mass a measure of total age by computing daily accumulation of deposit per individual and multiplying that figure by the estimated number of inhabitants. Nelson's estimate was made in terms of volume of Ellis Landing, and Gifford's in terms of weight of such a site as Emeryville. The two estimates harmonize with each other and with the more recent work of Cook who brings a physiologist's point of view to the question of daily dietary intake of shellfish for the average bay mound resident.[162] All three, when considering

the total age of such a deposit as Emeryville Site, arrive at estimates which overlap at about the 4,000 year mark. It is now demonstrated that the lower levels of Emeryville Site constitute a Middle Horizon Component; pedologic studies of the soil overlying Monument Site in the Walnut Creek Valley, which is probably a Middle Horizon manifestation also, have given an estimated date of 4,000 to 8,000 years as indispensable to the development of a mature profile in the sterile sediments. While these are estimated dates, presented tentatively, they point the way to a possibly fruitful approach toward chronological ordering of the older sites.[163]

An interesting problem is delineated by the application to Late Horizon[164] of a different method of dating, the direct-historical approach. Heizer, after careful consideration of the bearing of historical records on archeological data in the Sacramento Valley, proposes a date as late as 1790 for the inception of Phase 2 culture in the delta region, and shows that direct contacts with the Spanish, etc., either brought Caucasian artifacts and a true historic period into the area or caused the natives to evacuate to more remote regions no later than 1830.[165] It is of interest to examine the San Francisco Bay and Marin County Coast material in the light of this 1790-1830 dating. The questions raised are: what is the nature of Phase 1-Phase 2 cultural relationship? When did Phase 2 begin in any area, and in what direction were its elements spread? How is Phase 2 characterized in each area?

To a large extent, the traits linking Estero Facies with Miller, Mosher, and Fernandez Facies are those of the clam disc bead complex, i.e., clam disc beads, magnesite tubes, steatite tubes and discs, Olivella type 3a1 beads, and Tivela tubular beads. Where one type is found, the others are likely to occur; where they are absent, the bead types of Phase 1 appear. Each province adds elements of its own or shows trends characterizing Phase 2 culture, but it is particularly the clam disc complex which links the four provinces together.

Clam disc beads are inferred to be present on the Marin Coast by 1579 from description of the Drake account. The clam disc complex occurs in coast sites in stratigraphic association with Chinese porcelain presumed on good evidence to have been brought there in 1595 in the San Agustin (see Chap. 3, sec. 5).[166] The probability is that the entire complex was present by 1595, although direct burial association is lacking. As noted above, Heizer postulates an initial date of 1790 for Phase 2 in the delta region where the clam disc complex accompanies numerous distinctive traits, and he allows for slightly earlier inception in Colusa Province to the north in the Valley. On San Francisco Bay only two sites are known which carry components of Phase 2 culture (Fernandez Facies) and which have the clam disc complex. Fernandez and Newark Sites are both somewhat distant from the majority of sites excavated along the bay shore. Aboriginal culture cannot have lasted long on the bay after the establishment of Mission Dolores at San Francisco in 1776, for the country was soon scoured for natives to gather in to the mission, so the paucity of Phase 2 traits might be thought evidence of their introduction into the Bay area after 1776.

Thus, we arrive at the following dates for the beginning of Phase 2: Estero Facies, before 1595; Mosher Facies, about 1790; Miller Facies, some

years before 1790; Fernandez Facies, after 1776. But several objections may be raised which make the establishment of this absolute chronology less tidy than it appears. For example, if Fernandez Facies is a post-1776 development, why should it show no evidence of Caucasian contact? And why should there be a two-hundred year differential between arrival of the clam disc complex on the Marin coast and its transmission to the Valley and Bay areas? We presume on the basis of ethnological evidence that clam disc beads were manufactured by the Pomo, north of the Marin County Coast Miwok, and were traded from there as a practical monopoly. By late historic times, they were spread so widely through California that Klimek, utilizing ethnographic evidence in a reconstruction of California history on age-and-area principles, stipulated them as an element of his earliest horizon.[167] The chronology presented above would suggest that clam disc beads and associated traits spread from the Pomo south to Marin County but no farther for two hundred years or more, and then, in perhaps one quarter of that time, suffused widely over the central portion of the state.

The Marin Coast evidence does not make this view untenable. Many of the traits associated with the clam disc complex probably came from the interior where they occur in greater profusion and in more complex forms: these are cremation and pre-interment pit burning, type G Haliotis ornaments, square serration of obsidian points, and fine-line incising on bone. And in the Valley these traits are in a Phase 1 (Hollister Facies) context which would make them available for diffusion to the coast well before the postulated date of 1790.

Except for the last two traits, however, the list above is present on the Coast also before Phase 2, and is shared as well by Emeryville Facies (Phase 1) on San Francisco Bay. Yet it is absent from Phase 1 of Colusa Province in the northern Sacramento Valley. In other words, the lower Valley, the Bay, and the Coast form a bloc as against the upper Valley. There was an interchange of elements in an east-west direction, which did not operate along the north-south axis, as early as Phase 1. It seems curious, in view of the fact that the path was grooved by the interchange of these other elements, that the clam disc bead complex should hold out on the coast for two hundred years before finally being adopted into the culture of the climax area.

Alternative explanations, however, are not very much more satisfactory. One may presume that Heizer's date of 1790 for the first clam disc beads, etc., in the Valley is too late, and extend it backward in time to suit the conscience, but one is then caught by the other horn of the dilemma -- Phase 2 rarity on San Francisco Bay. Why should the major sites of the Bay not show Phase 2 components if Phase 2 traits were available long before the Spanish arrived? One is forced to assume that cultural unreceptiveness delayed the traits until Spanish soldiers and missionaries had cleared the Bay shores of possible receptors, or that the Bay was all but deserted before the arrival of Spanish missionaries because of some unknown influence, or simply that excavation has missed the Fernandez Facies components along the Bay shore.[168]

The problem does not appear to be soluble with the evidence in hand. Systematic archeology is urgently required in key areas, such as Pomo

territory as far north as Lake County, or Napa Valley which is a wedge between Coast and central Valley penetrating south as far as San Francisco Bay. Further search for Phase 2 components near the San Francisco Bay shores is not out of order, even though it seems rather unlikely that such components have been missed by coincidence in an area where fourteen sites have been explored.

The problem has been discussed here, not because it is of greater significance than other equally clear problems, but because it exemplifies the inquiry into culture process which is increasingly possible as temporal sequences and areal configurations become evident in California archeology. California archeology is no longer a study of the distribution of material traits against a vague backdrop of the limitless past. Demarcation of meaningful problems with specific objectives is possible in terms of a relative chronology derived from culture sequences.

Appendix A

Typological Minutiae

Projectile Points

Obsidian is favored almost exclusively; less than 1% of the whole pieces or fragments are of non-obsidian materials. Workmanship is variable, in most cases adequate but not exemplary. Fine-quality chipping is well within the capacity of the worker, but as an ideal apparently was overridden by utility and practicality. The occurrence of obsidian chips in midden deposit throughout Marin County indicates ready access to the sources, in Napa County, in contrast to the virtual absence of unutilized obsidian in sites east and south of San Francisco Bay. Non-obsidian projectile point materials include Franciscan chert, chalcedony, and slate. These points are restricted to certain forms, notably the small-sized ovate type without stem; the largest stemmed points are chert.

Knives are not distinguished from projectile points in the terms of this classification. There seems no doubt that any but the small sizes of non-stemmed points may have been hafted and used as knives; the side-shoulder point, because of its typical assymmetry, is the most likely knife form, but it could also serve as a projectile point and has been grouped as such.

Chipped stone projectile points from the San Francisco Bay area, being unavailable for study, are not described in this typology. Where reference is made to specimens in the text, it is on the basis of a Marin coast typology which follows.

Non-stemmed.

N1: Blade, length 140 mm., weight 50 grams. Four complete specimens were found plus three additional fragments. Resharpening of the complete specimen, creating a complex outline curve, shows its use as a knife.

N2: Lanceolate-shaped point, length 54-106 mm., weight 6.7-31.0 grams (average 16 grams). A utility form with variable workmanship. Medium to long in ratio to width, often fairly thick. Base may be either rounded or pointed, and is generally a compromise between these extremes. Total: 22 specimens and 17 fragments, of which one-sixth are assymmetrical in outline.

N3: Ogive-based point, length 55-89 mm., weight 7.9-25.2 grams (average 15 grams). Marked by a complex outline, with curved edges forming an ogival butt, but with straight edges along the tip half. Flake scars and patina indicate hafting at the curved end, which may be either the short or the long half. Total: 10 specimens and 5 fragments.

N4a: Ovate point, length 49-65 mm., weight 5.3-17.9 grams (average 8 grams). Maximum breadth is medial, ends not specialized. Workmanship quite variable, frequently rough. Differs in symmetry of outline and in smaller size from Type N2. Two special forms included are non-obsidian:

chert, with shallow side notches one-third from base, and chalcedony, of N2 shape but small, finely serrated near point. Total: 6 specimens.

N4b: Slug, length 8-40 mm., weight 1.2-6.5 grams (average 4 grams). Marked by small size, thick cross-section, with keel. Half are fairly well chipped, half rudely made. General outline approaches ovate. Total: 10 specimens.

N5: Single-shouldered knife, length 32-64 mm. Moderate size, broad in ratio to length, frequently roughly flaked, with unfinished base. Asymmetric outline constant, with more or less development of shoulder on straightest side. Some are possibly fragments of lanceolate-shaped points. Total: 24 specimens.

Aberrant specimens of stemless points include a straight-based specimen of medium size with gently curved sides (Misc.: 1) and a diamond shape, with slight nibs at the corners along the short diameter (Misc.: 2). Both are obsidian and well made. Three additional specimens without stems were classed with stemmed points, to which they are otherwise identical (e.g., Misc.: 4)

Stemmed

S1a: Stemmed long, length 30-52 mm., weight .9-6.5 grams (average 2 grams). Long, slender point of quite small size. Straight-sided, stem and shoulders variable in shape and finish, but expanding stem slightly more common. Barbs or corner notches on about one-fourth the group, serration of edges in one-third; fine flaking more apparent than on any other type. Total: 41 specimens and 9 fragments.

S1b: Stemmed short, length 16-27 mm., weight .4-3.7 grams (average 1 gram). Like the preceding type in having straight sides, in size, flaking, and breadth, but shorter. Small size makes contracting stem or side notches more common than in long form. Serration of edges in one-third of the group. Total: 31 specimens.

S2: Large, expanding stemmed, length 61-68 mm. Large corner notches and an expanding stem, rounded blade outline. Of two specimens, one is jasper.

S3: Large, contracting-stemmed, length 29-58 mm., weight 5 grams average. Stem is poorly defined, contracting from heavy-bodied blade, which is narrow in ratio to length. Drills, otherwise not known from Marin, may be postulated within this type. Total: 7 specimens, 1 fragment.

Mortar Typology

The greater number of mortars are of basalt or sandstone, but granite is not uncommon, and a variety of medium to soft stones appear in the smaller specimens. Type of stone used varies somewhat by region. Though

stones close at hand were most utilized, basalt occurs only at considerable distance from certain sites containing large basalt mortars, so that choice of stone is not always merely an accident of propinquity. Broadly speaking, four principal classes of mortar are distinguishable: one shows all-over shaping and is an artificial product inside and out with a deep bowl; another, of similar size and also with deep bowl, has a natural, unshaped exterior; a third is miniature in size, and may or may not be purposely shaped on the outside; the fourth, with extremely shallow bowl, probably required a basket hopper to contain the material being pounded. These variations have been recognized as the primary class distinctions. Cultural selection, as evidenced by incidence of types in the separate temporal horizons under discussion, cuts across these lines, however, and it is finer details of degree of finish, size, and shape of base, sides, rim, shape of the interior bowl, etc., that carry cultural significance. The distinct types follow. Figures are from the Marin County collection, except Type D.

A1a: Basalt (8), fine sandstone (1), and granite (1). Stone is carefully dressed on exterior, rim, and flat base. Rim is flat or slightly beveled, and sides are straight but sloping inward at base. Bowl tends to be rounded at base. Largest specimens are of this type or A1b. Maximum diameter 18-49 cm.; height 12.5-18 cm.; rim thickness 2.5-4.5 cm.; bowl depth 12.5-18 cm.

A1b: Basalt (5), fine sandstone (7), an d granite (1). Stone is very carefully dressed overall. Sides flare outward from flat base to rim, which is generally beveled. Bowl tends to be flat bottomed or has secondary depression. Maximum diameter 29-41 cm.; height 19-24 cm.; rim thickness 2-4 cm.; bowl depth 10.5-16 cm.

A2a: Sandstone (1 fragment), dressed on exterior. Rim is flat or sharpened by interior bevel produced from pestle wear, sides are convex and slope outward from flattened base. Bowl tends to be flattened at bottom. Maximum diameter ca. 29 cm.; height ?; rim thickness 1-2.8 cm.; bowl depth ?.

A2b: Basalt (6). Exterior dressed roughly or with moderate skill. Rim is rounded or sharpened by pestle wear, bowl tends to have a concave bottom sharply divided from the sides or to have secondary depression. Base is convex or slightly flattened. A relatively low, braod type. Most examples are fragmentary so that range of some dimensions is unknown. Where only one specimen is measurable, only one figure is given. Maximum diameter 34.5 cm.; height 13.5-20.5 cm.; rim thickness 2-4.7 cm.; bowl depth 13.5 cm.

B1: Granite (3), basalt (2), and sandstone (3). Stream boulder, with natural exterior, generally rounded bottom; surface irregularities are occasionally pecked to shape. Bowl is in most cases broadly concave at bottom and shallow, but deeper bowls and greater concavity occurs. Maximum diameter 16-23 cm.; height 10-11 cm.; bowl depth 6-7 cm.

B2: Granite and sandstone. Six specimens known from San Francisco Bay area, but only one complete specimen known from Marin: diameter 16x23 cm., height 10 cm., bowl depth 7 cm. Stream boulder or roughly-shaped block, with irregularities pecked off exterior. Notable feature is ovoid shape of bowl, which varies from shallow to moderately deep, and is rounded at bottom.

C: Basalt, sandstone, trachyte. Two complete specimens: diameter 6-10 cm., height ca. 5 cm., bowl depth ca. 3.5 cm. Miniature mortar, often made from stream-worn stones, most often only partly shaped or left with natural exterior. Shape of exterior and of bowl may be irregular.

D1: Granite, sandstone (San Francisco Bay type). Flat, stream-worn cobbles or slabs, with shallow depression pecked in one or both faces.

D2: Granite, basalt, sandstone (San Francisco Bay type). Spheroid boulders, sometimes finished by pecking over most of exterior. Bowl is a shallow depression.

Types A1a and A1b are the "show-mortars" of museum collections from the area, since they frequently exhibit a high degree of artistry in their shaping and finishing. A bead applique set in asphaltum has survived on the rim of at least one, and traces of asphaltum suggest treatment of others in the same style. Proportions and rim dimensions are remarkably uniform. By contrast, the specimens grouped as A2 and B1-2 are quite variable. Type C miniature mortars are commonly known as "paint mortars" and traces of red stain can be seen in some specimens, residual from the grinding of minerals for coloring.[169] While Type D2 is quite distinctive, Type D1 resembles a grinding slab except for the depression which is obviously produced by pecking and hammering, and not by grinding.

Grinding slabs or querns[170] have been found, but are too infrequent and fragmentary to permit typological definition.

Pestle Typology

Granite and fine-grained sandstones are by far the most common materials used for pestles, with basalt and various cryptocrystalline materials appearing only rarely.

Two classes of indubitable pestles are recognized: those unmodified from an elongate stream cobble form, except for the battering produced by use, and those shaped to the desired form by pecking and polishing. The latter are unmistakably made for use in mortars; some show use marks at each end, but the majority observed were used at one end only, the larger end in tapering forms. Considered for convenience along with these two main classes is an implement type of uncertain use. In contrast to other pestle types, it is generally discoid rather than cylindrical, but shows light hammering marks as though from pestle use around part or all of the edges. It is described as a pitted stone, because of a small pecked pit on one or both faces. Secondary pecked pits not uncommonly are found on pestles, also.

Finds of complete pestles are not common; fragments of a single pestle found together give the complete form in default of complete specimens. At least two types, however, have been postulated on the basis of only one complete and several fragmentary specimens. Since considerable intergrading exists between shaped and unshaped cylinders, between cylindrical and tapering forms, etc., the classifications must be considered tentative on the basis of present data. In the following types, "long" and "short" varieties are defined by relation of length to width, but the long specimens are also absolutely longer than the short varieties, which do not surpass 11.5 cm. in length. The term distal refers to the lower or functional end when in use, proximal to the handgrip end. Number and dimensions of specimens refer to Marin Coast collection, except for Types IIA2, IIB4.

IA: Stream cobble, granite (9). Utilized with a minimum of shaping. Large enough to be for two-handed use in a few examples, and typically long in ratio to width. Length 125-170 mm.

IB: Stream cobble, granite (9) and sandstone (4). Like the foregoing in shape, finish, and proportions, but smaller, perhaps for use in miniature mortars. Length 75-113 cm.

IIA1: Sandstone (12). Cylindrical, generally but not invariably circular in cross section, typically long, with rounded ends. Length ca. 160 mm.

IIA2: Sandstone (7). Thick cylinder with flattened ends, both of which generally show battering from use. Length 130-160 mm. Single variant specimen, miniature, has conoid ends, length 95 mm.

IIB1a: Sandstone (3) and granite or a cryptocrystalline rock (3). Tapering very nearly to point from flat or rounded distal end, relatively long. Length 120-238 mm.

IIB1b: Sandstone (5) and granite (6). Gradual taper from flat or rounded distal end to blunt proximal end. Both ends are occasionally functional. Relatively short length, 74-107 mm.

IIB2: Sandstone (2). Taper from bulbed distal end to bluntly-pointed tip, slim and well finished. Length 115-170 mm.

IIB3: Sandstone (30), with few granite (2) or basalt (1). Convex outline, with maximum expansion near distal end, variably finished. Most frequent type throughout, with secondary pit in side occurring most commonly. Length 130-270 mm.

IIB4: Sandstone (5). Tapering from flattish distal end, but marked by special treatment of proximal end, which may be flanged, expanded, grooved, or have a concave cup in the tip.

III: Pitted stone. Sandstone or granite, discoid or oblong, marked by a small pecked pit in one or two faces. Edge is abraded or battered in one or more spots or around entire circumference. Maximum diameter 67-135 mm., minimum diameter 48-100 mm.

Charmstone Typology

Fine-grained or cryptocrystalline rocks are favored for charmstone materials, but sandstones of remarkably coarse grain are occasionally utilized, even to the point of obscuring the demarcation between crude charmstones and small pestles. Materials identified include sandstones (range is coarse sandstone to very fine claystone), limestone, chlorite and mica schist, actinolite, steatite, basalt, and possibly baked clay. Marble limestone, granite, and other refractory materials, with one exception (grooved type), have not been observed in the Marin County or the San Francisco Bay areas.

Although no end of conjectures have been made as to the use or uses of charmstones (or their equivalent under the name "plummet" in the archeology of the eastern United States),[171] and many small bits of evidence have accumulated to place them at least in a context of ceremonialism, knowledge of the functional reasons or cultural-psychological motives underlying their various forms -- or even their existence -- has scarcely advanced beyond Kroeber's statement of the problem in 1909.[172] To the extent that they are "problematical objects," therefore, any classification of their varieties must rely on form, finish, and materials, rather than on variations of their meaning within the culture which produced them. The present classification, compromising somewhat with previous typologies from other areas in California,[173] stresses variation in contour but makes secondary distinctions according to degree of finish. The merit of this procedure is to highlight two cultural processes, viz., a tendency to utilize essentially identical devices of ornamentation and elaboration of the charmstone in all periods within the areas considered, and secondly, a temporal change in the quality of workmanship.

Details such as perforation have not been given typological evaluation, since it is clear that both perforated and non-perforated forms were frequently, if not invariably, rigged for suspension. Specimens of both kinds show traces of asphaltum, together with impressions of the cord-wrapping by which they were hung. Grooving has been emphasized, on the other hand (except where associated with perforations), largely because the grooved forms are also aberrant in outline and finish.[174] Arbitrary use of terms has been made as follows: charmstone, general name for the class; plummet, specific, short, broad type with neck; spindle, a specific type, double-conical or conoid in outline.

IA: Plummet charmstone. Sandstone (7), chlorite schist (2), and limestone (1). Two portions, body and neck, are distinguishable, with a shoulder marking the division. Base may be round or pointed, neck rarely shows asphaltum traces. Often asymmetrical in outline or cross-section, very frequently poorly made of coarse materials, battered and fragmentary. Non-ceremonial use, as for fishnet sinkers, is suggested. Length 65-86 mm. Variant (1 specimen) is flattened in cross-section, with neck created by a groove and a second light groove encircling below midline of body.

IB 1a-b: Piled plummet. None found in Marin Coast sites, but fairly common in the San Francisco Bay area. Sandstone, actinolite, and schist. In two groups, the first like the simple plummet (Type IA) except for

addition of a small nodule or secondary curve on the end opposite the neck, the second much longer and slimmer and lacking a true neck. The first group is frequently of poor materials and is battered or broken; the second is beautifully finished and completely symmetrical, though it may be in fragments from intentional destruction.

IB 2a-b: Knob-piled plummet. Sandstone (2). Small knob at terminus of neck (to facilitate binding?) in addition to small nodule. The two specimens observed follow the dichotomy of poor finish and asymmetry versus total symmetry and smooth finish.

IIA 1-2: Asymmetric spindle. Sandstone (5), actinolite (1). One group has both ends pointed or nearly so, outline generally a simple curve, with maximum expansion nearest one end (hence, asymmetric). Perforation occasional, hole being at end opposite maximum bulge. Length 94-122 mm. Second group marked by greater length, angularity at zone of maximum expansion, complete symmetry, and fine finish. Never perforated.

IIB 1-2: Symmetric Spindle. Sandstone (5), chlorite schist (4), mica schist (2). First group broad, with blunt-pointed or rounded ends, outline a simple curve with maximum breadth in center. Occasionally flattened in cross-section. Most are perforated, but a variant is grooved circumferentially at each end. Length 72-128 mm. Second group is slightly longer and angular at zone of maximum expansion, symmetrical and well worked. May be perforated. Length 92-105 mm.

IIC: "Fishtail." Sandstone (2), mica schist (1), steatite (1). Like the asymmetric spindle type, but with one end elongated and laterally flattened. May be perforated at either end. Because of small number of specimens and general tendency toward flattened cross-section in various types, this type is very tentative. Length 97-120 mm.

III: Sub-cylindrical. Fine sandstone (2), mica schist (3), and baked clay ? (1). A catch-all group, variably constituted by specimens which approach simple cylindrical shape. Beach pebbles slightly worked and perforated are included. Two have pits dug in one end, are unperforated. The smallest in size, oblate more than cylindrical, are most numerous, occur principally in Site 295 at Ellis Landing, San Francisco Bay area, and are in some cases really spindle shaped. One has a series of encircling ornamental grooves on the body.

IV: Grooved. Fine sandstone (2), diabase (1). Three shapes are shown by the three specimens observed: spindle-like, ovular with flattened cross-section, and plummet-like. All share a longitudinally-encircling, carefully-made groove. Lengths 77, 63, 48 mm.

V: Phallic. Mica schist (1), schist (2), and steatite ? (1). The four specimens known are more or less burned from the cremations with which they were associated. One if fragmentary, two have representations of the glans penis on one terminus, and the fourth carries a representation on both termini, of which only one is grooved. All are perforated just behind the head. Length 74-100 mm.

VI: Pendular. Sandstone (3). Rare and mistakable for a miniature pestle except for the smooth finish overall and the asphaltum traces (from suspension ?) on the neck of one. Continuous taper from rounded base to round pointed tip, circular cross-section in two instances, flattened in one. Length 82 mm.

Shell Artifacts

The typology of shell beads published in "An Introduction to the Archeology of Central California,"[175] has been retained without alteration in this study of coastal areas. One added (Olivella 1d, noted below) is absent from the Sacramento Valley, for which the typology was devised, and is represented by only a few specimens on the coast. Concordance with a new and thoroughly illustrated typology, compiled by Mr. E.W. Gifford after study of all California shell artifacts in the collections of the Museum of Anthropology, University of California, is given at the end of this section.[176] It will be noted that the two correspond in almost every instance, excepting Haliotis beads. Owing to possible confusion through a typographical error in the original source, the types are defined here, with slight amplification.

Clam shell bead types.

Disc bead. Saxidomus nuttalli and S. giganteus. Disc beads of various sizes and degree of finish. Diameters range from 2 to 40 mm.; the typical size is about 15 mm. diameter.

Tubular bead. Tivela stultorum. Longitudinally-drilled tubes of various lengths up to 60 mm., made from the hinge of the giant Tivela clam, common near Santa Barbara but recorded from as far north as Stinson Beach north of San Francisco Bay. Ovoid bead. Tivela stultorum. Ovoid in one cross-section, flattened transversely, and drilled longitudinally.

Haliotis shell bead types.

Type 1a: H. cracherodii or H. rufescens. Small, rectangular to square or trapezoidal, centrally drilled.

Type 2: H. cracherodii or H. rufescens. Large, rectangular, with two perforations, incised straight edges. Rarely occurs with concave edges.

Type 3: H. cracherodii or H. rufescens. Thin, circular disc beads, centrally perforated.

Type 4: H. cracherodii predominates; H. rufescens used slightly. Subrectangular to rectangular, rarely circular shape. Edges usually smooth, but irregular. Size variable.

Olivella bead types.

Type 1a: O. pycna or O. biplicata. Small whole shell with spire ground off square.

Type 1b: O. biplicata. Large whole shell with spire ground off square.

Type 1c: O. biplicata. Small whole shell with spire ground off at an angle.

Type 1d: O. biplicata. New type. Large whole shell with spire ground off and body wall perforated.

Type 2a: O. biplicata. Rectangular, small to medium, thin, drilled in center or end. Edges are sharply cut off. Perforation is occasionally punched through.

Type 2b: O.biplicata. Rectangular, commonly large, occasionally medium, drilled in center. Remnant of inner whorl and edges usually ground to flatten bead.

Type 3a1: O. biplicata. Small, deeply-cupped saucer, centrally perforated. One edge bears remnant portion of lip.

Type 3a2: O. biplicata. Rough half-shell with punched-out hole in center.

Type 3a3: O. biplicata. Half-shell, approximately rectangular, with straight sides and ends. Punched-out hole in center.

Type 3b: O. biplicata. "Saddle-shaped" bead, subrectangular to ovoid, cut from transverse top section of shell. Flat in shorter diameter, curved in longer diameter. Lip or spire portions never attached. Small central perforation and trimmed edges.

Type 3b1: O. biplicata. "Saddle-shaped" bead, ovoid and deeply curved along short diameter. Small central perforation and ground edges.

Type 3b2: O. biplicata. Like 3b, but smaller and tending to true rectangularity with rounded corners. Small perforation and trimmed edges.

Type 3c: O. biplicata. Flat saucer, circular, with large central perforation.

Type 3d: O. biplicata. Very small, flat saucer, circular, with relatively large central perforation.

Type 3e: O. biplicata. Small, thick, circular bead with strong, cupped curve. Made from the spire portion of the shell.

Haliotis ornaments typology.[177]

"The classification is based upon the following: shape, perforation and ornamentation . . . The classification does not fit all forms equally well. Type G, for example, is not amenable to our mechanical taxonomy."

Key

Shape

A. Rim section
B. Rectangular
C. Circular
D. Ovoid
E. Triangular
F. Truncate
G. "Banjo"
H. Rectangular with concave edges
L. Diamond
M. Miscellaneous
R. Ring
T. Teardrop
BA. Bar

Perforations

1. One
2. Two
3. Three
4. Four
5. Five
6. Six
7. Seven
8. Eight

(1) One central hole or holes
1 One peripheral hole or holes

Ornamentation

a. Edge incising (Ill. in Fig 7a, type C(1)a.)
b. Serrate edge (Ill. in Fig 7a, type C(1)b.)
c. Shallow drilled pits (Ill. in Lillard, Heizer, & Fenenga, 1939)*
d. Surface line incising (Ill. in Fig. 7a, type C(1)d.)
e. Edge cross-hatching (Ill. in Fig. 7a, type C1e.)
f. Open notches (Ill. in Lillard, Heizer, & Fenenga, 1939)**
g. "Bisected-V" incising (Ill. in Fig. 7a, type C1g.)
h. End tabs (Ill. in Fig. 7a, type F1H.)

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* Type C.1.c., page 16.

** Type G.1.F., page 17.

SHELL ARTIFACT TYPES: CONCORDANCE

EWG, 1947	L.H.F., 1939
C23b	Olivella 1d (new
C24	———
D5	———
D6	Shell spoon 3
D7	Shell spoon 3a
D10	Shell spoon 3 ?
E1	Shell spoon 1 ?
F4	Olivella 1a
F5b	Olivella 1b
I3	———
J2aI, J2aIII, J2aIV	RC.(1) ___ (new)
J2bI	RC.(1).a (new)
K1aIII, K1aIV, K1bII	RC.(1).__(new)
K1bIII	C.(1).a
K1c	C.(1).d
K1f	C.(1).b
K2aI, K2aII, K2aIII, K2bI	C.1.____
K2bII	(C.1.a
K2bIII	(C.1.e
K3aIII	C.(2).___
K3bIV	C.(2).a
K4bII	C.(1).1.a
K6aI	C.2.____
K6bIII, K6bIV	C.2.a.
K10a	C.4.____
L1d	MT____(new)
L3	C.___.b
N1aII	G.I.H (new)
N1eII	G.I.J. (new)
O1aIII	F.1
O3aII	F.2
O3b	F.1.1
Q1aIII, Q1aIV	(B.1.____ (H.1.____
Q1bIII, Q1bIV, Q2aI, Q2aII, Q2bI, Q2bII	B.1.a
Q3b, Q3c, Q3d, Q4aII	Haliotis 1a
Q6aIII	F.2
Q10	F.3
Q11aII	F.1.2
S1b	B.___.e
S2aI, S2aII, S2aIII, S2bI	B.1.____
S2bII	B.1.a
S2g	B.1.b
S4c	B.1.___?
S5aIII, S5aIV	Haliotis 1a
S5bII	B.(1).a
S8aIII	Haliotis B2
S10aII	B.1.1
S29	B.3.7
T2a	———
U2aII, U2aIII	E.1.____

Note: 1. Only types represented on Marin Coast and S.F. Bay region are listed.

2. Decoration styles not distinguished in Gifford typology (EWG); type a, e, and g are lumped in some groups listed as a.

SHELL ARTIFACT TYPES: CONCORDANCE (Continued)

EWG, 1947	L.H.F., 1939
U2BI, U2bII	E.i.a
V1aI, V1aII, V1aIII	Clam disc
X1a	Olivella 3a2
X1b	Olivella 3b1
X2a	Olivella 2a/2b
X2b	Olivella 3b1
X3aI	Olivella 2a/2b
X3aII, X3aIII	Olivella 2a
X3bI	Olivella 3c
X3bII	Olivella 3a1
X3c	Olivella 3b/3b2
K4	Olivella 3e
Z2aII, Z2aIII	MB.1.____
Z2bII	MB.1.a
AA2aIII, AA2aIV	MB.1.____
AA2bI	MB.1.a
AB3bII	MC.1.b
AB6b	M.2.a
AF4b	ME.1.a
AF5aI, AF5aIII, AF5aIV	ME.1
AF5bI, AF5bII, AF6	ME.1.a
AP2aII	A.1
ATI	____

95. Lillard, Heizer, and Fenenga, 1939.

96. Schenck and Dawson, 1929, pp. 402-3.

97. Lillard and Purves, 1936.

98. Heizer and Fenenga, 1939.

99. Stearns, 1930: 10.

100. Russell, 1926: 73-84; Kesseli, 1942: 478.

101. 1898: 36, 41, and map. Kroeber (1939: 53) points out, however, that "so far as native habitat and utilization are concerned, all plant cover classifications are misleading" in the Sacramento Valley on account of the variety of environmental circumstances encountered from spot to spot.

102. Until recently no attempt at exact analysis of constituents within the deposit or of the nature of its growth and formation had been made, although statistical analysis of coastal shell mounds was on record (Nelson, 1909; Gifford, 1916; Cook, 1946). The gap is now being filled through research in progress under S.F. Cook and R.F. Heizer of the University of California (see Cook and Heizer, 1951).

103. For archaeological use of the term "community," see Introduction.

104. This discussion relies principally on a full report by Dr. R.F. Heizer (1949).

105. Since this report was written one new Early Horizon site (Sac-168) has been excavated.

106. Later burials were not introduced below the surface of the red clay base, presumably because it was so difficult to dig; no burial pits with black ashy midden fill were noted, although later burials sometimes lay in contact with the clay surface.

107. Lillard, Heizer, and Fenenga, 1939, p. 73. (See later analysis by Newman, n.d., and 1949.).

108. Small whole Olivella beads occur in later horizons.

109. Not found in interior province, Middle Horizon associations, but extending through Late Horizon in smaller form and found on fringes of ceremonial garments, e.g., among the Hupa of Northwest California.

110. Heizer, 1949.

111. Ethnographic patterns are vividly described in such sources as Merriam, H.C., 1918; Gifford, 1936, 87-90.

112. Lillard, Heizer, and Fenenga, 1939: 75.

113. Heizer, 1949, pp. 37-40. A radiocarbon date of 4052±160 B.P. was obtained for the Blossom site (SJo-68) in 1951 (Johnson, 1951, p. 13, Nos. 440 and 522). Typological comparisons would indicate that SJo-68 is the latest of the five Early Horizon sites.

114. In Lillard, Heizer, and Fenenga, 1939, pp. 75-6.

115. Lillard, Heizer, and Fenenga, 1939, p. 20. Supplementary analysis of the Horizon is presented by Heizer and Fenenga (1939), and collections from two sites (C59, C66) are shown by Schenck and Dawson (1929, passim). Additional papers dealing with Middle Horizon material are: Fenenga, 1939; Heizer and Hewes, 1940.

116. Lillard, Heizer, and Fenenga, 1939, pp. 24 ff., 44, 76 f.

117. Idem., pp. 29, 37, 42-52, 53-56.

118. Schenck and Dawson, 1929, p. 385.

119. The two possible functions are suggested by Schenck and illustrated (Schenck, 1925, Fig. 4, p. 226; Schenck and Dawson, 1929; see also Bennyhoff, 1950, pp. 296-298.)

120. See Heizer and Hewes, 1940, for discussion of probable meaning of such finds in the frame of prehistoric and ethnographic California cultures; for Middle Horizon (Transitional) occurrences, see Table 1, p. 600.

121. Compare, for example, the carved bone and horn hooks and boatstones found in shellmounds of the southeastern states (Webb and de Jarnette, 1942: 280-282). The form of the southeastern hooks is much more clearly adapted to the suggested use than that of the California specimens; they are reported to have been found, moreover, with "boatstones" believed to have been atlatl weights (idem.: 285-286), the distance between the two imperishable objects being the length of the atlatl proper, which is presumed to have decayed. (See Heizer and Elsasser, 1953, Appendix A, for the occurrence of boatstones in California.) Patterson, 1937, gives the extensive distribution and full description of several types of boat-shaped artifacts through Texas and the southeastern states.

122. Heizer, 1941, p. 109.

123. A small container shape is known, but it constitutes just one among many unique forms. See Heizer, 1937a, and compare Eckholm's discussion of still-born invention (1946).

124. Both tubes and clay objects spread north to Howells Point Component but not slightly farther to Miller A Component of Miller Facies.

125. Heizer, 1937b.

126. Gifford, 1926, Table 3, Miwok, p. 226. See also Newman, 1949 and Newman, n.d.

127. Heizer, 1941b, p. 119.

128. Heizer and Fenenga, 1939: 396.

129. Kroeber, 1925: 927-933.

130. A study of the same data used by Professor Kroeber was begun in 1937 by Alex D. Krieger, when new Sacramento Valley information offered leads to reinterpretation. Mr. Krieger's generous permission for my use of his notes facilitated my own rechecking of the data and collections on which this chapter is based.

131. Gifford, 1947. I gratefully acknowledge Professor Gifford's constant and willing assistance. I should note that in addition to changing nomenclature, I have not observed his typological attributions with complete consistency: e.g., I group one or two "type x" beads with "type y" when large numbers of "type y" co-occur and the two types are similar.

132. Sites not included here for lack of sufficient data to determine cultural affiliation are: N3 at Sausalito (Mrn-3); N39 at Belvedere (Mrn-39); N10 at Mill Valley (Mrn-10); N123, north of San Rafael (Mrn-123); N260 at Pinole (CCo-260); N298 at Stege (CCo-298); N267 at Giant (CCo-267); N329 at Newark (Ala-329); N420 at Walnut Creek (CCo-242); and N327 at San Mateo (SMa-4). The N numbers refer to the Nelson survey (Nelson, 1909). The parenthetical designations are the UCAS site numbers.

133. Survey numbers here are from Nelson, 1909. Middle Horizon components of each of these sites are designated by "B" added to the site name, e.g., Fernandez B Component; Late components are correspondingly labeled "A".

134. Yet, of six extended adult burials in Ellis Landing Site, the only one with associated artifacts was at the relatively shallow depth of ten feet, accompanied by a type A2a mortar, hence clearly of Middle Horizon. Burial position alone is thus not an infallible guide.

135. 1926: 275.

136. Uhle, 1907: 22 (for Emeryville A Component). Krieger's notes list cremation also for San Rafael and Greenbrae Components, but I was unable to confirm this in the field notes of the excavations. One partial cremation appears in Ellis Landing A Component, which may belong to either this or the succeeding phase of Late Horizon.

137. Nelson, 1910: 389; Uhle, 1907: 62; Schenck, 1926: 240.

138. Krieger's notes also list characteristic traits such as clam disc and magnesite beads for San Rafael (86c) and Greenbrae (76). Although I was unable to confirm these from museum collections or excavation notes, the extension of Fernandez Facies to these sites would not materially alter any conclusions derived here.

139. See pp. 29 ff., 119. Also, cf. Lillard, Heizer, and Fenenga, 1939: 79-82; Heizer, 1941b: 116-117 and passim. Note that "Late Horizon, Phase III" is culturally almost identical to "Late Horizon, Phase II" except for the increment of Caucasian objects.

140. Nelson, 1909.

140a. Cf. Greengo, 1951.

141. Nelson, 1909: 374, and Pls. 39, 49; Schenck, 1926: 169, fn. 35.

142. Uhle, 1907; Schenck, 1926.

143. Schenck, 1926: 169; Uhle, 1907: Pl. 4; Nelson, Ms. report, University of California Department of Anthropology.

144. University of California Museum of Anthropology catalogue numbers have been retained. Five burials (3769, 3769B, 3698, 3692, and 3662) are listed at shallow depths but have clear Ellis Landing Facies artifacts. Since each occurred in an area at the sloping edge of the site, I assume that the surface from which they were measured was lower than the crest of the site. On this assumption, they fall conformably below the cleavage line indicated for other burials.

145. Uhle, 1907: 22; Schenck, 1926: 183.

146. Broad, grooved lines decorate one perforated implement resembling both the forked headscratcher of San Francisco Bay and Marin Coast Middle Horizon components and the paired pendants (type 1) of Morse Component, Middle Horizon, in the Sacramento Valley, but identical to neither. (Lillard, Heizer, and Fenenga, 1939: Pl. 21a-b, c-f; and my discussion earlier.)

147. This site has since been excavated by the UCAS. The final report is being prepared by W. Wallace and D. Lathrop.

148. However, see recent analysis by Greengo, 1951 (Ed.).

149. Since destroyed by expansion of the U.S. Navy installation at this point.

150. Cf. Heizer and Beardsley, 1942.

151. Loud, 1925.

152. Kroeber, (1911) furnishes a photograph and brief discussion of excavations in progress here and at San Mateo.

153. See Gifford, 1916: Table 5, p. 19.

154. It may be noted also that Loud's notes report a collection of very similar material in the De Young Museum, San Francisco, taken from a mound levelled on Standard Oil property in Richmond, well within the Bay area.

155. Since excavated by A.E. Treganza. Results now being prepared by J. Davis and Ms. on file in UCAS.

156. Salvage excavation in 1948 by C.E. Smith. Notes filed in UCAS (Ms. No. 67).

157. Since published (Heizer, 1950).

158. Heizer (1946) lists elements cited in this connection, and includes bibliography since 1926.

159. Gladwin's version of this theory includes artifact inventories in a very specific sequence of hypothetical waves of population. The artifact associations he proposes, however, do not find very significant correspondences in Central California (Gladwin, 1937, 137-143).

160. The evidence consists of measurements published by Gifford (1926a) of crania from San Francisco Bay sites. Twenty-nine of these, definitely attributable to single horizons on the basis of artifact associations, show the following average cranial indices: Middle (13 crania), 77.2; Late (16 crania), 76.5. Other indices from thirty-six crania are comparably uniform.

161. Kroeber, 1936b; 112.

162. Nelson, 1909: 346; Gifford, 1916: 12-14; Cook, 1946: 51.

163. A C-14 date of 2339+150 B.P. has been obtained for Newark site (328). (Lee Libby, 1954, No. C-690).

164. A Phase I burial from site CCo-138 has been dated by C-14 at 1229+200 B.P. (personal correspondence from W.W. Libby, 2/19/54, No. 689). This date would apply to middle Phase I times of Hollister Facies.

165. Heizer, 1941b: 118, et passim.

166. Other conceivable sources are Sir Francis Drake, arriving in 1579, or the sea-otter-hunting "Boston ships" of the 1793-1818 period. From the historical point of view, attribution of the porcelain and spikes to Drake instead of Cermeno is important; as regards establishment of a cultural time datum, the sixteen-year difference is trifling. But the two-century difference between a Cermeno date and a Boston ship date would be very significant archaeologically. The sea-otter ships, moreover, made trips to the Canton markets, so that they could have had porcelain aboard. But had their contact been responsible for the occurrences on Drake's Bay, we should expect instances of more modern porcelain and certainly of less archaic spikes. It seems remarkable, moreover, that only these two kinds of goods should be found if they be assumed to come from the hunters who were well equipped with conventional trade goods. An 1800 dating strains credulity.

167. Klimek, 1935: 64.

168. It seems advisable to review the problem of dating Phase 2 in the light of several studies made since this report was written. The baptismal records of Missions Dolores and San Jose indicate extensive Spanish contact with the villages in the Alameda and south Delta provinces between 1776 and 1812. No gentile villages in this area are referred to after 1812. It seems probable that glass beads and other Spanish trade items would have been buried with at least some of the dead during this period (most of the baptized Indians were buried at the Mission, which explains the absence of historic burials in Alameda province).

At both Fernandez (CCo-259) and Hotchkiss (CCo-138) sites a sizeable group of burials was recovered which indicates fully developed Phase 2 components, yet no historic artifacts have been reported for either site. In view of the proximity of the two sites to the missions, and the frequent Spanish penetration of this area, it is difficult to accept the CCo-259 and CCo-138 components as of post-Mission date. The depth of the burials at CCo-138 and the changes which occurred in ornament forms both imply some time duration for prehistoric Phase 2 culture in the south Delta province. It would therefore appear that the inception of Phase 2 should be extended back beyond 1776; a date of 1600 seems to be a satisfactory approximation at the present time. Such a dating is in better agreement with the known existence of Phase 2 culture in Marin province in 1579.

If a 1600 date for early Phase 2 in the south Delta province is approximately correct, the rarity of clam disc beads in the Alameda province poses a serious problem. This coastal area was certainly inhabited when the Mission padres arrived, but the baptismal records suggest that the population was not as dense as in the interior. A factor worthy of continued investigation is the possibility that epidemics might have been introduced by the 16th century voyagers which could have decimated the population, and could have obstructed the trade relations which would have brought the clam disc complex of Phase 2 to the Alameda province. Additional evidence for such epidemics might be the apparent abandonment of the Cauley and Estero sites in the 17th century, and a mass burial area at site CCo-138 where a large number of individuals were buried in a relatively short time. Another possible explanation for the rarity of Phase 2 settlements in the Alameda province might be that trade routes were better established between the Sonoma coast (a primary source of clam and magnesite beads ethnographically) and the Interior than were the routes between the Sonoma Coast and the southeast shore of San Francisco Bay. It is also possible that the uppermost layers of Alameda province sites (which would contain the Phase 2 remains) were destroyed by the expansion of modern urban centers before a representative collection of artifacts was obtained from the deposits which capped the shell mounds (ed.).

169. The Yokuts say their old and infirm people used such small mortars to grind up the small animals and birds they were able to get for food (Kroeber, 1925: 528).

170. The term "metate" is not used, in order to avoid confusion with the metates associated with corn agriculture, on which a forward and back motion of the mano is prevalent.

171. For summaries, see Moorehead, 1927, and Pennypacker, 1938.

172. Kroeber, 1909: 13-14.

173. Gifford and Schenck, 1926: 94 (used also by Schenck, 1925: 254); Lillard, Heizer, and Fenenga, 1939: Pl. 13-14.

174. Numbers of specimens and dimensions are taken from Marin County collections.

175. Lillard, Heizer, and Fenenga, 1939: 12.

176. Gifford, 1947. I am indebted to Mr. Gifford's generous assistance in problems of shell identification and nomenclature, as well as for free access to the complete manuscript of his typology. I have chosen, not without hesitation, to continue the earlier classification largely because of its simpler terminology. There is also advantage and no difficulty in the Central California area in completely separating bead from ornament forms, as is done in the 1939 typology. In the Gifford pan-California study, however, it has been found judicious to run all shell artifact forms together in a single series.

177. After Lillard, Heizer, and Fenenga, 1939: 14-17. They do not illustrate Types GIH and GIJ. My added elements have been designated R., T., and BA., i.e., Ring, Teardrop, and Bar, respectively.

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AAn	American Antiquity
BAE-AP	Bureau of American Ethnology, Anthropological Papers
BAE-B	Bureau of American Ethnology, Bulletin
UC-AR	University of California, Anthropological Records
UCAS-R	University of California, Reports of the Archaeological Survey
UC-IA	University of California, Ibero-Americana
UC-PAAE	University of California, Publications in American Archeology and Ethnology
UC-PG	Yale University, Publications in Anthropology

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		Depth in feet	Steatite pipe	Quartz crystal	Mortar	Obsidian point	Red ocher	Yellow ocher	Mica ornament	Stone bead	Ear plug	Slate ring pendant	Awl	Bird bone whistle	Bird bone tube	Antler wedge	Spatulate bone	"Head scratcher"	Bird bones	Animal teeth	Pin, beveled base	Olivella bead 1b	" 2a	" 3b1	" 3b2	" 3c	" 3d	" 3e
	Total late		2	2	2	1	2						2	1	1							8	12					(2)
	Total Middle			2	2	1	13	2	3	1	1	1		2	3	1	2	1	2	2	1	11		2	12	(18)	1	
Emeryville Facies	Burial No.																											
	3691?	7																										7
	----	9																					(+)					
	3724	10			+								3									12	22					
	3702	10																				7	10					
	3703	10																					2					
	3704-5	10																				18	15					
	3671?	10		+	+																							
	3646	10																					64					
	3587	10					+						+									82	1					
	3708	11	+			2																107						
	3678	12													+							2	(4)					
	3738	13		+																		186	2000					
	3757B	15																				151	88					
	3747	16																					16					
	----	16	3				+							5									22					(+)
Ellis Landing Facies	3698	10			+																	1			7			
	3615?	11																							1			
	3616	11																							16	18		
	3617	11																				4			28	21		
	3618	12																							246	217		
	3619	12																		+		104			4			
	----	12												8								14			50	76		
	----	13				2					+											4			(+)	3		
	3692?	13			+																				17	44		
	3610	14																								1		
	3620	15																							4	6		
	----	15												9			2		+		1							
	3729	15																							250	30		
	3680	15					+																		80	6	2	
	3684	15					+																			7		
	3730	18					+		+																			
	3769	(1)														+		+		+						9		
	3769B	(1)						+											+							4		
	----	20		+			+	+	40																	(+)		
	3792	23																								(+)		
	3793	24					+															31						
	3794	24					+			+												92						
	3789	26																				(+)						
	3784	26					+															160						
	3783	27																								(+)		
	Uhle 1	9					+																					
	Uhle 4	15					+		+						+													
	Uhle 6	17					+					+												+		+		
	Uhle 7	21		+			+								+							+				+		
	Uhle 8	15					+								+		+					+						
	Uhle 9	18					+																	+				

TABLE 124: EMERYVILLE SITE (309). GRAVE GOODS WITH 48 BURIALS.

(Based on Schenck (1926) and Uhle (1907) excavations.)

		Depth in feet	Haliotis bead 4	Haliotis ornament types:	B_a	B1	B1a	B1e	B2	C_	C_a	C1	C(1)	C1.2	C1a	C(1)d	C1e	C2	C4	RC(1)	RC(1)d	E1	E1a	ME1	MB1	F_e	F3	A1	G1g	Whole	Fragment
	Total Late		1			1	2	1	1		1	2		1	1		4	1	1			2	1			1	1		1		1
	Total Middle		1		5	2	1			1			1			3		1		1	2	1		2	2			1		1	4
	Burial No.																														
Emeryville Facies	3637	8					+	+							+		+												+	
	----	9															+													
	3724	10	1																											
	3704-5	10				+																								
	3671?	10																	+											
	3646	10																												+
	3708	11										+										+	+							
	3678	12																				+								
	3738	13																								+	+			
	3757B	15							+																					
	3747	16										+					+	+												
	----	16					+				+			+			+														
Ellis Landing Facies	3662?	(3)																											+	
	3698	10																												+
	3616	11																												+
	3617	11			+																									
	3618	12			+																									
	3619	12			+																									
	----	12			+		+																							
	----	13			+					+																			+	
	3610	14				+																+		+						
	----	15																												+
	3680	15	+																											
	3684	15																												+
	----	20				+																								
	3792	23														+														
	3793	24																		+	+									
	3794	24														+														
	3789	26														+		+												
	3784	26																			+			+						
	Uhle 6	17											+												+					
	Uhle 7	21																							+					

TABLE 12B: EMERYVILLE SITE (309). GRAVE GOODS WITH 48 BURIALS.

(Based on Schenck (1926) and Uhle (1907) excavations.)

MIDDLE HORIZON PREDOMINATES

	Sites							
	Mendoza P-B 275		Cauley P-B 242		Estero P-B 232b		McClure P-B 266	
B = with burial/D = in deposit	B	D	B	D	B	D	B	D
Total burials			6		4		24	
Flexed, semi-flexed			4		2		18	
Head within 60° of West			33%				63%	
Contorted burials			1				3	
Grave goods associated			75%		25%		75%	
Baked earth basins								B,10
Artifacts*								
Mortar type B1			A,1	B,2		B,2		
Mortar type B2								A,1
Mortar type C				B,1			A,1	
Igneous rock hammerstone				B,4		B,2		(B),15
Igneous rock pick/chopper				B,2		B,2		(B),17
Chipped stone saw				B,1				B,9
Large projectile point (N1-3)		A,1	B,1	+,6		+,8	B,6	+,24
Grooved or notched sinker			A,2	B,24		B,16		+,130
Stone earplug						B,1		+,1
Baked clay female figurine						+,1		B,2
Obsidian eccentric							B,1	B,1
Large obsidian prism							B,4	
Powdered ocher							B,11	
Perforated bone needle							B,4	B,6
"Mesh-gauge"							B,3	
"Shoehorn-shaped" spatula								B,3
Spatulate bone hairpin							B,9	(B),2
Forked headscratcher						+,1	B,7	
Elongate antler triangle							B,2	B,6
Ringed "dagger"							B,2	
Quartz crystal				A,1			B,1	+,1
Olivella bead type 3c			B,1		B,1		B,6	B,3
" " " 3b2			B,1					
" " " 3d					B,1		A,1	
" " " 1b					A,1		A,1	B,1
Haliotis ornament type B	A,1						+,3	
Perforated mica ornament							B,8	B,3
Bone awl or perforator		A,1	A,1	+,15		+,27		+,11
Antler wedge		A,5		+,1		A,5		+,3

*Artifacts legend: A = A or Late Horizon; B = B or Middle Horizon.
+ = Both horizons or uncertain affiliation.
() = Predominates in horizon shown.
Numbers indicate separate occurrences.

TABLE 13A: SELECTED TRAIT LIST, MARIN COAST SITES

LATE HORIZON PREDOMINATES

	Sites							
	Mendoza P-B 275		Cauley P-B 242		Estero P-B 232b		McClure P-B 266	
B = with burial/ D = in deposit	B	D	B	D	B	D	B	D
Total burials	14		19		6		17	
Flexed, semi-flexed	12		19		3+		11+	
Head within 60° of west	58%		63%		33%		59%	
Total cremation	12		7		3		10	
Grave goods assoc. w/ burial	58%		53%		12%		76%	
Grave goods assoc. w/ crem.	75%		100%		100%		100%	
Artifacts*								
Mortar type A1	A,5	A,4	A,2			A,1	A,3	
Mortar type A2		A,1				A,2	A,1	
Pestle type IIB2	A,1	A,1		A,3		A,4	A,1	A,5
Crystalline hammerstone			A,1	A,1				+,10
Siltstone chopper		A,7				+,1		
Whalebone wedge	A,2	A,13		A,1		+,10	A,1	+,6
Small, stemmed projectile point		A,8	A,1	A,16		A,23	A,7	A,8
Tubular stone pipe	A,2	A,1		?,1				+,1
Charmstone, symmetrical a	A,1	A,1		A,1		+,2		+,2
Charmstone, cylindrical		A,1	A,1	B,1		A,2		
Charmstone, phallic	A,2		A,1					
Bird bone hairpin						A,1		A,1
Fine-line incised bird bone bead						A,1	A,1	A,3
Flanged pestle handle							A,1	
Carbonized hairnet	A,1							
Steatite pendant	A,1					A,1		
Steatite disc bead	A,1		A,2				A,2	
Magnesite tubular bead							A,2	
Tivela tubular bead							A,1	
Clam disc bead	A,2		A,5		A,3	A,1	A,15	A,1
Olivella bead type 3a1			A,3	A,1	A,1		A,6	
" " " 3a2							A,1	
" " " 3e			A,2					
" " " 2a							A,1	
" " " 1a			A,1					
Haliotis ornament type C								A,1
" " " E	A,1							
" " " G	A,1						A,1	

*Artifacts legend: A = A or late Horizon; B = B or Middle Horizon.
+ = Both horizons or uncertain affiliation.
? = Doubtful trait.
Numbers indicate separate occurrences.

TABLE 13B: SELECTED TRAIT LIST, MARIN COAST SITES