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THE ARCHAEOLOGY OF THE SIERRA NEVADA IN CALIFORNIA AND NEVADA

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ABSTRACT

An outline of the physical resources and ethnographic background of the entire area included in the Sierra Nevada province is given. This is followed by a review of the early history of archaeological finds, including the claimed associations of human remains and artifacts with pre-Pleistocene sedimentary deposits.

A description of the sites surveyed (totaling more than 1800) and excavated in recent years is presented, tabulated according to elevation, given in units of thousands of feet, and ranging from slightly above sea level to 11,000 feet and over. Inferences regarding summer use of the higher regions for hunting and as avenues of transmontane trade are based upon occurrence and distribution of sites thus far known.

Published reports defining the late occupation in the southern Sierra Nevada are summarized and, finally, reports are given of excavation of three sites of the Martis type, which are thought to represent an earlier time level in the northern part of the range.

The excavational data at hand, mostly concerned with projectile point typologies, do not indicate a uniform occupation over the entire Sierra Nevada. Offered for the first time, however, is detailed evidence pertaining to chronological relationships between archaeological complexes on either side, and in the northern and southern parts of the range.

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INTRODUCTION

It is well known that mountain chains or large bodies of water sometimes serve as effective barriers to the free mingling of peoples of different cultures or linguistic groups. That the main watershed of the Sierra Nevada represented, generally, a cultural boundary in prehistoric

times is not to be doubted, if the earliest ethnographic record accurately reflects the situation of different native groups before the arrival of the white man.

Nevertheless, aside from what may be looked upon as the complete spanning of the crest of the southern Sierra Nevada by the Western Mono (Kroeber, 1925, p. 585; Lamb, 1958, p. 97), the ethnographic record discloses smaller breachings of the gap represented by the crest of the mountains, from the northern to the southern end of the range. Sample (1950) has reviewed the evidence relating to trade and trails across the Sierra, and prehistoric commerce is shown by the wide distribution in Nevada of Pacific Coast shell ornaments and beads (Bennyhoff and Heizer, 1958). Moreover, we may observe that the Washo, who occupy the eastern slope of the Sierra and adjacent desert land at lower elevations, display traits which link them with cismontane California (Kroeber, op. cit., p. 569). Confirmation of this or of a similar type linkage is shown, apart from linguistic evidence, by parallels in design and weaving techniques of prehistoric basketry from California and the Great Basin (Baumhoff and Heizer, 1958, p. 55).

Besides serving as a crossroad for groups of different culture, the Sierra Nevada, especially in its higher reaches, may be looked upon, in a sense, as a specialized living region for these groups, an extensive territory which perhaps demanded special techniques in order to be fully exploited. The aim of this paper is to examine in detail the evidence of occupation from the foothill regions to the higher altitudes, and to relate to each other, if possible, the various manifestations of occupancy as disclosed by archaeological survey or excavation. The chief value of such a study probably lies in its revealing seasonal settlement patterns, and indication of movements of bands or groups within the vast mountain physiographic province which includes all of the known life zones in California (Grinnell, 1935).

Although the Sierra Nevada is often considered as a single, high fault-block, it should properly be conceived as "not that of a simple linear mountain range, but that of an uplifted and tilted segment of the earth's crust broad enough to bear on its back a whole system of linear ranges" (Matthes, 1947, p. 168). In spite of the concept of a large system of ranges and of the number of life zones represented, it is one of the purposes of this paper to isolate the Sierra Nevadan region, i.e., to demonstrate that in prehistoric as well as in historic times, it was used in such a way as to allow it to be looked upon as a special culture province, characterized by seasonal movements within its borders of the inhabitants, who, for most of the year, including the winter time, utilized its lower-altitude eastern and western slopes.

THE AREA AND ITS RESOURCES

For the purposes of this paper, the conventional north and south limits of the Sierra Nevada will be employed, i.e., from about latitude 40 degrees north, from the Feather River basin, south to the Tehachapi Pass (just east of the present town of Tehachapi), at about latitude 35 degrees north. The region thus is something over 400 miles in length, and varies in width from 40 to 80 miles.

The early geologic history of the range has little significance in the context of this study, and even a brief recounting of events in late Tertiary or early Quaternary periods would supply little meaningful background, except for the great amount of discussion which attended the announcement of evidence of early man found in the auriferous gravels of the Sierran foothills. Controversy about the evidence was active for about thirty years, from 1880 to 1910. Though the claimed association of human remains with pre-Pleistocene sedimentary deposits and bones of animals now extinct has by now been discredited, description of the evidence and counter-evidence in the affair may reasonably constitute the beginning of the history of Sierran archaeology. The subject will be taken up in a following section.

It has been calculated that the highest and greatest uplift of the Sierra Nevada took place in the Pliocene epoch (Matthes, op. cit., p. 198). Prior to that, a long history of events may be traced, including irregular, alternating periods of bowing up, faulting, erosion, stream cutting, and deposition of andesitic and basaltic lavas. The lavas covered old surfaces and filled the early stream channels as well. Significant volcanic activity continued, but ultimately ceased, in the Pliocene (Jenkins, 1948, p. 25; Hinds, 1952, p. 25). Finally, during the Pleistocene glaciation, old Tertiary surfaces, and stream channels, together with their auriferous gravels, were resurrected. Except for minor geological activities such as continuing stream cutting, we may assume that the physiography of the Sierra Nevada has remained virtually unchanged during all the time that human beings have occupied the region. Thus the range or series of ranges may be observed today essentially as a tremendous tilted block, with the eastern front presenting a great fault escarpment and the western side gradually sloping toward the Great Central Valley of California. While the great mass of the Sierra Nevada is composed of intrusive granitic rock, volcanic and sedimentary rocks occur in profusion, especially at lower altitudes, often representing remnants of earlier widespread formations.

The prehistoric inhabitants of the Sierra have left their meager records on the rocks in the form of grinding holes in the bedrock and of

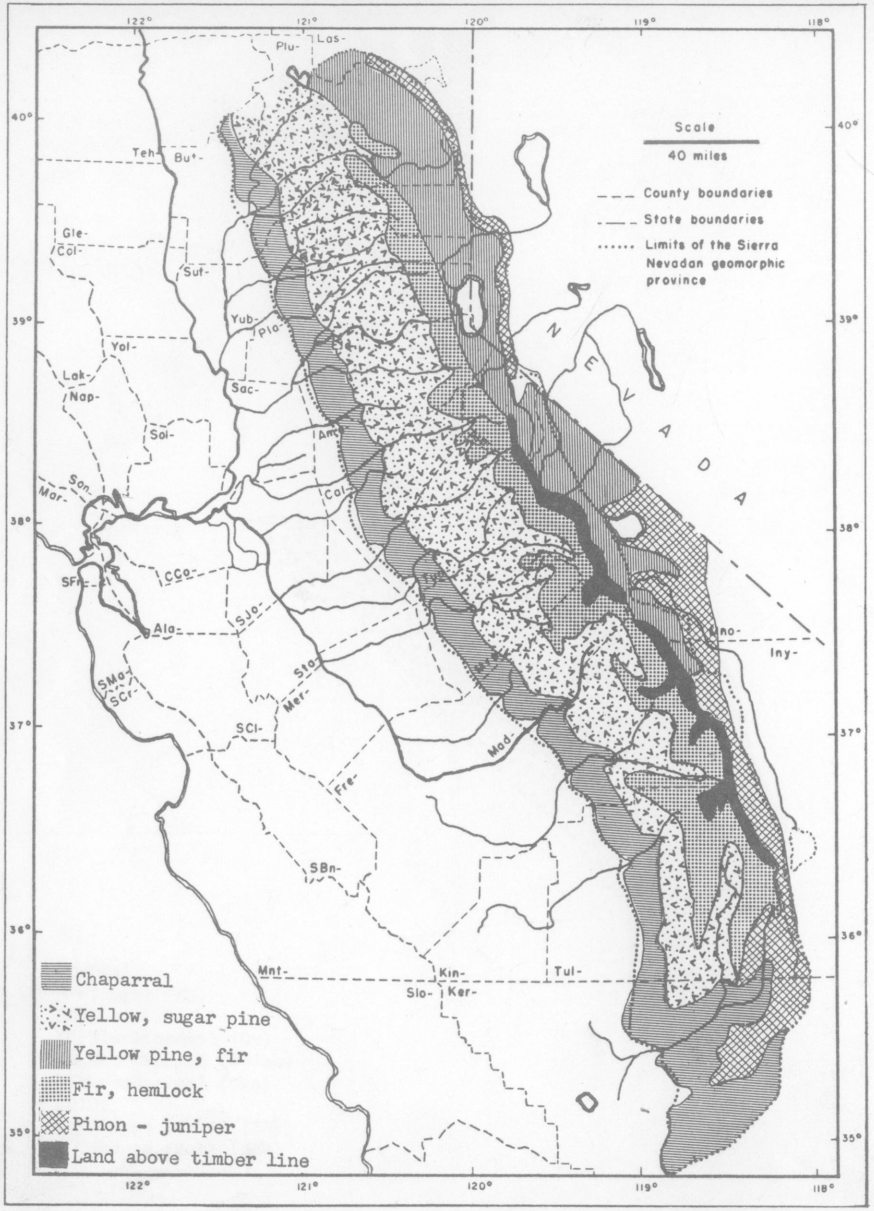
petroglyphs, usually on massive outcrops or huge boulders of granite. In addition, they exploited surface deposits of basalt and of a variety of siliceous rock, principally obsidian, for their hunting and domestic implements. Fragments of these implements are often found scattered about the former open occupation spots of the Indians. Besides using the overhangs of granitic boulders for shelter, true caves or caverns in the limestone belt, concentrated chiefly in Calaveras and Tuolumne counties, were utilized, though almost exclusively for burial chambers.

A corollary to the assumption concerned with the relative unchangingness in recent times of Sierran topography is that the floral and faunal resources of the Sierra Nevada were approximately the same in prehistoric aboriginal times as they were when the first white men penetrated the region. It seems to be true that the historic Indians, and probably their predecessors as well, burnt off certain areas for specific purposes connected with food getting. Barrett and Gifford (1933, p. 140), Driver (1937, p. 65), and Stewart (1941, p. 376), referring to the Miwok, Western Mono, and Washo and Northern Paiute, respectively, all give instances of burning by the Indians in order to improve the yield of seeds from certain grasses or of other wild crops, such as tobacco. Heizer (1955, p. 10) cites the opinion which ascribes the increase of forest land in the Sierra Nevada (Yosemite region) to the cessation of Indians' burning the underbrush, and states that, "It is noted by present day foresters that cows and deer prefer to graze on recently burned over land, probably for the reason that shoots from burned back brush and new grass growing in ash compost contain more minerals which are attractive to the animals."

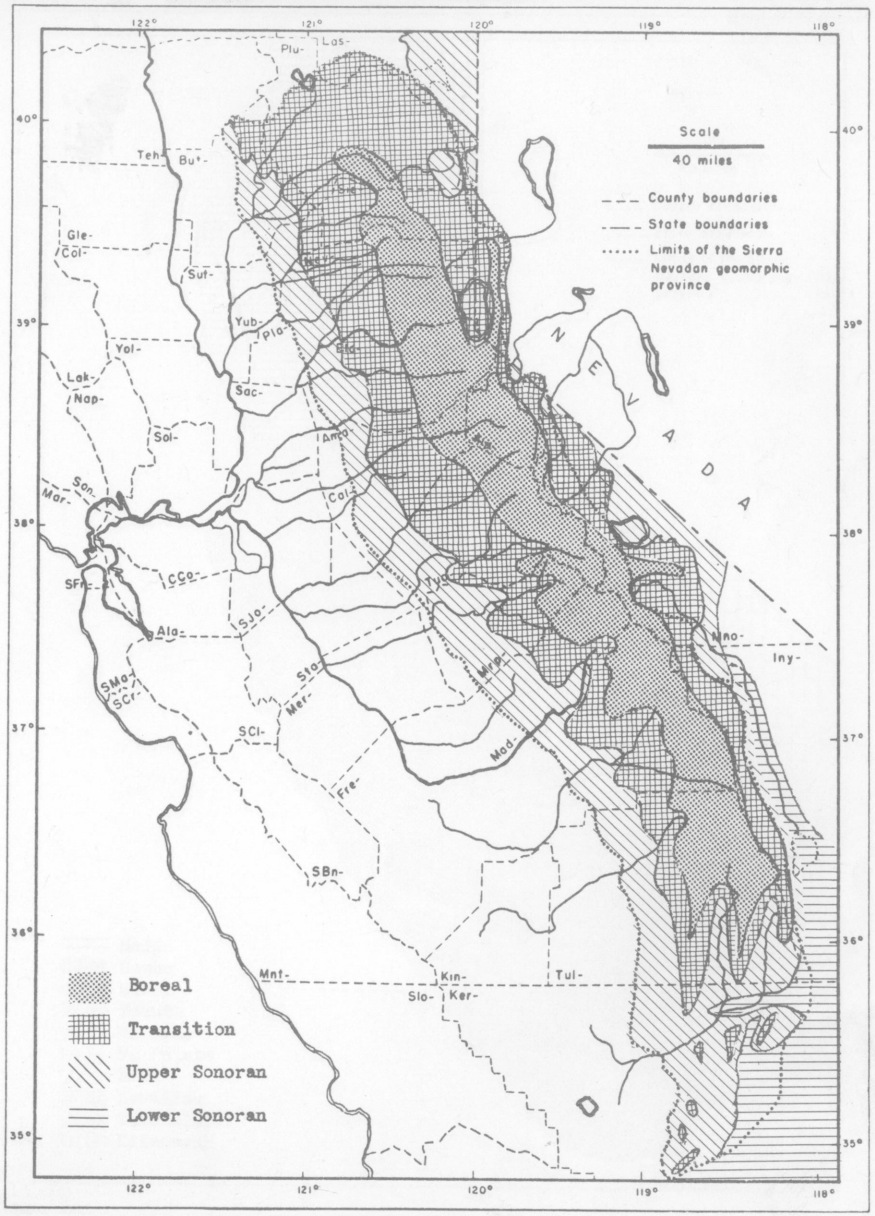
In any case, it appears that the only appreciable modification of the landscape by the Indians must have been related to burning practices, and any great degree of alteration from these probably took place primarily in the chaparral belt (see Map 1).* The higher altitude coniferous forests probably were not greatly affected by the Indians.

So far as can be determined, the Indians were not responsible for the extinction of any large game animals by over-hunting. Of the five large mammalian species known to be hunted by the historic Sierran Indians, i.e., the California mule deer (Odocoileus hemionus), the mountain sheep (Ovis canadensis), the pronghorn antelope (Antilocapra americana), the grizzly bear (Ursus henshawi), and the black bear (U. americanus), only the mule deer remains in large numbers for the sport of present day hunters. Since the coming of the white man, the grizzly bear has become extinct in Cali-

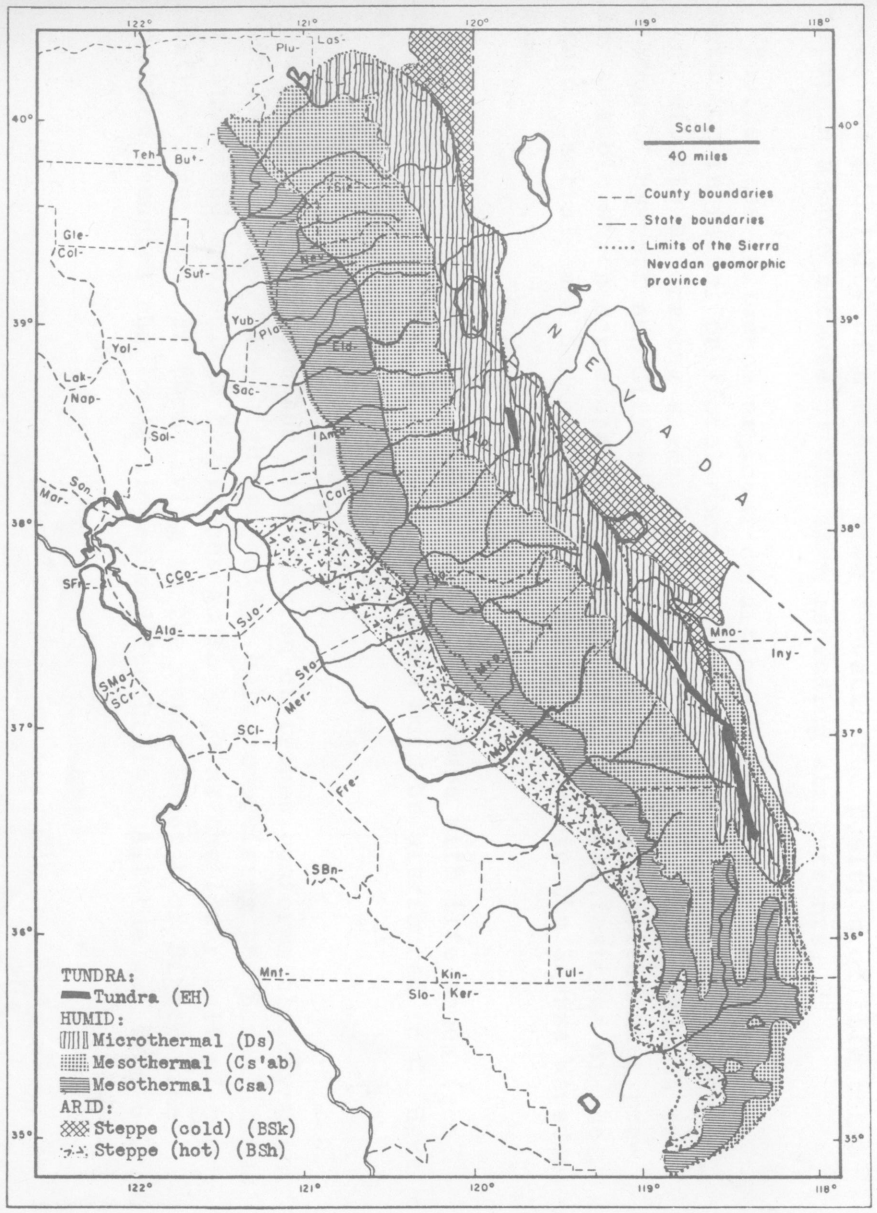
*Explanation of county symbols used on Map 1 and all following maps may be found in End Note 2.



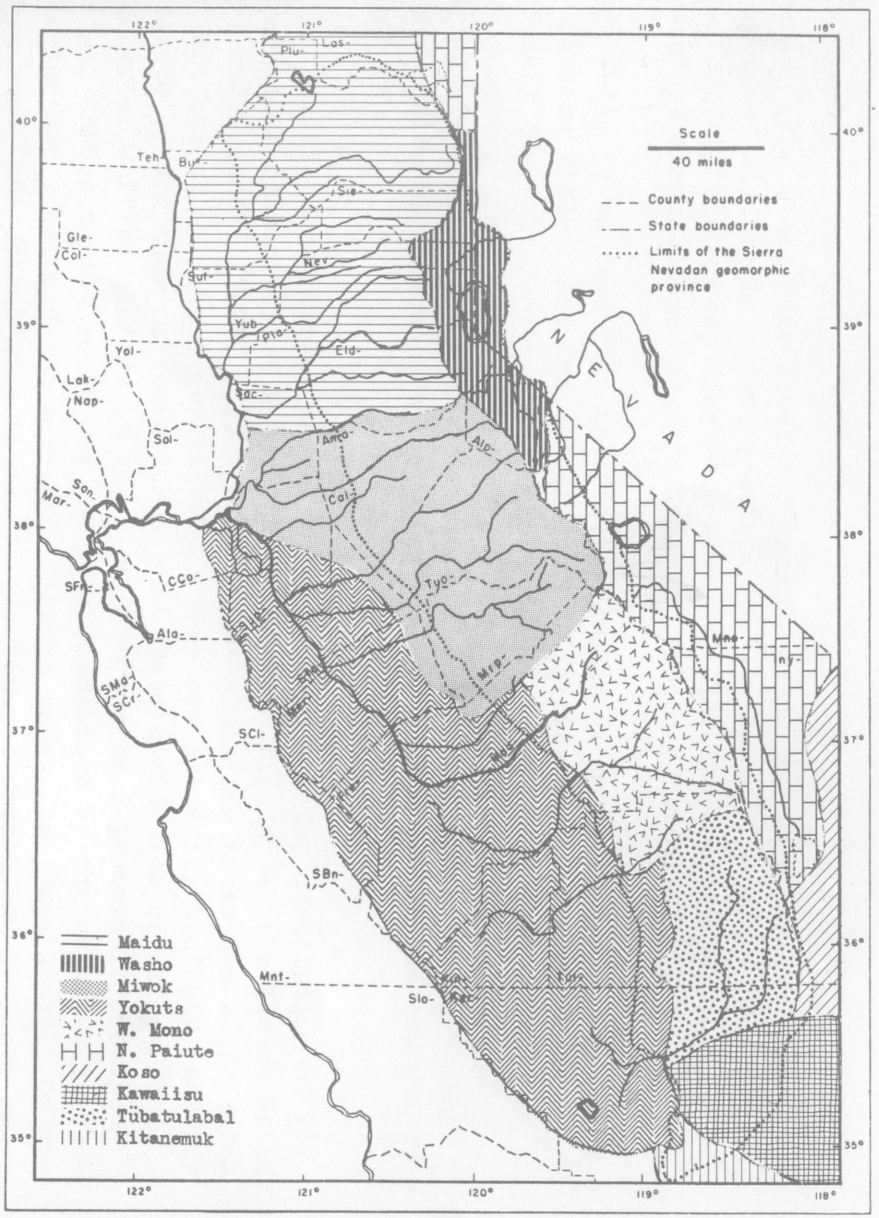
MAP I: Principal Vegetation Zones of the Sierra Nevada (after Shantz and Zon, 1924)



Map 2: Life Zones of the Sierra Nevada (Note: Boreal Zone includes Canadian, Hudsonian, Arctic and Alpine Zones [after Grinnell, 1935])



MAP 3: Climates of the Sierra Nevada (after Russell, 1926)



MAP 4: Ethnographic Groups of the Sierra Nevada and Surrounding Regions

fornia. The black bear population has at times and in certain places been reduced by killing by modern sportsmen or stockmen (Sumner and Dixon, 1953, p. 303); the black bear does not, however, like the bighorn or mountain sheep and the antelope, seem in imminent danger of extinction.

While it is true that the Sierra Nevadan geomorphic province as shown by Jenkins (1938) includes all of the Californian life zones outlined by Grinnell (op. cit.), the Lower Sonoran zone occupies but a small part at the southern end of the province (see map 2), hence will be considered further in this paper as of only minor importance in any attempts to work out relationships between cultural and environmental factors in the entire region.

The life zone concept especially is convenient for description of large areas characterized by a great range of altitude, as the Sierra Nevada. Hall and Grinnell (1919, p. 38) have stated that life zones are altitudinal or latitudinal only in a general way. They are primarily biologic, and are affected by altitude or latitude only as these modify the climate. The regular or unified quality of the Sierra Nevada as a geomorphic province running approximately north and south is emphasized by the relatively close correspondence between the life and climatic zones (see Maps 2, 3). On the other hand, the effect of altitude is sometimes overshadowed by local conditions, as when life zones are "depressed" in narrow valleys and canyons, resulting from the flow of cold air down the canyons, especially at night, or when the proximity of a desert area elevates the position of life zones on mountain slopes because of the warm ascending air currents.

Besides the influence of local conditions, the lack of truly sharp demarcation in faunal or floral characters where two zones adjoin often negates efforts at drawing exact correlations between culture elements and life zones. Barrett and Gifford (op. cit., p. 155) nevertheless have presented a table which correlates, in general, the cultural features of the Northern, Central, and Southern Miwok with life zones in the Sierra Nevadan region.

The idea of correlating aboriginal human groups with life zones (see Kroeber, 1955a, p. viii) in the Sierra Nevada must be attributed to C. Hart Merriam, who wrote (1914, p. 914):

"In the Sierra region the distribution of tribes conforms closely with certain faunal belts. The high and colder belt, comprising the Boreal zones, is not inhabited and only a few tribes go so high as the lower half of the Transition zone, most of them living in the upper Sonoran or Digger pine belt, which occupies the lower slopes and foothills. All the way from Sacra-

mento Canyon to Tehachapi, a distance of about 500 miles, fully 95 per cent of the Sierra Indians dwell in this life zone. Most of the tribes live wholly within it and not one lives wholly above it."

Although there may exist some question in the identification of winter as against summer occupation sites, it would appear, from comparison of Map 2 (life zones) with Map 6 (location of archaeological sites) that the Transition life zone was easily as important as the Upper Sonoran zone in number of archaeological sites. Furthermore, Map 6 represents only the sites so far known in the Sierra Nevada, especially in the higher altitudes. The relatively great number of sites lying in the Boreal zone, i.e., above 6000 feet (western side of the Sierra), suggests that Merriam tended to understate the importance of the summer occupation of that life zone.

Whether such cultural feature-life zone tables as that presented by Barrett and Gifford (op. cit.) could be constructed for all the groups which occupied parts of the Sierra is doubtful. It is clear, for example, that the Upper Sonoran and Transition life zones on the eastern side of the main crest are not the same as on the western side. Probably the two most important plant species, the black oak (Quercus kelloggii) and the piñon (Pinus monophylla), utilized by groups living at fairly high altitudes west and east, respectively, of the main divide, highlight the differences in altitude and life zone association on the opposite sides of the range. The piñon is typically an Upper Sonoran species (Hall and Grinnell, op. cit., p. 52) which occurs in a long belt on the eastern side and in but a few scattered localities on the western side of the range. Its characteristic altitudinal range in the area of heaviest occurrence is 6000-8000 feet (Sudworth, 1908, p. 35). The black oak, in contrast, is typical of the Transition zone (Hall and Grinnell, op. cit., p. 57), yet occurs characteristically at a lower altitude (1500 to 6500 feet, according to Jepson, 1951, p. 277).

Ethnographic reports by Barrett and Gifford (op. cit.), Steward (1933), and Driver (op. cit.) indicate a wide range of plant and animal foods utilized in the Sierra Nevadan province. Movements of people within the province may be understood in terms of the inhabitants' collecting products seasonally, following game such as deer, or of procuring products of limited natural distribution by trade.

ETHNOGRAPHIC BACKGROUND

In most of California, with the Sierra Nevada region certainly not excluded, ethnographic data and the use of the direct historical method (Heizer,

1941) have proved to be of incalculable value to archaeological research. Essential identity of non-perishable culture elements known to be at least late prehistoric in time, such as certain types of projectile points and shell beads, with material positively associated with historic artifacts (e.g., glass trade beads), gives a picture of probable steady occupation dating perhaps from about 1000 A.D. to the time of white contact in the Sierra Nevada. The transition between the putatively older cultures in the region, such as the Martis Complex in the central and northern part of the range (Heizer and Elsasser, 1953), and the Crane Flat culture in the Yosemite region (Bennyhoff (1956), and the later culture referred to above is not well known. It cannot be demonstrated at present that the Martis or Crane Flat peoples were ancestral to the people who were living in the Sierra at the time of first contact with Europeans.

The ethnographic picture in the Sierra Nevada has been complicated by the coming, first of the Spanish (ca. 1770) and then of the Americans. Even though the Franciscan missionaries and the accompanying soldiery did not forcefully occupy the region at any time, their mere presence on the coast, their occasional visits or crossings of the interior, and the effect of Indian "escapees" from the missions (see Cook, 1943, pp. 56-90), while perhaps not significantly altering the culture of the Sierra Nevadan groups, must have had influences which later would be reflected in the testimony of native informants or in the accounts of early European travelers concerning the aboriginal way of life. Heizer (1958a, p. 21) calls attention to passages in the account of Zenas Leonard, for example, which refer to settlements of Indians, in 1833, practicing agriculture in the San Joaquin Valley and Delta, and in the Walker Pass area. The latter evidently were a renegade group from Purissima Mission, who had brought to the Sierran region a technique not known before, and which could easily be diffused to the neighboring native groups.

With the coming of the Americans after 1848, large sections of the Sierra Nevada were irrevocably changed. The Nisenan, in the heart of the gold rush country, were virtually annihilated as a cultural entity (Beals, 1933, p. 335), and other groups were then or shortly thereafter strongly affected, whether or not gold happened to occur in their territory.

In spite of these adverse circumstances, by 1925 California was ethnographically one of the best known areas in the world. Early accounts or collections of accounts such as those of Powers (1877) and Bancroft (1883), plus the systematic descriptions in the twentieth century by Kroeber, Dixon, Barrett and Gifford, to mention the more important ethnographers in California, have given a reasonable picture of life in that area before 1770.* The culture

*See End Note 1.

element distribution lists developed at the University of California have filled gaps in knowledge of certain areas and supplemented information from already known groups.

With the tremendous numbers of ethnographic details available, and with fairly precise delineations of linguistic relationships in native California (see Map 4), we can make certain statements which may be of significance to the archaeology of the Sierra Nevada:

(1) The patterns of exploitation of the land cut across linguistic boundaries. Thus the material culture of the Sierra Miwok more closely resembled that of the neighboring Maidu to the north than it did that of their linguistic relatives, the Plains Miwok. The Northfork Mono, for another example, showed a closer affinity to the tribes of the western slope of the Sierra Nevada than to their Shoshonean-speaking kin to the east of the crest of the range (Gifford, 1932, p. 55). Dixon (1905, p. 346), referring primarily to the Northern Maidu, has pointed out that, "the accordance of culture with environment and the continuity of the areas of similar cultures, irrespective of linguistic boundaries, are evidences of long continued occupation of the region by its present occupants."

The universal practice of all Sierran ethnographic groups of moving with the seasons, usually east and west, but in specific territory, must indicate an optimum method of survival in the given environment, and one of long standing.

(2) Observations of divergences in related languages, such as those in the Shoshonean family, indicate that there is by no means a correspondence in the time at which the different groups entered the territory which they occupied in historic times, i.e., the geographic separation of the various groups within the Sierran region itself apparently was not responsible for the divergences in languages. Instead, the separations of certain groups, as judged linguistically, seem to have taken place long before their occupation of the Sierran habitat. Thus Kroeber (1925, p. 605) noted the Tübatulabal situation in the southern Sierra as similar to that of the neighboring Western Mono and the Kawaiisu, with reference to topography and contact with aliens: "On the other hand, their language is so thoroughly specialized as compared with that of their neighbors . . . that it is clear that the Tübatulabal have lived where they are now, or in the immediate vicinity, for a period of several times as long as these two groups of kinsmen."

Lamb (op. cit., p. 98), while warning that lexicostatistic figures can be used only with great caution, quotes some dates arrived at by Morris Swadesh in 1954. These would place the separation of Numic (which includes Western Mono) and the Tübatulabalic language about 3000 years ago. Even

if this figure is correct, it does not mean that the Tübatulabal occupied their present territory 3000 years ago. It does, however, give some notion of the order of time involved in the probable early movements of some groups in the Great Basin, groups which ultimately settled, but at different times, in the Sierra Nevadan region.

Another instance which points up the difficulty of determining the time of original settlement in presently known territory of ethnographic groups is seen in the estimated fifty centuries representing the length of time since the separation of Yana and Washo, both in the "Pacific Hokan" stock (Kroeber, 1955b, p. 95). In view of the relative geographical closeness of these two groups (they are separated by a distance of 60 miles) in historic times, Kroeber (loc. cit.) states: "It is evident . . . that they have been separated not only for a long period but probably by considerable geographical interval as well."

(3) Ethnographic informants have been of little or no aid in establishing points of origin or even migration routes used by their ancestors in arriving at their historic localities. Even in the clear cut instances of the Great Basin origin of the Western Mono and Tübatulabal, no documentation is available by native informants. In these cases, the general lack of migration myths among Basin Shoshonean speakers is partly responsible (Lowie, 1909, p. 233).

(4) The barrier presented by the main crest of the Sierra was not, per se, the chief factor which perpetuated cultural separation of ethnographic groups. Most of the trans-Sierran trade recorded ethnographically took place between the Western Mono and their linguistic kin in Owens Valley, and it will be noted that this trade took place across the highest part of the range. To the north, and as the range becomes lower, trans-Sierran trade seems to diminish, with the Northern Maidu evidently having little contact with the Washo and Northern Paiute to the east (Dixon, 1905, p. 201). Whether or not a different trans-montane contact pattern obtained in prehistoric times, for example in the time of the Martis culture, remains to be proved.

SUMMARY OF ARCHAEOLOGICAL EXCAVATION AND SURVEY

Early Finds

Any bibliography of the archaeology of California inevitably includes a great number of items concerning the discovery of human bones and artifacts supposedly associated with bones of extinct mammals in the auriferous gravels of Tertiary age, chiefly in the foothills of the Sierra Nevada. Heizer (1948), for example, lists 45 references to the Calaveras Skull, 15 to the Tuolumne Table Mountain finds, and 12 to miscellaneous auriferous gravel finds.

Possibly the main reason why the whole affair could not or cannot be easily dismissed is that reliable scientists of the time, such as Josiah Whitney, were aligned on the defensive side of the controversy. The finds engaged the attention of contemporary Pleistocene geologists, and startling evidence, much of it of questionable validity, was accumulated and published. Skertchly, for example, in 1888 presented an article in the Journal of the Anthropological Institute of Great Britain and Ireland which described the finding in Butte County, California, of about 300 stone mortars under a basalt cap 25 to 100 feet thick. These were discovered during the course of hydraulic mining. In this instance, the possibility of the mortars being washed down from above in the mining operation was noted, but the weight of evidence relating to previous finds in supposedly undisturbed gravels of comparable age was sufficient to encourage the observer to adhere to the theory of at least Pleistocene association of the artifacts.

Again, Becker (1890) described, in the Bulletin of the Geological Society of America, certain finds in tunnels or shafts penetrating the gravels under the lava cap of Tuolumne Table Mountain in California. Becker also believed that the finds dated from the Pleistocene, but offered as explanation of the supposed association of the artifacts with bones of Pliocene mammals the thesis that the Sierran glaciation was late, i.e., that it followed the eastern glaciation: "In short, then, it is not necessary to suppose that man reached the neolithic age in California earlier than in Europe, if one supposes that a remnant of Pliocene mammals survived on the Pacific Coast long after the age which they characterized was past" (p. 197).

Reactions to the claimants of "auriferous gravel man" and other ancient Sierran men were numerous, and for the most part tended to be entirely negative. Hrdlicka, for instance (1907), was instrumental in establishing positively that the "Calaveras Skull" was not of an ancient type of man. Holmes (1899) and Sinclair (1908) offered no affirmation whatever to the possibility of the legitimate association of the artifacts with the Tertiary gravels. Inasmuch as a great part of the evidence was collected by miners and later "corroborated" by means of affidavits and the like, it was not difficult to dispute many of the claims and to offer alternative explanations for the finds themselves.

Sinclair (op. cit., p. 30) concluded with this statement: "A review of the evidence favoring the presence of the remains of man in the auriferous gravels compels one to regard it as insufficient to establish the fact. On the preceding pages, it has been shown either that there have been abundant opportunities for the relics in question to be mixed with the gravels accidentally, or that the geological conditions at the localities are such as to render it improbable that the implements and bones have been associated in the gravels to the extent supposed."

Examples of discoveries, even of definitely historic artifacts buried under gravels, have been reported. Taylor (1862) refers to the recovery in 1860 of an arrastra (a rude drag-stone mill used by early white miners in California) as follows:

"There is nothing remarkable about this discovery, although it has been alluded to as an evidence that the gold mines were worked by an ancient people. The arrastra was found five feet deep, in a flat, and was probably buried by 'tailings' from adjacent placer diggings, within the last six or eight years. We have seen machinery buried by the same cause, to a depth of fifteen, twenty, and even thirty feet. Some miners on the American River once found a penknife under twenty feet of gravel, which looked as if it had been deposited for ages, but they were forced to conclude that that claim had been worked before, especially after learning that the knife was the most precious thing it contained. At some localities in the mines, where there is no outlet for the washings, hundreds of acres of valley land, ravine, or gently sloping hillside, have been covered to a great depth with tailings from diggings above."

Recent Excavation

While it may with some reason now be stated that the auriferous gravel finds were not as represented, i.e., were not truly associated with Pliocene or early Quaternary deposits, the question of an early "basement" culture in the foothills of the Sierra Nevada, dating perhaps from more than 5000 years ago, is still present. Treganza (1952) has described an entire assemblage of stone tools positively associated with alluvial gravels near Farmington, on the eastern edge of the San Joaquin Valley. It is thought that the gravels were deposited at some time "as far back as the Victor epoch of the late Pleistocene down to a period of several thousand years ago" (p. 10). The artifact-bearing gravels at Farmington seem to underlie the more recent alluvial fill of the Great Central Valley of California.

It was not unexpected that caves in the limestone belt of the Sierran foothills should ultimately come under close archaeological scrutiny. Even though human bones, occasionally associated with artifacts, had been found more than 80 years ago in these caverns, it was not until a firm chronological sequence had been established in Central California that it was possible to estimate accurately the dates of the cave finds. Hawver Cave (see Wallace and Lathrap, 1952) near Auburn, California, was destroyed by modern quarrying operations some years ago, but certain of the artifacts recovered before destruction were preserved for study. The provenience of these artifacts was uncertain, and the number available for analysis was not sufficient to allow important conclusions about the position of the site in Sierran archaeology. Nevertheless, it has been possible, on the basis of typological similarities

of lithic artifacts, tentatively to assign the specimens to the Middle Horizon of the Central California sequence, which dates from about 1500 B.C. to 500 A.D. (Heizer, 1949, p. 39). The deposits in Moaning Cave (Wallace, 1951) and in Winslow Cave (Gonsalves, 1955) both contained typologically distinct shell artifacts which are clearly comparable to specimens associated with the Middle Horizon, and the age correlation with that horizon thus was on firmer ground here than at Hawver Cave. All three of the caves mentioned appear to have been used as mortuary chambers, and the artifacts recovered from them were probably burial goods only. Wallace (op. cit., p. 35) states, however, that "Neither Moaning Cave nor any of the other nearby limestone grottoes seem to have been employed in recent times for entombing the dead. The Sierra Miwok, historic inhabitants of the region, either cremated or interred deceased tribesmen in rock-covered graves."

Deposits in neither the limestone caverns nor in two dry caves or shelters, for example, discovered in the southern Sierra Nevada (Harrington, 1950; Heizer, 1951) disclosed evidence of a culture which could be placed in a local chronological sequence. Uniformly, the limestone caverns which contain identifiable artifacts seem to be connected with the Middle Horizon of Central California, while the dry shelters to the south appear to be late in time, and probably correlate with the late prehistoric culture of the southem San Joaquin Valley in one instance, and perhaps of the northern Mohave Desert in the other.

Archaeological material from open sites excavated in the southern Sierra Nevada, two on the west side of the range, at Vermilion Valley (Lathrap and Shutler, 1955) and at Slick Rock Village in Tulare County (Fenenga, 1952), and one on the east side, in Owens Valley (Riddell, H. S., 1951) was not amenable to positive placement in a local sequence.* While there were hints of an earlier culture manifestation in all three of these sites, shown, for example, in the presence of heavy, parallel-sided, concave based blades, also designated as large projectile points or "skinning knives" (Lathrap and Shutler, op. cit., p. 234), the great majority of the specimens from the sites evidently were associated with the late prehistoric or early historic periods of the Owens Valley Paiute and with Mono and Yokuts groups on the western side of the main crest of the Sierra. All three sites share pottery of a similar type (Owens Valley Brown Ware; Lathrap and Shutler, ibid., p. 237), small, obsidian triangular projectile points, including the Desert Side-notched form (Baumhoff and Byrne, 1959), steatite disc beads, and glass trade beads.

The differences between the sites thus far excavated in the southern Sierra Nevada are essentially minute. The resemblances of material from the excavated sites, as well as the similarities between numerous surface or temporary camp sites (see Table 1, below) in the higher altitudes of the region, reflect a thriving prehistoric commerce across the range, especially in the latitude of Owens Valley. In addition, the homogeneity of the sites suggests

* I.e., in a sequence including appreciable portions of prehistoric time.

a widespread, integrated technique for exploiting the food resources of the region. For example, all of the excavated sites and a great number of the temporary camp sites, especially those on the western side of the range, are characterized by the presence of bedrock mortars. Though some minor differences in frequency of certain obsidian point types at different sites in the region have been observed, these tend to be leveled out as more and more sites are discovered and reported upon.

In the central and northern portions of the Sierra Nevada (exclusive of the limestone belt already outlined), excavation and survey have served to uncover probable late prehistoric or protohistoric stages of ethnographic groups. Material from parts of Tommy Tucker Cave (which actually is in the northern Great Basin, but which has certain affiliations, e.g., in projectile point types, with sites in the Sierra Nevadan Province) may be cited as representing Northern Paiute occupation (Fenenga and Riddell, 1949). The Kings Beach Complex, centered around Lake Tahoe (Heizer and Elsasser, 1953), seems to represent a manifestation of the late prehistoric and protohistoric Washo, while the Mariposa Complex in the Yosemite National Park region is equated with the prehistoric and historic Miwok (Bennyhoff, 1956). There are certain notable differences in culture elements between the late complexes of the southern part of the range and those of the central part, as follows: pottery is absent in Yosemite, in the Kings Beach Complex, and in the northern part of the range generally. The Kings Beach Complex does not share serrated projectile points or steatite disc beads with Yosemite and the southern Sierra Nevada. Further, although obsidian is used for implement manufacture in the Kings Beach Complex, it is not used to the extent that it is in Yosemite and in the southern Sierra Nevada. Projectile points often were made of chert and other siliceous materials, in addition to obsidian in the Kings Beach area and among the ethnographic Washo as well.

Bedrock mortars seem to have been used predominantly in late prehistoric times in the Sierra Nevada, although Bennyhoff (1956, p. 54) notes their use for the Tamarack Complex in Yosemite National Park, which is tentatively dated by him at somewhere between 500 A.D. and 1200 A.D. Certainly the southern part of the Sierra and the Yosemite region as well have been more intensively surveyed than the northern part. Whether the much greater number of reports of bedrock mortar sites to the south is simply a reflection of different emphases of archaeological survey projects, or of an actual dearth in the north of the trait, is not known (see Table 1, below).

Turning now to the probable earlier cultures, which, however, are not necessarily directly ancestral to those described immediately above, we may note that only on the eastern side of the southern part of the range, in Owens Valley, have any sites of supposed antiquity been found. These are at Rose Spring (Riddell, n.d.) and at Little Lake (Harrington, 1957). At Little Lake

the chief evidence cited for the estimated age of 3000 to 4000 years of the site is based upon several factors, including that of climatic change, and on the presumed age of projectile points of the Pinto type (ibid., p. 70 ff.). At Rose Spring, the deeply stratified site, in which pottery and small, triangular "late" type projectile points were found only in the upper levels, suggests an occupation beginning probably several thousand years ago.

In the northern part of the range, it is observed that Tommy Tucker Cave, on the basis of comparison of preserved organic material as well as of lithic material, may equate in time with the late phase of Lovelock Cave in Nevada and, according to Riddell (1956a, p. 19), its initial occupation may thus date at around 1 A.D. The Karlo site, an open Great Basin site not far to the north of Tommy Tucker Cave, contains non-perishable material which resembles that from probable early Middle Horizon sites in Central California, from Lovelock Cave, and from Tommy Tucker Cave as well. Material from the latter site, however, is equated with a later phase of Karlo. A C_{14} date of 2350 $\pm$ 150 years has recently been obtained from the laboratory of the Scripps Institution of Oceanography, La Jolla, California (Sample LJ-76), which seems to date part of the lower level of the Karlo site.

The Martis Complex, described by Heizer and Elsasser (op. cit.), is known, from surface evidence only, to represent a local variant of a culture which could be centered either in the Great Basin or in California. With regard to age, its position was deemed to equate with the Middle Horizon of Central California. It showed possible connection as well with the Southern California deserts, this connection being based on a similarity of some types of Martis projectile points to Pinto points, as described by Rogers (1939) for the Colorado-Mohave desert region. Excavations in Martis Complex sites have been carried out, and results of these are set forth in a following section of this paper.

Bennyhoff (1956) has found cultural stratification in Yosemite National Park which enabled him to define an early complex (named Crane Flat) and a late prehistoric and protohistoric manifestation (the Mariposa Complex). Between these in time is a less completely known complex, the Tamarack, which at the time of Bennyhoff's work could only be summarily presented. It will be shown in the next section of this paper that the Crane Flat and Tamarack complexes both may have some affiliation with the Martis Complex.

Archaeological Site Survey

It has become apparent in the course of years that any general area chosen for archaeological site survey in the Sierra Nevada will reveal signs of Indians in certain expectable spots within that area. If it is rare to

find remains of camp sites on the tops of alpine peaks or in the depths of extensive forests of yellow pine, for example, it is equally out of the ordinary not to discover some evidence of prehistoric occupants in favorable hunting, fishing, or gathering spots. Thus, locations in the foothills, associated with or within easy distance of oak trees and water, may show dark soil midden deposits appearing as mounds in open places, with perhaps bedrock mortars at or near the sites. At greater elevations, the signs of mounds, which usually may characterize winter occupation, tend to disappear. Camp sites, indicated by the presence of bedrock mortars and perhaps scatterings of chippage resulting from the manufacture of tools such as arrow points, yet remain, or even increase in number. Finally, as the main crest of the range is approached, only camp sites, without bedrock mortars, probably located with reference to game or trade trails, are to be found.

In addition to these main types of occupation evidence are lesser numbers of petroglyph sites, quarry workshops, or sites associated with overhanging rock shelters, usually of granite.

Tables 1 and 2, below, summarize the number and kinds of sites which have been recorded by the University of California Archaeological Survey during approximately the last ten or twelve years. The numbers of each type of site have been computed county by county, and the totals combined arbitrarily into four areas (Map 5)[2] which, however, may be described in a general way as follows: (I) Northern Sierra; (II) Central Sierra; (III) Southern Sierra; (IV) that part of the Sierra Nevada fronting on the Great Basin.

It may be seen on Map 6 that sites appear to be clustered in certain areas, for instance, in the upper Tuolumne River Basin. As mentioned previously, in the case of the bedrock mortar sites of the southern Sierra, it is not known whether these clusters reflect a true preponderance of sites in one area as against another, or are simply the result of intensive survey in one area, to the relative neglect of another. Whatever the true situation, surveys by Bennyhoff (1956) in Yosemite National Park; by Meighan (1955) in Mono County, near the eastern side of the Sierra; by Heizer and Elsasser (op. cit.) in the region centering about Lake Tahoe; by H. S. and F. A. Riddell (1956) in Owens Valley; and by Hindes (1959) in the Huntington Lake region (Fresno County), have all revealed great numbers of sites which were previously unreported, e.g., by modern local residents, native informants, or by hikers and campers.

In some cases it has been possible solely by means of surface survey to identify, if only tentatively, one or more culture complexes in sequential relationship. The Martis-Kings Beach sequence in the Central Sierra (Heizer and Elsasser, op. cit.) has not been clearly demonstrated stratigraphically to date, although each complex has retained its original identity,

Table 1

Elevations of Various Types of Sites in the Sierra Nevada*

	Area I										Area II									
	Site designation**										Site designation									
Elevation (feet)	TC	Occ	BRM	P	P BRM	C-S	C-S BRM	P C-S	QW	Total	TC	Occ	BRM	P	P BRM	C-S	C-S BRM	P C-S	QW	Total
over 11000																				
10-11000											15									15
9-10000											42									42
8- 9000											67									67
7- 8000	2			2						4	25	14			1					40
6- 7000	28			5						33	23	2	26							51
5- 6000	53	1	4	1		1			2	62	10	4	19			2				35
4- 5000	16									16	48	6	102		3		4			163
3- 4000	11	2	5							18	15	3	12							30
2- 3000	7	3	17	1		1				29	24	16	34		1	1			2	78
1- 2000	4	8	17			2	1			32	17	29	34	1	2	4				87
500- 1000	2	3	17				1		1	24	17	11	27		3	1	1		4	64
0- 500	1	1	5							7	9	6	23			2	1		4	45
Total	124	18	65	9		4	2		3	225	312	91	277	1	10	10	6		10	717

*For identification of areas, see Map 5.

**For meaning of site designation symbols, see end of Table 2.

Table 1 (continued)

Elevations of Various Types of Sites in the Sierra Nevada*

	Area III										Area IV									
	Site designation**										Site designation									
Elevation (feet)	TC	Occ	BRM	P	P BRM	C-S	C-S BRM	P C-S	QW	Total	TC	Occ	BRM	P	P BRM	C-S	C-S BRM	P C-S	QW	Total
over 11000	5									5	1									1
10-11000	7								1	8	2									2
9-10000	11		4							15	3									3
8- 9000	11		2							13	7		7			1				15
7- 8000	27	1	22							50	35	2	15			1			10	63
6- 7000	11	1	20							32	30	5	2	1		4				42
5- 6000	5		12	1	1	2				21	44	1	12	1		5				63
4- 5000	3	3	20	3	4			1		34	57	14	9	13	3	8				104
3- 4000	3	6	17	7	1			2		36	149	13	6	5	1	7		4	1	186
2- 3000	3	15	48	6	10	2	1			85										
1- 2000	2	6	42	5	2				2	59										
500- 1000	2	7	40	11	5	1	1		2	69										
0- 500	2	4	4	2	2					14										
Total	92	43	231	35	25	5	2	3	5	441	328	35	51	20	4	26		4	11	479

Table 2

Elevations of Various Types of Sites in the Sierra Nevada (Summary)

Areas I, II, III, IV

Elevation (feet	Site designation									
	TC	Occ	BRM	P	P BRM	C-S	C-S BRM	C-S	QW	Total
over 11000	6									6
10-11000	24								1	25
9-10000	56		4							60
8- 9000	85		9			1				95
7- 8000	89	17	37	2	1	1			10	157
6- 7000	92	8	48	6		4				158
5- 6000	112	6	47	3	1	10			2	181
4- 5000	124	23	131	16	10	8	4	1		317
3- 4000	178	24	40	12	2	7		6	1	270
2- 3000	34	34	99	7	11	4	1		2	192
1- 2000	23	43	93	6	4	6	1		2	178
500- 1000	21	21	84	11	8	2	3		7	157
0- 500	12	11	32	2	2	2	1		4	66
Totals	856	187	624	65	39	45	10	7	29	1862

Meaning of site designation symbols:

TC - Temporary Camp
Occ - Occupation
BRM - Bedrock Mortar
P - Petroglyph
C-S - Cave or Rockshelter
QW - Quarry or Workshop

after investigation at several sites by excavation. The sequence in Yosemite National Park (Crane Flat-Tamarack-Mariposa complexes) has been confirmed stratigraphically by excavation at several sites (Bennyhoff, 1956). No excavation has yet been carried out for the express purpose of testing the validity of Meighan's (1955, p. 13) statement that, "There appears [in Mono County] to be a late protohistoric period characterized by small corner-notched points and an earlier period containing larger and coarser points of several varieties." That there is an earlier period represented in the Mono County region is also suggested by the report of K. A. Dixon (1953) of large projectile points, resembling Sandia specimens, found in Long Valley, in one of the five zones into which Meighan (op. cit.) divided the Mono County survey area.

In Tables 1 and 2, site designations fall into nine separate categories, viz., (1) temporary camp, (2) occupation (village), (3) bedrock mortar, (4) petroglyph, (5) petroglyph-bedrock mortar, (6) cave or rock shelter, (7) cave-shelter with bedrock mortar associated, (8) cave-shelter with petroglyph associated, (9) quarry or workshop. A small number of sites display associations of more than two of the identifying or defining characteristics of sites, i.e., a cave or rock shelter site, for example, may have associated bedrock mortars and petroglyphs as well. Inasmuch as the prime purpose of this summary of recorded sites is to indicate a broad settlement pattern or a pattern of prehistoric land use, at any rate, such multiple-feature sites may be regarded as insignificant in the broad outline of Sierran archaeology.

Another possible inconsistency in the schema of Tables 1 and 2 may be seen in the rationale for separation of temporary camp and occupation (village) sites from bedrock mortar or petroglyph sites proper. It has been observed that at or around many granitic exposures containing bedrock mortars or petroglyphs are also other evidences of aboriginal camping refuse, such as bits of pottery or perhaps scatterings of obsidian chips. On the other hand, some of these bedrock mortar or petroglyph sites seem to be utterly devoid of any such association. Thus it has been considered reasonable here to define "temporary camp sites" on the bare minimum of evidence, not even including mortars or petroglyphs.

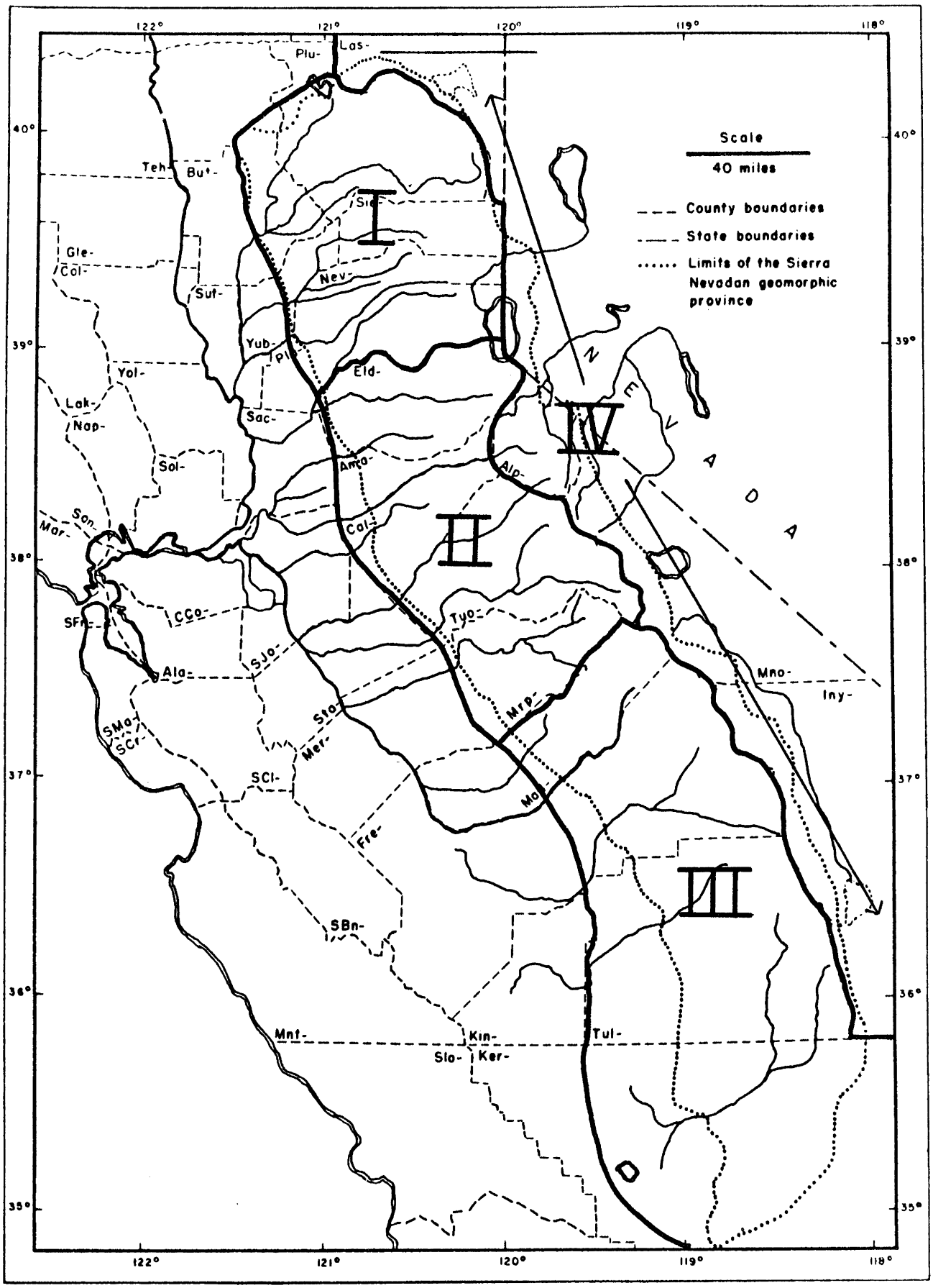
In instances of open occupation (village) sites, where bedrock mortars are present, but obviously were not the most important features of the site, the occupation site is given the primary heading, without inclusion of the bedrock mortar designation. Open occupation sites with petroglyphs associated are so rare as not to merit enumeration here.

With this perhaps unnecessarily involved explanation of the site designations employed in Tables 1 and 2, we may proceed with a description of the main types of sites, in the order shown in the tables.

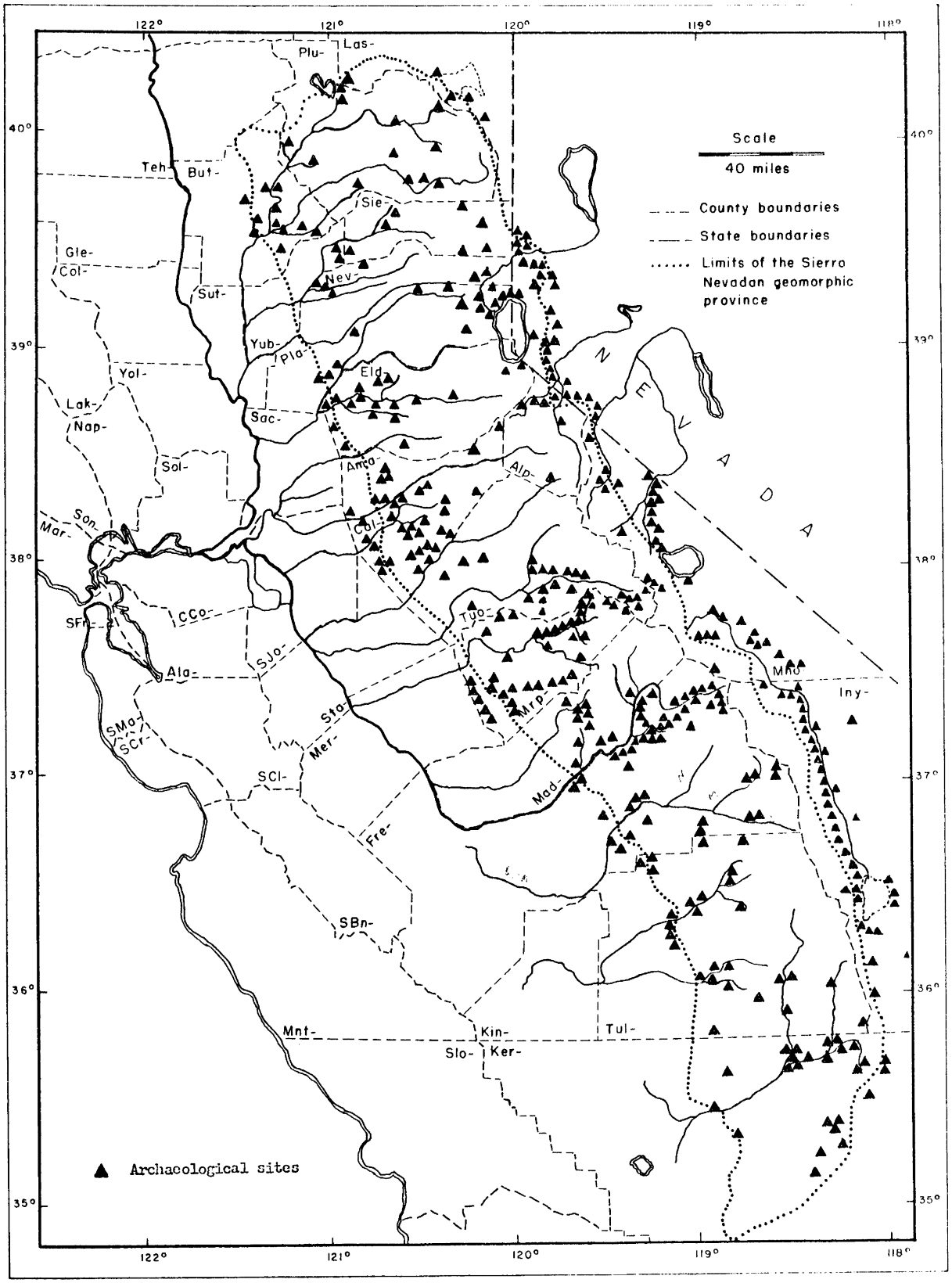
(1) Temporary camp sites. These are sites which characteristically show no considerable refuse deposit and but little or no discoloration (darkening) of soil to distinguish the camping area proper from the surrounding native soil cover. However, temporary camp spots which were occupied at later periods may exhibit a thin mantle of soil, perhaps darkened by fires and by the deposition of organic food wastes by the aboriginal campers. It is therefore suitable to distinguish certain temporary camp sites from occupation sites by arbitrarily assuming a maximum depth of six inches of deposit as marking the camp site, while any depth greater than this would allow the occupation or village site designation. In practice, it is usually not difficult to make the distinction, since so many sites obviously do not contain midden deposit. Conversely, it is not always possible to make an accurate test of the midden depth without examining a fairly large portion of the site--an activity sometimes not feasible in an extensive areal survey. In the Sierra Nevada, temporary camp sites, even those which evidently could only have been occupied seasonally, may be several hundred yards in extent, with vast quantities of implement chippage scattered closely on the entire camp surface. Such sites probably signify places which were visited year after year by several families, simultaneously. Small sites, where perhaps but one family, or even a single individual, might have camped overnight, may be recognized by a modicum of chippage. In the Yosemite National Park region, for example, Bennyhoff (1956, p. 12) designated as temporary any spot from which at least five scattered obsidian flakes or one complete artifact was recovered.

Temporary camp sites, as stated above, are often associated with bedrock mortars, and are usually located with reference to availability of water, of good hunting spots, of hunting or trade trails (Hindes, op. cit.), or as at a natural salt lick for deer. It will be seen in Table 2 that even without considering the frequent bedrock mortar association, more temporary camp sites have been reported to date in the Sierra Nevada than any other type of site, and that, excluding bedrock mortar sites, there are more temporary camp sites than there are all other types of sites combined.

(2) Occupation sites. The word "occupation" as used here is not a felicitous term for description of a place which has been lived on long enough or intensively enough to have developed a soil mass which can be referred to as "midden" deposit. Other words, such as "habitation" or "village" have approximately equal disadvantages, hence "occupation" will serve here, but with qualifications. Thus an occupation site should be thought of as an "open" site (as opposed to a cave or rock shelter), which, by its depth (greater than six inches) of refuse deposit, indicates that a place was favorably enough endowed with regard to food-getting activities to have attracted numbers of persons year after year. Ordinarily, large occupation sites below 4000 feet elevation, or the snow line, may be presumed to have been winter villages,



MAP 5: Archaeological Site Location Areas in the Sierra Nevada (see Table I)



MAP 6: Archaeological Site Locations in the Sierra Nevada (symbols represent one or more sites)

while the smaller sites at high altitudes (cf. figures of Area II, Table 1, which show fourteen sites classified as occupation sites at an elevation between 7000 and 8000 feet) probably were preferred summer-long camp grounds. In all of the excavated sites known to the author in the Sierra Nevada or in immediately adjacent regions, the depth of the midden deposit rarely has been found to be more than about 52 inches. The exceptions to this pattern are the Rose Spring site, which has disclosed a stratified midden about ten feet deep (Riddell, n.d.), and the Little Lake site, which shows a fairly complicated soil stratigraphy, with at least one artifact being recovered at the 79-84 inch level (Harrington, 1957, p. 90).

Occupation sites are usually recognized by their mound-like appearance and by discoloration of the soil in the immediate area of the midden deposit. Sometimes a bizarre appearance of vegetation cover of the site gives a clue to identification of soil which has been deposited or lived upon by man. In the Sierra Nevada such site markers are not nearly so frequently noticed as at lower elevations in California. However, one plant species (Wyethia mollis, sometimes called "mule-ears") has been observed to have at least a slight affinity for former occupation spots or other places that have been disturbed by man. Sites evidently were located with reference to availability of water, nearness of favorable food-gathering localities, and dryness. Probably in order to avoid dampness, natural knolls and open places allowing maximum exposure to the sun were often selected.

Included in the category of occupation sites are those spots which were used as "cry circles" in historic times. Such sites have been precisely identified, especially in the northern part of the range (in the territory of the ethnographic Maidu). They were used in connection with the annual "burning" ceremony for the dead, and may today easily be recognized by the presence on their surfaces of quantities of burnt glass trade beads, which, according to Dixon (1905, p. 246), were only part of the vast quantity of material, much of it perishable in the ceremonial fire, which was offered the ghosts of the dead.

(3) Bedrock mortar sites. In that part of the Sierra Nevada west of the main crest, bedrock mortar sites outnumber all other types of site. In Area IV (Table 1), which includes Owens Valley and parts of Mono County, the count of bedrock mortar sites includes some occurrences of bedrock metates as well. This, taken with the common observations of portable metates and of the general lack of portable stone mortars at temporary camp or occupation (village) sites in Owens Valley and in Mono County, would seem to indicate specific adaptation of the bedrock mortar to acorns. While Steward's ethnographic data for the Owens Valley Paiute (1933, p. 246) support this view, and further assign the metate to use with other seeds (wild grass and/or piñon?), there is some evidence that suggests a non-association of

acorns and bedrock mortars. Meighan (1955, p. 12), Elsasser (1957, p. 7), and Bennyhoff (1956, p. 19) have all reported bedrock mortar sites outside of the range of oak, especially the black oak, the most important source of acorns in the Sierra Nevada. In the case of Yosemite National Park, however, however, Bennyhoff (loc. cit.) suggests that camps with bedrock mortars were established above the limits of the oaks in upland valleys in order that the Indians might more easily gather acorns produced on the upper slopes of the adjacent canyons. Meighan's explanation (loc. cit.) for the presence of bedrock mortars in the non-oak parts of Mono County, at least, is simply that "such functional distinction as existed [between bedrock mortars and bedrock or portable metates] was more likely based on differences in grinding techniques (coarse grinding as against fine grinding perhaps) than on the seeds used."

The frequency of occurrence of bedrock mortars in the Sierra Nevada offers opportunities to estimate both the size and total length of occupation of certain temporary camp or village sites. Bennyhoff (1956, p. 12) has presented a detailed and rigourous investigation of the possibility of exploitation of data involving bedrock mortars for these estimates. His assigning of size of site based upon numbers of mortar holes[3] in given granite exposures in Yosemite National Park is reasonable, though arbitrary. However, he suggests that with additional excavation at a variety of sites containing bedrock mortar holes, some method may result whereby the length of occupation of any such site may be deduced from the number and depth of mortar holes. Some data are at hand as to the point at which an individual mortar hole was abandoned (at 5 inch depth). At present, however, "Too many unknown factors exist to warrant any refined estimate as to length of occupation of these sites. The depth to which each hole was worn is dependent not only upon the time factor, but also upon the amount of unused space available for new holes, and the advantages of comfort which might be associated with a particular grinding spot. It is possible that each woman had some claim to a specific mortar hole or holes, and the amount of use might vary with the individual" (ibid., p.13).

(4) Petroglyph sites. According to the subdivision of California into petroglyph-pictograph areas by Steward (1929), the Sierra Nevada includes two specific areas, as follows: Area A (California east of the main crest of the range; Area D (in the Tulare region, i.e., in the foothills of the western slope of the southern part of the mountains). In general, these two areas correspond to a distinction between petroglyphs (Area A: geometric, i.e., curvilinear or rectilinear incisions) and pictographs (Area D: painted, often polychrome, and with figures representing animals or men). Exceptions to this correspondence are seen in petroglyphs cut into float boulders found in the western foothills of the central Sierra, and in pictographs, usually executed with but one pigment (red) in Owens Valley. Since Steward's survey in 1929, a great number of sites have been discovered by or reported to the University

of California Archaeological Survey. On the basis of these new data, there seems to be no reason to modify the boundaries of the areas originally designated.

The vast majority of Sierran petroglyphs are found on granite boulders, either on horizontal (ceiling) or vertical surfaces. Local outcrops of certain metamorphic rocks, and in one case in Sierra County (Sie-1), of magnetite-basalt, have, however, been utilized. While there are several pictograph sites found outside of the Tulare region, for example, those mentioned in Owens Valley, or those in Yosemite National Park, these are not nearly so elaborate in concept as even the average examples shown in the Tule-Kaweah drainage basins in the western foothills of the southern Sierra. Furthermore, as Bennyhoff (1956, p. 22) has pointed out, the generally rectilinear elements of the Yosemite pictographs more nearly resemble those of the petroglyphs of the Mono Lake-Owens Valley region than those of the Tulare region, and perhaps serve to demonstrate the contact between the Miwok and the Paiute indicated by the ethnographic data.

The widespread distribution of the curvilinear style of petroglyphs in Area A (eastern California and the Great Basin) suggests a greater age for it than for the rectilinear style, which is restricted in distribution, and which centers in the Owens Valley (Steward, 1929, p. 220). Although the rectilinear elements are found all along the eastern edge of the Sierra Nevada, a mixture of these with curvilinear elements may be observed at many sites. In one instance at least, a site in Inyo County, not far to the north of Owens Valley, rectilinear elements are found superimposed on curvilinear elements.

The most important, or at least the most extensive, petroglyph sites known in the central and northern Sierra, i.e., those at Hawley Lake (Sie-1); near Donner Lake (Nev-5); and near Summit Soda Springs (Pla-26), seem, by inspection, to show a dominance of curvilinear elements.

Few petroglyph sites in California or Nevada have been subjected, to date, to such extensive analysis of design elements and style as those at the Lagomarsino site, in the Virginia Range, east of the Sierra Nevada, near the ethnographic Northern Paiute-Washo boundary (Baumhoff, Heizer and Elsasser, 1958). Until large numbers of petroglyph sites are so examined, and the results published, no significant conclusions other than those set forth by Steward and others can be drawn concerning the meaning and age of the petroglyphs. Recent attempts (ibid.) at explanation of the purpose of the petroglyphs have been presented for the Lagomarsino site, and for certain sites in western and central Nevada which were apparently placed in favorable (ambush) spots along game trails (Heizer and Baumhoff, op. cit., p. 904). Whether or not the association of game trail location with petroglyphs would obtain persistently in any but the lower elevations on the eastern side of the Sierra, for example at Martis Valley, north of Lake Tahoe, is yet to be determined.

(5) Caves or rock shelters. The few true caves, i.e., caverns in which are dark or at least twilight zones even when the daylight outside is at a maximum, in the Sierra Nevada are almost all in limestone formations, and evidently have been used prehistorically as mortuary chambers (see p. 12). Rock shelters which are so situated as to permit the accumulation of a dry deposit are even rarer than true caves, and the few Sierran cases recorded to date (see p. 12), disclosed either (a) a burial chamber in a small "cave" or shelter: Ker-185 (Heizer (1951), or (b) a cache or storage spot (Harrington, 1950). It is thus apparent that our chief concern in the Sierra Nevada proper is with rock shelters with predominantly "wet" deposits. Results of limited excavation, as at site Alp-7, near Markleeville, or site 26-Do-1 (Cave Rock) on the east shore of Lake Tahoe, in Nevada, have pointed to but temporary occupation, probably during the summer time. Both Alp-7 and 26-Do-1 are in non-granitic formations and present quite adequate overhang shelter for perhaps several families. Site 26-Do-1 is by far the more impressive of the two shelters in appearance, and a "tunnel" in the rear of the shelter almost could be termed a true cave. It is perhaps significant that of these two shelters, both in Washo territory, only the smaller, less spectacular one (Alp-7) contains specimens associated with the Kings Beach Complex, which has been identified as the late prehistoric or protohistoric manifestation of the ethnographic Washo. The Cave Rock (26-Do-1) site in Nevada and the limestone mortuary caverns of the western Sierran foothills show a parallel in that they seemingly were avoided by the historic Washo and Miwok, respectively, as representing the abodes of "wild men" or "giants" (Heizer and Elsasser, op. cit., p. 9; Wallace, op. cit., p. 35).

The great majority of Sierran rock shelters are formed from overhanging granitic masses. These do not often provide any appreciable overhead shelter, hence it is not surprising to find little evidence of midden deposit under many of the shelters. On the other hand, in the Tulare petroglyph region (Steward's "Area D"), granite overhangs frequently were utilized as shelter for pictograph groups, and are certainly a contributing factor in the preservation of the latter. If rock paintings which characterize the Tulare region were executed on exposed rocks, one could surmise that they would survive for but relatively few years, as compared to the decades or perhaps even centuries which have presumably elapsed since the drawings in protected spots were made.

(6) Quarry-workshop sites. Although quarry or workshop sites are the least important, numerically, of all the main types of sites outlined here, they are emphatically not unimportant in the total picture of Sierran archaeology. Indications of quarrying or workshop activities reflect the extent to which certain groups utilized a local resource or perhaps were willing to travel in order to obtain desired materials for hunting, decorative, or domestic implements.

Quarries may be outcrops where, with a minimum of work, the preferred material might have been obtained. For example, merely scratching the surface at a certain spot might produce the sought-after substance. On the other hand, some products were evidently secured only after breaking down the parent material with stone picks or the like. Heizer and Treganza, in the most comprehensive publication on California mines and quarries (1944, p. 302), state that in the case of steatite, "Shallow depressions near the outcrop indicate that the Indian went to some depth in order to obtain unweathered chunks." In one instance at least, a "mine," in the conventional modern sense of an actual pit or hole in the ground, seems to have been utilized by the Maidu Indians as a source of flint (ibid., p. 303).

Workshops may be located in direct association with quarries proper, or they may be separated from the source point of the material by relatively great distances. Near Taboose Pass, in Inyo County, for example, at an elevation of over 10,000 feet, where no obsidian outcrop is known to occur, is a thick scattering of obsidian flakes and rejected chunks surrounding the trail over the pass. The obsidian is presumed to have been collected in the Owens Valley region. Why it was taken to such a high spot for working is not known. Perhaps Taboose Pass is on a migratory game trail, and the Indians, while waiting for the animals to arrive at the spot, passed the time in fashioning arrow points or other implements.

It is clear that observation of the locations of the sources of implement material may be of value in helping to determine the reason for numerous trails or trade routes over and along the flanks of the Sierra Nevada, in the archaeological as well as in the ethnographic period. The best variety of obsidian, and probably the majority of it, for example, came from the east side of the Sierra (Inyo or Mono Counties), and the trade for obsidian from the Paiute territory is consequently given most prominent notice in the ethnographic record (see Sample, op. cit., pp. 12, 17-19). Steatite sources, on the other hand, have been reported only on the western side, and steatite seems to have been used frequently in foothill sites along that side of the range. It is found only in relatively reduced quantity (as beads, or occasional bowl sherds, for example) in Owens Valley sites.

Usable sources of flint, quartz crystal, and chrysoprase (a variety of chalcedony) have been reported only on the western side of the mountains as well. Hematite and chalk, both probably used for face paint, occurred at a few sites on both sides of the main crest (Heizer and Treganza, op. cit., pp. 317-320).

Some trace of procurement activities connected with all of the material so far mentioned, except perhaps quartz crystals, may be expected to have been left by the Indians. Evidence of artificial alteration of the surfaces

of certain outcrops and scattered spalls, blanks, or fragments of rejected, partially worked implements near or at the outcrop may identify the site positively as an aboriginal quarry.

Gathering of mineral commodities such as salt, clay, or asphaltum (in seeps) would not necessarily leave any tangible evidence of removal; hence sites where these were available and utilized can usually be identified by the close proximity of a camp spot (with obsidian chippage on the surface, for example) or by the testimony of ethnographic informants.

Discussion of Site Distribution

Enough has been said so far to allow the suggestion that in aboriginal times in the Sierra Nevadan province, little or no land, even at the highest elevations, was unknown to the Indians. A table of peak elevations for the Sierra Nevada, such as that constructed by LeConte (1903), reveals that there are but two peaks exceeding 12,000 feet in height north of the 38th parallel (approximately in the latitude of Mono Lake or Lake Eleanor in Yosemite National Park). Between the 38th and the 36th parallels, i.e., in the southern half of the range, however are 140 peaks of over 12,000 feet elevation; eight of these, including Mt. Whitney, are over 14,000 feet high. These figures indicate a loftier general aspect in the southern part of the range rather than a mere multiplicity of high peaks rising like slender towers in a limited part of the range.

Paradoxically, it is in or adjacent to this highest section of the range that the majority of archaeological sites have so far been located in the Sierra Nevada. Furthermore, it is here that those sites of over 4000 feet elevation, which is taken as the approximate dividing line between summer and winter habitation, appear most frequently. The possibility of this southern preponderance being based upon more extensive survey there than in the north has already been discussed. If it turns out in subsequent investigation that the southern portion of the range actually does contain many more sites than the northern portion, we may then infer tentatively that one of the main reasons for this phenomenon has to do with the linguistic kinship and possibly therefore the increased trading propensities of the Owens Valley Paiute and the Western Mono. It is suggested here that the Western Mono entered their present territory somewhere around 1300 A.D., and that association across the high crest of the Sierra Nevada with the Owens Valley Paiute has continued since that time. The suggested date is based archaeologically upon evidence from the distribution of the Desert Side-notched projectile point, and of pottery (see following section).

While the neighboring Miwok, to the north of the Western Mono, apparently

also engaged in trade across the mountains with the Owens Valley Paiute, it seems to be true that such intercourse did not approach the intensity that obtained between the Western Mono and the Owens Valley people. Barrett and Gifford (op. cit., p. 271) express this by noting that, "This mountain barrier [the Sierra Nevada] was no doubt an important factor in hindering the Miwok absorption of Great Basin cultural traits. The Ghost Dance cults of 1870 and 1890 are cases in point. The influence of the 1870 form did not reach the Miwok direct from its Paiute originators to the east, but only through the medium of central Californian people to the west."

The Washo certainly had trans-montane commerce with both the Miwok and the Maidu (Barrett, 1917). Again, however, there is no clear evidence that such relationships were particularly cordial, and Dixon (1905, p. 201) states that there seems to have been little trade or intercourse between the Northern [Mountain] Maidu and the Paiute or Washo. Littlejohn (1929, p. 779) quotes one informant as saying that warfare was frequent between the Northeastern Maidu and the Washo.

Comparison of the general topography between the northern and southern parts of the Sierra Nevada reveals a single, strong "backbone" aspect in the south which is not present in the north. Thus, in the relatively lower, more broken, northern ranges, low gaps or otherwise easy routes penetrating what amounts to a single mountain wall are much less frequently noted. Accordingly, it seems that aboriginal travel across the northern part of the range was not confined to a series of well-known passes, but rather was more haphazard, i.e., any trail over the lower ranges, however little used previously, could have been utilized. Unfortunately, such a pattern of travel has not yet been determined archaeologically or ethnographically.

Aside from the frequently used passes, including those like Sonora or Tioga, over which modern automobile roads have been built, there are numerous small, high altitude passes, both on the north-south trending ranges as well as on the east-west divides of the southern Sierra Nevada. Livermore (1942, pp. 59-64), for example, has listed more than fifty passes in the southern part of the range. These were, to be sure, not all utilized by the Indians, since there are historic records, many of them published in the Sierra Club Bulletins (e.g., Keough, 1918), that speak of trail blazing as well as the stabilization or improvement of trails in extremely difficult spots (for pack animals) on routes which presumably would not have been used by the Indians. It may be surmised also that the great numbers of sheepherders who brought their animals to the high Sierran meadows followed established Indian trails (Versteeg, 1923), and in some cases obliterated evidence of Indian use of the trails. In any case, there is archaeological evidence that trails leading over most of the important Sierran passes were utilized by Indians.

We may mention such passes, associated with trails, roughly from north to south, as Yuba, Donner, Echo, Carson, Ebbetts, Sonora, Tioga, Donohue, Parker, Tuolumne, Kaiser, McGee, Hopkins, Mono, Italy, Pine Creek, Paiute, Bishop, Knapsack, Cottonwood, Olancha, and Walker Passes. Some passes, like Mammoth or Kearsarge, are mentioned as being used by the Owens Valley Paiute (Steward, 1933, p. 329), but have not as yet been examined by any archaeological survey known to the author.

Archaeological and ethnographic evidence of use of high elevation trails and passes is of value chiefly because it bears out the thesis that all areas of the Sierra Nevada, even those above the timber line, were known or utilized by inhabitants on both sides of the range. It should be recognized, in addition, that whatever the discrepancy in numbers of known sites, trails, or passes between the northern and southern parts of the range, seasonal occupation and use, which ultimately covered the entire range at virtually all altitudes, must have started several thousand years ago. The widespread distribution of the Martis Complex, generally in the northern part of the range, suggests a relatively homogeneous local culture, probably representing a seasonal adaptation to an economy based on the hunting of large mammals. This culture seems not to have been subject to such natural boundaries as existed between the Maidu and the Washo in ethnographic times. Evidence of a hunting culture similar to the Martis culture in the southern part of the range is as yet lacking.

During the ethnographic period, and probably in the late prehistoric period of Sierran archaeology, the situation outlined above was apparently reversed, i.e., an essentially uniform widespread culture, based on trade as well as on hunting, seems to dominate the southern part of the range. In the north the linguistic differences between the Penutian-speaking Maidu and Miwok, and such groups as the Washo and the Northern or Owens Valley Paiute on the eastern side of the range were emphasized by a relative lack of trade or other intercourse.

Ample reasons have been recorded for the almost total exploitation and seasonal occupation of the Sierra Nevada. These include such diverse factors as the following of deer and other large mammals; procurement of desirable plant foods available in the summer time only (Powers, op. cit.; Muir, 1913); health (Derby, 1933); and possibly aesthetics (Elsasser, op. cit.). It may be stated, therefore, that although trans-montane trade was probably more important in the south than in the north, it did not offer the only inducement to the Indians to occupy the high altitude land during the summer.

Archaeological Time Markers in the Sierra Nevada

Artifact types which can be used for approximate dating in the Sierra Nevada are relatively rare. Boatstones (atlatl weights?) and "large" projectile points (i.e., those consistently weighing more than 3 grams) may be mentioned tentatively for the Martis Complex, and large projectile points only for the presumed early complexes of the archaeological sequence in Yosemite National Park (Bennyhoff, 1956). For the later cultures, mostly in the southern part of the range, pottery, steatite arrow straighteners, and certain types of small triangular points appear to qualify as time markers, since they can be placed fairly definitely in the local chronological sequence (usually late prehistoric-protohistoric-historic) and may be related to known sequences elsewhere to the east.

Most of the projectile point types from the Martis Complex, although they resemble in a general way points occurring in the Middle Horizon of the Central California sequence, have not as yet been found amenable to classification in terms of their historical meaning, hence are at present practically valueless as time markers. The great majority of the projectile points found in excavations at Martis Complex sites and in the earlier complexes in the Yosemite region as well do not demonstrate any specific motor habits of the kind which would produce a dominant type of point during a particular segment of the occupation period to which they have been assigned. The specimens recovered generally cannot be shown, without additional excavation, to have sufficient cultural association in time or area to merit any more than treatment in purely descriptive expressions, such as "shouldered," "tanged," and the like.

Variants of the so-called Pinto type of projectile point, or at least types which resemble the latter, occur frequently in the Martis, Mono, and Yosemite areas (Heizer and Elsasser, op. cit; Meighan, 1955; Bennyhoff, 1956). If all the claims which have been made for the early date of this type of point in western North America were consistent, it could have some value as a time marker. However, Lister (1953, p. 265) notes that estimates of age of points resembling, if not in fact, Pinto points, from more than seventeen sites in the western United States, vary a great deal (range shown is from Pueblo II times to 10,000 years ago). Although the "stemmed, indented base point" well might occur "between the Folsom and recent Horizons" (ibid.), this kind of span is almost without meaning when applied to Sierra Nevadan archaeology.

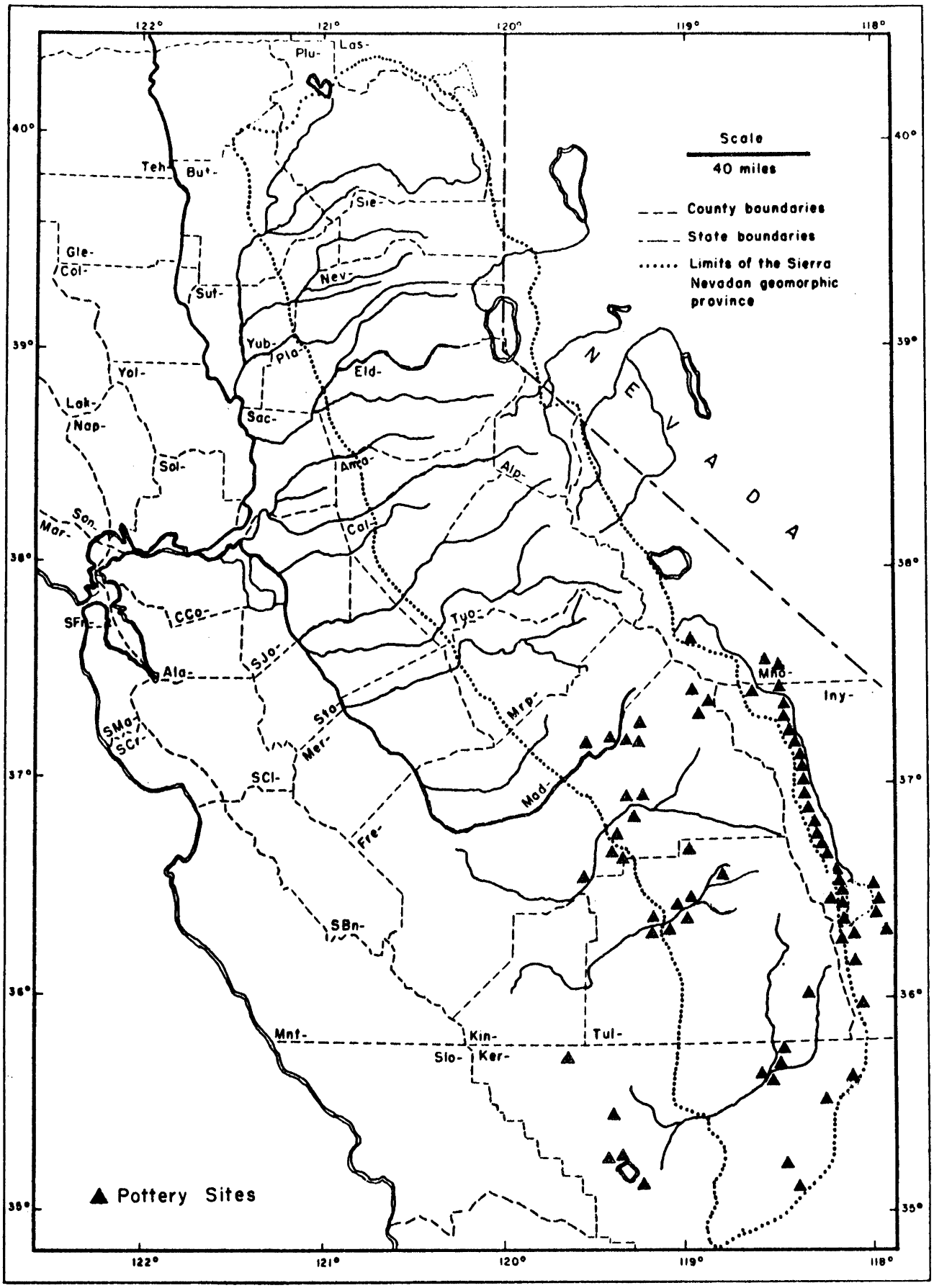
If the use of the so-called boatstones as atlatl weights may be questioned, there seems little doubt that their time of occurrence in the Sierra Nevada was during a period corresponding to the Middle Horizon in Central California (ca. 1500 B.C. to 300 A.D.). This is supported by the fact that

such specimens have been found in two sites identified as of Middle Horizon affiliation in the Sacramento Valley. Moreover they have never been found in any late archaeological contexts in California (Heizer and Elsasser, op. cit., p. 25). Since publication of the report on the Martis Complex in 1953, several additional boatstones have been reported from Owens Valley (Riddell and Riddell, op. cit., p. 30), and from the Martis area, e.g., from sites near Hobart Mills and Lake Almanor in California (personal communication with F. A. Riddell). In addition, two specimens were recovered at the Karlo site, where supposed atlatl hooks of bone and stone also were found (Riddell, 1956c, p. 46).

Several excavations in the Martis area during the past five years, however, have failed to yield boatstones. This is significant only in the case of the excavation of site Nev-15, in the western foothills of the Sierra Nevada. At this site, where a large number of Martis type points of a size and weight which might suggest use as atlatl darts rather than arrow points were found, one could reasonably expect also to find at least one boatstone or atlatl weight to confirm the association of "heavy" points and weighted throwing sticks.

Turning now to late time markers in the southern part of the range, we may first examine pottery. The only type of pottery found in significant quantity in the Sierra Nevada and immediately outside its eastern and western borders falls into the category which has been named Owens Valley Brown Ware (Riddell, H. S., 1951; see also Gayton, 1929). This ware may be characterized briefly as a relatively crude, unpainted, unslipped type of coiled, scraped pottery that has been fired "in an oxidizing atmosphere" (Riddell, H. S., op. cit., p. 20), resulting in surface color ranging from gray-black to red-brown. The pottery occasionally has handles or lugs, and is rarely decorated with single or double bands of finger-nail impressions. Round or flat bowls and conical, flanged forms are those usually described as distinctive of this ware. Owens Valley Brown Ware has a Sierran distribution as shown on Map 7, where each triangle on the map may represent one or several archaeological sites which contain pottery. The numbers of sites, by county, recorded to date in the files of the University of California Archaeological Survey, where this ware occurs in the region under consideration, are as follows: Mono, 3 sites; Madera, 2 sites; Fresno, 18 sites; Tulare, 12 sites; Kern, 12 sites; Inyo, 169 sites. Map 7 shows the known westernmost point of archaeological distribution in the San Joaquin Valley, in the ethnographic Yokuts area, but does not show the eastern limits of the type which include a fairly large segment of Inyo County east of Owens Valley (ibid., Map 2).

Although the distribution of Owens Valley Brown Ware, as described by Riddell, certainly seems centered in Owens Valley, recent investigation (e.g., by Prince, n.d.) has tended to place this ware as a subtype of a widely rang-



MAP 7: Pottery Sites in the Sierra Nevadan and Adjacent Regions

ing type of pottery in the Great Basin which includes ethnographic Shoshoni (Steward, 1941) and Southern Paiute Utility Wares (Baldwin, 1950). This concept underscores the overlapping of traits shown by the three subtypes of the widely ranging type, thus tends in turn to alter the distributional picture, to the east, of Owens Valley Brown Ware proper.

On the basis of such differences or resemblances as do exist between the putative subtypes, it would seem that the nearest relative and perhaps the progenitor of Owens Valley Brown Ware is Shoshoni Ware (Eberhart, n.d., p. 69). This ware has been identified in sites in eastern Nevada, western Utah, southern Idaho, Montana, and Wyoming. In no case is its placement in any of these areas prior to 1300 A.D. (cf., e.g., Rudy, 1953, Enger, 1950), and 1300 A.D. is therefore taken as the earliest date at which Owens Valley Brown Ware could have been made in California (Eberhart, op. cit., p. 73). In those reports concerning the subject of Owens Valley Brown Ware where dates are mentioned specifically, however, its occurrence in California is placed at a much later date than 1300 A.D. For example, H. S. Riddell (op. cit., pp. 23-24) suggests some time after 1650 A.D. for its appearance in the type site in Owens Valley (Iny-2), while Meighan (1953, p. 189) believes that there was no pottery, either Southern Paiute Utility Ware or Owens Valley Brown Ware, in the Death Valley region before 1700 A.D.

Complementing Owens Valley Brown Ware at many sites, but with a much wider distribution in the Sierra Nevada, are one or another of the following five types of small, light, triangular projectile points: (1) simple triangular with straight base; (2) simple triangular with concave base; (3) side-notched, straight based; (4) side-notched, concave based; (5) side-notched, end-notched (or with "V" shaped base). All of these types have been found at protohistoric and historic sites in California. Bennyhoff (1956, pp. 35-39), in connection with his findings in Yosemite National Park, has summarized their occurrence in California and to some extent in the Great Basin and the Southwest. Eberhart (op. cit.) has made a detailed study of the literature concerning all but the first type of the point outlined above (simple triangular with straight base), in the western United States. This includes a list of regions outside of California where the remaining four types have been noted, and the most probable times of their occurrence.[4] Finally, Baumhoff and Byrne (op. cit.) have completed a study of triangular side-notched, concave, or notched based forms which represent, following statistical analysis, four subtypes of the generalized form previously designated "Desert Side-notched" by Baumhoff (1957, p. 10). The subtypes which have been found in the Sierra are named by Baumhoff and Byrne as follows: (a) "General" subtype (side-notched, concave based). As the name implies, the distribution of this subtype includes all of the Sierra Nevadan province, without regard to elevation. (b) "Delta" subtype (side-notched, with "V" shaped base). This subtype appears frequently in the delta region of the Sacramento-San Joaquin Rivers. It shows,

however, a continuous distribution from the ethnographic central Sierran Washo territory (Kings Beach Complex area) through Maidu, Plains Miwok, and into Yokuts territory. (c) "Sierra" subtype (side-notched, end notched). Points in this category have been found throughout the length of the Sierra Nevada, but seem never to occur in the province below 5000 feet elevation.

Data from the Great Basin, the Southwest, and Central California suggest an eastern origin, with relation to California, for the small triangular points. The probable date of origin to the east (specifically, the Southwest) was somewhere between 800 and 1000 A.D. (see End Note 4). While there might have been an independent development of certain of the subtypes of the Desert side-notched points (judging from its distribution, the "Delta" subtype, for example, could have had its source in the western foothills of the Sierra Nevada [Baumhoff and Byrne, op. cit.]), it seems that the general direction of diffusion of small triangular points into California was also from the Southwest.

Specimens representing both "General" and "Delta" subtypes of Desert side-notched points have been found in lowland sites in the Sacramento Valley, dating from probably terminal Phase I, Late Horizon of the Central California sequence (ibid.) Late Phase I in this sequence is thought now to extend from 1100 A.D. to 1600? A.D. (see Heizer, 1958b, p. 6). If we take 1500 A.D., therefore, as at least a tentative date for the earliest introduction of these two subtypes into Central California, we may then allow another time lag, and suggest (after Baumhoff and Byrne) that at least some representatives of the small triangular side-notched types of point reached Owens Valley and the southern Sierra between 1300 A.D. and 1400 A.D., and gradually moved west and north in the Sierra Nevada, finally reaching the northen part of the range and the Sacramento Valley between 1500 A.D. and 1600 A.D. There is some evidence that the "Sierra" subtype of Desert side-notched points entered the mountains or other regions of California slightly later than the other two subtypes (unpublished data on excavations in Northern California by J. A. Bennyhoff).

For the non-side-notched points, and for the side-notched, straight based form, it is not possible, on the basis of data available, to present such a relatively refined estimate of the time of first appearance as shown for the other types, i.e., the side-notched, concave, notched (or "V" shaped) base projectile points.

Steatite disc beads and steatite arrow shaft straighteners both seem to have a distribution in the Sierra Nevada limited to the southern part of the range, and both seem to occur in late prehistoric or historic archaeological contexts. It is possible that future investigation will reveal northern Sierra occurrences of steatite disc beads, since it is known that they have a wider non-Sierran distribution in California than the arrow shaft straighteners (cf.

Beardsley, 1954, p. 79; Fenenga, op. cit., p. 345). It has already been noted that at southern Sierran sites such as the Slick Rock Village site (Fenenga, ibid.), site Iny-2 (H. S. Riddell, op. cit.), the Vermilion Valley site (Lathrap and Shutler, op. cit.), and at sites identified as late prehistoric or historic in Yosemite National Park (Bennyhoff, 1956) steatite disc beads have been found in excavations. In all but the last case, glass trade beads were also found in the same deposits with these beads.

Steatite shaft straighteners seem to be lacking, ethnographically or archaeologically, in the northern portions of the Sierra Nevada as well as in Northern California generally (Eberhart, op. cit.). Apparently the two-piece shaft straightener, or more properly "smoother" (see Dixon, 1905, p. 135 for illustration of a Northern Maidu sandstone smoother, referred to as an "arrow straightener"), has a marked northern distribution. In at least two instances, one in the southern Sierra (site Fre-123; field notes on file at the University of California Archaeological Survey, Berkeley) and one in the southern San Joaquin Valley (site Ker-74, Riddell, 1951a), steatite shaft straighteners, steatite disc beads, and glass trade beads have been found associated in the same deposits.

Summarizing the status of time markers in Sierran archaeology, it is seen that aside from the boatstone, the types of artifacts which can be thus categorized are late prehistoric in time, with their period of use extending into the full historic period. In certain cases, for example, with several of the small triangular projectile point types, reasonably exact interpretations of direction of movement or time of origin may be based on documentation of occurrence and time estimates in the Southwest or in Central California, where cultural chronologies have been worked out with a degree of exactitude not yet found possible in the Sierra Nevada. It follows from this that any changes or modifications of chronology in either the Southwest or Central California will demand adjustments in the calculations for the time of the Sierran occurrences.

ARCHAEOLOGY OF THREE MARTIS COMPLEX SITES

Site Nev-15

Description of Site. In terms of artifacts recovered, Nev-15 is the most important Martis type site excavated to date. Its location (see Map 10) is far to the west of the supposed center of the Martis area (e.g., site Pla-5) on the western side of the main Sierran crest and at a lower elevation (ca. 2,400 feet) than the majority of Martis type sites previously reported (Heizer and Elsasser, op. cit.). These factors also give importance to the site as an aid in interpreting the position of the Martis Complex in Sierra Nevadan archaeology.

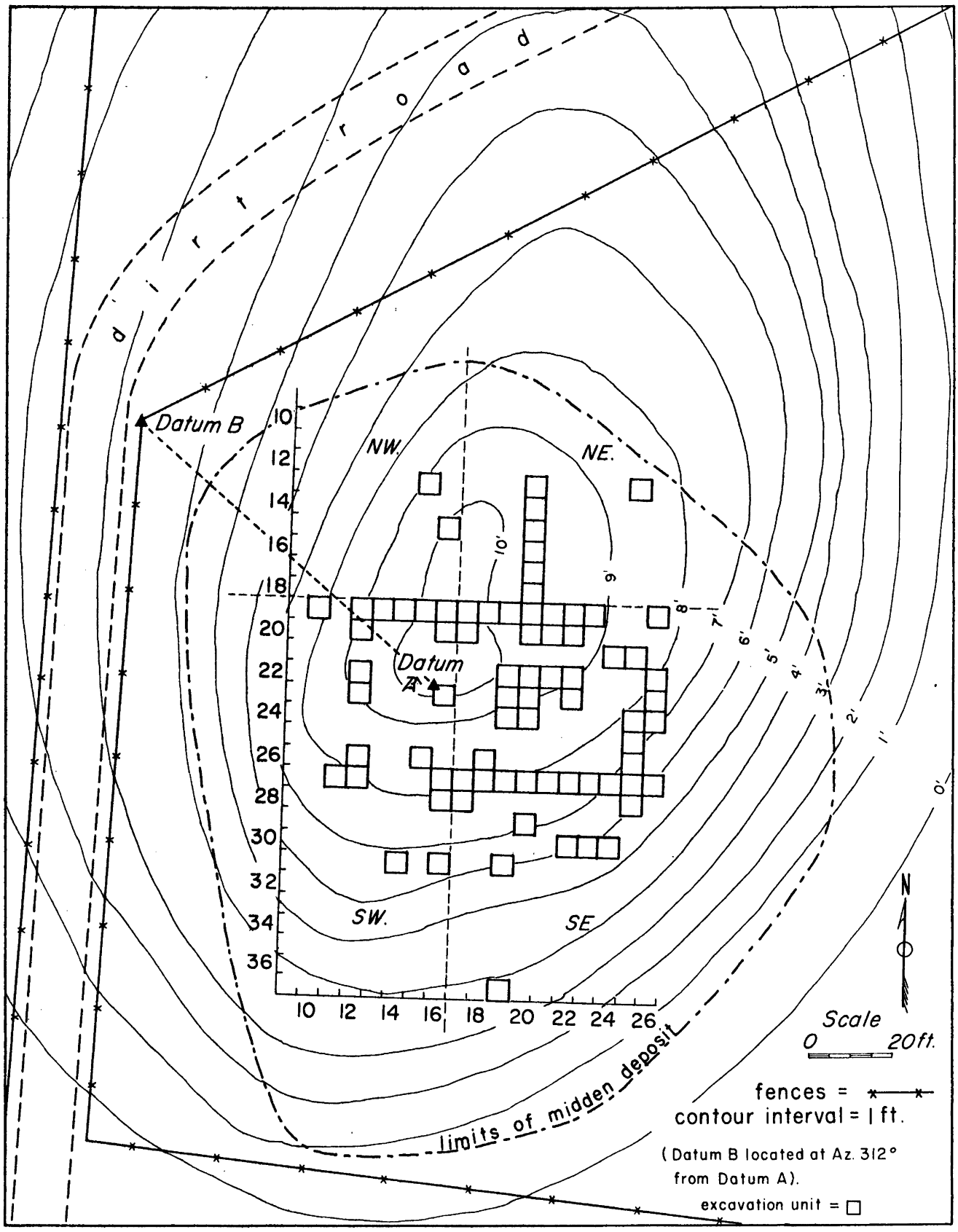
Nev-15 was first reported to the University of California Archaeological Survey in 1953, by James Fogarty of Oakland, California. Specimens shown at the time of recording immediately were seen to resemble those published earlier in the year by Heizer and Elsasser, and were identified as belonging to the Martis Complex. A subsequent visit to Nev-15 disclosed an extensive site about 200 feet in diameter, with a midden deposit of dark soil capping a small, natural knoll. The soil surrounding the knoll is of the red, lateritic type characteristic of large parts of the western foothill regions of the northern Sierra Nevada. The soil type seems to correspond closely to what has been described as Aiken clay loam (Watson and Hammon, 1921, p. 25). The midden soil is a darkish, sandy loam with a friable texture and evidently of a highly permeable nature.

The site is located about two miles due east of the Gold Rush town of North San Juan, on a low ridge which separates Shady Creek, to the south, from the Middle Fork of the Yuba River, about one and one-half miles to the north. The immediate water supply for the inhabitants of the site probably was a small, permanent spring close to the north edge of the site.

Nev-15 lies at the lower range of the Transition life zone (cf. Maps 2, 10). Plant species near the site, in small canyons and on neighboring ridges, consist of typical Upper Sonoran and Transition zone species, such as the black oak (Quercus kelloggii), digger and (predominantly) ponderosa pine (Pinus sabiniana and ponderosa), madrone (Arbutus menziesii), incense cedar (Libocedrus decurrens), manzanita (Arctostaphylos manzanita and other species), and (rarely) buckeye (Aesculus californica).

The situation of the site seems ideal for a relatively permanent type of village. It is favorably located with regard to plant species, as indicated above, and in addition seems to be within the winter range of the deer (Longhurst, Leopold, and Dasmann, 1952, p. 24). Although few or no bones of animals, including deer, were found in the midden deposit, which could be designated aboriginal food remains, it is believed that at the time of occupation of the site an abundance of mammalian and avian species must have been available to and utilized by the inhabitants. Possibly the same factors which contribute to the red color of the soil are at least partially responsible for the disintegration of food bone, whether rejected casually or concentrated in refuse heaps.

The 1954 Excavation. When it was realized that Martis-like material was present in a site which contained a midden deposit, plans were made to excavate. Accordingly, under the direction of R. F. Heizer, a class in archaeological methods spent about five weeks during the summer of 1954 at the site. Following a prepared grid system (see Map 8), about 75 test pits, 5 by 5 feet on their sides, were excavated, thus giving the deeper portions of the site almost complete coverage. Although some of the pits near the center proved to be



MAP 8 – Site Map of Nev-15

about 40 inches deep, the average depth of all the pits dug was about 24 inches. With these figures, it may be calculated that about 140 cubic yards of soil were excavated during the entire project.

Part of the midden soil excavated was put through shaker screens of one-quarter inch mesh, but this practice was abandoned when it was discovered that the artifact yield from adjacent pits was not decreased if shovels and trowels only were used for probing the excavated soil.

In contrast to the rich yield of lithic artifacts from the midden, no human burials were found in the deposit, and only a small amount of animal bone was recovered. It is believed that such animal bones as were recovered, chiefly of rodents or lagomorphs, are of animals only recently dead. Although the site deposit did not appear to have been markedly disturbed by rodents or other small mammals, there remained some fairly fresh evidence of animal burrows in several of the pits excavated.

Following is a list of the total artifact recovery at the site. Description of these artifacts is outlined below. Depth distribution is given only for projectile points and manos, i.e., for types of specimens which may be classified into several distinct subtypes and which appear in sufficient quantity to allow valid inferences of relative popularity between subtypes at different levels.

Projectile points	300	Hopper mortar	1
Drills	15	Pestles	5
Blades	23	Miscellaneous:	
Scrapers	147	(a) Steatite pendant	1
Hammerstones	32	(b) Polished pebbles	3
Choppers	41	(c) Steatite pipe fragment	1
Worked cores	73	(d) Polished slate "pencil"	1
Worked steatite frag's.	19	(e) Granite bowl fragment	1
Manos (whole or frag.)	192	(f) Quartz crystal frag.	2
Metates (whole or frag.)	19		

Artifacts Recovered

Projectile points. The total collection of points or fragments at Nev-15 is large, by any Californian site standard, with materials used as follows:

Table 3

Material of Nev-15 Projectile Points

Material	Typable specimens	Not typable specimens
Basalt	239	31
Chlorite schist	9	9
Chert	5	3
Obsidian	4	-

The identifiable chlorite schist points are similar in form to the basalt, i.e., Martis Complex, specimens, and are included with them in the computations in Table 4, below. The column in Table 4 showing the Desert side-notched points accounts for the 5 chert specimens (one Desert side-notched point is of basalt). The remaining obsidian specimens, considered here as unique at the site, are all illustrated in Plate 1Ci-1, but are not further described.

In a point sample of this size, one might expect some positive chronological significance to emerge from analysis of the specimens. It has already been stated that evidence of rodent disturbance at the site was not marked. Whether in fact rodents are responsible at Nev-15 for the type of mixing and destruction of stratigraphy which they have often been accused of elsewhere is not definitely known.

In any event, while examination of Table 4 shows a preponderance of two general types of point, i.e., Type 3 (shouldered) and Type 5 (tanged), it is not possible to construct a graph which expresses a regular waxing and waning of popularity of these types. According to the figures given in Table 3, it is clear that one or another of the subtypes of Types 3 and 5 occur with fair regularity throughout the deposit, except in the lower level (36-42 inches) which shows a reduced number of points of all kinds. Analysis of 19 pits out of 75 excavated, from which identifiable projectile points were recovered below the 24 inch level, tends to confirm the results of Table 3. The reduced form of the following table (Table 5), however, does suggest that Types 3 (shouldered) and 5 (tanged) might be earlier than Type 4 (side-notched) points at Nev-15.

Table 4. Occurrence by Level of Martis Complex and Desert Side-Notched Projectile Points at Nev-15

Level	Types																
	1a	1b	2	3a	3b	3c	4a	4b	4c	4d	5a	5b	5c	8	11a	11b	DSN	Totals
Surface				3			1			2	1	2	2		1	1		13
0- 6"	1	1	2	6	2	1	2		2	2	2	2	8		2	3	2	38
6-12"			2	7	4	4	5	1		2	3	4	8	1		1	1	43
12-18"	1	2	3	9	2	2	2	1	2	1	2	3	8	5	1	3	1	48
18-24"	1		1	4	9	3	3	1	3		3	3	12	5	2	5	2	57
24-30"		1		6	3	2	1		2	2		2	10	1				30
30-36"			2	5		2	1				1	1	4	1	2	1		20
36-42"				1		1							2					4
Totals	3	4	10	41	20	15	15	3	9	9	12	17	54	13	8	14	6	253

Table 5

Number of Occurrences of Types of Projectile Points in 19 Excavated Pits from Which Points Were Recovered Below the 24 Inch Level

	Point Type						
Level	1	2	3	4	5	8	11
24-30"	1	0	6	4	7	1	0
30-36"	0	2	7	1	6	1	3
36-42"	0	0	1	0	2	0	0

The other types of points (1, 2, 8, 11) shown in Table 4 are even more inconclusive so far as demonstration of stratigraphy is concerned. In only two pits were other types of specimens found at a lower level (below 24 inches) than either a Type 3 or 5 specimen. One of these pits produced a Type 2 point and the other a Type 11 specimen.

Weight of specimen gives no distinct clue here as to chronology. It would appear, in fact, that if a weight criterion such as that employed effectively by Bennyhoff (1956) in Yosemite National Park were applied, opposite results to Bennyhoff's would obtain. Thus, the Type 3 and 5 points, which have been suggested as perhaps the oldest points in the deposit, average lighter in weight (see Table 6) than any of the other types, and therefore their first appearance should be later in time than the other types if the usual "early-heavy weight"-"late-light weight" relationship were invoked.

The depth of occurrence of the Desert side-notched points is enigmatic. According to the discussion of time markers above, these points should occur uniformly at or near the surface of the site. It is easily conceivable that the top 12 inches of the deposit have been disturbed by the repeated plowings which have taken place on the site, hence three of the Desert side-notched points found could have been plowed under. The remaining three specimens all occurred at depths below 12 inches (in the 18-24 inch level), and in addition were in pits where Martis Types 3 or 5 points were found stratigraphically above them. In view of the relatively small number of Desert side-notched points recovered and of what is known elsewhere of the relationship of this type of point with Martis Complex specimens, it seems reasonable to suggest either that more wholesale disturbance by rodents has taken place than could

Table 6

Measurements of Martis Complex and Desert Side-Notched (1 Basalt, 5 Chert) Projectile Points at Nev-15

Type	No. of specimens	Length (cm.)	Width (cm.)	Weight (gms.)
1a	3	4.4	1.7	4.6
1b	3	4.1	1.6	3.3
2	10	3.8	1.9	3.7
3a	44	3.9	1.8	3.2
3b	17	3.6	1.9	3.0
3c	14	3.7	2.1	2.8
4a	15	4.0	2.0	4.2
4b	3	3.1	2.3	3.4
4c	10	3.6	2.1	3.6
4d	10	4.3	2.3	5.5
5a	12	2.8	2.0	1.5
5b	17	3.2	2.2	2.6
5c	55	3.4	2.3	3.0
8	14	4.0	2.4	3.3
11a	8	4.1	1.6	3.7
11b	15	4.8	2.4	9.3
Desert Side-notched	6	2.7	1.2	.7

be observed at the time of excavation, or that, coincidentally, three Desert side-notched specimens were subjected to similar treatment by localized farming or rodent activity within the site.

Summarizing the occurrence of all the projectile points in the deposit, it seems that the types of points most heavily represented numerically throughout the deposit (Types 3 and 5) are also possibly the earliest types of points to have been used at the site. Since the pattern of deposition and deflation of the soil, as well as the true extent of disturbance by rodents, cannot be determined, and since no physical layering could be discerned while executing any of the profile drawings of individual pits, the evidence for cultural stratigraphy as expressed by projectile points at Nev-15 is not convincing, and can only be placed in the tentative category.

Drills. Of the 15 basalt specimens recovered and identified as drills, 12 are fragments, i.e., tips, varying in length from 3.2 to 4.8 cm. The three typable specimens, according to the Heizer and Elsasser classification (op. cit., p. 15), are all of Type B, that is, they have small, shaped (circular or subcircular), flat bases and long tips. The specimens are all of approximately the same size, and average 5 cm. in length (see Pl. 1Cq-s).

Blades. Ten of the 23 blade specimens are complete enough to suggest a size range for these implements. The largest specimen (No. 1/172420) is 9.3 cm. long and 4.1 cm. wide (Pl. 1Dd), while the smallest (No. 1/172426) is 5.8 cm. long and 2.7 cm. wide (Pl. 1De). One finely chipped example (No. 1/127423) is of brown chert (Pl. 1Df), and the remainder of the specimens are of basalt. All blades are of some variant of the leaf shape, and all are chipped bifacially. If these specimens were used as knives, it would appear that the majority of them could have been employed without hafting.

Scrapers. The vast majority of this type of implement are flake scrapers, i.e., flakes with varying degrees of retouching on one or two edges, unifacial or bifacial. Material is mostly basalt; of the 142 specimens, 14 are of chert, 1 is of obsidian, and 1 of agate. Only two specimens are distinctive enough to be described: Nos. 1/172411 and 1/172980. These are small plano-convex discoidal implements, finely retouched on one face only. One specimen is fragmentary, but seems to have been identical in size and finish with the complete one (No. 1/172411), which is 3.3 cm. in diameter and has a completely retouched edge (Pl. 1Dg).

Hammerstones. Although specimens called hammerstones here are basically simple implements, with the typical battered edges which serve as their chief identifying feature, they display a diversity of form and material as follows:

Table 7

Hammerstone Types and Materials (Nev-15)

Type of hammerstone	Material				Average measurements
	Granite	Basalt	Chert	Quartzite	
I (Battered core)		13	1	1	12 cm. diam.
II (Round cobble)	4				7.5 cm. diam.
III (Pestle-like)	7	1			(9.6 cm. length (5 cm. diam.
IV (Tabular)	3	1			(10 cm. length (2.4 cm. thick
V (Grooved)	1				8.0 cm. diam.

Type I hammerstones are the simplest--possibly they represent cores from which flakes for projectile point manufacture have been removed and then employed secondarily as hammerstones. Battering on their edges is irregular.

Type II specimens appear to be ordinary round stream cobbles or perhaps irregular cobbles shaped by pecking into the rounded form. Battering is shown most often on two opposing sides of the specimens.

Type III examples are elongated cobbles with shaped sides and battered ends. Perhaps some of these specimens are incipient pestles.

Type IV, tabular specimens, are similar to those of Type III, except that the cobble, instead of being round in cross-section, is flattish, and the sides are not additionally pecked.

Type V is represented by but one specimen (Pl. 1Da). This is a shaped, subspherical cobble with an encircling groove 11 mm. wide and 3 mm. deep (No. 1/172848).

Worked cores. These are doubtful artifacts at best, and are included here only to indicate the kinds of lithic material which may have been used at the site for the manufacture of finer implements. Some of the specimens might have been used once or twice as choppers, scrapers, or perhaps as metate "sharpeners," but evidence even of use-retouching on such specimens is negligible. Other specimens in this category perhaps represent crude blanks, i.e., pieces which ultimately could be fashioned into usable tools like hammerstones or choppers. Of the 73 cores recovered, 65 are of basalt, 4 of chert, 3 of granite, and 1 of quartzite. About 27 of the basalt cores do not display fresh flake scars, and some of these are heavily patinated. The latter may represent pieces which were gathered or quarried elsewhere, but were never subsequently flaked or put to other use at Nev-15.

Choppers. This category of artifacts is likewise offered with misgivings as to interpretation of the ultimate function of the specimens. Twenty-four of the pieces are of basalt and 7 are of granite. Most of them are unworked cobbles which have been broken in such a way that a crude cutting edge has been produced at the point of fracture. There is only slight evidence of retouching on some of the edges. Furthermore, while the granite specimens generally resemble the basalt specimens in form, they probably could not have been effectively used as choppers because of the nature of the stone.

Worked steatite fragments. Three pieces of the 19 steatite specimens were recorded as occurring at depths below 12 inches. The remainder were found on the surface or in the upper 12 inches of deposit. The majority of the specimens (13) apparently are vessel sherds, and 8 of these are (incurving) rim fragments.

Probably platters or shallow bowls are represented, but the sizes of the sherds and the irregularities of their curves hardly allow reasonable estimation of the original sizes and shapes of the vessels. Thickness of the vessel sherds ranges from 11 to 24 mm., with an average of 16 mm. The remaining, probably non-sherd, fragments are all irregular pieces which cannot be specifically identified as functional artifacts. Five of these specimens are evidently quarried fragments averaging about 5 cm. in length and 2.4 cm. in thickness. Finally, there was found on the surface of the site a thin (9 mm.), subrectangular fragment (No. 1/171503) with all edges marked as if by gnawing of rodents. This kind of incision or grooving has been noted by the writer as a seemingly integral element of a decorative steatite specimen displayed in the State Indian Museum, Sacramento, California. There is no other indication on the Nev-15 specimen that it was intended to be a decorative pendant.

Steatite vessels are a widespread trait on the western side of the

Sierra Nevada. They have been noted ethnographically in the central and northern Sierra, among the Miwok (Barrett and Gifford, op. cit., p. 211) and the Northern Maidu (Dixon, 1905, p. 138). Bennyhoff (1956, p. 25) summarizes their archaeological occurrence in Yosemite National Park and notes that steatite sherds have also been reported elsewhere in the southern part of the range. In addition (ibid., p. 53), he associates steatite sherds with the Mariposa Complex, i.e., the protohistoric Miwok occupation in Yosemite National Park.

On the basis of the absence of this trait at other Martis Complex sites, it is suggested that the steatite sherd fragments at Nev-15 are another indication, like the Desert side-notched projectile points, of a late, possibly short-lived, occupation by a protohistoric Maidu group. All but one sherd specimen, which was found at a depth of 19 1/2 inches, occurred on the surface or close enough to the surface of the deposit to be explained as late arrivals, subject to disturbance by plowing. The single, questionable specimen (measuring 3.1 by 1.8 cm.) must be placed in the prosaic "subject to unusual disturbance" category, or it must be considered as a trait which was present, though rarely, in the Martis Complex.

It does not seem profitable to speculate about the use of steatite in Martis Complex sites. Since steatite is so admirably suited for domestic processes involving fires, it may be that the unidentified fragments found at Nev-15 were used as cooking stones by the Martis people, or by the people who succeeded them at the site. It is conceivable that a secondary use of the sherd specimens was for cooking stones as well. In any case, if cooking stones are truly represented, it may be noted that pitifully few specimens were recovered to allow the inference that such specialized stone was employed for such a commonplace purpose.

Manos. All of the manos at Nev-15, regardless of type, are of a granitic material. Of the 192 manos recovered, 77 are complete specimens, and 115 are fragments. Of the latter, 13 may be distinguished as unifacial, 56 as bifacial; 46 specimens are fractured in such a way that the number of ground surfaces could not be determined. Several of the features (identified tentatively as fireplaces) at the site contained, besides quantities of fractured rocks, one or several mano fragments. This peculiar occurrence suggests that broken manos were used secondarily as cooking stones, in stone boiling of acorn mush, for example. The complete specimens occurred at random throughout the site and were presumably employed solely as grinding tools in conjunction with metates.

For convenience in description, the complete manos have been divided into three separate types, as follows:

(I) Round or ovate cobbles with wear on one or two faces;
(II) Shaped cobbles, i.e., with pecked or slightly ground sides and bifacial wear;
(III) Irregular cobbles with grinding evidence on from one to four separate faces.

In Types I and II, the plane of the wear is approximately parallel to an imaginary plane bisecting the stone through its greatest thickness. The grinding surfaces of Type III specimens, however, are not parallel to this imaginary plane, which is shown as a dotted line through the cross-section of the schematic drawings in Figure 1.

The unifacial specimens of Type I are amenable to further subtyping in that the degree of wear on some of the specimens is not so marked as on others.

Aside from these arbitrarily chosen typological differences, there seems to be a significant difference in size groups within each of the three types (see Table 8). This size difference is probably related to a difference in use of the specimens, that is, the manos were used on different sized metates. Examination of the metates found at the site shows that there were two general types, one of large, heavy blocks, and another of small, light, thin, finely made slabs. It is not unreasonable to suppose that the latter were portable, and used along with corresponding small manos, while the larger blocks were left permanently at the site. About two-thirds of the complete mano specimens from Nev-15 are in the small group.

Observation of type frequency and depth of occurrence in the deposit does not seem to allow the assigning of chronological significane to any one type. As observed for the Nev-15 projectile points, the mano types occurring in greatest number also seem to occur fairly consistently throughout the depth of the deposit.

Metates. Fifteen slab metates or fragments and 4 block type metates were recovered at Nev-15. The distinction drawn between slab and block types is based simply on the different thickness of the specimens, not upon their other dimensions or qualities. Thus the dividing line between slab metates and block metates is at 5 inches (of thickness).

Slab metates made from flattish rocks, and often with shaped edges, apparently may range in length from 8 to 16 inches and in width from 7 to 11 inches. Of 12 granitoid slab fragments, 8 could have been portable. On the other hand, of 3 complete slab specimens, only one could easily have been portable.

Table 8. Measurements and Depth of Occurrence of Typable Manos at Nev-15.

Type	I						II		III			
Grinding surfaces	Uniface				Biface		Biface		Uniface	Biface	Multiface	Totals
Degree of wear	Slightly worn		Well worn									
Size	Large	Small	Large	Small	Large	Small	Large	Small	Large	Small	Large	
No. of specimens	1	11	6	20	11	19	4	1	2	1	1	77
Average length cm.	9.7	8.0	13.3	7.5	11.0	7.7	11.2	8.5	11.3	8.5	10.0	9.7*
Average width cm.	9.0	6.6	8.7	6.7	8.9	6.6	9.0	7.3	8.2	6.6	7.7	7.8*
Average thickness cm.	7.2	5.6	6.2	4.8	5.4	4.1	4.8	4.1	6.6	3.8	5.5	5.3*
Depth: 0-6 in.		1	4	4	3	8	3		1	1		25
6-12 in.		4		3		1						8
12-18 in.	1	4	1	5	2	2	1					16
18-24 in.		1	1	5	4	5			1			17
24-30 in.				3	2	2						7
30-36 in.		1				1		1			1	4

* Average measurements for all specimens.

The block metates, which are "subcubical" in shape, have unshaped sides with top surfaces averaging in length about 14 inches, and in width about 10 inches. The average thickness of the specimens recovered is 8 inches, and they weigh about 60 pounds each.

All of the metates are of the basin type, with shallow, subcircular basins about 3/4 inch deep and from 3 to 8 inches in diameter.

While granite is the predominant material for the slab metates, 2 specimens are of fine-grained meta-andesite. The block metates are all of a similar andesitic or basaltic material. Some of the metates obviously have been "sharpened" by pecking, but some have smoothly ground basins.

Only one slab specimen was noted which had depressions on two sides.

Pestles. Five granitic pestles were found, 3 of them fragmentary. The latter all had the rounded ends and relatively untouched sides which may characterize use with a hopper mortar. The two complete specimens (each about 22 cm. long and 9 cm. in diameter) had been used at both ends, possibly in a bedrock mortar (see below), and one of these specimens had apparently been used as a mano on one of its sides.

Hopper mortar. Only one specimen recovered. This is a rectangular granite slab 11.5 cm. thick, 28 cm. long, and 26.5 cm. wide, with a hole near one edge 11.1 cm. in diameter and 3.1 cm. deep.

Miscellaneous artifacts. (a) Steatite pendant. A fragmentary specimen, ca. 2 cm. long, 1 cm. wide, and 3 mm. thick, with a biconically drilled hole 3 mm. from its rounded end. This pendant was of a greenish colored steatite, polished all around.

(b) Polished pebbles. One specimen is of shale, 2 are of basalt. The pebbles are lenticular in shape, averaging 5 cm. in length, and about 3 cm. in thickness. Two are polished all over, and one specimen (No. 1/172159) is polished on one surface only and has ground edges.

(c) Steatite pipe fragment. This specimen (No. 1/172748) is of blue-gray steatite, smoothly ground and roughly conical or cup-like in shape. It is 3.9 cm. long, 3.2 cm. wide at one end and 1.5 cm. wide at the opposite end, with a conically drilled hole 1.8 cm. in diameter at the wide end, 1 cm. at the constricted end. The average thickness of the walls of the pipe is 8 mm. The depth occurrence (24 inches) is greater than that of any other steatite specimen. Cup-shaped stone pipes occur as ceremonial objects in Central

Californian Middle Horizon provinces (Beardsley, 1948, p. 13), and this may be sufficient grounds for associating the Nev-15 specimen with true Martis Complex artifacts. Otherwise it may be looked upon as a protohistoric artifact which had, through disturbance of the midden deposit, finally come to be found at a greater depth than is usual for steatite artifacts (Pl. 1Db).

(d) Polished slate "pencil" fragment. Another probably decorative specimen, highly polished, 4 cm. long, and 5 and 7 mm. in ovoid cross-sectional diameter at the broken, unpointed end (Pl. 1Dc).

(e) Granite bowl fragment. This is a rim sherd 1.6 cm. thick, similar in form to some of the steatite sherds.

(f) Quartz crystals. Two specimens recovered, both semi-opaque quartz. One specimen has both formerly pointed ends battered, while the other example has an irregular break at one end, but an intact tip at the opposite end, also battered.

Features. Thirteen notable instances, either of close concentrations of artifacts or of unmodified rock concentrations with or without artifacts, occurred throughout the midden deposit. Two of the features were of artifacts only: (a) Four pebble tools (2 scrapers, 1 hammerstone, 1 chopper); (b) 1 metate and 3 manos. Five features were irregular collections of angular or subspherical stones ranging from 3 to 12 inches in thickness, associated for example with metates, manos, choppers, or basalt flakes. Five of the features were simply collections of rocks without any artifact association whatever.

One feature was noted with several rocks and the articulated foreleg and cranium of a mammal about the size of a large jack rabbit. The feature was found at the 6 inch level of the deposit. The animal bones were in an extremely crumbly condition, and this, taken with the fact that no human burials or other remains of animal bones were found at the site, seems to indicate that the bones associated with the "feature" were introduced perhaps within the past five or ten years before their discovery.

Rock concentrations as features within deposits are quite common in Californian archaeological sites. It is not possible in many cases to interpret their true function, although fire hearths are most often suggested. In the Nev- 15 examples neither extensive burning of the rocks nor ash was noted as characteristic of the rock features. This is not so significant, however, when it is observed that no other positive remains of fireplaces could be identified anywhere within the midden.

Bedrock Mortars. About 75 yards south of the midden deposit is a small outcrop of heavily weathered granitoid rocks. On several detached flat boulders of this outcrop are a series of bedrock mortar holes (ca. 12 holes scattered on 3 separate boulders). It is not certain that the bedrock mortars were truly associated with Nev-15, since they are located close to another spring and in a spot favorably situated for a small temporary camp site. Evidence of the camp area could have been obliterated by the erection of farm buildings and dwellings of the modern residents.

Discussion. Site Nev-15 serves to emphasize the widespread distribution of the Martis Complex in the Sierra Nevada. The close correspondence in types of a large assemblage of basalt projectiles recovered from the midden deposit at Nev-15 with specimens from the surface of the Martis type site, Pla-5, on the eastern side of the range, represents the chief evidence for the essential unity of the Martis Complex over a large area.

Hints of stratigraphic differences in artifact types within the midden deposit at Nev-15 are seen in the analysis of projectile points. Although Types 3 (shouldered) and 5 (barbed) are the most numerous points found at all levels of the deposit, they were present at the lowest levels (below 24 inches) to the virtual exclusion of all other types, and in only two instances, i.e., in two pits, were other types of points (Types 2 and 11) found below* specimens of Type 3 or 5 (see Tables 4 and 5). No similar relative chronological observations could be made here with respect to other artifact types. The role of disturbance by plowing or by rodent activity in the midden deposit cannot be assessed with accuracy at present. The lack of observable layering and articulated human burials, for example, made disturbance subsequent to occupation extremely difficult to detect.

The ecological situation at the site suggestswinter rather than summer occupation. Predominance of projectile points over other types of artifacts certainly implies a culture which strongly emphasized hunting. If we are correct in assuming that deer were the mammals chiefly hunted, then Nev-15 would be at too low an elevation during the summer months for such hunting, but would be ideally located for winter headquarters for this purpose. Furthermore, other factors, such as closeness to acorn sources and to localities where a variety of other Upper Sonoran and Transition life zone food plants and animals abound would make the site favorable for late fall and spring occupation as well.

Even though Nev-15 is much closer to the Great Valley of central

* I.e., at depths lower than 24 inches.

California than any other definite or at least extensive Martis type site hitherto discovered, the concept of the cultural relationship with Middle Horizon groups of the Valley has not been entirely clarified by the results of excavation at the site. Positing of cultural relationships on the basis of projectile points alone is risky, unless there are large quantities of distinctive points to work with. Thus it is not difficult to compare Martis Complex sites one with another, but comparisons of Martis Complex projectile point assemblages with others that correspond only generally, or exactly in but few cases, do not ordinarily offer successful results.

Until Martis sites are excavated which include such types of artifacts (shell beads or ornaments) as were recovered at the Karlo site (Riddell, 1956b), little more can be said with regard to the point of origin or the center of strongest influence operative on the Martis Complex.

Site 26-Do-12

Description of Site. During an archaeological reconnaissance of the Carson Valley in the state of Nevada in the summer of 1955, the University of California Archaeological Survey visited a site known locally as Hobo Hot Springs. Living Washo Indians in this part of the Carson Valley have a native name for the spot, which may be translated as "trapping place - hot springs." The surface of the site previously had yielded several known private collections of obsidian and basalt projectile points. Part of the data included in this section of the present paper is based upon the collection of Mrs. C. L. A. Schmidt, of Berkeley, California, and others who have kindly allowed me to record their specimens.

The Hobo Hot Springs site, which henceforth will be referred to as site Do-12, is situated at the south end of a low spur which extends into the western side of the Carson Valley from the lower elevation of the steep eastern face of the Sierra Nevada. The site itself is at an elevation of 4,900 feet, in the Transition life zone. About one mile to the west, the Sierra Nevada rises abruptly from the plain, at an altitude of 5,000 feet, up to about 9,000 feet, presenting the appearance of a tremendous wall, often with but a sparse growth of pine forest on its slopes, extending many miles to the north and south. Although the region is in the Transition life zone, the plant cover is meager at the site, sage brush (Artemisia tridentata) and rabbit brush (Chrysothamnus sp.) being the dominant vegetation. The area surrounding the site has been considerably modified by irrigation projects connected with the growing of forage crops. Jack's Creek, a small stream emanating from a high elevation canyon not far away on the slope of the Sierra, evidently once ran close to the edge of the site. Presently, two dams create small reservoirs, one of which covers part of the site. Hobo Hot Springs, just off the southwest edge

of the site, is surrounded with reeds, and a small pond or pool, supplied by the spring, evidently has been dug out in recent years to be used as a bathing spot, especially by the Washo Indians living in Carson Valley. It is not known whether the spring itself, or Jack's Creek, was the chief source of water for the aboriginal inhabitants. Questioning of several Indian informants failed to elicit any specific, substantive information concerning the condition of the site and the adjacent spring before it had been modified. On the surface of the site were found several indications of a post-Contact period dwelling (iron nails, bottle fragments, and the like), but no local informant volunteered details about the former resident.

At this point it should be noted that no glass trade beads, usually a certain clue to early historic or at least nineteenth century commerce between the local Indians and the intruding white man, were found at the site. Further, in all of the projectile point collections taken or observed at the site, only one Desert side-notched point was recorded. The Kings Beach Complex (protohistoric Washo) is partially identified by this type of projectile point. If Do-12 were occupied at all intensively during the Kings Beach period, one would expect to find numbers of these points or at least identifiable fragments thereof on the surface or in the midden deposit of the site.

The soil of the site is dark brown in color, sandy (decomposed granite) and porous. It is homogeneous in texture and color until the sterile bottom is reached. The latter is a lighter brown to yellow in color, also sandy, but considerably more compacted than the midden lying above it. The primary definition of "midden" is based on the presence of artifacts; since the top soil is porous, it is likely that some of the ash and other organic refuse, presumed to have been left by the early inhabitants of the site, has been leached out of the deposit. Nevertheless, one human burial (the only one found) and the osseous remains of numerous mammals (see list below) from nearly every pit excavated, testify to the incompleteness of the dissolving processes in the soil. It should be noted, however, that the sagebrush and rabbit brush contribute, through their root systems which are coextensive in depth with the midden deposit, to the darkness and generally loose quality of the midden soil.

Animal bone recovered from the deposit (identified by Mr. Alan C. Ziegler, a student in the Zoology Department, University of California, Berkeley) is varied, and includes fragments of two mammalian species not now inhabiting the area, i.e., mountain sheep (Ovis canadensis) and the pronghorned antelope (Antilocapra americana). For the rest, any of the genera listed may be expected to be found living presently in the Carson Valley or in the immediately surrounding area. The species designations, where given, are not necessarily exact, since they are based upon knowledge of living species in western Nevada.

Anas sp.	duck
Antilocapra americana	pronghorned antelope
Canis latrans	coyote
Citellus sp.	ground squirrel
Dipodomus sp.	kangaroo rat
Fulica sp.	coot
Lepus californicus	hare, "jackrabbit"
Lynx rufus	bobcat
Odocoileus hemionus	mule deer
Ovis canadensis	mountain sheep
Sylvilagus sp.	cottontail rabbit
Taxidea taxus	badger
Thomomys sp.	gopher

The 1956 Excavation. In July, 1956, excavation, under the direction of the writer, was begun at Do-12. It was decided that an adequate sample of the total midden deposit would most likely be obtained through the digging of a large number of small test pits, rather than a small number of large pits or trenches. In consonance with the relatively even vegetation cover of the site, square pits with 3 foot sides were dug, and located on the contour map of the site according to the plan of a rough grid system which covered the deposit. Datum A (Map 9), near the center of the deposit, was represented throughout the excavation by a stout wooden stake driven into the sandy soil. Datum A was located 116 feet, at Az. 158 degrees, from Datum B, which was represented by the northwest corner of a masonry structure formerly used in connection with part of an irrigation control system at the site. All pits were located with reference to Datum A, but are shown on the map as squares in a number-letter grid system. The attempt to excavate as wide an area as possible by spacing the pits not more than 30 feet from each other was realized in the time allotted the excavation. The sandy nature of the soil demanded that all of the excavated material be passed through rocker screens of one-quarter inch mesh if maximum artifact recovery were to be achieved. Each pit was excavated in arbitrary layers 6 inches deep. The use of the screen and the control afforded by assigning of such levels seemed to be a reasonably efficient method for executing the requirements of the chief problem at hand.

Except in the case of several large artifacts and in the one burial encountered, trowels and other fine tools were not employed in the excavation. A total of 35 pits was excavated, ranging in depth from 5 inches (near the south edge of the site) to 54 inches (near the north edge of the site). The average depth of all the pits dug was thus 20 inches. The bottoms of the pits were easily identified by a distinct change in color from the dark brown midden type soil to the light brown or yellowish underlying sterile sand.

As a check of the soil profile, if any observable, and of the efficiency of the screening technique, a trench 30 feet long by 2 feet wide was dug. The trench intersected Pit F-10, and the deposit was dug to its bottom, to an average depth of 25 inches, as measured at 5 foot intervals along the trench. No screens were used in this excavation. The entire yield of projectile points in the trench, excluding Pit F-10, was less than from Pit F-10 alone, where the midden material had been passed through the screen. Observation of the walls of the trench did not reveal any information concerning soil components not already yielded by the method of digging pits at regular intervals.

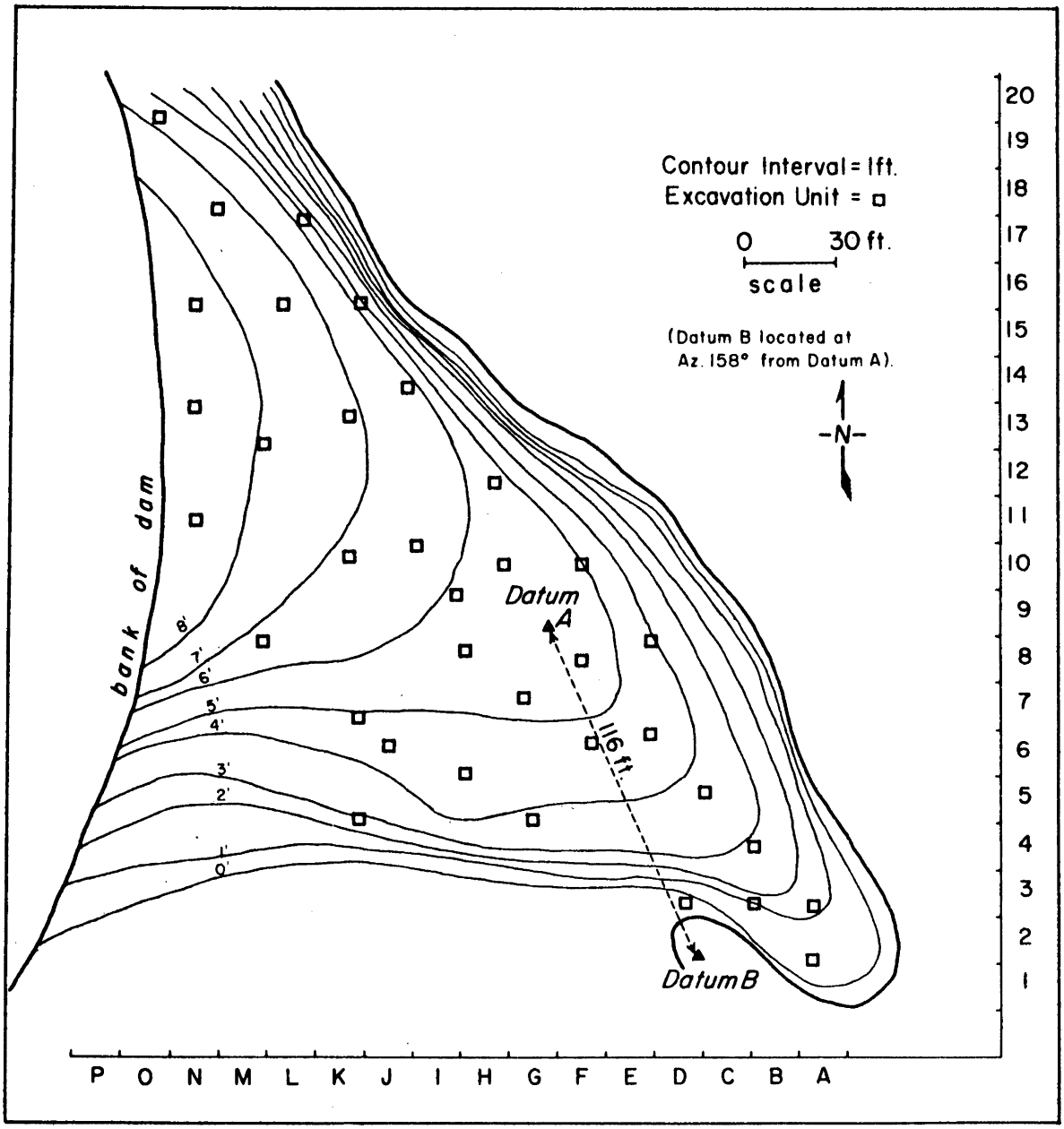
Artifacts recovered

It should be stated at the outset that it was not possible to recover a complete sample of artifacts from the site. A good portion, perhaps one-third of the total area according to several local reports, has been obliterated by the construction of an earth dam at what is now the western edge of the site (the dam is represented by the heavy regular line running about north-south in the "O" and "P" grid zones (Map 9) and by the filling of a pond behind the dam.

In spite of this area lost to investigation, it is felt that the information gained from the study of the private collections mentioned above, plus that from the excavation, represent a fair sampling of the artifactual content of the site. Unless a burial area or cemetery has been destroyed or covered by the reservoir, the material reported upon here should be essentially identical with that which was not available for excavation. The folowing list outlines the number and kinds of artifacts recovered from the excavation and those in private collections from the surface of the site:

Identifiable projectile points or fragments	365
Obsidian crescent	1
Mortar fragment	1
Unshaped pestle fragments	2
Manos	48
Basin metates	49
Stone discoidal	1
Bone awl	1
Bone dagger	1
Incised bone fragment	1

Projectile points. In the analysis of projectile points from Do-12 (summarized in Tables 9 and 10), all specimens known to have come from the site are included. Several private collectors interviewed by the author



MAP 9: Site Map of 26-Do-12

Table 9. Occurrence by Level of Martis Complex and Other Projectile Point Types from Site 26-Do-12. (B = basalt; O = obsidian; C = chert).

	Martis Types																										Other Types						
Type	1a	1b			2	3a		3b		3c		4a		4b		4c		4d	5a	5b			5c	5d	7	9	10	B-11	Hum. Conc. A			Hum. Basal Notched	DSN	
Material	B	B	O	C	B	B	O	B	O	B	O	B	O	B	O	B	O	B	O	B	O	C	O	O	C	B	B	B	O	C	O	C	Totals
Level: Surface	2	2	3		2	3	1		1	7		6	6	3	2	3	8	4		2	5		5	1		3	1			5			1	76
0-6	1	2				1		1		1	1	2		4	1		1						1						2	1				19
6-12		3		1				2	1				1	2	2	1	3	3	1		2	1	2		1		1	1	3	1	1	2		35
12-18		1	2					1						1		3		2					1											11
18-24							1									1	1									1								4
24-30														2																				2
Totals	3	8	5	1	2	4	2	4	2	8	1	8	7	13*	5	8	13	9	1	2	7	1	9	1	1	4	2	1	5	7	1	2	1	147

* Includes point recovered from 48-51 inch level.

Table 10

Measurements of Martis Complex and Other Projectile Point Types from Site 26-Do-12

Type	No. of specimens	Length (cm.)	Width (cm.)	Weight (gms.)
1a	3	5.5	1.6	3.6
1b	14	3.7	2.0	5.0
2	1	3.2	1.5	2.9
3a	5	3.0	2.0	3.2
3b	6	3.2	2.1	4.6
3c	5	3.9	2.1	5.1
4a	6	3.1	2.1	4.1
4b	14	2.8	1.9	3.0
4c	11	2.6	2.1	3.4
4d	7	3.0	2.5	5.8
5a	1	2.4	1.6	1.1
5b	9	2.7	2.3	2.3
5c	4	2.2	1.8	1.8
5d	1	1.8	1.9	1.3
7	1	4.8	2.5	10.0
9	4	2.9	3.2	6.6
10	2	3.0	1.8	2.2
- - - - - - - - - -				
Humboldt Concave Base A	10	2.2	1.6	2.1
Humboldt Basal Notched	2	2.6	1.9	2.3
B-11 (Yosemite)	1	3.8	2.3	4.5
Desert Side-notched (DSN)	1	2.7	1.3	.9

have stated that they have made repeated collection trips to the site. By making their specimens available to the University of California, they have therefore contributed to the present report. The surface collections, representing slightly more than one-half of the total projectile points collected, reflects the comparative richness of the site. It was not possible to keep a tally of the relative amounts of rejected chips, presumably from projectile point manufacture, which were picked up by private collectors at Do-12. To compensate for this, all chips were saved during the excavation and later sorted and counted, with the results shown in Table 11 below.

The seeming preoccupation with the raw materials of projectile points is explained by considering it as one factor in an attempt to relate Do-12 to other sites or cultures, for example, in the Great Basin or Yosemite National Park. Aside from this, the meaning of the various proportions of chips to finished artifacts is not readily determinable. Perhaps the dominance of obsidian chips suggests that obsidian was acquired through trade to the south, then locally worked into artifacts. Complete basalt specimens may have been acquired from groups to the north, around the Truckee region, i.e., nearer the center of the Martis Complex.

The evidence from the analysis of projectile points suggests a later phase of the Martis Complex than that expressed at Nev-15, and at the same time a mixture with another complex, i.e., that called by Bennyhoff (1956) the Tamarack Complex, in Yosemite National Park. It will be recalled that at Nev-15, projectile point Types 3 and 5 predominated, and that these types also were recovered generally at the lowest levels in the deposit. At Do-12, Types 3 (shouldered) and 5 (tanged) are present, but they occur in reduced number compared now to Type 4 (side-notched). Furthermore, it is clear that Types 3 and 5 do not consistently underlie Type 4 in the deposit (Table 9). While this evidence is admittedly tenuous, in view of possible disturbances of essentially shallow midden deposits, it appears that there is the beginning of a trend, mainly based upon relative type frequencies, in the direction suggested.

The relationship of Do-12 with other sites or cultures in a wider area is discussed below, and is summarized, so far as projectile points are concerned, in Table 14.

Table 11

Materials of Projectile Points and Fragments from 26-Do-12

	Basalt	Obsidian	Chert
Unworked chips recovered	171	682	293
Projectile point specimens (excavation - not typable)	60	100	57
Projectile point specimens (excavation - typable)	45	29	5
Projectile point specimens (private collection - surface - typable	36	33	--
Totals - projectile points	141	162	62

Obsidian crescent. The single specimen recovered is 3.7 cm. in length and 6 mm. in thickness (Pl. 2Bo). It is similar to specimens from the Humboldt Lakebed site (26-Ch-15), and from Owens Valley, in the collections of the University of California Robert H. Lowie Museum of Anthropology. The type has also been found at the Karlo site (Riddell, 1956b). The function of this kind of object is problematical. Possibly it was part of a shaman's kit, though in the several such kits found in dry caves in Nevada to date no crescents have been discovered (cf. Heizer and Krieger, 1956).

Mortar fragment. One specimen only was recovered from the surface of the site. This was approximately one-half of a complete specimen, a globose boulder, of gray rhyolite. The fragment measures about 24 cm. in full cross-section. The hole was about 11 cm. in diameter at its top and was ground to a depth of 10 cm.

Unshaped pestle fragments. Basalt pestle fragments (2 specimens) were likewise found on the surface of the site. Both were subcylindrical, roughly ovoid in cross-section, and about 9 cm. long and 4.5 cm. in diameter. Both had clean breaks at one end and show slight wear at the other. These specimens probably were used in shallow bedrock mortar holes. Bedrock mortars were reported (on a ridge quite near the site) by W. L. d'Azevedo (personal communication) but were not seen by the present author.

Manos. A total of 48 manos (see Table 12) were recovered at Do-12. These may be divided among the 3 types defined for site Nev-15 (see p. 44 and Fig. 1) as follows:

Type I:	25 (21 fragmentary)	specimens
Type II:	14 (9 fragmentary)	specimens
Type III:	9 (7 fragmentary)	specimens

The great majority of the manos were bifacial, of granitic rock (though basalt and rhyolite are also represented by a few specimens). It was not possible, as with the Nev-15 specimens, to suggest two ideal sizes (large and small) for the Do-12 manos. No particular significance as to depth of occurrence could be attributed to any type or subtype mano.

Basin metates. All of the 49 metate fragments recovered at Do-12 (38 specimens on surface) appeared to be basin metates of the thin slab type, except one (No. 2/32251) which conceivably could have been a hopper mortar slab. This specimen does not have a definite basin; the maximum depth of its depression is 1.5 cm. About one-half of the metate specimens were of basalt; the other half were of rhyolite or basalt. Fourteen of the specimens were definitely worked on both sides, and of the remaining pieces, most showed some faint evidence of use on the reverse of the positive working side. Sizes of metate fragments ranged from 40 to 90 cm. in length or width, and from 5 to 12 cm. in thickness. More than one-half of the specimens seem to represent about one-third of the original specimen. Efforts at fitting the broken fragments together failed in all cases. The majority of the specimens showed some sort of edge shaping, but it is difficult to determine how much of any given edge was modified from the original shape of the stone.

Stone discoidal. One specimen only was found (Pl. 2Bq). This is of a hard, fine grained, argillitic stone, evidently a segment representing about one-quarter of a centrally perforated circular disc. The width of the specimen ("radius") is 3.4 cm., and it has a maximum thickness of 7 mm. near the biconically drilled central hole. Reconstructed, the specimen is a disc about 7.3 cm. in diameter, with a central perforation about 5 mm. in diameter. The thickest part, near the hole, tapers out to a sharp, finely ground edge, all around the specimen.

The Do-12 discoidal fragment is polished all over, except where the breaks occur on either side, and probably should not be placed in the category of "perforated sinkers" which have been reported from the Humboldt Valley in Nevada. Loud and Harrington (1929, p. 107) state that certain similar specimens from Lovelock Cave "are better adapted as spindle whorls." In the opinion of the present writer, the Do-12 specimen either served this latter purpose or was perhaps used as an ornament.

Table 12. Measurements and Depth of Occurrence of Manos at 26-Do-12

Type	I				II		III				
Grinding surfaces	Uniface		Biface		Biface		Biface		Multiface		Totals
Average length cm.	13.3		13.1		12.5		13.0		10.3		12.4
Average width cm.	9.9		8.8		9.2		9.7		7.7		9.1
Average thickness cm.	6.1		5.6		4.9		4.8		6.9		5.7
	Comp.	Frag.	Comp.	Frag.	Comp.	Frag.	Comp.	Frag.	Comp.	Frag.	
No. of specimens	2	2	2	19	5	9	1	3	1	4	48
Depth: Surface	1	1		7	1	6		1			17
0-6 in.		1		4	1	1	1	1			9
6-12 in.				2	1	1		1		2	7
12-18 in.	1			5	1	1			1	1	10
18-24 in.				1						1	2
24-30 in.											
30-36 in.			2		1						3

Perforated stone discoidals have a fairly wide distribution in the Great Basin, and have also been found in Late Horizon archaeological sites in central California (Lillard, Heizer and Fenenga, 1939, p. 79: "The Late Period"). At the Karlo site, in Lassen County, among several such specimens found, one is virtually identical to the Do-12 example.

Bone awl. Although a considerable amount of unmodified animal bone and one human burial were found at Do-12, only three bone artifacts were discovered in the excavation. One of these is an awl 15.5 cm. long (Pl. 2Br) with a shouldered tip. The specimen is evidently made from a deer metapodial, and, aside from the ground tip, is only slightly worked.

Bone dagger (?). This specimen (Pl. 2Bs) was evidently made from a long bone of an artiodactyl (deer?). While it, too, may have served as an awl, its size and weight suggest a more rugged function. Its length is 19.3 cm., not including the broken tip.

Incised bone fragment. One small fragment, 1.8 cm. long, of bone (No. 2/31836) from a small mammal, was found. This specimen has numerous transverse incisions along its entire length, on one side. These are placed in such a way as to indicate a decorated bone object (a needle or hairpin?). There is no evidence to confirm the speculation as to its original use.

Bedrock Mortars. (See description above, under "Unshaped pestle fragments.")

Burial. The one burial found, at a depth of 17 inches, provides little data for interpretation. The burial was in a loosely flexed position; there were two projectile point bases associated with it. Rodent holes near the skeleton explained partially the disturbed appearance of the bones--many were missing, and those that remained were not in an easily recoverable state.

Discussion. Site Do-12 is the first Martis type site found which contains sufficient artifactual material to allow the suggestion of another culture complex mixing with the Martis Complex. Although the correspondences with Do-12 are not exact, the Tamarack Complex, in Yosemite National Park, appears to be the candidate for the successor or at least the representative of the terminal Martis period in the Carson Valley. The probable linkage between the Carson Valley and the Yosemite National Park area may have been in Mono County, but this cannot be asserted definitely until stratigraphic excavation is carried out, perhaps near important obsidian quarries in Mono County.

There is little doubt that the culture disclosed at Do-12 is an outlying manifestation of the Martis Complex. Do-12 could have been used for year-round occupation, since it is closely associated with a warm spring and, in addition, is so located with reference to elevation and shelter as to make winter occupation bearable. The site may therefore be an eastern-slope parallel to site Nev-15, i.e., a predominantly winter campground which could also have been partially occupied in the summer.

It seems to be true that all Martis-type sites excavated, including Do-12, have relatively shallow midden deposits when compared, for example, with low elevation sites in central California. These deposits, furthermore, probably have been subject to post-occupation disturbance, chiefly by rodents. At Do-12, as at all other excavated Martis sites, therefore, the determination of chronologically significant artifacts is extremely tenuous. While it has been possible to make some essays in this direction at Do-12, the results should not be taken as conclusive. Perhaps more to the point in differentiating this site from other Martis sites farther to the north, or in suggesting that it is a later example of the complex, is the observation that at Do-12 there seems to be a dearth of the crudely chipped basalt blades and scrapers which are so characteristic of the northern sites. On the other hand, this lack may be attributed simply to the fact that Do-12 is not close enough to any basalt sources to have made desirable the carrying back of large chunks of the material to the site by its occupants.

Site Do-12, in spite of the numerous gaps or inconsistencies shown in the analysis of the material recovered from the deposit, appears to play an important part in tying together several of the loose ends which are so prevalent in Sierra Nevadan archaeology. This will be the concern of the next section of this paper.

Site Sie-20

Description of site. This site is located in Sardine Valley, about 15 miles north of the town of Truckee. It was first reported to the University of California by Mrs. Gladys Smith, of Reno, Nevada, and was named the Smithneck Creek site, after the designation of the road near the site which connects Truckee and Loyalton, also about 15 miles away, to the north. The site proper is located on a so-called sage brush knoll or slope on the western margin of the large grassy meadow which makes up Sardine Valley. Its elevation is 6,100 feet. A small spring on the northwest margin of the site probably represents the aboriginal water supply. Unlike site Pla-5, to the south, the type site for the Martis Complex, Sie-20 is not located near the center of the open plain or meadow, but rather is intimately associated with a stand of yellow pine (P. ponderosa) on its western edge, and several trees grow on the midden deposit of the site itself.

Like site Pla-5, however, Sie-20 is much more extensive than is usual for a camp site or village in this area. Basalt chippage and tool fragments are spread over an area amounting to more than one-half of a square mile in Sardine Valley. That portion of the site where excavation took place should be thought of as an area of concentration of artifacts, where about 18 inches of darkish midden soil has been deposited over but comparatively few acres. Not far to the south of Sie-20, and also on the western side of Sardine Valley, is another, probably smaller, concentration spot, designated Sie-21. The same type of basalt detritus as at Sie-20 marks the area surrounding Sie-21, and even appears to overlap with that of Sie-20. These two sites could reasonably be classified as one, and it is only a matter of convenience to deal with them as two separate sites. In any case, only limited excavation was carried out at site Sie-21, and the few identifiable projectile point specimens recovered are reported here along with those from Sie-20.

Previous Investigation. Dr. L. Payen, of Sacramento, California, has a large collection of artifacts taken from the surface of several sites or extensions of sites, as I have defined them here, in Sardine Valley. The collection is uncatalogued as regards exact location within the Valley, inasmuch as members of the Payen family have been collecting from the general locality for many years. (It is through the interest and support of the Payen family that the University of California was allowed to excavate the site in 1958.) The Payen collection has been recorded by the University of California Archaeological Survey, Berkeley. It displays a great preponderance of Martis type projectile points, which, in spite of the lack of exact accompanying data, allows the drawing of a parallel between Sardine Valley and Martis Valley to the south. Both localities apparently were extensive workshops and possibly centers for the hunting of antelope or deer in the early summer.

Another surface collection, specifically from sites Sie-20 and 21, which, as has been pointed out, actually adjoin each other, has been taken by Mrs. Gladys Smith. Her collection also shows a predominance of Martis type projectile points, although one Desert side-notched form, of the "Delta" subtype (Baumhoff and Byrne, op. cit.), was found at site Sie-21. It is not known if any excavation had taken place at either site Sie-20 or 21 prior to 1958.

The 1958 Excavation. During the summer of 1958, a class in archaeological field methods from the University of California, Berkeley, under the leadership of Dr. A. D. Krieger of the Riverside Municipal Museum, excavated 4 test pits, measuring 10 by 10 feet on the sides, at Sie-20. Since the excavation was intended to be exploratory, only brief field records, not including a site map, were kept. Artifacts, however, were carefully recorded as to depth in each pit, and it is these artifacts, as well as those recovered from the surface of the site while the excavation was in progress, that will

be described in this report. In some cases specimens from site Sie-21 will be included in the descriptions. The depth of artifact-producing midden proved to be but 12 inches or so in all 4 test pits. Below that, to a depth of 18 inches, was darkish soil charged with large cobbles or boulders which finally necessitated a termination of excavation at the latter depth. Shaker screens were used throughout excavation, since the fine dark midden soil of the "sage brush knolls" made artifact detection difficult if shovels or trowels only were used for probing the excavated soil. No human or animal bones were recovered in the excavation. This corresponds to results in two other excavations in the nearby Martis Complex area, at Nev-67 (Davis, n.d.) and at site SP-6 in Martis Valley (Arnold, n.d.).

Artifacts Recovered. About 218 artifacts were found in the excavation or on the surface of the site. These were in the following categories and numbers: (1) Post-contact artifacts, i.e., square iron nails, white earthenware sherds, glass bottle fragments: 25. (2) Projectile points: 79 typable specimens; 68 tip or mid-section fragments. (3) Drills: 2 typable specimens; 2 fragments. (4) Flake scrapers: 7. (5) Ornaments: 1 stone; 1 shell. (6) Manos: 11. (7) Pestles and/or hammerstones: 3. These artifacts are described below in the order given.

Post-contact artifacts. All of these specimens evidently were left by early white settlers or travelers in Sardine Valley. The immediate area of midden concentration has presumably been used for many years in cattle-raising activities connected with the Payen Ranch. It is said also that one of the wooden sheds associated with the site was once used as part of a stage coach station along the Smithneck Creek Road. This would explain the recovery of the relatively great number of square (horseshoe) nails at the site. The historic material occurred in the aboriginal artifact-bearing deposit (0-12 inches), hence it must be assumed that the part of the site chosen for excavation, while perhaps the richest portion in terms of artifacts, also had been subject to considerable disturbance since the time of Indian occupation.

Projectile points. Of the 147 specimens which could be identified as projectile points, all were of basalt except 13 chert specimens, 3 of schist, and 11 of obsidian. Of the 79 typable specimens, 44 were complete enough to be measured, with the results shown on the following page.

No attempt was made to place these points in a chronological sequence since the midden deposit was so shallow, and, in addition, showed signs of having been disturbed subsequent to aboriginal occupation. All of the points fit into the Martis classification as based originally upon the Pla-5 material, except 2 asymmetrical specimens which display tangs on but one side only. This is thought to be a type simply not recovered or recognized at Pla-5 (the

Martis type site), hence is incorporated here as a new type in the classification (Type 5f). The type, or subtype, has been found recently at another Martis Complex site in the Truckee region by Davis (op. cit.). In view of the relative paucity of specimens made from obsidian, and their similarity in form to the classic Martis basalt forms, the obsidian specimens are included, for convenience, in the Martis classification. It is possible in some cases that the comparative lightness of the obsidian specimens may affect the weight averages of the points given in Table 13.

Table 13

Measurements of Martis Complex Type Projectile Points from Sie-20

Type of point	No. of specimens recovered	Average length (cm.)	Average width (cm.)	Average weight (gms.)
1b	2	5.8	2.1	7.3
2	2	3.5	3.4	5.7
3a	7	4.1	1.9	3.9
3b	7	3.4	2.2	3.1
4a	1	3.3	1.4	2.7
4b	6	2.5	2.0	2.8
4c	6	3.8	2.1	4.6
4d	6	2.7	1.9	2.8
5a	3	3.9	2.3	2.9
5c	2	3.2	2.3	3.0
5f	2	3.8	2.7	5.4

All chips except those of basalt, of material which probably would have been used in projectile point manufacture, were collected. Basalt occurs locally as float material, hence innumerable chips recovered in the screening were rejected on the spot. Chert and obsidian, on the other hand, were no doubt imported from elsewhere, in reduced quantity. The numbers of chips from all the pits excavated were as follows:

Chert	Obsidian	Other silicified volcanic material
484	126	40

Representative projectile point specimens are illustrated in Plates 2C, D.

Drills. These specimens are all of basalt. Two fragments are worked tips only, and two specimens, not entirely complete, are, however, identifiable as Types A and C in the Martis classification (Heizer and Elsasser, op. cit.). The Type A fragment (Pl. 2Do) appears to have had a large circular base and a short tip, while the Type C example (Pl. 2Dn) has a long point, with a continuous (unshaped) base.

Scrapers. The majority of the 7 scrapers recovered are unshaped or roughly shaped flakes, partially chipped on one or both faces. The specimen shown in Plate 2Dq is representative of this class. It is a crudely shaped flake with secondary chipping along one face. The specimen shown in Plate 2Dp is a finely made specimen which should perhaps be called a knife. It is a tabular, shaped flake, with retouching along both lateral edges. The retouching is alternately unifacial, i.e., both lateral edges are chipped, but on opposite faces of the specimen.

Ornaments. Two ornaments were recovered, and both specimens are illustrated (Pl. 2Dr,s). The stone ornament is a thin tabular pendant, 2 cm. long, with a single conically drilled hole 2 mm. in diameter at one end. The specimen is fragmentary, though it is evident that it originally had an ovoid shape. A full longitudinal break of the schistose material of the specimen prevents determination of its original thickness, and whether or not it had a biconically drilled hole.

The shell specimen (Pl. 2Ds) is of the green-backed abalone (H. cracherodi). It is fragmentary, also, but its original shape can only be guessed. Even though the original specimen probably was circular in outline, perhaps one of the variants of the C(1) or C(2) types (Bennyhoff and Heizer, op. cit., p. 64), it cannot properly be used as a chronologically diagnostic specimen since there is no way to determine the number of central or edge perforations in the original specimen.

Manos. Eleven manos, representing Types I and II (see p. 44), were recovered, all either from the surface of the site or in the first (and only) 12 inch level of the deposit.

Type I manos (round or ovate cobbles) are of granite (1), basalt (3),

and felsite (3). Four of the specimens are complete, 3 are fragmentary, and all have wear on but one limited surface.

Four Type II (loaf-shaped, bifacial) specimens are of basalt (3) and granodiorite (1). Shapes of two of these manos are identical to those shown in Figure 2B, C (Heizer and Elsasser, op. cit.), i.e., the length does not appreciably exceed the width of the specimens. Of the remaining two specimens, one, though fragmentary, appears to have been a "long" specimen like the complete example (No. 208) which is 15 cm. long by 8 cm. wide.

Metates. No portable metates were found at the site. Probably with additional excavation, these would appear. In addition, it is possible that some of the heavy granitic boulders which are distributed throughout the surface of the site could once have contained metate surfaces, since mortar holes were present in at least two of these boulders.

Pestles and/or hammerstones. One small, roughly cylindrical section of felsite (No. 130) with smoothed sides, 3.8 cm. long and 2.9 cm. in diameter, possibly could represent a mid-section of a small pestle. Two other specimens, one complete, of felsite, and one fragmentary, of basalt, show a ground flattening on their ends. The complete specimen is an irregular cobble 10.2 cm. long, unworked on its sides but with distinct, smoothly worn ends 6.5 and 5.5 cm. in diameter, indicating use as a pestle in shallow mortar holes or perhaps as a hammerstone in some food- or hide-softening process which required only a flat pounding under-surface. The fragmentary specimen (No. 236), 8.8 cm. long and with one smoothly ground end 5.2 cm. in diameter, was pecked on its sides so that it has an ovoid cross-sectional shape. Its sides are not worn smooth, however, and the specimen thus suggests use as a pestle in a shallow mortar hole or possibly occasional secondary use as a hammerstone.

Bedrock Mortars and Petroglyphs. Study of the grinding tool complex at Sie-20 is hampered by the limited nature of the excavation. Ordinarily one would expect to find metates or metate fragments along with manos, and not have to depend on a putative association of manos with possible bedrock metates in order to explain the presence of the manos. The small number of pestles recovered, on the other hand, corresponds with the relative paucity of bedrock mortars at the site. The latter are represented on two flattish-topped, granitic boulders, each about 36 inches in diameter, imbedded in the midden soil. One of the boulders shows 3 well developed mortar holes, while the other has but one incipient hole. It may be surmised that more shallow mortar holes, or perhaps metates, were at one time present on other, similar boulders at the site, but have become obliterated in the course of years.

The exposed nature of the terrain at both sites (Sie-20 and 21) leaves

open the possibility of obliteration of petroglyphs as well as evidences of grinding surfaces on the bedrock or float boulders. At Sie-21, however, there still remain a few petroglyph elements on one boulder. These are one straight-line groove separating two wavy lines (snakes?) in a field measuring about 20 by 8 inches.

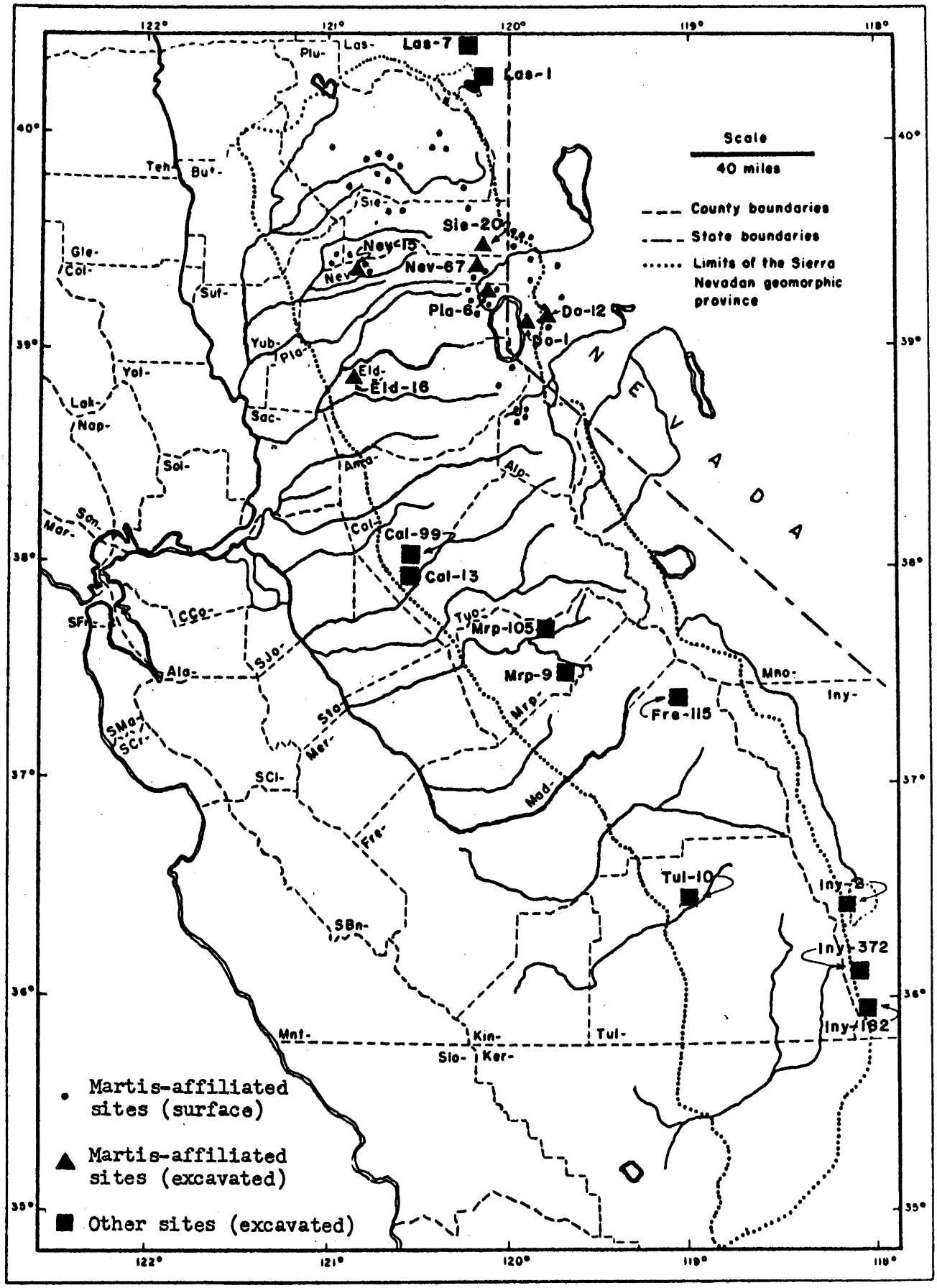
At site Sie-20 is a boulder which contains numerous small, conical pits or "dimples" averaging about 6 cm. in diameter and from 2 to 4 cm. deep. A similar petroglyph style has been observed in various Great Basin sites. At the Grimes site, near Fallon, Nevada, for example, the pit (and groove) style, on the basis of degree of patination of the element with relation to the parent rock, is thought to represent a culture stratum in the Great Basin perhaps dating from more than 5,000 years ago (Baumhoff, Heizer and Elsasser, op. cit., p. 15). A pitted boulder has been observed at site Pla-5 in Martis Valley by the present author, and Arnold (op. cit.) reports what appears to be a pitted boulder in a site not far away from Pla-5, in the same valley.

Discussion. Site Sie-20 and its adjoining site, Sie-21, have yielded enough evidence from limited excavation and surface collection to indicate a type of occupation in Sardine Valley which was probably identical to that posited for the dominant occupation in Martis Valley, 20 miles to the south. Both areas were probably used seasonally, e.g., as early summer headquarters, for hunting groups who spent much time on the sites manufacturing domestic stone implements as well. Of the complement of Martis Complex material exemplified at Pla-5, large leaf-shaped blades of basalt were not recovered in the excavation of Sie-20. Also, no traces of metates were found at Sie-20, either in the excavation or in the surface collection. These discrepancies might be explained by noting the great amount of intensive private collecting in Sardine Valley, and the relatively small amount of excavation carried out at the site in 1958.

One previously unreported element found at both Sie-20 and Pla-5, the pitted boulder, possibly could pre-date the Martis Complex. It could also be an element which survived from earlier times and was used by the Martis people, perhaps to increase their hunting luck.

Discussion of Martis Complex

Since 1953, when the Martis Complex was first proposed, a great number of sites have been discovered which seem to bear Martis affiliation. These sites are distributed in an area extending from as far north as Honey Lake in Lassen County to the southern end of Hope Valley, in Alpine County. Many Martis-like sites have been located or identified around Peavine Mountain, and in Spanish Spring and Washoe Valleys near Reno, as well as in the Carson



MAP 10: Distribution of Martis Complex Sites and Other Excavated Sites in the Sierra Nevada

Valley, in Nevada. At least one site has been reported from as far south as Sonora Pass in California.

The general area of distribution may be seen in Map 10. A total of 150 Martis type sites has been recorded, with the occurrence in each county as follows: (1) California: Lassen, 1 site; Plumas, 21 sites; Sierra, 21 sites; Nevada, 46 sites; Yuba, 5 sites; Placer, 13 sites; Eldorado, 2 sites; Alpine, 9 sites. (2) Nevada: Ormsby, 1 site; Douglas, 3 sites; Storey, 1 site; Lyon, 1 site; Washoe, 46 sites.

The locations of these sites tend to modify slightly ideas originally set forth on the relationship between site location and function. It may be observed that, if there is any area which could properly be referred to as the characteristic "Martis area," this would fall largely into the Transition Zone (cf. Maps 2 and 10), on the eastern and western sides of the range. Furthermore, of the three excavated sites reported upon in this paper, two could well have been used as winter occupation sites. Thus the concept of an extremely high altitude culture complex should be altered in favor of one referring to what may be called a mid-altitude optimum, which varies from about 2,500 to 6,000 feet, and depends upon which side of the range is under consideration. It has been shown previously that the Transition life zone comprises a different emphasis of life species and range of elevations where it adjoins the Great Basin than where it faces the Great Central Valley of California. It appears that the distribution of Martis-type sites is closely associated with this ecological phenomenon.

Davis (op. cit.) has recorded data pertinent to prehistoric economic activity in the probable central region of the Martis Complex (i.e., north of Lake Tahoe, in the Truckee River drainage area). Most of this information was offered by Dr. A. Starker Leopold of the Department of Zoology, University of California (Berkeley), and may be paraphrased as follows:

The sagebrush knolls upon which the majority of Martis Complex sites are located were formerly grass-covered knolls. It was not until after the land was utilized for sheep and cattle grazing that the once grassy vegetation was replaced by sagebrush and bitterbrush.

Deer eat only a limited quantity of green grass, and will not feed on dry grass. Also, elevations from about 5,500 to 6,000 feet in this region are too low for summer deer range, even with the present day vegetal covering.

In early historic times, before the vegetation change occurred, valleys such as Martis, Prosser, Stampede, and Sardine furnished summer grazing for

antelope herds which migrated from western Nevada. The antelope drifted in herds up to higher elevations during the summer and returned to the lower elevations during the winter. The approximate time of this drifting occurred upward during the months of May and June and downward during late October and November.

During the protohistoric period, no other large mammals, such as deer or bighorn sheep, were in abundance in this region.

In aboriginal times Pyramid Lake supported a considerable population of large cutthroat trout, which ran up the tributaries of the Truckee River, such as Prosser Creek, to spawn. Two runs occurred annually from Pyramid Lake, one during December and January, the other during March and April. After spawning, the fish returned to Pyramid Lake during May and June.

The near absence of bone in these sites may be accounted for by the fact that bone left lying on the surface of this mountain country disintegrates rapidly. Deer bones resulting from the starvation winter of 1952 have almost disappeared in six years' time. Locations of carcasses and skeletons have been checked periodically since 1952, and an informal notation of their rate of decomposition has been made.

Locations of Martis-type sites on the western side of the main Sierran divide probably may be explained in similar terms to those outlined for the Truckee River drainage, with different animal species substituted where applicable. If the Martis people followed antelope to the lower elevations and deer over the higher parts of the range, and perhaps from one side of the range to the other, neither the point of origin, the usual direction of movement, nor the side where the bulk of the people spent the winter months can be determined with the data at hand. The similarity of artifact material on both sides of the main range certainly suggests regular trans-Sierran trail routes in Martis Complex times. These routes could have followed generally the North, Middle, and South Forks of the Feather River, and the Middle Fork of the Yuba River. Sites usually are found on ridges or upon small flats close to the streams named, or their tributaries. The trails themselves probably alternated between relatively low canyon sides and easily accessible ridges. It has been noted above that the northern Sierra Nevada is not characterized by numbers of definite passes or gaps in the mountain wall, such as are encountered all along the southern Sierran divide. Trails may be made in a much more wholesale fashion in the north, hence there is no tendency to "channeling." Where prehistoric trails have been channeled, or funneled, there is usually abundant evidence in the form of camp-spot detritus spaced at intervals along the route.

A definite genetic relationship seems to hold between the projectile point types on the two opposite flanks of the Sierra Nevada, at Nev-15 and Pla-5 (western and eastern, respectively). In addition to the overwhelming evidence from the excavations at Nev-15, it appears that the majority of projectile points recorded from Hawver Cave (Wallace and Lathrap, op. cit.) may easily be identified, from material, shape, and size, as Martis types. Thus, of 13 points illustrated (ibid., p. 134), 6 of basalt, 6 of slate or schist, and 1 of limestone, 10 are classifiable as Martis types (basalt: 3 of Type 4 [side-notched], 2 of Type 3 [shouldered]; slate or schist: 5 of Type 3 [shouldered]).

At Nev-15 there is reason to believe that some sort of change took place through time in the popularity of projectile point types. Data from other excavations of Martis sites on the eastern side of the range, except in one instance, all tend to emphasize, however, the single-phase quality of the Martis Complex.

Arnold (op. cit.), for example, has found Martis projectile point Types 1, 2, 3, 4, and 5 at a site in Martis Valley. There, only Types 1 and 3 were found in the lowest level excavated (30-36 inches).

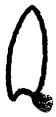
At Cave Rock (site 26-Do-1), on the eastern shore of Lake Tahoe, an excavation under the direction of the writer disclosed but 3 basalt projectile points, all of them of Martis type (1 of Type 3; 2 of Type 4).

Another excavation, carried out at a site (Nev-67) near Alder Creek, a tributary of Prosser Creek (Davis, op. cit.), resulted in the finding of Martis Complex projectile points, Types 1 and 4, in the lowest (6-12 inch) level of the site.

From the excavations just mentioned, and from the excavation at Sie-20 reported in this paper, the samples were not large enough to merit any attempt at drawing conclusions regarding relative chronology at the sites. At site Do-12, also reported herein, there is not only evidence that pertains to relative chronology, but the projectile point types found there indicate, for the first time, wider relationships of a site which can assuredly also be classified as representative of the Martis Complex.

Table 14 shows the affinities between site Do-12, the Humboldt Lakebed site (26-Ch-15), the Mono County area surveyed by Meighan (1955), and the Yosemite National Park sites excavated by Bennyhoff (1956). It will be recalled that the Yosemite region projectile point specimens of the "C" designation have been placed in the early complex at Yosemite (Crane Flat), while those with the "B" prefix are of the succeeding (Tamarack) complex. Bennyhoff (ibid.) equated the Crane Flat Complex with the Martis Complex, and

Table 14. Comparison of Projectile Point Types from site Do-12 and Other Sites in Nevada and California.

Shape	Do-12	Ch-15*	Mono County**	Yosemite***
	1b	A	2	B1 or C1
	4a	B (Rose Spring side notch?)	8	B4 or B5
	X	Humboldt concave base A		B3
	X	Humboldt basal notched	3	C5
	4b		9	C11a
	4c	F	4	B7
	5a	Rose Spring contracting stem	7	
	5b, 5c	Eastgate expanding stem	6	B10
	5d	Elko eared		C15
	X	Eastgate split stem		

X: Type not previously classified in Martis Complex. *Unpublished data.
**After Meighan, 1955. ***After Bennyhoff, 1956.

suggested that the not-so-well-known Tamarack Complex followed both in time. If the evidence for relative chronology from Nev-15 and Do-12 has any validity, then we may look upon site Do-12 as a later phase of the Martis Complex. Taken with the evidence from Yosemite National Park, Do-12 would appear to follow the same sequence that obtained there, according to Bennyhoff's stratigraphy, and possibly represents a transitional period between the earlier (Martis or Crane Flat) and later (Tamarack) complexes.

Both Meighan (for Mono County) and Bennyhoff (for the Yosemite region) refer to certain similarities in point types between these two localities and the Martis Complex area. However, neither saw fit to emphasize clear-cut comparisons between assemblages of basalt points and those of obsidian, which characterized most of the specimens from Mono County and Yosemite. A possible explanation for observed differences between basalt and obsidian specimens is that a point maker might have the same general form in mind when starting the flaking process, but the size and fineness of outline of the finished product might depend on the material used. This distinction in material thus could be important to the archaeologist engaged in classifying a large group of points.

Specimens from site Do-12, as shown above, display certain similarities to points recovered from the Humboldt Lakebed site in Churchill County, Nevada. A wide range of specimens has been found on the now dry surface of the lake bed, and the latter collection includes also several basalt specimens which are easily identified as Martis Complex types.

At both sites Nev-15 and Do-12, points resembling Pinto type projectile points have been recovered. The Nev-15 specimens are all of basalt (designated as Martis type 12), and are of the so-called "sloping shoulder" variety named by Harrington (1957, p. 50). The concave-based specimens from Do-12 are perhaps too small to be equated with the "unshouldered" Pinto points of Harrington (ibid.), although the resemblance in shape is definite. In all, the Do-12 specimens probably show greater likeness to projectile points which occur in quantity at site 26-Ch-15, called "Humboldt concave-base A" type, in the collections of the University of California Robert H. Lowie Museum of Anthropology.

The occurrence of the almost unquestionably late Desert side-notched type of point at sites Nev-15, Pla-6 (site excavated by Arnold [op. cit.]), Do-12, and Sie-21 may be explained simply as the result of temporary camping on the sites by protohistoric or historic Maidu or Washo groups. At both sites Nev-15 and Pla-6, however, such specimens (3 at Nev-15, 1 at Pla-6) were found relatively deep in midden deposits, in the 18-24 inch levels, as it happens. Evidence from the majority of Martis type sites recorded (mostly surface sites where the typical Martis specimens do not occur

in conjunction with the Desert side-notched points) suggests that these occurrences represent disturbance of the mound soil rather than an extension of the Martis culture into the time of the late prehistoric or protohistoric cultures of the region.

In sum, three possibilities may be set forth to explain the areal distribution of the Martis Complex: (1) It was a higher altitude or summer manifestation of a culture which was centered farther out in the Great Basin, to the east; this perhaps had ultimate roots in the Southern California deserts. (2) The same as above, except that the center or point of origin was in central California, during Middle Horizon times. (3) It was an essentially autochthonous culture, i.e., one which developed in the Sierra Nevada without strong reference to cultures on either side of the Sierra.

The first possibility is based upon the greater number of Martis type sites on the eastern side of the Sierra and on the distribution of Pinto type points in the Great Basin. The latter may point to early movements along the eastern flank of the Sierra Nevada, with utilization of locally available material for implement manufacture. It may be suggested on these grounds that the early culture of the Yosemite National Park area and that of the Martis Complex area were derived from the same tradition. The penetration of the Sierra as far as Yosemite Valley or the western foothills in the north may be based partially on the following of large game animals over the mountains from the east.

On the other hand, the second possibility (above) forces us to confront the evidence of the strong resemblance of Martis Complex points with those recovered from the Middle archaeological Horizon of central California. Furthermore, investigation to date of the foothills on the western side of the Sierra has not been carried on so intensively with regard to the Martis problem as on the eastern side of the range. Thus it remains possible that the known high- or mid-altitude Martis sites represent a summer occupation of a basically central Californian culture.

The argument for the third possibility is simply that what have been defined as Martis type artifacts, especially the all-important projectile points, are reasonably distinct assemblages, and while influence from farther east in the Great Basin or from central California is obviously present, as at site Do-12 (Great Basin), one would expect it to be strong enough to be definitely identified at higher altitudes, i.e., at some distance from the periphery of the Martis region or zone of direct impingement with either Great Basin or central Californian cultures.

Whatever the case, all that can be said at this writing is that the lower

altitude sites with midden deposits probably represent winter residences,* while the higher sites with scatterings of artifacts on their surfaces only represent summer camp sites. In some instances, observed sites with midden deposits such as those in Martis Valley and along Alder Creek near Truckee can hardly qualify as winter sites, hence must be looked upon simply as continuously preferred summer camp sites.

It is apparent that the number of wintering sites, being places of concentration of population, would be less than of summer camp sites, yet only a few of these probable winter occupation spots have been found and excavated. It therefore does not seem unreasonable to state that knowledge of the Martis Complex is by no means complete, and that excavation in future may yield solid data which will aid in establishing closer Californian-Great Basin archaeological relationships through the definition of a local Sierran culture, which, no matter what its ultimate affiliations, could also serve as a linking type of culture between the regions to the east and west of the Sierra Nevada.

CONCLUSIONS

An attempt has been made in this paper to review all known data pertaining to prehistoric culture chronology and distribution in the Sierra Nevada. While no new concepts have been derived from this study, it is felt that the ralating to each other of previously defined culture complexes over the entire extent of the geomorphic province will be of value in future in the interpretation of local Sierran archaeology, and of the influences received by the Sierran cultures from cis-montane California or the Great Basin.

Unfortunately, the familiar demand for additional investigation before the large problems of the region can be solved must again be voiced. The specific, immediate deficiencies are that not enough is known of the early complexes in the southern or higher part of the range, while in the northern part, especially on the western side of the range, there has not been sufficient survey or excavation properly to outline the later complexes.

Keeping in mind the background of comparatively intensive survey in certain regions, like Yosemite National Park, and the virtual neglect or but sketchy outlines of the archaeology in the foothill region between Nevada City and Placerville, for example, we may tentatively summarize the broad conclusions of this paper as follows:

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*These may have also been occupied in the summer, perhaps by a smaller number of people than in winter.

(1) In the early period of Sierran occupation by man, the beginning of which is tentatively dated here as about 2,500 years ago, the Martis Complex was thriving in the northern part of the range. This evidently was a relatively homogeneous culture which seems not to have been subject to such natural or artificial boundaries as existed between the ethnographic groups, the Maidu and Washo, which later occupied the same general area. The Martis people either were confined fairly strictly to the Sierran geomorphic province itself, like the ethnographic Northeastern Maidu, or they represent a summer manifestation of lower altitude groups on one or both sides of the Sierra. Unlike that of the Northeastern Maidu, their cultural affiliation with central Californian (Sacramento Valley) peoples cannot definitely be established. Neither can their origin be positively connected with the Great Basin.

The existence of any Sierran archaeological culture equivalent to the Martis Complex south of the Yosemite National Park region is only vaguely known. Bennyhoff (1956) has, however, demonstrated at Yosemite a possibly continuous sequence found in stratified relation, and the report in the present paper on site Do-12 may be the first step in determining a transition from the Martis culture to a succeeding culture equatable with the Tamarack Complex in Yosemite. Although at two Martis type sites (Nev-15 and Do-12) there is some slight evidence of culture change reflected by the position in the midden and popularity of certain projectile point types, this is of tentative nature only, and cannot soundly be used as a basis for separating the Martis Complex into "early" and "late" periods (see Table 15 below).

(2) For the later period, i.e., in late prehistoric or protohistoric times, evidence of movements of people (trade routes, commonly used hunting trails, for example) and their distributional patterns, in the area which previously was occupied by the Martis Complex, tends to be scanty. Lacking over most of the area, except as noted, at site Do-12, is evidence of a transitional culture between the Martis Complex and the protohistoric Maidu or Washo. If the estimates of the dating of the Martis Complex as given here are correct (ca. 1500 B.C. to 500 or 600 A.D.), there is a lapse of more than 500 years before the supposed appearance of the late prehistoric expressions of these ethnographic groups. The depth association of Desert side-notched points and shaped steatite specimens with Martis Complex artifacts at Nev-15 may conceivably be evidence for the bridging of the gap, which would almost certainly be represented as a survival or extension of the Martis Complex into a period later than that indicated in this paper. The types of steatite objects found do not here present serious difficulty, since their temporal affiliations are not precisely known. The problem of the Desert side-notched points possibly may be resolved with additional excavation, especially if sites are found in which "disturbed midden" does not

Table 15. Tentative Archaeological Chronology of the Sierra Nevada.
(Adapted from Bennyhoff, 1958)

Sub-Region	Owens Valley	Southern Sierra	Yosemite	Northern Sierra
Historic Group	Owens Valley Paiute	Western Mono	Central & S. Miwok	Maidu and Washo
Dating BP (1950) / BC-AD				
1700	Rose Spring; Cottonwood Creek (Iny-2)	Vermilion Valley	Mariposa*	Kings Beach*
800 / 1100	Earlier Rose Spring; Earlier Cottonwood Creek ?	Earlier Vermilion Valley	Tamarack*	?
1500 / 500			Crane Flat*	Martis*
0-AD / 2000				
3000 / 1000	Stahl			
	Pinto Gypsum*	?	?	?

* Named complexes--unstarred names are of individual sites.
xxx = Base line for "Shoshone" ceramics (Owens Valley Brown Ware).
--- = Approximate temporal boundaries.

have to be invoked in order to explain what are thought to be anomalous, deep occurrences in the deposit of "late" specimens.

In the southern part of the range, on the other hand, there is much evidence of a homogeneous late prehistoric or protohistoric culture, based upon hunting and most probably upon trade as well. It is assumed that this apparent homogeneity may in turn have been based on linguistic kinship of the Shoshonean peoples who lived on either side of the range.

Table 15 summarizes the estimated chronological relationships between the archaeological cultures of the Sierra Nevada.

Throughout this paper, reference has been made to sites on the outer edge, or entirely outside, of the Sierra Nevadan province. The Karlo site in Lassen County, site Inv-2 in Owens Valley, sites in Mono County surveyed by Meighan (1955), and even the Martis type site, Do-12, are all, properly speaking, in the Great Basin. There is certainly no question, however, as to whether or not such sites are necessary to the interpretation of Sierra Nevadan archaeology. The only real question here is how much more regions like the Humboldt Valley, in Nevada; Owens Valley; or the southern end of the Cascade Range in Tehama County should have been considered as essential bases for comparison with the data from the Sierra Nevada proper. The answer of course is that all of these regions ultimately are archaeologically interdependent. Collections of data from all of them, and from the Sierra Nevada as well, still must be built to the point where they can be easily and without strain compared to each other. Only then can the prehistory of any of the regions separately and of western North America as a whole be meaningfully synthesized.

END NOTES

1. In addition to Kroeber's Handbook (1925), the following ethnographic sources have been consulted for the groups indicated:

Maidu:	Dixon (1905) Voegelin (1942) Littlejohn (1929) Beals (1933) Faye (1923)	Owens Valley Paiute: (E. Mono)	Steward (1933) Driver (1937)
		Yokuts:	Gayton (1948a,b) Aginsky (1943) Driver (1937)
Washo:	Barrett (1907) Lowie (1939) Stewart (1941)	Tübatulabal:	Voegelin (1938) Driver (1937)
Miwok:	Barrett and Gifford (1933)	Kawaiisu:	Driver (1937) Zigmond (1938)
W. Mono	Gifford (1932) Driver (1937) Gayton (1948b) Aginsky (1943)	Kitanemuk:	[Kroeber (1925)]
		Koso:	Driver (1937)

2. Counties included in areas indicated in Tables 1 and 2, with county symbols shown on maps (from north to south), are:

Area I

Plumas	(Plu-)
Sierra	(Sie-)
Butte	(But-)
Yuba	(Yub-)
Nevada	(Nev-)
Placer	(Pla-)

Area II

Eldorado	(Eld-)
Amador	(Ama-)
Calaveras	(Cal-)
Tuolumne	(Tuo-)
Mariposa	(Mrp-)

Area III

Madera	(Mad-)
Fresno	(Fre-)
Tulare	(Tul-)
Kern	(Ker-)

Area IV

Lassen	(Las-)
Alpine	(Alp-)
Mono	(Mno-)
Inyo	(Iny-)

Counties in state of Nevada (boundaries not shown on map)

Washoe
Ormsby
Douglas

3. Size of site correlated with number of mortar holes (after Bennyhoff, 1956, pp. 12-13):

Mortar holes

1-7:	single family occupation
8-19:	small village
20 plus:	large village

(One site in Big Meadow [Mrp-3] has 473 mortar holes)

4. Summary of probable dates and place of occurrence of small, triangular projectile points outside of California (after Eberhart, n.d.).

(1) Simple triangular with concave base type

Great Plains, ca. 1300 A.D.
Texas, 800-900 A.D.
Southern New Mexico, 900-1100 A.D.
Northern New Mexico, 1100-1300 A.D.
Southern Arizona, 700-1000 A.D.
Northern Arizona, 700-900 A.D.
Utah, 500(?)-900 A.D.
Southeastern Oregon, ca. 1000 A.D.

(2) Side-notched, straight based type

Northwestern Plains, 1150-1350 A.D.
Central Plains, 1000-1150 A.D.
Texas, ca. 1100 A.D.
Mogollon, 700-1000 A.D.
Hohokam, 800-900 A.D.
Sinagua, 1070-1120 A.D.
Anasazi, 900-950 A.D.
Utah, 900-1000 A.D.
Northwest, ca. 1000 A.D. or later

(3) Side-notched, concave based type

Northwestern Plains, 1150-1350 A.D.
Central Plains, 1250-1450 A.D.
Texas, ca. 1100 A.D.
Chihuahua, 1200-1450 A.D.
Mogollon, 950-1150 A.D.
Hohokam, 800-900 A.D.
Sinagua, 1070-1120 A.D.
Anasazi, 900-1100 A.D.
Utah, 950-1150 A.D.
Oregon, ca. 1000 A.D.
Washington, ca. 1000 A.D. or later

(4) Side notched, end notched type

Central Plains, 1000-1150 A.D.
Texas, ca. 1100 A.D.
Mogollon, 900-1100 A.D.
Hohokam, 900-1100 A.D.
Sinagua, 1070-1120 A.D.
Anasazi, 1100-1300 A.D.
Utah, 900-1300 A.D.
Southeast Oregon, ca. 1000 A.D.

5. The projectile point classification is adapted from that in Heizer and Elsasser (op. cit., p. 11), except for a few additions and slight modification, as follows:

Type 1

Subtype a. Bi-pointed, spindle shaped (Pl. 1Aa-c).
b. With rounded base (Pl. 1Ad-f).
c. With rounded base and point.
d. Crescentic.

Type 2 Triangular (Pl. 1Ag-i).

Type 3 Shouldered, with contracting or nearly parallel-sided stem.

Subtype a. With pointed stem (Pl. 1Aj-m).
b. Stem with rounded end (Pl. 1An-p).
c. Stem with square end (Pl. 1Aq-s).
d. Stem with concave end (Pl. 2Co).

Type 4 Side-notched; depending on size and shape of notch, approaches shouldered form with expanding stem.

Subtype a. With no discrete stem, square or convex end (Pl. 1At-v).
b. With concave base (Pl. 1Aw-y).
c. With rounded base (Pl. 1Ba-c).
d. With squared base (Pl. 1Bd-f).

Type 5 Barbed or tanged (corner or basal notched).

Subtype a. With contracting, pointed stem (Pl. 1Bg-i).
b. With expanding or parallel-sided stem, rounded base (Pl. 1Bj-l).
c. With expanding or parallel-sided stem, squared base (Pl. 1Bm-p).
d. With expanding or parallel-sided stem, indented base (Pl. 2Az, a').
e. With long tangs extending as far as base of stem (basal notched).
f. With one tang only, variable stems (Pl. 2D1-m).

Type 6 Quadrangular (Pl. 1Bq-r).

Type 7 With long, parallel-sided stem, with rounded end, basal edges ground (Pl. 2Bf).

Type 8 With long, narrow blade with concave sides, barbed or shouldered (Pl. 1Bs-v).

Type 9 Side or corner-notched with chipped blunted tips (reworked projectile points for use as hafted scrapers?) (Pl. 2Ba).

Type 10 Side-notched points with shouldered tips (reworked projectile points for use as hafted perforators or drills?) (Pl. 2Bb-c).

Type 11 With slight (sloping) shoulder.

Subtype a. With pointed base (Pl. 1Bw-y).
b. With square or concave base (Pl. 1Ca-e).

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AAnt	American Antiquity
AMNH	American Museum of Natural History
-AP	-Anthropological Papers
-B	-Bulletin
CAS	California Academy of Sciences
-P	-Proceedings
GSA	Geological Society of America
-B	-Bulletin
IJAL	International Journal of American Linguistics
KAS	Kroeber Anthropological Society
-P	-Papers
PMCM	Public Museum of the City of Milwaukee
-B	-Bulletin
SC	Sierra Club
-B	-Bulletin
SI	Smithsonian Institution
-BAE	-Bureau of American Ethnology
-B	-Bulletin
SWM	Southwest Museum
-M	-Masterkey
-P	-Papers
UC	University of California
-AR	-Anthropological Records
-AS-R	-Archaeological Survey Report
-PAAE	-Publications in American Archaeology and Ethnology
-PG	-Publications in Geography
-PZ	-Publications in Zoology
UUDA	University of Utah Department of Anthropology
-AP	-Anthropological Papers

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EXPLANATION OF ILLUSTRATIONS

Plate 1 Projectile points and other artifacts from Nev-15. All material is basalt unless otherwise specified. Specimen numbers shown are University of California Archaeological Survey field numbers in A, B, and C. In D, numbers are of University of California Lowie Museum of Anthropology specimens.

A: Projectile points from Nev-15 (Martis types)

a-c. Type 1a (259, 601, 1014).
d-f. Type 1b (794, 443, 944).
g-i. Type 2 (16, 400, 995).
j-m. Type 3a (201, 982, 1077, 822).
n-p. Type 3b (886, 1013, 263).
q-s. Type 3c (9, 650, 115).
t-v. Type 4a (630, 188, 293).
w-y. Type 4b (742, 46, 173).

B: Projectile points from Nev-15 (Martis types)

a-c. Type 4c (1080, 2, 805).
d-f. Type 4d (299, 309, 1081).
g-i. Type 5a (438, 17, 11).
j-l. Type 5b (885, 737, 207).
m-p. Type 5c (185, 428, 174, 371).
q,r. Type 6 (568, 362).
s-v. Type 8 (21, 386, 1058, 1011).
w-y. Type 11a (394, 840, 463).

C: Projectile points and drills from Nev-15 (Martis type)

a-e. Type 11b (255, 292, 510, 633, 823).
f-h. Desert side-notched points, chert (341, 411, 897).
i-l. Obsidian points (831, 39, 502, 51).
m-p. Chlorite schist points (1096, 896, 118, 64).
q-s. Drill, type B (140, 186, 73).

D: Miscellaneous artifacts from Nev-15

a. Grooved hammerstone, granitic material (1/172848).
b. Steatite pipe fragment (1/172748).
c. Slate "pencil" fragment (1/172749).
d. Blade (1/172420).
e. Blade (1/172426).
f. Blade (1/172423).
g. Scraper (1/172411).

Plate 2 Projectile points and other artifacts from sites 26-Do-12, Sie-20, and Sie-21. Specimen numbers shown in A and B are Lowie Museum of Anthropology numbers; in C and D, University of California Archaeological Survey field numbers.

A: Martis type projectile points from 26-Do-12. Material as indicated.

a. Type 1a (2/32039: basalt).
b-d. Type 1b (2/31973: chert; 2/31998, 2/31993: obsidian).
e,f. Type 3a (2/31989, 2/32088: obsidian).
g-j. Type 3b (2/32091, 2/32009: obsidian; 2/31609, 2/32065: basalt).
k,l. Type 4a (2/31707: obsidian; 2/31628: basalt).
m-o. Type 4b (2/31977: obsidian; 2/31602, 2/31611: basalt).
p-r. Type 4c (2/31683: obsidian; 2/31597, 2/32063: basalt).
s,u. Type 4d (2/32060, 2/31978, 2/31584: basalt).
v. Type 5a (2/31692: obsidian).
w-y. Type 5b (2/31962: obsidian; 2/31712: chert; 2/31675: obsidian).
z,a' Type 5d (2/31613: basalt; 2/32089: obsidian).

B: Projectile points and other specimens from 26-Do-12. Material as indicated.

a. Martis type projectile point, type 9 (2/32076: basalt).
b,c. Martis type projectile points, type 10 (2/32085, 2/31995: basalt).
d,e. Martis type drills, type B (2/31622: basalt; 2/32092: chert).
f. Martis type projectile point, type 7 (2/31714: chert).

g-k. Projectile points: Humboldt Concave Base A (2/31676, 2/31637: obsidian; 2/32014: basalt; 2/31742: jasper; 2/31979: basalt).

l,m. Projectile points: Humboldt basal-notched (2/31645, 2/31657: obsidian).

n. Projectile point: Yosemite type B-11 (2/31579: basalt).

o. "Crescent" (2/31807: obsidian).

p. Projectile point: unique specimen (2/31701: obsidian).

q. Stone ornament fragment (2/31822: argillite[?])

r. Bone awl (2/31824).

s. Bone dagger (2/31823).

C: Martis type projectile points from Sardine Valley. All specimens are from Sie-20 except b, c, and e, which are from Sie-21. All are of basalt except v and w, which are of obsidian, c' which is of greenish chert, and d' which is of chlorite schist.

a,b. Type 1b (184, 216).

c. Type 2 (219).

d-i. Type 3a (164, 221, 71, 69, 75, 66).

j-n. Type 3b (165, 123, 178, 67, 171).

o. Type 3d (181).

p,q. Type 4a (25, 19).

r-w. Type 4b (122, 194, 79, 77, 199, 200).

x-e' Type 4c (116, 85, 36, 51, 73, 35, 34, 179).

D: Various artifacts: a-m, Martis type projectile points; n-s, as indicated, from Sardine Valley. All specimens are from Sie-20, except f, p, and q which are from Sie-21. Specimens are of basalt, except e and f which are of obsidian; l which is of chlorite schist; s which is of shell; and r which is of an unidentifiable schist.

a-f. Type 4d (180, 75, 176, 117, 147, 232).

g. Type 5a (177).

h-j. Type 5c (166, 78, 30).

k. Type 5a (70).

l,m. Type 5f (115, 183).

n. Drill, type C (37).

o. Drill, type A (44).

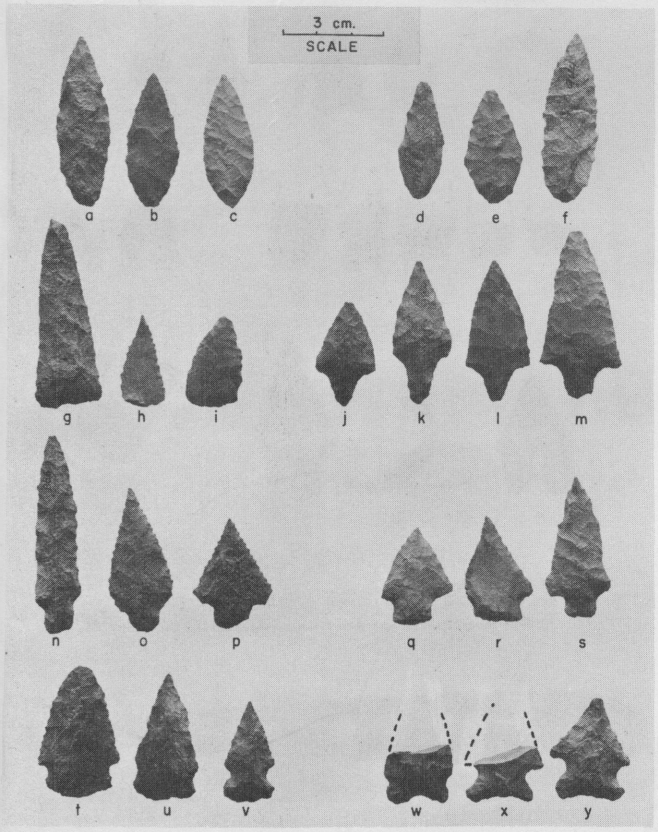
p. Scraper or knife (210).

q. Scraper (212).

r. Stone pendant fragment (173).

s. Shell ornament fragment (174).

Figure 1 Mano types from Martis Complex sites. (Heavy dark lines represent grinding surfaces; dotted lines represent imaginary plane, cutting stone through its greatest thickness.)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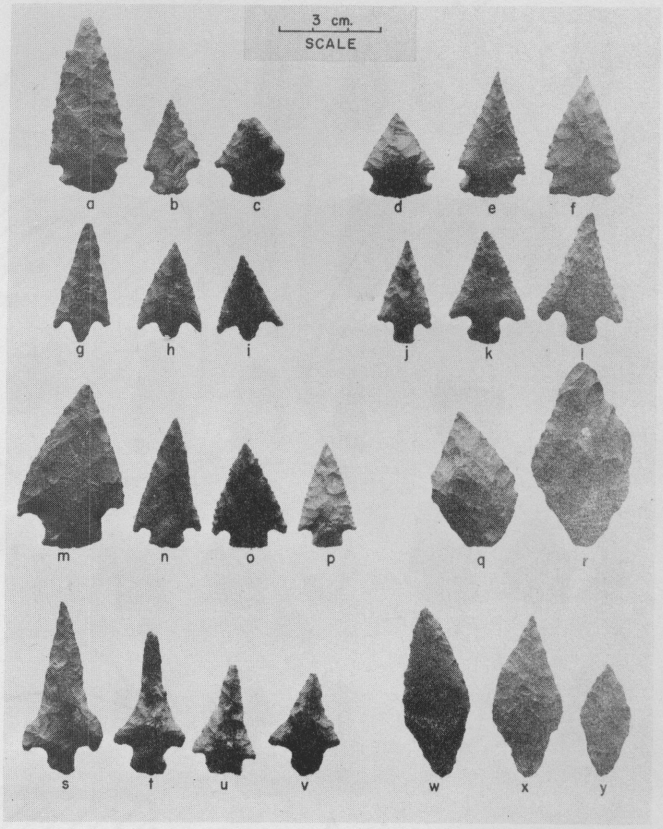
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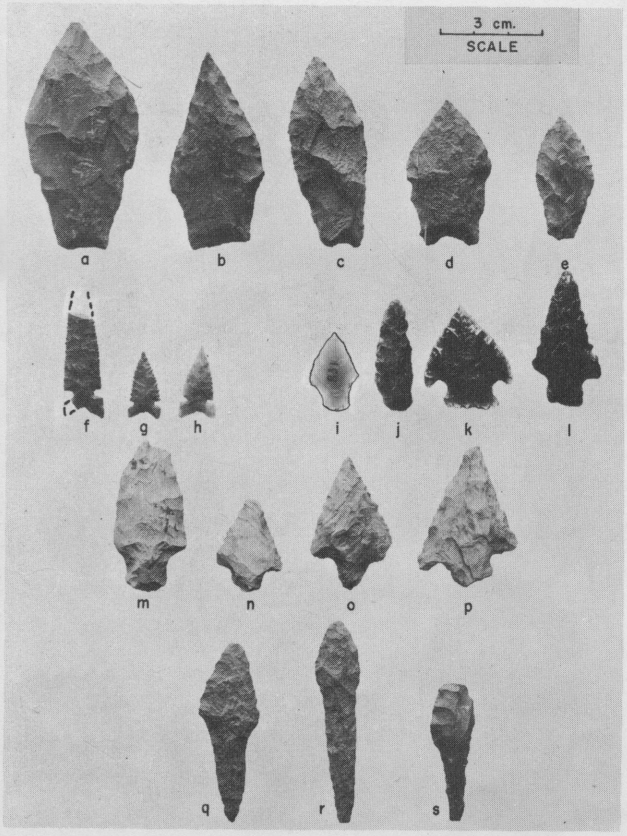
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C

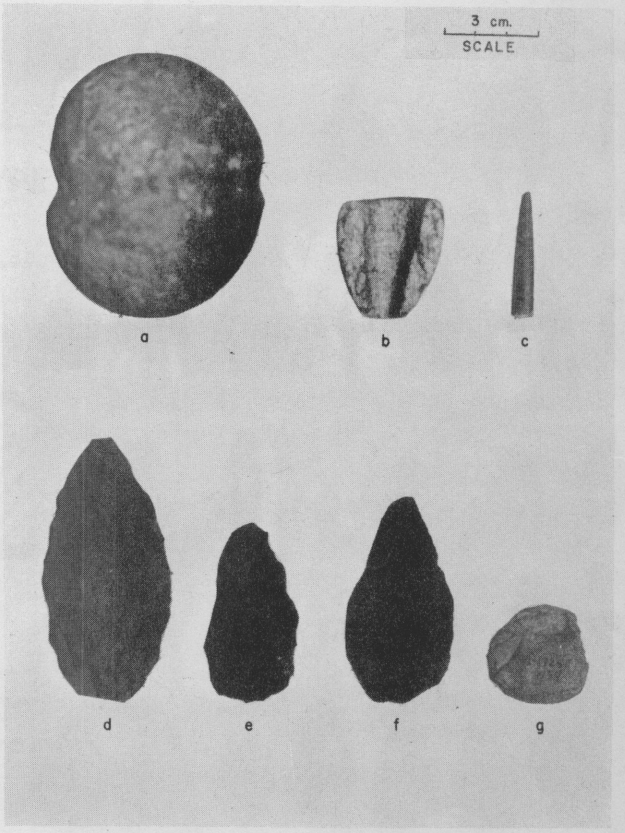
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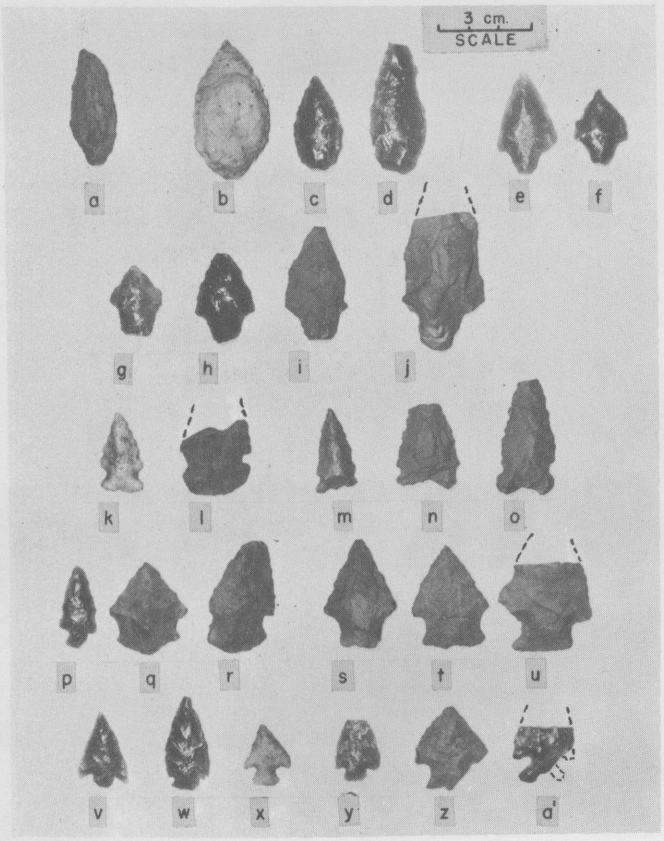
Plate I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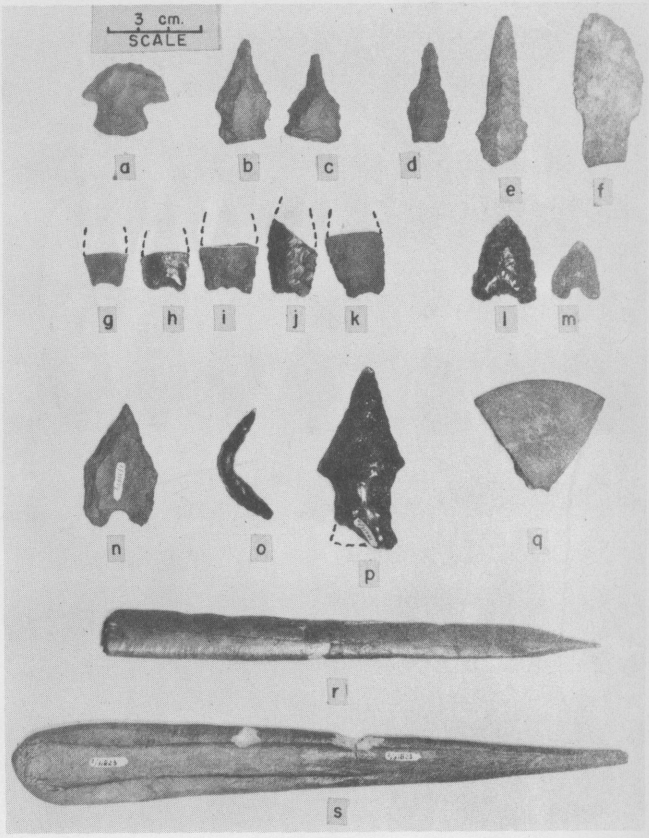
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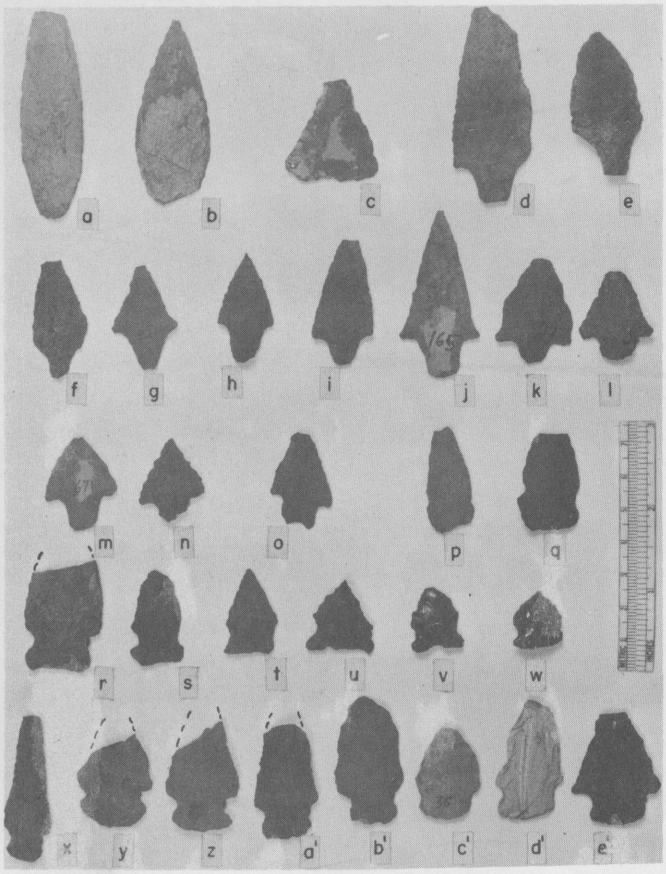
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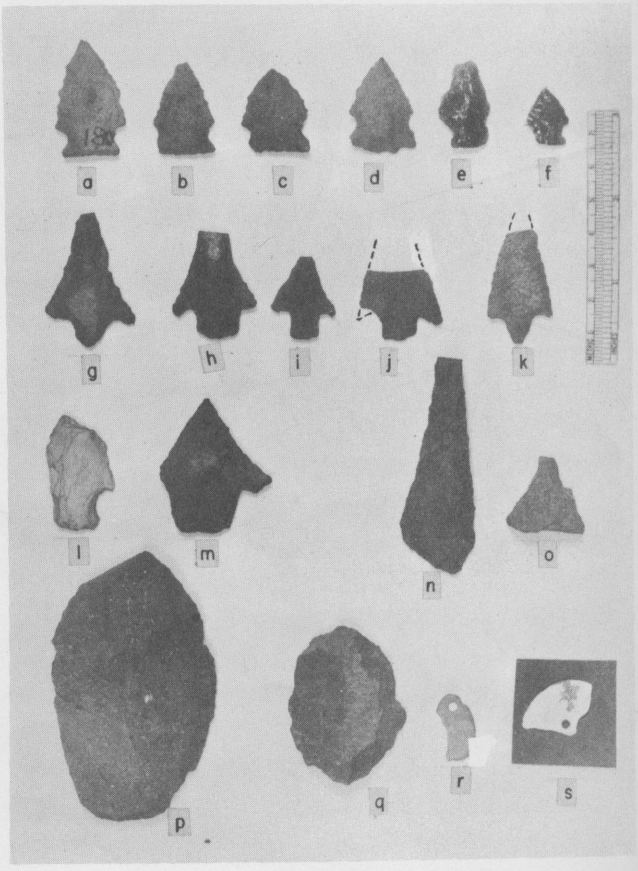
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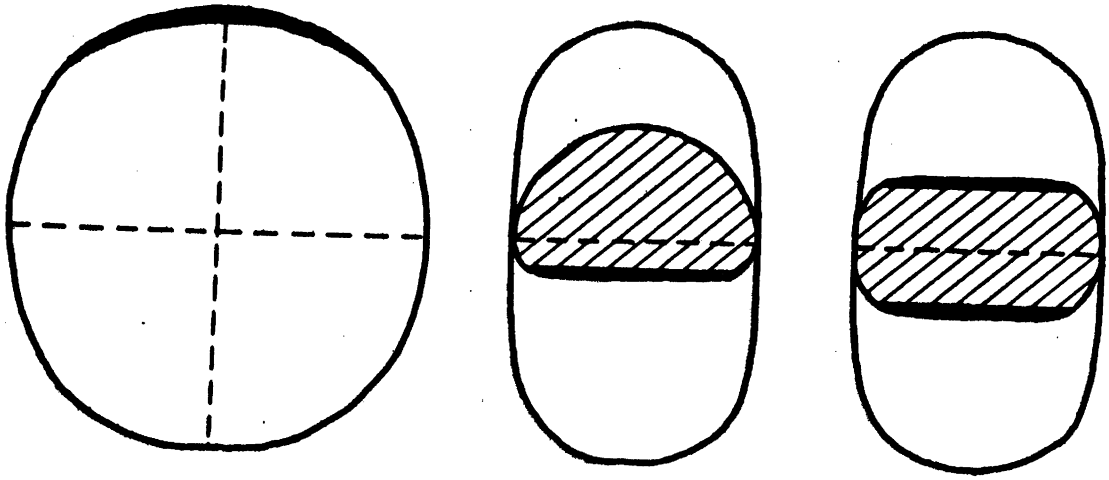
Plate 2



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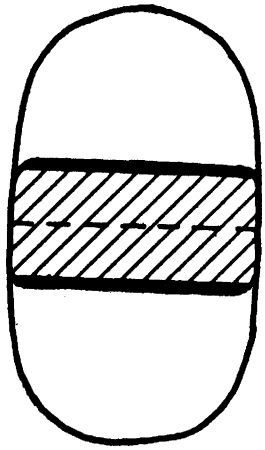

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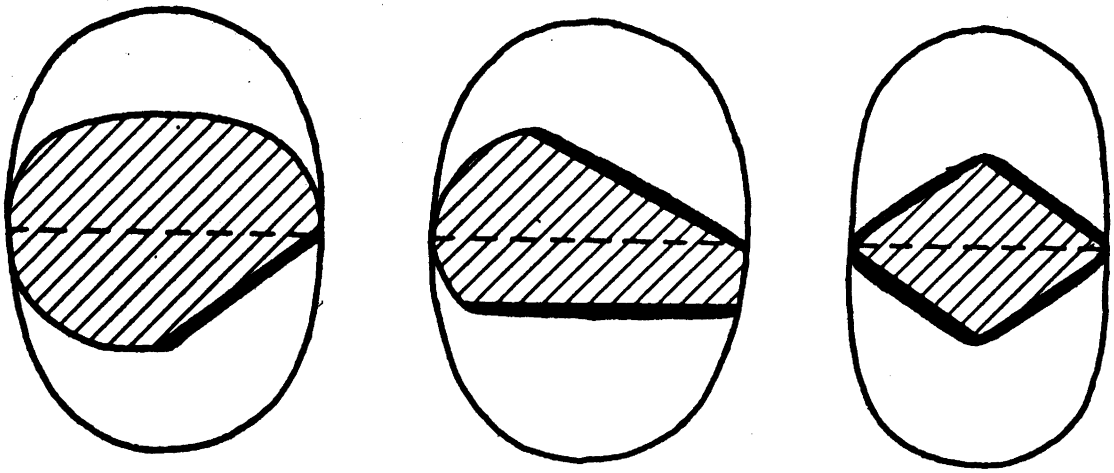

TYPE III

FIGURE 1