

Early Cultures of the North Coast Ranges, California

By

DAVID ALLEN FREDRICKSON

A.B. (University of California, Berkeley) 1948

M.A. (University of California, Davis) 1966

C.Phil. (University of California, Davis) 1969

DISSERTATION

Submitted in partial satisfaction of the requirements for the degree of

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Anthropology

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In 1967, when I initially became involved in the preparation of this dissertation, there was little indication that the project would extend over a period of more than five years. A considerable amount of research has been carried out in California during this time span and a number of conceptual advances made. This, of course, has necessitated a continuous updating of this essay and of my own thinking with respect to both data and theory. I wish to acknowledge, in particular, the influence of James Bennyhoff, with whom I have discussed many of the details, both substantive and theoretical, covered in this paper. The breadth of Jim's knowledge of archaeology continually placed me in the position of novice and I cannot overstate my appreciation for his generosity in adding to my education. I also wish to acknowledge Martjn Baumhoff, who not only served with extreme patience as chairman of my thesis committee, arranged for the financing of the two radiocarbon dates from Lak-261, saw to the funding for my field trip to Men-455 in Coast Yuki territory, but extended to me the necessary moral support and guidance, as well as financial support, when I proposed to continue my graduate studies after an extended absence. I learned much from our intensive discussions on archaeological and anthropological topics during the two years I was in residence at Davis and regret that our conversations have been only intermittent since then.

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I

Introduction

The original plan for this thesis, when I started work on it in 1967, was to use the stratigraphic and dating evidence from the Houx site (Lak-261) to document the existence of the early milling stone culture, called here the Borax Lake Pattern, in the North Coast Ranges and to offer evidence for the occurrence of a second early culture, called here the Houx Pattern, which was later in time than the Borax Lake Pattern with an economy based upon hunting (with dart and atlatl) and acorn processing (with mortar and pestle). On the basis of typological evidence (fluted, Clovis-style projectile points and chipped stone crescents) from the Borax Lake site (Lak-36), I had originally hypothesized occupation of the North Coast Ranges prior to the milling stone culture during the Palaeo-Indian Period. Using geological evidence and obsidian hydration rim measurements, Meighan and Haynes (1968, 1970) arrived at a sequence which included the Palaeo-Indian Period and the Borax Lake Pattern, but they did not have evidence of the Houx Pattern.

As I attempted to relate the archaeological findings from the North

Coast Ranges to the three-part sequence of Early, Middle, and Late Horizons of the Central California taxonomic system, a number of difficulties and apparent contradictions were encountered which stimulated my efforts to overcome the difficulties and resolve the contradictions and thus helped give the thesis its present form. The evidence showed that the Borax Lake Pattern was clearly contemporaneous with the Early Horizon (called here the Windmiller Pattern), as well as with portions of the Middle Horizon (called here the Berkeley Pattern). The Houx Pattern was contemporaneous with the later portion of the Berkeley Pattern, but sufficiently different in adaptive mode that identity with the Berkeley Pattern was questionable. The occupation of the North Coast Ranges during the Palaeo-Indian Period implied an "Earlier Early Horizon," an awkwardness that Ragir (1968:15-16) also grappled with in her dissertation on the Early Horizon in Central California. I concluded that a thorough revision of the Central California taxonomic system was necessary. An ad hoc patch-and-mend approach could only lead to greater difficulties.

When in late 1967 a series of workshops on Central California archaeology was called at the University of California, Davis, under the sponsorship of the Center for Archaeological Research at Davis in conjunction with the Society for California Archaeology, it seemed an appropriate time and place to suggest the need for revision of the Central California culture classification system and to work with colleagues to accomplish it. The consensus at these workshops appeared to be that revision was necessary, but no agreement was reached with respect to terminology or basic concepts. Over a period of about two

years, during 1968 and 1969; partly in conjunction with the CARD workshops, partly in conjunction with problems encountered in this thesis, but mostly due to our shared interest in making sense of the data pertaining to California prehistory, James Bennyhoff and I worked closely together, dealing with both substantive and theoretical problems of California archaeology. It was during these workshops with Bennyhoff that I was able to test, with a most knowledgeable and formidable critic, concepts such as the Emergent Stage (a nonagricultural equivalent to the Formative) and the Pattern (a replacement for the Horizon of Central California, separating the cultural dimension from the temporal).

The 1968 publication of Gerow's University Village report, with his critical analysis of the three-part Central California cultural sequence, reinforced my conviction that a thorough revision of the Central California taxonomic framework was necessary. Gerow's evidence that his Early San Francisco Bay culture (here referred to as early Berkeley Pattern) was contemporaneous with the Windmiller Pattern persuaded me to re-examine the conclusions of my 1966 report on CCo-308, a Berkeley Pattern site in interior Contra Costa County. The site had been dated by radiocarbon at 2500 B.C., but I had been reluctant to assert contemporaneity with Windmiller though I had left the possibility open. After the CCo-308 report had been completed, Harvey Crew forwarded to me hydration rim measurements for a number of obsidian artifacts from the site. The measurements were compatible with the age suggested by the C-14 date. In retrospect, my reluctance to accept contemporaneity of the Berkeley Pattern at CCo-308 with the Windmiller Pattern of the lower Sacramento Valley seemed less due to

a lack of evidence and more due to timidity prompted by the clear stratigraphic sequence of Windmiller Pattern followed by Berkeley Pattern in the lower Sacramento Valley.

This, then, is the background for the direction which the dissertation has taken. Overall, I have done three things. First, I have presented a critical, historical discussion of some of the achievements and some of the deficiencies of the handling of culture classification in Central California. This included not only discussion of the three-part cultural sequence, but also the stages of New World prehistory presented by Willey and Phillips (1958). Second, I have proposed a system of spatial and cultural integrative units for use in Central California. I have attempted to utilize concepts according to general New World usage, basing the framework upon the Willey and Phillips (1958) discussion, but have introduced modifications when it seemed warranted by the California situation. Third, I have reviewed the current state of knowledge of the archaeology of the North Coast Ranges, initially as a physiographic province, and then focusing upon the central districts as the archaeological region of the North Coast Ranges. Utilizing the preceding framework, I have organized the early cultural manifestations into three patterns: the Post Pattern (representing the Palaeo-Indian Period), the Borax Lake Pattern (beginning in the Lower Archaic Period and extending into the Upper Archaic Period), and the Houx Pattern (beginning in the Upper Archaic Period, with time of termination not yet known). I also review dating evidence which suggests that during the Archaic Period in Central California, the Borax Lake Pattern had both temporal and geographic priority, with the

Windmill Pattern appearing to represent a relatively late climax of a local milling stone culture which was adapted to the environment of the lower Sacramento Valley. As Windmill was achieving its climax in the Valley, the Berkeley Pattern, possibly derived from the southern California Coast, was developing on the Bay. By about 500 B.C., the Berkeley Pattern had replaced the Windmill Pattern of the Valley and the Houx Pattern had replaced the Borax Lake Pattern of the North Coast Ranges. Houx appears to have strong affiliations with Berkeley, but is sufficiently different in adaptive mode that separate pattern status is warranted. In the next several paragraphs I offer a chapter by chapter outline of what follows in this paper.

The history of concepts of change regarding the archaeological record in California, or what constitutes significant change is discussed in Chapter Two, which follows. From the turn of the century until about 1930^c, the dominant view was that significant change must be on the level of basic technological stage, palaeolithic and neolithic. Kroeber's view was that the then-available archaeological evidence indicated long-term stability throughout California at the neolithic level. The cultural sequences inductively demonstrated for several regions of California and the Great Basin in the late 1920's and 1930's provided a conceptual break-through in the recognition and definition of significant change, though there was little explicit discussion with respect to the meaning of the changes which were recognized. Over time, however, the three-part Central California cultural sequence proved to be implicitly unilineal, fostered by the deliberate linking, through the concept of the horizon, the cultural and the temporal

dimensions. Difficulties in applying the unilineal scheme, plus ambiguity with respect to criteria for identification of the horizons, seem to have prompted workers since the late 1940's and early 1950's to retreat from large-scale integrating concepts, including that of the horizon, to the cover of local sequences of named complexes.

In Chapter Three, the stage classification of Willey and Phillips (1958) is reviewed with respect to Central California and is seen to be applicable but insufficient in itself. The long span of time for the Archaic Stage in California, put by some researchers as long as 7000 years, indicates that additional integrative units, on a scale smaller than the stage, are needed as well. With respect to stages in Central California, candidates for the Early Lithic or Pre-Projectile Point stage exist, but data are inconclusive. The Palaeo-Indian stage is represented at the lacustrine localities of Buena Vista Lake, Tulare Lake, and Borax Lake. I attempt to resolve the classificatory problem as to whether the climax cultures of California's ethnographic period were Formative or Archaic by proposing the Emergent stage as a nonagricultural equivalent to the Formative.

In Chapter Four, I focus upon the historical insight that can be gained from nonarchaeological data, reviewing the historical reconstructions of Kroeber and Klimek, as well as reconstructions based upon linguistic evidence. Despite specific errors and methodological flaws, such reconstructions provide the opportunity for the formulation of hypotheses regarding archaeological expectations and in general support a non-unilineal developmental framework for the California area. Specifically, the reconstructions form the basis for a hypothesis that during the

Upper Archaic Period (ca. 4000 to 2000 years ago); we can expect diversity of cultural pattern, evidence of population movement, merging and replacement of patterns, internal development within patterns, little evidence of long-standing or far-reaching trade networks, and lack of regularization of cultural influences.

The use of spatial units in Central California archaeology is discussed in Chapter Five and alternate terminology, based primarily upon the Willey and Phillips formulations, is suggested in order to bring California in line with more general usage. Modifications made or suggested by other workers with respect to concept and terminology are also discussed. The culture-area concept as an archaeological tool is reviewed, as well as the tendency to equate cultural units with physiographic zones without empirical verification. I briefly discuss differences between the archaeology of the lower Sacramento Valley and the northern San Joaquin Valley in order to show that these two regions may have had significantly different developmental histories which can be obscured by the application of a unilineal framework.

In Chapter Six, again using Willey and Phillips as a major source, I suggest a series of cultural integrative units. Two additional concepts, not found in Willey and Phillips, the aspect and the pattern, are introduced. An aspect is a sequence of phases within a district. Conceptually, phases are analyzed out of the aspect as greater control of the temporal dimension is achieved. A pattern is an adaptive mode extending across one or more regions, characterized by particular technological skills and devices, particular economic modes, including participation in trade networks and practices surrounding wealth, and by

particular mortuary and ceremonial practices. It is a small-scale equivalent, on the regional or transregional level, to the culture-area concept. I suggest that the pattern is the unit most readily perceived in the archaeological record and that smaller units of phase and aspect are detectable only through more detailed analysis. It is conceptually important that patterns are not built up from phases, but that phases are analyzed out of larger units. Criteria are suggested for a number of patterns in Central California: Windmiller, Berkeley, Augustine, Borax Lake, and Houx (criteria for the provisional Post Pattern are suggested in Chapter Eight).

The ambiguity sometimes encountered with respect to temporal markers and cultural markers is also discussed in Chapter Six, and a distinction is suggested between time markers and district markers. District markers are those features, varying from quality of workmanship to characteristic decorative styles, which assist in distinguishing between one community or group of communities and another. I suggest that the term horizon be limited to particular artifacts or elements of style or technology, rather than to complexes of elements. The horizon should be employed as a concept for relative dating, not cultural identity.

In Chapter Seven, the North Coast Ranges become the focus. The geographic setting is outlined, including geology, climate, flora, and fauna, followed by a discussion of the status of archaeological knowledge. It is apparent that the North Coast Ranges archaeological region is not equivalent to the physiographic North Coast Ranges. The northern districts of the physiographic province are archaeologically related to northwestern California, the eastern districts to the northern part of

the Sacramento Valley, and the southern districts to the Delta and the Bay. At an earlier time period, that of the Borax Lake Pattern, the archaeological region appeared to have included a larger territory than in later times. I note the rarity of Phase One, Augustine Pattern time markers in the North Coast Ranges, and the relatively unelaborated mortuary customs of this period, and suggest these to be signs of the lesser importance of ceremonial organization in this region as contrasted with the lower Sacramento Valley.

Chapter Eight, the final chapter of this paper, contains a review of the early archaeological manifestations in the North Coast Ranges. Three important sites (Lak-36, Lak-261, and Nap-131) are reviewed in some detail and three periods are summarized: Palaeo-Indian, Lower Archaic, and Upper Archaic. The Post, Borax Lake, and Houx Patterns are identified. Also included in the chapter is a review of the dating of the Archaic Period cultures in Central California and a discussion of processes of change in the North Coast Ranges.

The most significant additions to knowledge since Meighan's 1955 summary of North Coast Ranges archaeology appear to be the geologic and obsidian work at Lak-36 and the stratigraphic excavation and radiocarbon dating of Lak-261. The Lak-36 study (Meighan and Haynes 1968, 1970) allowed the relative dating of a large series of artifact types from the site, demonstrated a temporal distinction between fluted and nonfluted concave-base projectile points, and showed the contemporaneity of fluted points and chipped stone crescents. The Lak-261 investigations (Fredrickson 1961a) provided documentation for the temporal placement of the Borax Lake Pattern, as well as its stratigraphic relationship with respect to the Houx Pattern and the Clear Lake Complex. The Lak-261

investigations also provided the assemblage which formed the basis for the Houx Pattern.

Although the obsidian study at Lak-36 indicates that the provisional Post Pattern dates back to the Palaeo-Indian Period, no direct evidence for big game hunting has yet been found. Relationships of the pattern seem closest to the San Dieguito complex and a lakeside collecting-hunting adaptation is indicated. The Borax Lake Pattern, with an economy probably based upon the milling of hard seeds and hunting, is seen to have a northern (Thomes Creek district) and a southern (Borax Lake district) aspect, with better documentation for the southern than the northern. A sequence of point types (wide-stem, followed by nonfluted concave-base, with expanding-stem a late addition) suggest that as more data accumulate a number of phases will be distinguished. The Houx Pattern, based upon an acorn economy with a strong hunting emphasis, appears late in the Upper Archaic Period, possibly during the period of Berkeley Pattern expansion into the lower Sacramento Valley. The Houx Pattern may be a Berkeley Pattern variant and the working hypothesis is proposed that it represents Miwok intrusion into the vicinity south of Clear Lake.

A review of dating evidence from Central California's Archaic Period shows contemporaneity of the Borax Lake, Windmiller, and Berkeley Patterns. The milling stone-based Borax Lake Pattern has the earliest C-14 date in the Central California subarea. This date is supported by obsidian hydration measurements. The C-14 dates for the climax-culture Windmiller Pattern in the lower Sacramento Valley parallel those of the early Berkeley Pattern on the Bay, with the earliest dates from both patterns placed at approximately 2500 B.C. By about 500 B.C. the Berkeley

pattern appears to have replaced Windmiller in the valley and the chronological sequence known as Middle Horizon (late Berkeley Pattern) begins at this time. The single date of the Houx Pattern places it within the time span of the late Berkeley Pattern.

A concluding commentary in Chapter Eight deals with questions of culture and stability. It is suggested that reasons for change in the archaeological record, regardless of how slight or how profound the change might be, be sought through examination of changes in environmental circumstances. These circumstances include those of the physical environment, the social environment, and the internal environment of the culture itself. With respect to current knowledge of the archaeology of the early cultures in the North Coast Ranges, some understanding of the sequences of cultural changes which occurred there is now emerging, but we have little understanding with respect to the reasons for the changes.

II

Historical Background

Concerns of Archaeology in California

Many years ago Kroeber (1909:1) wrote that the archaeology of California was concerned primarily with two questions: one was time and origins and the other was prehistory and culture. The first question pertained to determining the first appearance of human beings in a given region and the fixing of the time of their arrival as absolutely as possible; the second question dealt with ascertaining the different forms taken by the various cultures and their succession. Until quite recently little else has been said explicitly in regard to formulating the objectives of archaeological research in California, particularly objectives pertaining to the broader context of North American prehistory or to the potential contribution of California archaeology to general archaeological and anthropological theory. Review of California's archaeological literature, especially that produced during the past several decades, indicates that Kroeber's concept still shapes to a large extent not only the theoretical, but also the operational objectives of archaeologists dealing with California materials. Baumhoff and Elsasser (1956:1), for instance, in their review of the California archaeological literature, suggested that the common archaeological problems in California "are largely concerned with internal relationships, between local cultural sequences, for example, and are considered against the backdrop of

California as a separate, or even detached area. On the other hand wider relationships, though not extending beyond the Northwest Coast, the Southwest, or the Great Basin are sometimes introduced as specific problems."

Meighan (1961) made some significant statements along a similar line, but in more detail, in his review of archaeological research in the far west of North America, primarily California, in terms of contributions to methodology and theory. Meighan concluded that the generally simple level of culture in the area created a problem for which solutions were sought by the "perfection of analytical techniques for non-ceramic evidence, development of ingenuity in deriving conclusions, and considerable use of the direct-historical approach." Meighan cited new methodological approaches in analysis of physical components of sites, determination of food resources, estimation of population density, establishment of functional typologies, testing of the value of chemical and other changes for chronological control, and experimentation with statistical techniques of seriation. In regard to theory, Meighan emphasized the absence of culture classification systems comparable to those in other North American regions and a dependence upon classificatory units on the level of the complex or assemblage. He also noted a tendency toward the development of a classificatory system based upon an ecological framework. No mention was made of contributions relating findings from California to a broader perspective, either areal or theoretical. In an earlier paper Meighan (1959) discussed the concept of the Archaic as applied to California prehistory, but did not pursue to any extent the line that California findings could contribute to a

general understanding of the Archaic on a continent-wide basis. In brief, the approach has been to apply concepts to California materials in an effort to understand California, rather than to use California materials as an aid in apprehending problems more wide-spread in scope.

Heizer's (1964) recent summary of the archaeology of the western coast of North America is a masterful instance of the concept of California archaeology as formulated by Kroeber in 1909 and characterized by Baumhoff and Elsasser in 1956. Heizer, in his summary, moved from one geographic region to another with methodological thoroughness and listed the local sequences and some of the salient problems of each region as he perceived them. The approach resulted in an admirable summary of the basic state of substantive knowledge concerning Pacific Coast archaeology, but was sparse regarding broader areal and theoretical problems. Appropriate to the concern of this essay with the North Coast Ranges, Heizer's (1964:129-30) summary of the archaeology of this region is given below. This excerpt is in style a fair approximation of his descriptions of other regions (for convenience, Heizer's bibliographic citations are omitted):

"In the Coast Ranges and along the coast north of San Francisco Bay, there was substantial inhabitation in Middle Horizon times, the cultural materials being similar to those found farther east in the interior valley. On an earlier time level is site Nap-131, which produced flaked basalt and obsidian implements similar to some from the Borax Lake site in Lake County, whose proper position in time has never been satisfactorily agreed upon, even though it has yielded a number of Clovis fluted points. Surveys carried out since 1949 have led to the location of eight

additional sites, characterized by manos; heavy, short, concave-base projectile points with basal thinning; and heavy flake scrapers and scraper planes, which are coming to light in the Coast Range valleys north of San Francisco Bay. It is tempting to lump these together as evidence of an old seed-using-hunting culture that is coeval with, or possibly antedates, the Early Horizon culture of the lower Sacramento Valley, whose age is 4000 and more years old. What are called the Mendocino and Borax Lake complexes are probably both to be included in this proposed category, as well as some sites to the north in Shasta County. A definite tendency to use flint and basalt rather than obsidian for flaked implements appears to be characteristic of this time level. However, until more investigation is carried out and some dating of these sites can be secured, this suggestion of an early hunting-collecting culture should be considered only a hypothesis. Late Horizon sites in the northern Coast Ranges are abundant, though little archaeology has been carried out in the region. Just west of the head of the Sacramento Valley, in the Coast Range section, salvage archaeology in reservoir areas has yielded an abundance of late materials that are basically central California in type but are modified by influences reaching southeast from the distinctive culture development of northwestern California."

Archaeological site Lak-261, incidentally, from which derived materials for much of the substantive portion of this essay, was listed by Heizer (1964:130, fn. 9) in a footnote as one of the "eight additional sites" representing part of the hypothesized early hunting-collecting culture of the North Coast Ranges. Lak-261 (the Houx site) is culturally stratified with the earliest of three cultural periods representing the

milling stone culture discussed by Heizer above. The latest cultural period represents the direct antecedents of the ethnographic culture of the region. The middle cultural period represents a heretofore undescribed culture which existed in the region prior to the introduction of the bow and arrow, but after the replacement of the milling stone by the mortar. The importance of Lak-261 rests not only upon the cultural sequence, but also upon two radiocarbon dates, one dating the early milling stone cultural representative (1740 ± 130 B.C., I-2754), the other dating the heretofore undescribed cultural component (150 ± 150 B.C., I-2791) (Buckley and Willis 1969:76).

While Kroeber's formulation of the concerns of California archaeology as being time and origins, plus prehistory and culture, is still partially adequate, I suggest the formulation should be extended. Revising and adding to Kroeber's concerns, the problems of archaeology in California can be grouped into four interrelated spheres: history, culture, context, and process. The problem of history is one of chronology, that of discovering events in the past, each assigned to its particular time of occurrence and each in its appropriate temporal sequence. The problem of culture is one of defining and delineating the patterns of each of the various cultures which existed in each geographic region throughout the history of human occupation in the area. The problem of context is one of determining the relationship of historical events and cultures within California to historical events and cultures outside of California employing increasingly broad areal perspectives. The problem of process is one of extracting regularities and generalizations about the varieties of change which can be observed in the historical, cultural, and contextual reconstructions.

Models of Expectation in Central California Archaeology

California archaeology has experienced a sequence of conceptual models which have been increasingly complex and sophisticated. The most significant early model of expectation in California prehistory was based upon Kroeber's (1909:15) evaluation of culture change as he perceived it: "It does appear that there was some gradual elaboration and refinement of technical processes, but it was a change of degree only, and one in no way to be compared even for a moment with a transition as fundamental as that from palaeolithic to neolithic. For that matter, no trace of any people in a purely palaeolithic stage of cultural development has yet been found anywhere in California."

Kroeber's dismissal of the significance of the observable culture change in archaeological sites back in 1909 was based upon the prevailing intellectual view of that time which saw significant culture change only in terms of such large-scale stages as palaeolithic and neolithic. As Rowe (1962a:399) pointed out: "The archaeology of North America was still virtually without depth at this time, and it was to be another ten years before the possibility of making chronological distinctions in the archaeological record began to be generally admitted by archaeologists working in the United States. A few pioneers suggested such distinctions earlier, only to have them explained away. It is interesting that Kroeber, who was later to become a pioneer of chronological interpretation himself, was involved in the rejection of one of the soundest earlier efforts in this direction, Max Uhle's claim to have found a record of cultural change in the shellmound at Emeryville on San Francisco Bay, where he dug for Merriam in 1902. Uhle had spent the previous

five years sorting out chronological differences in the archaeology of the Peruvian coast, and he had learned to see cultural change in his archaeological data at a time when no one else working in New World archaeology was able to do so.

"...Uhle recorded the objects from his excavation [at the Emeryville site (Uhle 1907)] by natural levels, of which he distinguished ten in all. He distinguished two phases ('people') in the occupation, the first represented by the lowest levels, VIII to X, and the second by levels I to VII. Speaking of the people of the earlier phase he says: 'They may have been neolithic, they may have been connected with the following generation by some common traits, although there is little evidence for this; but the two people certainly differed in cultural characteristics'...

"Kroeber went over Uhle's notes and collections from Emeryville, and the chronological differences which Uhle claimed seemed to him insignificant...Kroeber at this time visualized cultural change in terms of major shifts in technology and subsistence; any changes of less moment were insignificant. He could not comprehend Uhle's interest in all changes, however minute."

Kroeber's view of culture change dominated the approach to archaeology in California until approximately 1929, when cultural sequences for Lovelock Cave, Nevada, and the Santa Barbara Coast were published (Loud and Harrington 1929; Olson 1930; Rogers 1929). Although weakly documented suggestions of cultural change appeared earlier (Lillard and Purves 1936; Schenck and Dawson 1929), it wasn't until 1939 that a cultural sequence for Central California appeared (Lillard, Heizer, and Fenenga (1939). In 1936 Kroeber published a brief summary of findings

suggestive of prehistoric change within the state, and, although he tempers his discussion with the observation that "a defeatist attitude will accomplish nothing," the overall tenor of his paper is low-keyed: "it is indispensable to realize how scant and sketchy all our associations and tie-ups, and therefore inferences, still are from the point of view of real evidence. Olson's data prove something, but are too limited to prove much. They include no charmstones from Late sites when we are almost certain charmstones were still used, and are therefore defective for a complete picture. Rogers' conclusions are likely to be true to a considerable degree, on account of his large experience and material, but cannot be used as evidence because his data have been passed through the subjective crucible of one mind. Schenck has no positive findings for San Francisco Bay or the south end of the Great Interior Valley, only hesitant suggestions for Stockton; Lillard, whose conclusions for adjacent Sacramento are very nearly the same, appears to have derived them from valid evidence but has not yet set this forth so that it can be controlled. In short, we have clues, and should feel encouraged; but we have not as yet any proofs for generalizations of breadth or depth" (Kroeber 1936b:114-15).

In the same paper Kroeber (1936b:115) suggested several reasons for the difficulty in discerning change from California's archaeological remains: "California prehistory has long been resistive to interpretation, and promises to remain so. Many factors contribute to this condition: absence of pottery and of permanent structures; a limited cultural inventory; quantitative meagerness of remains in most sites; paucity of ethnographic data where archaeological ones are most accessible, and vice versa; unusual sessility, from all indications, of population; and

conservative stability, in the large, of culture. The nut will be hard to crack; this must be frankly admitted in advance."

While primarily concerned with the history of classification of California's ethnographic cultures, Elsasser (1960b:5) echoed Kroeber to some extent when he pointed out that the absence of pottery in all but the upper levels in California sites and the lack of permanent dwellings or ceremonial structures contributed to the failure to distinguish pre-historic cultures; Elsasser also implicitly criticized the concept of large-scale stages as the only valid category of culture change by pointing out that there was an "inability to recognize distinctive assemblages of artifacts with similar association [which] inhibited precise interpretations of all the data which had been gathered."

In Central California recognition of the three-part cultural sequence of Early, Middle, and Late Horizons was achieved in January, 1938, when the then-named Transitional period (later to be designated the Middle Horizon) was named and described in field notes (Lillard, Heizer, and Fenenga 1939:77). Recognition and identification of this cultural sequence in the lower Sacramento Valley marked a new era in Central California archaeology in that change on less broad a scope as that from palaeolithic to neolithic was now recognized as legitimate for study. The differences which were perceived in the archaeological record, however, were arrived at through the inductive method with no explanatory theory for accompaniment.

Beardsley (1948, 1954), in the most detailed application of the Central California taxonomic system, identified variants of the Middle and Late Horizons in the San Francisco Bay region and along the Marin-Sonoma ocean frontage. Both Beardsley (1954) and Heizer (1949)

acknowledged that the then-new taxonomic scheme had been developed to accommodate expanding substantive knowledge and might well be superseded as even more information became available. In this regard Heizer (1949:2) commented: "We are now abandoning our earlier, oversimplified classification of cultures by expanding them into what appear to be related intracultural groups. When this classification no longer serves, we shall abandon it in favor of one that permits inclusion of new data."

The basic distinctive elements of the Central California classificatory system were the facies, province, and horizon. In practice the archaeological units were derived inductively through use of grave analysis. Heizer (1949:2, fn. 4) described the method, as follows: "We have proceeded from the first on the basis of assemblages of artifact types associated with burials, matching one group of contemporaneous burials (in a single-period cemetery) with another series of intra-contemporaneous burials from the same or a different site. On the basis of similarity of difference, aided by stratigraphy, we determine horizon, province, and facies." Parenthetically, it can be mentioned that a major difficulty with this method has been that burials in many Central California localities generally lack accompaniments, and those few which are found often appear nondistinctive.

The facies of Central California, identical with the focus of the Midwestern taxonomic system, designates "a group of settlements which may be distinguished from another group within a province...on the basis of recurrent trait assemblages. A series of closely related settlements becomes a facies; communities within a facies are generally assumed to be contemporaneous" (Heizer 1949:2). The term facies is thus synonymous with the concept of phase, explicated by Willey and Phillips

(1958:22ff.). In a subsequent portion of this essay it is suggested that the term phase be employed in Central California rather than facies.

Beardsley (1954:6-7) described province, as follows: "Several facies are grouped on the basis of cultural resemblance to form the next larger unit, the 'province.' Because each province occupies separate territory, the term is not divorced from its normal geographic meaning, but is given cultural significance as well. Each province is represented by a coherent complex of traits which is localized in time as well as in space." Heizer's (1949:2) comments on the concept clarify the meaning somewhat: "we feel that the regional differences are not based simply upon different environments (e.g., littoral as against interior) but are, rather, divergences which, evolving through spatial separation of groups, resulted in regional subtypes." Province is similar to the region of Willey and Phillips (1958:19), which is discussed further on in this paper.

In explicating the concept of the horizon, Beardsley (1954:7) pointed out that both the cultural and the temporal dimensions are included: "The time periods are called 'horizons,' because they are definable in terms of culture content, like the smaller units, and are cultural entities, not simply chronological or geographical divisions. Their sequential stratigraphic relationship to each other, independent of culture content, happens to give them a proven time value as well, which is recognized in the names applied to them: Early, Middle (in place of Transitional), and Late."

Beginning in the post-World War II era, as archaeological research gained momentum after the lull of the war years, there were increasing attempts by various workers in Central California to extend the three-

horizon sequence beyond the immediate geographic limits where it had already been identified. As more and more workers experienced difficulty in this effort, several inadequacies and misunderstandings in regard to the three-horizon system were revealed. Since horizons were defined inductively on the basis of artifact assemblages, the inherent question occurs as to the nature of the minimal number of features which should be considered diagnostic of a horizon. This question was never explicitly formulated to my knowledge, nor was it answered either explicitly or implicitly. As research was carried out in more remote localities, artifact assemblages tended to deviate more and more from the inclusive lists of horizon attributes offered by Beardsley (1954) and Heizer (1949). This problem was often compounded by sparse assemblages and burial customs which left few material goods to be found as grave furniture. Thus, in application, there was frequently no distinction made between culture traits which were diagnostic of the horizon as a cultural entity and those culture traits which were diagnostic of contemporaneity, rather than identity. For example, shell beads were often extremely important in assigning cultural components to particular horizons and such beads also were items which were traded beyond the spatial limits of cultures which could be considered a part of the horizon in question. The presence of California shell beads in the Great Basin (Bennyhoff and Heizer 1958) has never been taken to indicate cultural identity of Great Basin cultures with Central California cultures, but to indicate contemporaneity of the former cultures with the latter.

Rowe (1962b) has pointed out that failure to separate the cultural and the temporal dimensions in the definition of archaeological cultures

has a strong tendency to influence workers to treat a sequence based upon such definitions as a series of complex stages, complex stage being defined on the basis of several different features (rather than the single feature of a simple stage) which are supposed to occur together. Rowe (1962b:43) argued that use of complex stages to assist interpretation "lies in man's persistent hope of getting something for nothing... if we can assume that cultural change does in fact take place through a series of uniform stages over a large area, the establishment of a single local sequence provides us at once with the outline of the cultural development of the area as a whole. There is no need to seek other sequences except to fill in minor details, and a great deal of laborious research can be saved."

Rowe (1962b:42) suggested that the use of complex stages comes about as follows: "The reason why such a situation can arise is that archaeologists who adopt a system of complex stages as a framework for organizing their data usually do so at a very early stage in their research on the area involved. They have, perhaps, one good sequence, the units of which range from 300 to 500 years in length, and are wrestling with the problem of relating to it a number of isolated cultural units from other parts of the area. The units of the known sequence are too long to betray differences of a century or two in the appearance of new features, and the lack of other sequences for comparison eliminates the possibility of finding that the diagnostic features appear in a different order in different parts of the area. The inherent weaknesses of the method of using complex stages as a framework for interpretation appear only much later when the relative chronology can be made more precise and other local sequences are established. Unfortunately, by this time

everyone is accustomed to thinking in terms of the traditional stages, and it is very difficult to give them up and start afresh with a more productive system."

The failure in the Central California taxonomic system to distinguish adequately between cultural horizon markers as contrasted with temporal horizon markers was but one source of dissatisfaction with the system. The Central California three-part chronological sequence is in actuality not as inclusive in scope as its title implies. It has never been demonstrated to hold for Central California as a whole. The original formulation contained in Bulletin 2 of Sacramento Junior College was at most a regional sequence, specifically, for the region centered in the lower Sacramento Valley, filled in with supporting data from the Sacramento-San Joaquin delta (Lillard, Heizer, and Fenenga 1939:18-22).

Beardsley's 1954 analyses of materials from the San Francisco Bay region and the Marin-Sonoma Coast likewise provided regional sequences. There was simply not enough information available at the time for this to be otherwise. A comment by Willey and Phillips (1958:27) in regard to the development of regional sequences is appropriate here within the context of areal sequences: "In the normal extension of archaeological information, components, subphases, phases, and local sequences multiply, and questions of wider relationships come to the fore. Ideally, the archaeologists of a region come together in a harmonious session where a careful matching of local sequences produces a new sequence of larger scope. Actually this happy event occurs but rarely. What more often happens is that phases and local sequences gain in scope by a sort of osmosis. They flow outward, so to speak,

often propelled by their originators, uniting to themselves their weakened correlates over a widening circle. The process is necessarily accompanied by a progressive generalization of definition until much of their original usefulness to research is impaired."

A number of attempts to extend the three-horizon sequence beyond the immediate geographic regions where it had been defined created considerable controversy. In retrospect the controversy appears to have had as a basis the problem mentioned earlier as to the nature of the features taken as diagnostic of a particular horizon. For example, Heizer (1952:7) has identified the artifacts deriving from the Tranquillity site in Fresno County (Hewes 1943, 1946), from which bones of extinct Late Pleistocene mammals were recovered, as belonging to the Middle Horizon of the Central California cultural sequence. In this example, although Heizer suggested that more work should be done at the site, he stated that if he properly identified the artifacts as to cultural horizon, they are too late in time to be associated with Upper Pleistocene mammals. In a parenthetical aside, Heizer granted the possibility that his Central California sequence is in error. Angel (1966), in a recent study of human skeletal material from Tranquillity, evaluated the chemical evidence presented by Heizer and Cook (1952) as supporting the inference of contemporaneity between the extinct Late Pleistocene mammals and the human bone. The chemical evidence, which indicates a close similarity in content of fluorine, carbon, nitrogen, and water between Comelops, Equus, Bison, and human bone from the Tranquillity site, is part of the same evidence which Heizer utilized in the discussion cited above. Angel (1966:2) stated that he cannot follow Heizer's arguments in regard to Tranquillity artifact similarities with

Middle Horizon assemblages, since in his opinion the published descriptions suggest that the Tranquillity artifacts represent "a somewhat substandard version of those of the Early horizon and that the only major difference is in Tranquillity's semiflexed rather than extended and prone burial position."

Similarly, in terms of suggesting an extension of the Central California cultural sequence as an alternative to other interpretations for the Borax Lake site (Harrington 1948a), Meighan (1955:26-27), in his synthesis of North Coast Range archaeology, observed that artifacts recovered from the site, including the metate and concave-base obsidian projectile points, showed several specific resemblances to sites of the Middle Horizon in the Sacramento Valley. Nonetheless, he considered that the Borax Lake assemblage was sufficiently distinctive so that it could not be fitted into any specifically known Middle Horizon assemblage. Meighan concluded that the site represented the oldest culture so far discovered in the North Coast Ranges and that the site "probably dates somewhere in California's long and inadequately defined Middle Horizon."

Heizer (1950:6) at one time was critical of the method followed by Harrington in dating the site and in drawing cultural connections: "Not only have other students pointed out that the typological similarity of the fluted Borax Lake specimens and those of classic Folsom form is not at all close but in addition the Borax Lake site, in a large number of its traits, resembles closely that of the Middle Horizon culture of the Sacramento Valley which probably does not date farther back than 1000 B.C. When the archaeological complex of one site can

be reasonably assigned a position in a well established local sequence, the necessity for dating it with reference to a series of sites 500 to 1000 miles distant is not apparent." More recently Heizer (1964:129) acknowledged that Clovis type projectile points have been recovered from the site. While he made the qualification that its "proper position in time has never been satisfactorily agreed upon," by implication he now placed the site on an earlier time level than the Middle Horizon when he accepted this placement for Nap-131 while pointing out the similarity between the Nap-131 and Borax Lake assemblages. Most recently Meighan and Haynes (1970) have partially resolved the controversy through utilization of the obsidian hydration dating method to demonstrate a mixing of artifacts from three different cultural periods. The earliest period dates back approximately 12,000 years and is contemporaneous with and perhaps a variant of the Clovis tradition. The next period has an apparent age of 6000 to 8000 years and represents the major part of the occupation of the site. The latest period dates back about 3000 to 5000 years and "is related to the Middle Central California complex."

These two examples, Tranquillity and Borax Lake, are particularly interesting because of the controversy created by the alternate explanations, that is, Middle Horizon affiliation as contrasted with affiliation with a more ancient cultural stratum (not necessarily the Early Horizon). Other examples of attempts to extend the Central California cultural sequence beyond the limits of the San Joaquin-Sacramento delta region are not as dramatic, but the difficulties encountered by the various workers have encouraged: a) a strong tendency to drop the

term "horizon" for large-scale integration; b) the development of the archaeological complex as a basic regional unit; c) the use of the horizons of Central California in the same sense as the complexes of other regions, and d) an additional use of the horizons as chronological periods with emphasis upon specific time markers attributable to each horizon. Olsen and Riddell (1963:52-54), for example, in their discussion of the archaeology of the Oroville region, did not attempt to fit their local sequence into the large-scale use of horizon, but compared their complexes with the Central California horizons, using the horizon on the same level of integration as the complex, as in the following statement: "Present evidence suggests that relationships [of the Mesilla Complex] are with the Martis Complex to the east and with the Central Valley Middle Horizon to the west." Other workers have on occasion referred to the Central California Early Horizon as the "Windmill^r Complex."

Olsen and Riddell also used the horizon concept with emphasis upon time markers, as in the following statement: "The latest period (the Oroville Complex), represented by But-90A, is directly equatable with the Late Horizon Phase II occupation in the Sacramento Valley. Diagnostic trade items include clam shell disc beads and thick lipped Olivella shell beads (Type 3a1). The thin rectangular Olivella beads (Type 2a2) with terminal perforation may have been retained into Phase II times. The shell beads indicate trade relationships with the Central Valley during both late Phase I and Phase II times."

The addition of the concept of the archaeological complex and the changes in usage of the horizon concept in Central California cannot

be interpreted as new conceptual models in regard to archaeological synthesis in the area, but rather as indication of dissatisfaction with the concept of horizon as used in the area. The wide-spread usage of the complex has served as a stop-gap measure by relieving workers of the burden of forcing their material into what appears to them to be an inappropriately extended sequence. At the same time, the adoption of the complex has resulted in an extremely complicated multitude of local complex sequences with no conceptual or integrative model for relating one local sequence with another. Heizer's (1964) review article, cited earlier, is the best summary to date of the many sequences of complexes which have been defined in recent years in California. Many more such sequences have been proposed since Heizer's discussion; some have been published, some have been reported at scholarly meetings, and some remain in manuscript form.

The multiplicity of such sequences has prompted comments such as those of Greenwood (1969:338) who, in a review of a report on archaeological investigations in Madera County, stated that before the archaeology "of Buchanan Reservoir can be definitive, they [the authors] will have to confront the proliferating phases, complexes, traditions, horizons, facies, and other nomenclatures still being assigned to every microenvironment of Central California. One can hardly read even this paper without a concordance of cultural and chronological terminology, let alone another for the shell-bead typologies." While the critical connotation of Greenwood's words should not be ignored, it should be kept in mind that there is no reason to expect the archaeological record of Central California to be any less intricate

than the known ethnographic one. The recorded ethnographic diversity of language family, dialect group, tribelet, and interacting village-communities should have equally diverse and intricate archaeological correlates. Synthetic concepts are necessary which can elucidate general cultural organization, development, and mode of adaptation without unduly obscuring the variant particularism of local sequences. In later sections of this essay changes in the Central California taxonomic system instituted by Bennyhoff (1961) and Ragir (1968) and suggested by participants in a series of workshops held at the University of California, Davis (1967-1969), are discussed, as well as some suggestions by the author.

III

Stages in Central California Prehistory

The Archaic Stage in California

In the renewal and revitalization of concepts of historical-developmental culture stages recently manifested in American archaeology, specifically, in response to the formulations of Willey and Phillips (1958), there has been considerable discussion as to the relationship of California's prehistoric cultures to the Archaic stage. In regard to the Archaic as a mode of adaptation, Meighan (1959) has suggested that for at least 7000 years the archaeological cultures of California, including the Early, Middle, and Late Horizons of Central California, fell under the rubric of the Archaic. Willey (1966), in his recent continent-wide synthesis, drew heavily from Meighan in his portrayal of what he has called the "California Coast and Valley cultural tradition." Willey (1966:366) summarized Meighan's characterization of California's Archaic cultures: "Ground stone was employed in a diversity of forms which we can group here under two headings: grinding implements and ornamental devices. Grinding implements included the ubiquitous metates and manos or mortars and pestles, the ornamental devices, such items as charmstones or plummet-like pendants and pipes. The atlatl and dart (earlier periods) and the bow-and-arrow (later periods) were used, and among the chipped-stone projectile points were large bi-pointed, straight-based, and fish-tailed lanceolates and stemmed and notched forms, as well as smaller points for

arrow tips. Vessels were made of steatite and other stone in some regions and periods, but baskets were apparently the principal containers. Pottery-making was not practiced until very late, and then only in regions influenced by the neighboring Southwest area. Widely distributed bone objects included fish gorges, awls, whistles, fish-spears, and wedges. Marine shells, especially abalone (Haliotis), were usually made into ornaments. Meighan concludes his survey of California technology by observing that while few devices could be called complex, and most of them were tools or objects similar to those known in other areas of the world, the majority exhibited excellent workmanship and were efficient or aesthetically pleasing, or both. Furthermore, in his words: '...there is an increased elaboration of artifacts (through time), with more attention being paid to artistic embellishment and the production of ornaments and other non-functional objects.'

"From archaeological remains and from projecting ethnohistorical sources backward in time, Meighan has inferred that the largest political units were probably villages, usually numbering no more than a few hundred persons. Society was stratified, but according to a person's qualities rather than by class. Warfare was carried out on a small-scale raiding basis. Trade was often conducted over long distances, some by hand-to-hand passage of objects but often by trips undertaken by certain groups. Standardized mortuary practices give some indications of a cult of the dead. Burial offerings were sometimes elaborate. Archaeological charmstones and pipes or sucking tubes had ethnographic counterparts in types used by shamans in curing,

sorcery, and controlling nature."

Willey, following Meighan, thus characterized the California archaeological area for a proposed period of 7000 years. Given the viewpoint that the majority of California assemblages thus far described represent the Archaic stage of cultural development, it appears that we are left very close to the same point, though with more refinement, where we were in 1909 when Kroeber (1909:15) pointed out the basic uniformity of California's archaeological materials: "... there was some gradual elaboration and refinement of technical processes, but it was a change of degree only..."

Evidence for the presence in California of stages other than the Archaic is gradually accumulating. The evidence can be taken as indicating both pre-Archaic cultures and post-Archaic cultures. The cultures here considered to be post-Archaic are direct historical developments from the Archaic cultures and have been discussed several times in relationship to the Formative stage of Willey and Phillips (1958). Meighan (1959:305) discussed this question briefly as follows: "Whether one calls the California cultures Archaic or Formative depends on whether more emphasis is placed on social features, population density, and nonmaterial elaboration of the culture."

Meighan selected the technological stage upon which to place his emphasis, and thus classified California cultures Archaic. Heizer (1958b), on the other hand, placed his emphasis upon social features, population density, and nonmaterial cultural elaboration and classified as Formative certain California cultures, those located within the regions defined by Kroeber (1936a) as those of cultural climax. Baumhoff

(1963:229-30) added a historical-developmental criticism to the classification of California cultures as Formative:

"Now, it is quite true, as Heizer argued, that the abundant and assured food supply of the Central Californians (and of the Northwest Coast peoples as well) created a demographic and, therefore, a social situation that was in many ways comparable to that of the Puebloans, to take an example of a Formative culture. But one essential thing was lacking. The Puebloans, with agricultural economy, could, through technical innovations, increase their food production and in turn their population so that they could ultimately achieve a more developed cultural level, perhaps comparable to the Valley of Mexico. In other words, an agricultural economy is expandable--not, perhaps indefinitely, but certainly beyond what is now foreseeable. The Central Californians, on the other hand, had evidently reached about the limit of productivity, given a nonagricultural economy, and therefore could have progressed no further unless they abandoned their economy and started on a new track. It therefore seems to me to be a mistake to class the Californians with agriculturalists, especially under the term Formative, since their economy was blocked from 'forming' a subsequent stage."

It is obvious that Baumhoff's argument against the classification of California's climax cultures as Formative emphasized the priority of technological over social features. For analytical purposes in the study of cultural stages and culture change involved in the transition from one stage to another, the granting of a major role for technological systems is useful. However, the Willey and Phillips scheme itself is not logically consistent in this regard, as is apparent when one examines

the interaction between the technological and social systems at the more complex stages, for example, in the differences involved between the Classic and the Postclassic stages. In other words, there is no a priori reason to assume that social conditions might not be equally as important as technological conditions in the development of cultural complexity.

Although there is apparently no way to accurately predict what the careers of the climax cultures in California might have been if contact with Europeans had been delayed 500 to 1000 years, it is nonetheless interesting to speculate about them. For example, archaeological evidence supports the inference that trade networks were becoming more elaborate and more trade items were moving greater distances in the late prehistoric period in California. Differentiation in terms of cultural complexity is readily apparent in the archaeological record of climax regions (such as the delta of the San Joaquin-Sacramento Rivers, cf. Bennyhoff 1961) and marginal regions (such as the headwater region of the Sacramento River, cf. Treganza 1954). One can conjecture that marginal regions could experience social pressures generated by the desire to share some of the wealth of the climax regions. As Rowe (1962b:51) suggested while discussing the value of close control of relative dating: "Information on the nature of cultural influences and the direction in which they move in turn throws light on prestige relationships, since people tend to imitate those whom they respect." It can be conjectured that such social pressure might have had one or both of two outcomes, both dependent upon the conversion through exchange of resource wealth, in this case surplus food, into prestige

wealth (cf. Bohannan 1963:246ff.; Bean 1971). Various foodstuffs are known to have been the object of intergroup trade in California (cf. Davis 1961) so that no new economic pattern need be postulated in this regard. A possibility here is that, with existing nondomesticated food resources, the conversion could take on a nonsymmetrical character. That is, food could move from marginal localities to climax localities, while prestige items, such as shell beads, could move in the opposite direction (cf. Chagnon 1970). Davis (1961) provided ample documentation that groups which have been classified as marginal to the climax localities included food in their trade cycles. If such centralized movement of food did in time indeed develop, it would have furnished the prerequisite for growth of the climax cultures beyond that allowed by their own natural resources. The traded natural foods would become in effect the functional equivalents of agricultural resources in the sense discussed by Baumhoff.

A second possibility could be that of a marginal region such as the southern San Joaquin Valley developing social pressures, stimulated by prestige factors, sufficient to encourage the adoption of agricultural techniques in order to provide surplus foods for trading purposes. Heizer (1958b) has presented evidence that "the standard Indian crops, maize, squash, and beans, can grow in California" under prehistoric conditions, and has argued that it was not environmental factors, but some such cultural factor as the efficiency of the existing acorn economy that brought about the indifference toward the acceptance of agriculture. One can thus speculate again that the climax cultures could have developed further in their sociocultural integration by the

addition of imported foods to their subsistence base. It can also be suggested in the form of speculation that in a long term view, the marginal cultures might either form the basis of a peasant class dominated by the peoples of the climax regions or the marginal cultures themselves might become truly Formative in the sense argued by Baumhoff, following the process categorized by Service (1971:31ff.) as "the law of evolutionary potential," a process whereby less developed cultures are conceived to have greater potentiality for growth under changing circumstances due to less systemic entanglement with the institutions and technology of the status quo.

Such speculation aside, the discussions in regard to the classification of California's climax cultures (and, as Baumhoff suggested, the Northwest Coast peoples as well) indicate that such cultural development should be recognized in a historical-developmental framework. Even granting technological priority and allowing that California had reached the limit of food productivity under the existing conditions and the near-limit of their potential cultural complexity, the complexity which was achieved does allow them to be significantly differentiated from other cultures classified as Archaic. Since one of the arguments against the use of the term Formative as applied to non-agricultural societies is its predictive connotation, that is, as Baumhoff stated, the economy "forming" the basis for a subsequent stage, I suggest that the term Emergent be applied to nonagricultural societies which have reached levels of sociocultural complexity usually considered correlates of agricultural societies. The term Emergent avoids the predictive connotation and emphasizes the direction of

development from which the society derived, rather than the direction toward which it is going.

In California one of the important traits for the Emergent cultures was the secret society, which according to Bennyhoff (1961) dominated the late prehistoric period in Central California. Elements of social organization such as clans, moieties, "functional families," and occupational specialists are also indicative of the Emergent cultures (Goldschmidt 1948; Loeb 1926; McKern 1922). The stage classification of several ethnographic cultures of California in illustration of the above discussion are listed below.

<u>Archaic</u>	<u>Emergent</u>	<u>Formative</u>
Atsugewi	Chumash	Diegueno
Yana	Gabrielino	Mohave
Yuki	Plains Miwok	
	Pomo	

Prearchaic Stages in Central California

Mention must be made of the presence of cultures in California usually categorized as being at a different stage of cultural development and more ancient than the suggested 7000 years of the Archaic period. Warren (1967) has recently reviewed the terminology and characteristics of the San Dieguito complex, which he suggested dated earlier than 6000 years B.C. Warren hypothesized that the San Dieguito complex was distinct from the Desert culture (Jennings 1964) and that it represented a generalized hunting tradition which moved into the western Great Basin,

including Southern California, along a north-south belt. Warren emphasized that the hand stone and milling stone, the characteristic implements of the Desert Culture, were not present in the inventory of the San Dieguito complex. These implements, with the alternatives of the mortar and pestle, have already been noted here as characteristic of the Archaic stage of cultural development. Thus, the San Dieguito complex can be taken as a hypothesized premilling-stone horizon, that is, a pre-Archaic culture type in California.

None of the locations of the San Dieguito sites, as discussed by Warren, fall within the Central California subarea. A probable addition to the areal distribution given by Warren, which may place a site within the Central California subarea, is the deeply buried cultural stratum recently investigated on the shoreline of ancient Buena Vista Lake in the Southern San Joaquin Valley (Fredrickson 1964, 1965; Fredrickson and Grossman 1966; Grossman 1968). This deeply buried cultural layer is stratigraphically deeper and temporally older than the early culture from the same locality described by Wedel (1941), characterized by extended burials and hand stones. Although the artifactual inventory from the recent Buena Vista Lake investigations is small, hand stones are missing, while crescents and large bifacially flaked projectile points or knives, implements characteristic of the San Dieguito complex, do occur. Radiocarbon dating of these Buena Vista Lake finds (5650 ± 200 B.C., I-1928; 6250 ± 400 B.C., LJ-1356; 6250 ± 400 B.C., LJ-1357), obtained from Anodonta shell, places them temporally compatible with Warren's hypothesized San Dieguito complex. Warren (1967:179) provided three radiocarbon dates run from samples

of charcoal and carbonaceous earth obtained from the San Dieguito component of the C. W. Harris site. These dates (6540 \pm 400 B.C., A-724; 6540 \pm 400 B.C., A-725; 7080 \pm 350 B.C., A-722A) are of the same order of magnitude, though somewhat older, as the dates obtained from Buena Vista Lake. Fredrickson and Grossman (1966) have hypothesized that the deeply buried Buena Vista Lake assemblage represents a localized southern San Joaquin Valley lakeshore manifestation of the San Dieguito culture.

Ragir (1968:353ff.), in her recent doctoral review of Central California's Early Horizon, briefly mentioned Buena Vista Lake (misplacing it in Tulare County rather than Kern) as one of three sites which "require discussion with regard to a pre-Windmiller occupation in the Central Valley." The other two sites are Borax Lake and Tranquillity. Ragir, who rejected radiocarbon dates based upon shell (1968:365), based her comments about the Buena Vista Lake site upon incomplete information, and thus in an end-note (1968:413) stated: "The culture represented by only a few obsidian flakes within a shell midden could not be identified; therefore, the exact relevance and reliability of the dates is not known (Heizer, pers. comm.)." In my estimation, the artifact assemblage recovered from the deep Buena Vista cultural layer, the Anodonta-based C-14 dates, and the lakeshore context of the assemblage are all compatible with and support assignment of the complex to the San Dieguito culture.

It is of particular interest that Meighan in 1965 was in the position to state that there was virtually no dated evidence for human occupation in the time period 7500 to 9500 years ago from sites south

of Oregon. This lacuna has since been filled with the dates cited above from the Harris site (the San Dieguito type site) and the Buena Vista Lake site. With the exception of this latter site, no Central California site has been dated by the radiocarbon method as being more ancient than Archaic sites.

Warren (1967:182) gave as one alternate interpretation concerning the origin of the San Dieguito complex a theory that the tradition derived from the north and represents an old, "as yet undefined, cultural stratum that is present throughout a large part of western North America. If this cultural tradition was derived from the North, it was probably adapted to forest and grassland environments, but not to the desert conditions of the Great Basin today." The implication here, of course, is that sites representing this cultural stratum, and outgrowths similar to San Dieguito, will eventually be found in the Central California area. Such a site might be the Borax Lake site (Harrington 1948a), often cited as containing a "basement" assemblage for the North Coast Ranges of California (Meighan 1955). Recent dating of the Borax Lake site by the obsidian hydration method (Meighan and Haynes 1970), discussed earlier, lends some credence to this suggestion.

The San Dieguito complex is considered to be generally equivalent in time to the Palaeo-Indian cultures of other parts of the United States. In recent years, in addition to the San Dieguito data, new evidence and new interpretations of older data have given provocative support for occupation of Central California during Palaeo-Indian times. Clovis-type projectile points, for example, considered diagnostic of the Palaeo-Indian period, are now attributed to the Borax Lake site (Heizer

1964; Meighan and Hyanes 1970) and have been found in some number from a locality in the Tulare Lake Basin in the San Joaquin Valley (Riddell and Olsen 1969). The Tranquillity site, also located in the San Joaquin Valley, mentioned here in an earlier context, cannot as yet be fitted into the current understanding of Central California archaeology. As indicated earlier, the artifacts from Tranquillity are considered by Heizer to be comparable to those from the Middle Horizon of the lower Sacramento Valley, although there seems to be question in regard to whether or not the human bone with which the artifacts were associated was contemporaneous with the associated extinct mammals. Until fuller publication of the Tranquillity materials, however, further speculation would seem fruitless.

In regard to the possibility of the existence of a stage of cultural development in Central California comparable to the hypothetical "early lithic" of Willey and Phillips (1958) or the "pre-projectile point horizon" discussed in some detail by Krieger (1964), one candidate for such an assemblage is that from the Farmington locality in Stanislaus and Calaveras Counties in the northern San Joaquin Valley, adjoining the Sierra foothills (Treganza 1952; Treganza and Heizer 1953). The assemblage has been well-described and was characterized by Treganza (1952: 10) as "representative of a core and flake industry with percussion flaking as the predominant method of manufacture." Inconsistency in the dating is such to prevent assignment of the Farmington complex to any definite developmental stage; as Heizer (1964:130-31) remarked, "radio-carbon ages of 1660 and 1170 years old (UCLA-132, UCLA-133) from the gravels at Farmington seem effectively to dispose of this site as ancient.

The Farmington gravels have been judged to be much older than the radiocarbon dates secured, and further age determinations should be made before a final decision is reached on the antiquity of the implements that are incorporated in the lower gravels."

Another California locality which offers possibility for a representative of a pre-projectile point stage is Santa Rosa Island, off the Santa Barbara Coast, where it has been claimed (Orr 1968) that burned remains of extinct dwarf mammoths are the by-product of human activity. A number of radiocarbon dates ranging from about 11,300 years ago to more than 37,000 years ago have been obtained from features which Orr attributed to human behavior. Orr argued that since a natural origin could not be determined for burned and partially articulated mammoth bones, Haliotis shells recovered some distance from the shore line, and what he claimed were fire areas, these features must have a human origin. Reporting is incomplete and such that data are difficult to evaluate. Radiocarbon dates are scattered throughout the report, some dates are mentioned more than once (several times in slightly different form), and it is difficult to collate dates with the materials which are being dated. The only tool which seems to be reported in the context of these early dates is a "well-made hand axe," which was situated stratigraphically below "charcoal from a well-defined fire area." A radiocarbon date of $11,900 \pm 200$ years B.C. was obtained from this charcoal. Until the finds are reported in more satisfactory detail, the Santa Rosa Island finds remain provocative, but unsubstantiated. Krieger (1964) discussed other sites in Central California which, if future evidence warrants, might be placed within the pre-projectile point horizon.

In summary, the evidence for a pre-projectile point stage within the Central California subarea is no stronger than that for any other area of the continent. In my opinion the Farmington assemblage and the Santa Rosa Island "hearths" seem at present good candidates for representing such a stage, but dating of Farmington and the features at Santa Rosa Island are insufficiently understood to allow certain assignment. Evidence of the Palaeo-Indian stage is present in the three lacustrine localities of Borax Lake, Tulare Lake, and Buena Vista Lake. The Buena Vista Lake assemblage appears compatible with the San Dieguito variant of the Palaeo-Indian period, but the small artifact inventory from the site makes further investigation desirable. The Tulare Lake finds must remain simply provocative at the present time. Seriation of artifact forms by the obsidian hydration method at the Borax Lake site strongly supports assignment of the earliest interval of utilization of the site to the Palaeo-Indian period. Evidence for an Emergent stage, a nonagricultural equivalent of the Formative stage, also occurs in Central California, as a direct development out of the Archaic substratum. What remains is that the vast majority of archaeological complexes and cultures known from Central California conform to a basic Archaic pattern.

The prehistory of Central California now appears considerably more complex than Kroeber's 1909 evaluation had it. This is understandable, of course, since sixty years of field investigation should certainly extend the range of knowledge, both substantive and theoretical. The preceding discussion illustrates that Central California archaeological materials are compatible with existing classificatory systems based upon developmental stages. The most significant drawbacks of such classifica-

tion are that the very long time ranges involved for each of the stages obscures internal developments which occur during each stage and, in addition, the very broadness of the concepts, such as Archaic, which enhances their usefulness for broad-scale integration, also tends to negate significant differences between regional variants. A classificatory system is needed for California which reflects these regional and temporal differences and developments.

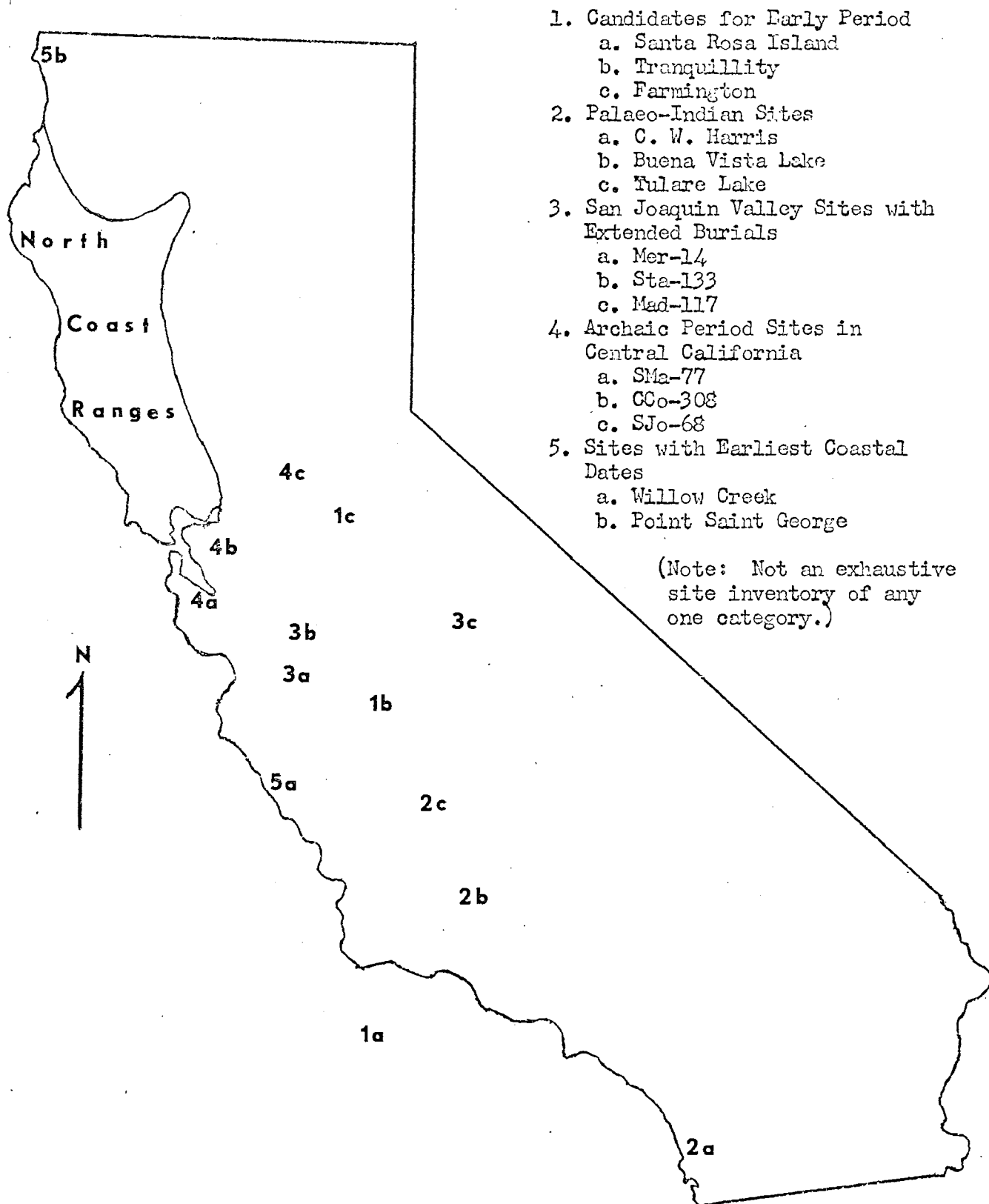


Figure 1. The North Coast Ranges of California in Relationship to Some Archaeological Sites in Other Regions (Citations provided in the text, passim).

IV

Prehistory without Archaeology

Ethnographic Reconstructions

In an acknowledged exercise of imagination, utilizing the age-area principle, Kroeber (1923) abandoned "indubitable record for speculative interpretation" and presented a reconstruction of the development of culture in prehistoric California. Kroeber's (1923:129) diagrammatic presentation of the sequence of occurrence of traits is presented here as Figure 2, slightly modified and with additions from Kroeber's text. Kroeber was quite aware of the short-comings of the age-area method, and added prefatory comments in this regard: "The genetic assumption which underlies the arrangement of elements in the diagram is that, other things equal, widely distributed traits are likely to be ancient; locally limited ones, of more recent origin. Obviously, this assumption may not be adhered to too rigidly: other things never are equal, or we often cannot be sure that they are.

"For instance, had the ghost dance of fifty years ago been included in the tabulation, its place therein, on the basis of its fairly wide occurrence, would have been below the two peaks representing the culminations of the north-western and central cultures; but on the basis of its known recency, overlying them. It is conceivable that a similar influence, institutional, mechanical, or religious, might have been only

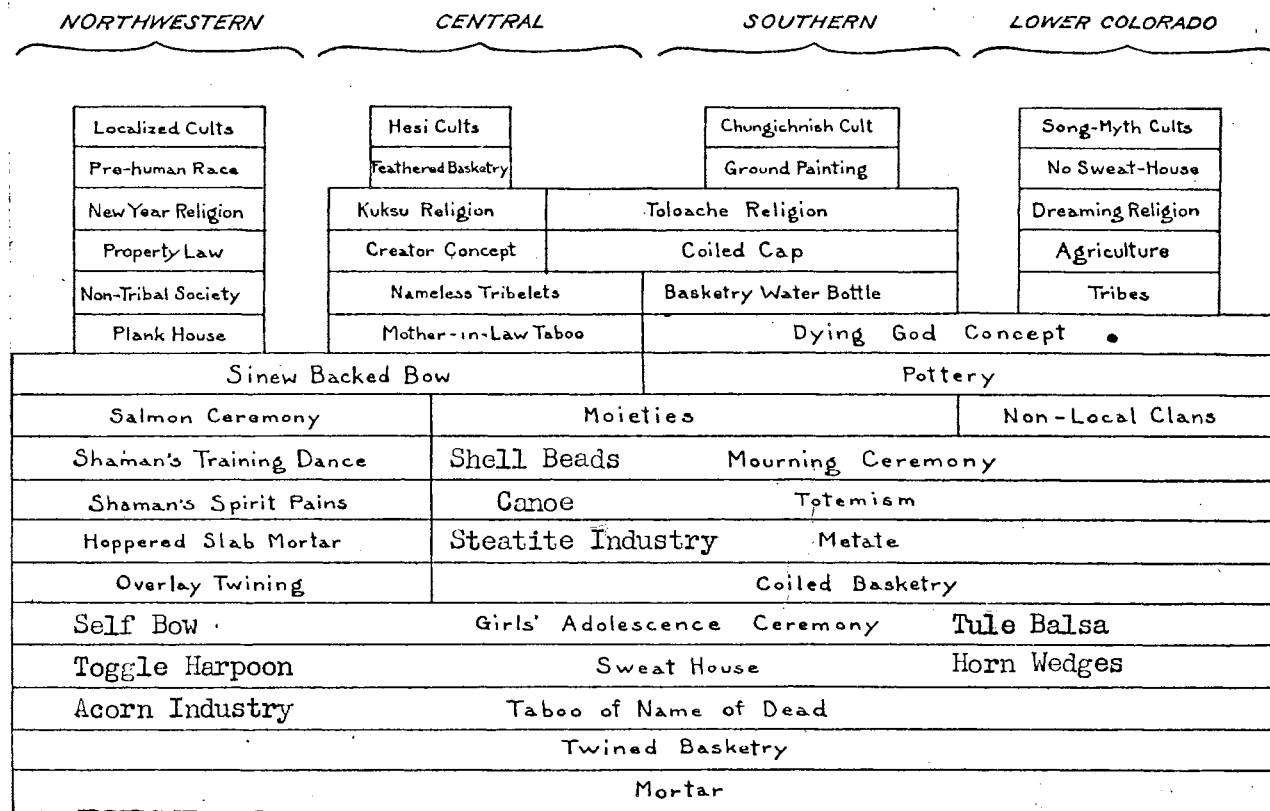


Figure 2. History of Native Culture in California (after Kroeber 1923).

a very few centuries older than the ghost dance, just far enough in the past to be undocumented by history, and have left permanent residua in the culture of the same two provinces. In that event, it might have entered, according to the plan followed, in a fairly low portion of the table, at a point representing an antiquity of perhaps several thousand instead of only a few hundred years."

On the basis of spatial distribution of culture elements, Kroeber hypothesized four periods in California prehistory and suggested language group correlates for each period. Kroeber also provided estimates as to the dating of the four periods, obtained on the basis of Nelson's (1910) calculations of 3500 or more years for the age of San Francisco Bay shellmounds, and further influenced by the assumption, in accord with precedent elsewhere, that California culture tended to develop somewhat faster as it grew more advanced. Kroeber (1923:142) emphasized that his earliest period may not be, in fact, the earliest which might ultimately be found: "This does not of course place the beginning of all culture in the area as late as 4000 years ago. The first occupation by man may well have occurred more than twice as long ago. In other words, our 'first' period is almost certainly not the original one. It is the first that is fairly recognizable in the present state of knowledge."

The first period people, whose culture was characterized as relatively simple and uniform, "almost certainly comprised the ancestors of the modern Hokans, perhaps of the Penutians. Algonkins and Athabascans are more doubtful; Shoshoneans had not yet entered." Kroeber estimated this period to have ranged in time between 2000-1500 B.C. and 500 B.C.

The second period, according to Kroeber's reconstruction, was characterized by the addition of elements which derived from both the north and the south, with the northern influences having been "earlier and more effective, so far as they reached," which was not more than the northern third of what is today the state of California. During this period the Athabascans and the Algonkins may have entered northern California and Penutians may have been expanding along the Sacramento drainage. Hokan groups began to shift due to these movements, bringing about the separation of the northern and central Hokan groups. In the southern two-thirds of the state Shoshoneans appear to have been moving in from the Great Basin toward the Pacific, separating the central from the southern Hokans. This second period was dated as continuing from about 500 B.C. to 500 A.D.

The third period of prehistoric culture was characterized by differentiation of localized cultures. Large-scale movements probably did not take place, although cultural influences from the North Pacific Coast and the Southwest continued. In northwestern California local differentiation appears to have taken place more rapidly than further south and Kroeber stated that consequently "it is difficult to distinguish this period and the next" in this region. The emergence of Central California as a separate cultural province appears to begin during this third period, while in southern California agriculture was introduced into the region of the lower Colorado, most probably coming by way of Sonora. The third prehistoric period was estimated to fall between 500 A.D. and 1200 A.D.

The fourth and final period in prehistoric California was characterized by "the growth of its specializations," that is, by a continuing differentiation of the major culture types into their distinctive ethnographic forms. This period was perhaps 600 to 800 years in duration and its cultures conformed in general outline to the descriptions provided by the 16th century European sea-faring explorers.

In 1935 Klimek published another reconstruction of the development of California's prehistoric cultures, again based upon ethnographic data, but employing "all elements of the economic, social, and spiritual culture of California Indians" subjected to extensive statistical analysis rather than a much smaller body exposed to admittedly intuitive mulling. Klimek identified 14 "strata," i.e., groupings of cultural elements, in more than sixty ethnographic cultures of California. Utilizing Karl Pearson's coefficient of similarity, Q_6 , Klimek established "groups of tribes which have similar inventories and groups of elements which have a similar distribution. The groups of tribes correspond to cultural provinces in California. The groups of elements represent cultural strata."

While Kroeber discerned four culture provinces in ethnographic California (Northwestern, Central, Southern, and Lower Colorado), Klimek's method distinguished seven such provinces. Klimek's approach divided Kroeber's Northwestern Province into a Northwest Coast and a Northwestern Province, with the latter province extending its influence considerably inland. Klimek added a Northeastern Province, while Kroeber's Central Province is split into a North Central (or simply Central) and a San Joaquin Province. The Southern and Lower Colorado Provinces were maintained and redefined. Klimek's method also showed

regions of overlapping influences, thus the state could be subdivided into an even larger number of provinces on the basis of cultural similarities.

Klimek suggested that the strata, presented partially here in Figure 3, represent historical occurrences, and, on the basis of his analysis, arrived at six major periods in California prehistory, suggesting, as Kroeber did earlier, linguistic correlates for each of his periods. Figure 4 is adapted from Klimek's (1935:64) table of historic sequences. Klimek's reconstruction is remarkably congruent with Kroeber's in regard to the general outline of suggested cultural development, though there are many differences when it comes to the historical sequence of specific traits. Both reconstructions suggest that the earliest inhabitants of prehistoric California were ancestral to the ethnographic Hokan, followed in time by entry and expansion of ancestral Penutians. Kroeber next has the Shoshoneans moving into the southern portion of the state as the Algonkins and Athabascans moved into the north, while Klimek separates the movements in time with the southern occupation preceding the northern one. Both have a period of cultural differentiation within which the ethnographic cultures gained much of their individual character.

The major drawback of Klimek's treatment is that unlike Kroeber, he did not qualify his application of the age-area principle and thus cultural elements were treated mechanically. For instance Klimek did not consider the late and rapid spread of culture traits accompanied by their universal or near-universal acceptance, thus postulating clam shell disk beads and magnesite cylinders as ancient elements when

FIGURE 3. Cultural Strata in Prehistoric California
(selected traits, primarily material; from text of Klinek 1935)

-
- K beard cradle; coarse tule sack; porcupine tail hair brush; L-shaped stone pipe bowl; wooden pipe stem; beaver-teeth dice; loophandled muller; two-horned muller; circular metate; small, mat-covered sweat house
-
- M shallow sitting cradle; mourning necklace of pitch lumps; squared house of bark slabs; trapezoidal house plan
-
- I overlay twining; sea lion tooth head band; Haliotis inlay in pipe; mussel disk dice; salmon vertebrae ring-and-pin; dentalium money; short, thin, broad bow; long elkhorn wedge; pear-shaped maul; 'slave-killer' club; redwood dugout canoe; plank house
-
- L blanket with warp of birdskin twisted with cord; woodpecker scalp visor; Hesi cult
-
- D flat-bottomed, asphalted water basket; small-mouth steatite bowl; wooden bowls with Haliotis ornaments; pipe with mouthpiece of bone; carved steatite in spike, scoop, and hook form; circular Haliotis fishhook; plank boat
-
- G coiling; more than 50 stitches per inch; lattice twining; bead work on baskets; long basketry quail trap; acorn bread made with red earth; bulb end on pestle; fetish bag for shaman; grizzly bear shaman wears bearskin
-
- F triangular winnowing tray; flat basketry cradle with vertical warps; exogamic patrilineal totemic moieties without subdivisions
-
- E nonpaddle pottery making; Y-frame cradle; bottleneck basket with sharp shoulder; looped-stick food stirrer; split acorn dice; shallow wooden mortar; tobacco eaten with lime; toloache taken in groups without achieving status; ong, gabled communal house
-
- B paddle-made pottery; pottery spoon; large bowl for ferrying; stick-and-cord carrying frame; painted tablet dice; flood agriculture; gourds; maize; beans; pumpkins; squared muller; squared metate; deep wooden mortar; long wooden pestle
-
- C₁ coiled mortar hopper; unroofed granary; fiber sandal; clay pipe; long self bow; cone frustum war club; curved rabbit club; gourd rattle; grave trench; sand painting; toloache initiation into a status
-
- C₂ pointed-bottom pitched water bottle; granary on posts; rabbit net; cane pipe; clam disk money measured on hand; shell-cylinder wealth; slab metate; bedrock mortar; grizzly bear shaman transformed into bear
-
- Z coiling; feather rope; magnesite cylinders as treasure; split-stick dice; split-stick rattle; cocoon rattle; bullroarer; footdrum; Kukusu big-head impersonation; Kukusu grizzly bear impersonation; earth-covered ceremonial house
-
- Y diagonal twining; basketry seed-beater; stone boiling in basket; pounding slab with loose twined basketry hopper; deer-mask decoy; sinew-backed bow; shaman sucks out disease object
-
- X hoop-and-pole game; cremation of dead; earth-covered house with one to four center posts
-

Strata		Periods
K	Plains influences in California. Development of the Modoc culture.	VI
M	Inland tribes of N. California influenced by the N. W. culture.	VI
I	N. California influenced by the N. W. culture. Athabascan and Algonkin migration	V
L	Development of Sacramento valley culture. Hesi cult.	IVc
D	Development of Chumash-Gabrielino culture. Oceanian influence (?).	IVc
G	Final formation of Pomo culture.	IVb
F	Development of Miwok culture.	IVb
E	Development of San Joaquin province.	IVb
B	Development of Colorado r. province.	IVa
C ₁	Development and spread of S. Californian culture.	IVa
C ₂	Southern California occupied by Shoshoneans. Spread of southwestern and Mexican influences over S. E. California.	III
Z	Penutian expansion and spread of their culture. Territorial disintegration of Hokan groups.	II
X+Y	The coexistence of Hokan and Yuki. The territorial continuity of Hokan groups in California and their cultural community. Yuki assimilated culturally by Hokan.	I

Figure 4. Historical Sequence of California Indians (after Klimek 1935).

archaeological investigation shows them to be extremely late in time, in fact, diagnostic of the protohistoric period in Central California (Beardsley 1954). Klimek also failed explicitly to allow for the complete loss of cultural elements, such as chipped stone crescents and atlatl engaging spurs, both of which occur early in the archaeological record only to disappear well before the ethnographic period (Tadlock 1966; Riddell and McGeein 1969). Neither Kroeber nor Klimek allowed for the possibility that trait complexes may not spread to all groups that have access to them, or that their initial appearance and subsequent spread may be intermittent or irregular due to social factors such as those involved in differential social ranking (cf. King 1970).

Although the work of what sometimes has been called the California historical school has often been seen as leading to a dead end (cf. Harris 1968:376ff.) and the methods ultimately abandoned to a large extent because of difficulties in defining basic cultural elements, the reconstructions of Klimek and Kroeber do seem to have a general value for the historical dimension of archaeology. The reconstructions provide models of California's prehistory from which specific hypotheses can be deduced for archaeological and linguistic testing. Although not explicitly formulated in these terms, the work of Taylor (1961) in his reconstruction of an early Hokaltecan substratum in western North America and that of Baumhoff (1957) and Baumhoff and Olmsted (1963, 1964) in their reconstructions of early Yana and Palaihnihan prehistory belong in this context.

Language and Culture History

It has repeatedly been noted with respect to the archaeology of the

Great Basin that there exists a considerable resemblance between the Desert cultures of 8000 B.C. and those of the ethnographic period (Jennings and Norbeck 1955; Jennings 1957), and yet the linguistic evidence suggests that the historic population entered the area as recently as 1000 years ago (Hale 1958, 1959, 1964; Hopkins 1965). Because of the intimate connection long recognized between California and Great Basin cultures, it is relevant here to discuss recent reconstructions of Great Basin prehistory, especially those drawing heavily upon linguistic data. One such effort was that of Taylor (1961), who, in an attempt to reconcile the archaeological and linguistic evidence from the Great Basin, proposed a series of population distributions and movements associated with specific linguistic stocks, and mustered data from linguistics, archaeology, physical anthropology, and ethnography to support his hypothesis. At his earliest level, Taylor (1961:71) proposed that there was a "continuous band of Hokaltecan [Hokan plus Coahuiltecan] people practicing Desert culture from the great Basin to the Texas and Tamaulipecan coasts."

Taylor (1961:78) cited parallels between Klimek's (1935) ethnographic reconstructions and archaeological work by Schroeder (1960), who, according to Taylor, offered the hypothesis "that the earliest known dwellers along the lower Colorado and Gila rivers, the people we have been identifying as belonging to the Pioneer Period of the Hohokam sequence, were similar enough to later Yuman groups as to be in all probability their cultural and linguistic ancestors." Taylor pointed out that a number of "specific traits link the ancient Hokan culture-stratum of California with both Schroeder's Lower Colorado River Pattern

and with the Desert culture(s): earth lodge with four posts, cremation, diagonal twining, one-piece mocassin, conical burden basket, basketry seed beater, stone boiling in basket, hoop and pole or dart (game?), tattooing, and possibly the deer-mask decoy, pounding slab with loose hopper (twined), quiver of animal hide, triple arrow feathering (radial?). This list includes all but one of the archaeological discernible Hokan-Yuki traits listed by Klimek (1935:40)." Although it is not clear here what Taylor meant by "archaeologically discernible" traits, since Klimek compiled his list on the basis of statistical analysis of ethnographic information, not archaeological, the agreement suggested by Taylor would seem to support Klimek's method, despite the obvious methodological problems discussed earlier.

In further support of his proposal, Taylor (1961) linked the Borax Lake finds, "the fluted points aside," and the early milling stone cultures of southern California with the Desert culture, and further linked them in his hypothesis with Hokan-speakers: "At some time... [after 10,000 years ago and] before 5000 years ago, certain Hokan groups began to move westward out of the Great Basin and into California over the northern passes. These were the people who brought the Basin-like Hokan culture-stratum, the earliest in California. They spread southward, occupying California at least as far south as the historic Chumash and probably into Baja California as well."

Taylor (1961:75) proposed that, following the Hokan settlement of California, Penutian-speakers entered the area, probably from what is now Oregon, as part of more wide-spread population movements; "Since the divergence between Yokuts and Chinook is said to be about 55 centuries

and the separation of Washo and Yana 50 minimum centuries (Kroeber 1955:95-6), the entrance of Penutians into California and the consequent breaking of the Basin-California Hokan-speaking continuity may have been at this time. That 'explosive disruption' which Kroeber (1955:102) noted among the California Hokan speakers between 35 and 40 centuries ago could have been one of the later effects of this incursion which involved the usurpation of the Central Valley by the Penutians, the relegation of the Hokans to the peripheries, and the beginnings of the latter's migration(s) southward." Taylor (1961:77) accounted for the Hokan entry into California as a result of Utaztecan movements, apparently assuming that California was not populated prior to this time: "sometime before 5000 years ago people speaking Utaztecan began to move southwestward across the Great Basin from locations along the western flanks of the northern Rockies. This incursion may have been responsible for starting the Hokaltecan on their way to California."

Hopkins (1965), making use of additional data not available to Taylor, also attempted to reconcile the long span of Desert culture continuity shown by archaeology with the apparent short span of occupation by the historic inhabitants shown by linguistics. Hopkins accepted Taylor's views on Hokaltecan, suggesting that: "The dispersion of Hokan-Siouan took place at an unspecified date probably well before 10,000 years ago, perhaps reflecting the differences between big-game hunting east of the Rockies and hunting-gathering to the west. Hokaltecan settled a large band of territory from California to the Gulf of Mexico in environments where the generalized Desert culture was a successful adaptation."

In regard to the Penutians, however, Hopkins (1965:56) proposed a

significantly different temporal relation: "Moving in from the north, and also having Desert culture, Macro-Penutians occupied most of the Great Basin. (That all Hokaltecs were Desert culture does not, of course, imply that all Desert cultures were Hokaltecan.) Linguistic subdivisions of the Macro-Penutian phylum had probably already formed; Swadesh (1959: 10) calculates the internal divergence of Penutian as 10,000 years, indicating that Penutian groups were no longer homogeneous in speech by 10,000 years ago. This diversification may have taken place as Penutian groups began to move into California."

Hopkins envisaged the next major change to have taken place as a result of the Altithermal, when "conditions in the Great Basin became hotter and generally drier." He suggested that while some groups may have continued to occupy some more favored regions of the Basin, much of its population "may have withdrawn in favor of more productive areas," with Uto-Aztecan's moving southward along the eastern and western margins of the Great Basin and ultimately into Southern California, but "maintaining contact through a sparse population in the central Great Basin, with contact being broken only as the southern Great Basin was reached." In Central California at this time the Penutians were expanding to occupy essentially all of their ethnographic territory, isolating the Hokan-speakers in a dispersed marginal pattern. During the Medithermal, no changes in Central California were proposed, but improving climatic conditions in the Great Basin were "apparently bringing about the beginnings of the northeastern expansion of Numic speakers."

Wick Miller (1966:85ff.) agreed with a limited portion of the Taylor

hypothesis, namely, that the broken and peripheral distribution of Hokaltecan languages relative to California Penutian and Utaztecan languages is indicative of greater age for Hokaltecan in the area than for the other two language groups. Miller was more skeptical of other parts of the Taylor reconstruction, cautioning that "uniformity of culture does not necessitate uniformity of language." Further, Miller disagreed with Taylor's postulated northern homeland for Macro-Penutian, pointing out that this "is only one of several possible alternatives." Miller (1966:88) stated categorically that a northern homeland for Utaztecan is extremely unlikely since the distribution of diversity in Utaztecan favored a more southern origin.

A number of researchers have focused their attention within California, attempting to collate information on California's archaeological cultures with that on the ethnographic linguistic groups. Of particular importance for Central California has been the work of Baumhoff (1957) and Baumhoff and Olmsted (1963, 1964) in regard to the prehistory of Hokan-speaking peoples. Their work yielded results compatible with that of Taylor and Hopkins. Also important has been the work of Bennyhoff (1960) with respect to the prehistory of Penutian-speakers.

Hokan-speakers in California were geographically, linguistically, and culturally the most diversified of the several linguistic stocks represented in the state. Hokan representatives were located from the Oregon border to the Mexican border and from the Pacific Coast to the Nevada border, with at least ten distinct languages spoken and with every major culture type within the state represented. As indicated in preceding paragraphs, it has long been recognized that Hokan-speakers may well have

been residents of the state for a longer time span than speakers of the other major linguistic groups. Recent time-depth determinations employing glottochronology, the method whereby estimates can be calculated as to the length of time elapsed since related languages diverged, substantiate the conclusion that the divergencies of the Hokan language stock began a considerable number of centuries ago, as illustrated below (Baumhoff 1957:4; Baumhoff and Olmsted 1963:279; Kroeber 1955; Swadesh 1954:362).

Hokan Differentiation

<u>groups</u>	<u>centuries separated</u>
Washo-Comecrudo	55
Washo-Jicaque	45
Yana-Chimariko	38
° Yana-Yuma	37
Chontal-Comecrudo	35
Chontal-Yuma	35
Chontal-Jicaque	34
Achumawi-Atsugewi	31-35

Baumhoff (1957:4-5), anticipating the hypothesis presented by Taylor (1961), proposed California as the locale for the "explosion" postulated by Kroeber (1955) on the basis of the linguistic evidence, which resulted in the Hokan language breaking up "into ten or a dozen languages."

Baumhoff stated that the "time depth given by glottochronology suggests that the Pacific Hokan languages broke up about 3500 to 4000 years ago, perhaps at the time of the hypothetical Penutian immigration. If this is

correct, it might tie in with the end of the Early Horizon in Central California. One of the most recent sites of the Early Horizon has been dated by the radiocarbon method as 4052 ± 160 years ago (Heizer, 1951, p. 25) and would thus support the hypothesis nicely." Baumhoff went on to associate the difficulty in obtaining a chronological sequence in Yana territory with cultural continuity based upon Yana entrance into the region about 3000 to 4000 years ago.

A similar situation has strong support in Palaihnihan territory (Baumhoff and Olmsted 1963, 1964) where an archaeological site which showed little cultural differentiation from bottom to top yielded three radiocarbon dates, as shown below. Baumhoff and Olmsted stated "there being no evidence for any population change, the data seem to us to suggest that the ancestors of the Achumawi and Atsugewi were responsible for the original settlement of the site and stayed there almost until the historic period."

<u>excavation unit</u>	<u>depth</u>	<u>date</u>
M-11	18"	510 ± 70 B.P. (A.D. 1452 ± 70)
M-11	48"	1470 ± 80 B.P. (A.D. 480 ± 80)
M-11	68"-72"	3310 ± 90 B.P. (1360 ± 90 B.C.)

Another archaeological correlation with Hokan glottochronological results is found with the Washo. Kroeber (1955) suggested that the presence of the Washo in their historic location was a "secondary and recent affair" and that they had been separated from other California Hokan-speakers not only for a long period of time but also "by a considerable geographical interval much of that time." Baumhoff (1957:4-5) cited supporting

evidence as follows: "Heizer and Elsasser (1953) found two distinct culture complexes in Washo territory. One of these, the Kings Beach complex, they identify with the historic Washo. The other, the Martis complex, is quite distinct and it is therefore reasonable to assume that it was displaced by an actual migration rather than stylistic fluctuation."

Baumhoff and Olmsted (1963:280) suggested that the bottom layers of their Palaihnihan site "are to be included in a larger culture complex of which Central California Early Horizon is but one manifestation. It is also suggested that they both fall into what Wallace (1954:122) has termed the Early Milling Stone culture, which is widespread in Southern California." Baumhoff and Olmsted went further than Wallace, who suggested that the Early Horizon settlements "may represent carryovers from such an ancient substratum," and suggested that the Central California Early Horizon "is simply a highly evolved and specialized version of the same culture."

On the basis of the correlations of the archaeological data and the glottochronological data, Baumhoff and Olmsted (1963:282) made a further suggestion which has important consequences in terms of field investigations: "What we are suggesting is that the Early Horizon peoples were Hokan speakers and that the intrusion of the Penutians, which resulted in the relegation of the Hokans to marginal or peripheral areas, is displayed archaeologically in the beginnings of the Central California Middle Horizon. We do not believe the Palaihnihan precursors were specifically Early Horizon but rather some regional variant, probably farther north in the Central Valley. The logical corollary of this position is that Wallace's Early Milling Stone culture of California (as distinct from

Cochise and other such manifestations to the east) was also borne by Hokan speakers. This may prove to have been the case, but as yet the evidence is too scant for such an assertion. Such a hypothesis can be tested by precise chronologies through the state to determine whether variants of the culture tend to persist later in areas occupied historically by Hokan speakers than they do in areas of other linguistic affiliation."

Gerow (1968) does not agree with this hypothesis and has argued that the Central California Early Horizon people may have represented an early intrusion of Penutian-speakers into California and that their culture was distinct from that of the coterminous Early San Francisco Bay people, who Gerow suggested may have been Hokan-speakers. After about 1000 B.C. the cultures of both regions gradually converged to become Central California's Middle Horizon culture. Gerow saw no fundamental difference between the Early Bay culture and later complexes on the Bay which have been identified as Middle Horizon. Thus, Early San Francisco Bay culture can be viewed as a direct antecedent of the later Bay Middle Horizon culture.

Without supporting either of the alternate linguistic hypotheses of Baumhoff and Gerow, independent evidence is available to support Gerow's implication of contemporaneity of the life styles characterized as Middle Horizon and Early Horizon. The controversial Tranquillity site, discussed earlier, with flexed burials and artifacts identified by Heizer as Middle Horizon, may well be contemporaneous with the Early Horizon components situated further north. Artifactual similarities with Early Horizon materials may well be due to trade influence. As was noted earlier, full publication of the Tranquillity materials is necessary before the temporal and cultural position of this important site can be understood.

Additional evidence supportive of the hypothesis of contemporaneity of Middle Horizon and Early Horizon components comes from the Stone Valley site in interior Contra Costa County (Fredrickson 1966) where the deepest component yielded flexed burials, boulder mortars, and other artifacts compatible with Middle Horizon identification, along with a radiocarbon age determination of 2500 ± 400 B.C. (UCLA-259). This date, of course, is earlier than the date of 2102 ± 160 B.C. (Heizer 1951:25) reported from an Early Horizon component believed to be relatively late.

When it is recalled that the Central California chronological sequence is actually a regional sequence at most, and that its area-wide application has never been documented, it can be allowed that the evidence cited above is not incompatible with the accepted sequence. The evidence, and the hypothesis in support of which it is presented, also highlight one of the problems inherent in naming archaeological cultures by explicitly sequential terms, such as Early, Middle, and Late. Additional information might well show that a different sequence for the same cultural units might exist in the same geographic area.

Bennyhoff, in his unpublished doctoral dissertation (1961), has distinguished between several Penutian-speaking groups of the Delta region and believes that continuity of essentially the same area for each group, and temporal continuity of cultural identity of each group, is demonstrated for at least 2000 years, all during what is known as the late Horizon in Central California. It is relevant here to quote extensively from an unpublished paper by Bennyhoff and Fredrickson (1969) on substantive and theoretical problems involved in Bennyhoff's dissertation findings:

"The original topic for Bennyhoff's doctoral dissertation was to be

an analysis of the Late Horizon in Central California. In order to understand this cultural unit, he also re-evaluated the Early and Middle as well as the Historic Horizons. Unfortunately, only one chapter, the ethnogeography, was completed (Bennyhoff 1961).

"In the early phases of his analysis Bennyhoff attempted to fit his data into the Beardsley framework, dealing with all the excavated Delta sites as a single ecological unit. Anyone who has seen the Hotchkiss (CCo-138, near Antioch) and Hollister (Sac-21, on the Cosumnes River) collections cannot fail but be impressed by the cultural similarity. However, when trait lists were prepared for the refined 'facies' which were evident, the differences were as striking as the similarities. Although CCo-138 is ecologically in the Delta, it is culturally aligned with the Coast Ranges and Bay, as evidenced by the absence of baked clay objects, emphasis upon show mortars and carved pestles (in contrast to the wood mortars and chisel pointed pestles of the northern Delta), and emphasis on piled charmstones (in contrast to their near absence in the northern Delta). A host of other differences left no doubt but that different groups had occupied CCo-138 and Sac-21.

"Even more startling was the emergence of still another configuration around Stockton. Although situated in the heart of the Delta, with a baked clay industry barely distinguishable from that of the Cosumnes, the former occupants preferred to import stone mortars and pestles (different from CCo-138 types) rather than use the 'ecologically determined' wood mortar. Harpoons, shell ornaments, incised bone, and many other traits were consistently distinguishable from those in the northern Delta or at CCo-138.

"When plotted by site, three discrete and consistent geographic units emerged which at that time Bennyhoff termed the Diablo, Cosumnes, and Stockton localities (now termed districts). It was considerably later, after having resolved the linguistic boundary problem, that he noted that the available archaeological data had linguistic correlations -- that the Cosumnes locality fell within the distribution of the Plains Miwok tribelets, that the Stockton locality coincided with the known Northern Yokuts tribelets, and that the Diablo locality could be assigned to the newly discovered Bay Miwok tribelets. Comparative study of the available, though deficient in sample-size, collections allowed less definite correlations of archaeological locality and linguistic group in the regions to the west and north.

"In short, Bennyhoff submits that our cultural units should ultimately be defined inductively by cultural content, not deductively imposed by ecological determinants. Secondly, when adequate collections are available, typological or stylistic minutiae will be significant guides in the identification of the specific cultural groups which, unfortunately, the ethnographers have named in terms of the language spoken. By means of the direct historical approach, these linguistic/cultural groups can be projected backwards in time, and, with proper analysis of adequate data, the history of specific groups may hopefully be revealed."

Historical Reconstructions and Central California Archaeology

A number of methods in addition to direct archaeological investigations have been employed by researchers which enable us to gain understanding of the prehistory of California. The most important of the methods discussed

here have been the formulation of historical reconstructions based upon detailed statistical analysis of ethnographic elements, coupled with the age-area principle; the reconstruction of distributions and movements of language groups through linguistic analysis, including the statistical method of glottochronology; and the extension of territorial boundaries and linguistic identity back into the past utilizing the direct historical approach of archaeology.

All the methods employed strongly support Hokan temporal priority in prehistoric California, although Kroeber allowed the possibility of Penutian contemporaneity and Hopkins pointed out that Penutian distributions and time depth were such to allow the hypothesis that the northernmost portion of the state was occupied by Penutians at an early period equivalent to that of Hokan occupancy. Similarity of Klimek's ethnographic reconstruction with Great Basin cultures and linkage of the early milling stone cultures of California with the Desert culture have been taken as support of the hypothesis that the early Hokan and Penutian peoples were both associated with some variant of the Desert culture. None of the reconstructions deal with possible linguistic affiliation of the peoples associated with Palaeo-Indian period cultures such as the San Dieguito. Both Penutian and Hokan stocks seem to have sufficient time depth for such association. Clearly, more comparative data for this period are needed. The question as to the nature of the relationship of the California early milling stone cultures with the Great Basin Desert cultures will be brought up at a later point in this essay. Suffice it to say now that identity of the cultures from the two areas has not been demonstrated, only hypothesized.

Despite obvious errors in detail, the reconstructions of Kroeber and Klimek provide material for generating new hypotheses when viewed in the context of the linguistic reconstructions. The early milling stone cultures can then be equated with the first prehistoric period of the ethnographers' reconstructions and the long period of territorial stability demonstrated by Bennyhoff in Central California can be equated with the final reconstructed period, characterized by "growth of specializations." Thus, an early "relatively simple and uniform" period, ending at the time of the Hokan "explosion" about 3500 to 4000 years ago, and a later period of territorial stability, beginning about 2000 years ago, are represented.

It can be deduced, following both Kroeber and Klimek and the linguistic hypothesis of Baumhoff and Olmsted, that the intervening period, especially in its initial phases, should be characterized by considerable diversity and much irregularity. Considerable population movement should be evidenced and the early milling stone pattern should be altered both by significant internal development commensurate with the climatic changes of the Medithermal and by the introduction of new traditions (e.g., the acorn processing industry?). In some regions complete replacement of the earlier pattern should be observed relatively early, in other regions relatively late. In some regions evidence of assimilation and coalescence should be forthcoming, again with probable time differentials. Following Kroeber and Klimek, Shoshonean influences should be felt to some extent in Central California, especially within the San Joaquin Valley, but due to the nature of the hypothesized population and culture contacts, it would seem unlikely that complex, long-standing, or far-reaching trade networks would develop during the earlier portion of this period of change. In other words, there is no reason to expect uniformity of culture pattern,

stability of population, or regularization of cultural influences during the period dating from about 4000 years ago to about 2000 years ago. This would be more true for the earlier portion than the later portion of this period, since the territorial stability described by Bennhoff for the late period must have had antecedents during the preceding period.

In the light of the preceding discussion, another view of the conceptual shortcomings of the Central California taxonomic system can be obtained. The "intervening period" referred to above falls within the time span attributed to the Central California Middle Horizon. It is hoped that the above discussion illustrates that, while the time interval can be conceptualized as a prehistoric "period," in the sense explicated by Rowe (1962b), there is sufficient reason not to expect the cultural similarities which are part of the "horizon" concept as defined for Central California. In short, while the Middle Horizon as arrived at inductively did have both cultural and temporal coherence for the region where it was described, the hypotheses arrived at deductively concerning the same time period suggest greater diversity than the "horizon" concept can encompass. Some modification of the Central California taxonomic system, then, seems appropriate, considering the present state of knowledge. In the preceding chapter it was pointed out that stage classifications, such as that of Willey and Phillips (1958), have only limited value, since they obscure interactions between peoples of a similar stage for time spans up to several thousand years. In the following chapters a taxonomic system believed capable of handling existing California data is proposed and explicated. In later chapters the system is applied to some early North Coast Range archaeological materials in the form of a substantive contribution.

Spatial Units in Central California ArchaeologyThe Central California Taxonomic System and the Culture-Area Concept

It has already been mentioned that the cultural sequence which forms the foundation for the Central California chronology is at best a regional sequence, rather than an areal or subareal one. It appears that the underlying logic of assuming that the cultural sequence of the lower Sacramento Valley could legitimately be extended to other regions of Central California was intimately connected with the ethnographic concept of the culture-area. It is worthwhile to review here the culture-area concept and to point out some of the consequences of its application to archaeological materials.

Basic to the culture-area concept is the finding that particular culture traits, both material and nonmaterial, tend to be associated with one another in given regions, and that this association tends to be confined to such regions. The ethnographic finding of Wissler (1926) in regard to culture-areas was that the various groups within a given culture-area each possessed to a greater or lesser extent, the trait elements characteristic of the area. Wissler presented the notion that each culture-area had a center and that culture elements diffused outward from the center subject to limitations of natural boundaries. Groups situated at or near the center of the culture-area were found to have all or nearly all of its characteristic traits, and their cultures were

considered to be typical, in the normative sense, of the area. Groups situated some distance from the center, or the "climax" region, as Kroeber (1936a, 1939) referred to it, have fewer of the characteristic traits of the area. Such groups are often called "marginal." Groups situated at the borders of the area have traits which are derived from more than one climax region. It has often been pointed out that culture centers, or climax regions, are relatively easy to determine, but that the borders of culture-areas tend to be indeterminate with sharp boundaries between culture-areas quite rare (Kroeber 1939; Driver 1962).

Although several archaeologists have pointed out that their co-workers rarely make explicit use of the culture-area concept, Jennings (1968:5) pointed out its implicit use: "When the archeologist describes or delineates an archeologic region on the basis of many sites with similar technology and subsistence, he is in effect establishing a prehistoric culture area, although the term is rarely used by archeologists." Chang (1967:118) suggested a reason why "the culture-area concept has not been used in archaeology too explicitly or vigorously. The archaeologist, I think, in general terms tends to resist the concept because in the archaeological scale of time cultures move and macro-environmental changes occur, and cultural types and macro-environments do not associate stably within fixed geographic boundaries. Therefore, archaeologists often focus their eyes on the culture, together with the environment with which it interacts, but not on fixed geographic areas. The co-tradition concept, said to be 'culture areas in time depth,' is an eloquent example (Bennett 1948; Rouse 1954)."

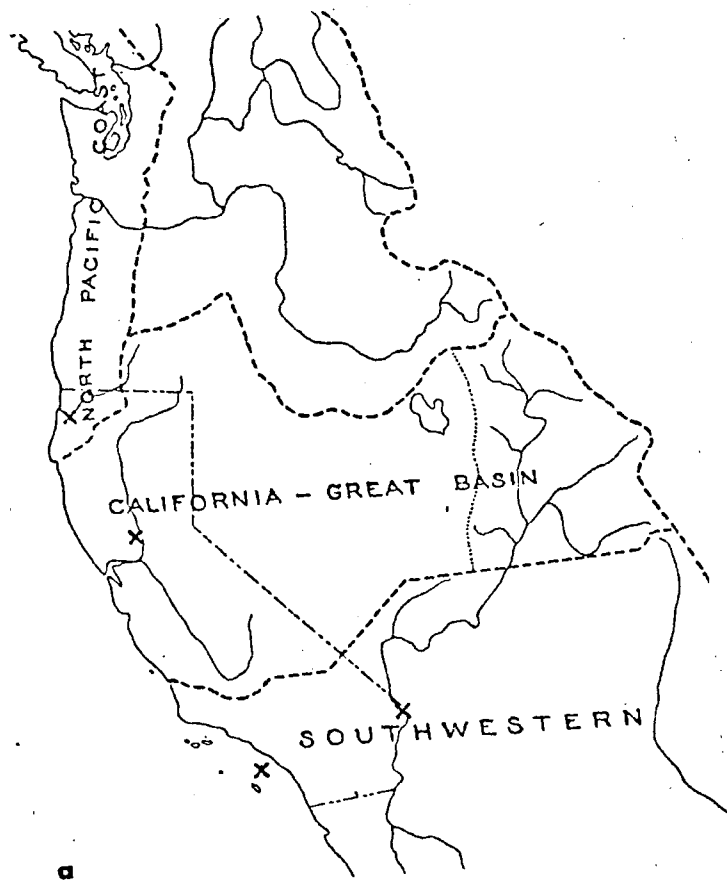
Willey (1966:5), in his recent synthesis of North and Middle American

archaeology, did make explicit use of the culture-area concept, and also discussed circumstances prompting the resistance referred to by Chang: "The archaeological culture areas, as employed here, are extensions of the traditional ethnographic culture area concept. It is, however, much more difficult to delineate archaeological areas than those which are projected for a single ethnographic horizon, because archaeological culture boundaries change through time. Occasionally, such changes are drastic. Such phenomena usually coincide with the inception or introduction of a new major cultural tradition. A prime example would be the differentiation of the Southwest United States area from the nearby Great Basin area which partially surrounds it. At an early period the two areas were one, with the whole characterized by the Desert cultural tradition. Later, with the rise of village farming patterns and the beginnings of the Southwestern cultural tradition, the Southwest area came into existence. Often, however, the 'hearts' or 'cores' of culture areas remain relatively fixed, with only the borderlands expanding or retracting with the passage of time. Sometimes this is true even in spite of major cultural traditional shifts. Thus, the Eastern Woodlands of North America maintained an integrity as a culture area, as the homeland of the earlier Archaic tradition and of the two later traditions which succeeded it -- apparently a testimony to the powerful conditioning factors of natural environment in culture development, at least under certain conditions. In sum, archaeological culture areas must be compromises which will embrace a significant cultural unity through a significant span of time."

Jennings' (1968:4-5) brief comment on the relationship between ethnographic and archaeological culture areas is appropriate to the

present discussion of Central California archaeology: "...Kroeber does emphasize the variation in cultural intensity from area to area and notes that in areas of greatest intensity, climaxes of cultural richness and complexity can be recognized. His identification of cultural climax areas is derived from ethnographic data but tends to agree with archeologic findings, so that some ethnographically delineated culture areas are also fairly accurate demarcations of culture difference and similarity in the prehistoric periods. For example, the climaxes observed archaeologically in the Southeast and Southwest were identified by Kroeber from ethnographic data."

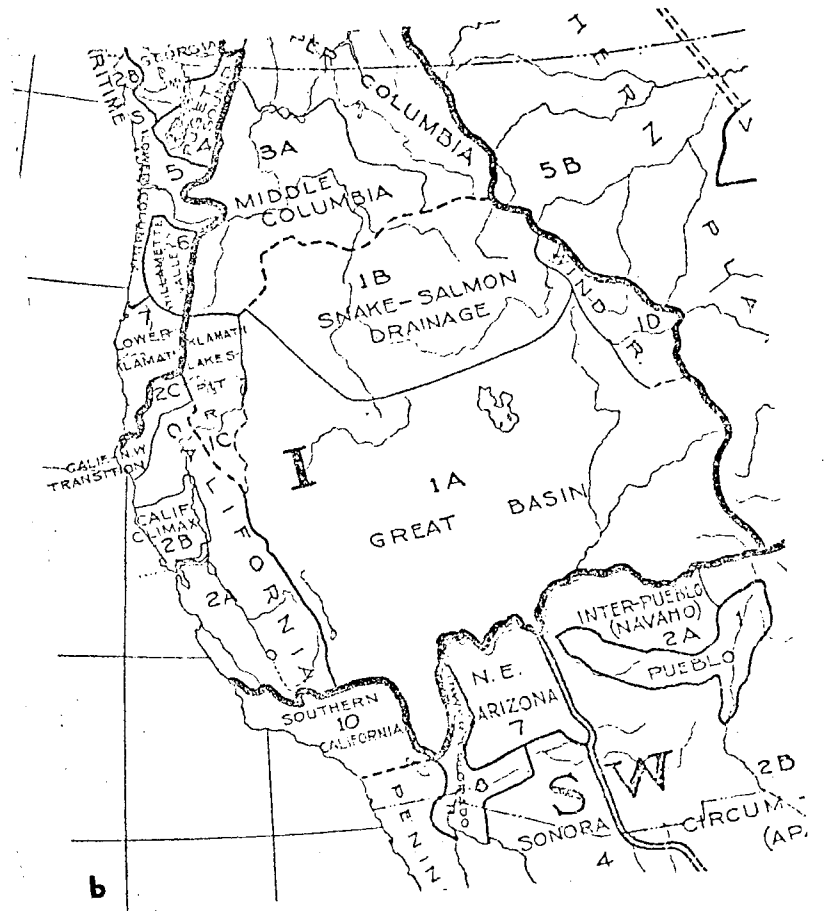
In his early summaries of California's position in regard to culture-areas, Kroeber (1920, 1925) included the bulk of California, the area usually referred to as Central California, with the Great Basin to form a single culture-area. Northwestern California was included with the North Pacific Coast culture-area and Southern California was included with the Southwestern culture-area (see Figure 5a). In his later work, however, Kroeber (1936a, 1939:53-54) isolated a separate California culture-area (see Figure 5b): "Otis T. Mason made his California area include Oregon. Wissler makes it coterminous with California, except for excluding the southeastern corner of the state and including western Nevada. My classification gives southern California to the Southwest, the northwestern corner to the Northwest Coast, the northeastern...to the Great Basin, the eastern or trans-Sierra fringe also to the Basin. This leaves to the California area only the region which in earlier classifications, made with a local rather than continental view, I called Central California. Essentially, this area consists of the Great (or Interior) Valley of California with the Coast Ranges and Sierra Nevada



a

Figure 5. Culture Areas of Western North America.

a. After Kroeber 1920,



b

b. After Kroeber 1939.

that flank it."

Driver and Massey (1957), employing detailed statistical analysis, also distinguished California as a separate culture-area, but differed from Kroeber in that Southern California and the northwestern corner of Baja California were included as part of the California rather than the Southwest area (see Figure 6a). Willey (1966:361ff.) utilized a demarcation of the California area similar to that of Driver and Massey in his summary treatment of archaeological culture-areas, but added Northeastern California, which Driver and Massey placed in the Plateau area (see Figure 6b).

The changes in status of California vis-a-vis its culture-area assignment are in large part measures of the diversity of its cultures and the strength of influences from the surrounding culture-areas, both of which factors are closely related to the physiographic diversity of the state. Kroeber (1920:151), recognizing this complexity, was explicit in emphasizing that the divisions he had made of California did not imply identity of culture: "...any map of this nature creates an erroneous impression of internal uniformity and coherence. Thus, all in all, it is true that the 'central' Yokuts are probably more similar to the 'central' Wintun in the totality of their life than to the 'southern' Gabrielino. But innumerable cultural elements have reached the Yokuts from the south, and they themselves have very likely developed local peculiarities of which some have filtered across the mountains to the Gabrielino. Consequently any statement which tended to create the impression that the Yokuts and Wintun belonged to a block of nations in which certain traits were standard and exclusive, would mislead."

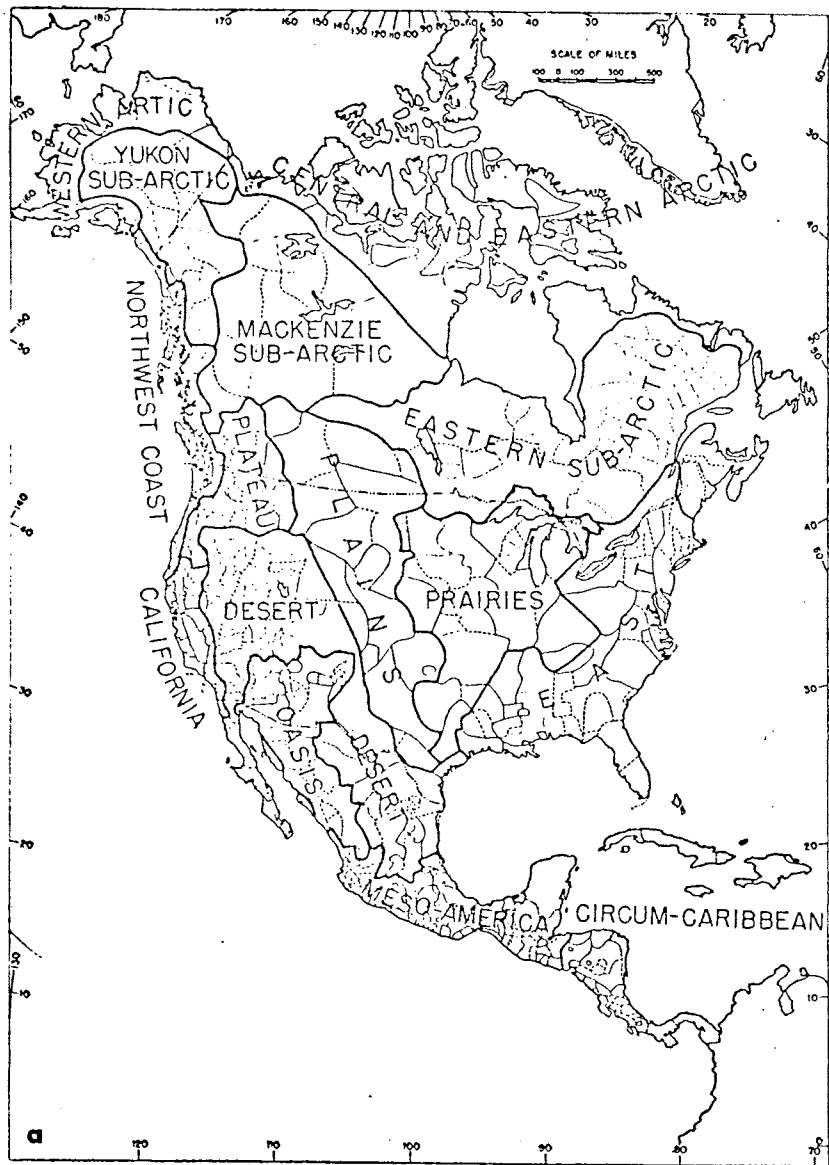
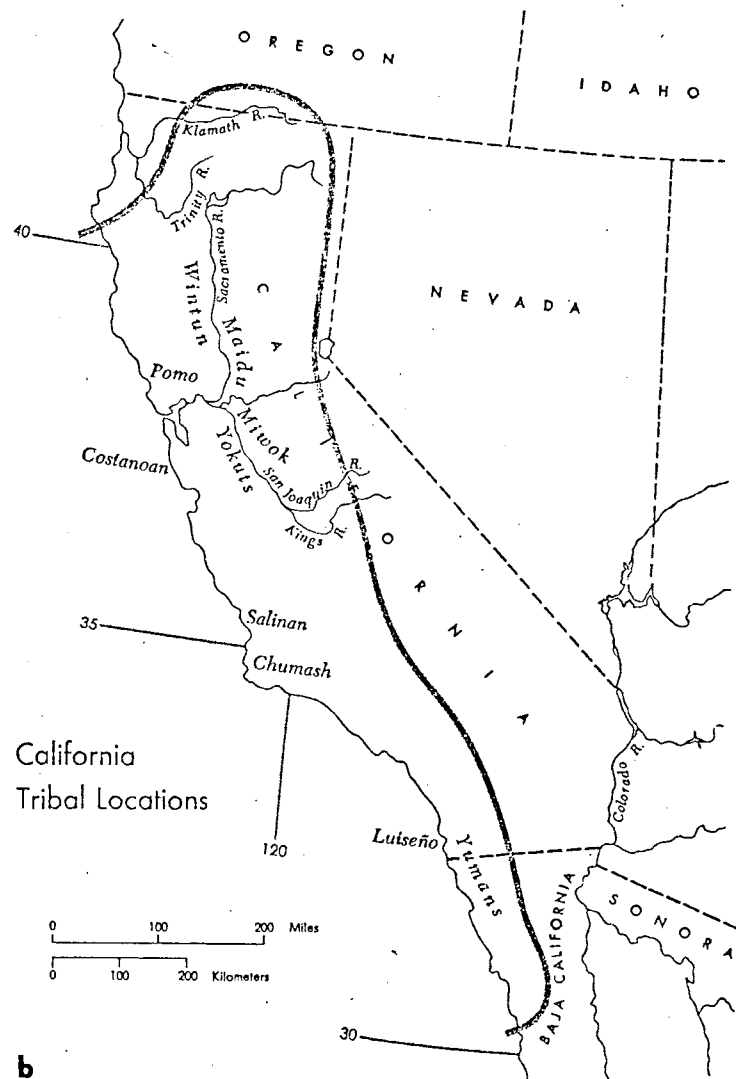


Figure 6. The California Culture Area.
a. After Driver and Massey 1957,



b. After Willey 1966.

In his later work Kroeber (1939:55) recognized three subdivisions within Central California, including the climax regions, which he extended from "the lower Sacramento to the Russian River." Klimek (1935), on the basis of his comprehensive statistical analysis, made even more internal distinctions. See Figure 7 for maps of culture areas within California following Kroeber (1936a) and Klimek (1935).

Within the Central California subarea the existing archaeological sequence was established from excavations conducted primarily within what was the ethnographic territory of the Plains Miwok, located in the lower Sacramento Valley. Although it has not been expressly stated, the assumption appears to have been that the archaeology of this region adequately represented the climax region of Central California, and, thus, following the implications of the culture-area concept, marginal or border regions are not important to the understanding of the cultural development of the area under consideration since their cultures derived from traits which spread from one or more climax regions.

It is illuminating to analyze a portion of Heizer's recent review paper from this perspective. Heizer (1964:126) defined Central California as follows: "Central California, defined here as the region lying between Tehachapi (where the Sierra Nevadas join with the Coast Range) in the south to the head of the Sacramento Valley in the north, and the ocean coast on the west to the Sierra Nevada crest on the east, may be divided into three zones: (1) coastal (i.e, shore plus Coast Range section), (2) interior valley (the combined Sacramento and San Joaquin valleys), and (3) Sierran (western slopes of the Sierra Nevada)."

Although it is not explicitly stated, Heizer's "zones" are physio-

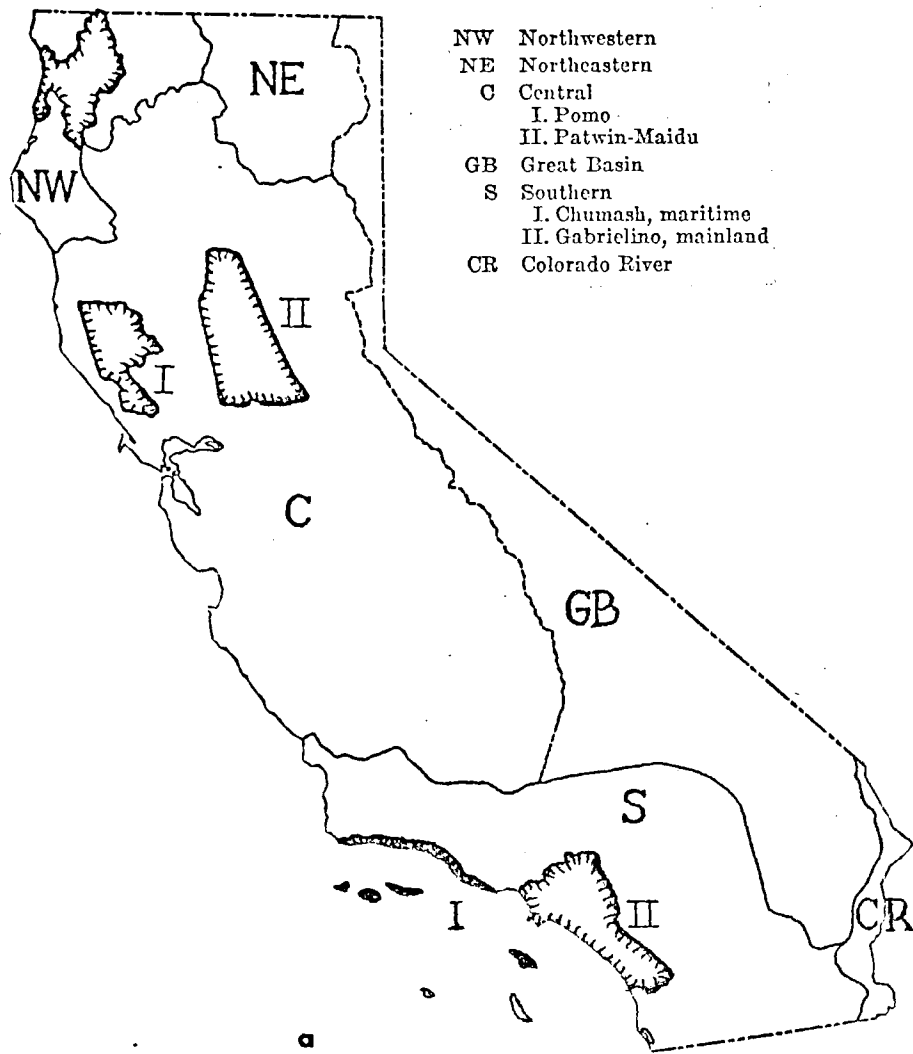
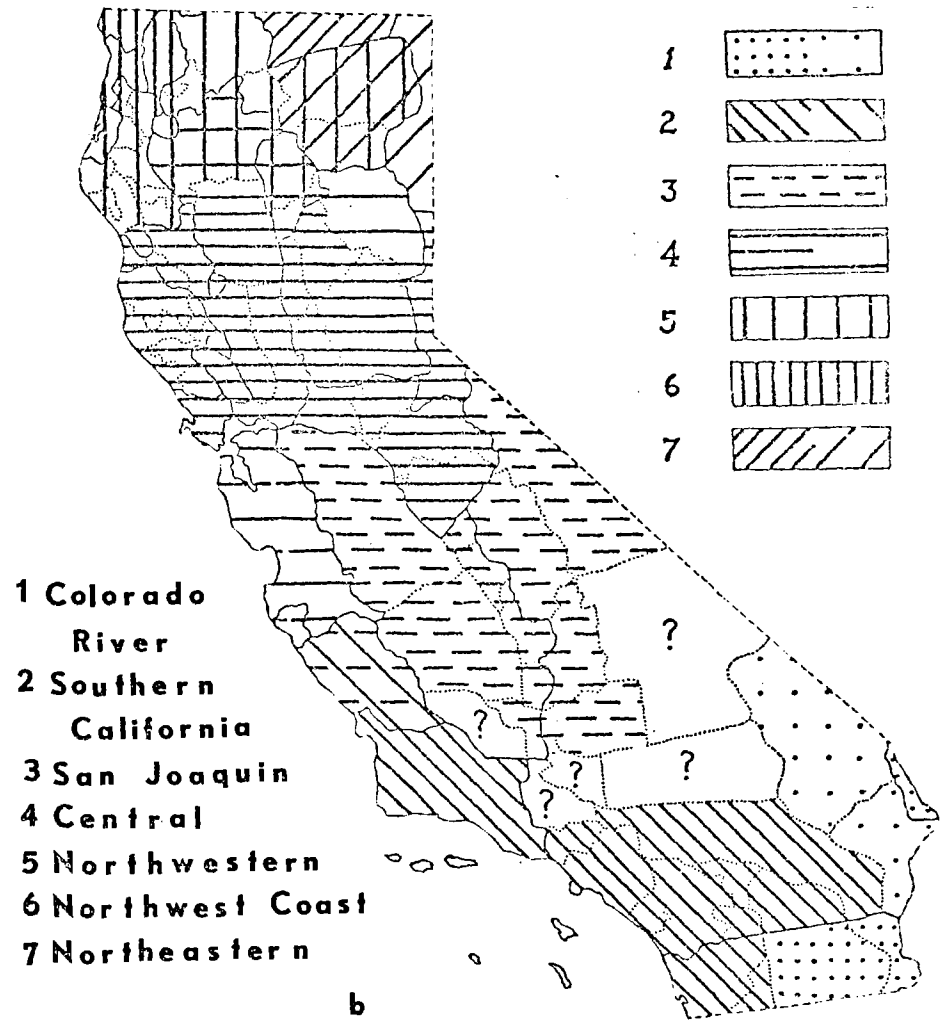


Figure 7. Culture Areas within California.
a. Culture Areas and Climaxes
 (after Kroeber 1936a),



b. Culture Provinces
 (after Klimek 1935).

graphic divisions. The context, however, seems to imply that each of the zones can also be treated as separate cultural units, with each showing variation from the basic regional sequence according to environmental influences, as in the following (Heizer 1964:129): "Generally speaking, allowing for local ecologic adjustments to tidal shore (as against valley riverine locale), the Middle and Late sequence on the bay conforms to that already sketched for the Interior Valley [read: for the lower Sacramento Valley]."

The idea that border or marginal areas can be referred to climax regions can be seen in the following statement by Heizer (1964:130): "Just west of the head of the Sacramento Valley, in the Coast Range section, salvage archaeology in reservoir areas had yielded an abundance of late materials that are basically central Californian in type [read: basically similar to the lower Sacramento Valley in type] but are modified by influences reaching southeast from the distinctive culture development of northwestern California."

The emphasis upon the prehistory of culture climax regions, based upon the assumption that the significant cultural developments of the area had their origins in such regions, not only produces a difficulty in the classification of marginal or border region cultures (which could be considered simply a mechanical procedure), but more importantly serves to obscure cultural processes, some of which may be unique to marginal or border regions and some of which may strongly influence the course of development of the climax cultures. For example, evidence of population movement or territorial expansion may be recovered archaeologically only in marginal or border regions.

Heizer's definition of Central California also carries the implicit assumption that a cultural unit with a predictable degree of homogeneity is contained within the geographic space included in the definition. When data are available to demonstrate that the geographic space is not predictably culturally homogeneous, there is no corresponding change made in the definition of the space. Thus, the culture-area model serves as a principle from which propositions concerning the nature of specific marginal cultures can be deduced. These deductions should be tested as hypotheses and subjected to modification when data warrant.

For example, the southern San Joaquin Valley is included in Central California as defined by Heizer, and is briefly characterized as follows (Heizer 1964:128): "In the southern San Joaquin Valley...[there is] a long sequence of cultures that go back to the same period as the Early Horizon culture [of the lower Sacramento Valley] and continue into the historic period. The Late period shows influence from the Santa Barbara coast, as well as from the Colorado River region." It is of interest that despite placing the region within the Central California subarea no claim for identity or relatedness of southern San Joaquin Valley materials with the lower Sacramento Valley is made, only a temporal connection. Examination of archaeological materials from the southern San Joaquin Valley (Gifford and Schenck 1926; Fredrickson 1964; Wedel 1941) reveals virtually no direct relationship with lower Sacramento Valley materials; instead, the similarity with Santa Barbara coastal materials is quite clear. It is evident that the southern San Joaquin Valley does not belong culturally with the Central California

subarea, regardless of its physiographic characteristics, but instead should be included with the Southern California Coastal subarea. This suggestion is compatible with Kroeber's (1959b) discussion of Yokuts geographic movements (based upon linguistic relationships), wherein he suggests that the movement of Yokuts into the northern San Joaquin Valley is relatively recent, probably beginning no more than 500 years ago, and that the major late expansion of Yokuts "has almost certainly been toward the delta, not from it."

Kroeber's discussion in itself is provocative in regard to our understanding of the prehistory of the Interior Valley. In the discussion here so far, problems of dealing with marginal and border archaeological manifestations in terms of the lower Sacramento Valley have been emphasized. If we move to a region immediately adjacent to the lower Sacramento Valley, namely, the northern San Joaquin Valley, which presumably should undergo the same development as its neighbor region to the north, we find at least one significant difference, which has been little noticed until quite recently. This difference is found in the mortuary practices found within the northern portion of the San Joaquin Valley, as contrasted with the practices reported for the three-part cultural sequence of the lower Sacramento Valley.

Each of the three cultural units in the Central California sequence has characteristic or modal mortuary practices (Heizer 1949; Beardsley 1954). The Early Horizon is characterized by fully extended burials, face down, most frequently oriented to the west. Flexure and cremation also occur, but rarely. During the Middle Horizon, the prone burial position is rather abruptly replaced by the flexed burial posture along

with variable burial orientation. Occasional cremation also occurs. During the Late Horizon both flexed burial and cremation occur, with cremation becoming more important as the Late Horizon continues. Orientation continues to be variable. Until quite recently occurrences of extended burials (whether prone or supine, regardless of orientation), which lacked clear-cut artifactual linkages to defined cultural units, were often referred to the Early Horizon simply on the basis of extension. A brief unpublished report (Miller 1964) on site Frn-373 in Fresno County evaluated the dating of the site on the basis of burial posture as follows: "The belief that the undisturbed burials in block 22 might be Early Horizon was based on the fact that the burials were all extended, and regularly oriented west..." The report continued with an alternative temporal placement, showing the influence of finds in nearby Merced County (Olsen 1968; Riddell 1968): "However, recent information suggested the burials might be from the early phases of the Late Horizon. This theory had its origin in the fact that the Yokuts apparently returned to extended burial during that time."

The apparent return to extension noted here refers to findings from site Mer-14 in Merced County where both supine extended burials and flexure were recovered from a context clearly dated by artifactual similarities as contemporaneous with the early portion of Phase 1 of the Late Horizon (Riddell 1968; Olsen 1968). Additional evidence is accumulating, however, which allows the working hypothesis that the occurrence of extended burials in the San Joaquin Valley during temporal periods more recent than the Early Horizon is not necessarily a return to extension, but possibly a continuation and modification of a mortuary

tradition which had its origins during the period represented by the Early Horizon. Extended burials found at Buena Vista Lake in the southern San Joaquin Valley (Wedel 1941) are acknowledged as being in all probability coterminous with the Early Horizon of the lower Sacramento Valley.

Although no radiocarbon dates have been obtained for the Buena Vista extended burials, the presence of milling stones and hand stones link the complex to the early milling stone horizon. No burials identifiable with this horizon have yet been reported from the San Joaquin Valley north of Buena Vista Lake, but it seems likely that such burials may yet be found. Extended burials representative of later time periods have been found in the San Joaquin Valley, however, from localities from the central to the northern portion of the Valley. Foote (1964) in a brief unpublished communication reported dorsal and ventral extension, as well as flexure, from site Sta-133 in Stanislaus County, with which were recovered full saddle Olivella beads (Type 3b) which are a middle Middle Horizon time marker in Central California (Bennyhoff and Heizer 1958). King (1968a) also reported dorsal and ventral extended burials, as well as loose flexure, from site Mad-117 in Madera County, which he dated on the basis of artifactual analysis as "roughly contemporaneous with the Brazil and Need phases [of the Middle Horizon] in the Cosumnes Locality...in the 2-3000 year B.P. time slot."

In Contra Costa County, in a district adjacent to the northern San Joaquin Valley, unexplained ventrally and dorsally extended burials were reported from site CCo-141 (C.141) from a Middle Horizon context (Lillard, Heizer, and Fenenga 1939:55): "It is impossible to account for the variety

of burial positions -- the ventrally extended posture has heretofore been noted only in the Early period; dorsal extension may occur in Late period sites (e.g., site S.1, S.3) though it seems localized in its manifestations. It is possible that the Transition horizon of site C.141 is closely connected with the Early period and derives the extended burial position from it, yet the material culture speaks against this since there are few Early artifact types present. Probably the situation is this -- in this Delta area is a local specialization in the mortuary complex, the development of which was more or less independent of the Mokelumne-Cosumnes region further north and east." More recently, dorsally extended burials have been recovered from site CCo-31 near Pleasant Hill in Contra Costa County in association with Type 3b2 modified saddle Olivella beads (Kemnitzer 1968), which are late Middle Horizon time markers (Bennyhoff and Heizer 1958).

This distribution in time and space of extended burials, while not by any means conclusive of the working hypothesis suggested above, can be taken to support the argument that the culture history of the San Joaquin Valley differs significantly from the culture history of the Sacramento Valley and that a priori application of the lower Sacramento Valley three-part cultural sequence to all of Central California is not warranted. Although evidence has been presented here in support of the working hypothesis that the peoples of the San Joaquin Valley followed a culture pattern different from that of the lower Sacramento Valley, it seems quite clear that the cultures of both regions were variants of the Archaic pattern. It is on this higher level of generalization that the culture-area concept seems useful. That is, during the chronological period in question, all the cultures of Central

California appear to have been at the Archaic stage of development.

Earlier in this essay it was pointed out that while the classification of prehistoric California groups as Archaic is a valid procedure, the long time span encompassed by the Archaic stage in itself obscured fundamental processes and differences between groups so classified. A similar argument can be employed concerning application of the culture-area concept. Significant processes and differences expected on the basis of the large area and great ecological diversity within the Central California subarea are obscured. In regard to correcting this obscuration, the existing practice of dropping the horizon concept as used in the Central California system and substituting sequences of locally or regionally defined complexes, while perhaps satisfactory for local interests, does not suffice for synthesizing or integrative efforts. In the following pages modifications which have already been made in or suggested for the Central California taxonomic system are discussed and a proposal is offered for integrative units which seem appropriate for the current state of knowledge in Central California. Concepts developed here will be applied to materials recovered from the North Coast Ranges, the archaeology of which does not conform to the pattern of the lower Sacramento Valley.

The Central California Taxonomic System and Recent Modifications

The basic organization of the Central California taxonomic system and the definitions of the concepts employed in it have been presented in earlier paragraphs, along with a discussion of the at least partial abandonment of the framework as it was initially formulated.

It was suggested that several factors contributed to this situation, among them the absence of any discussion as to the minimal number of what specific features are diagnostic of each of the horizons and also the failure to separate the cultural from the temporal dimensions, confounding cultural horizon markers with temporal horizon markers. Apart from the operational modifications already mentioned, which, by the way, seem to have developed without explicit formulation, there have been a number of changes explicitly suggested for the system. Bennyhoff (1961), in his doctoral dissertation on Plains Miwok ethnogeography, grouped "sites which were occupied by culturally related people into localities which have been named after some feature of the local geography." Bennyhoff's localities, which appear to be somewhat but not completely concordant with the provinces of the Central California scheme, were found to correlate with the territories occupied by language groups: Cosumnes locality: Plains Miwok language; Sutter locality: Valley Nisenan language; Solano locality: Southern Patwin language; Diablo locality: Bay Miwok language; Stockton locality: Northern Yokuts language. More recently Bennyhoff (personal communication) has substituted the term "district" for locality. Both terms are discussed in more detail in the following section of this essay.

Ragir (1968), in her doctoral dissertation on the Early Horizon, did not continue Bennyhoff's usage, but retained the term "province," apparently unchanged from its original application, despite Bennyhoff's findings. That is, Ragir's (1968:23) chart on Central California culture classification showed the Delta Province occupied by Plains Miwok, Southern Patwin, and Nisenan, with no mention of the finer distinctions

offered by Bennyhoff. Ragir did make two significant changes, however. First, she has discarded the terms "Early," "Middle," and "Late," substituting for them "Windmiller," "Cosumnes," and "Hotchkiss," respectively. Second, she has replaced the term "horizon" with the term "culture."

Referring to "growing evidence of very early cultures in Southern California," Ragir (1968:15-16) made the following cogent comments: "Given the present system of naming groups which are typologically and temporally related, one would have to call an earlier culture, the 'Earlier Early Horizon.' Furthermore, the tripartite system in a local sequence invariably causes confusion when one compares sites from one area to those of another which has either temporarily or permanently classified its local sequence in a similar fashion. Thus, one finds the Early Lovelock culture coeval with the 'Middle Horizon' in Central California and the Late Phase of the Desert Archaic.... 'Early,' 'Middle,' and 'Late' designations limit pre-history to three phases despite the fact that evidence sometimes suggests four or more changes important enough to warrant equivalent classificatory recognition." Ragir (1968:16ff.) stated that "archaeological cultures ought to be named after the type localities or, where adequately excavated type localities do not exist, after geographical regions where large numbers of the sites occur and there is a possibility of further work." She has, however, "chosen to classify the temporal-cultural divisions defined by California archaeologists as cultures named after the type sites or regions important in their early history." Thus, Windmiller Culture was selected for Early Horizon, Cosumnes Culture for Middle Horizon, and Hotchkiss Culture for Late Horizon.

Ragir's (1968:14-15) reasoning for substituting the term "culture" for the term "horizon" does not in any way relate to criticisms of the concept offered in this essay: "Based on considerable evidence that several 'Early' sites represent more than just burial complexes, this thesis introduces some modifications of Central Californian archaeological nomenclature. The combination of village and cemetery had long been recognized in 'Late' and 'Middle' period sites of the Central Valley. With the presence in 'Early' sites of both habitation midden and cemeteries, a record of the major portion of the cultural activity taking place would exist, and the settlements would deserve the status of a cultural tradition. Although the designation of 'Culture' to archaeological materials had not yet come into use, Heizer implied such a status in his paper on the 'Early Horizon.'" Ragir did not define "culture" and did not elaborate further as to how the two terms might differ.

In the Fall of 1967 the Center for Archaeological Research at Davis, in conjunction with the Society for California Archaeology, issued invitations to a number of archaeologists to attend an evening workshop at the University of California, Davis, to discuss current problems in California archaeology. Individuals representing at least 14 institutions and organizations attended this highly successful meeting, which turned out to be the first of six such workshops held over the next two years (Nov 22, 1967, Feb. 10-11, Mar. 31, Nov. 9-10, 1968; Feb. 22, Oct. 25-26, 1969; the October 1969 meetings were held at Sacramento State College, the remainder at Davis). Among many diverse topics brought up during these meetings was the Central California taxonomic system and proposed revisions.

The workshops were initially quite successful. The concept of "locality," as utilized earlier by Bennyhoff (1961) was tested in a series of substantive presentations by regional specialists, with general agreement that local assemblages could be distinguished on the basis of stylistic differences. Evidence was also presented regarding apparent contemporaneity of the Middle Horizon culture-type in the Littoral Zone of Central California with the Early Horizon culture-type of the Interior Valley Zone. There appeared to be general agreement that the Central California taxonomic system was outmoded and a number of suggestions were made in regard to terminological revision. For example, it was suggested that the terms Early, Middle, and Late be replaced by terms which do not imply temporal sequence. It was also suggested that the term "horizon" be dropped and replaced by either "culture," "tradition," or "pattern." A conceptual suggestion was that stylistic factors not be included as diagnostic criteria in the taxonomic scheme and be kept separate from techno-economic factors. Ultimately, however, there was no general agreement as to details of revision.

Throughout the discussions it was reiterated that individual workers try utilizing some of the proposed revisions in order to test their usefulness, but to refrain from employing them in publication until definite consensus had been achieved. Unfortunately, no consensus was achieved, but publication did occur. Following the March 1968 workshop, Gaumer (1968) published a note in the Newsletter of the Society for California Archaeology in which he reported that "tradition" had been selected as a basic term to replace "horizon" and that the following

changes in terminology had been agreed upon: Augustine Tradition for Late Horizon; Emery Tradition for Middle Horizon; and Windmiller Tradition for Early Horizon. Gaumer stated, "All present agreed to use this new terminological system in their own areas, while maintaining lines of communication with researchers in other areas, and have set Fall of 1968 as the date for another colloquium for presentation of progress reports." Later workshops made Gaumer's announcement of agreement premature when alternate revisions were suggested, including substituting Berkeley for Emery and Pattern for Tradition, but with no final agreement reached. Terminology reported by Gaumer has appeared in publication since. For example, King (1968a:116) employed "Emery Tradition" for "Middle Horizon," as well as other terminology introduced in the workshop context, and Schulz (1970:187) published "Windmiller Tradition" for "Early Horizon," stating, "While this concept will undoubtedly undergo considerable redefinition in the future, as used here it is only a modification of the 'facies' concept (Beardsley 1948:3)."

Thus it is with the Central California taxonomic system: agreement that the original framework is no longer workable, lack of consensus on revisions, and de facto introduction of terminology which was in the discussion phase. In the following paragraphs I offer a revision of the Central California taxonomic system. I incorporate what I believe are some of the agreements arrived at during the Davis workshops and I try to take into account as well modifications suggested by workers such as Bennyhoff and Ragir. The section immediately below covers the basic spatial units, while cultural units are discussed in the next chapter. This proposal is made with the conviction that archaeology can best aid in revealing both synchronic and diachronic cultural processes

when cultural units are controlled in as fine detail as possible, both temporally and spatially.

Spatial Units

The units employed in this essay to designate the geographic space occupied by various cultural units are essentially those of Willey and Phillips (1958), these are the site, locality, region, subarea, and area. An important additional spatial unit, midway between the locality and the region, is the district (Lehmer and Caldwell 1966). One of the major reasons for employing these terms, rather than those presented by Beardsley (1948, 1954; see also Heizer 1949), is that the Willey and Phillips terms are more generally used throughout the New World. It should be emphasized that the boundaries of the various spatial units may shift through time, as the different cultural units which occupy their geographic spaces shift their boundaries. Definitions of spatial units which rest solely or primarily on geographic or physiographic criteria are not adequate for archaeological analysis. As was pointed out earlier in this discussion, the inclusion of the southern San Joaquin Valley into the Central California prehistoric culture area (as defined by Heizer 1964:126) is not justified on the basis of archaeological materials so far recovered. In regard to spatial units smaller than the area, Bennyhoff (1968a) has demonstrated the expansion and contraction of the Stockton district (referred to as the Stockton locality in Bennyhoff 1961) across three physiographic provinces at the end of the Middle Horizon in Central California.

Site, Locality, and District. An archaeological site was described

by Willey and Phillips (1958:18) as "the smallest unit of space dealt with by the archaeologist and the most difficult to define." Without minimizing the many problems involved in the uniform definition of a site, and pointing out that the same site may be assigned to differing larger spatial units at different times in its history, it can be defined as "a discrete area fairly continuously covered by remains of former human occupation or providing evidence of human activity" (Bennyhoff and Fredrickson 1969).

According to Willey and Phillips (1958:18) the locality is "generally not larger than the space that might be occupied by a single community or local group." They stated: "In strictly archaeological terms, the locality is a geographical space small enough to permit the working assumption of complete cultural homogeneity at any given time." Evidence already available indicates that complete cultural uniformity was often shared by several local groups, which during the ethnographic period in California are called tribelets, that is, autonomous social units intermediate in size between bands and tribes (Kroeber 1962). Bennyhoff and Fredrickson (1969) suggest that the locality usually reflects cooperative groups of tribelets. Since differences between tribelets within the locality often involve only percentage frequencies, the total culture can be considered "completely uniform."

Bennyhoff (1961) applied the locality concept to Central California materials utilizing highly detailed comparisons of cultural inventory, but related the locality to social groups larger than those discussed above. Bennyhoff now favors the term district (Bennyhoff and Fredrickson 1969) where before locality was employed and states that in California,

an area of reasonably stable population, there is sufficient evidence available to allow the equation of districts with language groups in the protohistoric and late prehistoric periods. Bennyhoff's Diablo locality (now Diablo district), for example, includes the Bay Miwok tribelets of Saklan, Chupan, Wolwon, Julpun, and Ompin. Bennyhoff now divides the Diablo district into two localities (Oakley and Walnut Creek), each with two or three tribelets.

The district is the geographic space, normally larger than a locality but smaller than a region, which exhibits a significant degree of total cultural uniformity among its constituent components. The district is the basic spatial unit of analysis in that phases, the basic temporal units, are coterminous with district boundaries. Only one phase exists in one district at any one time. In ethnographic terms in California the unity exhibited within districts is possibly related to the ease of linguistic communication plus factors such as dance and ceremonial exchanges documented for the Kuksu and Ghost Dance.

Ideally districts are defined in contrast to adjacent districts where cultural differences are already apparent. Most districts appear to have a distinctive ecological core, but the peripheral boundaries often fluctuate, sometimes radically, into adjacent physiographic provinces. Various reasons can be offered for the fluctuation, such as climatic change, acculturation of and by adjacent groups, and population expansion, but such reasons often remain hypothetical unless a large body of analyzed data is available.

Region, Area, and Subarea. The region of Willey and Phillips (1958:19) "is roughly equivalent to the space that might be occupied by

a social unit larger than the community, a unit to which we may with extreme trepidation apply the term 'tribe' or 'society.'" In Central California, where tribes in the sense conveyed by Willey and Phillips were absent, the cultural resemblances would appear to be due to both direct and indirect interaction (including trade networks) and tribelet environments which were sufficiently similar to allow the development of similar subsistence activities. A region in Central California, then, could include speakers of different languages, for example, Bay Miwok, Plains Miwok, and Southern Patwin.

The region in some respects is similar to Beardsley's (1954:6-7) concept of province, which has both geographic and cultural significance, being defined as a geographic grouping of several facies, formed on the basis of cultural resemblances. Beardsley recognized that the boundaries of a province can change from one period to the next and accounted for the possibility by naming the provinces of each successive time period separately.

The area, following Willey and Phillips (1958:20) "corresponds roughly to the culture area of the ethnographer." The identical difficulty applies to the archaeological culture area as to the ethnographic culture area: although both may have general physiographic integrity, the boundaries are not as easy to define as those of the smaller region. In each case, examination of cultural inventories is necessary to determine areal boundaries. California as an archaeological area would include several subareas (Willey and Phillips 1958:20), that is, "territories of geographical extent intermediate between the region and the area which possess qualities and degrees of cultural unity." During

different cultural periods, subareas may differ as well. For the protohistoric period Central California would be one such subarea, the Southern California Coast another. As has been mentioned, the boundaries of any one subarea may intrude into the physiographic space of another subarea, as in the example of the southern San Joaquin Valley relating culturally to the Southern California Coastal subarea, rather than to the Central California subarea, despite physiography.

In practice, with the exception of the site, each of the spatial units, from the locality to the area, may be conceived in terms of an ecological core, becoming more generalized as one proceeds from the locality to larger geographic units. It is at the borders of each of the territories that the assignment of the space occupied by a particular culture becomes dependent upon cultural factors, rather than ecological. In the final analysis, the assignment of a particular geographic space to one district or another, or to one subarea or another, is dependent upon cultural rather than strictly ecological or environmental factors. The nature and extent of any particular spatial unit can not be assumed a priori, but must be determined by cultural analysis and comparison. To illustrate the above discussion, a classification of some of the spatial divisions in California, adapted from Bennyhoff and Fredrickson (1969), is presented below.

Some Archaeological Spatial Units in California

California area

Southern California Coastal subarea

Southern San Joaquin Valley region

Central California subarea

San Francisco Bay region

Alameda district

Carquinez locality

Oakland locality

Newark locality

Livermore Valley locality

Santa Clara Valley locality

Peninsula locality

Marin district

Delta region

Diablo district

Oakley locality

Walnut Creek locality

Cosumnes district

American locality

Cosumnes locality

Mokelumne locality

Solano district

Stockton district

North Coast Ranges region

Mendocino district

Clear Lake district

Northeastern California region

South Coast Ranges region

Cultural Integrative Units in Central California ArchaeologyComponent and Phase

In general, the use of cultural units here follows the usage of Willey and Phillips (1958:21-40). Two additional concepts are introduced, however, which appear useful for the understanding of Central California materials. These two concepts, both of which are discussed more fully in later paragraphs, are the pattern (cf. Bennyhoff and Fredrickson 1969), used to integrate materials from one or more regions, and the aspect, a district integrative unit, similar but not identical in meaning to its use in the Midwestern Taxonomic System (Mckern 1939).

Component and Assemblage. The archaeological component was defined by Beardsley (1954:6) as the "archaeological record of human occupancy at a single locality at a specific time." Although Beardsley's definition is essentially identical with the Willey and Phillips (1958:21-22) definition of the same term, the word "locality" is not used with the precise meaning of Willey and Phillips. Concordance can be achieved by replacing the "single locality" of the Beardsley definition with the Phrase "specific site." Heizer (1949:2) introduced the term "settlement," favoring it over the equivalent term component, which was already in use in the Midwestern system. Later, however, Beardsley (1954:6) selected component, since, although components might well be

"entire settlements or communities," they "need not necessarily be so." Although the term assemblage is sometimes used to refer to the totality of artifacts from a given site, in this essay the assemblage is the totality of artifacts found in any one component. Thus a stratified site containing three cultural components would also contain three artifactual assemblages.

One of the first tasks of the archaeologist as a field worker is the definition of the various components represented by the site which is under investigation. In some cases, such as in a deep, physically homogenous site, this cannot be achieved completely until careful analysis of the distribution of all recovered cultural materials is done after excavations have been completed. In many cases, however, a field worker during field work can distinguish between the various cultural components on the basis of observed physical stratigraphy and later analysis will usually confirm and add greater detail to the initial working hypothesis.

Phase and Aspect. The concept of phase employed here is identical to that of Willey and Phillips (1958:22ff.) Since the term "phase" is in wide usage throughout the New World, it is preferred to the equivalent terms "focus" of the Midwestern Taxonomic System (McKern 1939) and "facies" of the existing Central California culture classification system (Beardsley 1954:6). Willey and Phillips (1958:22) described phase as "an archaeological unit possessing traits sufficiently characteristic to distinguish it from all other units similarly conceived, whether of the same or other cultures or civilizations, spatially limited to the order of magnitude of a locality or region and chronologically limited to a relatively brief interval of time."

The phase is the smallest cultural unit recognizable in space and time and in Central California is identifiable on the district level (Bennyhoff and Fredrickson 1969). The use of the term "phase" in Beardsley's Central California framework, as in Phase 1 and Phase 2 of the Late Horizon, includes much greater geographic space than even the region suggested by Willey and Phillips, and in use is more closely equivalent to the period concept, which is discussed in later paragraphs.

Although Willey and Phillips designated the phase as "the practicable and intelligible unit of archaeological study," it must be pointed out that the phase, as conceptualized here, can only be defined precisely after a considerable amount of comparative analysis of larger, more generalized units has been carried out. In practice larger prehistoric cultural units are not "built up" out of phases, the smallest discernible unit, but phases are analyzed out of the larger units. Thus, to a large degree, phase distinctions involve recognition of cultural differences comparable to those made between two adjacent societies within a common environmental setting. In regard to technology, economy, social and political organization, and ceremonial practices, such societies will probably be quite similar, but in language and many nuances of culture they may be quite different. Most importantly, they experience themselves as different peoples. The recognition of phase differences, then, involves recognizing cultural nuances, often expressed as stylistic differences, which distinguish two similar societies from one another. I have employed the term "societies" here, rather than cultures, since archaeological cultures are usually not isomorphic with discrete ethnographic cultures but are comparable to groupings of cultures such as those found in culture

areas (cf. Rouse 1965). This problem is discussed in more detail in later paragraphs on "district markers."

The definition of phases and their temporal and spatial relationships with one another allow the recognition of many processes, ranging from those involved in the interaction of two adjacent societies, to those accompanying alterations in the environment, to those hypothesized on the basis of general systems theory (Boulding 1956; Hall and Fagan 1956; both cited in Hole and Heizer 1969:378ff.). For example, the present writer (Fredrickson 1971) has developed the working hypothesis of a growing importance of social ranking in the Walnut Creek locality of the Diablo district on the basis of systematic differences in burial practices during successive phases of the Emergent Period (Late Horizon) beginning perhaps 2000 years ago and culminating in the Protohistoric Period.

In the earlier discussion of the district, it was stated that only one phase existed in one district at any one time, and that the cultural uniformity found within a district during any phase was possibly related to ease of verbal communication plus factors such as dance and ceremonial exchange. A sequence of phases within a single district is referred to in this essay as an aspect. Both phases (during a single time interval) and aspects (usually covering several time intervals) are district representatives of a pattern, a generalized cultural configuration, usually encompassing one or more regions, which is discussed in detail in later paragraphs.

The aspect is often discernible in the archaeological record before its constituent phases can be isolated, but like phases, the aspect is analyzed out of a larger, more generalized unit, the pattern.

Procedurally, the pattern is the most readily identified configuration in an archaeological component. As spatial data come under control, the pattern can be broken up into a number of aspects. As temporal data come under control the aspects can be subdivided into constituent phases. In this scheme, patterns themselves are not broken up into phases, but rather the temporal dimension is subdivided on the basis of time markers, technically artifacts or stylistic detail on the order of the horizon-style of Willey and Phillips (1958:29ff.), which are limited in temporal distribution.

The analytic isolation of the aspect is greatly dependent upon what are called here district markers (cf. Bennyhoff 1961), that is distinctive artifacts, qualities of workmanship, or stylistic details which are limited in spatial distribution. Some district markers may persist through time for a short while and others may persist for a prolonged period. District markers may also serve as time markers within their district of occurrence. The definition of the phase, then, is dependent upon the intersection within an assemblage of district markers and time markers.

District Markers and Time Markers

Archaeological workers in Central California have placed a great emphasis upon certain artifact forms and stylistic detail, such as the forms of shell beads and ornaments and the ornamentation on bone and shell artifacts, because of their proven value in showing temporal relationships between assemblages in different regions. Bennyhoff and Heizer (1958), for instance, discussed the value of California shell beads for the cross-dating of Great Basin archaeological sites, while

Baumhoff and Byrne (1959) and more recently O'Connell (1967) have suggested the utility of employing certain forms of projectile points as temporal markers. With the exception of Bennyhoff's (1961) unpublished doctoral dissertation, however, little attention has been explicitly focused upon cultural characteristics which assist an analyst in distinguishing between one community or group of communities and another. These characteristics, combined here under the heading of district markers, may vary from the quality of workmanship exhibited in the manufacture of fish spears to the characteristic designs incised upon bone tubes (Bennyhoff 1961).

Beardsley's (1954:76ff.) comparative discussion of the Late Horizon in the Cosumnes (Delta in Beardsley's Table 1) and Colusa Provinces included itemization of traits which assist in the cultural differentiation of one province from the other and is accompanied by an interpretation which refers the cultural detail involved to a specific cultural group: "Areal differentiation is brought to attention...by the appearance of traits in an earlier facies of one province than of another. 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...; general elaboration in forms and decorative styles of abalone ornaments...; and Olivella bead type 3e....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 [1941b:109] to suggest northward migration of a Delta group as a cause rather than simple spread of elements."

Hole and Heizer (1969:43) expressed a common archaeological view when they stated: "We expect that people who occupy a common territory and share a common material culture will also share such things as language, ideas about right and wrong, preferences in art, religion, and other intangible traits. These elements of nonmaterial culture are not recovered by prehistoric archaeologists, but every effort is made to make inferences about the social or nonmaterial aspects of the remains they examine." We may add to this that in addition there are data available which inform us that material products themselves often are invested with nonmaterial meaning related to cultural identity. Dawson (1963), for example, has pointed out that cultural standardization in mush boiling baskets (and presumably other basketry forms as well) is accomplished through mutual criticism of the makers, that is, by ridiculing deviations from the norm. Thus, Whilkut mush boiling baskets can be consistently differentiated from the mush boiling baskets of the neighboring Yurok, who exhibit and reinforce a different standardization: "the shape was different and the weave of the lateral reinforcement was different." Dawson also pointed out that in the teaching of the young, instructions include "not only technical manipulations but also the tribal ethos and style precepts about baskets."

Food preferences show that cultural identity may have at least partially an ecological basis. DuBois (1935:6-7) reported that various subgroups of the Wintu ridicule one another in regard to food preferences: "The Upper Sacramento Wintu were called derisively 'mussel eaters' and ridiculed by the McCloud Wintu for grinding deer bones into flour, to which the Upper Sacramento people responded that the McCloud people ate salmon-bone flour and 'besides they stank of salmon and bear.'" If we can expect actual food preferences to parallel the food prejudices, we can hypothesize that an abundance of "mussel" shells in archaeological sites in one Wintu district as contrasted with another would reflect not only local availability, but also the identity of the specific Wintu subgroup. Further, we could hypothesize that there would be a relative abundance of mussel debris in Upper Sacramento Wintu sites where local availability would not support the prediction. In this regard the present writer (Fredrickson 1969) has inferred movement or expansion of a bayshore-oriented society into the interior Walnut Creek locality partly on the basis of changes in dietary practices, including a change marked by an abundance of marine molluscan remains where previously such remains were virtually absent.

DuBois' data are particularly interesting in that she "lays stress upon behavior and attitudes of mind" rather than simply "presenting what may be called the type culture" (DuBois 1935:1). Unfortunately, most of the existing ethnographic accounts of California Indian groups do not contain the wealth of attitudinal information that DuBois' work on the Wintu contains. There are occasional references, devoid of the affective implications, that cultural traits, including decorative elements, are related to cultural identity. Gifford (1965:56) for

instance, stated: "The tattooing on the women's faces was different among each tribe or group in this general region, and the Coast Yuki show that they form no exception to this rule. They used fine marks in considerable quantities on the cheeks and chin, but did not employ heavy wide chin-tattooing as did some other tribes."

On the basis of these kind of data, it can be postulated that when two cultures are closely related to one another in total organization and content, the identity of each group may be projected into what might appear to be minor cultural detail and may be invested with emotional significance not necessarily corresponding to its seemingly minor significance to the culture generally. It can be further postulated that at least a portion of the concept of district marker may have a psychological or attitudinal basis and that district markers themselves may be the equivalent of material symbols of cultural identity.

In earlier paragraphs in another context the concept of horizon as used in Central California was criticized on the grounds that the binding of time and culture into a single concept was unduly limiting. The Central California usage can also be contrasted with widespread New World usage of the term horizon. Willey and Phillips (1958:29ff.) defined horizon as "a primarily spatial continuity represented by cultural traits and assemblages whose nature and mode of occurrence permit the assumption of a broad and rapid spread." They emphasized that: "The archaeological units linked by a horizon are thus assumed to be approximately contemporaneous. The word is italicized because it is recognized that horizons based on cultural criteria unsupported by independent dating may have considerable temporal depth and that the assumed correlation is not necessarily horizontal but may, and probably

does, have a 'slope' depending on the amount of time required for the spread of the elements used as horizon markers."

This definition is similar to the use of horizon in the Central California cultural sequence except that in the Willey and Phillips concept the horizon would occupy a very short time span (cf. Deetz 1967: 59ff.), rather than the thousand years or more of each of the California horizons. The example given above, wherein certain traits occur initially in the Cosumnes Province during Phase 1 of the Late Horizon and then later in the Colusa Province during Phase 2 of the Late Horizon would seem to fit the Willey and Phillips definition, but for several shortcomings. The criterion of "broad and rapid spread" is not clearly met, the two facies concerned are not approximately contemporaneous, and in chronometric terms Phase 1 lasted perhaps 1000 years and can now be divided into a number of smaller temporal units while Phase 2 lasted close to 300 years and can also be divided into smaller temporal units.

The above example highlights the difficulty of applying even the Willey and Phillips concept of horizon in Central California archaeology. The more valuable concept for Central California is not the horizon, but the horizon-style, which, according to Willey and Phillips (1958:32), "may be roughly defined as a specialized cultural continuum represented by the wide distribution of a recognizable art style. On the assumption of historical uniqueness of stylistic pattern, coupled with the further assumption that styles normally change with considerable rapidity, the temporal dimension is theoretically reduced to a point where the horizon style becomes useful in equating phases or larger units of culture that are widely separated in space." It is apparent that the

horizon-style of Willey and Phillips is simply another formulation of the well-known concept of cross-dating on the basis of artifact similarities, but with emphasis upon art styles rather than upon just artifacts in general and with the implicit assumption that the horizon-style is representative of the horizon assemblage.

Because of the emphasis upon formal art style, Willey and Phillips (1958:32) state that the "horizon-style concept has a limited application, since it presupposes a level of aesthetic development that many archaeological cultures in the New World failed to reach." Rowe (1959) has introduced analytic concepts which make the horizon-style concept broadly applicable, including within Central California, the cultures of which are not noted for elaborate artistic development, as contrasted, for example, with the Andean cultures of Peru. Rowe's contribution shows that the great importance of the horizon-style is not so much its potential for demonstrating culture contact, as emphasized by Willey and Phillips, but its potential for allowing precise relative dating of phases. Rowe (1959:317) aptly stated: "Patterns of cultural change begin to appear in the archaeological record as soon as the evidence can be arranged in any kind of chronological order. With increasingly precise relative dating it becomes possible to study the circumstances under which the known changes took place and to observe others. Any development in archaeology which makes possible more precise relative dating, therefore, increases the opportunities for studying cultural process."

Rowe was concerned with changes which occur within a tradition (as defined by Willey and Phillips 1958:37, a "temporal continuity represented by persistent configurations in single technologies or other systems of

related forms"), and in particular focuses upon ceramic traditions in Peru. The fine distinctions possible employing the method suggested by Rowe can form the basis of horizon-style traits in synchronic interpretation. Rowe (1959:318) pointed out one of the handicaps of the typological concept which is in general use among both American and European archaeologists (cf. Willey and Phillips 1958:12-13): "Since cultural change is normally a gradual process, it takes relatively long periods for enough change to accumulate in the appearance of a given kind of object so that it no longer qualifies as descriptively similar to the type specimen. Consequently, types set up in this way have relatively long spans of existence in time, rarely less than 200 years." In Central California the time span of recognized artifact types may extend for literally thousands of years. Rowe (1959:320) recommended that shortcomings of dating by types can be avoided "by using significant features as the unit of study instead of types." A feature is "any characteristic or detail of an object which can be observed and isolated, whether of material or workmanship or decoration."

With respect to relative dating, Rowe (1959:320) pointed out: "The most useful features for dating purposes are those which occur frequently during a relatively short span of time and are not found earlier or later. Features which occur at the beginning of the record being analyzed, have a continuous existence, and go out before the end of the record are also useful, as are features which come in after the beginning of the record and last until the end. Features which do not occur in one of these patterns are of no use in making chronological distinctions, no matter how prominent they may be or how useful they may become in the study of other problems. They are not significant features

for relative dating."

In Central California Bennyhoff (1961, 1968a; Bennyhoff and Heizer 1958) has employed Rowe's method of feature analysis to define horizon-styles which have been utilized both for extensional dating and for more precise division of the existing Central California horizons into numerous phases. Bennyhoff has examined fluctuations in various features, or attributes, of shell beads, for instance, and has found that the location of the perforation in small, rectangular Olivella beads is an important temporal indicator during the Late Horizon. Similarly, during the Middle Horizon, the size of the central perforation in shell beads is a feature with temporal significance.

Thus, feature analysis of various traditions, which by definition are presumed to have temporal continuity, allows the recognition of significant attributes, often attributes which appear to be minor stylistic details, which in turn allows more precise division of the aspects to which the traditions belong into phases than otherwise would be possible. Further analysis and comparison can identify those elements of the traditions which are spatially restricted to the district under consideration, and thus are district-markers, and those which are widely spread through space, presumably by means of trade or other similar means of transport, and thus can serve as time markers, or horizon-styles. The horizon-style should receive the name of the style which characterizes it, in order to emphasize the distributional and synchronic nature of the cultural relationship and to avoid unwarranted implications of cultural identity.

In field investigations known horizon-styles can be employed as aids in the assessment of the temporal standing of a given site or cluster

of sites. No implication of cultural identity then need be present when a site component is temporally identified by horizon-style. Horizon-styles may also be employed by field workers as aids in the assessment of direction and intensity of cultural influences which derive from outside of the locality represented by the site or sites under investigation.

Period and Pattern

Period and Stage. Willey and Phillips (1958:65) have pointed out that it is only recently that formal acknowledgement has been given to the distinction between an archaeological stage and an archaeological period, citing Krieger (1953) as presenting "the first adequate developmental scheme for North America as a whole...[containing] the clearest discrimination between the concepts of stage and period that we have yet seen in print." It is relevant here to repeat Krieger's (1953:247, cited in Willey and Phillips 1958:68-69) formulation: "For present purposes, I will consider a 'stage' to be a segment of a historical sequence in a given area, characterized by a dominating pattern of economic existence. The general economic life and outlines of social structure of past peoples can often be inferred from archaeological remains and can be related to similar phenomena, whether the dates are known or not. The term 'period,' on the other hand, might be considered to depend upon chronology. Thus a stage may be recognized by content alone, and, in the event that accurate dates can be obtained for it in a given area, it could be said that the stage here existed during such-and-such a period. Further, the same stage may be said to appear at different times or periods in different areas and also end at different times. A

stage may also include several locally distinctive culture complexes and minor time divisions. A great deal of discussion is needed on these points."

In earlier paragraphs evidence for the occurrence in Central California of four major stages was discussed. Although data are inconclusive, the Farmington assemblage and the Santa Rosa Island hearths were suggested as two of the best candidates for the "Early Lithic" or "Pre-Projectile Point Stage." Evidence for the "Palaeo-Indian Stage" in Central California was accepted as valid, but more investigation is needed. The majority of the archaeological assemblages in Central California represent the "Archaic Stage," and it was argued that the late cultures in certain climax regions were at the "Emergent Stage" of cultural development, "Emergent" being the nonagricultural equivalent to "Formative."

I suggest that California's prehistory be divided into four major chronological periods, with each period being named for the dominant stage. We would thus have a hypothetical "Early Lithic Period," a little-investigated "Palaeo-Indian Period," and firmly established "Archaic" and "Emergent" periods. Further, I suggest that the current status of substantive knowledge allows us to place the periods within a chronological framework specific for the California area. Although precise time boundaries between the periods will be subject to change, it seems less likely that radical change in the overall chronology will be necessary. I have tentatively divided the Archaic into Lower and Upper periods. The Lower Archaic is dominated by the Early Milling Stone Cultures and, as has been suggested earlier in this paper, represents a relatively simple and uniform culture-type, although subareal variations occur. The

Upper Archaic, the beginning of which I have made more or less coterminous with the beginning of the Medithermal, would include the Middle Horizon of the traditional Central California cultural sequence and the "Intermediate" cultures of southern California (Wallace 1955). I have suggested in an earlier paragraph of this essay that this period should be characterized by considerable diversity and irregularity of pattern.

I have also divided the Emergent into a Lower Period and an Upper. In Central California the Lower Emergent Period would be represented by Phase 1 of the Late Horizon and the Upper Emergent representative would be Phase 2. During the ethnographic period, which would be coterminous with the Upper Emergent Period, geographically and culturally marginal groups, such as the Yana, Atsugewi, and Coast Yuki would have cultures of the Archaic Stage of cultural development, but would be assigned to the Emergent Period on the basis of chronology. The proposed periods, provisional dating, and examples of archaeological sites and units assigned to each period are indicated in Figure 8.

Two additional terms, the use of which is already established in California, are protohistoric and historic. The original use of protohistoric, a term coined by the French (Hole and Heizer 1969:37), was in relation to the study of peoples who were without writing themselves, but who must be studied with reference to the history of a literate society. Following this meaning, the 1542 voyage of Cabrillo along the California Coast can be taken as marking the beginning of the Protohistoric Period in California. The 1492 contact of Columbus with the West Indies could also be taken as marking the beginning of the Protohistoric Period, taking into consideration that diseases brought by the Columbus

<u>Period and Dating</u>	<u>Archaeological Site//Unit</u>
Upper Emergent AD 1500	Phase 2, Late Horizon
Lower Emergent AD 300	Phase 1, Late Horizon
Upper Archaic 2000 BC	Middle Horizon Intermediate Cultures
Lower Archaic 6000 BC	Early Horizon Early San Francisco Bay Early Milling Stone Cultures
Palaeo-Indian 10,000 BC?	San Dieguito Western Clovis
Early Lithic ?	Formington? Santa Rosa Island?

Note: The temporal boundaries of any one archaeological culture may not correspond precisely with the dates given, e.g., Early Horizon (Windmiller Pattern) perhaps begins as late as 3000 B.C. and may persist until 500 B.C. (Ragir 1968).

Figure 8. Archaeological Periods in Central California.

voyages conceivably could have spread widely and quickly throughout the New World (S. T. Brooks, personal communication).

The more commonly applied meaning for protohistoric as applied to Californian materials, and the one recommended here, is for the designation of the cultural period immediately prior to historic contact. In this sense the term seems best applied to local and regional sequences. In the lower Sacramento Valley and San Francisco Bay regions the Protohistoric Period is equivalent to the Upper Emergent Period (Phase 2 of the Late Horizon). Different dating for the Protohistoric Period is found in some other regions. For example, King (1968a:115) assigned the upper component at Mad-117 in the San Joaquin Valley to "an entirely protohistoric date, suggesting a time depth probably not exceeding 700 years."

Bennyhoff (1961) placed the beginning of the Historic Period in California concurrent with the arrival of the Spanish on the California Coast in 1769. It is obvious that many groups were not affected by European contact until considerably later, thus it may be more useful to cite local or regional dates for the commencement of the Historic Period. Use of the term should be specified.

Employing the above framework field workers, on the basis of horizon-styles and other known, widely-spread cultural characteristics, would have a substantial likelihood of accurately assigning a given site to a specific period, but, once again, without the implication of identifying the culture under investigation with some reference point culture, such as one of those located in the lower Sacramento Valley.

Pattern. The division of California prehistory into major periods as

discussed above functions much the same as the traditional horizon framework, except for the crucial difference that the temporal dimension is kept separate from the cultural one. It follows, then, that the assigning of a particular phase or aspect to a particular period indicates little about the actual cultural content of these units or their relationship with comparable units. What must be introduced now is an integrative concept that fulfills the cultural function of the horizon concept, but without temporal implications. I have chosen to refer to the concept by the term pattern and will discuss the choice of this term in later paragraphs.

The pattern is the archaeological unit out of which different phases and aspects are abstracted. The concept is similar to the concept of "culture" in its "culture-area" usage. That is, inherent in the concept are a number of separate, coexisting societies, each of which possesses to a greater or lesser extent similar characteristics. The pattern, then, is a way of life shared by a number of different peoples residing in a particular geographic space. There is a decisive difference from the culture-area concept in that the territory in which the pattern is manifested is considerably smaller in extent than the territory included in the spatial unit of the area, and is also smaller than the unit of the subarea, at least as these units are found in California. The closest parallel in respect to cultural groupings are the "cultural provinces" of Klimek (1935), which were arrived at inductively through statistical analysis (see Figure 7b). Thus, a number of separate, but inter-related archaeological patterns exist within the Central California sub-area. A single pattern may be restricted spatially to a single region,

although several regions may be included. A sequence of patterns in one region may not be identical with the sequence of patterns in another region, even though both regions may be included within the same subarea. There is no necessary temporal sequence implied by terminology.

An archaeological pattern, as defined here, represents an adaptive mode shared in general outline by a number of analytically separable cultures over an appreciable period of time within an appreciable geographic space. Following Kroeber (1936a, 1939), the pattern of a climax region is likely to differ from the pattern of adjacent marginal regions, despite the probability of shared historic origins of the cultures of the two kinds of regions. Cultures which share a pattern can be assumed to interact more with one another, both directly and indirectly, than with cultures sharing different patterns. Relationships which can be discerned between different patterns can be indicated by descriptive commentaries, since inclusion in the same culture-area implies fundamental relationships.

A pattern is characterized by (a) similar technological skills and devices (specific cultural items); (b) similar economic modes (production, distribution, consumption), including especially participation in trade networks and practices surrounding wealth (often inferential); and (c) similar mortuary and ceremonial practices.

A single pattern will not be specifically uniform throughout the entire geographic space which it occupies. Regional and local variation, sometimes extreme, will occur, depending upon factors such as (a) abundance and nature of specific environmental resources; (b) regional specializations and elaborations, sometimes resulting from unique historic events; (c) degree of cultural and geographic marginality;

(d) influences of neighboring patterns. It is hypothesized that some patterns may have specific linguistic correlates in regard to origins, but such correlates must be demonstrated rather than assumed. During any one style-horizon, representatives of diverse language families may share the identical pattern.

A specific pattern should be defined in such a way as to make the identifying characteristics as generalized as possible, yet any two patterns should clearly contrast with one another. It should be emphasized that the definition of a particular pattern is based upon a configuration of trait elements. Individual characteristics may be shared mutually between two or more patterns, but the overall configuration of each pattern should be distinctive. Within a single culture-area or subarea, several patterns should be distinguishable. Although sharp boundaries between patterns may not be discernible, the units themselves should be more easily manageable than larger units encompassing the entire area. It can be expected during any given period in Central California that there will probably exist a climax region pattern, border region patterns which are strongly influenced by more than one climax culture, marginal region patterns where influence from two or more culture-areas is manifest, and coalescent patterns where characteristics from an earlier period strongly influence newer patterns.

All localities which participate in the same pattern can be hypothesized as having some historic relationship, such as through common ancestry, mutual interaction, and common external influences. However, no a priori assumption can be made with respect to the nature of the historical relationship between two successive or adjacent patterns.

Aside from the temporal sequence itself, only intensive analysis of adequate data can determine whether the later pattern may or may not have derived from the earlier one. New patterns can emerge through the physical displacement of cultures practicing the older pattern, from coalescence, such as when new configurations of trait elements enter an area and are integrated into an existing pattern, and from assimilation, such as when the pre-existing pattern loses its previous identity by accepting the newly introduced configuration completely.

Once a pattern has been defined, investigations can be formally planned with respect to hypotheses formulated concerning regional, local, and ecological variation. In stoneless alluvial regions, for instance, the absence of certain stone implements could be predicted, or their presence predicted based upon hypotheses related to trade. In remote mountainous regions, where resources are often not as abundant as in more open regions and where access to trade routes is restricted, hypotheses concerning economic modes can be formulated. Wealth and trade complexes in these regions can be expected to be unelaborate.

Within Archaic and Emergent cultures in Central California, the milling complex will always be present. The dominant or exclusive use of the mortar and pestle can usually be contrasted with the dominant or exclusive use of the handstone and milling stone. Projectile points will always be present, with forms being more conservative in marginal localities and the quantity of points in any single locality closely related to the economic adaptation. Marginal localities will have fewer trade items and will thus have smaller numbers of imported objects, such as beads and ornaments and stone pipes and charmstones. Climax

regions and tribelet centers will generally be richest in regard to artifact inventory and will show a greater variety of artifacts, more types of any given artifact, and more complex ceremonial indications than sites in marginal or subsidiary regions.

The term pattern was selected from several which have been suggested in recent years for this level of integration: horizon, culture, tradition, and pattern. The continued use of the term horizon (Beardsley 1954; Heizer 1949), without the temporal dimension, is not satisfactory for several reasons. Not only would continued use imply the traditional Central California meaning, linking time with culture when only culture is desired, but this linkage would be reinforced by the general New World denotation of the temporal dimension of the term. There is also a conflict with the use of horizon-style as defined in this essay.

Ragir (1968) has substituted the term culture for horizon in her recent modification of the Central California taxonomic system. Although she did not define her use of the term, the context implied compatibility with definitions such as those of Childe (1950:2), "an assemblage of artifacts that recur repeatedly associated together in dwellings of the same kind and with burials by the same rite. The arbitrary peculiarities of implements, weapons, ornaments, houses, burial rites and ritual objects are assumed to be the concrete expressions of common social traditions that bind together a people." This usage would seem more appropriately applied to the phase than to the concept of pattern as discussed above, since it is the phase (in this essay) which comes most closely to approximating a discrete ethnographic culture. Krieger (1964:26) proposed a much broader use for the term

culture, suggesting it be applied to "similar material that is found over great regions." The primary objection to the use of the term culture for the present context is that the word is thoroughly entrenched in anthropological vocabulary with a broad spectrum of meanings and it does not seem advisable to restrict this range. Culture ranges in meaning from the way of life practiced by members of a particular society, through the ways of life common to broader groupings of particular societies (such as those found within culture-areas), to the ways of life common to all humankind.

As noted earlier, the term tradition was one of the alternatives to horizon discussed during the Davis workshops. The fact that the term has already appeared in print several times (Gaumer 1968; King 1968a; Schulz 1970) argues in favor of its adoption, since to introduce yet another term would seem to add even more complexity to the literature. The term has much to recommend it, especially in the sense employed by Goggin (1949:17, cited in Willey and Phillips 1958:36ff.), which closely approximates the concept now being explicated: "My concept of Florida cultural traditions is similar in theory but more inclusive in content than a ceramic tradition. A cultural tradition is a distinctive way of life, reflected in various aspects of the culture; perhaps extending through some period of time and exhibiting normal internal cultural changes, but nevertheless throughout this period showing a basic consistent unity. In the whole history of a tradition certain persistent themes dominate the life of the people. These give distinctiveness to the configurations." Willey and Phillips, while

recognizing the virtue of this usage, reject this use of tradition, preferring to restrict it to "single technologies or other systems of related forms." Willey (1966:4-5), in his recent synthesis of North and Middle American prehistory, employed the term to refer to "major cultural groupings as these can be discerned in geographical space and in chronological time. In every instance these dimensions of space and time are appreciable. Each major cultural tradition is characterized by a definite patterning of subsistence practices, technology, and ecological adaptation. Each major cultural tradition also probably had a definite ideological pattern or world view. This can be demonstrated for some of them in their thematic arts, evidences of religious practices, and intellectual pursuits. For others, however, particularly the earliest of the New World traditions, the data are inadequate to allow such reconstructions." Thus it seems obvious that just as the term culture had a broad series of meanings, so does tradition. I consider it advisable to retain the flexibility of both terms rather than to restrict their meaning to a single dimension.

The term pattern can be similarly criticized in that it has a range of increasingly broader meanings. I have selected it primarily because it is not widely employed in the archaeological literature in any of its meanings, contrasting in this respect with both culture and tradition.

As a general principle, I suggest that patterns be given the name of the first site at which it is recognized. This does not imply any archaeological priority for the site thus employed. The priority relates only to recognition by archaeologists, not to elaborateness of

culture content or to temporal priority for the site in a chronological sequence. If such a label proves to be ambiguous, for instance, if it is already in use in some other context, an alternate label should be chosen.

With respect to the archaeologist in the field, I suggest that the pattern is the unit, along with the period, which is most generally recognized. I emphasize once again that in practice the pattern is not built up of aspects, but that aspects and their constituent phases are analyzed out of the more generalized pattern. Thus, a pattern is defined in terms of generalized forms and types, whereas aspects and phases are defined in terms of certain distinctive features which characterize these general forms and types.

Criteria for Several Patterns in Central California

Windmill Pattern. The Windmill Pattern, which appears to have its origin in the Lower Archaic Period and to have persisted into the Upper Archaic Period (Ragir 1968), includes the components previously included within the Early Horizon of the lower Sacramento Valley. It has recently been renamed by Ragir (1968) as the Windmill Culture. Windmill components are restricted to the Cosumnes district of the Delta region. Criteria for the Windmill Pattern are as follows:

a. Technological skills and devices. Mano and metate, although rare, are accompanied by small mortars (possibly meat or paint grinding implements). The dart and atlatl, as well as the spear occur. Atlatl spurs are rare and are of polished stone. Nonobsidian, stemmed projectile points are dominant and numerous flaked points have basal edges smoothed

by grinding. The bone industry is not elaborate, while the polished stone industry is, including the biconical drilling of stone tubes. Shell bead applique, but not true inlay occurs. Close twined basketry is documented by impressions on baked clay.

b. Economic modes. The relative number of projectile points as contrasted with the small number of grinding implements suggests a hunting emphasis. Inferentially, neither the acorn nor other seeds are too important. Trade appears to be focused primarily upon the acquisition of ceremonial and ornamental objects, which appear to have been obtained as finished specimens rather than as raw material.

c. Burial and ceremonial practices. Interment occurs both in intravillage grave plots and in nonmidden, off-village cemeteries. The mortuary complex has a ceremonial emphasis, with abundant, deliberate grave furnishings relatively common. The most frequent burial posture is westerly-oriented ventral extension, although westerly-oriented dorsal extension also occurs. One site yields rare flexure and secondary cremation. There is some work in human bone and evidence of head-taking. The use of red pigment and the paint palette is documented.

d. Variations in the Windmill Pattern. The cluster of sites, predominantly on the Mokelumne River, involved in the definition of the original Early Culture or Early Horizon, forms the nucleus of the present definition of the Windmill Pattern. The elaborateness of the mortuary practices suggest that these practices may be a regional specialization due to favorable economic resources. The culture represented appears to have been at a climax point, possible related to the favored environment. If this is assumed then it can be hypothesized that the areas geographically marginal to the Mokelumne cluster of sites

will present an abbreviated version of the ceremonial complex. The Bear Creek site (SJo-112) (Olsen and Wilson 1964), believed to be a Windmill Pattern site, located more than ten miles to the south of the Mokelumne site cluster, shows a significantly smaller number of charmstones and chipped stone tools as grave furniture. Although this is not necessarily indicative of a significant difference in the ceremonial complex, it is suggestive of such a difference.

Berkeley Pattern. The Berkeley Pattern, predominantly of the Upper Archaic Period but with possible Lower Archaic antecedents, includes those components previously included within the Middle Horizon, renamed by Ragir (1968) as the Cosumnes Culture and referred to by Gaumer (1968) as the Emery Tradition. The earliest phases of the Berkeley Pattern appear to be contemporaneous with the late phases of the Windmill Pattern (Fredrickson 1966; Gerow 1968; Ragir 1968). The name Berkeley rather than Emery (for Emeryville where this pattern was first recognized) has been selected in order to avoid ambiguity, since Beardsley (1954) has already used Emeryville as the name for a basic Late Horizon facies. Cosumnes is also not acceptable since Bennyhoff (1961) used the word to refer to a district of the Delta region. Berkeley Pattern components are more numerous than Windmill Pattern components and are found in the Delta and San Francisco Bay regions. The criteria for the Berkeley Pattern are as follows:

a. Technological skills and devices. The minimally-shaped cobble mortar and cobble pestle are employed as the virtually exclusive milling implements. Manos and metates, while sometimes present, are rare. The dart and atlatl are present, the atlatl being represented by rare engaging

hooks usually of bone or antler. Chipped stone projectile points are less frequent than in the Windmill Pattern, and nonstemmed forms predominate. There is a growing emphasis upon the bone industry during the temporal span of the pattern. Mammal bone is more commonly employed than bird bone. The polished stone industry does not appear to be as highly developed as it is with the Windmill Pattern.

b. Economic modes. As indicated by a high proportion of grinding implements in relation to projectile points and by the regional accumulation of large shell heaps, the Berkeley Pattern has a collecting emphasis. The acorn is probably the dominant staple. The large number of sites and great depths of deposit suggest a larger population than that supported by the Windmill Pattern. There is no apparent emphasis upon either trade or wealth. The use of local material predominates. Trade goods, when they appear, are finished specimens, rather than raw material.

c. Burial and ceremonial practices. The mortuary complex is rarely elaborated. Flexed burial with variable orientation occurs in village sites. Burial goods are mostly restricted to a few utilitarian items or to ornamental objects which are compatible with an interpretation of being part of a relatively unelaborate burial costume. Ceremonialism is indicated predominantly by shamanism, that is, by the presence of single graves with objects compatible with known ethnographic "shaman's kits," e.g., quartz crystals, charmstones, bone whistles. Graves are sometimes accompanied by bird and animal bone, occasionally by articulated portions of skeletons. Birds and animals sometime are found as ceremonial burials.

d. Variations in the Berkeley Pattern. Regional specializations

reflect at times differing environmental resources. For example, along the San Francisco Bay shoreline and the Marin-Sonoma coast, Berkeley Pattern sites emphasize the collection of shellfish. Notched stones, presumably net weights, are common in these localities, while absent in interior sites. Archaeological components in the northern San Joaquin Valley show a blending of the Windmiller with the Berkeley Pattern, although it appears that the Windmiller Pattern has historical priority in the region. With additional information it may prove necessary to distinguish the components in this region as part of a separate pattern.

Augustine Pattern. The Augustine Pattern of the Emergent Period includes those cultures previously included within the Late Horizon (renamed the Hotchkiss Culture by Ragir 1968). The Augustine Pattern appears to be a coalescent pattern merging the previous Berkeley Pattern with many new traits and involving a change in the general economic complex. Augustine Pattern components occur in many regions of the Central California subarea, although further analysis is necessary before its precise distribution can be determined. Augustine Pattern criteria are as follows:

a. Technological skills and devices. Well-shaped mortars and pestles are common. The bow and arrow are present, as evidenced by a growing increase in the number of small projectile points beginning in the earlier phases of the pattern. The dart and atlatl appear to drop out of use early during the pattern. Fishing implements, while rare in absolute terms, occur more commonly and in different types than in the Berkeley or Windmiller Patterns. The harpoon is introduced during early phases of the pattern. Bone work is not as extensive as with the

Berkeley Pattern, but bone awls, probably indicative of a coiled basketry industry, are common. Polished stone now includes tubular pipes as well as charmstones, which often are not as well made as those of the Berkeley and Windmiller Patterns. Use of and work in shell is common.

b. Economic modes. Fishing appears to be added to a strong collecting emphasis, while hunting (inferred by greater numbers of projectile points found in middens) may be more important than during the period of the Berkeley Pattern. The acorn is the dominant staple, as judged in part by charred specimens found in middens. There is high development of trade, beginning initially with finished specimens serving as trade items, and developing by the addition of raw materials involved in trade. There is a gradual appearance of more trade items which can be identified as coming from relatively great distances. During the Upper Emergent Period the Augustine Pattern appears strongly influenced by trade and wealth items deriving from the North Coast Ranges, a region which in earlier periods did not appear to participate to any great extent in the patterns so far discussed. Social differentiation in regard to wealth in the Augustine Pattern is evidenced by considerable variation in grave furnishings.

c. Mortuary and ceremonial practices. Cremation and preinterment grave pit burning of burial furnishings co-occur with flexed burial, with cremation apparently reserved for relatively wealthy or prestigious individuals, judging from the differential distribution of grave goods often found with the two burial modes. Grave orientation is variable. Ceremonialism, possibly indicative of widespread secret societies documented during the ethnographic period, is evidenced in the artifactual

complexes, markedly emphasizing shell beads and ornaments, found with graves.

d. Variations in the Augustine Pattern. Due to the developing elaborateness of the trade networks, localities which were unfavorably situated with respect to trade routes show considerably less embellishment of the Augustine Pattern than localities which are more favorably situated. Nonetheless, more trade objects are evident in the marginal localities than in comparable localities which follow the Berkeley Pattern. The importance of fishing in the Augustine Pattern implies that localities favorably situated with respect to fish resources will have a more elaborate cultural development than those in mountainous regions. In the northern San Joaquin Valley presence of extended burials in components which tentatively can be classified as participating in the Augustine Pattern may reflect a continuing influence from earlier Windmiller Pattern cultures.

Borax Lake Pattern. What is here referred to as the Borax Lake Pattern was first identified as a distinctive type of cultural manifestation at the Borax Lake site (Harrington 1948a) in the vicinity of Clear Lake. The pattern, which includes sites subsumed by Meighan (1955) as belonging to the Borax Lake and Mendocino Complexes, is characteristic of the Lower Archaic Period and has regional representatives persisting into the Upper Archaic Period. It has been suggested (Baumhoff 1957; Baumhoff and Olmsted 1963, 1964; Wallace 1954) that what is here referred to as the Borax Lake Pattern is historically related to the Early Milling Stone cultures of the Southern California subarea as well as to the Windmiller Pattern of the Delta region. The

spatial distribution of Borax Lake Pattern components is not incompatible with these possibilities. Borax Lake components are found throughout the North Coast Ranges, with strong indication that the same or a related pattern may also occur in the South Coast Ranges (Pilling 1955). Despite the possibility of a direct historical relationship between the Borax Lake and Windmiller Patterns, the extent of difference in economic mode and ceremonial behavior gives sufficient justification for establishing two distinct patterns. Criteria for the Borax Lake Pattern are as follows:

a. Technological skills and devices. Mano and metate occur with greater frequency than in the Windmiller Pattern. Mortar and pestle commonly occur along with mano and metate in later phases. Atlatl (inferred) and dart occur, as well as the spear. Stemmed, nonstemmed, and concave base projectile points, predominantly of local materials (either obsidian or chert), occur. There is some evidence of a burin technology. Polished stone items are found, but are quite rare. No evidence of a significant bone industry has yet turned up, although this may be due to differential preservation resulting from soil conditions. Similarly, there is no evidence of a shell industry.

b. Economic modes. The relatively large number of milling implements as contrasted with the relatively small number of stone projectile points suggests a generalized hunting-collecting economy, with collecting given an edge over hunting with respect to importance. No evidence for fishing has been preserved. The use of local materials predominates and trade does not appear to have been particularly well-developed, although in later phases contact with other patterns appears

to increase. There is no evidence of any wealth emphasis.

c. Mortuary and ceremonial practices. No interments have been found in habitation sites in earlier phases, although in one late phase site burials do occur in the midden. No nonmidden burials have yet been identified. Utilitarian objects, mainly pestles and projectile points, were found with the late phase burials. Polished stone items suggestive of ceremonial purposes include rare ovoid perforated charm-stones and a single occurrence of a small, tabular, centrally side-notched, ground stone object, possibly representing a form ancestral to the "painted tablets" of the Napa and Berryessa Valleys.

d. Variations in the Borax Lake Pattern. At present two aspects of the Borax Lake Pattern have been identified, distinguished by the stone materials employed and the forms of the projectile points utilized. There is a northern aspect focused in Mendocino County and extending to the east side of the Coast Ranges, and a southern aspect, focused in Lake County and extending southward into Sonoma, Napa, and Solano Counties. No regional specializations have yet been found, unless the "inscribed stones" of the Redding district (Edwards 1969) can be so considered. If the Borax Lake Pattern were related to the Windmill Pattern, it would represent both a culturally and geographically marginal variant.

Houx Pattern. The cultural assemblage which makes up what is referred to here as the Houx Pattern has not been previously described. The pattern is described at this time on the basis of materials obtained through stratigraphic excavation at a single site, Lak-261 (the Houx site), supplemented with comparative materials from neighboring localities.

The Houx Pattern, found at this time only in the North Coast Ranges, is assigned to the Upper Archaic Period, but it appears significantly different from the Berkeley Pattern which dominates this period in Delta, San Francisco Bay, and Marin-Sonoma County coastal sites. Criteria for the Houx Pattern are as follows:

a. Technological skills and devices. The mortar and pestle dominate the milling industry. The atlatl (inferred) and dart occur, but the bow and arrow are absent. Nonstemmed projectile points predominate, but broad, triangular, stemmed projectile points also occur. Well-flaked scrapers of various shapes and sizes are common. Locally available obsidian and basalt are the raw materials for virtually all chipped stone tools. Technical and possibly functional burins are relatively common. No polished stone objects have yet been recovered. The bone industry does not appear to be particularly well-developed, but this may be due to soil conditions which act against the preservation of bone. Work in shell is present in the form of beads, probably obtained by trade.

b. Economic modes. Projectile points are extremely numerous, both in absolute number and in relation to number of milling implements. Although this would strongly support a hunting emphasis, relatively little bone debris was recovered from the single stratigraphically excavated Houx Pattern component. Charred acorns were recovered from the site matrix. Poor preservation of bone may be responsible for this anomaly. Local materials predominate with little development of trade except as suggested by the presence of shell beads. There is no evidence of any wealth emphasis.

c. Mortuary and ceremonial practices. Flexed and semi-flexed interments occur within the habitation site. Although few burials have been recovered, those which were found show an undeveloped ceremonial complex with few associations. The few which are found are suggestive neither of a ceremonial nor of a utilitarian emphasis to the mortuary complex.

c. Variations in the Houx Pattern. While the Houx Pattern may prove to be a specialized adaptation based upon the Berkeley Pattern, at this time it appears significantly distinctive from this latter pattern to warrant classification as a separate pattern. So far, Houx Pattern sites appear to be focused in Lake and Sonoma Counties, but similarities in projectile point types provocatively suggest connection with Berkeley Pattern components on the Marin-Sonoma coast and with components assigned to the Berkeley Pattern in Napa County. Projectile point types and the burin technology also suggest connections with Borax Lake Pattern sites of the earlier Lower Archaic Period and with one or more as yet undefined patterns (Martis Complex) of the Sierras. Further excavation must be carried out to determine in more detail relationships of the Houx Pattern to other patterns in both space and time.

VII

Archaeology in the North Coast Ranges

Geographic Setting

The North Coast Ranges, part of the Pacific Mountain System as described by Kroeber (1939:191ff.), represent the northern portion of the California Coast Ranges, one of seven valley and mountain sections of the physiographically complex Pacific Border province. According to Kroeber (1939:191), the Pacific Border province was "the most densely populated area of its size north of central Mexico. Ethnically and culturally, the sections of this province were more important than many whole provinces elsewhere." Geologically, the North Coast Ranges are separate from the older, northerly adjoining Klamath Mountains, with the border between the two sections extending in a southeastward direction from the Trinidad Head region. The western border of the North Coast Ranges is defined by the Pacific Ocean, while the eastern border is shared by the adjoining Sacramento Valley portion of the California Trough. San Francisco Bay forms the southern margin, dividing, as it does, the California Coast Ranges into a northern and a southern half.

Physiographically, the North Coast Ranges constitute a region of relatively low mountains interspersed with small, northwest-southeast trending valleys. Elevations of 2000 to 4000 feet are common, but there are few mountain peaks with elevations greater than 7000 feet. At the northeastern margin are North and South Yolla Bolly peaks, both

of which approximate 8000 feet, and in the generally lower elevations of the southern end of the ranges is Mt. St. Helena, with an elevation of less than 4400 feet. The most important rivers of the region are the northerly flowing Eel, Mad, and Van Duzen and the southerly flowing Russian, all of which drain into the Pacific, but none is comparable in scale to larger rivers of adjoining sections, such as the Sacramento or Klamath. A number of small streams, such as Thomas Creek, Stony Creek, Cache Creek, and Putah Creek, drain to the east, but all are considerably smaller than the Russian or Eel.

One of the distinctive natural features of the North Coast Ranges is Clear Lake, a landslide lake, measuring about 19 miles in its northwest-southeast dimension by eight miles in greatest width. Clear Lake is a geologically recent phenomenon. At one time the valley plain in which Clear Lake is situated was drained by two streams, Cold Creek and Cache Creek. The former flowed easterly to empty into the Russian River, while the latter flowed to the west into the Sacramento River. At some time in the past a small lava flow blocked the eastern drainage so that all waters were diverted to Cold Creek. In the relatively recent past a massive landslide, a mile or more in width, blocked the western drainage, creating a basin which then filled with water until it spilled over the lava flow which earlier had closed off the eastern drainage. The lava flow proved resistant to extensive erosion and the western drainage remained blocked by the landslide; the body of water captured within the basin thus formed is Clear Lake (Davis 1933:197-199).

Close to Clear Lake, nestled between its two eastern arms, is Borax Lake, near which is Lak-36, the Borax Lake archaeological site.

Borax Lake, which is situated in a basin about a mile and a half long and less than a half mile wide, had an origin and history separate from Clear Lake. The lake is located in a cove with hills on three sides and was formed when a small lava sheet blocked its eastward opening.

Today this basin "is mostly occupied by a plain, but its western part is overspread after winter rains by the shallow Borax Lake, which vanishes in summer leaving a barren, white flat" (Davis 1933:219).

The relief of the Coast Ranges is generally due to faulting, with the topography related to differing resistances of rocks to weathering. Sandstones and conglomerates form the ridges, while shales form the valleys. The principal rocks of the North Coast Ranges are the graywacke and shale found in a northward-trending coastal belt; graywacke, shale, chert, and volcanic rocks of the typical Franciscan formation found in a similarly-trending central belt; and "weakly metamorphosed" Franciscan formation rocks of a parallel eastern belt. A north-trending band of serpentine separates the eastern belt from the Sacramento Valley and the Franciscan formation of the northern part of the central belt is faulted against schist of the Klamath Mountains section of the Pacific Border province (Irwin 1960:31).

The geological deposits of the North Coast Ranges furnished an abundance of rock and mineral materials which were utilized by the prehistoric inhabitants. Some of the most commonly used resources were the siliceous minerals of the Franciscan formation, such as the chert and chalcedonies which were the most frequently utilized materials for chipped stone tools to the north of the Clear Lake vicinity, and the volcanics, basalt and obsidian, which were most favored in use to the south. Heizer and Treganza (1944) summarized a considerable amount of

information on the sources of rocks and minerals employed by the pre-European occupants of California, including North Coast Range sources. Many of the geological resources of the North Coast Ranges entered into trade transactions between various groups. Information pertaining to such transactions was summarized by Davis (1961).

The North Coast Ranges share with the remainder of Central California the Mediterranean climatic pattern of summer drought alternated with winter rain (Kesseli 1942). Within this pattern climatic conditions vary in a regular manner from west to east and from south to north, being strongly affected by the westerly winds from the Pacific Ocean and by the high elevations found in the northeastern part of the Coast Ranges and the Klamath Mountains. In the southern portion of the region annual precipitation, frequently in the form of heavy downpours, averages about 30 inches and increases in much of the northern and western parts to more than 50 inches. In some localities rainfall is as high as 100 inches. The eastern slopes, which lie in the rain shadow of the Coast Ranges, experience much less precipitation so that local rainfall may not exceed 20 inches. For instance, in the chaparral portion of Lake County the annual rainfall is 21.6 inches but with only 0.53 inches falling from June through September (Shelford 1963:239). In the higher north country snow flurries often occur in late October and during the winter much of the region above 4000 feet is snow-covered. In some high protected localities patches of snow remain until the middle of summer. Snow seldom falls in the lower elevations and since the Coast Ranges are not of sufficient elevation to provide continuous snowmelt runoff during the summer, the volume of water carried by the various streams and rivers decreases considerably at this time, with many of the smaller

streams, especially those draining to the east, drying up completely. By contrast, during the late fall and winter months of heavy rainfall, the rivers become enormously swollen and flooding is frequent (Irwin 1960:14; Stone 1966).

The temperature along the coastal belt is moderate with small daily and annual ranges. At Point Reyes, for instance, the lowest winter monthly mean is about 50 degrees F., while the September high mean is approximately 57 degrees F. (Beardsley 1954:14). Freezing temperatures rarely occur during winter and in summertime fogs exert a cooling effect all along the coast. The prevailing wind of the coastal belt is from the northeast and the storm winds come from the southwest. The average annual humidity along the coast is greater than 70 percent, decreasing gradually toward the east. East of the coastal belt the climate is more rigorous, and is characterized by greater daily and annual ranges in temperature, with summer temperatures varying between 80 and 90 degrees F. with a daily high that frequently exceeds 100 degrees. Throughout the eastern belt the predominant breeze is from the south with strong breezes entering the Central Valley through the gap formed in the Coast Ranges by the Golden Gate and San Francisco Bay. Air masses move northward into the interior due to the combination of low air pressures and the barricade created by the Sierra Nevada Mountains (Irwin 1960:14; Stone 1966).

Redwood forests occur all along the coastal strip, being more abundant in Mendocino and Humboldt counties as contrasted with the southern counties of Sonoma and Marin. A specialized segment of the "rainy western hemlock forest biome" (Shelford 1963:211ff.), receiving a large amount of moisture during the summer drought in the form of ocean fog, the

redwoods (Sequoia sempervirens) are interspersed with western hemlock (Tsuga heterophylla) and western redcedar (Thuja plicata). The latter two species are the most important trees in the narrow portions of the coastal belt which has elevations from 2500 to 5500 feet. Various fir trees (Abies, sp.) also occur, as well as the tan oak (Lithocarpus densiflora). The latter "mingles with the redwood trees where they are not too dense, grows in a fringe along the inland side of the redwood belt, and is found also in clear areas or on the bald hills within the redwood belt" (Baumhoff 1963:164). The northern, higher inner ridges of the North Coast Ranges are considerably drier than the coastal strip and the vegetation, representative of the "lower montane coniferous forest" (Shelford 1963:152ff.), reflects this. Ponderosa pine (Pinus ponderosa) and Douglas fir (Pseudotsuga menziesii) are the most important trees.

The most extensive vegetation of the North Coast Ranges is sclerophyll. Sclerophyll vegetation may be forest, woodland, or chaparral and is characterized by plants with leaves which are "commonly thick, coreaceous, highly cutinized, and shiny" (Shelford 1963:238). The three vegetation types merge with one another without segregation into distinct regions. Sclerophyll forests are clusters of the larger oaks with a grass ground cover, and are found in advantageous locations within spreads of chaparral and woodland. Sclerophyll woodlands are dispersed trees with a different vegetation type, such as grass, chaparral, or sagebrush, dominating the ground surface beneath and between the trees. Sclerophyll chaparral occurs in the North Coast Ranges in scattered areas mixed chiefly with woodland-grass. Shelford (1963:241) states that: "Unity of the vegetation is indicated by woody species which occur as trees in woodland and forest but as shrubs in the chaparral. The canyon live oak and interior live oak are such species. A number of other oaks

and three species of Ceanothus vary in form and stature in chaparral and forest but cover only a part of the area."

Sclerophyll forests do not extend over the countryside in the manner usual for a conifer forest, but instead appear in discontinuous patches alternating with woodland or chaparral. Species are found in a number of different combinations, the most common ones in the North Coast Ranges being California Live Oak-Madrone Forest and the California Live Oak-California White Oak Forest. The former forest, characterized by California live oak (Quercus agrifolia) and madrone (Arbutus menziesii), occurs throughout the outer Coast Ranges, often on north-facing slopes, and is frequently associated with California buckeye (Aesculus californica), California laurel (Umbrellaria californica), and the bigleaf maple (Acer macrophyllum) (Shelford 1963:245). The forest characterized by California live oak and California white oak (Quercus lobata) is common in the broad valleys and foothill slopes of the central Coast Ranges, especially in the San Francisco Bay region, and merges into the woodland-grass community. Associates often include coffeeberry (Rhamnus californica), Christmas berry (Photinia arbutifolia), blueberry elder (Sambucus glauca), and poison oak (Rhus diversiloba), which together form a tall shrub layer, and Rubus vitifolius, Symphoricarpos racemosus, and Solanum umbelliferum, which form together a low shrub layer. Ground cover in the live-oak-white oak forest is dominated by yerba bucca (Micromeria chamissonis) (Shelford 1963:245).

Sclerophyll woodlands in the North Coast Ranges are formed predominantly by one or another oak species in combination with chaparral or grass. Shelford (1963:245-46) states that "only the predominantly

blue oak communities have been investigated biotically." Blue oak (Quercus douglasii) is found in the inner ranges of the North Coast mountains "as far west as Round Valley" (Baumhoff 1963:165). Digger pine (Pinus sabiniana) is an important associate in sclerophyll woodland communities.

Chaparral, the third type of sclerophyll vegetation, is the principal plant cover over most of the South Coast Ranges and is one of the major communities on the eastern slopes of the North Coast Ranges (Shelford 1963:251ff.). Chaparral apparently was once much more widespread in the North Coast Ranges than it is now, and Cooper (1922:82) suggests that chaparral was once the dominant community in all the Coast Ranges, but that clearing and other activities of the modern population have brought about chaparral replacement by grasses, oak, poison oak, and buckbrush. Once chaparral is cleared from a vicinity, the area generally goes into oak-grassland, since isolated chaparral have difficulty in reproducing under these circumstances.

The most common plants in chaparral communities are chamise (Adenostoma fasciculatum), sagebrush (Artemisia, sp.), Christmas berry (Photinia arbutifolia), scrub oak (Quercus dumosa), interior live oak (Q. wislizenii), canyon live oak (Q. chrysolepis), manzanita (Arctostaphylos, sp.) buckbrush (Ceanothus cuneatus), mountain mahogany (Cercocarpus, sp.), and red berry (Arctostaphylos, sp.). Other common constituents of chaparral are chinkapin oak (Q. muehlenbergii), bush-poppy (Dendromecon rigida), ribbon-wood (Adenostoma sparsifolium), hollyleaf cherry (Prunus ilicifolia), lemonade-berry (Rhus intergrifolia), laurel-sumac (Rhus laurina), and several species of Ceanothus, the hoary-

leaf species (C. crassifolius) being the most common. Several of the chaparral species may be either shrubs or trees (Shelford 1963:251).

Although literally hundreds of native plants were utilized by the pre-European inhabitants of the North Coast Ranges (cf. Balls 1962; Chestnut 1902; Curtin 1957), by far the most important were the various species of oak, which furnished the acorn, the staple food in prehistoric California wherever it was found in sufficient quantity. Baumhoff (1963) provided summaries of the distribution and utilization of the most important oaks utilized in several regions of California, including the North Coast Ranges, reporting that of nearly twenty species of oak in California, only nine were of economic importance. All nine species were native to the North Coast Ranges. It is important to note that oaks form an important part of all the plant communities of the North Coast Ranges. This factor would seem to encourage greater sedentariness, or at least less extensive seasonal ranging, on the part of populations which collected acorns as a major subsistence item.

The Roosevelt elk (Cervus canadensis) was once one of the most significant animals of the pristine redwood forest. Although they were most common in the moist coastal belt, they also frequented chaparral and oak woodland, since they both graze on grasses and browse on a great variety of bushes, leaves, and twigs (Shelford 1963:215). The Columbian mule deer (Odocoileus hemionus), sometimes referred to as the Columbian black-tailed deer (Baumhoff 1963:168), was an important animal throughout the North Coast Ranges. While it was relatively rare in the lower montane coniferous forest, it was quite common in the redwood forest and the sclerophyll chaparral, woodland, and oak forests. The present-day

distribution of Odocoileus is quite different from its native spread, due to considerable alteration of the natural environment brought about by the modern population. There is some evidence that even the prehistoric population played an important part in the distribution of this animal. Baumhoff (1963:168) cited Longhurst, Leopold, and Dasmann (1952:11) as offering an excellent statement on deer environment and it is worthwhile to repeat it here, in part: "In terms of vegetation types, the areas of deer abundance were predominantly chaparral and oak woodland. Frequent burning doubtless helped maintain a high carrying capacity in these areas for game. Presumably lightning started most fires at higher elevations, but from all accounts the Indians set numerous fires in the coast ranges and foothills....The mechanism of Indian fires, tending to set back plant successions to sub-climax levels favorable to deer, undoubtedly contributed to the high numbers found originally in coastal and foothill areas. It was only after the heavy timber was broken up that deer attained high density in the California mountains."

Three species of grizzly bear (Ursus californicus, U. tularensis, U. colusus) appear to have been important throughout the sclerophyllic vegetation communities, but have been largely exterminated before their natural histories could be fully noted. It appears that the bears were omniverous, occasionally killing deer and elk, but also plucking fruits and nuts from trees and shrubs, which they ate by the mouthful. They were pre-eminently diggers, quite regularly securing and eating rodents, insects, roots, and bulbs. One or two bears might dig over several acres of land, destroying all the ground vegetation (Grinnell 1938; Shelford 1963;241). The black bear (Euarctos americanus) was seasonally

active within the redwood forest and appeared as scattered individuals in the lower montane coniferous forest. It was one of the few animals, however, that appeared to show a preference for the California Live-Oak-California White Oak Forest (Shelford 1963:245).

Mountain lions (Felis concolor) are primarily constituents of the broad sclerophyll biotic communities, but also permeate through montane forests as scattered individuals. The California bobcat (Lynx rufus) was most numerous in the foothill chaparral and was also found in oak woodland. Wolves (Canis lupus fuscus), never numerous, were originally present in sclerophyll vegetation. Coyotes (Canis latrans) were found as single individuals in the montane forest, but occurred in greatest number in sclerophyll vegetation.

Ingles (1961) listed a great deal of information on the large number of smaller mammals which are found throughout the North Coast Ranges. Some of the more important smaller mammals were the striped skunk (Mephitis mephitis), beaver (Castor canadensis), badger (Taxidea taxus), cottontail (Sylvilagus, sp.), jack rabbit (Lepus, sp.), ground squirrel (Citellus, sp.), pocket gopher (Thomomys, sp.), mouse (Peromyscus, sp.), and wood rat (Neotoma, sp.). Small burrowing animals and seed eaters were important in the ecosystem to a degree that their small size might not suggest. A ground squirrel burrow, for example, may displace more than 20 cubic feet of soil. The earth is brought to the surface and spread over the surrounding vegetation, usually killing it. Shelford (1963:248) described the process: "pulverized mineral soil, old nests, carcasses of squirrels, mice, snakes, lizards, toads, insects that have died in the burrow, feces and refuse plant material are all mixed together in the

mounds so as to fertilize a more luxuriant vegetation."

Common reptiles of the North Coast Ranges, especially of sclerophyll communities are the rattlesnake (Crotalus, sp.), common king snake (Lampropeltis, sp.), gopher snake (Pituophis catenifer), and garter snake (Thamnophis, sp.). Common amphibians are the yellow-legged frog (Rana boylei), Pacific tree frog (Hyla regilla), western toad (Bufo boreas), and spadefoot toad (Scaphiopus hommondi) (Shelford 1963:238ff.).

There are literally hundreds of different avian species which frequent the North Coast Ranges, either as part of a migratory cycle or as year-round residents. Several species of migratory waterfowl, for example, are attracted to Clear Lake. Important birds from the standpoint of the pre-European inhabitants were California quail (Lophortyx californicus), mountain quail (Oreortyx pictus), and mourning dove (Lenaidura macroura). In order to escape their predators, quail require environments which contain covers of brush, rocks, or small trees, and are thus most numerous in sclerophyll communities with such features. Raptorial birds, important in the biotic communities, include, for instance, golden eagle (Aquila chrysaetos), red-tailed hawk (Buteo jamaicensis), sharp-shinned hawk (Accipiter striatus), Cooper's hawk (Accipiter cooperii), screech owl (Otus asio), and the great horned owl (Bubo virginianus) (Shelford 1963; Hinton et al. 1965).

Several fish species were important for the pre-European inhabitants of the North Coast Ranges. Baumhoff (1963:169ff.) summarized and evaluated data on fish as a native food resource. King salmon (Oncorhynchus tshawytscha), silver salmon (Oncorhynchus kisutch), and steelhead trout (Salmo gairdnerii) were the most important fishes for the reason

of their annual or semiannual spawning runs. These runs were such that a great number of fish were available for a limited period of time so that concentrated labor yielded a relatively high return. Casteel (1970) summarized the distribution of native freshwater fishes in California.

A number of floral and faunal species are found in the specialized ocean shoreline environment. Seaweed, including palm kelp (Postelsia palmaeformis) and giant kelp (Macrocystes pyrifera) were important plant species. Abalone (Haliotis, sp.), clam (Saxidomus nuttali), and mussel (Mytilus californianus) were some important molluscan species (cf. Stewart 1943:60-61). Greengo (1951) has analyzed the molluscan content of archaeological shellmounds on San Francisco Bay and on the coast north of the bay. Although they were taken occasionally, sea mammals were not as significant for the coastal inhabitants of the North Coast Ranges as they were for the coastal residents of Northwestern California. The fur seal (Arctocephalus townsendi), sea lion (Zalophus californianus), and sea otter (Enhydra lutris) were the most important species.

Culture-Historical Setting

At the time of initial European contact, the physiographic region of the North Coast Ranges was inhabited by groups representative of four major linguistic stocks and two culture-areas. Athabascan-speakers held the northern districts, Penutian-speakers were established in the southern and eastern districts, while central districts were occupied by Hokan and Yukian-speakers (see Figure 9). With minor exceptions, the region is contained entirely within the Central California subarea of the California culture-area, as defined in earlier paragraphs. Kroeber

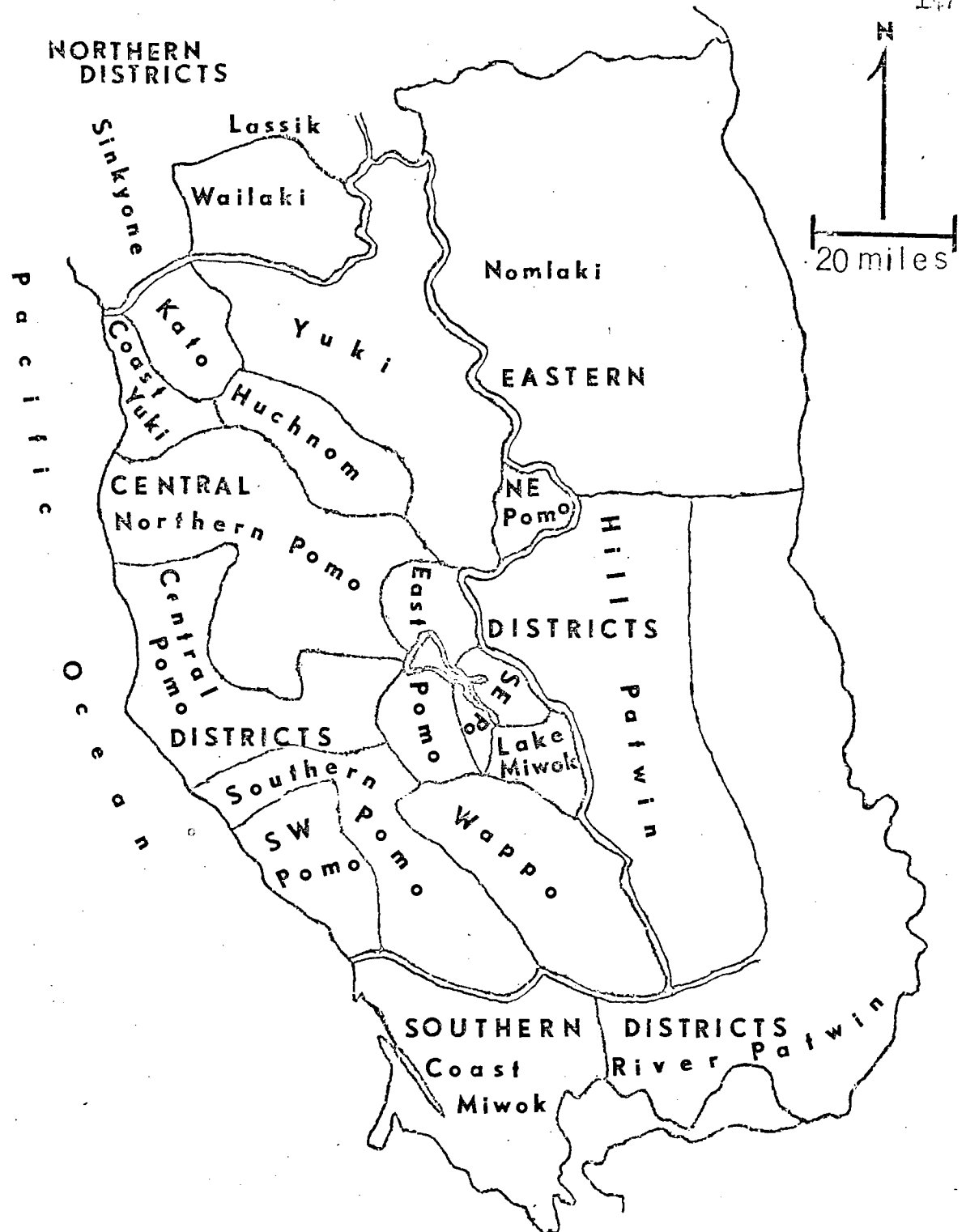


Figure 9. Archaeological Districts within the Physiographic North Coast Ranges.

(1939:192) placed one of the excepted portions, the northwestern-most part of the Coast Ranges extending from Cape Mendocino to the Trinidad Head vicinity, within the Lower Klamath subarea of the Northwest Coast culture-area. Kroeber assigned districts intermediate between these two culture-areas to a California-Northwest Transition area. This intermediate zone was inhabited by the Hokan-speaking Shasta of the middle Klamath, the Penutian-speaking Wintu of the upper Trinity, and the Athabascans of the Eel River Coast Ranges.

Northern Districts. On comparative and distributional grounds, it has been suggested that both the Athabascan and Algonkian-speakers of Northwestern California, including the Athabascans located within the physiographic borders of the North Coast Ranges, were relatively late settlers in their ethnographic territories (cf. Klimek 1935; Kroeber 1923). Glottochronology supports linguistic separation of approximately 1000 years for the Athabascan Kato and Hupa and slightly more than 2000 years for the Algonkian Yurok and Wiyot (Elsasser and Heizer 1966:5; Hoijer 1956; Hymes 1957; Kroeber 1959a). Archaeological investigations in Northwestern California beyond the boundaries of the North Coast Ranges and along the Oregon coast as far north as the mouth of the Columbia River have revealed until recently only late cultures, easily interpreted as being directly antecedent to the ethnographic groups (Elsasser and Heizer 1964, 1966; Gould 1966; Loud 1918). Relatively late entry of the historic groups is supported by a series of radiocarbon dates from Northwestern California and the Oregon Coast which indicate that the historic cultures had a time depth of no more than 1000 years (e.g., Buckley and Willis 1969:75; Elsasser and Heizer 1966:

103). With the exception of the Point St. George site in Tolowa territory (Gould 1966), the earliest levels of Northwestern California archaeological sites which have been investigated have yielded materials representative of a culture-type essentially identical with that of the ethnographic peoples. These sites, from their earliest beginnings into the historic period, have provided assemblages characteristic of what might be called here the Gunther Pattern (cf. Elsasser and Heizer 1964, 1966), which would correspond closely to the descriptions of the ethnographic cultures of the Northwestern California subarea (cf. Kroeber 1920).

A single exception to this pattern has been found in the lower levels of the Point St. George site, where Gould (1966) indentified a culture-type that did not appear to have the same basic adaptation as later cultures. For example, there was little evidence of the complex fishing industry of the typical Northwestern California coastal peoples. Lithic material in the form of chipped stone projectile points was common, but there was no evidence of the specialized work in bone and antler, ground stone, and wood characteristic of the Gunther Pattern. Gould (1966:63) considered the flint-chipping traditions of the early cultural component to be unlike those described for other sites along the coastal zone of northern California and southern Oregon, and suggested a tentative relationship with interior sites. Gould (1966:77) also reported that while the late materials were readily recognized by living Tolowa Indian informants, this was not true for the earlier materials. A radiocarbon date of 310 ± 210 B.C. (I-4006; Buckley and Willis 1970:116) has been obtained for the early Point St. George component.

Whether or not the early component at Point St. George represents the initial entry of either Algonkian or Athabascan-speaking peoples into the northwestern portion of California must remain speculative at this time. Conceivably, even earlier cultural manifestations could be discovered in the region, especially in view of recent findings at Cascadia Cave in the Willamette Valley of Oregon, where an assemblage including Cascade points was dated by radiocarbon as beginning 5960 ± 280 B.C. (Newman 1966). That more early sites have not been found in Northwestern California may be due to sampling error. That is, the settlement and resource utilization patterns of any earlier culture would likely differ considerably from those of the late period and survey methods may not take these differences sufficiently into account.

One additional point relevant to the prehistory of the North Coast Ranges has been made by Elsasser and Heizer (1966; see also Klimek 1935:31-33; Whitehead 1968) with respect to the Kato, an Athabascan-speaking group imbedded between the Coast Yuki and the Yuki proper: "The Kato are of special interest since they are physically of the distinctive Yuki type. Such a shift -- presumably one of a Yuki group acquiring a new language -- ought to be traceable archaeologically, and with reasonable success in such an effort a new linguistic time depth datum could be secured."

Eastern Districts. The eastern districts of the North Coast Ranges, as well as the southern districts, were occupied by Penutian-speakers. Unlike the Athabascan-speakers, who appear to have had a relatively shallow time depth in their Northwestern California location, Penutian-speakers in California are believed to have considerable time depth.

Linguistic and historical reconstructions discussed earlier in this essay (cf. Hopkins 1965; Klimek 1935; Kroeber 1923; Taylor 1961) strongly support a long period of occupation of Central California by Penutian-speakers, possibly equaling Hokan-speakers in time depth. Baumhoff's (1957) suggestion that Hokan glottochronology, which shows divergences of 3500 to 4000 years for Californian groups, may be associated with Penutian entry into the state has been discussed earlier.

Penutian-speakers in the North Coast Ranges are represented by members of two language families, Wintun and Miwok. Wintun groups situated within the physiographic North Coast Ranges are the hill tribes of the Nomlaki and the Hill Patwin. Miwok groups include the Coast Miwok and Lake Miwok. Kroeber (1932:253) noted that Patwin and Wintun were mutually unintelligible languages, and, according to Broadbent and Pitkin (1964:35), they were nonetheless regarded as comparable in closeness as Spanish is to Portuguese. As a result of their comparative analysis of Miwok and Wintun, however, Broadbent and Pitkin found a much more extreme difference, that although Wintun and Patwin do appear to be related to one another, they "may constitute two distinct families within California Penutian." By contrast, the several Miwok languages of California appear to be "comparable in degree of closeness to a branch of Indo-European such as Ibero-Romance." Within this context, Coast Miwok and Lake Miwok are more closely related to one another than to any other of the Miwok language (Broadbent and Callaghan 1960).

The Hill Patwin inhabited the eastern foothills of the North Coast Ranges from south of the Willow Creek drainage, occupied by the Nomlaki

Wintun, to the foothill portion of the lower Cache Creek drainage. Although Kroeber (1925:Pl. 34) indicated on his map of Wintun territory that the lower Napa Valley was occupied by Southeastern (or River) Patwin, in his later work on the Patwin (1932:262) he acknowledged lack of satisfactory data but conjecturably assigned the lower Napa Valley and foothill portion of the Putah Creek drainage to the Hill Patwin. The Nomlaki Wintun were situated to the north in the adjacent Coast Range foothills, from the Willow Creek drainage to the south fork of Cottonwood Creek. Beyond the Nomlaki to the north were the Wintun, situated in the southeasternmost portion of the Klamath Mountain section of the Pacific Mountain System (Kroeber 1939: 191ff.).

A considerable amount of archaeological work, much of it in connection with reservoir planning and construction, has been conducted in the foothills and eastern slopes of the North Coast Ranges, the majority of it in Wintu territory. Before much work had been carried out, however, Meighan (1955), on the basis of very sketchy information, attempted a synthesis of the prehistory of the North Coast Ranges, arriving at a formulation of six complexes, Borax Lake, Mendocino, McClure, Wooden Valley, Clear Lake, and Shasta. Of most relevance here in regard to the Wintun-speakers of the eastern slopes of the North Coast Ranges is the Shasta Complex, a protohistoric expression which included the territory of the interior Yukian groups of the Coast Ranges proper as well as that of the northern Wintun-speakers. One of the characteristic features of the Shasta Complex is the small-stemmed, long-barbed projectile point (Meighan 1955:33) which was later named the Gunther-barbed point (Treganza 1958:14-15; Treganza and Heicksen

1960:17-18). Other features of the complex were large, thin, bipointed chert blades, slab mortar used with a basket hopper, bulbous-ended and tear-drop shaped pestles, clam disk and pine nut beads, and rare spindle-shaped and phallic charmstones.

As information accumulated from the eastern foothills and northern Sacramento Valley (e.g., Treganza 1954, 1958, 1959), the views developed that the Shasta Complex might well be found to have "two or more phases" (Treganza and Heicksen 1960:2-3) and probably dated back beyond the A.D. 1600 suggested by Meighan to perhaps A.D. 900. A recent workshop summary of Wintun archaeology (Edwards 1968) tentatively proposed three phases for the Shasta Complex, retaining the suggested beginning date of A.D. 900, as well as two additional complexes, Bella Vista and Northern Milling Stone. The Bella Vista Complex is represented by a single site (Sha-286) in the Redding locality and is dated only as prior to the Shasta Complex. Distinctive artifacts of the Bella Vista Complex are large projectile points (corner-notched, side-notched, and with "stem and lopped base"), a stone ball, and a stone ring. Small points, including variants which appear to fall within the range of the Gunther-barbed type, also occur. The Northern Milling Stone Complex, guess-dated at 3000 to 4000 years before the present, is represented by a number of sites from Thames Creek (situated in Nomlaki territory) to north of Redding (Wintu territory) (cf. Edwards 1969). This presumably early complex is discussed in more detail in a later section of this paper.

Additional survey and excavation in the foothill portion of Nomlaki territory have revealed materials which appear to date almost exclusively from the historic and protohistoric periods (cf. Chartkoff and Childress 1966; Treganza and Heicksen 1969; Woolfenden 1969). Suggestions of earlier

periods exist, but not in definitive contexts. For example, Treganza and Heicksen (1969:41) in regard to their work in the Black Butte Reservoir reported: "What we did anticipate finding, however, were mano and metate sites along the higher terraces or in the rolling hills adjacent to the stream courses. No such sites were found there although they were known to the south, west, and north of the immediate area. Mrs. Henthorn of Grindstone had both manos and metates in her collection but could not identify them as coming from any one specific site."

Southern Districts. The southernmost portions of the North Coast Ranges, ending at San Francisco Bay, were held by the Coast Miwok and Patwin. The Penutian-speaking Coast Miwok occupied what is today Marin County and the southern part of Sonoma County. They held the territory north of the Bay from the Pacific Ocean to the Sonoma Valley. Kroeber (1925:273-74) remarked that conflicting evidence suggested ownership of the Sonoma Valley by either Coast Miwok or Patwin, although Heizer (1966:19), in his revision of Kroeber's handbook map, followed a later proposal of Kroeber's (1957:216) and assigned the Sonoma Valley definitely to the Coast Miwok. The Penutian-speaking Patwin, either River or Hill (cf. Kroeber 1925:Pl. 34, 1932:262), extended westward from their primary territory (the western side of the Sacramento Valley, including the foothill elevations of the North Coast Ranges), into the southern portion of the Napa Valley.

Archaeological investigations in the southeastern margins of the North Coast Ranges, in the territory that in the pre-European period was claimed by the Patwin, have revealed a sequence of cultures which appear to have relations with both the lower Sacramento Valley and the North

Coast Ranges (cf. Arnold and Reeve 1959; Elsasser 1955; Heizer 1953; McGonagle 1966; Palumbo 1964; Robinson 1964; Treganza 1955). The proto-historic period in this region is characterized by a variant of the Augustine Pattern, to which Meighan (1955) has given the name Wooden Valley Complex. The most distinctive trait of this complex is a series of small sandstone slabs, many of which are decorated with red and white geometric motifs. Wooden Valley, a small upland valley situated at the headwaters of Suisun Creek northeast of the city of Napa, is in borderland territory between the Wappo and Patwin with its precise occupants unknown, although McClellan (1953:233) suggested probable Patwin ownership. The distribution of the distinguishing sandstone slabs does not at this time assist in attributing Wooden Valley to either the Wappo or the Patwin since they are found in the ethnographic territories of both groups (cf. Arnold and Reeve 1959; Heizer 1953; Edwards 1968). When a larger sample of such items becomes available it is possible that stylistic analysis might shed insight upon this question.

On the basis of artifactual similarities, Meighan (1955:29) observed that the Wooden Valley Complex "looks like an intrusion of Late Sacramento Valley peoples in proto-historic times." Although much more data and detailed analyses are needed before this possibility can be adequately tested, there is some suggestion in the archaeological record that during the Lower Emergent Period (i.e., Phase 1, Late Horizon) the peoples of this district, as well as peoples of adjoining districts to the west, did not participate as fully in the culture-type characteristic of the lower Sacramento Valley as they did during the following protohistoric Upper Emergent Period. For example, cross-dating evidence,

such as rectangular Olivella beads, small, multiserrated, parallel-stemmed projectile points, and tubular stone pipes, sometimes with a single flange (Heizer 1953), is found in both Wappo and Patwin territories and supports the inference of occupation by Augustine Pattern peoples during the Lower Emergent Period (cf. Beardsley 1954:78; Bennyhoff 1968b). However, the burial assemblages of this period, insofar as present data show, lack the associative complexity of the lower Sacramento Valley, especially with respect to furnishings of shell beads and ornaments. This could be interpreted as an indication that the ceremonial patterns of the two regions may have differed significantly.

In this regard Kroeber's (1932:401-402) remarks on the time depth of the Kuksu ceremonial system are relevant. Kroeber granted "a millennium or two" for the development of the system and saw its origins as probably resting in the Sacramento Valley. Bennyhoff (1961:237-38) accepted a Delta hearth for the Kuksu system and suggests that "both ancient and intrusive ideas were fused into a religious complex about A.D. 300." Bennyhoff stated, "By one interpretation inferrable from burial associations, this religion diffused outward to the north and west in the form of public dance ceremonies. Restriction of performances to the men's secret society may have been a protohistoric development. Constant accretion and reorganization would seem indicated, and the River Patwin, centrally located and least affected by European settlement, were able to add elements developed by their neighbors and to preserve far more of the aboriginal content than other Valley groups." Within this context, then, the burial patterns in the southern portions of the North Coast Ranges during the Lower Emergent Period suggest that the proto-Kuksu system was not as fully developed there as it was in the

Delta region. There is some suggestion that the ceremonial system spread to the north and south before spreading to the west, since recurring similarities in burial furniture are found from Oroville in the Sacramento Valley (Olsen and Riddell 1963) to Los Banos in the San Joaquin Valley (Riddell 1968). This question needs to be investigated more fully.

Archaeological explorations within the southeastern margins of the North Coast Ranges have also yielded evidence of occupation during the Upper Archaic Period (i.e., Middle Horizon period) (Arnold and Reeve 1959; Elsasser 1955; Johnson 1968; McGonagle 1966). Materials from these sites show similarities with Berkeley Pattern materials (Olivella beads and Haliotis ornaments) from the lower Sacramento Valley as well as with Houx Pattern materials (projectile points) from the North Coast Ranges (Fredrickson 1961a). There also appear to be particularly close relationships between the Berryessa Valley Upper Archaic sites and the Napa Valley Upper Archaic sites (Arnold and Reeve 1959; Elsasser 1955; Heizer 1953), though total samples are relatively small.

Finally, there is sporadic evidence of occupation in these southeastern districts during the Lower Archaic Period. A single burial without grave furnishings was found in a stream cut in the Capay Valley and assigned by Heizer and Cook (1953:26; cf. Harradine 1953) on the basis of chemical analysis of the bone to "a date lying in the late range of the Early culture period, or the early phase of the Middle period." Johnson (1968) reported a Lower Archaic Period component, also from the Capay Valley, which included manos, boulder metates, and a variety of beads and ornaments. In Indian Valley, at a considerably higher elevation than Capay Valley, Orlins (1971) reported a survey which resulted in finding chipped and ground stone tools characteristic of the Borax

Lake Complex (cf. Meighan 1955). Orlins (1972) also reported obsidian hydration rim readings from Indian Valley which range up to 8.7 microns, possibly dating up to 8000 years B.P. These presumably early Indian Valley finds will be discussed in more detail in a later section of this paper.

A considerable amount of archaeological work has been conducted in the southwesternmost portion of the North Coast Ranges, in territory that was claimed by the ethnographic Coast Miwok, whose range was predominantly in Marin County. While Kroeber (1925:275) remarked that the Coast Miwok, as well as the linguistically close Lake Miwok, were culturally "tributaries of the Pomo," Emergent and Upper Archaic Period archaeology also suggests strong relationships between the prehistoric cultures in Coast Miwok territory and the cultures of the Costanoan-speakers in the San Francisco Bay region (Beardsley 1954:82). Beardsley assigns the protohistoric cultural expression on the Marin-Sonoma coast to the Estero Facies of the Marin Province of the Late Horizon, but does not identify an equivalent culture on the Marin bay shore, stating that evidence for such a culture "is curiously scarce." Such evidence has since been discovered (cf. Meighan 1953b), but the situation remains that Beardsley's comment generally hold true.

Since interior sites in Coast Miwok territory do show evidence of protohistoric occupation (cf. King 1968b; NSHAC 1967), its expression named the Veronda Phase by King et al. (1966), the scarcity of such evidence in bay shore sites is worthy of comment. To account for the scarcity, Gould (1964) has suggested an economic reason for a shift in population from the bay shore region into the interior during the transition between the Lower and Upper Emergent Periods. Gould attributes

the move to the superior storage qualities of acorn over shellfish resulting in the consolidation of the acorn-focused economy. While this may be the case, other factors may be operating as well. For example, it may be that the bay shore sites represent a limited, seasonal sample of the Coast Miwok annual cycle. McGeein and Mueller (1955), for example, suggest that the faunal evidence from Mrn-20 on Richardson's Bay indicates that the site was occupied seasonally, probably during the fall and winter months, since over half of the indentified bird bone from the excavations is from species that populate the region only during these seasons, with the remaining species being year-round residents. Mrn-20 appears to fall temporally into a transition period between the Berkeley Pattern and the Augustine Pattern, but this same cycle may have persisted into the protohistoric period. This hypothesis could be tested by archaeological investigation of settlement patterns for the Coast Miwok communities which utilized the bay shore.

Another possibility, not exclusive of the ones just mentioned, is that the definition of the protohistoric culture-type is heavily dependent upon trade items so that its recognition is retarded when the group under investigation did not participate fully in the value system reflected by the trade goods. In this regard it is significant to cite Beardsley's (1954:61) comment on the protohistoric Estero Facies of the Marin-Sonoma coast: "The most significant accretion to Estero Facies is the clam disc complex of clam disc beads, steatite and magnesite beads. Olivella type 3a1 beads, and the large Tivela tubular bead." It should be clear that these are all items which are involved in trading transactions (cf. Davis 1961).

The protohistoric period on the Marin-Sonoma coast has been of

considerable archaeological and historical interest because of the contacts made by sixteenth century European explorers. These contacts began in 1542 with Cabrillo, who apparently anchored on the coast between Drake's Bay and Bodega Bay. Next, in 1579, was Drake, who spent five weeks presumably in the Drake's Bay vicinity. Drake's visit was followed in 1595 by Cermeño's Drake's Bay shipwreck. Beardsley (1954:15ff.) summarized these early contacts, as well as some later ones. The recovery in 1940 of Chinese porcelain and iron spikes from archaeological sites in the Drake's Bay region, materials inferentially attributed to Cermeño's visit (cf. Beardsley 1954:55ff.; Heizer 1941a; Meighan 1950), prompted a great deal of attention to be focused upon this region in the hope of finding more definitive evidence of contact. Both archaeologists and historians have worked in the region and have recovered a considerable amount of sixteenth century material with some debate resulting concerning its meaning as well as the meaning of the contemporary sixteenth century accounts (cf. Aker 1965; Dillingham and Aker 1960; Heizer 1947; von der Porten 1963).

Of most relevance here are questions of culture-contact and the influence of the early contacts upon traditional pre-European culture. The similarity between the dates for these early contacts and the dating for the beginning of the protohistoric period is close enough that the possibility must be considered of a contact-derived stimulus for the changes represented during this period. Heizer (1947) has inferred from contemporary descriptions that the native inhabitants who had contact with Drake made use of clam disk beads. If this inference is accepted, then the prior emergence of the protohistoric is documented. Treganza and King (1968:76ff.), however, have questioned Heizer's inference,

remarking that the sixteenth century description "fits several kinds of Olivella sp. beads at least as well as it does the generally thicker, larger, less shiny and bonelike clam disc beads." Treganza and King (1968:77) assumed that the Coast Miwok "invented" the clam disc bead form, apparently basing their assumption on Gifford's (1967) report that the Coast Miwok were the principal manufacturers. They proposed the hypothesis "that the inception of the clam disc bead industry, at Drake's Bay at least, was a post-16th Century phenomenon," and suggested testing the hypothesis by stratigraphic excavations in the Drake's Bay vicinity.

The questions brought up by Treganza and King are indeed important, but perhaps not as simply answered in the manner suggested. This is not the context in which to consider the problem at length, but several factors which should be included in testing such a hypothesis can be mentioned. To begin with, I believe it is unsound to assume that the Coast Miwok developed the clam disc bead. Ethnographic comments on importance and distribution of culture traits can lead to false historical inferences, as is evident when it is recalled that Klimek (1935) attributed clam disc beads to a relatively early period of origin in California. The archaeological record, of course, shows the beads to be quite late. Initial appearance must be documented archaeologically, not assumed. Next, if the sixteenth century accounts describe Olivella beads rather than clam, it would be useful to have supporting evidence in the form of large numbers of such beads from coastal archaeological sites. While admittedly a limited sample, Beardsley (1954:44ff.) provided relevant information which suggests that such evidence might not be forthcoming. The largest cumulative number of Olivella beads recovered

from five coastal archaeological sites was 1900 Type 3c saucer beads, which are considered diagnostic of the McClure Facies. The next largest number of beads was 1773 clam disk beads, diagnostic of the Estero Facies. Type 2a rectangular Olivella beads, diagnostic of the early portion of the Late Horizon, following McClure and preceding Estero, were of rare occurrence. Type 3a1 lipped Olivella beads occurred in relatively large quantity, 746, but almost 70 percent were co-occurrences with clam disk beads. The present evidence regarding cultural sequences on the coast rules out Type 3c saucer Olivella bead as a candidate to fit the Treganza and King hypothesis. Type 3a1 lipped Olivella bead is temporally suitable as such a candidate, but its temporal priority in significant numbers over clam disk beads is not supported by present evidence. Finally, the Treganza and King argument that clam is less bonelike in appearance than Olivella must be taken in the context that the Pomo, representative of groups to whom clam shell disk beads were important, referred to clam shell as "water bone" (Loeb 1926:176-178), suggesting that the fresh clam shell beads were more bonelike in appearance than those recovered from archaeological sites.

The available evidence from the Lower Emergent Period in Marin County shows similarities with the southeastern district of the North Coast Ranges. That is, the Marin district was occupied by Augustine Pattern peoples, but burial practices suggest that that proto-Kuksu ceremonial system was lacking, or at most poorly developed at this time. No single component Lower Emergent Period site has yet been reported, although multicomponent sites with various combinations of early Augustine Pattern, late Augustine Pattern, and Berkeley Pattern have been investigated

(cf. McGeein and Mueller 1955; Meighan 1953b; King et al. 1966).

On the coast, Beardsley (1954) has tentatively identified early Augustine components, which he assigned to the Mendoza Facies. On the bay shore, equivalent components were assigned to the Emeryville Facies, although Beardsley acknowledged that fuller data might warrant formulating a larger number of facies, presumably with Marin being separated from the east and west bay.

Beardsley (1954) assigned Berkeley Pattern sites on the bay to the Ellis Landing Facies and on the coast to the McClure Facies. Meighan (1955:28-29) based his description of the McClure Complex on Beardsley's account of the McClure Facies, but has drawn as well upon an examination of materials from Son-299 at Bodega Bay. Meighan included Marin bay shore sites in the McClure Complex rather than the Ellis Landing Facies. Davis and Treganza (1959:70) have tentatively established a second Berkeley Pattern facies, Patterson, which they proposed was earlier than both Ellis Landing and McClure. They suggested that the Marin-Sonoma coast had a temporal equivalent, probably dating more than 2500 years ago, in the lower levels of Son-299.

Mrn-27, a Berkeley Pattern site on the Tiburon Peninsula, has been assigned by cross-dating of Olivella and Haliotis beads "to the middle of the Middle Horizon" (Fredrickson 1970). The beads were frequent grave associations at the site, and charcoal obtained from a cremation with such an association yielded a radiocarbon date of 30 ± 95 B.C. (I-3148), while charcoal associated with a stratigraphically deeper primary interment without artifactual associations yielded a radiocarbon date of 370 ± 190 B.C. (I-3149) (King 1970). This dating is internally

consistent and appears to be compatible with the date of 389 ± 150 B.C. (C-690) obtained for the Ellis Landing component at Ala-328, from which component Olivella beads similar to those from Mrn-27 were recovered (Davis and Treganza 1959:63, 70).

King (1970) considered the archaeological findings at Mrn-27 especially significant because they seemed to indicate an organized cemetery, unlike the usual McClure Facies practice of what appears to be "unplanned dispersion." King (1970:22ff.) has interpreted the Mrn-27 remains to mean that ascribed rank, probably gained on the basis of membership in lineages organized along ramage principles (cf. Kirchhoff 1955), was an important element of social structure.

No sites dating from the Lower Archaic Period or sites showing evidence of a milling stone component have yet been reported from the Marin district. Treganza and King (1968:42) reported finding in the Point Reyes vicinity a chipped stone artifact which they stated "rather closely approximates the form of 'zoomorphic' eccentric associated with the Borax Lake Complex." The illustration of the artifact provided in their report does not convince this observer that it has been accurately identified.

Central Districts. The central portion of the North Coast Ranges, the territory controlled by ethnographic Pomo, Lake Miwok, and Yukian groups, is considered here to comprise the North Coast Ranges archaeological region. This region is part of the Central California subarea, but distinct from the surrounding San Francisco Bay, Delta, and Sacramento Valley regions of the same subarea, and the Northwestern California region of the Northwest Coast area. The culture-historical

		Northern Districts	Eastern Districts	Southern Districts			
		Historic Groups					
1800		Tolowa Yurok Wiyot Karak	Wintu Nonalci	Patwin	Coast Miwok	Bay Costanoans	
300	Emergent Per.	Gunther Pattern	Shasta Complex Bella Vista Complex	Augustine Pattern	Wooden Valley Complex	Estero Facies (Interior; Verona Phase)	Fernandez Facies
	AD BC	Point St. George II	Lake Pattern		Berkeley Pattern	Mendoza Facies	Emeryville Facies
2000	Upper Archaic Per.			Northern Milling Stone Complex		McClure Facies	Ellis Landing Facies
	Lower Archaic Period					Early San Francisco Bay Culture	
<p>Note: Older terminology is written horizontally; terminology proposed in this paper is written vertically.</p>							

Figure 10. Cultural Sequences in Peripheral North Coast Ranges Districts.

data already reviewed from the northern, eastern, and southern districts of the geomorphic North Coast Ranges suggest that these districts have cultural affiliations with the groups of adjoining geomorphic provinces that are as strong if not stronger than affiliations with groups of the central districts. Additionally, some of the information covered earlier gives indication that the borders of the North Coast Ranges archaeological region may have shifted to some extent from one period to another. Refer, for example, to Meighan's (1955:29) observation that the Wooden Valley Complex appeared to be a protohistoric intrusion of Sacramento Valley peoples.

Shifts in boundaries aside, ecological determinants, including both resources and terrain, appear to have played an important role in maintaining the separateness of the North Coast Ranges region. It is probable that social factors also may have played a part in preserving the region's separateness. For example, hostility hindered Yukian trade to the north and most of their trade was with peoples to the south (cf. Sample 1950:3). The specialized environments provided by San Francisco Bay and the large Sacramento River allowed adaptations for bayshore and riverine groups that were not available for groups in the central portion of the North Coast Ranges. No large rivers were present and the largest body of water was the specialized interior environment of Clear Lake. The peoples of the North Coast Ranges utilized coastal resources as well as the localized resources of Clear Lake and the small mountain rivers, but this utilization seemed to function more as a divergent influence rather than as one bringing about significant convergence with adjoining regions. Baumhoff (1963) has demonstrated that population size in

the North Coast Ranges was heavily influenced by availability of acorns and game and little influenced by availability of fish, which was a significant resource in surrounding regions. Coupled with this was a relatively rugged terrain along much of the regional boundary which seemed to retard to some extent the exchange of goods and ideas between the North Coast Ranges and other regions (cf. Sample 1950:3).

All three language stocks of the North Coast Ranges, Yukian, Hokan, and Penutian, are believed to have considerable time depth in California. Earlier discussions in this essay have cited Kroeber (1923) and Klimek (1935), as well as various glottochronological and archaeological reconstructions (e.g., Baumhoff and Olmsted 1963; Hopkins 1965), with respect to this view. While Baumhoff and Olmsted (1963, 1964), have proposed the working hypothesis that Central California's Early Horizon was a manifestation of an early Hokan culture-type with the Middle Horizon representing a Penutian intrusion, they do not offer any suggestion as to early Yukian relations with either Hokan or Penutian. Linguistic data are unclear with respect to broader Yukian relationships. Whitehead (1968:6-8), in his recent examination of Yukian physical anthropology, has summarized views on Yukian linguistic relationships and concluded that no general consensus existed with respect to Yukian affinities, despite data which have been interpreted to suggest ties with a number of linguistic entities, including Penutian, Hokan, and Siouan (cf. Elmandorf 1963; Shipley 1957). Physical anthropology is no more revealing in this regard. Whitehead (1968:90), after a detailed comparative analysis of Yukian anthropometry and a careful examination of the many hypotheses regarding the wider relationships of the Yukian physical type,

comes to the conclusion that "the Yuki cannot be proven to be related biologically to any other known people. This strongly suggests that the Yuki type represents a localized one which has become differentiated through the processes of genetic drift and natural selection. The broader affinities of the Yuki still remain an area for further research."

The Yukian-speaking Wappo formed a linguistic island separated from the northern Yukian groups by about 40 miles of land that was claimed by the Pomo (Barrett 1908; Driver 1936; Kroeber 1925:217-21). The Wappo occupied the northern part of the Napa Valley with their territory extending further north to include some of the highest elevations of the southern North Coast Ranges. While linguistically related to the Yuki, the Wappo were physically dissimilar, not sharing the distinctive Yuki physical type but being more similar to their non-Yukian neighbors. Likewise, the Wappo at the time of European contact were culturally closer to the Pomo than to the Yuki. Driver (1936:219) commented that "the acculturation of the Wappo by the Pomo was practically complete." At the present time there is insufficient archaeological information to allow more than speculation with respect to Wappo time depth in their ethnographic localities.

Despite the stated similarity of the Wappo with the Pomo, the archaeological evidence for the protohistoric period in the southern portion of Wappo territory (the northern portion being virtually unknown archaeologically) shows close similarities with materials from the lower Sacramento Valley as well as from San Francisco Bay and the Marin Coast (cf. Heizer 1953). The painted sandstone slabs, characteristic of Meighan's (1955) Wooden Valley Complex, are found in the Napa Valley portion of Wappo territory and link the locality with Patwin localities

to the east. Meighan (1955:33) also saw evidence for his protohistoric and historic Clear Lake Complex in the Napa Valley.

Archaeological investigations in Wappo territory reveal Lower Emergent Period parallels with the southern districts of the North Coast Ranges which have already been discussed. There is sufficient evidence to allow the inference of occupation by Augustine Pattern peoples, but burial assemblages of this period do not have the associative complexity of shell beads and ornaments characteristic of the lower Sacramento Valley. It has already been suggested that this may be an indication that the ceremonial systems of the two regions may have had significant contrasts.

Excavations in the lower levels of two sites in ethnographic Wappo territory have disclosed materials attributable to the Upper Archaic Period. Insufficient goods have been recovered to allow precise statements with respect to cultural affiliations. Berkeley Pattern similarities were emphasized by Heizer (1953:306) who pointed out relationships with the lower Sacramento Valley and by Meighan (1955:33-34) who remarked that the "general pattern looks somewhat like cultures of the Middle Horizon on San Francisco Bay, but more detailed definition is necessary before the affiliations of the complex may be seen." The present author (Fredrickson 1961a) has remarked upon some similarities between projectile points from the Upper Archaic Period of Napa County and those characteristic of the Upper Archaic Houx Pattern.

Finally, Meighan (1953a, 1955) has suggested similarities between early Napa County sites which contain manos and metates and the Borax Lake site, subsuming all these materials under the rubric Borax Lake

Complex. The present writer (Fredrickson 1961b), working with materials collected from Nap-131 subsequent to Meighan's (1955) North Coast Range synthesis, has distinguished two cultural components at the site. In addition, Gamst and Shkurkin (1963) have analyzed surface collections from the site, while Cook and Heizer (1965) reported on chemical analysis of the site's soil, comparing it with the soil of the later Nap-1. These early Napa materials will be discussed in more detail in a later section of this paper.

Very little archaeological investigation has been conducted in the territories of the northern Yukian groups, the Yuki, Huchnom, and Coast Yuki. Cook and Treganza (1950), in a comparative quantitative investigation of archaeological site constituents, reported the results of the analysis of three Round Valley sites, all of which fell into the protohistoric and historic periods. Treganza, Smith, and Weymouth (1950) reported on a survey in Yuki territory, tentatively identifying both northern and southern influences. Two more recent surveys have been conducted in Yuki territory in conjunction with proposed reservoir construction (Edwards 1966; King 1966). Viewing the results of these surveys from the perspective of present knowledge, at least three broad chronological periods would seem to be represented in Yuki territory during prehistoric times. These periods are most easily characterized by their respective milling implements. The most recent prehistoric period, the protohistoric, is represented by hopper mortars, identical in type with tools reported ethnographically (Essene 1942: 14; Foster 1944:169). The next most recent period, whose chronological position with respect to the Lower Emergent and Upper Archaic Periods cannot yet be stated, is represented by portable mortars. Such

implements were not a part of the recorded cultural inventory of the ethnographic Yuki, but it is reported (Treganza, Smith and Weymouth 1950:117) that "a specimen in a store in Round Valley is avoided and looked upon with fear by the local Indians, which seems to imply at least a mythological knowledge of the implements." The earliest period which can be distinguished on the basis of the preliminary surveys is the Lower Archaic Period, possibly represented by a variant of the Borax Lake Pattern, which is characterized by manos and metates. Of course, more work is required to document and fill out the details of this proposed sequence.

A single survey within a proposed reservoir area has been conducted within Huchnom territory (Childress and Chartkoff 1966). Predominantly late sites were discovered and the chronological implications of the survey were summarized by Childress and Chartkoff (1966:22) as follows: "The late artifact forms appear to be associated more with the Clear Lake Complex forms than the Shasta forms described by Meighan (Meighan 1955). Earlier artifacts have some relevance to the Mendocino Complex, but what it is should not be ventured at this stage. The presence of hopper mortars and pestles, with the lack of manos and metates should not be regarded too seriously in light of the small sample."

Although virtually unknown with respect to substantive archaeological knowledge, the Coast Yuki have been the subject of a speculative essay regarding their early prehistoric relationships (Thomsen and Heizer 1964). Noting the oft-made observations that the northern Yukian groups were physically distinctive, linguistically isolated, and culturally candidates for autochthonous Californians (cf. Gifford 1926;

Dixon and Kroeber 1919; Schmidt 1936), Thomsen and Heizer (1964) introduced botanical and palaeontological evidence with respect to the closed-cone pine forest association to bolster the argument that an ancient relationship might exist between the Yuki and the ancient peoples of the Santa Barbara region (cf. Boas 1905) and to suggest the investigation of the possibility that the Coast Yuki "may have represented a relict people, surviving in a relict environment." Reference has already been made to Whitehead's (1968) anthropometric study of the Yuki in which he concluded that no biological relationship between the Yuki and any other known people could be demonstrated and that the Yuki probably represented a group which had differentiated through genetic drift and natural selection.

Gifford (1965:13) placed the southern boundary of the ethnographic Coast Yuki north of Fort Bragg but south of the town of Cleone. Stewart (1943:32), however, placed the drainage of Ten Mile River, to the north of Cleone, within Northern Pomo territory. Thomsen and Heizer (1964: 49-51) discussed the contradiction, pointing out that while the Pomo excavated for their dwellings, Gifford (1965:45) reported that the Coast Yuki did not. A number of archaeological sites north of Cleone evidence house pits on their surfaces, suggesting, if Gifford's dwelling datum is correct, Pomo occupation. Investigations which I directed for the University of California, Davis, at Men-455, just to the north of the mouth of Ten Mile River (cf. SCA 1967:5) allow the hypothesis that the Northern Pomo claim on this territory might have been entirely post-contact.

Men-455 consisted of numerous clusters of about five to ten house pits situated in linear fashion along the top edge of a bluff overlooking

a deeply entrenched stream which emptied into the nearby ocean. The total number of house pits at the site approximated 100. On the basis of Gifford's (1965) data, Cook (1965:106) calculated the total population of the eleven local groups which comprised the Coast Yuki as being 750, which compares with Kroeber's (1925:213) estimate of "perhaps 500" for their population in the year 1850. Cook arrived at his figure by using 6.3 as the average number of houses per village and 6.0 as the average number of persons per house. Thus, a typical village would number about 38 persons. Applying Cook's figures to Men-455, if all houses had been occupied simultaneously the population would have been about 600 persons, a highly improbably^E number. Excavation by the UCD field party which sampled a number of house pits situated in different clusters revealed essentially the same characteristics for each: little or no midden accumulation, very little soil darkening, and glass trade beads, always of the same types. Although clearly more testing is necessary, the hypothesis formulated to account for the Men-455 data is that during the historic period the Northern Pomo extended their prehistoric territory by moving northward on a seasonal basis into territory previously held and utilized by the Coast Yuki.

One additional find of the UCD investigations was the discovery of a surface site in the near-vicinity of Men-455 from which were recovered a number of manos and heavy core and flake tools. No midden was in evidence and excavations into the site revealed only the natural gravels of the native soil. This is the northernmost coastal site which has yet shown evidence of the early milling stone technology.

The ethnographic peoples known collectively as the Pomo are represented by seven separate but historically related languages and

form part of the Hokan linguistic family (cf. Barrett 1908). Halpern (1964), disagreeing with Kroeber's (1925:227) reconstruction of historic relationships among the seven languages, has employed sound-correspondences to arrive at a genetic classification of Pomo-speakers. His results indicate a sequence of linguistic differentiation which he suggested has relevance to general culture-historical problems of the region. He (Halpern 1964:91) wrote: "The historical picture of the development of the Pomo languages suggests a hypothesis that the original territory of the Proto-Russian River Pomo was in the region between the Russian River valley and Clear Lake and that the linguistic differentiation accompanied a fanlike migration to the north, west, and south. In the course of such a migration the Pomo could have separated the Wappo from the Yuki, driving the one group south, the other north. This hypothesis accords with a suggestion made by Kroeber (1925:218) on different grounds." Oswalt (1964:149) cited Barrett (1908) in stating that among the seven Pomo languages there are vocabulary correspondences which vary from 36 to 82 percent, and he found a 76 percent vocabular correspondence between Kashaya (or Southwestern Pomo) and Central Pomo. While Oswalt utilized the 100-word lexicostatistic list to obtain this result, he warned against imputing a definite date of split between the two languages. At the same time, however, he compared the similarity of the two Pomo languages with the 75 percent correspondence calculated for French and Spanish.

Archaeologically, Pomo territory is little known. A number of systematic surveys have been made, mostly in conjunction with reservoir, park, and highway planning, but results of these surveys remain unanalyzed and

unpublished. A number of excavations of various scope have also been conducted by various institutions and agencies, but again the results are for the most part unpublished and the general rule is that the materials have been neither described nor analyzed. Thus, the number of sites and the amount of analyzed material upon which our understanding of the archaeology of Pomo territory is based remain only slightly changed from the time Meighan (1955) presented his preliminary synthesis of North Coast Range archaeology. Older materials, in particular those from the Borax Lake site, have been reanalyzed, however, to produce a more carefully detailed chronology (Meighan and Haynes 1968, 1970). In addition, comparative materials from nearby Lake Miwok territory allow for significant reorganization of portions of the early chronology in adjoining Southeastern Pomo territory (cf. Fredrickson 1961a).

Meighan's (1955) Clear Lake Complex represents the terminal phase of the archaeological sequence in Pomo and adjacent territories. Important traits for this period are the pestle and hopper mortar, small, triangular, corner-notched projectile points, clamshell disk beads, and tubular magnesite beads. The manufacture of these two bead forms is also a trait of the complex. Meighan (1955:31) stated that cremation was the most frequent mode for disposing of the dead, but that primary burial in a tightly flexed position was also practiced.

There is some evidence, admittedly slight, that cremation was adopted in Pomo and adjoining territories at a relatively late date, possibly during the protohistoric period, and in a relatively short span of time largely replaced burial. Thus, the Clear Lake Complex, insofar as it represents the protohistoric Upper Emergent Period, might ultimately be divided into two phases on the basis of presence or absence of cremation,

with cremation being the later mode for disposal of the dead. In support of this hypothesis the following findings are cited. In the Clear Lake vicinity Harrington (1948c; cf. Harrington 1943) conducted test excavations in a historic Pomo site on Rattlesnake Island, encountering only evidence for cremation. Harrington (1948b; cf. Harrington 1943) also carried out excavations on nearby Dollar Island, describing the whole eastern part of the island as "one great inky black midden" up to ten feet deep. Harrington (1948b:56) reported that the local Pomo "claim that their ancestors occupied it before they removed to Rattlesnake Island." Beads, including both glass and shell varieties, were recovered from on and near the surface, as were the typical protohistoric projectile points, small, triangular, and notched. While no cremations were reported for Dollar Island, a tightly flexed burial was uncovered at a depth of 59 inches. Harrington (1948b:56) was of the opinion "that Dollar Island was a Pomo site, probably from start to finish." Finally, at Lak-261, in nearby Lake Miwok territory two miles south of Lower Lake, this writer (Fredrickson 1961a) found no evidence of cremation but did expose several burials, dated to the protohistoric period on the basis of clamshell disk bead grave furnishing.

While the lower levels of the Dollar Island site might well represent the Lower Emergent Period, there is no direct evidence that it does. It is remarkable that throughout Pomo territory no clear indication of occupation during this period has yet been discovered. While there is certainly no reason to believe that this territory was not occupied at this time, the absence or rarity of the usual Central California artifacts diagnostic of this period, absence from both

excavation and survey, suggest an Emergent Period development in this region considerably different from that in the lower Sacramento Valley.

While no sites clearly representative of the Upper Archaic Period have yet been investigated in Pomo territory, surface and test finds in the vicinity of Clear Lake have yielded materials which fit into the Upper Archaic Houx Pattern as discussed in the following chapter. Some characteristic tools are the bowl mortar (rather than the later shallow, slab hopper mortar) and large, broad, triangular, stemmed projectile points. As yet the relationship of the Houx Pattern with Meighan's Clear Lake Complex cannot be stated. The lack of information regarding Lower Emergent sites militates against making inferences concerning historical relationships, despite the observation that a number of the point forms, such as willow leaf and lozenge-shaped, are shared by both the Houx Pattern components and the Clear Lake Complex. These forms are probably quite ancient in the region since they are also characteristic of the late phases of the Borax Lake Pattern (cf. Harrington 1948a; Meighan and Haynes 1970).

Meighan's (1955:27-28) Mendocino Complex is here considered to be a late phase of the Lower Archaic Borax Lake Pattern. Although no other such site has been reported upon from Pomo territory, with the possible exception of a site near Healdsburg which was briefly reported upon by an amateur (Graham 1951), Lak-261 contains a milling stone component which is also considered to represent a late phase of the Lower Archaic Borax Lake Pattern (Fredrickson 1961a). This site will be considered in more detail in the next chapter. Traits characteristic of the later portion of the Lower Archaic Period, both at Men-500

(the type site of the Mendocino Complex) and at Lak-261, are concave-based, lozenge-shaped, and leaf-shaped projectile points, carefully manufactured scrapers, and mano and metate which co-occur with mortar and pestle. Loosely flexed burials were exposed at Men-500, but none for this period at Lak-261. The working hypothesis proposed here is that the cultures of the later portion of the Lower Archaic Period in the North Coast Ranges have been influenced by changes taking place in the central portion of the state. This influence is seen most clearly in the importance of the mortar and pestle which ultimately replaces the mano and metate as the Borax Lake Pattern gives way to the Houx Pattern. It should be noted that there is as yet no indication of the Houx Pattern in the vicinity of Men-500. Survey results and museum collections show that Houx Pattern materials appear to be focused in Lake and Sonoma Counties.

The earliest identifiable phase of the Borax Lake Pattern is represented by artifacts from Lak-36, the Borax Lake site, first excavated by Harrington (1948a; cf. Harrington 1938a, 1938b, 1938c, 1945), with the obsidian artifacts recently seriated by Meighan and Haynes (1970; cf. Meighan and Haynes 1968) on the basis of obsidian hydration rim measurements. The history of interpretive views of this site was briefly discussed in the initial pages of this paper and the site will be discussed once more in the following chapter. The obsidian hydration results indicate that artifacts characteristic of this period include "wide-stem Borax Lake points, some coarse single-flake blades, and probably manos and metates" (Meighan and Haynes 1970:1220). While no other site attributable to the early portion of the Borax Lake Pattern

has yet been excavated, Orlins (1972) has obtained hydration rim readings for obsidian flakes from Lak-153, situated in Indian Valley in Patwin territory, which are comparable in magnitude to the readings from Lak-36.

The Borax Lake site also contributed the sole materials yet found in the North Coast Ranges which appear to be of prearchaic origin, representative of the Palaeo-Indian Period. Again based upon seriation of obsidian hydration measurements, as well as upon geological analysis, Meighan and Haynes (1970) estimated that the original occupation of the Borax Lake site may have occurred as long ago as 12,000 years. The diagnostic artifacts for this early period, as determined by hydration rim measurements, are chipped stone crescents and fluted, concave-based projectile points.

The final territory of the North Coast Ranges to be covered in this review is that assigned to the ethnographic Lake Miwok. The Lake Miwok were geographically separate from other Miwok groups, most of whom were located in the central portion of California's great interior valley and the Sierran hills adjacent to the east. Surrounding the Penutian-speaking Lake Miwok were the Hokan-speaking Pomo to the north and west, the Yukian-speaking Wappo to the south, and the Penutian-speaking Wintun to the east. Speaking of the Lake Miwok and the similarly isolated Coast Miwok, Kroeber (1925:272) posed the alternatives that they were "ancient emigrants of enterprise toward the west, or remnants of a once wider distribution."

The language of the Lake Miwok has been found to be more closely related to Coast Miwok than to any other of the Miwok languages

(Broadbent and Callaghan 1960). Kroeber (1932:368) remarks that the Lake Miwok were culturally more closely related to their Pomo neighbors than to their Patwin (Wintun) ones. Archaeologically, Lake Miwok territory is known primarily on the basis of sporadic surveys and the intensive excavation of Lak-261, located on Copsey Creek about two miles south of the town of Lower Lake. The archaeological sequence revealed by these data is virtually identical with that outlined above for Pomo territory. The Upper Emergent Period is represented by materials which fit into Meighan's (1955) Clear Lake Complex, with the qualification that cremation may be a late accretion to the complex (Fredrickson 1961a). No data are yet available for the Lower Emergent Period, while the Upper Archaic Period is represented by the Houx Pattern component at Lak-261. A late phase of the Lower Archaic Borax Lake Pattern is also found at the site. No earlier materials have yet been reported from Lake Miwok territory.

This review of the present status of archaeological knowledge for the North Coast Ranges shows only too clearly that the prehistory of the region is still largely unknown. It seems evident that more has been learned since Meighan's (1955) synthesis with respect to the earlier periods than with respect to the later ones. This increase in knowledge is in part due to the new substantive contribution of the Lak-261 excavations and in part due to reanalysis of older material in the light of the obsidian hydration technique. Little or no understanding of the origin of the protohistoric period has been gained and there is an apparent absence in the record with regard to the Lower Emergent Period. The seriation results of the application of the obsidian hydration method appears to be a new contribution, as well as the discovery and

definition of the Houx Pattern, discussed in greater detail in the chapter that follows.

		Central Districts				
		Yuki	Huchnom	Pomo	Lake Miwakt	Wappo
1800	Historic Groups					
	Emergent Period	Shasta Complex (hopper mortar)	Clear Lake Complex (crenation)		(burial)	Wooden Valley Complex
300	AD					Augustine Pattern
BC	Upper Archaic Period	(portable bowl mortar)			Hour Pattern	Berkeley Pattern
				Mendocino Complex		Middle Horizon Culture
2000	Lower Archaic Period	(milling stone)				
		Borax Lake Pattern (Thomas Creek Aspect)		Borax Lake Complex		
				(Borax Lake Aspect)		
6000	Palaeo-Indian Period					
				Post Pattern		
					Note: Older terminology is written horizontally; terminology proposed in this paper is written vertically.	

Figure 11. Cultural Sequences in Central North Coast Ranges Districts.

VIII

Early Cultures of the North Coast Ranges

The preceding review of archaeological investigations in the North Coast Ranges indicates that the most significant additions to knowledge of the prehistory of the region are the results of the reinvestigation of the Borax Lake site (Lak-36) by Meighan and Haynes (1968, 1970) and the stratigraphic investigations at the Houx site (Lak-261) by the present author (Fredrickson 1961a). Both of these endeavors are discussed in this chapter, along with other finds from the North Coast Ranges which can be linked with them. The early cultures which are represented by these finds are placed into a culture-historical framework with emphasis upon the pattern concept as explicated in Chapter Six of this essay, and discussed with respect to the concerns of California archaeology outlined in Chapter Two: history, culture, context, and process. The early cultures are subsumed under three archaeological patterns representing the Palaeo-Indian, Lower Archaic, and Upper Archaic Periods, respectively. One of the patterns, the Borax Lake, while defined somewhat differently than Meighan's (1955) Borax Lake and Mendocino Complexes, is familiar in both substance and concept, being representative of the early milling stone culture (cf. Wallace 1954). The pattern dates from the Lower Archaic Period. Stratigraphic and dating evidence for the Borax Lake Pattern now exist in sufficient amount to offset criticisms such as Heizer's (1964:130) summary comment, "until more investigation is carried out and some dating of these sites can be secured, this

suggestion of an early hunting-collecting culture should be considered only a hypothesis." Two other archaeological patterns are proposed here for the first time. The Post Pattern, dating from the Palaeo-Indian Period, is tentatively presented on the basis of the obsidian and geological studies conducted by Meighan and Haynes at Lak-36. No new data are given, however. The Post Pattern appears to be based upon an early lakeshore-hunting adaptation which recently has been suggested for this period in the far west (cf. Davis 1967; Warren 1967). The Houx Pattern, defined on the basis of stratigraphic excavations at Lak-261 and dating from the Upper Archaic period, is based upon previously unpublished data and appears to represent an adaptation based upon the acorn economy and hunting. While the possibility exists that other early patterns may yet come to light in the North Coast Ranges, virtually all currently available data can be included within these three patterns.

The Borax Lake Site (Lak-36)

Until recently, no discussion of North Coast Range prehistory would have been complete without some detailed consideration of the controversy and ambiguity surrounding the Borax Lake site (cf. Harrington 1948a; Treganza 1950). Hopefully, the restudy of the site by Meighan and Haynes (1968, 1970) has made such consideration primarily academic. Earlier in this essay the Borax Lake site was mentioned in two contexts, (1) to illustrate difficulties encountered in extending the three-horizon Central California sequence to regions other than the lower Sacramento Valley, and (2) as an example of a California archaeological site containing prearchaic materials. The site, the controversy surrounding it,

and the apparent resolution of the controversy will be summarized only briefly here. Wormington (1957) has discussed the arguments involved in the controversy and Meighan and Haynes (1970) have recapitulated the major themes.

The Borax Lake site was called to the attention of the archaeological profession in 1938 by Chester C. Post, an amateur collector who had recovered from the site a number of fluted points and other implements (Harrington 1948a:9, 67; cf. Harrington 1938a, 1938b, 1938c). Over a period of years M. R. Harrington of the Southwest Museum conducted investigations at the site which were reported upon in 1948 (Harrington 1948a). For a number reasons, Harrington's findings and their interpretation generated a good deal of argument. Much of the controversy derived from Harrington's interpretations and the manner by which he arrived at them. In my estimation, significant faults of Harrington's method were (1) that he assigned projectile points from the site to generic categories, such as Folsom, Pinto Basin, Silver Lake, Gypsum Cave, and Lake Mohave; (2) that he extended or modified the idealized categories to include specimens with only superficial resemblance to them, as with his Folsomoid category; and (3) that he linked the generic categories and their extensions to different prehistoric groups and took the presence of the several categories as indicative of visits to the site by several groups. Harrington (1948a:117-18) suggested an indigenous population for the Borax Lake site who "used willowleaf points, metates, manos, charm-stones, choppers, pointed scrapers, also rarely, mortars." He went on to suggest that "Other types of artifacts were probably brought in by visitors..." Harrington suggested that the

visitors came to the site to make use of nearby obsidian quarries, "leaving their 'calling cards' in the form of characteristic implements." Harrington also apparently underestimated the degree of disturbance of the site and chose a cultural answer to the problem he had in detecting stratigraphic changes: "The most plausible explanation of the fact that the artifact complex shows little if any change from bottom to top...is that the whole artifact-bearing deposit at Borax Lake was laid down within a relatively short time--perhaps within a few centuries" (cf. Meighan and Haynes 1970:1215). It is of interest (and perhaps only marginally relevant) with respect to the obsidian hydration findings which are reviewed below that Harrington (1948a:118-19) reported that Fisher's (1938) t-test of the difference between means revealed statistical significance to the depth distribution of "Folsom" points. The statistical findings indicated that these points were stratigraphically lower than the "Borax Lake" and "Silver Lake" points.

Meighan and Haynes (1970) described the physical stratigraphy of the Borax Lake site employing information gathered through excavating twenty backhoe trenches to an average depth of ten feet, a depth exceeding that of the original archaeological excavations. The cultural materials were contained in an alluvial fan, most probably formed as the result of a series of mudflows, which rests upon a clay base of lacustrine origin. The bulk of the alluvial fan is composed of two soil units, D, a gravel unit with interbedded lenses of silt and sand which is interfingered with the lacustrine clay base, and E, which is further subdivided into units E₁ and E₂. Unit E₁ is composed of clay and gravel while unit E₂ is composed of silt and gravel. Cultural material occurs in both of the

E units, while unit D is reported to be culturally sterile. Charcoal was so dispersed in the soils that radiocarbon dating was not feasible and obsidian hydration measurements were not consistent with depth increments, a result attributed to internal disturbance. Thus, geologic correlations were employed for the purpose of estimating the geologic age of the deposits. The stratigraphic record and dates obtained for pluvial Lake Lahontan, the nearest late Quaternary sequence analogous to the Borax Lake situation, indicated that the lacustrine clay and unit D, its alluvial-facies equivalent, are of Twocreekan age, approximately 12,000 years old. This dating is compatible with the results of the obsidian hydration measurements.

A total of 80 obsidian hydration measurements from the Borax Lake site, plus some additional readings from nearby sites, form the basis for the dating and artifact seriation reported by Meighan and Haynes (1970). In the early period of the development of the obsidian hydration method of dating, Clark (1964) measured approximately 200 specimens from thirty California sites, including a long series from Lak-36, the Borax Lake site. Clark (1964:190) dismissed high readings from the site with the statement that they "are probably due to thermal actions around the Clear Lake area," rather than being due to age. Meighan and Haynes (1970:1217), as a result of their field investigations, found that within the alluvial fan which made up the Borax Lake site, "there is no evidence of anomalous geochemical activity such as rock alteration, stains, salts, or unusual odors." They "do not believe that past sulfataric activity has affected the obsidian hydration of the artifacts from the Borax Lake archaeological deposit."

Although strikingly consistent results were obtained with respect to sorting artifact types by hydration rim thickness, Meighan and Haynes (1970) did not arrive at a satisfactory solution to the problem of dating the specimens in absolute terms. One difficulty was that "there is no extensive series of radiocarbon dates that can be linked to a comparably extensive series of obsidian hydration readings" (Meighan and Haynes 1970:1217). Current research now underway at U.C.L.A. is dealing with this problem; for example, obsidian specimens from Lak-261, situated approximately nine miles south of Borax Lake, are being analyzed with respect to the two radiocarbon dates from the site. A second difficulty, not fully recognized at the time Meighan and Haynes conducted their investigations, is that obsidian from different sources appears to have different rates of hydration (cf. Friedman, Smith, and Clark 1970). Although the proximity of the Borax Lake site to obsidian quarries would suggest that these would be the likely sources of the obsidian artifacts at the site, obsidian sources must be determined before the Lak-36 readings can be fully accepted in detail. At Lak-261, for example, obsidian from at least two sources (Borax Lake and Mt. Konocti) was utilized (Stross 1970). Despite this problem, however, it seems doubtful whether the sequence of artifacts proposed by Meighan and Haynes (1970) would be radically altered unless the artifacts with the thickest rims were consistently manufactured from obsidian with the slowest rate of accretion and vice versa. The finding that obsidian from different sources does have different hydration rates is also crucial with respect to the conversion of hydration measurements to absolute dates. Existing formulas for converting rim readings to years are based upon what are in

fact composite samples deriving from several different sources. Thus, the discussion by Meighan and Haynes (1970:1217-18) as to the preferable hydration rate is no longer entirely relevant. Tentative results of the U.C.L.A. findings with regard to Lak-261 radiocarbon dating and hydration band measurements will be discussed below.

On the basis of the study of the hydration measurements of the Borax Lake obsidian artifacts, Meighan and Haynes (1970:1219-1220) proposed the following sequence to serve as a working hypothesis for the prehistoric utilization of the site. Comment on the sequence will be postponed to a later portion of this chapter dealing with the periods and patterns represented in the North Coast Ranges. The earliest period at the Borax Lake site has an estimated age of up to 12,000 years and is characterized by fluted points and crescents. The suggestion was made that the assemblage may perhaps represent a western variant of the Clovis tradition. The second period is believed to follow a break in occupation and has an apparent age of 6000 to 8000 years before the present. This is the period of major occupation for the site and is characterized by wide-stem Borax Lake points and "some coarse single-flake blades." It was suggested that manos and metates probably are a part of the assemblage. The final period at Borax Lake, with an apparent age of 3000 to 5000 years before the present, is characterized by concave points that lack fluting and by stemmed points, presumably of types other than the broad-stem Borax Lake form. Manos and metates were suggested as a continuing part of the assemblage. Meighan and Haynes (1970:1220) stated: "This horizon is related to the Middle Central California complex" and suggest that the Mendocino Complex (Meighan 1955) developed

out of it. Figure 12 illustrates the Borax Lake site chipped stone sequence as indicated by the obsidian hydration study.

The researchers report that the Borax Lake sequence contains nothing that is truly late. A few anomalous readings appear to represent intrusive or abraded specimens. Meighan (personal communication) reports that five late style projectile points from the Rattlesnake Island site on Clear Lake (cf. Harrington 1948c) produced measurements ranging from 1.5 to 2.2 microns, averaging 1.7. Sixty-six Borax Lake specimens ranged from 3.8 to 15.6 microns, averaging 7.9. Meighan and Haynes (1970:1219) point out that for the past two millenia the Borax Lake Basin has been drier than in the more ancient past and that adjoining Clear Lake apparently provided a more attractive location for prehistoric settlements.

Butler (1961:70-72) has given his opinion that the willow-leaf points from Lak-36 described by Harrington (1948a:83-85) appear to him "to be identical in every respect with those found at Cougar Mountain Cave and at other Old Cordilleran sites in the Pacific Northwest." The work of Meighan and Haynes sheds no light on this possibility, since their primary aim was to determine diagnostic points types, especially to estimate the relative chronological positions of the fluted and nonfluted concave-base points. The willow-leaf form was apparently non-diagnostic and no data are given as to its time of entry into the site assemblage. It is of interest that the entire range of leaf-shaped points described by Harrington also occur at the Houx site (Lak-261), associated in greater number with the Houx Pattern component rather than with the Borax Lake Pattern component.

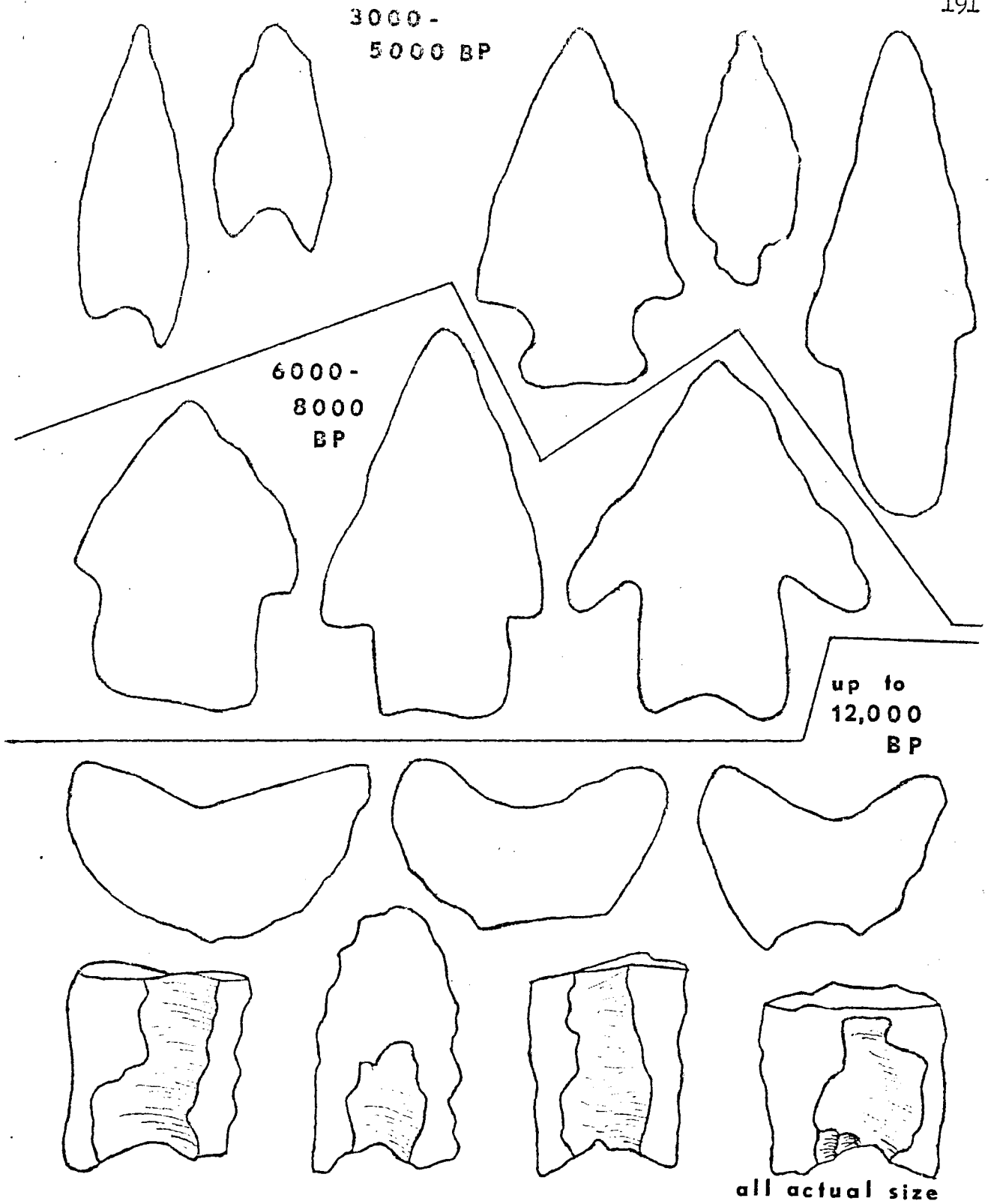


Figure 12. The Artifact Sequence from the Borax Lake Site as Indicated by Obsidian Hydration Results (after Meighan & Haynes 1968, 1970; Harrington 1948 a).

The Houx Site (Lak-261)

The Houx site, now destroyed, was situated in Excelsior Valley on the west bank of Copsey Creek, two miles south of the town of Lower Lake and about nine miles south of the Borax Lake site. The site was excavated in 1961 under the State of California Highways Archaeological Salvage Program. The present writer directed the field investigations and prepared a brief report on the site for the Department of Parks and Recreation (Fredrickson 1961a). The artifacts have been completely re-analyzed for this essay, radiocarbon age-determinations are now available as are preliminary results of an obsidian hydration study, and faunal remains have been identified.

Excavations at Lak-261 revealed a complex stratigraphic sequence representing three major cultural periods. The earliest component has been assigned to the Borax Lake Pattern with two phases apparent, the following component has been assigned to what is named here the Houx Pattern, also with two phases apparent, and the latest component, believed to be a superficial overlay on the already existing site, has been assigned to an early phase of the Clear Lake Complex. The Lak-261 findings are important for a number of reasons. First, the stratigraphic excavations clearly show the temporal position of the milling stone complex vis-a-vis other complexes; second, a previously unknown assemblage, characterized by use of mortar and pestle and inferred use of dart and atlatl was disclosed; and third, radiocarbon dates from the site place the preceding assemblages within an absolute time scale. In addition, obsidian from Lak-261 is currently being used in conjunction with the radiocarbon age determinations to assist in establishing rates

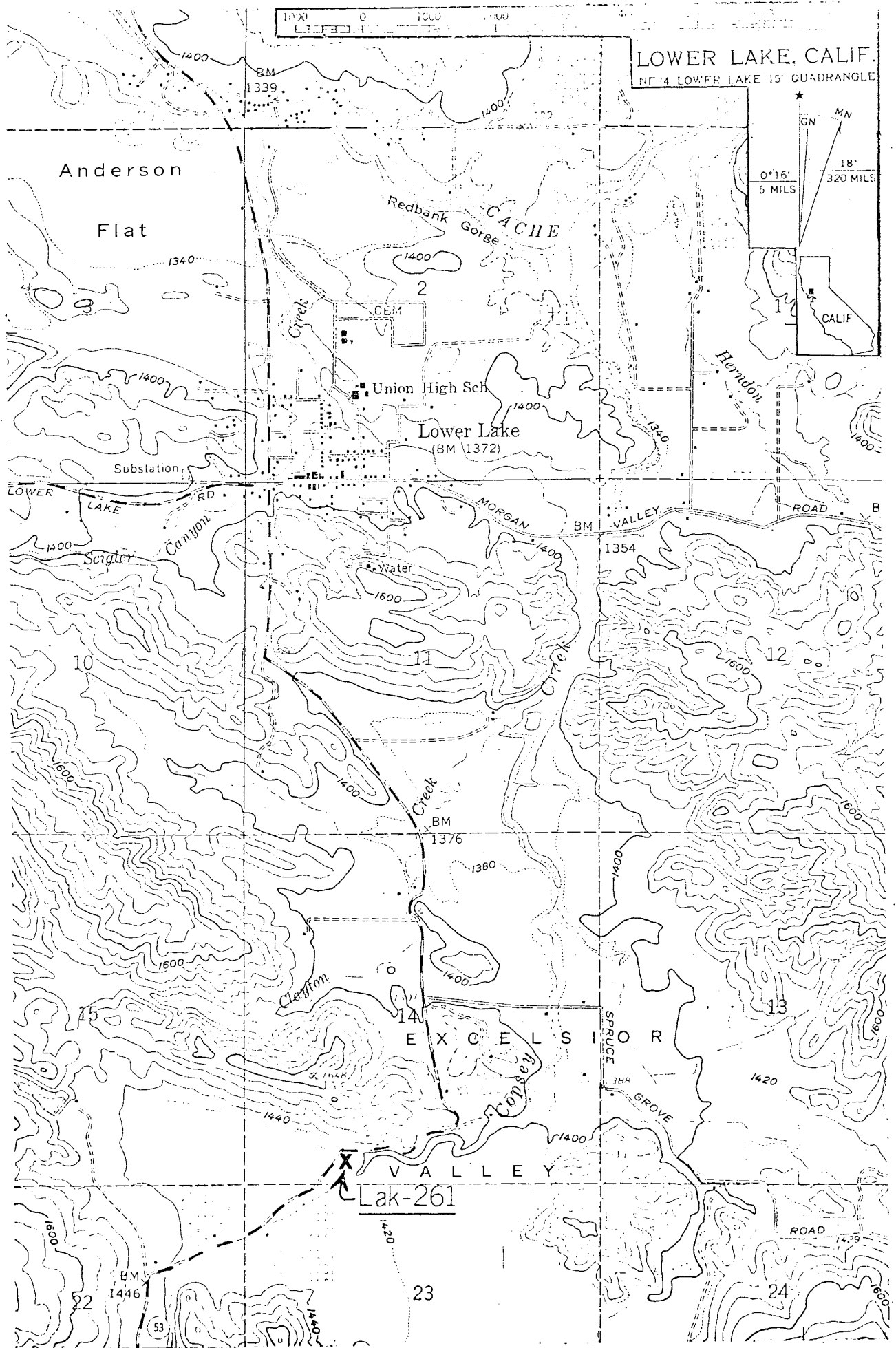


Figure 12a. Location of Lak-261.

of hydration for obsidian from at least two different sources (Frank Findlow, personal communication).

The northern and southern halves of Lak-261 displayed strikingly different soil profiles, apparently due to different local influences, the most evident of which were Copsey Creek, which adjoined the site on the east, and a small unnamed creek which drained the western hills above the site and joined Copsey Creek directly to the north of the site. For convenience, because of the different soil profiles, the site has been divided into two sections, the northern portion referred to as Lak-261N and the southern portion referred to as Lak-261S. Artifact inventories from the two portions contrast with one another, with the Borax Lake Pattern component restricted to Lak-261N and the Houx Pattern and Clear Lake Complex components concentrated in Lak-261S. R. J. Arkley (Department of Soils and Plant Nutrition, University of California, Berkeley) assisted the author in the interpretation of the soils.

The deepest soil at Lak-261, a mottled yellow and brown clay, was shared by both portions of the site and was also visible in the eroded bands of Copsey Creek (see Figure 13 for a schematic representation of the soil profile of the site). Borings both on and off the site indicated that the area covered by the clay was quite extensive and probably more than a localized phenomenon. Cultural material, apparently intrusive, was recovered from this stratum in Lak-261N, but it was culturally sterile in the south. Overlying the clay was a buried "A" soil horizon, also apparently quite extensive in area. In Lak-261N the "A" soil contained cultural material attributable to the milling stone complex,

while in the south what remained of the soil was culturally sterile. In Lak-261S much of the "A" horizon soil had been eroded away and replaced with loosely-textured, yellowish-brown sandy gravel. The gravel was apparently a local phenomenon, the result of erosion and new deposition by Copsey Creek. The gravel was deposited after occupation of the "A" soil at Lak-261N, as evidenced by the disconforming interface between the gravel and the profile which included the clay and the artifact-bearing "A" horizon. From this point on the profiles of Lak-261N and Lak-261S diverged, with the south portion growing in large part as a result of soils deposited by Copsey Creek and the north portion growing by accretion from both Copsey Creek and the small stream coming down from the west. The profiles are distinguished primarily by color, compactness, and gravel content, as well as by quantity and kind of cultural debris. A schematic representation of the Lak-261 soil profile is provided in Figure 13.

The Borax Lake Pattern Component. Artifacts assigned to the Borax Lake Pattern at Lak-261 were found in the "A" soil of the northern portion of the site and in the soil immediately above the "A" horizon, indicating a climatic and/or erosional change preceding the final phase of the Borax Lake Pattern at Lak-261. The soil profiles suggest that the horizon directly above the buried "A" horizon is possibly contemporaneous with the deposition of the yellowish-brown gravel stratum.

Consistent typological differences between the artifacts found in the buried "A" soil and the stratum immediately above constitute the basis for distinguishing between two phases of the pattern. Both soils contained manos and neither contained any evidence of mortar or pestle; metate fragments were found in the deeper soil. Artifacts diagnostic of

Approx. Vertical Scale
1" = 20"

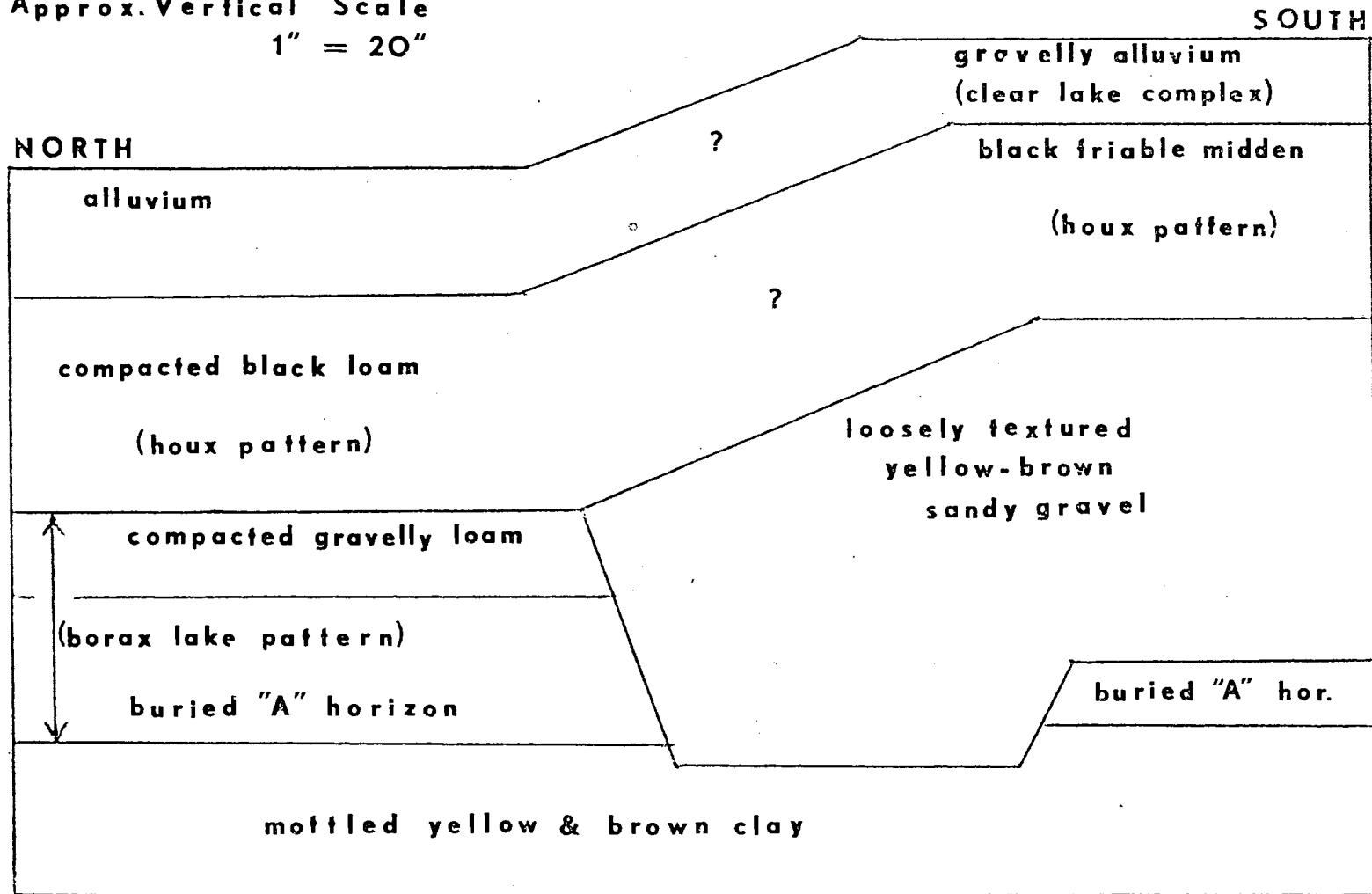


Figure 13. Schematic Soil Profile from Lak-261.

the early phase include narrow, leaf-shaped projectile points, often re-worked as though for secondary use as drills or engraving tools, a large, expanding stem point, and a small, well-made tabular stone with central edge-notching. This latter object is strongly reminiscent of the painted tablets from Napa County, although it is much smaller and lacks pigment. A crude, plummet-shaped charmstone fragment was found in the transition zone between the "A" horizon and the stratum directly above and cannot be attributed with certainty to a specific phase. The later phase of the Borax Lake Pattern, again possible contemporaneous with the deposition of the gravel stratum, is characterized by small, concave-based projectile points, lozenge-shaped points (called here Excelsior Points), large, stemmed points, and by crystals, known locally as Lake County diamonds. Figure 14 provides illustrations of artifacts representative of the Borax Lake Pattern component at Lak-261.

A radiocarbon age was determined from charcoal which was associated with Feature 11, a concentration of rock and artifacts found within the buried "A" soil horizon at Lak-261N. Feature 11 consisted of a cluster of local rock, a number of obsidian and basalt refuse flakes, an obsidian projectile point, a small slab metate, red ochre, and charcoal. The charcoal yielded a C-14 date of 1740 ± 130 B.C. (I-2754; Buckley and Willis 1969:76), thus falling within the third and most recent period represented at Lak-36.

X-ray fluorescence analysis of obsidian from the feature showed that the flakes derived from two different sources, one of which was Borax Lake (Frank Findlow, personal communication) and the other most probably Mt. Konocti (cf. Stross 1970; Stevenson, Stross, and Heizer

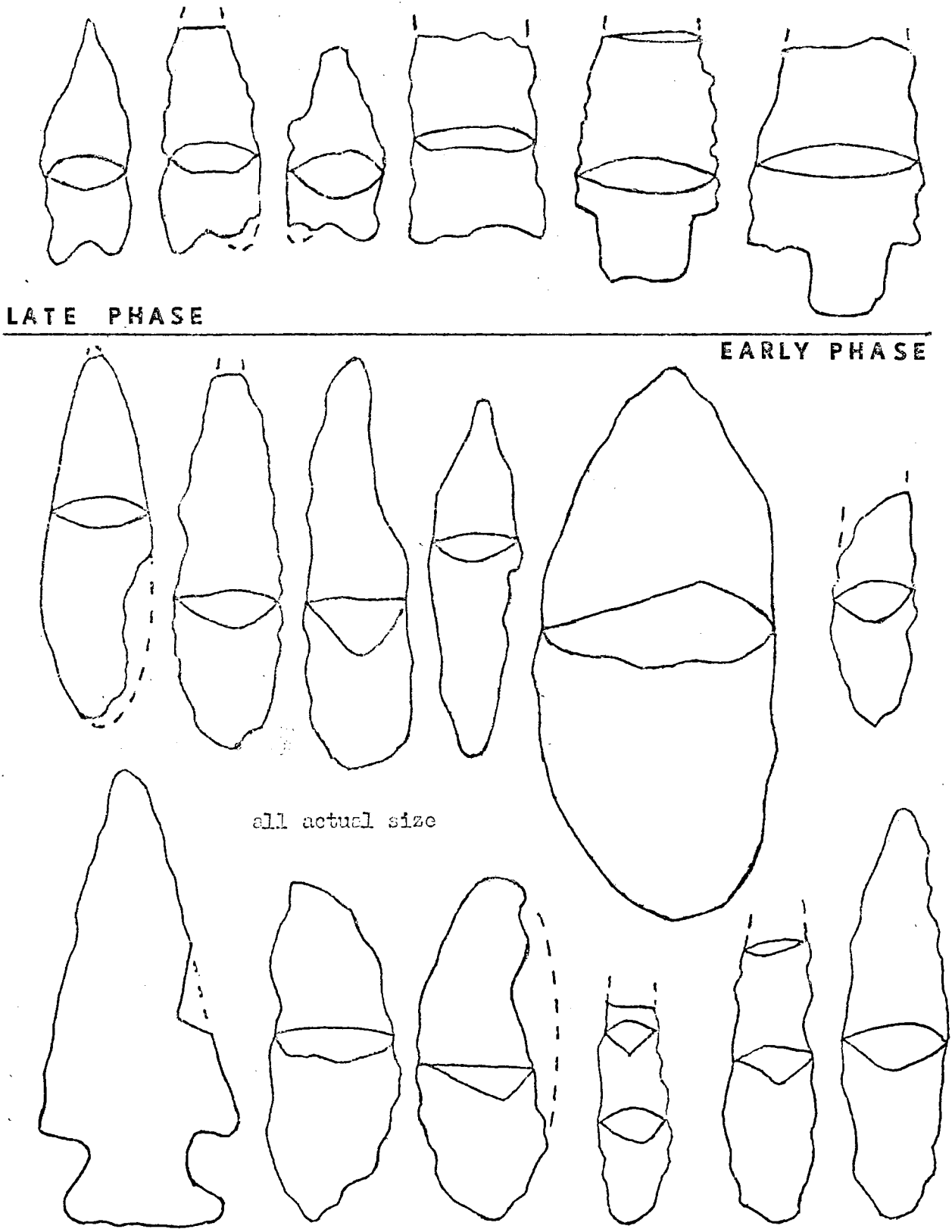


Figure 14. Artifacts from the Borax Lake Pattern Component at Lak-261.

1971). Twelve flakes of the Borax Lake obsidian provided hydration measurements which ranged from 3.6 to 4.4 microns, averaging 3.9. Correlation of the obsidian hydration measurements with the C-14 date yielded a tentative hydration rate of 946 years per micron for this obsidian (Findlow and de Atley 1972). Five obsidian flakes, tentatively identified as deriving from Mt. Konocti, provided hydration band measurements of 3.1 to 3.4 microns, with an average of 3.2. Correlation with the radiocarbon date yielded a tentative hydration rate of 1153 years per micron. Correlation of the radiocarbon date of 150 ± 150 B.C. (I-2791) obtained from Lak-261S (see below) with obsidian hydration and source identification results yielded somewhat discrepant hydration rate information. Nine samples of Borax Lake obsidian from the deeper levels of Lak-261S provided a hydration band average of 2.7 microns. When correlated with the C-14 date from this component, a tentative hydration rate of 778 years per micron was obtained (Findlow and de Atley 1972). Work continues on the project.

The finding that concave-based points occur in the later phase of the Borax Lake Pattern at Lak-261 and are absent from the early phase must be considered in light of the Lak-36 obsidian hydration results which indicate that such points may date back 5000 years. The Lak-261 findings may well represent sampling error.

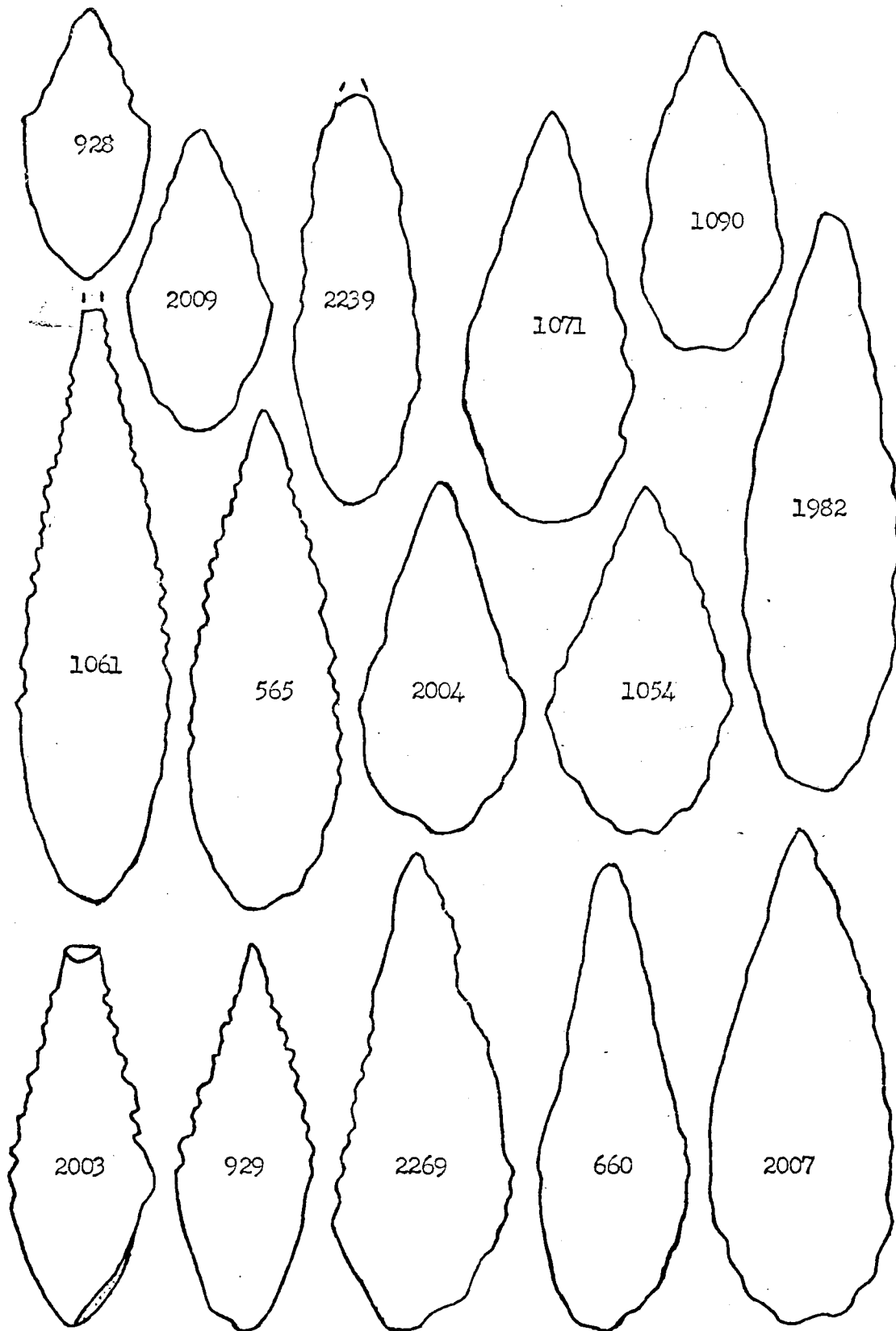
The Houx Pattern Component. The vast majority of the artifacts recovered from Lak-261S have been assigned to the Houx Pattern. The high degree of disturbance of the site matrix, by burrowing animals, agricultural activities, and the pit-digging proclivities of the prehistoric inhabitants, made it difficult to delineate phases within

the component. Two phases of what appears to be an occupational continuum are recognized, however, distinguished on the basis of stylistic differences in projectile points. In general, stemless points become smaller in the dimensions of weight, length, and width; the stems of broad, triangular points become broad and contracting; and serration as an attribute becomes less frequent. The following description of the Houx Pattern materials applies to the entire occupational continuum.

One of the results of a detailed analysis of the chipped stone projectile points was the definition of several types of leaf-shaped points which were subsumed under the heading Excelsior point series, following procedure initiated by earlier workers (cf. Baumhoff 1957: 10; Heizer and Baumhoff 1961:123) in applying a binomial system to designate points. Under this system the initial term derives from some geographic feature or location, in this case the Excelsior Valley in Lake County within which Lak-261 is situated, and the second term from some diagnostic or characteristic feature of the point type. The defining characteristics of the Excelsior point are a triangular, straight-edged body and a convex base, which is frequently ogival in outline; that is, it resembles a pointed arch. A frequent but not necessary attribute of the Excelsior series point is the presence of a definite shoulder at the junction of the body and the base. This shoulder may be further marked by an abrupt broadening of the specimen as the body terminates and the base begins. Point types falling within the Excelsior series are distinguished on the basis of other attributes, such as serrated or denticulate edge and relative breadth and length. The stratigraphic evidence at Lak-261 suggests that Excelsior points entered the region during the later portion of the Lower Archaic Period, as

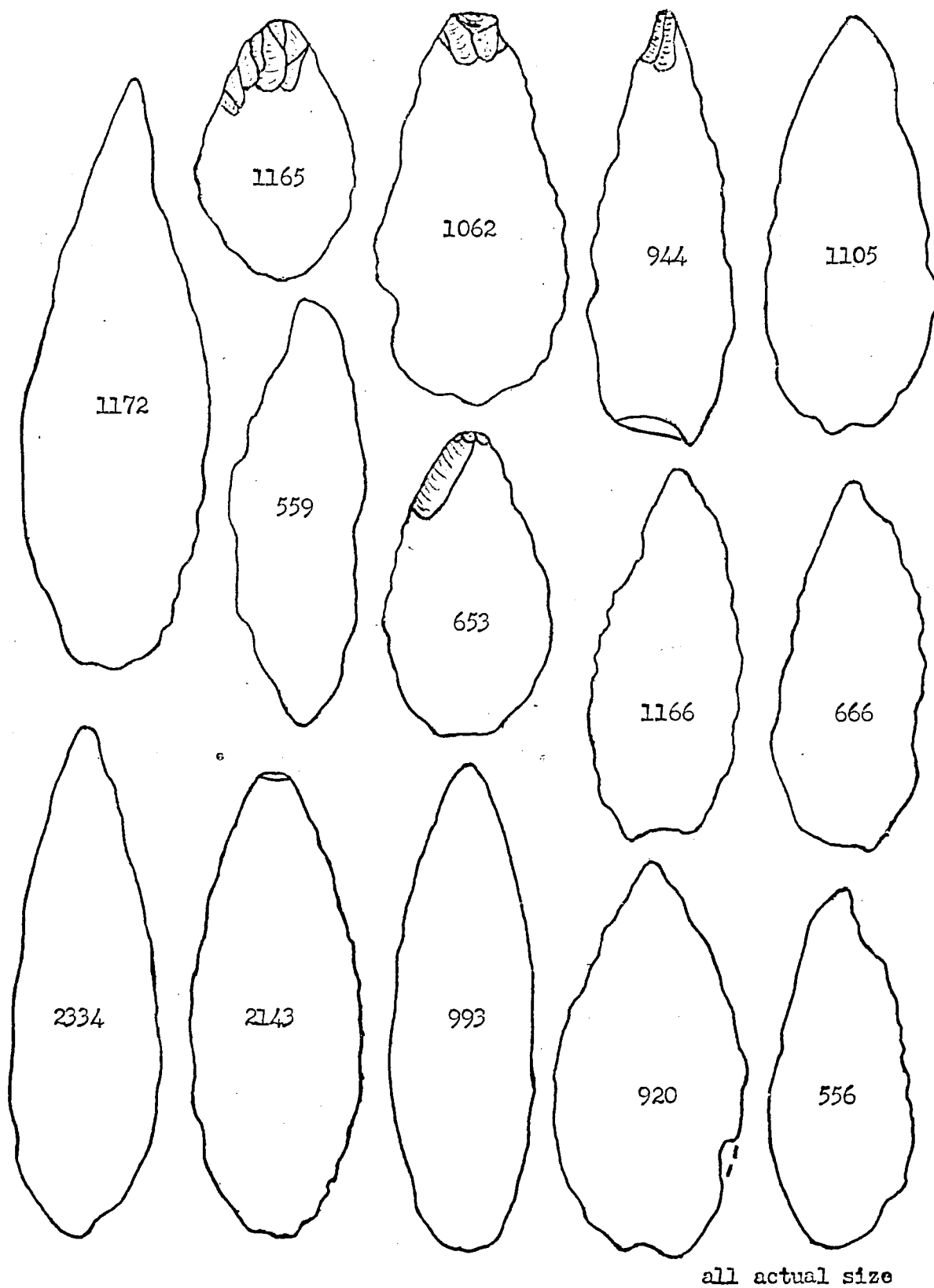
represented by the Borax Lake Pattern, and persisted in large numbers during the Upper Archaic Period, as represented by the Houx Pattern. Comparative information from museum collections indicate that the form persisted in the North Coast Ranges, but with lesser frequency, up into the historic period.

Excelsior points are characteristic of the Houx Pattern component, as are stemless forms in general. On the basis of the size of the entire range of projectile points, numbering into the hundreds, it is inferred that the bow and arrow were absent and that the dart and atlatl were employed as hunting implements (cf. Fenenga 1953). Only a small handful of points were manufactured of material other than obsidian. Manos and metates did not occur, while bowl mortar and cobble pestle were present. Grinding implements were few in number, contrasting with the abundant number of projectile points, and a hunting emphasis is suggested. Both functional and technical burins were present, including burin-faceted projectile points (cf. Epstein 1963). Well-made obsidian and basalt scrapers, including serrate specimens similar to the one illustrated by Harrington (1948a:109, fig. 39) from the Borax Lake site, are common, as are roughly worked obsidian pieces with broad serrations, also similar to finds from Borax Lake (Harrington 1948a:109, fig. 38). Bone implements were rare, possibly due to poor soil conditions, but included the splinter awl, a "wand" manufactured from the femur of a mountain lion, and a dagger or perforator made from the tibia of a deer. Loosely flexed burials occurred, including one with a number of Type 3b1 split, drilled, bevelled Olivella beads and a single Macoma clam disk bead in association. Figure 15 provides illustrations of artifacts representative of the Houx Pattern component at Lak-261.



all actual size

Figure 15. Artifacts from the Houx Pattern Component at Lak-261.



all actual size

Figure 15 (continued). Artifacts from the Houx Pattern Component at Lak-261.

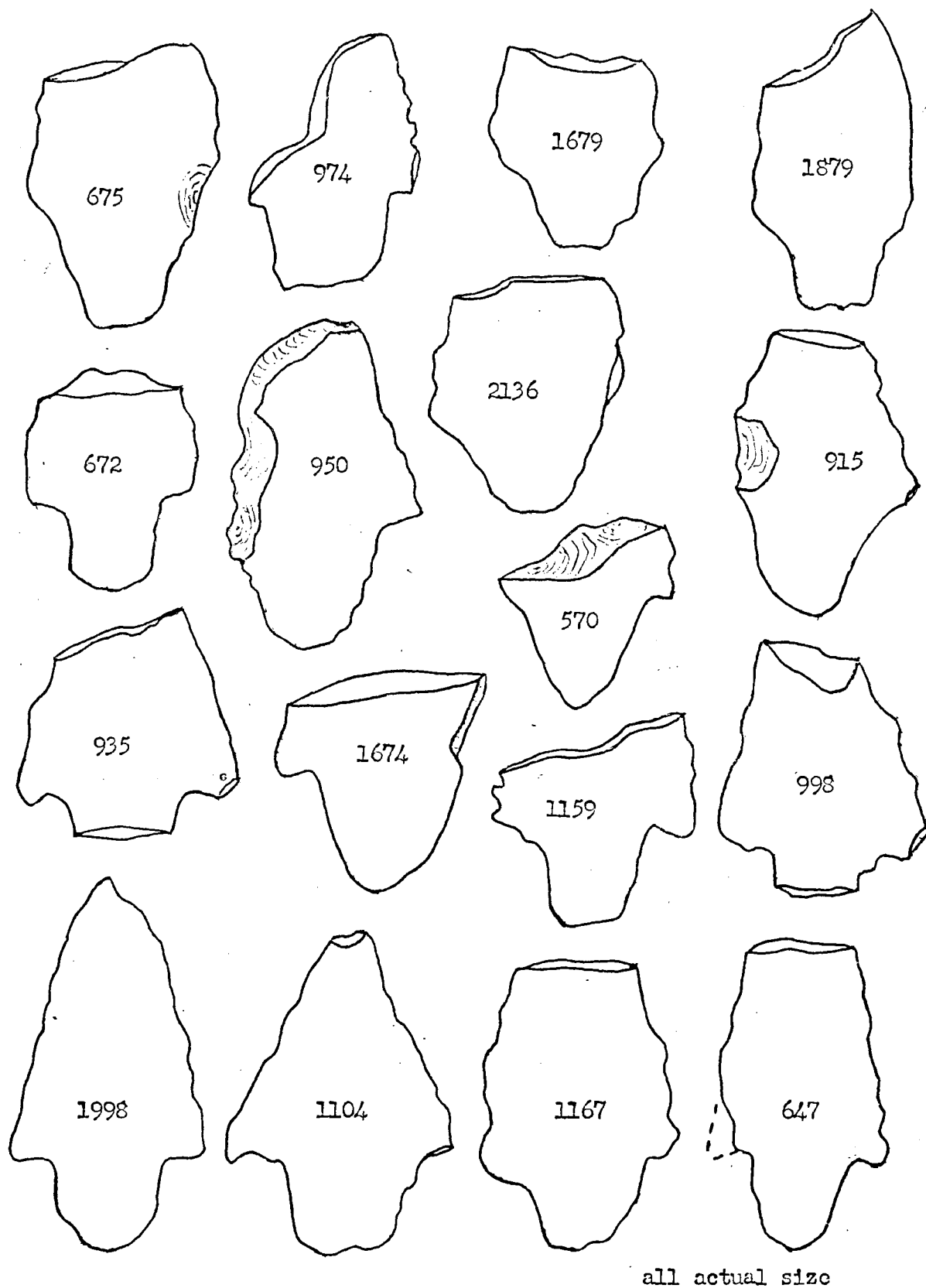


Figure 15 (continued). Artifacts from the Houx Pattern Component at Lak-261.

A radiocarbon date of 150 ± 150 B.C. (I-2791; Buckley and Willis 1969:76) was determined from charcoal which was part of a submidden firepit at Lak-261S. Cultural dating of the Houx Pattern component is also suggested by the occurrence of the bevelled Type 3b1 Olivella beads and the Macoma clam disk bead. Both of these bead types are indicative of contemporaneity with the early portion of the Middle Horizon of the lower Sacramento Valley (Bennyhoff and Heizer 1958). Obsidian hydration results from Lak-261S were discussed in an earlier paragraph, above.

Since there is no reason with respect to the stratigraphic excavation to doubt the approximate contemporaneity of the firepit from which the radiocarbon assay was obtained and the burial from which the cultural dating was determined, a discussion of the implications of these results is in order. Heizer (1958a:7, 1964:127) placed the lower Sacramento Valley Middle Horizon into the time period from about 2000 or 1500 B.C. to A.D. 300. If this dating is correct and if we accept the cultural dating of the two bead types, we could expect a radiocarbon age far in excess of the one obtained, such as the one determined for the Borax Lake component at Lak-261N. However, since the two radiocarbon measurements from Lak-261 are internally consistent, and since the cultural inventory associated with the earlier of the two dates is compatible with similar materials associated with similar hydration readings from Lak-36, I find no basis for rejecting the C-14 dates. Likewise, I find no reason for rejecting the cultural dating of the bead types, since it is based upon a mass of carefully analyzed stratigraphic grave lot analysis and has proven to be internally

consistent at other sites (cf. Bennyhoff and Heizer 1958). We are left then with questioning the assignment of a date of about 1500 or 2000 B.C. for the beginning of the lower Sacramento Valley Middle Horizon. This question will be discussed in more detail in a later section dealing with dating in Central California's Archaic Period.

The Clear Lake Complex Component. A number of artifacts and burials were uncovered from the upper levels of Lak-261S which are assigned to Meighan's (1955) protohistoric Clear Lake Complex. The scarcity of such materials supports the inference that only slight utilization of the site was made during this time period. Artifacts included the slab hopper mortar, small, corner-notched projectile points, Saxidomus clam disk beads, Type 3d round saucer Olivella beads, and small rectangular Haliotis ornaments with punctate decoration at their borders. A number of flexed burials occurred in the black midden with small numbers of Haliotis ornaments and clam disk beads in association. No evidence of cremation was observed. While other artifacts of generalized form, such as scrapers and large, leaf-shaped projectile points, may also have been a part of the Clear Lake Complex assemblage, the physical mixing within the site made such assignment on the basis of stratigraphic position alone impossible. Since these artifacts are largely manufactured from obsidian, hydration rim analysis would offer a method for sorting these materials.

The Hultman Site (Nap-131)

Nap-131, situated in the northern portion of the Napa Valley about 35 miles to the south of Lak-36, is a third site which warrants detailed

discussion with respect to its relationship with the early milling stone period. A brief note on test excavations at Nap-131 was prepared by Meighan (1953a) who pointed out similarities between the site and its assemblage and the Borax Lake site. Manos, willow-leaf points, and Borax Lake fluted points were specifically mentioned. Because of the similarities, and also because of a more limited artifact inventory, Meighan (1953a:316) suggested that Nap-131 represented "chronologically a part of the time period of the Borax Lake site." In his 1955 synthesis of North Coast Range archaeology, Meighan specifically assigned Nap-131 to the Borax Lake Complex and cited manos, metates, and Borax Lake fluted points as linking artifacts. Heizer and Elsasser (1953:23), in an extensive footnote to a report on assemblages from the Sierra Nevada Mountains, cited Nap-131 and Nap-129, as well as other Napa County sites listed in the files of the University of California Archaeological Survey, as representing an earlier basalt-using culture which may have occupied the Napa vicinity before the use of obsidian gained overwhelming popularity.

In 1960, the UCAS sponsored further excavation at Nap-131 which was conducted under the field direction of W. H. Kinsey. The present writer utilized materials collected at that time, as well as materials already housed in the Lowie Museum at Berkeley to prepare a more comprehensive report on the site (Fredrickson 1961b). Although this report was never published and now is in need of substantial revision, findings within it agreed with Meighan's suggestion of a relatively early age for the Nap-131 assemblage and accepted in part the proposed relationship with the Borax Lake site. This writer disagreed with the classification

of the Nap-131 concave base points as "Borax Lake fluted." While bases on several of the Nap-131 concave base points had been thinned, it appeared to have been more the result of basic manufacturing technique than that of deliberate fluting such as was evidenced by Lak-36 specimens. Since mortars and pestles were also a significant part of the Nap-131 assemblage and since several minor artifact styles were also compatible, this author concluded that Nap-131 relationships were as close to the Mendocino Complex as to the Borax Lake Complex. The present writer also concluded that much of the material from the upper levels of Nap-131 represented workshop activity. While no relationships with known Napa assemblages could be shown, the possibility remained that the workshop materials did not represent the same period of time as did materials clearly relating to the milling stone assemblage. Finally, this writer found no evidence that basalt was extensively employed for tool manufacture at Nap-131, either in the lower levels or in the upper levels.

In 1963, Gamst and Shkurkin analyzed surface collections from Nap-131 and nearby Nap-129 as part of course work undertaken at U.C. Berkeley. The analysis showed that the two sites were divergent in several areas of chipped stone technology and thus were quite likely of different temporal position. Points and point fragments found on the surfaces of the two sites suggested Nap-129 was part of the late Napa Valley complex, while Nap-131 was divergent. Gamst and Shkurkin also found that the preponderance of basalt tools and waste was found at Nap-129 rather than at Nap-131. While Heizer and Squier (1953:324) explicitly stated that no evidence of extensive use of basalt was found in the deeper levels of Nap-32, dated by bead type as belonging to the Middle Horizon period, they

did report a limited use of obsidian, a characteristic they report is shared with lower Sacramento Valley sites. Further quantitative investigation is needed to show the significance of the impressionistic differences in the use of obsidian and basalt in different temporal periods in Napa Valley sites (cf. Fredrickson 1969).

In 1965, Cook and Heizer contrasted results of chemical analysis of the soils from Nap-131 and Nap-1, the latter site being predominantly late in time with deeper levels apparently contemporaneous with the lower Sacramento Valley Middle Horizon. Soil samples were drawn from both sites at different depths and surface transects were made as well. Off-site soils were also sampled. Nap-1 showed high concentrations of carbon, nitrogen, phosphorous, and calcium, all by-products of intense human activity. Furthermore, the process of chemical deposition "must have been relatively recent since the mass has undergone little if any alteration of substance or translocation of materials since it was laid down" (Cook and Heizer 1965:34). At Nap-131, the inference of habitation was supported since the four elements were significantly more concentrated in the site area than outside of this area, although the magnitude of the concentration was considerably less than at Nap-1. Proportions of the four elements were also different from those found at Nap-1, indicative of a far longer period for processes to take place affecting the chemical substances. Of interest with respect to the observation that Nap-131 was located on a hill slope (Meighan 1953a:316) was the chemical finding that heaviest occupation at the site was closest to the river and that "it may actually have been a river-bank site with the western edge parallel to the stream itself" (Cook and Heizer 1965:38).

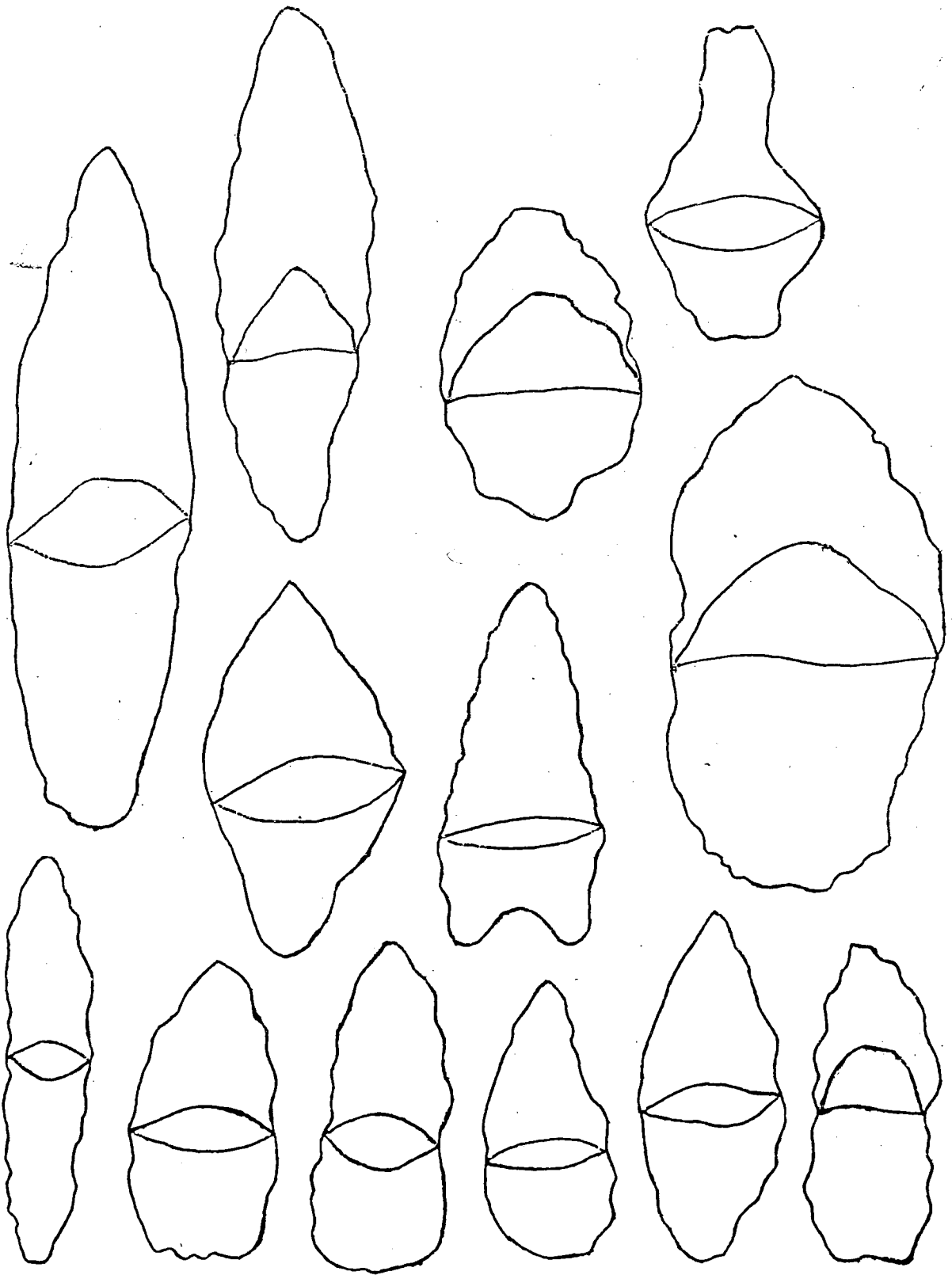
Clark (1964) included a number of obsidian hydration measurements from Nap-131 in his report on the obsidian hydration method and archaeological chronology in California. Although obsidian was not differentiated according to source in Clark's study so that direct comparisons of the different rim thicknesses must be done circumspectly, the overall configuration of the obsidian hydration results suggest considerable age. Readings from twelve specimens range from 2.7 to 9.5 microns with an average of 4.7. It is significant that the lower range of the Nap-131 readings overlaps the range obtained from measuring hydration bands on five obsidian projectile points found with a deep burial at Nap-1 (Burial 7, depth 80"). These specimens provided measurements ranging from 2.4 to 4.6 microns with an average of 3.5. Clark (1964:159) suggested a hydration age of 2050 B.P. for Nap-1, citing poor agreement with expectations based upon the assignment of the site to the Late period. Burial 7, from which the measured samples were obtained, is attributable to the early period of Nap-1 utilization, presumed on the basis of bead type to be contemporaneous with the Middle Horizon of the lower Sacramento Valley (Heizer 1953:273-276). Without implying acceptance for the hydration age stated by Clark, the date is compatible with the archaeological expectations.

To summarize, Nap-131 can be attributed with certainty to the Borax Lake Pattern as defined in this paper. The attribution of fluted points to the site is not accepted, nor is the attribution of an important basalt-working industry. Workshop activity may have taken place at the site, but the cultural period which this activity represents cannot yet be determined. Apparent similarities of Nap-131 with Nap-129 were not

confirmed by subsequent analysis of surface materials. The sites were considered to have substantially different technologies, with Nap-129 showing similarities with late Napa Valley materials and Nap-131 standing more or less alone. Chemical analysis of Nap-131 soils suggests a considerably greater age for the site than for the predominantly late Nap-1. While obsidian hydration results cannot be considered conclusive at this point, they do support considerable antiquity for the site, with some possible post-milling stone use contemporaneous with the time of deposition of the deeper levels of Nap-1 and Nap-32. Other comparative evidence from the Napa Valley indicates that the period of major use of the site dates prior to the Middle Horizon of the lower Sacramento Valley. The site is placed within the latest of the three periods represented at the Borax Lake site. Meighan and Haynes (1970:1220) suggest that this period lasted from about 3000 to about 5000 years ago. Precise placement of the Nap-131 assemblage within this period is not yet possible, although refinements occurring in the obsidian hydration method may ultimately allow precise placement without further field investigations. Figure 16 provides illustrations of artifacts from Nap-131.

The Palaeo-Indian Period

In this section and in the following two sections the early cultural periods of the North Coast Ranges and their representative patterns are discussed. The Post Pattern is proposed as representative of the Palaeo-Indian Period, the Borax Lake Pattern as representative of the Lower Archaic Period, and the Houx Pattern as representative of the Upper Archaic



all actual size

Figure 16. Artifacts from Nap-131 (see also Meighan 1953a:315-17).

Period. No candidate for the hypothetical Early Lithic Period has yet been discovered in the North Coast Ranges. Of the three patterns mentioned, the Borax Lake is most fully documented. Relatively few data are available for the Post and Houx Patterns.

Data for the existence in the North Coast Ranges of what is called here the Post Pattern is restricted to that presented by Meighan and Haynes (1968, 1970) on the basis of their restudy of the Borax Lake site and includes only the materials which fall into their earliest period. Because of the scarcity of data, the pattern must be considered provisional. Although the assigning of a name to a pattern should remain the prerogative of the researcher who first recognizes and documents it, Meighan and Haynes do not suggest any nomenclature, perhaps because it is not a relevant issue to them. It is with some hesitation, then, that I propose a term for the pattern which is represented by the earliest materials from the Borax Lake site.

Earlier in this essay I suggested that a pattern be named for the first site at which it is recognized. In this case, the name Borax Lake is already employed to designate the early milling stone complex in the North Coast Ranges and should be avoided for use with respect to the earlier manifestation. Although relationship with the San Dieguito Complex as proposed by Warren (1967) is possible, as is relationship with the Clovis culture of the Plains and Southwest, distances involved and the uncertainty of the nature of the relationships militates against using terms which derive from these complexes. I have selected a local name for the Borax Lake materials, while using narrative to suggest relationships with other regions. The designation Post Pattern has been

selected after Chester C. Post, the amateur who in 1938 called the Borax Lake site to the attention of the archaeological profession (cf. Harrington 1948a:9).

The Post Pattern is defined on the basis of the sorting of the hydration rim measurements of certain chipped obsidian artifacts from the Borax Lake site. Since physical mixing at the site has made stratigraphic analysis virtually meaningless in cultural terms, criteria for the pattern can include only those types of chipped stone implements which hydration measurements show to be early. These include Borax Lake fluted points, chipped crescentics, and a single-shoulder point (Meighan and Haynes 1970:fig. 5).

Dating of the Post Pattern is largely inferential, but internally consistent. Analysis and comparisons of the geology of the Borax Lake site suggest a maximum age of 12,000 years. The thickest hydration bands measured upon artifacts from the site fall between 8 and 10 microns, which measurements suggest an age compatible with the geologic date. Cross-dating of artifact types, namely the crescents and the fluted points, also yields ages comparable to the geology and obsidian hydration readings (cf. Tadlock 1966; Haynes 1968). The evidence with respect to dating supports the assigning of the Post Pattern to the Palaeo-Indian Period. Criteria for the pattern are as follows:

a. Technological skills and devices. Inferentially, food grinding implements are quite rare or absent. The dart and atlatl are inferred to have been used for hunting game, with the fluted projectile point the dominant type. Crescents may also have been used as transverse projectile points (cf. Clewlow 1968; Tadlock 1966) employed in the hunting of birds.

This use would not rule out other functions for the crescents. At the present time no direct information exists with respect to work in ground and polished stone, bone, or shell.

b. Economic modes. The projectile points indicate an emphasis upon hunting, while the lakeshore location of the site suggests that available lacustrine resources may well have been utilized. Inferentially, seed collecting was less important than hunting and may have been restricted to those seeds which did not require extensive processing. No evidence of trade is yet apparent and no indication of a wealth emphasis has been found.

c. Burial and ceremonial practices. No burials were uncovered at the Borax Lake site, which may indicate poor preservation of bone, or at least equally likely, off-site disposal of the dead. No evidence of any ceremonial activity has been definitely recognized.

d. Variations in the Post Pattern. Since the Post Pattern is recognized at only a single site, no evidence of local variation can be cited. Meighan and Haynes (1970:1220) remarked that a break in occupation appears to have separated the initial period of occupation at the Borax Lake site from the next period, thus little can be said with respect to relationships with the later Borax Lake Pattern. Meighan and Haynes (1970:1220) also pointed out that the linkage of fluted points with crescents does not occur in Folsom or Clovis cultures and emphasized that this linkage at the Borax Lake site is evidenced only by the obsidian hydration method. Nevertheless, they listed three other localities where such a pairing is suggested. A personal communication from Claude Warren was cited that fragments of fluted points occur in the surface

collections from Lake Mohave. The co-occurrence of fluted points and crescents in surface collections from Long Valley Lake, Nevada, is also cited (Tadlock 1966), as is a similar co-occurrence in surface collections from the Tulare Lake Basin, California (Riddell and Olsen 1969; Roehr and Wilwand 1968).

Mention was made earlier in this essay of Warren's (1967; cf. Davis 1967) hypothesis of the San Dieguito Complex, distinct from the Desert Culture, which represents a generalized hunting culture of the western Great Basin. The early Buena Vista Lake assemblage was provisionally placed within the San Dieguito Complex (cf. Fredrickson and Grossman 1966), and apparent temporal parallels with the Tulare Lake and Borax Lake Clovis-style points were mentioned. It seems probably that the Post Pattern materials are historically related to these other early assemblages. For example, the fluted points may mark the Borax Lake and Tulare Lake finds as a single cultural pattern which existed at a different, presumably earlier, time period than that represented by the bulk of the San Dieguito material, or they may be indicative of a significant areal distinction. The scarcity of data rules out extensive discussion at this time. Butler's (1961:70-72) suggestion that the willow-leaf points from the Borax Lake site point to a relationship with his proposed Old Cordilleran culture, which he dated back to possibly 12,000 years ago, is neither supported nor refuted by the data currently available from the Palaeo-Indian Period.

I conclude with a cautionary note. It has frequently been assumed that the occurrence of clovis-style projectile points is indicative of the hunting of large game animals (cf. Davis 1963; Haynes 1964). While it

may well be that this will prove to be the case in the far west, it is appropriate to repeat the point recently made by Heizer and Baumhoff (1970) that no clear evidence for this correlation has yet been discovered. Since radiocarbon dating of Gypsum Cave materials demonstrated a considerable temporal gap between the ancient sloth remains and the cultural remains (Heizer and Berger 1970), the presence of big game hunters in the Great Basin and California remains hypothetical.

The Lower Archaic Period

In Chapter Three of this essay, I suggested that the long period traditionally known as the California Archaic (cf. Meighan 1959) be divided into two major divisions, the Archaic and the Emergent, with the Emergent Period beginning with the start of the Late Horizon of the traditional Central California framework. In Chapter Six, I further suggested that the Archaic Period of California's prehistory be divided into two smaller divisions, Lower and Upper, respectively. The Lower Archaic Period is characterized by the use of mano and metate, while the Upper Archaic, its beginning approximately coterminous with the beginning of the Medithermal, is characterized by use of mortar and pestle. On the basis of culture-historical reconstructions, it was hypothesized that the culture of the Lower Archaic would be relatively simple and uniform while the Upper Archaic Period would be characterized by considerable diversity and irregularity of pattern.

The presence of mano and metate in the North Coast Ranges has long been recognized, but because conclusive evidence for dating was absent, and because the extreme claims made for the Borax Lake site, for many

years the only excavated milling stone site in the region, were controversial, the meaning of this milling equipment and acceptance of its relatively early status was frequently held in abeyance (cf. Heizer 1964:129). Although excavations at Men-500 near Willits, about 50 miles north of Lak-36, produced stratigraphic evidence that milling stones predated the Clear Lake Complex (Meighan 1955), and thus did not represent a late culture phase variant, perhaps related to specialized activity or seasonal differentiation, dating of the milling stone complex remained in doubt. Meighan (1955) recognized that at least two milling stone phases could be distinguished, referring to the earlier as the Borax Lake Complex and the later one as the Mendocino Complex. At that time Meighan (1955:27) felt that while there was little question that the Borax Lake Complex was a "basement culture for the North Coast Ranges," it probably dated "somewhere in California's long and inadequately defined Middle Horizon." On the basis of artifact comparisons, but without stratigraphic documentation, Meighan (1955:23) proposed the Mendocino Complex as a later development of the Borax Lake Complex and suggested that the Mendocino Complex probably fell "into the period between about 500 and 1000 A.D."

The materials from the Borax Lake site have frequently been cited in support of two different arguments. One argument has been that Borax Lake artifacts support suggestion of an early widespread milling stone culture (cf. Wallace 1954), the other has been that the finds support suggestion of a widespread culture characterized by lakeshore camps, but earlier in time than the milling stone culture was generally conceded to be (cf. Davis 1967; Warren 1967). Until the recent obsidian study of

Borax Lake artifacts, such suggestions stood only as speculation, with a number of apparent contradictions unresolved. Although milling stones from the Borax Lake site cannot themselves be dated so that their precise cultural affiliation cannot be determined with certainty, documentation was given to the existence of two distinct time periods contemporaneous with the periods during which the lakeshore camps and the milling stone horizon, respectively, predominated in other regions.

The Borax Lake obsidian hydration study has also allowed Meighan to revise his dating estimate for the Mendocino Complex (Meighan and Haynes 1970:fn. 24). In combination with artifact comparisons, the obsidian hydration results were taken to suggest that the Mendocino Complex has "a Middle Central California affinity, although not a strong one," and a date at "the more recent end" of the time span between 1000 B.C. and 5000 B.C. was proposed. This date was based upon "a rough age of 1000 B.C." for Middle Central California. A review of the evidence for the dating of the Borax Lake and Mendocino Complexes, both subsumed here under the Borax Lake Pattern, is now in order.

Three radiocarbon dates relevant to the Borax Lake Pattern are at present available from the North Coast Ranges. The earliest date, 3370 ± 145 B.C., is for a milling stone and projectile point assemblage from site Men-581 in the Cold Creek vicinity of Mendocino County (James Dotta, personal communication). Apparently reflecting local availability, the predominant material from which the projectile points were manufactured is chert, although a few obsidian specimens were found. Since the assemblage has not been fully reported or described, the date and its context cannot be evaluated in any detail. Full reporting is important since, among other reasons, the date falls within the

period between the earlier and later phases of the Borax Lake Pattern that Meighan and Haynes (1970:1220) distinguished at Lak-36. The remaining two C-14 dates were obtained for assemblages from Lak-261 (the Houx site) and were discussed earlier in the essay. The earlier of the two dates, 1740 ± 130 B.C., is associated with the milling stone component and gives good support to the suggestion of Meighan and Hyanes that the milling stone pattern lasted until about 1000 B.C. The later date, 150 ± 150 B.C. is associated with the Houx Pattern component and indicates that the Borax Lake Pattern had been fully displaced in the Clear Lake vicinity by this time.

Additional obsidian hydration support for the dating of the Borax Lake Pattern comes from Orlins' (1971, 1972) work in Indian Valley, situated about ten miles northeast of Borax Lake in the territory of the ethnographic Hill Patwin. Survey and test excavations at Lak-153 in Indian Valley, for example, yielded not only the pestle and clam shell disk bead, but also the metate, concave base projectile point, and the classic wide-stem Borax Lake-style point. Basal thinning and burin reworking of points also were observed (Orlins 1971:49-50). A series of obsidian flakes obtained from a test excavation were analyzed with respect to hydration band thickness and yielded results consistent with expectations suggested by the same point types at Lak-36. Thirteen flakes, believed to have derived from the Borax Lake obsidian flow, provided measurements ranging from 2.7 to 8.7 microns, averaging by depth interval as follows (Orlins 1972:6):

10-20 cm.	3.2 microns
30-40 cm.	4.7 microns
50-60 cm.	5.7 microns
70-80 cm.	8.0 microns

These readings are consistent not only with results from Lak-36, but also from Lak-261, discussed in an earlier section of this paper.

Although the direct association of milling implements with the earliest phase of the Borax Lake Pattern, that characterized by wide-stem Borax Lake points and "some coarse single-flake blades," cannot be shown, stratigraphic and contextual evidence from a number of sites shows the association of non-fluted concave base points and Excelsior points with milling tools. As presently known, the spatial distribution of projectile points associated with milling stones suggests division of the North Coast Ranges into a northern portion and a southern portion (see Figure 17 for a map showing distribution of Borax Lake Pattern sites and localities in the North Coast Ranges.) In the northern portion, the Borax Lake Pattern is represented by what Edwards (1968, 1969) has called the Northern Milling Stone Complex. This complex has been identified at a number of sites north of Redding, Shasta County, and in the vicinity of Thomas Creek in Tehama County. The complex appears to be represented predominantly by stemmed points, none clearly of the wide-stem Borax Lake type, and appears to lack concave base points. A distinctive feature of the complex is the occurrence of a number of inscribed stones with a variety of straight line motifs, predominantly parallel lines and cross-hatching, with apparently minor use of the chevron motif. Flaked basalt core tools are also representative. In this context it may prove relevant that the milling stone surface site in the Ten-Mile River area on the Mendocino Coast (mentioned earlier in this paper) yielded heavy core and flake tools and no points. Large stemmed points without provenience occur in local collections, but concave base points appear to be absent.

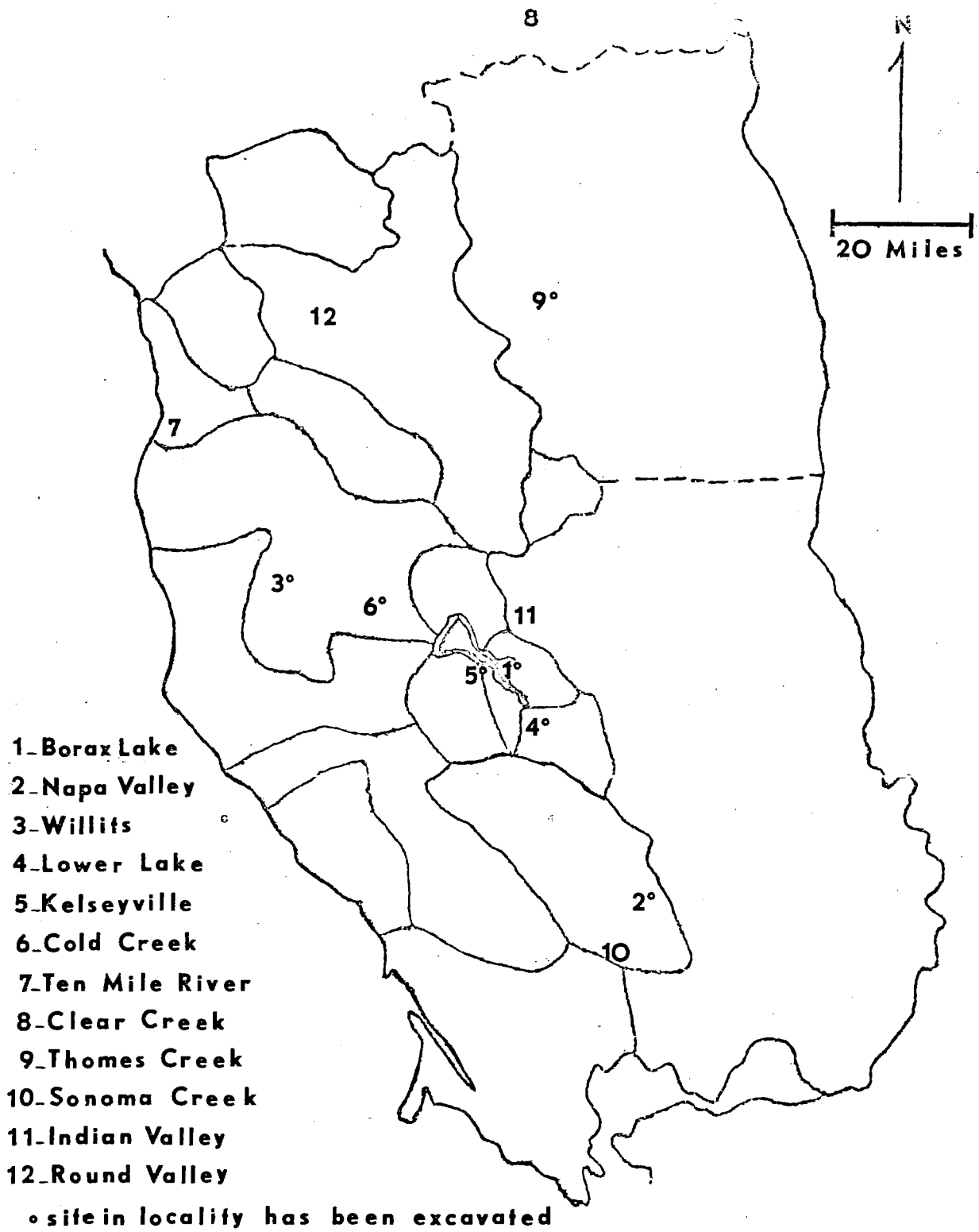


Figure 17. Distribution of Borax Lake Pattern Sites and Localities in the North Coast Ranges.

In the southern portion of the North Coast Ranges, milling stones are most frequently found in association with concave base and stemless points, although stemmed points sometimes occur in small numbers. This association is clear at the following excavated or carefully surveyed sites: Nap-131, Lak-261, Lak-153, Lak-30 and Lak-140 (both sites located near Clear Lake with unanalyzed collections from them housed in the Lowie Museum, Berkeley), a highway salvage excavation near Kelseyville (results are unanalyzed), and Men-500. The last site, Men-500, has a higher proportion of stemmed points than any of the other sites in the southern portion. Whether this is predominantly an areal or a temporal phenomenon cannot be determined on the basis of present evidence. The unreported materials from Men-581 in the Cold Creek vicinity, dated at 3370 B.C., could contribute toward a solution to this distribution problem.

Present evidence also indicates that wide-stem projectile points are most frequently found in the central districts of the North Coast Ranges. Specifically, although comparative data are few, these forms appear in greatest number in the Clear Lake vicinity. Meighan (1955:26) cited surface finds of this type near Occidental in Sonoma County as well as from Mendocino County, but their frequency there seems low when compared with Clear Lake. There is also a possibility, the reasoning founded upon similarities in form and geographic proximity, that the broad points with both square and contracting stems from the Houx Pattern component at Lak-261 are historically derived from the earlier wide-stem Borax Lake point. More stratigraphic evidence is necessary to document these suggestions, of course.

Although comparative evidence is scanty, at present it is possible to offer the working hypothesis that the Borax Lake Pattern existed in at least two aspects. The best known aspect was focused in the southern portion of the North Coast Ranges, radiating out from a center in the Borax Lake and Clear Lake vicinity, a territory which is called here the Borax Lake district. Boundaries of the district are vague and depend upon additional research for their definition. Important district markers would be the wide-stem Borax Lake point for the earliest period and the nonfluted, concave base point for the later phases. The second aspect, which cannot yet be dated or divided into temporal subdivisions, seems to have existed to the north and is only sketchily known from the Tehama and Shasta County finds. Here also the district borders cannot yet be determined. Called here the Thames Creek district, its important markers are a preponderance of stemmed projectile points and inscribed stones. Men-500, which contains both concave base and stemmed points is placed here within the Borax Lake district and may represent a site in the transitional zone between the two districts. Ten-Mile River is tentatively placed within the Thames Creek district. As more information becomes available, it may be found that district borders shifted somewhat from phase to phase.

Although change within the southern aspect of the Borax Lake Pattern is evident, the scarcity of data makes it premature to define precise phases. Experience elsewhere suggests that more data will allow more than two phases to be distinguished from the two later periods which were distinguished by Meighan and Haynes at the Borax Lake site, which together had a temporal span of roughly five thousand years. Ragir (1968:341), for example, has divided the Windmiller Pattern into "five, perhaps six" phases, assigning the sites which

furnished the data for the division into the age range 3000 to 4000 B.P. Ragir based her phase distinctions upon seriation of projectile points, charmstones, and shell and bead ornaments. Only chipped stone tools have been recovered in any number from Borax Lake Pattern sites and clear phase distinctions are not yet evident. At Lak-261N, concave base points and Excelsior points were stratigraphically late in the Borax Lake Pattern components and allowed the hypothesis of two phases at the site. However, obsidian hydration evidence from both Lak-36 and Lak-261 suggests that Lak-36 concave base points were contemporaneous with the earliest occupation of Lak-261. Rather than using the Lak-261 evidence to suggest that there were successive phases within the Borax Lake Pattern when nonfluted concave base points were employed, dropped out of fashion, and then once more were utilized, I prefer to select the simpler explanation that the absence of concave base points from the assemblage recovered from the earliest stratigraphic component at Lak-261N was due to sampling error.

Current evidence, however, does allow a number of projectile point traditions to be distinguished for the southern aspect of the Borax Lake Pattern. The earliest, based upon the work of Meighan and Haynes, is the wide-stem tradition, which according to the obsidian hydration evidence may have had its range from 8000 to 6000 years ago. The second is the concave-base tradition, which obsidian hydration measurements, supported by a single C-14 date from Lak-261N, suggest ranged from 5000 to 3000 years ago. I also hypothesize a third, the expanding-stem tradition, which overlaps the later portion of the concave-base tradition. The expanding-stem tradition is represented at both Lak-261 and Men-500, but appears to be absent from Nap-131. The tradition may

have begun about 4000 years ago and persisted through the end of the Borax Lake Pattern into succeeding periods.

The dating of the Borax Lake Pattern discussed above, its division into aspects, and the sequence of point traditions, warrants discussion with respect to contemporaneity with other patterns implied by the dating and with regard to processes of change implied by the cultural divisions. These two topics are touched upon later, following discussion of the Upper Archaic Period.

The Upper Archaic Period

For the purposes of this paper the beginning of the Upper Archaic Period in Central California has been more or less arbitrarily set at the boundary between the Altithermal and the Medithermal. Archaeologists in the western United States have frequently made use of Antevs' (1952, 1953, 1955) divisions of the postglacial period into three general temperature ages. The earliest, the Anathermal, followed the cold and wet glacio-pluvial period and was characterized by "frequently interrupted warming and drying" (Antevs 1962:193). It has been dated from about 8000 B.C. until about 5000 B.C. The second period, the Altithermal, dated from 5000 B.C. until about 2000 B.C., has been characterized as warm and dry. The Medithermal followed from about 2000 B.C. up through the present and has been characterized as semi-arid with dry intervals.

Deevey and Flint (1957) extended Antevs' Altithermal from about 8000 B.C. to about 600 B.C. and refer to it as the Hypsithermal. Aschmann (1958) questioned Antevs' climatic sequence in its entirety, and after

a search of the climatic evidence referring to the Great Basin concluded, "It would appear that during the last 10,000 years the annual climate has varied greatly, as it does now." Martin (1963; Martin et al. 1961), using pollen evidence, questioned the condition of aridity which Antevs attributed to the Altithermal and suggested that, to the contrary, the period from roughly 6000 B.C. to 1000 B.C. was subpluvial due to an increase in summer rainfall. Antevs (1962) offered a rebuttal to Martin's proposition that the Altithermal was wet rather than dry. Finally, Bryan and Gruhn (1964) suggested that while the sequence of Anathermal, Altithermal, and Medithermal is a demonstrable reality, the various phases have been improperly employed to determine absolute dates and past conditions from archaeological deposits. They argued that the concepts should be reserved for designating differences in temperatures and that the addition of other climatic factors leads to confusion. Bryan and Gruhn also presented evidence that the Altithermal began earliest in the southern parts of the Great Basin, by perhaps 7500 B.C., while it did not get underway until well after 5000 B.C. in the northern Great Basin. They proposed that the dates for the three phases, as well as the specific climatic conditions characteristic of them, be determined independently for each ecological area.

In this paper the date of 2000 B.C. is provisionally accepted for the boundary between the Altithermal and the Medithermal and thus for the division of the Archaic Period into lower and upper portions. No specific archaeological deposits are being dated with respect to the climatic phases and no statements are made with respect to climatic conditions in specific regions. Implicit in the division, however, is an untested

hypothesis that changes in the archaeological record in California may be causally related to large-scale climatic changes. The "Intermediate" cultures of southern California (Wallace 1955) and the Berkeley Pattern in northern California appear to have had their origins at this time level. Specific research into the palaeoclimatology of the subareas of California is necessary to establish a more precise date and to help test the above hypothesis.

In the North Coast Ranges, the Borax Lake Pattern appears to have continued into the Upper Archaic Period for perhaps a thousand years, but showed foreshadowings of the Houx Pattern in that mortars and pestles became quantitatively more numerous (cf. Men-500), implying a growing importance for the acorn in the economy. By 150 B.C., however, as indicated by a C-14 date from Lak-261, the Borax Lake Pattern had given way completely to the Houx Pattern. See Chapter Six for the criteria proposed for the Houx Pattern and the earlier discussion on the Houx Pattern component at Lak-261 in this chapter for a summary of characteristic implements.

To date, only the single Houx Pattern component at Lak-261 has been stratigraphically excavated. The preponderance of projectile points over milling implements contrasts markedly with findings at Berkeley Pattern components in the Bay region, suggesting hunting was more important at this time in the North Coast Ranges than it was at the Bay. Whether this was simply an ecological phenomenon or whether it reflects a fundamentally different adaptation with different historic roots cannot yet be determined. A number of Houx Pattern sites in a wide range of differing microenvironments should be found and excavated before

any definitive statement is made in this regard.

Typological carryovers from the preceding Borax Lake Pattern suggest that the Houx Pattern may be a coalescent one, merging Borax Lake attributes, such as the Excelsior point and the large, broad point possibly derivative from the wide-stem Borax Lake point with elements ultimately derived from the Berkeley Pattern. Although data are few and must remain only suggestive, comparisons point to Houx Pattern relationships to the south rather than to the north. For example, the Houx Pattern large stemless points are similar to those from Napa and Solano counties (cf. Arnold and Reeve 1959; Elsasser 1955; McGonagle 1966) and to the unpublished point assemblage from Son-299 on Bodega Bay. It is tempting to see the Houx Pattern as representing a Miwok entry into the North Coast Ranges. Much more comparative evidence is necessary before this suggestion could be seriously entertained. In particular, the artifact distributions in ethnographic Wappo, Pomo, and Patwin territories must be known more fully before this hypothesis could be tested. In sum, the discovery of the Houx Pattern component at Lak-261 raises more questions than it answers. Figure 18 provides a summary of the cultural sequence within the North Coast Ranges as it is presently understood.

Dating in Central California's Archaic Period

As stated earlier, Meighan and Haynes related the terminal portion of the Borax Lake Pattern to the Berkeley Pattern of the Bay and Delta (referred to by Meighan and Hanes as Middle Central California). This relationship was proposed on the basis of similarities between the artifact assemblage at Men-500 and artifacts characteristic of the Berkeley










Upper Archaic Period	Hour Pattern	C-14: 150 ± 150 BC	(related to the earlier Borax Lake wide-stemmed point?) 	Excelsior points becomes shorter and narrower through time many leaf-shaped points	mortar and pestle mano and metate drop out	possibly a coalescent pattern (Berkeley and Borax Lake?) ties seen closest to Bay and Delta
	Lower Archaic Period	Borax Lake Pattern	1000 BC	 	Excelsior (late addition?)	mortar and pestle introduced: co-occurs with mano and metate, concave base pt., and Excelsior pt.
3000 BC			(related to similar points from the Central Valley and Humboldt concave base A?) 	willow-leaf (willow-leaf and Excelsior related to Old Cordilleran, but later in time?) 	expanding stem (late addition to Borax Lake District?) 	Borax Lake District: leaf-shaped point most frequent small tabular stone (related to later painted tablets?)
4000 BC			 Borax Lake wide-stem	"coarse, single-flake blades"	mano and metate inferred	
Palaeo-Indian Period	Post Pattern	6000 BC hiatus?	(related to similar points - all later in time? - from Martis Complex and other northern California assemblages?)			
		max. age 10,000 BC	 Borax Lake fluted	 crescent	(related to assemblages from Tulare Lake, Buena Vista Lake?)	

Figure 18. Cultural Sequence within the North Coast Ranges.

Pattern plus the previously accepted dating of the Berkeley Pattern of about 1000 B.C. Evidence now available supports the interpretation that the Berkeley Pattern was considerably earlier on the Bay than in the Delta and that the Windmiller Pattern was considerably later in the Delta than previously believed.

In her doctoral dissertation on the Windmiller Pattern, Ragir (1968) reviewed the dating evidence for the Pattern and presented a number of additional radiocarbon dates based upon the dating of bone collagen (see Figure 19). A total of ten dates on collagen from Windmiller Pattern components yielded a continuous range of overlapping dates from 545 ± 120 B.C. to 1825 ± 160 B.C. Heizer (1958a:3) had previously rejected a date of 1130 ± 300 B.C. determined from "calcined and carbonized human bone" obtained from an SJo-68 cremation as too late in time and had based his dating of the Windmiller Pattern upon charcoal obtained from midden screenings which yielded dates of 2102 ± 160 B.C. and 2150 ± 250 B.C., respectively, and a second cremation sample which yielded a date of 2400 ± 250 B.C. Considering the internal consistency of the three latter dates, Heizer's view of the unreliability of the latest date is understandable. Ragir (1968:352), after a discussion concerning the reliability of bone collagen dating with respect to charcoal dating (cf. Berger et al. 1964), provisionally gave a maximum age of 5000 B.P. to the Windmiller occupation of the Central Valley and suggested its termination by perhaps 3000 B.P. Ragir found no direct dating evidence to support an estimate made by Heizer and Cook (1949) that the Windmiller Pattern had an initial date of perhaps 7500 B.P.

Since Berkeley Pattern components in the Delta occur stratigraphically

Site	Lab No.	Pattern:					Borax Lake	San Dieguito	Remarks
		Augustine	Berkeley	Windmiller	Houx				
Sac-21	M-885	1700 ± 150						middle phase one	
CCo-309	I-1193	1665 ± 95						phase 2	
Sac-60	M-749	1638 ± 200						phase 2a	
CCo-138	M-884	1450 ± 150						late phase one	
Sac-21	M-866	1440 ± 150						middle phase one	
Sac-6	M-648	1330 ± 200						late phase 1 or p2	
Mrn-115	C-186	1230 ± 130						phase 1 or middle hor	
CCo-138	M-865	1025 ± 150						middle phase one	
Sol-236	M-886	870 ± 200						middle phase one	
CCo-138	C-689	721 ± 200						middle phase one	
Sac-29	M-752		200 ± 500				A.D.	end middle horizon	
Mrn-27	I-3148		30 ± 95				B.C.	middle middle hor	
Lak-261	I-2791				150 ± 150				
CCo-259	UCLA-297		230 ± 250					Ellis Landing facies	
Ala-309	LJ-199		360 ± 220					Ellis Landing facies	
Mrn-27	I-3149		370 ± 190					middle horizon	
Ala-328	C-690		389 ± 150					Ellis Landing facies	
Sac-6	C-691	460 ± 200						late phase 1 or p2	
Ala-307	M-121		500 ± 250						
SJo-142	I-2750a			545 ± 120				phase 5?	
SJo-142	I-2750b			635 ± 100				phase 5?	
Sac-197C	GX-0659			725 ± 135					
SMa-77	L-187A		750 ± 350					early SF Bay	
SJo-56	I-2751			905 ± 115				phase 3	
Ala-307	M-123		930 ± 300						
SJo-68	I-3033			1030 ± 110				phase 4	
Sac-168	I-3037			1120 ± 170				phase 3?	
Sac-107C	I-2748			1125 ± 105					
SJo-68	M-646			1130 ± 300					
Ala-307	M-126		1190 ± 300						
SMa-77	L-197B		1200 ± 300					early SF Bay	

continued next page

Figure 19. Radiocarbon Dates for Some Archaeological Sites and Patterns in Central California.

Site	Lab No.	Pattern:					Remarks
		Augustine	Berkeley	Windmiller	Houx	Borax Lake	
Ala-307	M-127		1250 ± 250				
Ala-307	M-122		1260 ± 300				
SJo-142	GX-0660			1495 ± 110			phase 5?
SJo-68	L-2749a			1635 ± 110			phase 1
Ala-307	M-124		1650 ± 250				
Lak-261	I-2754					1740 ± 130	
SJo-68	I-2749b			1825 ± 160			phase 1
Ala-307	M-125		1910 ± 450				
SJo-68	G-440,552			2102 ± 160			
SJo-68	M-645			2150 ± 250			
SJo-68	M-647			2400 ± 250			
CCo-308	UCLA-259		2500 ± 400				early middle horizon
Men-581						3370 ± 145	
Ker-116	I-1928					5650 ± 200	
Ker-116	LJ-1356					6250 ± 400	
Ker-116	LJ-1357					6250 ± 400	

Figure 19 (continued). Radiocarbon Dates for Some Archaeological Sites and Patterns in Central California.

above Windmiller Pattern components, a number of radiocarbon dates for Berkeley Pattern components on the San Francisco Bay have previously been interpreted as supporting evidence of the greater antiquity for the termination of the Windmiller Pattern. Discrepancies in the cross-dating of artifacts between the Bay and the Delta which were brought about by the acceptance of this framework have only been briefly alluded to until recently. Although the present author (Fredrickson 1966) obtained a radiocarbon date of 2500 ± 400 B.C. from a Berkeley Pattern component at CCo-308 in interior Contra Costa County and found a number of typological similarities with the Windmiller Pattern, he accepted temporal priority of Windmiller over Berkeley, while at the same time he granted the possibility of some contemporaneity of the Berkeley Pattern CCo-308 with the Windmiller Pattern. Obsidian hydration measurements from CCo-308, determined by the University of California, Davis, support the antiquity of the Berkeley Pattern components at CCo-308. A total of sixteen obsidian artifacts, not differentiated according to source, provided measurements ranging from 1.2 to 13.2 microns (Harvey Crew, personal communication). Using the Clark (1964) curve as guide to approximate chronometric dating, the average of 5.6 microns converts to 4400 years before the present. Obsidian hydration measurements were also obtained from artifacts recovered from the youngest component at CCo-308, guesstimated on the basis of artifact styles at 2000 to 1700 years before the present. Nine of fourteen measurements ranged from 3.1 to 3.6 microns, averaging 3.4 or 2300 years B.P. The remaining five specimens from this component averaged 5.2 microns, suggesting physical mixing between the stratigraphic components or reuse of older specimens. From his present

perspective, this writer accepts contemporaneity of the two patterns.

Gerow (1968), utilizing radiocarbon dates, obsidian hydration measurements, and cross-dating of artifacts, dates the assemblage from the University Village site (SMA-77) between 1000 and 2000 B.C. Two charcoal radiocarbon dates were obtained from SMA-77: 750 ± 350 B.C. (L-187A) and 1200 ± 300 B.C. (L-187B). Citing typological correspondences between the ornamental shell from University Village and the Windmiller Pattern, Gerow rejected the formulation of the "Middle Horizon" in the Central California Taxonomic System as methodologically unsound and offered the term Early San Francisco Bay to designate University Village, the lower levels of West Berkeley, and "probably the lower levels of Ellis Landing." He suggested that the Early Bay period continued down to about 1000 to 500 B.C. Gerow (1968:106ff.) argued that the Early Bay was contemporaneous with the Windmiller Pattern and that the two cultures had fundamentally different adaptations. He saw no fundamental difference, however, between the Early Bay and the later complexes of the Bay region, although some "cultural and populational change through time is suggested." Refer to Gerow (1968) for a full discussion of the dating and cultural evidence. With respect to this essay, Gerow's Early San Francisco Bay culture becomes an early Berkeley Pattern manifestation.

A series of seven overlapping radiocarbon dates, ranging from 500 ± 250 B.C. to 1910 ± 450 B.C. has been obtained for midden charcoal from the deeper levels of the West Berkeley shellmound (A1a-307) (Heizer 1958a:10-11). The dates suggest that the same levels at different portions of the site are of different ages, not an unusual expectation for a large shellmound, but precise cultural contexts for the dates will

not be known until the report on the West Berkeley investigations becomes generally available. The dates do suggest that the deeper levels at West Berkeley were occupied during the period 3000 to 4000 years ago. Gerow (1968:10) cited a manuscript copy of the report on West Berkeley, made available by William Wallace, and commented on the shellmound as follows: "The data show that while the upper six feet are assignable to the Middle Horizon as suggested by Beardsley, the lower 12 feet are considered by Wallace to be a coastal manifestation of the Early Horizon. From the data made available it is not possible to assess completely the West Berkeley burial complex in the light of the University Village materials. All that can be done in the present report is to show that, although the two sites are at a considerable distance from each other, they are in essential agreement not only in sharing with the Windmiller facies components a large number of diagnostic traits such as specific shell beads and shell ornament types, perforated plummets, and heavy chipped stone points of non-obsidian materials, but in contrasting with the Early Horizon of the interior in large numbers of traits which Beardsley has ascribed to the Middle Horizon of the Coastal Province." As indicated above, Gerow (1968:99ff.) placed the lower levels of Ala-307 in his Early San Francisco Bay period.

There is no doubt that the Berkeley Pattern is stratigraphically and temporally later than the Windmiller Pattern in the lower Sacramento Valley (cf. Lillard, Heizer, and Fenenga 1939). It is evident that the artifact typologies and horizon-styles which have been established as characteristic of the Middle Horizon were distinguished on the basis of what now appear to have been materials representative of the later

portion of the Berkeley Pattern, dating after the replacement of the Windmill Pattern in the lower Sacramento Valley. Ragir (1968:352) has placed the changeover from Windmill to Berkeley about 1000 B.C., although the radiocarbon dates based upon bone collagen suggest that the changeover may have been as late as 500 B.C. Radiocarbon dates from later Berkeley Pattern sites in the San Francisco Bay region and the single date from the Houx Pattern component at Lak-261 in the North Coast Ranges would seem to support the date of 500 B.C. rather than 1000 B.C. for the termination of Windmill. These dates are reviewed below. More data are necessary and, in all cases of assigning absolute dates on the basis of cross-dating, what Willey and Phillips (1958:29ff.) referred to as "slope" must be taken into account, that is, the span of time involved in the geographic dispersion of the trait employed in cross-dating.

A number of internally consistent radiocarbon dates have been obtained from San Francisco Bay site components which have been assigned to the Ellis Landing Facies of the Middle Horizon. A date of 389 ± 150 B.C. (C-690) was determined from charcoal from the lower level of component B at Ala-328, the Patterson site. Davis and Treganza (1959:70) assigned this component to the Ellis Landing Facies, while linking component C at Ala-328 with the lower levels of Ala-307, CCo-295, and Son-299. The former two components are part of Gerow's (1968) Early San Francisco Bay. A date of 360 ± 220 B.C. (LJ-199) was obtained from charcoal situated near the mound base of Ala-309, the Emeryville site. Beardsley (1954:88-89) assigned 32 burials from the site to the Ellis Landing Facies of the Middle Horizon and 16 burials to the Emeryville Facies of the Late Horizon. No other facies were identified at the site. The

radiocarbon date presumably applies to the Ellis Landing Facies. A date of 230 ± 250 B.C (UCLA-297) has been determined for charcoal at a depth of 76 inches from CCo-259, the Fernandez site. Heizer (Fergusson and Libby 1964) found the date consistent with the cultural evidence which linked component C of the site to the Ellis Landing Facies (cf. Davis 1960:46). At a final Bay region site situated on the Tiburon Peninsula, Mrn-27, two charcoal age determinations placed the archaeological remains between 370 ± 190 B.C. (I-3149) and 30 ± 95 B.C. (I-3148). The later date was obtained from charcoal found with a cremation which also had Type 3c Olivella beads in association. This bead type was used to date the Mrn-27 burials to the "middle of the Middle Horizon" (Fredrickson 1970:28).

Two other radiocarbon dates from other geographic regions are relevant in this context. Charcoal from the Houx Pattern component at Lak-261 in the North Coast Ranges yielded a date of 150 ± 150 B.C. (I-2791). This component also contained a burial with which were associated a single Macoma clam disk bead and a number of bevelled Type 3b1 Olivella beads. Both bead types have been assigned to the early Middle Horizon of the lower Sacramento Valley (Bennyhoff and Heizer 1958). Finally, a questioned date of A.D. 200 ± 500 (M-752) was determined from charcoal obtained from the Roeder site (Sac-29) in the lower Sacramento Valley. The sample was expected to yield a date for the terminal Middle Horizon and its lateness suggest that re-evaluation of the Roeder site date is in order.

The remarkable consistency of the five dates from the Middle Horizon components of four San Francisco Bay shellmounds, supplemented by the two dates from the Houx Pattern component from the North Coast Ranges

and the terminal Middle Horizon component of the lower Sacramento Valley, would seem to support the cross-dating of lower Sacramento Valley Berkeley Pattern sites at the 500 B.C. level rather than the 1000 B.C. level.

The total of the chronological evidence reviewed above does not support the alternative that the dated cultural remains had their origin in the Sacramento Valley and required 500 years to move to the Bay.

To summarize, the dating evidence from Central California leads to the conclusion that there was a considerable span of time when the Windmill Pattern of the lower Sacramento Valley, the Berkeley Pattern of San Francisco Bay, and the Borax Lake Pattern of the North Coast Ranges were contemporaneous. At present it appears that the Borax Lake Pattern had a much earlier initial date of appearance than the Windmill Pattern, 6000 B.C. as contrasted with 3000 B.C. Sometime between 1000 B.C. and 500 B.C., the probability being closer to the latter date, the Berkeley Pattern appears to have replaced the Windmill Pattern in the Delta while retaining its continuity in the San Francisco Bay region. At about the same time interval in the North Coast Ranges, the Borax Lake Pattern gave way to the Houx Pattern, which may eventually prove to be a Berkeley Pattern variant. Figure 20 shows schematically the periods and patterns in the North Coast Ranges, San Francisco Bay, and the lower Sacramento Valley.

The suggestion sometimes made informally that Windmill perhaps represented a local climax of an early, widespread milling stone culture (cf. Baumhoff and Olmsted 1963; Wallace 1954) is supported by the dating evidence. As it presently stands, it appears that the Borax Lake Pattern has temporal, geographic, and cultural priority within the

		Region		
		North Coast Ranges	San Francisco Bay	Lower Sacramento Valley
1800	AD BC	north (Shasta Complex)	south (Clear Lake Complex)	Augustine Pattern (Hotchkiss Culture) (Late Horizon)
300		?	?	
300		Upper Archaic Period	Houx Pattern	Berkeley Pattern (Middle Horizon) (Cosumnes Culture) (Emery Tradition)
2000		Lower Archaic Period		
6000		Palaeo-Indian Period		
10000				

5011-100020

Note: Older terminology is written horizontally; terminology proposed in this paper is written vertically.

Figure 20. Periods and Patterns in the North Coast Ranges and Two Adjoining Regions.

Lower Archaic Period of Central California, with the Windmill Pattern coming into existence in its closing phases at the same time the Berkeley Pattern was developing its ultimately successful adaptive strategy which dominated the later portion of the Upper Archaic Period in the Bay and Delta regions and possibly, under the guise of the Houx Pattern, in the North Coast Ranges.

A number of suggestions have been made with respect to the cultural origins of these three patterns. The available obsidian hydration measurements and radiocarbon dates support the inference that the Borax Lake Pattern was contemporaneous with early milling stone sites of southern California (cf. King 1967; Moriarty et al. 1959; Owen et al. 1964; Peck 1955; Rogers 1929; Treganza and Bierman 1958; Wallace 1954; Wallace et al. 1956), allowing the possibility that both northern and southern manifestations ultimately derived from some common origin such as the Cochise of the Southwest (cf. Sayles and Antevs 1941). Detailed consideration of the origins of Windmill and Berkeley, both of which appear to be later manifestations with respect to origins, is beyond the scope of this paper. See Ragir (1968) for an extensive comparative discussion of Windmill Pattern origins. She favored the alternative that at the time level of the Windmill Pattern, the cultures of northern California and southern California had two separate origins, "the southern province from the Great Basin (the Desert Culture), and the northern from the Northwest Plateau." Ragir saw the possibility that the Berkeley Pattern was a result of expansion of the southern California La Jolla complex about 3500 years ago. Gerow (1968:122-123), on the basis of detailed trait comparisons, considered the closest analogue to his Early San Francisco Bay culture to be Olson's (1930) Early Island

Cemetery C-3 on Santa Cruz Island, and implied a southern California origin for the Berkeley Pattern. Pohorecky (1964), in his doctoral dissertation on the South Coast Ranges, also saw a south coast origin for the Berkeley Pattern. The South Coast Ranges appear to be a key region with respect to determining the origins of the Berkeley Pattern. Pohorecky's (1964) analysis of the archaeology of this region was primarily from the perspective of the Willow Creek site (Mnt-282), dated by radio-carbon at A.D. 71 ± 250 (C-628) and A.D. 110 ± 400 (C-695). Influence from the well-developed coastal culture further to the south was evidenced at Willow Creek, but how early the southern influence was felt in the region was not shown. No additional data were reported on earlier materials, such as the sporadic occurrences of manos and metates reported by Pilling (1951, 1955). On the basis of the distribution of the early milling stone cultures in southern California and in the North Coast Ranges, we can expect that sooner or later a milling stone pattern will be demonstrated and defined for the South Coast Ranges. If the Berkeley Pattern did indeed derive from the south, moving northward along a coastal route, and if the dates from Ala-307, CCo-308, and SMa-77 are correct, we would expect to find evidence of the Berkeley Pattern replacing or merging with the hypothetical milling stone pattern of the South Coast Ranges at a time depth of 2000 B.C. or earlier. It may prove that the origins of the Berkeley Pattern in Central California are related to the origins of the poorly understood "Intermediate" cultures of southern California (Wallace 1955).

Processes of Culture Change in the Early North Coast Ranges

One of the aims of defining cultural units in archaeology, whether the units are broad-scale or minimal with respect to the geographic space

and temporal span encompassed, is to facilitate the study of culture change. The units which have been established in this paper for the early periods in the North Coast Ranges are few in number and the minimal units accomodate much more time and space than the ideal would recommend. In the following paragraphs, I briefly discuss some cultural processes which can be discerned or hypothesized on the basis of the meager data available. I conclude the discussion, and this paper, with a summary of significant problem areas in the archaeology of the North Coast Ranges.

My premise is that archaeological cultures constitute the adaptive mechanisms of interreacting individuals who, by virtue of their inter-reaction, constitute a society. I also assume that the processes of adaptation in archaeological societies are not qualitatively different, at the time scale within which we are concerned here, from processes involved in directly observable ethnographic groups. I do not assume that minimal archaeological units are isomorphic with societies that once actually existed, but I do presume that questions regarding change and stability can be formulated and answers obtained as if the archaeological society did indeed at one time exist. The error with respect to the archaeological situation is assumed to be qualitatively little different from that of the ethnological situation when dealing with more inclusive levels of generalization, as, for example, in statements made with respect to Plains culture or Northwest Coast society.

The three successive patterns - Post, Borax Lake, and Houx - which have been defined here for the North Coast Ranges are considered to represent basic adaptive behaviors of the archaeological societies

represented. Discernible changes within each pattern are construed as responses to changing circumstances, whether it is the circumstance of the physical environment, the social environment beyond the boundaries of the archaeological society, or the social environment contained within the boundaries of the archaeological society.

With respect to the Post Pattern, which falls within Haynes' (1969) hypothetical Late Palaeo-Indian Period during the Valderan Substage of the Pleistocene, there is little direct evidence which can be employed in the reconstruction of characteristic adaptive modes. Despite the assumption often made that fluted points are indicative of big game hunting, the admonition of Heizer and Baumhoff (1970), that no clear evidence supportive of this correlation has yet been discovered in the Great Basin, should be kept in mind. One of Daugherty's (1962: 144) criteria for the Intermontane Western tradition may also be applicable to the Post Pattern: "a diversified economy, not strongly oriented toward big game hunting, except locally." It seems reasonable to infer that elk and deer were hunted in Post Pattern times, as well as to keep open the possibility suggested by the crescents that waterfowl provided an important food source (cf. Clewlow 1968). However, faunal remains have not been found in a cultural context, perhaps because the acid soils characteristic of the North Coast Ranges (cf. Cook and Heizer 1965) militate against bone preservation.

The lakeside setting for the Post Pattern component seems more than accidental at this time depth, since a lacustrine or riverine location seems to be an element held in common by many of the far western cultures of the Palaeo-Indian Period (cf. Butler 1961; Daugherty 1962; Davis

1967; Warren 1967). Lakeshore resources, such as waterfowl, fishes, and shoreline plants, undoubtedly formed a part of the subsistence base of the Post Pattern peoples.

The two distinctive artifact forms of the Post Pattern, the crescent and the fluted point, both imply historical relationships elsewhere in the western United States. The crescents suggest a link with sites in southern California and the Great Basin, particularly its western edge and northernmost portion (cf. Tadlock 1966), and have been suggested as a diagnostic element by Warren (1967) for his proposed San Dieguito complex. The fluted, concave-base projectile point occurs sporadically throughout the Great Basin, southern California, and the Columbia Plateau, sometimes in association with crescents (cf. Tadlock 1966:672-673). When documented, the context of this co-occurrence is in excess of 7000 B.C.

With respect to existing hypotheses regarding the Palaeo-Indian Period in the western United States, the Post Pattern of the North Coast Ranges would seem to have its closest tie to Warren's (1967; cf. Warren and True 1961) San Dieguito complex. Warren hypothesized that the San Dieguito complex was an off-shoot from a non-Desert Culture western tradition, derived from the north and probably adapted not to desert conditions but to forest and grassland environments as unspecialized hunters, fishers, and gatherers. Warren (1967:182) briefly discussed the finds of fluted points in the west, but does not attempt to explain them. The only additional evidence of significance concerning fluted points in the west is that produced by Meighan and Haynes (1970) demonstrating their contemporaneity with crescents at Lak-36.

Although the obsidian hydration method may ultimately provide the deciding evidence, at present there is no demonstrable evidence that the Post Pattern is related to Butler's (1961) Old Cordilleran culture, linked by the willow-leaf (or Cascade) projectile point. The radio-carbon date of 5960 ± 280 B.C. (Newman 1966) associated with Cascade points at Cascadia Cave in the Willamette Valley in northeastern Oregon provides a hint that such a linkage may well exist, though the date is more in line with the period of the following Borax Lake Pattern rather than the Post Pattern.

The possible derivation of the Post Pattern from a northern culture oriented to forest and grassland and its probable affiliation with the San Dieguito complex does not imply any continuing social contact with these related cultures through time. Topography as well as physical distance suggest that the North Coast Ranges Post Pattern peoples constituted a society separate from the societies which utilized sites dated at the same time level elsewhere, including those sites identified as Old Cordilleran and San Dieguito. No data are yet available which suggest either geographic (and hence social) or temporal differentiation within the Post Pattern.

A marked change in environmental use in the North Coast Ranges, represented by the milling stone-using Borax Lake Pattern, began about 6000 B.C., following an apparent break in the utilization of Lak-36 (Meighan and Haynes 1970:1220). The adaptive behavior, presumably involving the gathering and milling of hard seeds, began toward the end of the Valdres Substage (Haynes 1969) and persisted into the Altithermal phase (Antevs 1962; cf. Bryan and Gruhn 1964). Presumably this was a

period of higher temperatures than those which characterized the period of the Post Pattern, and it is probable that changes in the plant and animal communities of the region were associated with the climatic change. No direct evidence is available in this regard, however. The shore of Borax Lake continued to be utilized, but overall a wider range of site locations was utilized than appear to have been employed during Post Pattern times. Whether this new adaptation was the result of population movement, possibly involving a displacement of indigenous peoples or a merging with them, or of the diffusion of technological skills and knowledge to an indigenous population cannot be determined on the basis of present evidence.

The roughly 8000 year time depth for the Borax Lake Pattern in the North Coast Ranges, as indicated by obsidian hydration measurements, appears to be equal to that of the early milling stone horizon in southern California where a number of radiocarbon dates cluster close to 5500 B.C. (cf. King 1967:61). The apparently rapid spread of the milling stone industry throughout California, plus the span of several millenia during which it had technological dominance, is sufficient evidence of its selective advantage over non-milling stone adaptations. Unlike the implements of the Post Pattern, which appeared to have had strong northern connections with respect to origins, the milling stone industry would seem to have had Desert Culture origins (cf. Jennings 1964).

The origin of the wide-stem Borax Lake point cannot be so easily indentified. Although some of the specimens illustrated by Harrington (1948:82) are reminiscent of the earlier weakly-shouldered Silver Lake points of southern California (cf. Warren 1967), and thus might be a

stylistic derivative of this point type, a survey of published reports on early milling stone assemblages from southern California failed to reveal any typological equivalent to the wide-stem Borax Lake point. Such an equivalent would be expected if indeed earlier southern California points were ancestral to the wide-stem point. Ragir (1968:383ff.), in a comparative review of the distribution of early stemmed points, found such points absent in the Great Basin but present in the Columbia Plateau (e.g., the Lind Coulee point). The Plateau points are generally much longer and narrower than the Borax Lake specimens and do not appear to be typologically equivalent. Within California, no clear-cut typological equivalents to the wide-stem points appear in early Berkeley Pattern components on the Bay (cf. Fredrickson 1966; Gerow 1968) or in Windmiller Pattern components (cf. Heizer 1949; Ragir 1968). Some of the Lak-36 Borax Lake wide-stem points resemble specimens from the little-understood Martis complex of the Sierras (cf. Heizer and Elsasser 1953; Elsasser 1960a) which suggests that the points of both regions perhaps had a common ancestor. Baumhoff (1957; Baumhoff and Olmsted 1964:9-10) has tentatively identified Borax Lake wide-stem points from the Plateau region of northeastern California, although he mentions a problem with the identification "since the specimens from the Lorenzen Site are not typologically identical with those that Harrington recovered at Borax Lake" (Baumhoff and Olmsted 1964:10). The dating in this region does not appear to be early enough for the northeastern California specimens to be ancestral to the North Coast Ranges specimens. At the present time, then, the origin of the wide-stem Borax Lake point remains unknown.

According to obsidian hydration measurements, the nonfluted, concave-

base projectile points of the Borax Lake Pattern date back roughly from 3000 B.C. to about 1000 B.C. (Meighan and Haynes 1970:1220). Concave-base projectile points also occur in both Windmiller and Berkeley Pattern assemblages of about this same time depth (cf. Beardsley 1954; Heizer 1949, Ragir 1968). A large concave-base point from a Berkeley Pattern component at CCo-308 yielded an obsidian hydration measurement of 6.3 microns (ca. 3150 B.C. by Clark's [1964] curve) (Harvey Crew, personal communication). A C-14 date of 2500 ± 400 B.C. (UCLA-259) was obtained from the same component of the site (Frédrickson 1966). Clewlow et al. (1970:25) report radiocarbon dates from South Fork Shelter, Nevada, of 2360 ± 400 B.C. (UCLA-295) and 2410 ± 300 B.C. (UCLA-296) as the earliest dates associated with Humboldt Concave Base A projectile points in the Great Basin. A date of 1094 ± 200 B.C. (L-289BB) from Hidden Cave, Nevada, was reported as the latest date associated with the point form in the Basin.

The close agreement in the ages of concave-base points from the Great Basin and Central California is strongly suggestive of a historical relationship between the several regions of occurrence. It is perhaps significant that the earliest dated concave-base point from Central California is associated at CCo-308 with the earliest dated Berkeley Pattern site in this subarea. The appearance of the concave-base point in the milling stone-using Borax Lake Pattern of the North Coast Ranges thus appears to correspond to the appearance of the mortar and pestle-using Berkeley Pattern in the San Francisco Bay region. Similar, as yet undetermined causal factors may have brought about both phenomena. As more stratigraphic evidence is available and more

precise dating controls are obtained for the Borax Lake Pattern in the North Coast Ranges, we can perhaps predict that a marked increase in the frequency of mortars and pestles within the Borax Lake Pattern will be coterminous with the development of the Berkeley Pattern on the Bay and in the Delta.

The expanding-stem tradition of the North Coast Ranges may be due to external influences, but could as easily be interpreted as a local stylistic development, perhaps originating through processes similar to those involved in linguistic drift (cf. Sapir 1949:147ff.). More data are needed, especially with respect to the aspect of the Borax Lake Pattern focused in the Thomas Creek district, before the development and spread of the expanding-stem projectile point can be understood more fully.

The presence of at least two aspects of the Borax Lake Pattern implies that the population at that time was divided into at least two groups, each with its own social identity. Also implicit is some degree of linguistic differentiation. If the northern aspect of the Borax Lake Pattern derived from the southern (or vice versa), the time depth of the separation between the two groups would determine whether the differences would be on the level of dialect or separate language. Given separate social origins for each aspect, separate languages would be implied.

Termination of the Borax Lake Pattern in the North Coast Ranges appears to have been preceded by a gradual increase in the importance of mortars and pestles (and presumably of the acorn) in the economy as contrasted with milling stones (and presumably hard seeds). The abrupt change in economic mode, including an apparent dramatic increase in the importance of hunting, which the Houx Pattern seems to indicate, would appear to require explanation on grounds other than that of gradual

replacement. More investigation throughout the region into a number of sites dating to the period of transition from the Borax Lake Pattern to the Houx should reveal whether the abrupt transition is a widespread phenomenon or whether it is localized. The change itself implies that physical or social circumstances changed drastically enough to require a new adaptive response. If the abrupt change is localized, the inference would be that the changed circumstances were likewise localized. Given ethnographic knowledge of the area, penetration by Miwok speakers at this time could be the working hypothesis. If the abrupt change is characteristic of the entire North Coast Ranges, the environment should be examined with respect to which circumstances altered radically enough to stimulate the new adaptive response.

The adaptation represented by the Houx Pattern is similar to that of the Berkeley Pattern in that both are apparently based upon utilization of the acorn as the most significant vegetable product. While Berkeley Pattern sites on the Bay and the Marin-Sonoma coast show a predominant shellfish-collecting emphasis, the single Houx Pattern site shows a marked hunting emphasis. It is quite possible that the Houx Pattern is a regional expression of the Berkeley Pattern, differentiated on the basis of significantly different physical environments which elicit different adaptive responses from the same fundamental set of behaviors. This possibility is strengthened by typological comparisons of projectile points which suggest relationships of the Houx Pattern with Berkeley Pattern components on the Marin-Sonoma coast and in Napa County. A number of traits, including projectile point types and the burin technology, appear to be carried over from the preceding Borax Lake

Pattern, thus giving the Houx Pattern an appearance of being at least in part a result of a merging of Berkeley Pattern and Borax Lake Pattern elements. Until both extraregional and intraregional influences on the Houx Pattern can be defined in greater detail than is now possible, Houx is kept separate from Berkeley.

The single radiocarbon date of 150 B.C. from the Houx Pattern component at Lak-261 appears to mark the beginning of Houx Pattern utilization of the site, but there is no evidence that it represents the beginning of the Houx Pattern in the North Coast Ranges region. Although the data of Meighan and Haynes (1970) suggested that the Borax Lake Pattern terminated at Lak-36 about 1000 B.C., there is a period of several hundred years during which the replacement may have taken place. More substantive information is needed to date this replacement more closely. Similarly, no data are available with respect to the time of replacement of the Houx Pattern in the region and whether the replacement was by the adaptation represented by the Clear Lake Complex or whether there was an intervening phase equivalent to that of Phase 1 of the Augustine Pattern in the lower Sacramento Valley and Bay. Again, more data are needed.

Within the span of time indicated for Houx Pattern utilization of Lak-261, no major external influences can be demonstrated. The changes that are demonstrable occur with stylistic elements, such as the shape of stems on projectile points, and can be attributed to an internal process such as drift. Some as yet unknown functional origin may underlie the phenomenon noted that points of the Houx Pattern at Lak-261 appear, over time, to become shorter, narrower, and less heavy, without any significant change in shape (cf. Corliss 1972).

Summary

This essay has been organized around three major themes. First, I have examined the history of archaeological culture classification in Central California, attempting to show how each phase in the development of classification was in part an outgrowth of prior phases and in part a function of contemporary thinking with respect to cultural units in general. As new data became available, the method of classification employed at the time tended to become unduly restrictive with regard to understanding the complexity of the archaeological record, and in the succeeding phase new concepts and new organizing principles were formulated which took into account as much existing knowledge as possible. This effort was not always in the direction of providing synthesizing concepts, as when the three-part Central California taxonomic system was side-stepped by the focus on the local complex.

Second, I have presented a revision of the Central California taxonomic system, incorporating a system of spatial and cultural integrative units, modified from the framework presented by Willey and Phillips (1958), which I believe is capable of encompassing archaeological reality in Central California as it is presently known. The framework emphasizes what I have called the pattern, which is a regional or transregional adaptive mode, from which smaller units are abstracted. It is here where my formulation differs from earlier ones, where the larger, more generalized cultural units are conceptualized as being built up from the smaller ones. I have suggested that with respect to the experience of the archaeologist (in Central California at least), it is the pattern which first becomes apparent when a site is investigated. It is only

later during detailed analysis that smaller units such as aspects and phases become apparent. The framework I suggest is open with respect to culture-environment relationships, but our knowledge in Central California with regard to these relationships is apallingly slight. There is much inference but little substance.

Third, I have reviewed substantive and theoretical archaeological work as carried out in the archaeological region of the North Coast Ranges, focusing upon the earlier cultural manifestations, and have employed my suggested framework of spatial and cultural integrative units insofar as data were available. Since the region suffers an impressive lack of basic information, to a large extent the potentiality of the proposed framework remained latent. The following comments are made with respect to directions archaeological activity in the region might follow. Some of the comments relate to specific problems of trait distribution, some to general problems of strategy and theory. All are offered from the perspective that it is important to gain as much control as possible over temporal and spatial units in prehistory, since this is necessary before processes involved in change and stability can be adequately discerned, tested for, or formulated.

In Chapter Four of this paper, I examined a number of historical reconstructions of California's cultural past that utilized nonarchaeological data. Of most interest were the reconstructions of Kroeber and Klimek, which established a number of successive prehistoric periods for California. Utilizing their results as a guide to archaeological expectations, I hypothesized that the period between their "relatively simple and uniform" early period and their final period of "growth of specializations" would, especially in its early portion, be characterized

by considerable diversity and much irregularity. The history implicit in the ethnographic complexity of California is such that there is good reason not to expect cultural uniformity, stability of population, or regularization of cultural influences. Making an approximate concordance of the periods arrived at by the methods of historical reconstruction and those suggested here on the basis of archaeological evidence, the early culture-historical period would be equivalent to the Lower Archaic Period, the final culture-historical period to the Emergent Period, and the intervening culture-historical period equivalent to the Upper Archaic Period. The review presented earlier of the Archaic Period in Central California substantiates the hypothesis with respect to the intervening Upper Archaic Period. The coexistence of Borax Lake, Windmiller, and Berkeley Patterns and the implied (but not known) dynamics of replacement of Windmiller by Berkeley and of Borax Lake by Houx, is compatible with the expectations of the hypothesis. It can now be suggested that the prehistoric periods of Kroeber and Klimek be re-examined in more detail with respect to forming hypotheses of what might be expected archaeologically in different regions at different times.

One of the arguments of this essay has been that a satisfactory taxonomic system should provide a framework for organizing a great mass of data and at the same time it should suggest relationships between the different cultural units. Such a system should not be an end in itself, but should also provide a stimulus to elicit questions regarding processes of change and stability. When it is assumed that culture is the adaptive mechanism of human social groups, it follows that adaptive changes result when the environment changes. Adaptive changes may relate to the

seasonality of the physical environment and thus be cyclical and be reflected in variations within settlement patterns, or they may relate to fundamental shifts in the physical environment and be reflected in far-reaching alterations of the cultural inventory. Adaptive changes may result from the changing circumstances of the social environment as well as from those of the physical environment. Items obtained through trade, ideas moving from group to group, and groups themselves in movement can require adaptive and adjustive changes. Intragroup changes also occur without the necessity of changing exterior environments, either physical or social. Such changes may be arbitrary or fortuitous, such as those which occur as a result of stylistic drift, or they may be long range changes resulting from "deviation-amplification" processes.

I argue that the question of meaning be asked with regard to every observed change in the archaeological record. The amazing breadth and depth of our ignorance is thus revealed. It is not enough to organize data to show, for example, that one pattern has been replaced by another, or that one phase develops into another, or that a new artifact type becomes part of a trade horizon. Because of the considerable analysis necessary to demonstrate changes such as these, it is tempting to treat their discovery and explication as ends in themselves, and quite frequently this has been the situation. I suggest further steps on the programmatic level. Each change in the archaeological record should be examined with respect to processes involved and with respect to its relationship to the adaptation of the group and to possibly changing circumstances. If evidence suggests that circumstances are changed or changing, the circumstances themselves should become the object of study.

Unfortunately, the program implied in these suggestions is difficult to implement because it frequently requires the special knowledge of other

disciplines and often this knowledge is not available. For example, a knowledge of past climates of the North Coast Ranges, including corresponding changes in plant and animal communities, is necessary before we can gain fuller understanding of the early prehistoric adaptations and changes in these adaptations implied by the record. Although I have arbitrarily accepted 2000 B.C. as the end of the Altithermal, and thus the beginning of the Upper Archaic Period in Central California, this correlation is simply a working hypothesis. In addition, we cannot assume that the North Coast Ranges experienced any significant change of temperature at this precise date (cf. Bryan and Gruhn 1964). A regional palaeoclimatic study is necessary and this is beyond the usual scope of the archaeologist.

We can ask, however, that inferences regarding culture-environment relationships be based upon as much direct archaeological evidence as possible. I repeat the earlier citation of Heizer and Baumhoff (1970) that, despite assertions to the contrary, no clear evidence exists for big game hunting in the Great Basin, and, we might add, neither does it exist in California. A Clovis-type projectile point in the North Coast Ranges of California need not have the same culture-environmental meaning as a Clovis-type point in the High Plains.

To shift back to problems which can be solved within the repertory of existing archaeological methods, the problem stands out of controlling time and space so that minimal cultural units can be established. To cite Rowe (1959:317) once more, "Any development in archaeology which makes possible more precise relative dating...increases the opportunities for studying cultural process." The first tool of the archaeologist has been stratigraphic excavation and this still remains the single most

important technique of discovery. Next, detailed analysis of artifact co-occurrences, such as those found as grave furnishings provides controls for relative dating (cf. Heizer 1949:2, fn. 4). The development of relative dating based upon obsidian hydration rim measurements and x-ray fluorescence analysis minimally provides an important tool which assists in clarifying stratigraphic relationships as well as for relative cross-dating of assemblages.

Not all social groups provide their dead with abundant grave offerings, and this in itself is a significant cultural datum (cf. King 1970). Lacking grave lots, however, (and virtually none are known for early North Coast Ranges cultures) additional methods for detecting change must be employed. In addition to hydration and x-ray fluorescence studies, studies of chipped stone technology should receive high priority, since most early sites provide an abundance of chipped stone tools and manufacturing debris. Gamst and Shkurkin (1963) were able to differentiate the chipped stone assemblages at Nap-129 and Nap-131 on the basis of features of stone-working technology, and such study, in theory, should provide additional insight with respect to change and processes of change.

A number of unsolved problems have come up with regard to change in the early cultures of the North Coast Ranges. For one, the adaptive mode represented by the fluted points and crescents must be filled out in documented detail. So far, inferences relating to utilization of lacustrine resources have more support, however tentative, than those relating to the hunting of big game. For another, the association of the wide-stem Borax Lake point with milling stones remains to be documented. As yet we do not know, except by assumption, the time of entry of the

milling industry into the region. Further study in the relationship of the North Coast Ranges nonfluted, concave-base points, the Berkeley and Windmiller concave-base points, and the Great Basin Humboldt Concave Base A points is needed. Their temporal co-occurrence seems more than a coincidence. The problem of the willow-leaf Cascade point in the North Coast Ranges needs clarification. At present, if the typological identity of northern Cascade and North Coast Ranges willow-leaf points is correct, the style appears to become more important in the North Coast Ranges at a much later date than in the Plateau. The Houx Pattern needs additional documentation and its distribution in space must be delimited. The time of entry must be established as well as the time of replacement. Its affiliation with the Berkeley Pattern must be clarified. History, culture, and context must be controlled before much can be said about process. Expectations with respect to linguistic inferences were higher than what was achieved. The single new hypothesis we leave with is that the Houx Pattern represents the Miwok intrusion into the North Coast Ranges. Little understanding was gained with respect to internal differentiation of the Pomo or the geographic split of the Yukian-speakers.

Finally, I urge better and faster descriptive reporting of results of investigations. Without exempting myself from criticism, the amount of unanalyzed material exceeds that of analyzed material. Only a small fraction of excavations conducted in the North Coast Ranges has been adequately reported, let alone published. Even though more excavation is obviously required, I would place first priority on the publication of full descriptive reports on the investigations which have already been

carried out. Investigation procedure is significantly affected by the perception of problem. Problems must be formulated from an informed position. To inform and to be informed are primary obligations of research workers.

Bibliography

Abbreviations

AA	American Anthropologist
AJPA	American Journal of Physical Anthropology
AmAnt	American Antiquity
AMNH-B	American Museum of Natural History, Bulletin
Ar	Archaeometry
ARA-CCA	Archaeological Research Associates, Contributions to California Archaeology
ASASC-P	Archaeological Survey Association of Southern California, Paper
BAE-B	Bureau of American Ethnology, Bulletin
CARD-P	Center for Archaeological Research at Davis, Publication
CHS-Q	California Historical Society, Quarterly
CJMG	California Journal of Mines and Geology
DNG	Drake Navigators Guild
DRI-SSH-P	Desert Research Institute, Social Sciences and Humanities, Publication
GR	Geographical Review
GS	General Systems
IJAL	International Journal of American Linguistics
ISUM-OP	Idaho State University Museum, Occasional Papers
JRAI	Journal of the Royal Anthropological Institute
KAS-P	Kroeber Anthropological Society, Papers
NCAS-OP	Northwestern California Archaeological Society, Occasional Paper

NCAS-RR	Northwestern California Archaeological Society, Research Report
NPS	National Park Service
PMNW	Prehistoric Man in the New World (see Jennings and Norbeck, editors)
Ra	Radiocarbon
SAA-M	Society for American Archaeology, Memoirs
SAS-P	Sacramento Anthropology Society, Paper
SBMNH	Santa Barbara Museum of Natural History
SCA-ACA	Society for California Archaeology, Archives of California Archaeology
SCA-N	Society for California Archaeology, Newsletter
SC-DBP-AR	State of California, Division of Beaches and Parks, Archeological Report
SFSC-AM-OP	San Francisco State College, Anthropology Museum, Occasional Paper
SJC-DA-B	Sacramento Junior College, Department of Anthropology Bulletin
SM-M	Southwest Museum, Masterkey
SM-P	Southwest Museum, Papers
SWJA	Southwestern Journal of Anthropology
UC-AR	University of California Anthropological Records
UC-ARF-C	University of California, Archaeological Research Facility, Contributions
UCAS-R	University of California Archaeological Survey, Reports
UC-PA	University of California Publications in Anthropology
UCPAAE	University of California Publications in American Archaeology and Ethnology
UCPL	University of California Publications in Linguistics
UCLA-AS-AR	University of California at Los Angeles, Archaeological Survey, Annual Report

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