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THE ARCHAEOLOGY OF THE KARLO SITE (LAS-7), CALIFORNIA

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ABSTRACT

Prior to the excavation of the Karlo Site in northeastern California, no open archaeological sites in the western Great Basin had produced material in sufficient quantity to allow attempts at broad interpretations of the prehistoric cultures of the region. By far the greatest source of archaeological information had been the dry caves, such as Lovelock and Humboldt Caves. Unfortunately, such caves, although providing a variety of perishable and imperishable artifacts, seem primarily to have been utilized as cache spots rather than as ordinary habitation places. Data from the Karlo Site, including those concerned with a burial complex (cremations and burials), are set forth here with the idea of filling the gap in our knowledge of the day to day affairs of the prehistoric inhabitants of the Great Basin.

From the "wet" deposit of the Karlo Site were recovered a great number of stone, bone, and shell artifacts. Some of these, by association in the deposit and by their similarity to forms from other parts of the Great Basin and from Central California and the Southwest, indicate fairly close relationships which may date back to some three thousand years ago.

Evidence referring to living structures and detailed analysis of projectile points and shell beads and ornaments from Karlo is presented. A review is given of projectile point types recovered by J. D. Jennings from Danger Cave in western Utah, for the purpose of facilitating comparisons between the Danger Cave specimens and those from Karlo, which appear to be remarkably similar to each other when the relatively great distance which separates the two sites is considered.

The virtual identity of some of the shell bead and ornament types recovered at Karlo with specimens first known from Early Horizon Central California (ca. 3500-4000 years B.P.) is utilized as evidence to suggest a possible beginning date for the Karlo site.

Comparative data from late prehistoric sites in the general region of the Karlo Site as well as ethnographic data from the local Wadátkut (Northern Paiute) are given throughout the paper, to support the suggestion that the site may have been occupied seasonally but otherwise was never abandoned for appreciably long periods throughout its history. During this time, it appears that the people, or peoples, who lived at the site made but few significant changes in their basic way of living. (Ed.)*

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INTRODUCTION

Archaeologically speaking, northeastern California was inadequately known until quite recently despite the fact that large local collections have been amassed by casual curio seekers. In the past few years, however, qualified students have made a series of investigations in this region, with the result that it has been possible to relate its prehistory to that of the more well-known surrounding areas (Riddell, 1958:41 ff.).

Hitherto lacking in both temporal and cultural information was the Honey Lake Valley-Madeline Plains area of Lassen County. Bordering the state of Nevada, this area, physiographically, is a portion of the Great Basin and is characterized by a vegetation cover of juniper and sage within a predominantly volcanic landscape. In the ethnographic period, this region practically coincided with the territory claimed by the Wadátkut or Honey Lake Paiute (Riddell, n.d.b). At the first recorded contact with the whites in 1850, this Paiute band, apparently composed of two groups, probably did not exceed three hundred persons. At the present time only remnants of these people continue to live in their homeland.

Controlled archaeology in the Honey Lake-Madeline Plains area of northeastern California first was carried out at Tommy Tucker Cave (Las-1), a dry cave above the east shore of Honey Lake which was excavated in the winter of 1941-42, and again in February, 1949 (Fenenga and Riddell, 1949; Riddell, 1956). In the meantime Amedee Cave (Las-90), close by Tommy Tucker Cave, was excavated in July, 1951. Both before World War II and after, site surveys were made with the result that approximately two hundred sites have been recorded, a fraction of the probable total number of sites in this region (Riddell, n.d.a). Most of these field investigations were made by the author, often with the aid of students from the University of California Department of Anthropology. Financial support and equipment were provided, in most instances, by the University of California Department of Anthropology and by the University of California Archaeological Survey.

Among the sites recorded during the various surveys of this region was the Karlo Site (Las-7). This site had been reported in 1936 or 1937 by Edwin H. Allison, who had lived at Karlo, a Southern Pacific Railroad water stop. His accounts of the site ultimately prompted a group from the Sacramento Junior College to check it as a potential site for excavation. In the summer of 1939, Franklin Fenenga, Garth Murphy, Harry Riddell, Jr., and the author visited the site. Several small test squares were excavated and a midden deposit several feet deep was found. At that time a series of artifacts, including the only known glass trade bead to come from this site, was collected.

In view of my experience with archaeological sites in the general Honey Lake region, it was significant to me that this site had a much greater depth of deposit than is usual in desert sites of this area. The importance of excavating Las-7 was immediately recognized, but circumstances prevented any excavation until the fall of 1954 when my brother, James F. Riddell, and I opened two 5 by 5 foot squares to base (approximately 3 feet). The artifactual richness of the deposit as determined by screening each shovelful reinforced my determination to excavate the site before it could be further damaged by vandals and by the Lassen County Road Department, which was using the sandy site deposit for road fill. Fortunately, Dr. R. F. Heizer, Director of the University of California Archaeological Survey was sympathetic with my plan, and in the summer of 1955 I returned to Karlo with a crew and spent approximately two months excavating the site. At that time I was Assistant Archaeologist for the University of California Archaeological Survey, and in charge of the Karlo project.

Permission to excavate was obtained from the Cliff Cattle Company of Denver, Colorado, through its local representative, Mr. Carl West. Camp was conveniently established within the shallow borrow pit at the site. The success of the work at Las-7 is directly due to the cooperative group of students and others who participated in the excavation. It is my pleasure to acknowledge the generous support of the following persons who formed the archaeological crew: David Biernoff, William Burd, Frank Clune, Eugene Friedman, Bernard Fontana, William Hohenthal, Edward Lanning, Harold Nelson, Dorothy Riddell, James Riddell, and Robert Squier. Four of the group remained the full time; the others gave what time they could spare, from several days to several weeks. Particular thanks are given to Harry Nelson, whose culinary creations over the two-burner Coleman stove provided nourishment and conversation pieces.

Earlier I mentioned the role played by the University of California Archaeological Survey at Berkeley, and its director, R. F. Heizer. This support was vital to the project and is hereby gratefully acknowledged.

Except for several obvious instances, all of the pen and ink illustrations for this report were prepared by Donald F. McGeein. The excellence of his work is apparent, and I am very grateful that he volunteered to make these illustrations. His unstinting support of this project is recognized and I extend to him my sincere thanks.

Many other individuals have given generously of their time and ideas to help this project, and if I do not specifically mention them by name it does not mean that their support is any the less appreciated. I am particularly indebted to my sister-in-law, Doris Riddell, whose home in Susanville was always most hospitably open to me and my dusty, ragged, unshaven fellow excavators.

PHYSIOGRAPHIC, FAUNAL, AND FLORAL CONSIDERATIONS

Honey Lake Valley is situated immediately east and at the base of the northern extremity of the Sierra Nevada in northeastern California. Some fifteen miles north of Honey Lake Valley is Secret Valley, in which the Karlo Site is located. Directly to the north, over a low mountain pass, is an extensive, flat plain, the bed of Pleistocene Lake Madeline (see Map 1). These three contiguous areas form an ethnographic territorial unit which was the homeland of the Wadátkut Paiute. To the west were the Pit River groups, the Achomawi and the Atsugewi. The Northeast or Mountain Maidu were on the southwestern border, and the Washo were on the southern border. Paiute groups related to the Wadátkut bordered on the north and the east.

Honey Lake Valley at one time formed a western arm of Pluvial Lake Lahontan although Lake Madeline seems to have been a separate entity at that time. At present, as in the past, Secret Valley drains into Honey Lake Valley, although in Pluvial times a large body of water must have accumulated in this basin. Evidence of such a lake is in the form of lacustrine deposits lying below several feet of alluvium. The banded pumice sands beneath the culture deposit at Las-7 have been water deposited, presumably at a time when lake waters covered the site area.

At the present time Honey Lake is a playa with a maximum depth of approximately 12 feet. In particularly dry years the lake becomes a vast dusty plain, fifteen miles across. Susan River and Long Valley Creek are the sources of the major portion of the water entering Honey Lake. The delta region and the sloughs of Susan River were of prime importance as a source of fish and water-fowl for the Wadátkut.

Secret Valley, with its major component, Mud Flat, is strictly within a juniper-sage environment as contrasted to the Honey Lake region which is bordered by the Sierra Nevada, with a characteristic vegetation of pines and oaks. In Secret Valley there are numerous permanent springs flowing out of the lava formations laid down by extensive volcanic activities which produced the Modoc Lava Sheet. These warm springs supplied water to the Wadátkut who made Secret Valley their home, and are the sources of streams which sink into meadowlands of wild grasses, or drain into Secret Creek and ultimately find their way into Honey Lake, fifteen miles to the south. Endemic fishes in these streams provided a small portion of the food resources of the Wadátkut.

Madeline Plains, some fifteen miles north of Secret Valley, has an environment essentially the same as the latter area. The Wadátkut report, however, that due to the severity of the winters they chose not to live in the Madeline Plains during that season, but instead would winter in Secret Valley or Honey Lake Valley. That important villages existed in Madeline Plains is attested by the large surface areas showing occupational debris which have been recorded there, in a region which now consists of partially stabilized sand dunes not far from a stream. The stream, however, now sinks into the ground. Within this sand dune area (Madeline Dunes, or site Las-9; Map 1) concentrated occupational evidences are found; among these certain projectile point types and cremations indicate a close relationship or identity with the Karlo Period of occupation (defined below) at the Karlo Site in Secret Valley.

Manifestations of the Karlo Period also have been recorded at Las-45, an extensive habitation site at the northeast corner of Honey Lake, a mile or more from the present shore and in the vicinity of some hot springs. The evidence is in the form of burials with square abalone shell beads which are identical with those found with burials at Las-7.

The Karlo Site is but a few minutes walk from a clear stream flowing from a large spring. The stream flows through the sagebrush flats out into meadowland a short distance southeast of the site. The area is bounded on the north and partially on the east by a small ravine in which an intermittent stream flows from an extremely limited watershed. Water for the village may have been supplied by a spring which was reported to have been at the southern periphery of the site. The physical remains of the defunct spring at the time of our excavation consisted of a shallow, basin-shaped depression a few feet across, in which a quantity of flat scales of basalt rock lay without pattern. Excavation within this feature revealed nothing of significance.

A variety of mammals inhabit, or formerly inhabited, the Wadátkut territory, including such Insectivora as moles and shrews. The Carnivora include grizzly and black bears, weasels, striped and spotted skunks, badgers, coyotes, and bobcats. Among the Rodentia are marmots, a variety of ground squirrels and chipmunks, gophers, mice, kangeroo rats, wood rats, voles, muskrats, and porcupines. Cottontails, pigmy rabbits, black-tail and white-tail jackrabbits are Lagomorphs which inhabit the area. The list of Artiodactyla includes the white-tailed deer, the mule deer, the black-tailed deer, the prong-horn antelope, the mountain sheep, elk, and in limited numbers, buffalo.

Myriads of waterfowl of many varieties occurred aboriginally in the marshes, meadowlands, and sloughs in the Wadátkut territory. Fish were caught in most of the streams and bodies of water, with an emphasis on the delta region of Susan River and along Long Valley Creek. With respect to plant foods, the Wadátkut utilized acorns and a variety of bulbs, corms, and roots. Mustard and similar seeds were important to the Wadátkut, particularly those of Suaeda depressa, or Wada seed, after which these people were named. Currants, raspberries, chokecherries, elderberries, and roseberries were eaten. The seed of the sunflower was particularly important as a food, and was gathered in quantity at Mud Flat in Secret Valley. Insects such as crickets also were prized as a food. In fact, there were few edible items which escaped the larder of the Wadátkut. Since there are no indications of any major climatic changes of long duration in the Honey Lake Valley-Madeline Plains area in the past several millenia, it seems safe to say that the climate, and thus the fauna and flora, were essentially the same during the Karlo Period as they were during ethnographic times. In other words, there is no reason to believe that the people in this area three or four thousand years ago led a substantially different life from that of the ethnographic Wadátkut Paiute. Such a belief is substantiated mostly by the nature of the faunal remains recovered from the excavation at Las-7.

EXCAVATION METHOD

The site was mapped with the aid of a hand level and level rod, and surface contours with a one foot interval were plotted (Map 2). A datum point was established at the southwest corner of the site area and a grid system for horizontal control was utilized. All horizontal measurements, ultimately referrable to Datum A at the southwest corner of the grid, were taken first east, and then north. North, for all measurements of a horizontal nature, refers to magnetic north. It will be noted that the pattern of excavated trenches is roughly cruciform, a pattern which was intended to allow a maximum coverage of the deeper portions of the site. In those areas in which burials and house features were encountered, it became necessary to expand the trenches into larger, rectangular areas. All squares measure 5 feet on a side, or a fraction thereof, and all were excavated to base.

The site deposit is a dark, sandy midden containing a considerable amount of thermal-fractured stone, including a high percentage of mano and metate fragments. The sand is not indurated, and excavation and screening were in no way difficult. All excavation, except when close, careful work was necessary, was done by shovel. Each shovelful was passed through a three-eighths inch galvanized wire mesh, and all specimens located vertically in one foot levels. This method was utilized in order to excavate as large a volume as possible, yet obtain a maximum number of specimens. More precise vertical control was not felt to be necessary because of the amount of human and rodent activity in the deposit evidently subsequent to occupation. The deposit was not totally mixed, however, and this is illustrated by the different frequencies (both intra- and inter-class), by depth, of the artifacts. It will be observed in some of the artifact tabulations below that within the various classes of artifacts many show a numerical clustering in the upper levels, while the reverse is to be noted for a few of the classes. If the deposit had been rendered totally mixed by human and rodent activity, one would not expect such recognizable clusters of artifacts, but would anticipate rather a fairly equal distribution of types throughout the cultural deposit.

Physical stratification of the culture deposit itself was at no time clearly observable, although a difference in soil color was occasionally discernible (cf. Fig. 1). This difference appears to be attributable to burrowing rodents having mixed the yellow, banded, water-deposited pumice sand of the base material into the lower levels of the dark, sandy culture deposit. The digging of intrusive pits by the original occupants also brought sterile base material up into the midden mass.

Since the base was reached at different levels in the various squares excavated, the volume of the arbitrary one foot levels (for the entire site) differed. A total of 246.25 cubic yards was excavated from the 0-12 inch level, constituting about 43 per cent of the total volume excavated. Excavated from the 12-24 inch level were 219.86 cubic yards, or about 31 per cent of the total volume excavated. From the 24-36 inch level there were 100.80 cubic yards excavated, or approximately 17 per cent of the total. Only 4.51 cubic yards, or about 8 per cent of the culture deposit, were excavated from the 36-48 inch level of the site.

The preceding data presented on depth/volume relationship are in part an explanation of why there is an observable trend for artifacts generally to be more numerous in the upper levels of the site. However, if the volumes of the 12-24 and 24-36 inch levels were increased (in abstraction) to equal the volume of the top one foot level, increase calculated therefrom would seldom be sufficient to reverse the trend or even to bring about a numerical equality between the levels. This is, of course, especially so in those cases where numerical superiority is actually found, from excavation, to be in the upper level. In other words, the smaller volume excavated from the lower levels is not the only reason for some classes of artifacts to be more numerous in the upper one foot level. Possibly artifacts tend to be concentrated in the upper level because of aeolian erosion carrying away the top soil and leaving the projectile points and other stone specimens concentrated in this level. For whatever reason, it is certain that some artifact types cluster at one level or another, while others do not.

ARTIFACTS

Considering the volume of soil excavated against the total number of specimens recovered, the yield at the Karlo site was high. Not only was the site rich, but the recovery conditions were optimum because of the nature of the loose, sandy midden deposit which easily passed through a three-eighths inch wire mesh.

In the sections following, the artifact categories are taken separately and the recovery and descriptive data reviewed. In most instances relationships with other areas are considered, although no claim is made for a complete and exhaustive study. Most highly stressed are comparisons of the Karlo specimens with archaeological material from Lovelock and Humboldt Caves in Nevada, Danger Cave in Utah, and Ventana Cave in Arizona. These important archaeological sites served as major focal points in the description and interpretation of the specimens recovered at Karlo. Comparisons, however, were not necessarily restricted to these sites for in some instances unpublished comparative data were utilized.

Spire-Ground *Olivella* Beads

The shell beads and ornaments recovered from the Karlo site have been analyzed by Bennyhoff and Heizer (1958) as part of a study of shell bead and ornament types of California and the Great Basin. In this study it has been noted (p. 81) that spire-lopped *Olivella* beads may be separated into two types, based upon diameter of shell. The division point between small and large beads thus is taken at 9 to 10 mm. in diameter. It is recalled (ibid.) that in Central California "small" beads predominate during the Early Horizon and Phase 1 of the Late Horizon (perhaps because the large shells were used to make quantities of the rectangular beads in both periods.

Considering the possibility that diameter of beads may be a critical point in chronological determination, I have divided the spire-lopped beads from Karlo into three sizes, as follows:

Type I - (Large) 11-13 mm. diameter

II - (Medium) 8-10 mm. diameter
IIA - (Medium, with end opposite spire also ground)

III - (Small) 4-7 mm. diameter
IIIA - (Small, with end opposite spire also ground)

In Table 1 is given the distribution of the bead types (including Type B, which are "barrel-shaped" specimens showing equal amounts of grinding on both ends of the shell).

TABLE 1

Location by Depth of Spire-Ground Olivella Beads from Midden Deposit

Depth (in.)	Type I	II	IIA	III	IIIA	B	Totals
No loc.	2	1	-	-	3	-	6
Surface	1	-	-	-	-	-	1
0-12	5	8	1	4	4	1	23
12-24	4	10	3	10	4	1	32
24-36	3	5	-	2	-	-	10
Totals	15	24	4	16	11	2	72

Two species of Olivella are represented in the Karlo series, viz., O. biplicata and O. baetica. The latter species is represented by three specimens out of a total of seventy-two recorded unassociated spire-ground Olivella beads recovered from the midden deposit.

Spire-ground Olivella beads recovered as burial complements are divided as follows: Type I, 6; Type II, 87; Type III, 60. The percentage of the large beads with burials contrasts sharply with that of such beads recovered without association from the midden. Of the 153 burial associated beads, 146 were of O. biplicata and 7 were O. baetica. The latter came with Burial 3 in association with 62 O. biplicata specimens. Of the total of 153 beads, all were spire-ground specimens, and 60 showed grinding of the opposite ends as well.

It is suggested from these and other data pertaining to shell artifacts (e.g., Haliotis and Mytilus square beads), plus the evidence presented by Bennyhoff and Heizer (op. cit.), that the small spire-lopped beads show closer relationship to Early Horizon in Central California rather than Late Horizon.

Square Abalone Beads

The most common bead type recovered at Karlo is the square, centrally perforated abalone shell bead (ibid., Fig. 1, 70). In size the beads of this type range from 6 by 6 mm. to 13 by 13 mm., with an average of 11 by

12 mm. The central perforation in this bead type averages 3 mm. in diameter. Table 2, below, provides the depth location of beads recovered from the midden, and those recovered from burials and cremations.

TABLE 2

Midden		Burials	
Depth (in.)	Quantity	Number	Quantity
0-12	13	Bur. 2	100
12-24	16	Bur. 3	49
24-36	40	Bur. 7	18
No loc.	2	Crem. 2	190
		Crem. 5	506
Totals	71		863

Of the total of 863 beads from burials and cremations, 30 are of the green back abalone (Haliotis cracherodii), 82 of the red back abalone (H. rufescens), and 400 are ground down on the back, thus preventing identification of the species. The remainder are otherwise unidentifiable with respect to species.

Although the great majority of these beads have but a single central perforation, a few showed more than one hole. One bead with two holes, for example, was associated with Burial 3 (ibid., Fig. 1, 67). Its outside measurements were 10 by 12 mm. Three beads, two of green back and one of red back abalone, were found in association with Cremation 5. These three specimens have three perforations each (ibid., Fig. 1, 68). Also associated with Cremation 5 was a square bead with four perforations (ibid., Fig. 1, 69) made from the green back species of abalone.

Eighty-two per cent of the beads are between 10 and 12 mm. for both the width and length measurements. This average is similar to that of the square abalone beads of this same type found in Early Horizon sites of the Sacramento River Delta region of Central California. These beads are most typical of the Early Horizon, although they also occur in the Middle Horizon. The recovery of such beads at Karlo is another tentative indication of temporal and cultural relationships between this site and the Early Horizon of Central California.

As noted above (p. 5), beads of this type have been recovered from the extensive archaeological site near Honey Lake (Las-45). This may demonstrate that the Karlo Period (see Table 28) is not restricted in its areal distribution within the Honey Lake-Madeline Plains area.

Square Mussel Shell Beads

Similar in every respect to the square abalone shell beads except in kind of shell are the square mussel shell (Mytilus californianus) beads (ibid., 1, 70). These beads range in size from 7 by 7 mm. to 13 by 14 mm., with average dimensions of 11 by 12 mm. A total of 142 beads was found--4 specimens came from the midden deposit and 138 occurred with burials, in the following numbers: Burial 2, 20; Burial 3, 2; Burial 7, 3; and Cremation 5, 113. Of the grand total of 1076 square beads of abalone and mussel shell at Karlo, 13 per cent are of Mytilus.

The square abalone and mussel shell beads from Karlo are virtually indistinguishable from those recovered from sites of the Windmiller facies of the Early Horizon of Central California. These square beads and thick rectangular Olivella beads (see below) "appear to reflect a widespread temporal horizon" (ibid., pp. 64-65). These three bead types are found in three cultural assemblages of Central and Southern California as well as from sites of the Early-Transitional Lovelock Complex of west-central Nevada and northeastern California (ibid., Table 2).

Miscellaneous Shell Beads

Rectangular Olivella beads: Seven rectangular Olivella beads (ibid., Fig. 1, 16) were recovered from Burial 7 and one specimen from Cremation 5. These eight beads average 8 by 6 mm. in length and width, and form a complex with the other shell beads and ornaments which probably represents the Early Lovelock period (see p. 91a). Beads of this type were recovered at Lovelock Cave, from Grave 18, which has been assigned to the Early Lovelock period (ibid., p. 63).

Scoop Olivella bead: Only one bead of this type (measuring 10 by 9 mm.) was found at Karlo, and it came from the midden in the 12-24 inch level. Since this bead type is relatively rare, it has not been possible to obtain clear association for it in the sites from which it is recorded in the Great Basin. Bennyhoff and Heizer (op. cit., p. 69; Fig. 1, 44-46) see indications of a Middle Horizon dating for this type.

Oval Olivella beads: Of the two beads of this type, one came from Burial 2 and one from Burial 7. Both specimens measure 10 by 8 mm. Bennyhoff and Heizer (op. cit., p. 70; Fig. 1, 47-49) feel "that the oval Olivella bead in the Great Basin may be a Middle Horizon type, perhaps derived locally from the 3b1 Olivella bead."

Macoma clam disks: Of the five specimens of this type of bead, two came from the 12-24 inch level, one from the 24-36 inch level, one with Burial 29, and one was without location. These beads range in diameter from 7 to 11 mm., with an average of about 8 mm. All measure 2 mm. in thickness, except one which has a thickness of 3 mm. "The Macoma clam disks represent a very rare type in California, the known distribution of which is limited to five interior sites of the lower Middle Horizon. The relative high frequency of such beads in the Great Basin is therefore unusual and might indicate a northern coast source" (ibid., p. 65; Fig. 1, 52). Two beads of this type came from Lovelock Cave and six came from site Ch-2 in west-central Nevada (ibid., Table 3, p. 75; Map 1).

Abalone Ornaments

The abalone ornaments from the Karlo Site and the shell beads reported in the preceding section have been analyzed by Bennyhoff and Heizer (op. cit.). Following, however, is a short recapitulation of their findings, using their typological designations.

Type A1 is represented by three specimens, one from the 0-12 inch level of the midden and two from Burial 2. The one complete specimen from Burial 2 has a length of 87 mm. All three are portions of the rim of the abalone shell. Because of the widespread areal and temporal distribution of the type, it constitutes a poor artifact type for the determination of cultural and temporal affinities. Bennyhoff and Heizer record its occurrence at Early-Transitional Lovelock Period sites, at sites of the Windmiller facies of Central California (Early Horizon), and at sites of the Berkeley facies of the San Francisco Bay area (where Early and Middle Horizon traits have been noted).

Type C(1)1 is a disk with a diameter of 30 mm. and with one central perforation and one edge perforation, recovered from Burial 31. Bennyhoff and Heizer record this ornament type from three other Early-Transitional Lovelock Culture sites and from sites of the Windmiller facies (op. cit., Table 2, p. 64; Fig. 1, 73).

Type C(2) is represented by three salvage (no location) specimens with average measurements of 14 by 17 mm., and with a form which is nearly circular. Six specimens of this type were recovered from Burial 7. These specimens all have two nearly centrally located perforations. Ornaments of this type have been found at other Early-Transitional Lovelock sites, at sites of the Windmiller facies, the Berkeley facies, and at sites of the Early Island Period of Southern California. One specimen of this type came from the Transitional levels of Lovelock Cave (ibid., Table 2, p. 64; pp. 63-64; Fig. 1, 74).

Type C(2)a differs from the preceding type in that it is additionally decorated with edge incising. Two specimens were recovered: one has a diameter of 18 mm., and the other a diameter of 33 mm. The comments upon the cultural and temporal affiliations for the preceding type apply equally to this type (ibid., Fig. 1, 75).

Type C(2)1 (Fig. 10g) is a circular abalone ornament similar to the three preceding types except that it has two central and one edge perforation. The single Karlo specimen came from Burial 8, and has a diameter of approximately 38 mm. This ornament type is shared by Early-Transitional Lovelock sites and sites of the Windmiller facies (Bennyhoff and Heizer, op. cit., Table 2, p. 64; Fig. 1, 76).

Two subtriangular, nondiagnostic abalone ornaments were recovered in the midden in the 12-24 inch level, and an unclassifiable fragment was found in the 24-36 inch level.

Projectile Points

A detailed study of the projectile points from the Karlo village site demonstrates the popularity of two basic techniques for the manufacture of these artifacts. The original occupants made their stone points in either a "leaf" (lanceolate) or a triangular form. With these two basic forms they employed a number of modifications to constitute the types and subtypes which are to be discussed in the following sections. Proof of this dual system is present in the recovery of points in various stages of manufacture, particularly of the triangular forms. Since the people who produced these projectile points appear to have made such a basic distinction, it seems useful to follow such a system in describing the points.

The triangular points have their greatest breadth near the shoulder, while the leaf-shaped ones have theirs at the "waist," i.e., near their centers. There are of course certain overlapping tendencies in these two basic forms, and between types and subtypes of either form. However, it is clear that the lanceolate points form a separate mass from the triangular ones, despite the numerically limited occurrence of specimens which might be placed in either of the two basic categories. In cases where it was not possible to interpret the intention of the point manufacturer, it was necessary to make arbitrary decisions on the placement of certain specimens.

The most important criteria used in preparing a point typology for the Karlo specimens are form and size. Execution (i.e., flaking excellence and technique) and material also were considered in a number of cases. The outline drawings of the projectile point types (see Figs. 4-7) are idealized and not necessarily to scale. Presented with each outline form is the maximum, the arithmetical mean, and the minimum length, width, and thickness, respectively, of the type. The typology, therefore, is two-dimensional since it considers both form and size. Size can be expressed in two ways, either by linear measurement or by weight. For present purposes the former method is used, although weight is given considerable attention in the overall study of the points. Although a generous amount of time was spent in preparing the present typological system for the chipped stone projectile points for the Karlo Site (and, incidentally, for the Danger Cave projectile points used for comparison), it is not entirely satisfactory since the solution arrived at may not reflect the true chronological relationships among the specimens. Despite its shortcomings, however, the system reveals a number of interesting relationships which may be useful to future workers in the region.

Discussion and interpretation of the various point types will begin with the proposition that there was a tendency for light weight points to be popular during the late cultural periods in the Honey Lake region, while heavier points predominated during an earlier period. Presentation of pertinent data at this point will establish a method for the possible temporal placement of some types in the series to be discussed in the following sections. The method is based on the strong probability that light weight points in late times were utilized exclusively with the bow and arrow, following the deëmphasis or partial abandonment of the spear thrower and dart.

In Figure 2 it will be seen that the mass of projectile points from Tommy Tucker Cave (Las-1) and Amedee Cave (Las-90) average lighter in weight than do those from the Karlo Site. Since the guess weights of the broken projectile points from the three sites follow the same pattern, when plotted on a graph, as do the complete specimens, it seems safe to use them in this discussion. For the purpose of testing the similarity of these two samples (i.e., that from Las-1 and Las-90 vs. that from the Karlo Site) the Chi-square test for goodness of fit (Fisher, 1950:78) is suitable.

When the two samples are combined, there is a total of 601 projectile points, 299 of which weight less than 2.2 grams, and 302 of which weigh 2.2 grams or greater. Therefore it is to be expected that a random sample chosen from the total number of projectile points at any one, or as in the case below, two, sites would be divided into the same proportions. Actually, the projectile points from the two cave sites are divided into the proportions presented in the following table.

TABLE 3

	< 2.2 gms.	> 2.2 gms.	Total
Expected (E)	41	41	82
Observed (O)	62	20	82
$\frac{(E-O)^2}{E}$	10.8	10.8	21.6

The figure, 21.6 is the chi-square value with one degree of freedom. This figure represents a probability of less than 0.01 (Fisher, op. cit., p. 112). In other words, if this were a random sample chosen from the total population of projectile points at the two sites, the chance of such a poor fit, or an even poorer fit, is less than one in a hundred. Since this is less than the usual level of significance (0.05), we may safely assume that a real difference exists between the two groups (lighter and heavier) of projectile points. The two cave sites (Las-1 and Las-90), which are considered to be primarily late in time (extending into the protohistoric and historic periods; Riddell, 1956:44) yield, predominantly, projectile points of weights which cluster around 1.2 grams, i.e., light points.

If light weight points generally can be assumed to be temporally late in the greater Honey Lake region, the majority of the small, light points from Karlo can, on the same assumption, be assigned to that period. Proof of a late occupation period at Karlo is observable in the form of nonmineralized burials and a single glass trade bead. Since this additional evidence demonstrates a period of late occupation for the site, the placing of the light weight points in this period seems reasonable. The Karlo projectile points which cluster around the 1.2 grams weight will, for the most part, be considered to be, therefore, representative of the Late Period.

Given below are the descriptions of the various projectile point types, together with comments considered to be of relevance. In agreement with other sections of this report, Levels 1, 2, 3, and 4 stand for surface, 0-12, 12-24, and 24-36 inches from surface, respectively.

Type 1 (50 specimens--see Fig. 4) is composed of five subtypes consisting of triangular blades with differing base shapes. The bases range from convex (a-37[1]), straight (b-3), concave (c-8), deeply concave or V-notched (d-1), to diagonal (e-1). The edges may be convex, straight, or concave, and may occasionally exhibit wavy serrations. Those specimens with convex sides tend to blend into the lanceolate form as the convexity increases, and the maximum blade width occurs closer to the tip. The points of this type range in weight from 0.5 to 6.8 grams, with a clustering between 1.0 and 2.0 grams. They do not tend to be heavier in weight in the lower levels of the deposit.

Type 2 (70 specimens--see Fig. 4) are simply Type 1 points which have had notches placed laterally near their basal ends. The stem resulting from the notching from the blade edge can be considered as an "expanding" stem, which may or may not be as wide as the blade. This type has been divided into five subtypes on the basis of differing base forms. The specimens have bases which range from convex (a-19[2]), straight (b-21), concave (c-20), notched (d-8), to irregular (e-5).

The edges of the Type 2 projectile points exhibit the same range of form as the Type 1 specimens, i.e., they may be convex, straight, or concave. Some subtypes of point Types 1 and 2 show a constructional relationship, since a number of Type 1 specimens found could also be classified as incipient Type 2 or Type 3 pieces. Type 1 projectile points from this site in some cases, therefore, could represent a preliminary step in the manufacture of Types 2 and 3 projectile points, and possibly of the other basically triangular (as opposed to lanceolate) point types. This is not to say, however, that all Type 1 points are to be considered a preliminary phase of manufacture of the other triangular types.

The specimens of Type 2 range in weight from 0.4 grams to over 10 grams. However, the greater number of Type 2 points weigh between 1.0 and 2.0 grams and the heavier weight (over 10 grams) is represented by but one specimen. There is no observable tendency of an increase in weight of points with an increase in depth in midden.

Type 3 (198 specimens--see Fig. 5) have been noted above as being closely related typologically to Types 1 and 2. They differ from Type 2 in that the notches originate on the basal edge of the triangular blade rather than on the lateral edge. The four subtypes of Type 3 are determined by the base shape, viz., convex (a-59), straight (b-56), concave (c-50), and notched or bifurcated (d-33). The edges of this type extend through the same form range as do those of Types 1 and 2. The method of notching produces a discrete stem as well as barbs or tangs.

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1. Total number of specimens of this subtype.
2. I.e., subtype 2a, consisting of 19 specimens.

Type 3 projectile points range from 0.4 grams to more than 10 grams in weight. Again, the greater number of points weigh between 1.0 and 2.0 grams; for example, all 22 points (from Level 4) of this type weighed around 1.4 grams or slightly more. The absence of projectile points of Type 3 weighing less than 1.0 gram should here be noted.

Type 4 (20 specimens--see Fig. 5) projectile points resemble points of subtypes 2d and 3d. There is enough difference between the points, however, to merit presenting them as a separate type. The difference is in the concave, notched, or bifurcated stems of Type 4, which sometimes are expanding but also are often found to be parallel, or even contracting. The basic form, before notching, was quite likely triangular, like Type 1 points. Heavy corner notching has tended to make large, open notches with barbs little more than shoulders. The notching of the stems completes the singular appearance of this type. For refinement of definition, this type has been divided into those specimens with long (a-16), medium (b-3), and short (c-1) stems. The edges exhibit the same range of variability as do those of the three previously described types.

The Type 4 specimens range in weight from 1.3 to 3.7 grams, and occur in all four levels. It is interesting to note that points under 1.0 gram do not occur in this type, and that more than half the specimens weigh more than 2.0 grams. This suggests that they belong to the Karlo Period of occupation of this site rather than to the Late Period. Substantiation of this is given by the recovery of a subtype 4a point (1-197113) with Cremation 5 (Pl. 3e).

Type 5 (31 specimens--see Fig. 5) projectile points have been referred to as "Shoshone" points, and more recently as "Desert Side-notched" points (Baumhoff and Byrne, 1959). They are considered diagnostic of the late cultural periods in certain regions (ibid.). In the general Honey Lake region (including Madeline Plains) of Lassen County, these side-notched points are considered to be typical of the Amedee Phase of the Late Period (see section following on Danger Cave projectile points). Excluded from this category, however, are sixteen Type 5 points, described below, which are larger and heavier than the average point of this type usually found in California or the Great Basin. There is reason to suspect, because of the greater size and weight due to the manufacturing technique of these points, that a significant temporal difference exists between them and their smaller counterparts.

Subtype 5b (9 small and 16 large specimens) points have side notches and concave bases. Subtype 5c (3 specimens) is the same except that the concave base is notched at its center-point. Subtype 5d (3 specimens) is the same in general appearance as the other subtypes, except that it has an irregular, unfinished base. Subtype 5a points (i.e., those with straight bases) and triangular points with V-notch bases do not occur at Karlo.

The large (subtype 5b) points range in weight from 1.5 to 8.0 grams,[3] with a clustering between 2.0 and 3.0 grams. The side-notches may be characterized as deep and narrow, and carefully made. The bases range from nearly straight to concave, with the latter form most common. The large subtype 5b points were subjected to the chi-square test for the goodness of fit without conclusive results. It appears that they did not find their greatest popularity in the lower levels of the deposit. Although these points tend to merge with the small subtype 5b points in length, width, and thickness (see Fig. 5), they are named here "Madeline Dune Side-notched" to distinguish them from the Desert Side-notched types.

The small (subtypes 5b, c, and d) specimens range in weight from 0.5 to 5.3 grams, with a clustering between 0.5 and 1.0 grams. The heavier of these small specimens, it may be argued, should not be considered under this classification, but should be placed with the heavier subtype 5b points discussed above. Only four small specimens,[4] however, range into the heavy category and these, furthermore, do not exhibit the deep, narrow, and carefully made side notches which are considered important criteria for the determination of the heavy (subtype 5b) category.

A chi-square test for goodness of fit did not support the idea that the light weight Type 5 points tend to be more popular in one level than in another. A larger sample of both light and heavy Type 5 points might, however, show results in this direction. It must be confessed that this is only speculative since the small number of all Type 5 points (31) is not sufficient for adequate statistical analysis (see comparative section on Danger Cave points and the discussion of Type 5 points).

Type 6 (11 specimens--see Fig. 6), although numerically insignificant, attain some importance because of their probable association with Burials 23 and 29, and with Cremations 1 and 9. A nearly matched pair of points of subtype 6a were recovered in the vicinity of Burial 29 and are regarded as being a portion of the grave offering. The mineralized bones of this adult male burial strongly suggest that it has Karlo Period (Table 28) affiliations. Both of these points, as well as the single subtype 2a point, also in probable association with Burial 29, have wavy serrations.

Type 6 points are impressive because of their concave, slightly wavy, serrate edges, and because they are quite linear in form. The majority are manufactured from basalt; the sides of the stems are parallel, or nearly so, and the bases are either concave (a-8), straight (b-1), or rounded (c-2).

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3. Eleven guess weights and one actual weight.
4. Three fragmentary specimens classed as small have estimated weights of from 2 to 2.5 grams each. The complete specimen weighs 5.3 grams.

The points give the impression of having been made by one individual, i.e., in length, width, material, form, and execution they form a small and typologically discrete unit. The fact that specimens of this type occur at other sites in the greater Honey Lake region is evidence that the few specimens at Karlo are not to be considered as unique.

The specimens assigned to this type range in weight from 0.9 to 6.4 grams, and average 4.0 grams. The specimen weighing 0.9 grams is of obsidian and otherwise departs from the "ideal." It is possible that this specimen is not properly categorized, although in shape it most closely conforms to Type 6. Those seemingly associated with Burial 29 are in the heavier weight bracket. Type 6 points observed from other sites also belong in this heavy category. If weight may be considered as of use in temporal placement of projectile points (as discussed in a preceding section), it is possible to suggest that the Type 6 points are a manifestation of the Karlo Period. Their probable association with the mineralized remains of Burials 23 and 29, and with Cremations 1 and 9 supports this contention.

Type 7 (9 specimens--see Fig. 6) points, like Types 6 and 8, occur in but limited number at Karlo. The Type 7[5] specimens, in several instances, were manufactured from triangular blades in much the same fashion as the Type 4 points. The stems sometimes have parallel sides, although slight expansion can be detected on several pieces. The bases range from nearly straight to convex. The edges of the blade may be straight, concave, or convex, and several specimens have wavy serrations. Those points with convex edges overlap into the range of some of the Type 9 (lanceolate) subtypes, especially subtype 9i. The sometimes arbitrary decisions which were made in placing some of the specimens in Type 7 indicate that the typology used cannot always be expected to allow clear-cut placement into specific types.

Type 7 points range in weight from 2.3 to 8.7 grams. Of the nine points, seven are of basalt and two are of obsidian.

Type 8 (5 specimens--see Fig. 6) may be divided into subtypes with a straight base (a-3) and those with a concave base (b-2). The most distinctive feature of these triangular, side-notched points is that the greatest width occurs at the base. These points form a small but homogeneous group ranging from 1.9 to 2.2 grams in weight.

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5. Actually subtype 7a in contrast to subtypes 7b and 7c found at Danger Cave.

One of the specimens appears to have been originally a stemmed projectile point, supplied, after the breaking off of the stem, with two new binding notches.

Type 9 (196 specimens--see Fig. 7) projectile points are characterized by a lanceolate form, while the preceding eight types are of the basic triangular form, as previously discussed. Type 9 points are divided into nine subtypes, in which the extremes of one subtype may tend to blend into the extremes of another.

Subtype 9a (66 specimens) is characterized by a convex base, with a weight range from 0.7 to 9.8 grams. A tendency for the majority of these points to cluster in the 2.0 and 3.0 grams range was noted. Wavy serrations may occur on specimens in this and the other numerically significant subtypes.

Subtype 9b (26 specimens) points range in weight from 0.7 to 6.3 grams, with a concentration evident between 2.0 and 3.0 grams. This subtype is characterized by a straight base.

Subtype 9c (28 specimens) points are lanceolate blades with a concave base. The weight range for these points is from 0.3 to 5.9 grams, with a concentration of specimens in the 1.0 to 3.0 range.

Subtype 9d (34 specimens) range in weight from 1.3 to 8.6 grams. Most of the specimens in this subtype are subtype 9a points with the addition of a notch in their bases. They are not merely concave based points as typified by subtype 9c, but are basally-notched points. If there can be said to be an area of weight concentration for the few specimens of this subtype, it would be between 2.5 and 4.0 grams.

Subtype 9e (13 specimens) points range in weight from 1.4 to 5.8 grams with no clear indications of clustering at any point between these extremes. This subtype is similar to subtype 9d, but differs from the latter in that typical specimens have small shoulders, hence a stemmed appearance. This suggests a relationship in form to the Type 4 specimens.

Subtype 9f (14 specimens), with concave bases and edges recurved near the proximal ends, also tend to resemble, in their extreme form, some of the triangular points, in this case subtype 2c specimens. Subtype 9f specimens, however, did not occur in sufficient number to merit further elaborate comparison of this sort. They range in weight from 1.8 to 6.4 grams, and no clustering of points on the weight range is observable.

Subtype 9g points range in weight from 1.1 to 5.0 grams, with four of the seven specimens weighing between 4.0 and 5.0 grams. The specimens of this subtype can be characterized simply as subtype 9a points with shoulders. These two subtypes (a and g) blend well typologically into one another in their extremes.

Subtype 9h specimens are of slight numerical significance as only six have been recognized. They range in weight from 0.4 to 10 grams. Four specimens between these extremes range from 2.3 to 3.0 grams, in what might be considered a cluster. Probably the closest characterization of this subtype is that it is like subtype 9a, but with fairly shallow, wide notches on the sides near the proximal ends. In some cases a shouldered aspect is approached.

Subtype 9i is represented by only two specimens, both in fragmentary condition. Estimated weights for the two are 3.0 and 3.5 grams. These specimens resemble subtype 9h points, except that they have a straight rather than a convex base.

• Discussion: It will be observed in Figure 3 that the range in weight between the triangular and lanceolate point categories is approximately the same. Of possible significance, however, is the difference in the clustering of specimens at certain points within the weight range: this difference shows Type 9 specimens to be generally heavier than the triangular specimens. The difference is not great, to be sure, but it is an indication of the separateness of the two manufacturing traditions. Additional evidence pointing to two separate traditions may be seen in the tendency of the lanceolate points to be found in the deeper levels of the site. Considering the total of 582 projectile points (all types, both whole and fragmentary), it is observed that 13 per cent, 39 per cent, 32 per cent, and 16 per cent come from Levels 1 (upper), 2, 3, and 4, respectively. Assuming that all points contribute equally to make up these percentages, one would expect the lanceolate (Type 9) specimens to occur in the deposit in percentages similar to those given above. The lanceolate points, however, are aberrant in this respect. The chi-square test for goodness of fit (Fisher, loc. cit.) has been used with the results shown below.

TABLE 4

	Level 1	Level 2	Level 3	Level 4	Total
Expected (E)	25.50	76.40	62.70	31.40	196.00
Observed (O)	16.00	75.00	55.00	50.00	196.00
$\frac{(E-O)^2}{E}$	3.54	0.26	0.95	11.02	15.77

The chi-square value of 15.77 corresponds to a probability of less than .01. This means that a random sample of 196 projectile points, selected from the collection of 582 excavated points, would have less than one chance in one hundred of showing such deviation from expected depth distribution.

Type 9 has been found, by use of the chi-square method, to be significantly represented in the lower levels of the site. In addition, it seems that by the use of this same method (see Table 5) Type 1 presents an opposite situation, i.e., it is most popular in the upper levels of the site, and thus suggests a Late Period association.

TABLE 5

	Levels 1 and 2	Levels 3 and 4	Total
Expected (E)	26.50	23.50	50.00
Observed (O)	33.00	17.00	50.00
$\frac{(E-O)^2}{E}$	1.59	1.80	3.39

The chi-square value, with 1 degree of freedom, is expressed by the figure 3.39, and this figure represents a probability of less than 0.1. Thus if a random sample were chosen from the total population of projectile points, there is less than one chance in ten of such a poor fit, or an even poorer fit.

The remaining numerically significant projectile point types (Types 2, 3, and 4) also have been subjected to the chi-square test, and their level distribution has been found to be in agreement with that of the projectile points as a whole. No specific temporal association is thus indicated for these types. In sum, the present investigations suggest that Type 1 (light-"late") is more commonly found in the upper levels, while the Type 9 points (heavy-"early") are more commonly found in the lower levels. This is, of course, not incompatible with the proposition that two periods of occupation, an "earlier" and a "later," are represented at the site.

Since recognizable atlatl remains (in the forms of spurs and weights) have been recovered from the site deposit, it may be asked which of the specimens were dart points and which arrow points, and on what basis, such as type or weight, could these two types of projectile points be distinguished. On typological grounds there is evidence that Type 2d (?) and Type 9a (?) projectile points are associated with the use of the atlatl. The evidence is in the form of two stone points (similar to Type 2 and Type 9, respectively) hafted to two hardwood foreshafts recovered from the "Early Period" of Lovelock Cave (Loud and Harrington, 1929:25, 110 ff., Pl. 45c, d), and a hafted Type 9 point from Humboldt Cave (Heizer and Krieger, 1956, Pl. 15a). The Type 2 specimen from Lovelock Cave has a length (dimensions reconstructed from published photos) of 5.1 cm., and a width of 1.9 cm. The estimated weight is approximately 5 grams. The Type 9 specimen from Lovelock Cave has a length (also reconstructed from a photograph) of 4.5 cm. and a width of 1.5 cm. The estimated weight of the point is 3.5 grams. This evidence, when applied at least to the Type 2 and Type 9 Karlo projectile points, suggests that such points weighing between 3.5 and 5.0 grams, or more, are possibly dart points. It would seem that weight is one of the important factors (since weight is a reflection of size) to be considered in separating the dart points from the arrow points. It has been indicated in preceding sections that within each of the type groups from the Karlo Site there are some specimens which weigh below 3.5 grams. If the minimum weight limit for dart points is placed at about 3.5 grams, the remaining points, weighing less than this, must be assumed to be arrow points. However, an inspection of the weight graph for all the Karlo projectile points (Fig. 2a) shows a numerical clustering of the points about the 2.0 gram weight. It has been suggested above that projectile points weighing approximately 1.2 grams, or less, are arrow points (see Fig. 2b).

Furthermore, the popularity of the 2.0 gram weight for the Karlo points can be contrasted to the clustering of projectile points in the 3 to 4 grams weight range for the Danger Cave specimens. The difference in the clustering of points from the two sites, in different weight ranges, might be explained by supposing that the people of the Karlo Period may have been undergoing a period of transition in which the atlatl was being replaced by the bow. At that time the traditional dart points (with a tendency toward "lightness") could have been used on arrows. Such a transitional period already has been proposed for Lovelock Cave (Loud and Harrington, op. cit., p. 122), and could equally well have been present at Karlo. It may be suggested, therefore, that the points from the Karlo site weighing between about 1.2 and 3.0 grams were arrow and/or dart points, and those weighing 3.0 grams or more were predominantly dart points. Those weighing approximately 1.2 grams or less can be considered predominantly, or exclusively, as arrow points.

Associated, or presumed to be associated, with burials and cremations are a total of twenty-two specimens sufficiently complete to provide measurement data. These projectile points range in weight from 1.0 to 5.5 grams, with their average weight being 3.0 grams. These weight data agree with the contention made above that the earlier projectile points tend to be heavier than the later ones, i.e., those of the Karlo Period would have a heavier average weight than those from the Late Period. Because of their associational importance, the following data are given on these twenty-two projectile points.

TABLE 6

Burial or Cremation	Point Type	R. H. L.** M. A. No.	Weight (gms.)	Length (cms.)	Width (cms.)	Thickness (mm.)
Crem. 1	9a	1-197090	2.5	4.3	1.2	0.6
Crem. 1	Unique	1-197091	4.2	3.7	2.3	.6
Crem. 1	6a	1-197089	4.3	5.8	2.1	.6
Crem. 5	9g	1-197112	2.8	3.7	1.6	.6
Crem. 5	4a	1-197113	2.4	3.9	2.1	.6
Crem. 5	2a	1-197114	(1.8)*	(3.2)	(1.6)	.3
Crem. 9	4a	1-197130	2.2	3.6	1.9	.5
Crem. 9	4a	1-197139	2.5	4.0	2.1	.4
Crem. 9	6c	1-197138	2.2	4.1	2.2	.5
Crem. 9	6c	1-197129	3.5	4.3	2.4	.5
Crem. 9	1d	1-197931	2.5	4.0	1.4	.5
Crem. 9	3	1-197132	(1.0)	(2.8)	1.5	.3
Bur. 1	Undeterm.	1-196866	(3.0)	---	(2.0)	.5
Bur. 7	3d	1-196899	3.4	4.8	2.7	.5
Bur. 7	4a	1-196900	2.2	4.0	1.9	.5
Bur. 7	2a	1-196901	1.5	2.6	1.4	.6
Bur. 23	6a	1-197040	3.0	4.4	2.4	.4
Bur. 28	4a	1-196965	4.2	4.3	2.2	.6
Bur. 29	2a	1-196970	3.8	5.1	2.0	.5
Bur. 29	6a	1-196972	5.1	6.4	2.2	.6
Bur. 29	6a	1-196973	5.5	6.3	2.5	0.6
Bur. 29	Undeterm.	1-196971	(2.8)	---	---	--

* Parenthesized figures are estimates. ** See footnote p. 30.

Table 6 indicates that 50 per cent of the projectile points are of two types, viz., Types 4 and 6. Both types are rather specialized and outstanding in appearance, and, because of their dominant occurrence with what have been called Karlo Period burials, can be considered as period indicators. Despite the fact that Type 9 projectile points have also been mentioned as possible specific representatives of the Karlo Period, only two specimens (10 per cent of total) have been recorded with burials. One explanation for this may be that the more common projectile point types were not considered appropriate as grave goods. The occurrence of such a high percentage of Types 4 and 6 points with burials would suggest that these numerically unimportant types (considering the mass of projectile points found in the midden) were nonetheless important in the minds of the Karlo villagers. Type 6 points occurred with two different cremations and with two different burials, thus demonstrating that they were not a fortuitous inclusion with a solitary burial.

Referring to Plate 2, one notes that subtype 6a points are typologically quite similar to subtype 4a points. Size and material seem to be criteria which tend to set these subtypes apart. Although a typological distinction has been made between Types 4 and 6 points, they might almost as well have been considered as a single type. In any case, their association with burials and cremations suggests a close relationship with each other.

Danger Cave Projectile Points

Through the kindness of Dr. Jesse D. Jennings, it was possible for the author to study the chipped stone specimens from Danger Cave in western Utah. There is a striking similarity, in number as well as in form, of the points from the two discrete collections, from Karlo and Danger Cave. It was possible to separate for study 583 stone projectile points from the collection of chipped stone specimens from Danger Cave. Criteria used to distinguish projectile points from a category designated "knives," include form, execution, size, and use wear. The rather large, broad, heavy blades resemble point subtypes 9a or 1a, in a way, but their weight, thickness and width, as well as the fact that a number of these specimens have blunt points and no basal thinning, suggest use as knives rather than as projectile points. Striking platforms are observable on a number of these specimens, sometimes at both of their ends. Knives also often are indicated by the fact that one edge is straight or concave, while the opposite edge is strongly convex. The edges often exhibit wear through use.

A total of 587 projectile points from the Karlo site was assignable to types, but not all of these could be weighed because of the fragmentary condition of some specimens. At Danger Cave all of the projectile point types found at Karlo, except Type 8, were present. For the cave site, however, it was necessary to expand the typology to include Types 10 and 11, both of the triangular tradition (see Fig. 8). Besides the two additional types found at Danger Cave and not at Karlo, are subtypes designated as 2a1, 2b1, 2c1, 3a1, 3b1, and 3c1. These subtypes all fall into Karlo Types 2 and 3, but are generally set apart from the Karlo points on the basis of the occurrence of a basal notch. They are most like subtypes 2d and 3d of Karlo, which should be referred to as "bifurcated" rather than "notched." The occurrence of this basal notch may be of temporal significance, as it is a popular pattern in the lower levels of Danger Cave (Fig. 9). The popularity trend of these basally notched Types 2 and 3 points is to be compared with the trends of the other Types 2 and 3 points: Type 2 points (without basal notch) consistently are quite close to the line separating popular from unpopular, whereas Type 3 (without basal notch) exhibits a strong early unpopularity but marked late popularity, in contradistinction to the popularity trends of Types 2 and 3 points with the basal notch.

Some of the other Danger Cave types showed variations which also required splitting into subtypes, e.g., Type 7 into 7a, b, and c; Type 9 into additional subtypes 9j, k, and l; and subtypes of 9f and g into 9f<u>l</u> and g<u>l</u>. None of these additions is particularly significant numerically, and the splitting has been done for descriptive purposes. In addition, a number of the other Type 9 subtypes are numerically insignificant for both Danger Cave and Karlo. In fact, Type 9 points are about one-half as important numerically at Danger Cave as at Karlo. Leaf-shaped points have an early popularity at Danger Cave, but then lose it only to regain it to a lesser degree in the upper level (Fig. 9). This contrasts with the situation at Karlo in which the leaf-shaped (Type 9) points are popular in the lower levels and become slightly less so in the upper levels (Table 4).

Danger Cave Type 10 (Fig. 8) is of no importance as it is limited to a single specimen. Type 11 (Fig. 8), although limited to a dozen specimens, has an interesting distribution. Five come from Level II, two from Level III, two from Level IV, and three from Level V. It is possible that Type 11 is nothing but an extreme subtype, possibly of Type 5, and should be included with the body of points of that type.

The following table provides a numerical comparison, by type, of the projectile points from Danger Cave and the three Lassen County sites--Karlo, Tommy Tucker Cave, and Amedee Cave.

The numerical inferiority of the Tommy Tucker and Amedee Caves points as compared to those from Danger Cave and Karlo make cross-reference by percentage of type subject to misinterpretation. Types 1, 3, and 5 are most popular in Amedee Cave, and Types 1, 2, and 3 are most popular in Tommy Tucker Cave. Type 9 (leaf-shaped) is of no importance in either of the Lassen County cave sites. Types 1, 2, 3, and 9 are of greatest popularity at Karlo, and Types 1, 2, 3, 5, and 9 are the popular types at Danger Cave. Probably the most significant aspect of the typological comparison between the four sites is in the differing weights of the Type 5 points. Those from Amedee Cave range in weight from 0.3 to 0.8 gram, with an average of slightly more than 0.5 gram. Those from Karlo range from 0.5 to 5.3 grams, with a

TABLE 7

	Danger Cave		Karlo (Las-7)		T. T. Cave (Las-1)		Amedee Cave (Las-90)	
Type	No.	Per cent*	No.	Per cent	No.	Per cent	No.	Per cent
1	74	13	50	9	5	11	7	19
2	47	8	73	12	10	22	4	11
2a1, b1, c1	49	8	-		-		-	
3	136	23	198	34	27	59	15	42
3a1, b1, c1	76	13	-		-		-	
4	5	1	20	3	2	5	-	
5	75	13	31	5	1	2	9	25
6	1		5	1	-		-	
7	17	3	9	2	1	2	-	
8	-		5	1	-		-	
9	90	15	196	33	-		1	3
10	1		-		-		-	
11	12	2	-		-		-	
Totals	583	100	587	100	46	100	36	100

* Percentages to the nearest whole number.

clustering in the 0.5 and 1.0 gram range to form the "small" category of Type 5 points. Those forming the "large" category (i.e., Madeline Dune Side-notched) range in weight from 1.5 to 8.0 grams with a clustering in the 2.0 and 3.0 grams range. The range in weight for Type 5 points from Danger Cave is 0.8 to 11.1 grams with a majority of specimens weighing between 2.0 and 5.0 grams. Only four Type 5 Danger Cave specimens weigh 2.0 grams or less, out of a total of 58 such points weighed. The lightest specimen (0.8 gram) came from the top level. The next lightest (1.0 gram) point came from near the base of the cave, in Level II. Thus the greater number of Type 5 points from Danger Cave are in the "large" category, and all from Amedee Cave are in the "small" category. They are of about equal importance at Karlo, but with the "large" category having a slightly larger number (16 out of 27 specimens sufficiently complete for weighing). In short, the late site (Amedee) has light weight Type 5 points exclusively, and the site with the greatest antiquity (Danger Cave) has mainly heavy Type 5 points. The Karlo Site has a combination of both the light and the heavy Type 5 points. This condition supports the suggestion that Karlo has had at least two periods of occupation.

For completeness of description, it seems justified here to make a few comments on the Danger Cave point forms. For example, subtype 9c points often come close to subtype 1c points in form. Subtypes 9j and 9l, specimens with "basal" grinding, may represent knives. The "grinding" may represent edge use wear on the blade. The unground "blade" may actually represent the knife stem which was protected from wear, perhaps by a wooden handle. Subtype 7c is typologically close to subtype 4a. Type 11 may be said to be a variant either of subtype 2c or Type 5.

As previously indicated, subtypes 2a1, b1, c1, and 3a1, b1, c1 from Danger Cave are similar and in some cases nearly identical to Karlo subtypes 2d and 3d. However, Karlo 2d and 3d specimens, as a group, tend to have a bifurcated base while the Danger Cave specimens (2a1, b1, c1, and 3a1, b1, c1) are merely lightly notched. It is for these reasons that it is stated that such basal-notched points do not occur at Karlo or, if they indeed do, are but variants of the deeply notched (bifurcated) forms.

At Danger Cave there is some overlap between Type 2 and Type 3 points, and it is sometimes optional into which type some specimens may be assigned. However, the specimens have been divided into the two categories and a divergence in popularity by level is expressed in Figure 9b.

Large Chipped Stone Blades

In association with Cremation 1 were two large stone blades. The smaller (21.2 cm. long, 4.8 cm. wide, 1.5 cm. thick) one, an elongate, oval specimen is of basalt with one fairly blunt end. The edges leading to this end have been dulled through use, and traces of red paint adhere to one of its surfaces. The opposite end of the specimen obviously had been sharpened, but not used, before interment. The edges leading to this tip also are sharp and show no wear. High points on both flat surfaces of the specimen exhibit both wear and polish. The wear and evidence of sharpening suggest that it was a basically functional rather than a ceremonial piece.

The larger blade (with a reconstructed length of approximately 34 cm.) from Cremation 1 is of the same shape as the basalt blade but is made of gray, banded obsidian (1-197087). The maximum width is 6.2 cm. and the thickness is 1.4 cm. This specimen had been purposely broken ("killed") before being placed with the cremated remains. One end and a short median section are missing. The irregularity of the edges suggests use-fracturing, but obvious wear is lacking. This blade is so large that it would seem to be too clumsy to be functional as a knife for everyday use.

A fragment of a large obsidian blade was found in association with Cremation 9, apparently the remains of a large blade which had been "killed" (1-197140).

With Cremation 10 were found two almost identical obsidian blades (SIM[6] 119/172-3). Both had been "killed." In contrast to the blades from Cremation 1, these two blades are extraordinarily broad (Fig. 10), and have one blunt and one relatively pointed end. The edges of these two broad blades are similar to those of the large obsidian blade from Cremation 1, i.e., they appear to have been used sufficiently to produce fracturing at the edges. These outstanding chipped stone specimens also would seem, because of their size and shape, not to have been designed for common, everyday use. Perhaps these blades were considered as items of wealth, as among the ethnographic Klamath River tribes. If this were so, it would be a particularly early manifestation of this trait in California.

These large blades occur with cremations and most (four out of five) specimens have been "killed." It may be significant here to mention that the author found a cremation at Las-10 (ca. 1939), on the eastern edge of Madeline Plains, which contained an obsidian blade almost identical in size and shape to the basalt blade described above from Cremation 1 at Karlo. The blade from the cremation at Las-10 also had been "killed."

These large stone blades may have been, rather than wealth items, perhaps used by shamans. It is known, for example, that the ethnographic Wadátkut Paiute burned malevolent doctors, while ordinary individuals were buried. Traditionally, a person's belongings were either burned or buried with him. Among the effects of one of my Paiute informants, a woman shaman who died at the age of ninety-five years, was an obsidian knife of the same shape as the two recovered with Karlo Cremation 10. Her knife, however, was considerably smaller, and is reported to have been buried with her.

Ethnographic data collected from the Wadátkut is presented here merely to provide a possible explanation for the observable pattern of the occurrence of large stone blades with cremations at Karlo. It is possible that such a mortuary trait was retained for several millenia, and continued into ethnographic times. Other ethnographic traits retained (or at least, paralleling those) from the Karlo Period, however, do not necessarily suggest Paiute relationships. For example, the lemon-shaped charmstones found at Karlo are ethnographically used by the Klamath-Modoc people, and by the Achomawi and Atsugewi. These stones were recently used as gambling and hunting charms. Also, the hoppered(?) mortar and the blunt ended pestle so common at Karlo are not used by the Paiute but are typical of the Achomawi and Atsugewi and their neighbors to the west. More will be said later about the possible origin and relationships of the Karlo villagers.

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6. State Indian Museum, Sacramento, California.

Chipped Stone Crescents

Twelve specimens from Karlo may be placed in the category of chipped stone crescents. Several of them, because of their fragmentary condition are doubtful specimens, but have sufficient resemblances to the type to merit placement in this category.

Nine of the crescents are similar to specimen 1-196390 (Fig. 10e), which has one convex edge and one straight or slightly concave edge. Six of this kind are of agate or chalcedony, two are of obsidian, and one is of basalt. Two came from Level 1 (1-145368 and 1-196386), three from Level 2 (1-196388 [Fig. 10f], and 1-196389-90), and four from Level 3 (1-195780, 1-196332, 1-196392, 1-196393).

Two specimens are typologically distinct from the nine crescentic blades noted above. These two are nearly round in cross-section, and in outline are almost ring-shaped. One specimen from Level 3 (1-196391, Fig. 10b) is of obsidian; the other, from Level 2 (1-196387, Fig. 10c) is a fragmentary chalcedony specimen.

Additionally classifiable in the category of chipped stone crescents is the curved obsidian specimen with a bifurcated base from Level 3 (SIM 119/89, Fig. 10d [a base fragment probably in this same category also was found with Burial 7]). The illustrated specimen from Karlo is nearly identical to specimens recovered from a large mound at the confluence of the Deschutes and Columbia Rivers, in Oregon (see Pl. 3 which shows specimens from the Stiles Collection, Maryhill Museum, Oregon: communication from Dr. L. S. Cressman, who also supplied the photograph in Pl. 3). Also in the same collection are specimens closely similar to 1-196391 (Fig. 10b) and 1-196387 (Fig. 10c), the slender crescents with nearly round cross-sections. In the collections of the RHLMA[7] from Humboldt Lakebed, Nevada (site Ch-15), is an obsidian specimen almost identical in size and shape to specimen 1-196391 from Karlo. In addition, obsidian "fishhooks" evidently akin to the latter have been recorded from southeastern Oregon (communication with Mr. Louis Stanley, who has specimens from the vicinity of Lakeview, Oregon). All of these almost ring-like or crescentic-shaped objects may actually have served as fishhooks (Heizer, 1949, Fig. 34a, b).

The recovery of blade-type crescents like the nine nonring-like specimens described above from Lind Coulee Site in eastern Washington by Daugherty (1956:248-249, Figs. 21, 22), and from the Fallon Culture of west central Nevada (Grosscup, 1956) suggests considerable antiquity for this type of artifact. Also to Daugherty's list (op. cit., pp. 247-249) of

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7. Robert H. Lowie Museum of Anthropology, University of California, Berkeley.

occurrences of this type of artifact can be added specimens noted from the Tulare Lake region of the San Joaquin Valley of California (cf. Gifford and Schenck, 1926, Pl. 26; Harrington, 1954, p. 103); from Honey Lake Valley of northeastern California (RHLMA collections); from the Sacramento region, California (Payen Collection, Sacramento, California); from the Tule Lake and Clear Lake beds, northeastern California; from the Santa Barbara region of California, including the Channel Islands (see Jones, 1956, Pls. 122, 123); and from Owens Valley, California (RHLMA collections).

Kidder (1932, pp. 34-35, Fig. 17e, f) recovered "crescent-shaped objects" from Pecos, which he believes to be possible ceremonial forms. In size, shape, and probably function, the Pecos specimens are also comparable to the nine Karlo crescentic blades. A single crescentic blade of this type is illustrated by Jennings (1957, Fig. 156) from Danger Cave. Location data seem to be lacking for the Danger Cave specimen so a date for it is not possible. Its source within the cave deposit would be of considerable interest for temporal comparisons with the Karlo Site. Hunt (1953, p. 178) records a "crescentic stone" from a probable Early Fremont site in the La Sal Mountain area of Utah. These additional occurrences do not exhaust the known list of collections which contain crescentic stones, but they indicate more clearly the areal distribution of this artifact type.

Not only were chipped stone crescents used in antiquity, but they were used in the historic period by the Yokuts Indians of the southern San Joaquin Valley. An informant claimed to have seen such objects among the effects of a shaman who had died and was being buried. The specimens were buried with the shaman (personal communication with F. F. Latta). This does not prove that this specimen type was used exclusively by shamans, but it is at least one instance of such use. Kidder (op. cit., p. 35) recovered one specimen near a room in which a considerable amount of ceremonial paraphernalia was taken. He also recovered a "fine crescent-shaped obsidian object" from "an undoubtedly ceremonial cache" (ibid.). The former was from Pecos and the latter from the ruin of Puyé, both sites being located in north central New Mexico.

Miscellaneous Chipped Stone

Chipped stone artifacts other than projectile points were not common at Karlo. Most of the complete knives are illustrated in Plate 1C. Some of these are ovoid and others are triangular in outline; obsidian seems to be the most popular material used in their manufacture. Other materials include chalcedony, agate, and basalt. With respect to size and form, most of the Karlo specimens can be duplicated in the collections from Danger Cave.

Two triangular knives (1-197041 and 1-197042, Pl. 1D, right center) were found with Burial 23. One has a concave base and the other a convex base. The latter is of obsidian and the former is of a brown chert. These two knives were probably fitted with wooden handles, thus were quite similar to a specimen at the State Indian Museum in Sacramento, recovered from a cave in the Mohave Desert in Southern California. Another specimen, a larger, oval obsidian knife, pointed at both ends, came from Burial 4 (1-196886; Pl. 1D, lower right).

"Snub-nosed" end scrapers from Karlo are illustrated in Plate 1A (five specimens in top row). They are of chalcedony, chert, and agate. Heavy side scrapers are illustrated in Plate 1B (five specimens in top row, one on left in lower row). All of these specimens are of basalt and represent the best-made specimens of this category.

All the drills from Karlo are illustrated in the lower half of Plate 1A. It will be noted that there are two basic types, those with a widened base and those without. They are made of obsidian, chalcedony, basalt, agate, jasper, and chert.

Classified as gravers are ten obsidian specimens illustrated in Plate 1C (three in lower right corner) and Plate 3G. Some are merely flakes with prepared points, others are rather carefully chipped pieces with humpbacks.

Flakes and Flake Scrapers

Chipping wastage occurred profusely throughout the deposit and is, therefore, closely correlated with the number of projectile points recovered from the site. Obsidian was the most common type of material used, but basalt, jasper, chert, chalcedony, agate, opalite, and similar suitable stone materials occur. Among these vast numbers of flakes were a large number which show use-retouch. Presumably any handy flake was used when a wooden projectile shaft, for example, needed scraping. These simple tools were found at all levels in the deposit.

Obsidian, in some instances, was obtained in the form of water-rolled cobbles, a feature also noted at Las-9 in Madeline Plains.

Cores and Core Tools

Heavy stone tools formed by percussion-flaking around their surfaces were common implements at all levels within the midden deposit (Fig. 22i). These artifacts are almost exclusively of basalt and average approximately fist size. A number of the specimens exhibit no wear and appear to be nothing more than pieces of basalt from which flakes have been struck. Others show considerable wear and obviously were used as hammers. Others may have served as choppers and scrapers.

Manos

For purposes of convenient description, the manos from Karlo have been classified by use, shape, and size into the following categories:

I. Biface

A. Ovoid

1. Unshaped
2. Shaped
3. With lateral grinding
   a. small
   b. elongate

B. Rectangular

C. Irregular

II. Uniface

(Same subcategories as above)

It will be observed that there are two basic types of manos at Karlo, biface and uniface. Some are diminutive in size, and some are particularly elongate. The range and average dimensions for the manos are presented in Tables 8 and 9. In Table 9 the number and percent of Type I and Type II manos are given for each level.

Approximately 95 per cent of the manos from Karlo have been made from basaltic material, which occurs here abundantly in a variety of grades as well as degrees of vesicularity. Since the site is situated within a region which has been subjected to much volcanic activity, it is not surprising to find basalt so commonly used for the manufacture of manos, metates, mortars, pestles, hammers, and core tools. Outcrops of basalt can be reached from the site in a several minutes' walk. Granitic materials, however, cannot be had without making a day's walk west to the Sierra Nevada. This is presumably why only about 5 per cent of the manos are of granitic materials. A few manos are made from such other stone as metamorphic sediments and quartzite.

It will be seen (Tables 8 and 9) that a number of manos purposely have been shaped by pecking. Shaping appears to have been purely an aesthetic activity, since unshaped manos would seem to be as efficient as shaped ones. This same observation would apply to metates, except where the shaping would substantially reduce the weight of the metates to allow easy portability.

In a few instances, the direction of use on one face of a bifaced mano is at right angles to the use direction of the other. This type of mano, from Ventana Cave, is illustrated by Haury (1950, Figs. 70, 71). Another specialization occasionally found among the bifaced types from Karlo may be seen in what Haury calls the "Cochise type mano" (ibid., pp. 313-314; Fig. 71), where the opposite grinding surfaces show use directions about at right angles to one another, but unlike those mentioned above, the directions of use are at 45 degree angles from the longitudinal and latitudinal axes of the specimen. This gives the mano as a whole a "torque" effect. Haury (ibid., p. 313) states that the shape of the mano "is correlated with the right-handed use of the tools. In pushing the mano over the metate surface, greatest pressure was first applied on the left part of the leading edge and as the stroke continued the mano was rocked slowly back and the weight was then transferred to the right half of the trailing edge at the end of the stroke." He states that manos of this type are highly characteristic of the Cochise Culture and that they are used in flat surfaced or shallow basin metates.

In Loud's description of seed grinding implements from the Humboldt Valley, west central Nevada, manos are divided into two types, based upon their supposed use as "shellers" and "grinders" (Loud and Harrington, op. cit., pp. 136-140). "The muller or grinding stone . . . for grinding seed into meal is not flat on the used surface, but is rounding. . . . While the sheller is employed with one hand, moving lightly over the seeds with a rotary motion, the grinder is used with both hands, bearing heavily upon the seeds with a rolling motion." Loud's observation of this difference is substantiated by the ethnographic information he was able to gather from Northern Paiute informants living in the vicinity of Humboldt Valley. A similar distinction between types of manos has been noted ethnographically for the Honey Lake region of northeastern California (Riddell, n.d.b). This dichotomy, however, is not clearly reflected in the collections made at Karlo, i.e., there were indeed some flat use surface manos at Karlo which would fit Loud's description of shellers. However, except for several specimens, the use surfaces of the manos exhibit considerable wear against a hard surface. In no instance, furthermore, did the wear patterns on the Karlo manos indicate anything other than a fore and aft grinding motion. This is not to deny the possibility that some of the manos with a nearly flat grinding surface were not used as shellers, but only that the evidence for such use is not so clear at the Karlo site as at the Humboldt Valley sites.

Since only two metates with deep enclosed basins were recovered at Karlo, it is not surprising to find that the grinding surfaces of the manos tend to be flat or only slightly convex on their long axes. Much greater convexity occurs on the short axes, due to the rolling motion imparted to the mano during the back and forth grinding action. It appears axiomatic with the Karlo type implements that the deeper the depression of a metate, the greater the convexity of the grinding surface on the mano's long axis.

Almost all the manos exhibit end-battering, suggesting their use as hammers, a use apparently associated with the milling process. Coarse and/or hard foodstuffs were probably reduced to a size convenient for grinding by using the mano as a hammer. Because of their size and ready availability, manos may have commonly served as hammerstones for a great many other purposes. Occasionally the Karlo manos exhibit some lateral battering as well as end battering.

The grinding surfaces of a few manos present two longitudinal "facets" on one side, forming a distinct "ridge." None of these ridges show the steepness of pitch, however, of those noted on Ventana Cave specimens by Haury (op. cit., p. 316; Fig. 72d, e). Although not specifically stated, it appears that Loud recovered from Humboldt Valley, Nevada, at least one of these ridged types similar to the kind from Karlo (Loud and Harrington, op. cit., p. 138; Fig. 19L; Pl. 64d). Eleven specimens which had been used on three surfaces were recovered from Danger Cave (Jennings, op. cit., p. 213). These manos are similar to the ridged specimens from Karlo.

That chunks of red pigment were reduced to powder by use of the mano and metate is shown by the recovery of both manos and metates with such pigment adhering to their grinding surfaces. Honey Lake Paiute informants stated that "small" manos were used for grinding paint and for preparing poison, although there was an additional implication that small mortars and pestles also were used for the same purpose (Riddell, n.d.b). Loud states (Loud and Harrington, op. cit., p. 138; Pl. 65h) that extremely small manos are shellers, but also suggests that the smallest mano he recovered may have been a child's toy.

The smooth surfaces of the manos were roughened in the same manner as were the metate surfaces. This "sharpening" was done when the grinding efficiency of the milling stones was reduced due to the surfaces' becoming smooth and glossy. A stone, possibly a prepared core tool, was used to peck the smooth surfaces of the worn metates and manos. In post-Contact times this sharpening was done with a steel hatchet (Riddell, n.d.b).

Comparing the Karlo manos with those from Danger Cave, it will be observed that almost half of the former are shaped, while only about one-third of the Danger Cave manos are shaped. Approximately one-third of the complete manos from Danger Cave are single-faced, while one-fifth at Karlo are of this type. The bifaced manos were more popular than the single-faced type at both sites.

At Ventana Cave about one-fourth of the total number of manos discussed are single-faced, and Haury (op. cit., p. 311) states that, "bi-face manos are characteristic for the early levels, whereas in the late ceramic levels the uni- and bi-face types occur in about equal proportions."

Seemingly characteristic of the manos from Karlo, Danger Cave, and Ventana Cave is that they were designed to be operated by overlapping hands rather than by having the hands side-by-side on the mano, as is customary for the Anasazi. The technique of using both hands upon "one-hand" manos is customary for the ethnographic period in northeastern California (Riddell, n.d.b) and presumably over a wider area as well (cf. Loud and Harrington, op. cit., p. 138).

TABLE 8

Length, Width, and Thickness of Various Types of Manos Recovered from the Deposits of Las-7

Type		Length		Width		Thickness	
		Average (cm.)	Range (cm.)	Average (cm.)	Range (cm.)	Average (cm.)	Range (cm.)
IA1	(54)*	10.7	7.4-13.4 (24)	8.1	4.8-10.3 (48)	5.3	2.5-7.0 (53)
IA1a	(9)	7.2	6.2- 8.0 (8)	5.9	5.0- 6.7 (9)	3.8	3.1-4.6 (9)
IA1b	(3)	13.5	10.5-16.0 (3)	5.1	3.6- 7.4 (3)	3.6	2.5-4.2 (3)
IA2	(100)	10.5	7.4-13.6 (47)	7.9	5.5-10.2 (89)	5.0	3.5-6.6 (98)
IA3	(10)	11.7	10.5-12.5 (4)	8.9	7.4- 9.6 (8)	5.7	4.1-6.5 (10)
IB1	(5)	11.2	9.8-13.0 (4)	7.7	6.6- 9.2 (5)	5.7	4.7-6.8 (5)
IB1a	(1)	7.0		4.8		4.8	
IB2	(9)	10.5	8.7-13.0 (7)	7.2	6.1- 8.3 (9)	4.8	4.0-6.0 (9)
IC1	(15)	10.8	8.2-12.4 (12)	8.6	7.0- 9.5 (15)	5.3	4.0-6.4 (15)
IC1a	(3)	7.0	4.7- 9.0 (3)	5.2	4.2- 6.0 (3)	3.3	2.8-4.3 (3)
IC2	(6)	10.3	10.0-10.5 (3)	8.6	7.2-10.4 (5)	5.2	4.4-6.8 (6)
IIA1	(20)	10.5	7.6-14.2 (16)	8.2	6.2-10.5 (18)	5.2	3.0-6.3 (20)
IIA1a	(9)	6.4	4.8- 8.1 (9)	5.4	4.1- 6.5 (9)	3.6	1.5-4.7 (9)
IIA2	(4)	10.8	10.3-11.5 (3)	8.7	7.5- 9.8 (3)	5.8	4.9-7.5 (4)
IIA2b	(3)	17.9	16.5-20.2 (3)	8.1	7.6- 8.5 (3)	5.4	4.8-6.0 (3)
IIB1	(1)	6.3		6.5		3.9	
IIC1	(14)	10.7	6.8-14.4 (8)	8.1	5.5-10.8 (13)	5.3	2.3-9.1 (14)
IIC1a	(1)	6.8		6.1		2.7	
Total	(267)						

* Parentheses indicate the number of manos considered in each instance.

TABLE 9

Weight Average and Range of the Various Types of Manos Recovered from Las-7

Type		Average (gms.)	Range (gms.)	Type		Average (gms.)	Range (gms.)
IA1	(21)*	722	364-1176	IC1a	(3)	168	84-280
IA1a	(8)	220	168- 308	IC2	(3)	756	616-1036
IA1b	(3)	420	140- 784	IIA1	(14)	621	308-1260
IA2	(45)	727	252-1120	IIA1a	(9)	168	56- 336
IA3	(4)	1120	1008-1176	IIA2	(3)	849	616-1092
IB1	(4)	843	488-1288	IIA2b	(3)	1101	952-1344
IB1a	(1)	252		IIB1	(1)	280	
IB2	(7)	660	476-1064	IIC1	(8)	607	280-1176
IC1	(12)	717	364-980	IIC1a	(1)	140	

* Parentheses indicate number of specimens of each type sufficently complete for weighing.

TABLE 10

Number and Percentage of Types I (Biface) and II (Uniface) Manos by Level

Type	Surface		0-12 in.		12-24 in.		24-36 in.		Total	
I	49	(82%)	85	(77%)	61	(90%)	16	(73%)	211	(81%)
II	11	(18%)	25	(23%)	7	(10%)	6	(27%)	49	(19%)
Totals	60	(23%)	110	(42%)	68	(26%)	22	(8.5%)	260	(100%)

Metates

The metate typology used here is a modification of the one used for the Ventana Cave material (Haury, op. cit., p. 305 ff.). The primary division is into block and slab specimens, which are then each subdivided into either unshaped or shaped classes. Additional differentiation is based upon whether the specimens are used on one or both surfaces, and the depth of the depressions. For the purposes of describing the metates from Karlo, the word "concave" is used to distinguish those metates whose grinding surfaces have a depth of about one cm. or more, from those with a flat or only slightly concave grinding surface.

The metate types are as follows:

I. Block
   A. Unshaped
   B. Shaped
      1. Used on one surface
      2. Used on two surfaces
         a. Flat or slightly concave surface
         b. Concave surface

II. Slab
   (Subtypes as above)

The block metates tend to be subrectangular in form, although ovoid or irregular shapes occur. They range in length from about 30 to 60 cm. Their width range is from 18 to 36 cm., and their thickness range is often quite variable, even within a single specimen. For example, the largest block metate to be recovered from the site has a thickness range of from 3 to 15 cm. Block metates, being bulky, show a minimum of shaping. In some cases pecking and shaping by percussion occur in the block specimens, but shaping primarily is confined to the slab metates. The common form for the latter type is ovoid, although almost equally common are the irregular shapes. Because of their relative thinness, the slab metates lend themselves quite well to shaping. The three complete specimens have lengths of 29, 42, and 45 cm. Only three complete width measurements were obtained and these are 26, 29, and 32 cm. The thickness range is often variable in each specimen, but none has a maximum thickness greater than 5.4 cm. The minimum thickness measured in any slab metate was 1.1 cm. The thinnest area in the slab metates is generally in the center where the greatest wear occurs.

In Table 11 the occurrence by level of the metate types is given. A certain selectivity in collecting both the manos and metates was practiced at Karlo, i.e., a much larger number of metates could have been recovered from the entire surface of the site than actually was. Time and effort in collecting metates was purposely channeled, however, toward excavation, in the hope that more meaningful associations for the specimens could thus be had. Not saved were metate fragments which were too small to yield sufficient data, especially on shape, and metates and metate fragments (usually of the block type) which were too heavy for easy and inexpensive transport, or those which showed but slight use. In a number of such cases specimens were photographed and described in the field.

Probably the most significant things to be noted about the metates from Karlo are that they appear to be about equally divided between block and slab types, and that they show a marked decrease in number with depth (cf. Table 11). This indication of numerical superiority in the upper levels is shared by the manos, as shown in Table 10. This condition may have been caused by a number of factors, some of which have been discussed above in the section on excavation method.

The material chosen for block metates was, without exception, basalt, this showing, however, some difference in density and vesicularity from specimen to specimen. The slab metates also were usually made from basaltic materials, although in three instances granitic materials were used. One evident reason that more metates were not made from granite is that the nearest source lies about twenty-five miles west, in the Sierra Nevada. That granite was a favored material for slab metates is suggested by the fact that in each of the three cases in which it was used, the metates exhibited considerable care in shaping and all had been much used.

In only three instances (two block and one slab) were metates clearly used on both sides. Some of the better-made slab metates had been ground on the back side, but it seems that this was done as a part of the shaping process rather than in seed-grinding uses. The block metates, because of their size and weight, may have been used on one side only because they were set into the ground to serve as earth-bound milling stones. Local evidence of such use of milling stones has been obtained ethnographically (Riddell, n.d.b). Some of these block metates exhibit use as mortars, and these, for stability, probably would have had to be partially buried. Their use as mortars is observable in the form of battered and slightly depressed areas within the metate basin area proper. In addition, a possible sequence showing a change from a block metate into a mortar may be demonstrated in the specimens obtained during the excavations. All stages are represented, from the incipient depression in the center of the block metate to the rather deep, open basin-shaped depression. (For further discussion of the use of block metates as mortars, see the following section devoted to mortars.)

A further occasional use of the deep block metates as mortars is such reported use by the Northeastern or Mountain Maidu (ibid.). Both ethnographic and archaeological evidences, in short, demonstrate the occasional dual function of the block metate.

As stated above, it appears that the Karlo manos were predominantly used in a back and forth motion rather than a rotary motion. The reasons for saying this are: (1) Most of the grinding surfaces are longer than they are wide; and (2) the striations on both the manos and the metates extend in straight lines. This motion accords with that recorded ethnographically for the Honey Lake Paiute and the Mountain Maidu (ibid.), and the Atsugewi (Garth, 1953:140), three groups inhabiting northeastern California in the vicinity of Karlo.

Additional ethnographic data may aid in the interpretation of the function of grinding implements recovered archaeologically. A Mountain Maidu informant, when questioned about the use of manos and metates, stated that one's hands were placed side-by-side on the mano and a back and forth motion always was used. When it was pointed out that many of the manos recovered archaeologically were too small to get both hands on, side-by-side, the informant said that such small manos were used on soft foods, and then only one hand was used.

Personal preference in grinding technique is illustrated by the fact that one Maidu informant used an elongate mano which will accomodate both hands, side-by-side, while her mother customarily ground with a mano in one hand and would change hands when one hand became tired. With the free hand she would brush the meal back on to the metate with a pounded pine cone brush. Both women used the back and forth motion for both the hard and the soft foods.

A discussion of grinding methods with informants brought out that various combinations of grinding techniques are possible. Any method, or combination of methods, suitable for the particular task at hand was utilized. For example, manos may be used for pounding and pestles for grinding, in contrast to their more normal functions. Furthermore, the author has observed a Mountain Maidu woman using a nearly flat-ended pestle in a deep basin metate without the benefit of a hopper basket. One informant stated that food was ground on flat-surfaced stone blocks with flat-ended pestles, with or without the hopper basket. Through continued use these flat mortars became basin-shaped. Metates, if sturdy enough to withstand the blows, can serve additionally as mortars. This sort of activity on the part of native millers appears to modify the general picture of a mortar as a relatively deep bowl-shaped affair in which a round-ended or pointed pestle is used. It becomes apparent that not all metates served the single purpose of being ground upon with a mano. Careful examination on the part of the excavator may reveal sometimes multiple use, such as is observable at Karlo, for some of the grinding implements recovered from archaeological sites.

About one-half of the metates recovered have clear evidence of having been "sharpened," i.e., their worn and smooth grinding surfaces were struck with a sharp stone (possibly a prepared core tool) in order to roughen the surface to allow more efficient grinding of the foodstuffs.

TABLE 11

Type I (Block) Metates and Their Occurrence by Level

Type	Surface	0-12 in.	12-24 in.	24-36 in.	Totals
IA1a	0	1	1	0	2
IA1b	1	4	2	2	9
IA2a	0	1	0	0	1
IA2b	0	0	1	0	1
IB1a	0	1	3	0	4
IB1b	0	3	0	0	3
Totals	1	10	7	2	20

TABLE 12

Type II (Slab) Metates and Their Occurrence by Level

Type	Surface	0-12 in.	12-24 in.	24-36 in.	Totals
IIA1a	0	0	2	0	2
IIA1b	0	0	1	0	1
IIB1a	0	3	2	0	5
IIB1b	1	7	3	1	12
IIB2b	0	1	0	0	1
Totals	1	11	8	1	21
Totals) I, II)	2	21	15	3	41

Large stones, including block and slab metates, often were found in association with burials. They were placed around and above the burials in protective fashion. In several cases metates or metate fragments were found in association with manos or fragments of manos, suggesting that they were cached.

Discussion: The description of the Ventana Cave metates by Haury (op. cit., p. 305 ff.) almost could serve as a description of the Karlo metates. Probably the Karlo people, however, took greater care in the manufacture of their metates than those who lived in Ventana Cave. Approximately 50 per cent of the Karlo metates, and only 10 per cent of the Ventana metates, showed evidence of purposeful shaping. Actually, this difference may not be so great as it seems, because any Karlo metate which was felt to be "blanked out" by percussion was included in the shaped category. Haury (ibid, p. 308) limits his shaped category to those specimens which "showed marginal shaping by a crumbling process." He states earlier, however, that of the slab metates, "A minority (about 30 per cent) . . . show marginal dressing." Continuing his discussion of shaped metates, he says that "the best ones were made of a scoriacious lava. In outline they are oval or approaching the rectangular. One side only was normally used" (loc. cit.). An oval metate of this type occurred in association with Burial 31 at Karlo (ibid., Pl. 3A).

In comparing the Karlo metates with those from Danger Cave, several observations and one critical comment can be made. Jennings (op. cit., p. 211) has also equated his collection of metates and metate fragments with those recovered by Haury from Ventana Cave. In contrast to Ventana Cave, however, the slab metate was preferred to the block metate at Danger Cave. At Karlo the metates are equally divided between the block and the slab forms. At Danger and Ventana Caves it was a common practice to use both sides of the metates, but at Karlo it was an uncommon practice. At this point I would like to comment on one aspect of Jennings (ibid., pp. 209, 211) discussion of the metates from Danger Cave. He equates the "shallow round or elliptical basin" of all his milling stones (metates) with a rotary milling motion. However, he cites (ibid, p. 212) ethnographic sources for the Great Basin which describe a back and forth grinding motion on thin oval milling stones. From personal observation, the author knows that there is no one-to-one correlation between shallow round or elliptical basin metates and a rotary milling motion. Both Paiute and Maidu women have been observed grinding on such milling stones, and except for an occasional semicircular movement to drag the flour back to the center of the metate, the milling motion was back and forth. The crux of the milling problem is to grind the food but yet not to push it off the metate. This is accomplished by quick wrist movements which rotate the mano as it moves forward across the face of the metate on its (the metate's) long axis.

In addition, the so-called "one-handed" mano commonly associated with basin metates (the term "basin" here is used in contrast to the trough metate typical for the Anasazi) is commonly used with two hands, as described above. A simple rotary motion upon a metate with a flat surface, or a shallow basin, would require a special technique to prevent the food being wiped from the metate surface on the first or second rotation of the mano. I have already spoken of the special technique used with the back and forth grinding motion, namely, a quick wrist action which rolls the mano forward as it is pushed across the metate. I do not mean to imply that with this technique the miller is able to retain all of the meal upon the metate as it is ground, only that she is able to keep it on the metate long enough partially to reduce the seeds into flour. As the meal is ground, it is worked off the far end of the metate on to a tray or mat (winnower). This material is next winnowed and the coarse portion returned to the metate for further grinding. This process is repeated until all of the material at hand is reduced to a fine flour. I do not believe that a rotary milling motion would be nearly so effective as the one described.

Examination of the grinding surfaces of both the manos and metates from Karlo gives no indication of a rotary milling motion. In fact, the contrary is often observable since on many specimens the visible striations on wear surfaces are parallel and straight. A rotary motion presumably would tend to blur, eliminate, or produce curved striations. One of the metates illustrated by Jennings (op. cit., Fig. 190b) from Level III of Danger Cave shows a series of parallel, or nearly parallel, striations in a plane with the long axis of the specimen. This indicates that this specimen has not been subjected to a rotary milling motion by the mano. I would further suspect that Jennings' Danger Cave milling stones, or a major portion of them, were used with a back and forth milling motion, as were those from Karlo and Ventana Cave.

The statement made by Jennings with respect to the sharpening of the Danger Cave metates does not quite agree with my interpretation of sharpening techniques as practiced by the Danger Cave people, the Karlo villagers, and the ethnographic informants with whom I have discussed such activities. In speaking of the self-cleaning abrasive type of stone used for all the Danger Cave metates, Jennings (op. cit., p. 211) states that they did not need a periodic repecking or sharpening. "Indeed, it is suggested that there was never any pecking of the entire surface. Probably the roughening of one end . . . now to be seen on most whole specimens . . . was all that was done." My interpretation of this observation is that the "roughening of one end . . . now to be seen on most whole specimens" represents the end away from the miller which has not received the same amount of wear as the remainder of the once sharpened grinding surface of the metate. I feel, therefore, that these few pecked irregularities cannot be viewed as

" . . . cleats to hold the whole seeds until they could first be cracked and broken" (ibid.). Nor can I agree with the idea that, "with a rotary motion, the cracked seeds could be ground quite fine on the abrasive surface of the unroughened natural slab" (ibid.). Finally, I am not fully convinced that the smoothly fine-grained sedimentary materials from which all the Danger Cave metates were made would be "self-cleaning," as averred by Jennings. The scoriacious material from which some Ventana Cave metates were made, and the vesicular basalt metate from Karlo Burial 31, however, are materials which, by their vesicular nature, could be expected to be self-cleaning, or at least, self-sharpening.

Mortars

The mortars from Karlo are classified on the basis of form, presence or absence of external shaping, and to some degree, of size.

I. Globose
  A. Shaped
  B. Unshaped
    1. Diminutive

II. Rectangular
  (Subtypes as above)

III. Irregular
  (Subtypes as above)

In Tables 13 and 14 are given a number of measurements for the five types of mortars found at Karlo, and the number of each type from each level. All of the mortar specimens from the site are of a fragmentary nature, consequently some of the weights and measurements are approximations only.

The Type IA (Fig. 13a) mortars are numerically the most important at the site. These globose, externally shaped specimens have depressions which are V-shaped, in which pointed pestles evidently were used. The pointed pestles are classified, however, as "round ended" pestles (see description in the following section), and are to be contrasted with the "flat ended" type. Loud (Loud and Harrington, op. cit., p. 140) states that, "All mortars of the Great Basin region, used for grinding seeds, are of the V-type, so far as known. They are used with a pointed pestle which produces a deep V-shaped pit." Of the three specimens of this type from Karlo sufficiently complete for determination, all have (external) bases which are nearly flat.

The globose mortars are made of both fine-grained and vesicular basalt, and have been shaped by pecking with another stone. The fragmentation noted for all of the specimens of this type appears to be intentional rather than accidental. None of them was in such a worn condition that an accidental break would be expectable.

Type IIA (Fig. 18), represented by two half-specimens (one associated with Burial 10), is a composite grinding implement, i.e., it is a combination metate and mortar. The type is a shaped block metate which has a depression in its grinding surface which was evidently produced after the stone had been used as a metate. The evidence is not clear whether or not the stone was continued in use as a metate after its use as a mortar. In association with one of the Type IIA specimens, however, was a small mano, Type IA2, that is, a bifaced oval mano which has been shaped. The convex ends of this mano almost exactly fit the concave bottom of the shallow mortar pit, thus suggesting that the mano was used as both a mano and pestle with the Type IIA mortar. The mano is so small, however, that it extends but a few centimeters above the deep pit (5 cm.) of the mortar. This would not give the user a very firm grip, but use was still possible if care were taken. Even though the association may have been accidental, or due to the disturbed nature of the site deposit, the fact that the mano has rounded ends which fit into the mortar depression makes the co-occurrence of the specimens seem more than coincidental.

The single specimen of Type IIIA1 recovered is a small block of basalt (Fig. 12b) which has had one edge slightly shaped by the breaking off of a few pieces by crude percussion. It differs from the shaped globose mortars, therefore, which were shaped by the relatively controlled pecking technique. The block of basalt has a natural depression in one face which has been slightly used for mortaring.

The most complete Type IIIB mortar is a flat-bottomed, irregularly-shaped piece of basalt with a pit which is not so clearly V-shaped as in the Type IA specimens. This may be due, in part, to the fact that the pit is rather shallow, like those in the Type IIA mortars. Pestles used in the Type IIIB mortars probably are not quite so pointed as those used in the Type IIA mortars.

The single Type IIIB1 mortar (Fig. 14e) found is a small, irregular, unshaped specimen which may have had a special function, such as grinding paint, poison, or other material. That this specimen, or any of the others obtained from Karlo, ever were used in conjunction with a basket hopper is not clearly indicated. A number of the specimens could have been so used, but no adhesive substance was detected on any of them to suggest that a basket had been glued around the mortar pit.

Two types of mortars occur at Ventana Cave, boulder and bedrock (Haury, op. cit., p. 320; Fig. 75). Only two of the former were found, however, and only fourteen bedrock mortar pits were recorded. It is reasonable to assume that at Ventana Cave some of the mortars were of wood and were not preserved. In any case the wear patterns on the ends of some of the Ventana Cave pestles (striations, differential wear, and slightly wedge-shaped working ends) suggest their use with wooden mortars. Another reason that more mortars were not recorded from Ventana Cave is that a number of the block metates recovered simply were not recognized there as having been used also as mortars. The flat-ended pestles, according to Haury (op. cit., p. 321), "could have been, and probably were, used in the bedrock mortars." With respect to the cross-sections of the bedrock mortar pits, he states (ibid., p. 320) that they "were cone-shaped with rounded bottom and somewhat flared at the upper margin." If the bedrock mortar pits have rounded bottoms, it follows that the pestles used in them must have rounded working ends, thus probably ruling out flat-ended pestles on which "grinding ends are quite flat centrally but the edges are rounded and sometimes battered" (ibid., p. 321). It is my opinion that the rounding of the edges is due to the gradual deepening of the open basin-shaped pit of the block "metate" (i.e., mortar). The fracturing or battering on the edges of the working ends of the flat-ended pestles is characteristic of pestles used upon flat, or nearly flat, surfaces. In short, it appears that the flat-ended pestles noted by Haury for Ventana Cave were not used in bedrock mortars but upon flat or open concave block mortars (ibid., Fig. 69a). This is not to deny the probability that these block mortars were also used as block metates. In many cases they probably served, like similar Karlo specimens, a dual function as mortars and as metates. Ethnographic data also have been cited (above) to document the use of flat ended (or only slightly rounded) pestles with "block" metates as mortars.

Concerning mortars for Danger Cave, Jennings (op. cit., p. 214; Fig. 196a, b) makes no mention of them, but does illustrate two pestles. The fact that slab metates are preferred over block metates at Danger Cave suggests that the latter were not used as mortars as they presumably were at Karlo and Ventana Cave. The lack of any reference to flat-ended pestles by Jennings for Danger Cave also suggests that the block metate/mortar was not at all popular there, or did not occur at all.

I cannot agree with Jennings' endorsement (op. cit., p. 211) of Haury's statement (op. cit., p. 305) that, "they [metates] are so nondescript and so lacking in definitive details that classification is next to pointless." Jennings (loc. cit.) follows with the assertion that, "The extent of meaningful cultural interpretation one can squeeze from them [metates] is meager." It should be pointed out that these ideas do not fully apply to the milling stones from Karlo, if full recognition is given to the variety of techniques used in the milling process. I feel that it is of considerable interest to note that block metate/mortars occur at Karlo and Ventana Cave, but presumably not at Danger Cave. It is possible that meaningful cultural interpretations can be squeezed from the milling stones from archaeological sites in western North America. Jennings (loc. cit.), however, suspects that the preference for slab over block metates noted at Danger Cave, in contrast to Ventana Cave, "results largely from accidents of environmental resources." Blocks of stone were not readily available to the inhabitants of Danger Cave.

TABLE 13

Sizes and Weights of Various Mortar Types

Type	No.	Diameter (D) or Length x Width (X) (cm.)	Height (cm.)	Pit Depression (cm.)	Pit Diameter (cm.)	Weight (kg.)
IA	15	(D) 18-28*[6]	11-20[3]	7-15[5]	8-15[5]	2.8-13.6[5]
IIA	2	(X) 34[2] x 24-25[2]	13-16[2]	5[2]	9.5-10[2]	15.9-20.9[2]
IIIA1	1	(X) 10 x 8	6	1	8	1.1
IIIB	2	(X) 20[1] x 14 [1]	13[1]	5[1]	9[1]	5.4[1]
IIIB1	1	(X) 20 x 10	6	4	7	2.3

* Hyphenated numbers, e.g., "18-28," show range.
Bracketed numbers are the number of mortars considered in each case.
Underlined numbers represent approximations.

TABLE 14

Depth Table for Mortar Types from Las-7

Type	No Loc.	Surface	0-12 in.	12-24 in.	24-36 in.	Total
IA	1	2	8	2	2	15
IIA	0	1	0	1	0	2
IIIA1	0	1	0	0	0	1
IIIB	0	1	1	0	0	2
IIIB1	0	0	1	0	0	1
Totals	1	5	10	3	2	21

Pestles

The forty-six pestles or pestle fragments recovered from Las-7 are classified in the following manner:

I. Flat end

A. Shaped
1. Conical to subconical
2. Cylindrical to subcylindrical

B. Unshaped

II. Round end

(Subtypes as above)

The dimensions and weights are given in Table 15, and the depth distribution of pestles within the deposit in Table 16. It will be seen in Table 16 that the unshaped, flat-ended type pestles were the most numerous (23) at the site, although 20 round-ended specimens were recovered as well.

The (Type I) flat-ended pestles (Pl. 3c, upper) have been used on stones with a flat or only slightly concave surface (Pl. 3b). It is a characteristic of pestles to become more pointed as the pit of the mortar increases in depth. The Type I pestles evidently were used therefore on "metates" of a type discussed in a preceding section. These block metates or mortars not only show the usual metate wear but exhibit a broad pounded area as well. In fact, some of the specimens of this type do not exhibit abrasion wear, but only wear due to pounding (the specimen illustrated in Pl. 3b is an example of this). This type of milling stone is not to be confused with the combination metate/mortar (Fig. 18) which has a small pit into which a round-ended mano and/or pestle is struck.

Flat end pestles like those from Karlo have been recorded by Cressman (1942, Fig. 51) for Catlow No. 1 and Roaring Springs Cave, southeastern Oregon.

Four Type II (round end) pestles probably were used, secondarily at least, on a flat surface. Evidence of this is observable in the flat, battered ends of specimens which were originally round-ended. The classification of these specimens as Type II is for convenience, and was made despite the fact that they were last used on flat, or very shallow, mortars. One of these four pestles may have been used in a wooden mortar before it was used on a flat stone mortar. Evidence for this is in the form of polish, striations, and differential wear radiating away from the center point of the striking surface of the pestle. Pestles used in wooden mortars occur at Ventana Cave (Haury, op. cit., p. 324; Fig. 76c) and in central California (Lillard, Heizer and Fenenga, 1939:11:D1). As the end of the Karlo specimen is battered, it cannot be determined whether the pestle had a chisel point as do those described for central California. Haury's discussion of this type of pestle does not describe any with chisel points of the type noted for central California, i.e., the Ventana Cave specimens do not reach the same degree of sharpness as the Californian examples.

One of the Type IA1 pestles had been manufactured from an elongate mano, probably a Type IIA2b specimen. The pestle has a freshly pecked surface except on one side where the grinding surface of the former mano remained.

TABLE 15

Measurements of Pestle Types from Las-7

Type		Length		Width		Thickness	
		Average (cm.)	Range (cm.)	Average (cm.)	Range (cm.)	Average (cm.)	Range (cm.)
IA	(1)*	--		8.0		7.0	
IA1	(3)	20(1)			7.3- 7.7(2)	6.0(1)	
IA2	(1)	--		5.0		4.7	
IB	(18)	19	11-27(12)	9.0	4.5-11.5(18)	6.3	2.2-9.0(18)
II	(5)	(All fragments)					
IIA1	(3)	15(1)		5.8	5.5- 6.0(2)	5.0(1)	
IIA2	(5)	25	19-34(3)	7.0	6.0- 7.0(3)		
				7.7	7.5- 8.0(2)	6.3	6.0-6.5(2)
IIB	(7)	16	11-20(4)	7.2	4.7- 9.7(7)	6.4	4.2-7.5 (7)

* Parentheses indicate the number of pestles considered in each instance. Underlined numbers represent diameters.

Not treated in Tables 15 and 16 are three pestle fragments (collected from the surface), two of which are the center sections of shaped pestles and one the center section of an unshaped pestle which came from the 0-12 inch level.

All of the pestles and fragments were made from basalt, except two Type IIA1 specimens which were made from scoria and exhibited but slight wear as a consequence of their vesicular nature. A limited number of the basaltic pestles were vesicular, also.

One pestle (SIM 119/103) had been used on a flat mortar at one end and in a deep mortar at the other end (Pl. 3c, lower). This may demonstrate that both types of mortar were in vogue contemporaneously with the metates.

TABLE 16

Depth of Pestle Types from Las-7

Type	No Loc.	Surface	0-12 in.	12-24 in.	24-36 in.	Total
IA	0	1	0	0	0	1
IA1	0	2	0	1	0	3
IA2	0	0	1	0	0	1
IB	1	1	5	11	0	18
II	0	1	3	1	0	5
IIA1	0	1	2	0	0	3
IIA2	0	0	2	2	1	5
IIB	0	0	3	3	1	7
Totals	1	6	16	18	2	43

Pipes

Of the four pipe specimens recovered from the site, all are tubular in shape and all are made from pumice materials. The single complete specimen (1-196861) was found in fragments at the base (Level 4) of the culture deposit. It is considered as a grave accessory since it was found only 18 inches north of Cremation 8. The specimen (Fig. 19a) is of red pumice and has a maximum diameter of 3.3 cm. measured at a point 1.0 cm. below the rim. The maximum outside and inside diameters of the rim are 3.2 and 2.1 cm., respectively. The inside and outside diameters of the basal aperture are 1.3 and 1.9 cm., respectively. The length of the pipe is nearly 7.2 cm. Its interior exhibits a slight amount of "cake" in the form of a carbon crust adhering to the walls. Long striations on these walls demonstrate that at least in the terminal aspects of manufacture a gouge, not a drill, was used to enlarge the cavity. Although nearly twice as large, this complete pipe from Karlo is quite similar in form to one from Lovelock Cave which was found with a bone stem still attached (Loud and Harrington, op. cit., p. 113; Pl. 52a). Presumably the Karlo specimen was similarly stemmed when it was in use since it otherwise would probably be too hot to smoke.

Specimen 1-196827 (reconstructed, Fig. 19f) is a fragment of a decorated (criss-cross) tubular pipe from Level 2, made from a red-orange pumice. Heavy striations on the interior of the tube demonstrate the method by which the cavity was made. This method of producing the cavity is common to all four of the pipe specimens, but evidence of the use of a (stone) drill on one specimen suggests the probability that the latter was used in the first stage in the perforation of the tubular pipes. The gouge evidently was used for the final stage of enlarging the bowl to the desired size. The polish and wear on this fragment suggest that the piece may have been exposed above ground for a period of time before it became incorporated in the general deposit.

A fragment of a relatively massive tubular, gray pumice pipe (1-196862; Fig. 19e) was recovered from Level 4. The interior lip of this pipe exhibits circular striations produced by a drill. The remainder of the interior shows only slight evidence of longitudinal striations, which could have been made by a gouge. The reason for this slight evidence is that at least portions of the interior seem to have been abraded to present a relatively smooth surface. Figure 19e (reconstructed) shows the decoration of the specimen. An unusual feature of this specimen is the inward sloping, slightly concave rim surface. Except for the heavy, encircling, incised line, the decoration on the exterior surface is superficial and erratic.

The fourth specimen (1-202930; Fig. 19d [reconstructed]) is a fragment showing a punctate design on the exterior surface. The pipe is of reddish pumice, and was recovered in a test excavation at a depth of 24 inches. Vertical striations on the interior again demonstrate the popularity of the use of a gouge for preparing pipe cavities.

In reviewing the pipes from the site we may note especially the following: (a) All pipes are tubular; (b) all are made of pumice materials; (c) three of the four pipes found were decorated; and (d) the cavities may have had initial drilling but in the final phase of manufacture a gouge was utilized to enlarge the bowl. As for stems, it may be assumed, after comparison with the Lovelock Cave specimen noted above, that some of the bone tubes found during the excavation of the site were utilized as pipe stems. The fragmentary condition of all the specimens may indicate that pipes were ceremonially broken ("killed") and included as grave offerings. This is suggested by the proximity of specimen 1-196861 to Cremation 8.

Tubular stone pipes similar to those from Karlo occur in various places in the Great Basin, including Owens Valley (Riddell, 1951:16; Riddell and Riddell, 1956:31; Steward, 1933:319-320 [describes steatite pipes]), Honey Lake Valley (Riddell, n.d.a), west central Nevada (Loud and Harrington, op. cit., p. 107, Pl. 55i; p. 148, Fig. 24a, b, c; Pl. 65q, o, p; Heizer and Krieger, op. cit., Pl. 31d, e, f). In addition a variety of pipe forms and materials occur in central California (cf. Lillard, Heizer and Fenenga, op. cit.), and some of these are comparable to the Karlo specimens. Pipes are not numerous in Basketmaker collections from the Southwest (Amsden, 1949:95), nor are they found in all periods of the various branches of the Mogollon Culture (Wheat, 1955:124-125; Fig. 8dd, ee, ff; Table 11). Tubular stone and clay pipes of the Anasazi Culture are sometimes equated with the historic cloud-blowers used by the Southwestern Indians (Wormington, 1947:49), and are found broken as mortuary offerings in Anasazi graves (ibid., p. 89). As noted above, pipes appear to have been included as mortuary offerings after having been "killed" at Karlo, thus paralleling the Anasazi situation.

In both form and construction the ethnographic tubular stone pipe of the Wintu is similar to the Karlo specimens (Du Bois, 1935:129;Fig. 7e). The bowls of the Wintu (soft) stone pipes were hollowed with an awl of seasoned deer antler. For the Wintu, however, wooden pipes were more common than those of stone. Since only remnants of four stone pipes were recovered from Karlo, it is not unreasonable to suppose that perishable wooden pipes may have been common at Karlo as well.

Pipes were not recovered at Danger Cave, and only four were found at Ventana Cave (Haury, op. cit., pp. 329-332). Three of them are fragments of tubular pipes approximately 70 mm. in length. One comes from a level which indicates a probability of its being from the Chiricahua-Amargosa II cultural stage. In size, shape, and construction there is close resemblance between Karlo pipes and the Ventana Cave fragment illustrated (ibid., Fig. 79e).

Two tubular stone pipes (or shaman's sucking tubes) are recorded for the central California Early Horizon (Heizer, op. cit., p. 24). In size and shape they, too, are like the Karlo pipes. Interior pipe cake from the Karlo specimen possibly demonstrates the early rise of pipes for smoking.

Scoria Rubbing Stones

Apparently related to manos in form, but probably differing from them in function, are a small series of stones made from scoria. The two complete specimens, of a total of nine from the midden deposit, are 12.5 and 17 cm. in length. Seven specimens range in width from 7.7 to 9.6 cm., and all specimens together range in thickness from 2.3 to 7 cm. Weights of three complete or nearly complete specimens are 504, 784, and 952 grams. The shape of the stones is ovoid in both outline and cross-section, although some tend to be more barrel-shaped than others.

Besides the nine specimens from the midden deposit, two specimens were recovered from burials. The stone (1-197038; Pl. 3D) from Burial 23 is 18.5 cm. long and has a maximum diameter of 6.6 cm. It weighs 468.7 grams. The specimen recorded with Burial 31 may be doubtfully associated, as the burial had been partially disturbed at one time. This object (1-197080) is 14.2 cm. long, has a maximum diameter of 5.9 cm., and weighs 311.8 grams.

Except possibly in one instance, the mano-like scoria rubbing stones do not have the well-worn surfaces usually observable in manos. This lack may be partially attributable to the rough nature of the scoriacious material; nevertheless, it seems clear that these stones have not been in repeated contact with other lithic material, for example, or their surfaces would show a flattened or faceted appearance.

During the ethnographic period the Wadátkut used rough stones to scrape the mucous from fresh hides. As described by informants, these stones are much like manos, except that they are rough. Such a description fits the specimens just considered.

Atlatl Weights

Two fragmentary worked stone specimens in the collection are concavo-convex in cross-section and correspond in general size as well to specimens identified by Heizer and Elsasser (1953:26 ff.) as atlatl weights.

Specimen 1-196853 (Fig. 21g) was found in the 24-36 inch level. It was made from a somewhat granular igneous rock, and is an end portion which does not follow the pattern shown by other so-called atlatl weights from California, which have lashing grooves around the convex surface near their ends. It may be noted that if these grooves were truly for lashing the weight to a stick, they would not be absolutely necessary features, since if wet sinew or rawhide were used as lashings they would, upon drying, adequately immobilize the weight upon the throwing stick.

The length of the specimen is 4.5 cm. (possibly about one-half of its original length). It is 2.7 cm. wide and 2.1 cm. thick. The abrasive quality of the stone, as well as the lack of binding grooves suggest at first that the specimen may have been used also as a shaft smoother or abrader, but this idea may be rejected because the longitudinal groove (i.e., the concave surface) is uneven and shows no prolonged use-wear. In addition, what have been considered bona fide shaft smoothers from the site, with one exception, are much flatter in cross-section and are generally made from scoria or pumice, or of sandstone.

The second representative of the type is a portion of the center section of a carefully manufactured specimen (1-196807; Fig. 21i). It is made of a hard, fine-grained sedimentary material, and was recovered from the 12-24 inch level. It has a width and thickness (height) of about 1.6 cm. The concave surface has been produced by abrasion, and longitudinal striations can be observed on it and on the other surfaces as well. The specimen has been decorated by a series of short, light, parallel incisions upon, and at right angles to, the convex ridge. There is no way of knowing if there were lashing grooves at the ends of the original specimen.

Atlatl weights in California have been discussed in detail by Heizer and Elsasser (op. cit.), hence no more will be said here except to place on record several additional specimens which have been found in California since 1953 and which may have bearing on the present work. One finely made specimen, similar to one illustrated by Heizer and Elsasser (op. cit., Fig. 4a), was picked up on the surface of a site in the vicinity of Hobart Mills, five miles north of Truckee, California, in the Sierra Nevada (Payen Collection, Secramento). A private collector in Sacramento has two typical atlatl weights which he said came from Lassen County. Another (complete) specimen has been reported from a site on the shores of Lake Almanor in Plumas County (Plu-1). This specimen is of a soft material, apparently of soapstone (personal communication with Harry Ward, Redding, California). During excavation operations at the Farmington Dam site, Stanislaus County, a fine atlatl weight (SIM 177-1) was recovered at a depth of between 15 and 20 feet in a heavy type clay. Two halves of weights came from a site at the northwestern side of Pyramid Lake, Nevada, and are in the collections of the State Indian Museum, Sacramento, California.

In summary, it appears that atlatl weights in central California are closely comparable, even identical, with those from the Sierra Nevada region and from Lassen County. Although we lack close temporal control over most of the known specimens, it would appear that a single tradition with respect to these objects existed at one time in those areas just noted. Until more data are obtained on this artifact type, however, the temporal and areal distribution must remain unclear.

Atlatl Spurs

Additional evidence of the use of the atlatl, other than the recovery of the presumed atlatl weights, is the finding of three objects which have been classified as atlatl spurs. Two of the "spurs" are typologically the same and are of stone. The other forms a second type, and is of bone.

The smaller stone spur (1-196837; Fig. 22f) is complete and is made from a fine-grained sedimentary material of reddish color. It is 2.9 cm. wide and 1.3 cm. high. Abrasion striations produced during manufacture cover all surfaces. The specimen was recovered from Level 3.

The larger stone spur (1-196808; Fig. 22e) is fragmentary, of a fine-grained, gray-brown sedimentary material. Its width is nearly twice that of the smaller specimen described above. Other measurements are not obtainable. Abrasion marks are visible on a number of areas of the specimen. It was recovered from Level 2.

The flat basal surfaces of these specimens suggest that they rested on a flat surface, for example, in a shallow groove of an atlatl. The absence of perforations or grooves suggests that if so used, the spurs were lashed to the atlatl across their stems (as opposed to their engaging points), around the body of the atlatl. Wet sinew or rawhide upon drying would bind the stone spur tightly to the atlatl and a coating of pitch would further immobilize it.

The single bone spur (1-196518; Fig. 22c) is broken, but is sufficiently complete to allow a reconstruction of the probable method of securing it to a wooden shaft. The supposed engaging tip of this specimen is rounded, thus is similar to the tip of the complete stone spur described above. It will be observed in Figure 22c that a hole has been drilled from both of the flat lateral surfaces of the piece, and this could have been utilized in lashing the spur to a shaft. The specimen is 2.6 cm. long and about 0.8 cm. thick. It was made from the rib(?) of a large mammal (mountain sheep?), and was recovered from the 12-24 inch level.

Atlatl spurs, unless actually attached to atlatls, seldom are recognized in the literature of the archaeology of western North America. Archaeological specimens from California have never been described in print, although Riddell and McGeein (n.d.) have examined a great number of probably related specimens from various parts of California. Of these, only one specimen is closely comparable to one of the two Karlo types. It is a stone specimen almost idential in form to Karlo specimen 1-196837 (Fig. 22f), although nearly twice the size of the latter. It came from the surface of a site in Sardine Valley, Nevada County, about fifteen miles north of Truckee, California, i.e., in a region that is dominated by Martis Complex sites. It is believed that this specimen almost certainly belongs to the Martis Complex (Heizer and Elsasser, op. cit.). The typological near-identity of the stone spur from Nevada County with the two from the Karlo site further suggests the probability of cultural and temporal affinities between the Karlo site and the Martis Complex sites. The evidence for this, admittedly, is slight, but should not be ignored, especially when we consider, also, the relationships between the basalt points from Karlo and those from the type site for the

Martis Complex, Pla-5. Types from Pla-5, as illustrated by Heizer and Elsasser (op. cit., Pl. 1), in several instances can be duplicated in the mass of projectile points from Karlo (viz., Karlo Types 1a, 2a, 2c, 7a, and 9a). Of particular note, here, is the fact that Martis types average considerably greater in weight than the Karlo types.

Relationships between the Karlo site and those of the Martis Complex need not be too surprising because sites of the Martis Complex occur in the vicinity of Milford (Map 1) on the upper terraces of Honey Lake (Las-29, Riddell, n.d.b). The site at Milford is a multiphase site which includes protohistoric and historic occupation by the Honey Lake Paiute, who gave this winter village the name Matá, meaning metate. After a brush fire recently had passed over the site, local collectors acquired several hundred, possibly a thousand, basalt projectile points from Las-29 and the knolls immediately east of the site. These projectile points appear to fit the description of Martis Complex points presented by Heizer and Elsasser (op. cit.). The present known range of Martis Complex sites is from Honey Lake on the north to the vicinity of Sonora Pass on the south. The Complex seems to center, however, in the Martis, Sardine, Stampede, and Euer Valleys area of Nevada, Placer, and Sierra Counties.

The suggestion by Heizer and Elsasser that the reason why basalt was used predominantly and to the near exclusion of obsidian was a lack of intimate contacts between possibly ancient groups, like Pinto, Mohave, and Martis (ibid., p. 21) may be poorly founded in the light of subsequent knowledge concerning the areal distribution of Martis Complex sites (Elsasser, 1960). If Martis Complex is coeval with Late Early or Early Middle Horizon in California as well as to the earlier cultural manifestations at Karlo, we can assume that the Martis people had similar opportunities for trade as did the other groups named. Heizer and Elsasser (op. cit., p. 23, n. 6) make an additional comment which seems more credible; they bring in the factor of cultural conservatism to account for the extensive use of basalt. The Martis Complex has a rather extensive distribution including both sides of the Sierra Nevada (Elsasser, op. cit.) The Early Horizon people traded for coast products as well as to the Sierra (Lillard, Heizer and Fenenga, op. cit., p. 75), and the people of the Karlo Period had contacts with Early or Middle central California, and seemingly with the basalt-using Martis people as well.

Returning again to the specimens called atlatl spurs, one might ask why so few spurs were recovered from Karlo. The answer is probably that the commonest atlatl used there was the type which had an integral spur such as found at Roaring Springs in Oregon (Cressman, 1942, frontispiece) and at Lovelock Cave (Loud and Harrington, op. cit., Fig. 18, p. 110). Spurs bound to the atlatl, however, do occur in Fort Rock Cave and Catlow Cave No. 1, Oregon (Cressman, 1942, Figs. 30 and 33, respectively). It can be assumed from these comparative examples that both the integral and the attachable spur was used in the production of Karlo atlatls. No evidence of the perishable atlatls themselves, with or without integral spurs, was found at Karlo. Nevertheless, we can be reasonably confident that both atlatls and bows as well were used there despite the fact that no bow remains and only a few atlatl parts or accessories were recovered.

Perforated Stone Discoidals

Four perforated stone discoidals, of two types, were collected at Karlo. Three of the specimens, all in fragmentary condition, are thin discs with central perforations. One (Field No. R1140; Fig. 21f) is made of a hard, fine-grained sedimentary stone, and has a thickness of about 0.5 cm. and a diameter of about 5 cm.; the drilled perforation is conical. The specimen was recovered from Level 1.

Another specimen in this group has a thickness of 0.5 cm. and a diameter of about 4.6 cm. (1-196981; Fig. 21e). The material from which it is made is a fine-textured volcanic tuff. It came from Burial 17.

The final specimen of this type (SIM 119/57) came from Level 2 and is of a red sandstone and has a reconstructed diameter of 5 cm. and a maximum thickness of 0.7 cm. The worn perforation appears to have been biconically drilled. The edges of both this and the specimens described immediately above are thinned and rounded, and all have their greatest thickness at the center. They all lack decoration.

One discoidal, a thick specimen perhaps better termed a "doughnut stone," is of a type different from those discussed above. This object is also fragmentary, and the original may as well have been ovoid as disc-shaped. Its surfaces, as well as the perforation, are quite smooth, suggesting considerable care in manufacture. Use-wear in the form of highly polished or battered areas is not visible except at the constriction of the perforation. The single, large, central perforation is biconical and, because of its smoothness, exhibits no clue as to how it was made. There is no evidence of pecking or drilling, although both techniques were probably used to produce the hole. The specimen has a reconstructed diameter of 9.6 cm. and a thickness of about 3 cm. It was recovered from Level 3.

A perforated stone discoidal was recovered from Laird's Bay (old peat horizon), on Klamath Lake (Cressman, 1942:101; Fig. 98g) A series of "sinkers" were recovered from Lovelock Cave (Loud and Harrington, op. cit., Pl. 55c-h) and Humboldt Valley, Nevada (ibid., pp. 147-148; Pl. 65a-e). The average diameter of these (twenty) Nevada cave and valley specimens is 6.4 cm. (ibid., p. 148). Represented among the Nevada collections are specimens which fit into the two types found at Karlo, viz., thick and thin. Perforated stone discoidals, also called spindle-whorls, are common to the Late Period in central California (Lillard, Heizer and Fenenga, op. cit., p. 79). Ethnographic accounts of the Valley Nisenan in the vicinity of Sacramento indicate that the discoidals actually were used as spindle-whorls in the manufacture of cordage (Kroeber, 1929:263). Ethnographic data from Nevada indicate that discoidals were used as sinkers for fishing (Loud and Harrington, op. cit., pp. 147-148).

Closely analogous to the Karlo "doughnut" stone discoidal is the Wintu specimen illustrated by Du Bois (op. cit., Fig. 3h; p. 125). This specimen is of the type used by the Wintu for straightening arrows. Possibly the Karlo specimen served this function since the aperture at its smallest constriction is quite polished, as if arrow shafts or some similar objects had been repeatedly inserted there.

Cressman (1956:430, Fig. 18-3) illustrates and discusses a closely similar "doughnut stone" found at Kawumkan Springs in the Klamath Lake region of Oregon. He calls this stone an arrow wrench.

Haury (op. cit., p. 329; Fig. 79c, d) describes twenty-two centrally perforated stone discs from Ventana Cave which are similar to the type represented by the three Karlo specimens noted above. The majority of the Ventana Cave specimens came from the pre-pottery levels and "appear not to have been well suited" as spindle whorls. Perforated stone discs also were found at Pecos, New Mexico (Kidder, op. cit., p. 240, Fig. 199).

Perforated bone discs are reported for Tommy Tucker Cave, near Honey Lake, and at site Ch-15 in west central Nevada. A specimen from the former site is but 3.2 cm. in diameter (Riddell, 1956:5; Pl. I-15), thus smaller than the Karlo stone discs. The Nevada specimen (Heizer and Grosscup, n.d.) is decorated by fourteen conically drilled pits. Both of these specimens appear to be from sections of human skull, and may be in no way related to the perforated stone discs from Karlo except for a similarity in form.

The only specimen from Danger Cave at all resembling the three small discoidals from Karlo is the centrally perforated stone bead with a diameter of 1.2 cm. (Jennings, op. cit., Fig. 199d). Because of its small diameter this specimen probably is not truly comparable to the Karlo discoidals.

Human Figurines of Clay

Human figurines from the deposits at Karlo are represented by eight fragmentary specimens, none of which fit together. In addition, there are four baked clay specimens which may be remnants of figurines, but are too fragmentary to be positively identified as such. The figurines are cigar-shaped rolls of pumice silt, a material which underlies the culture deposit. They seem to be unfired in several instances, and poorly fired in others. The only humanoid features observable on any of the eight fragmentary figurines are appliqué "breasts," and these are noted on only two specimens. The others are either too fragmentary for sex identification or do not represent females. There is no evidence of decoration in the form of incised lines or punctations, and head, face, arms, and legs are not represented in any of the specimens.

The most complete figurine, the "Venus de Karlo" (1-196593-94; Fig. 14b), has allowed identification to be made for the less-complete specimens as figurines. This object has suffered the loss of one breast and the lower half of the body, but still is an obvious representation of the female torso. The second most complete female figurine has lost both protuberances. This is indicated by two depressions in which the two appliqué breasts presumably were situated (1-196595; Fig. 14d). Both ends of the piece are broken, but at one of these two holes had been punched, evidently when the clay was still plastic, on the long axis of the specimen. Possibly twigs were inserted into these holes to serve as legs for the complete figure (cf. Jennings, op. cit., pp. 207-208).

The largest figurine fragment is sufficiently complete to indicate a cigar-shaped taper to the body of the specimen (1-196592; Fig. 14c). Two barely discernible swellings on a somewhat uneven surface may indicate the former location of mammary gland representations on this figurine. In its proper position below the swellings is a small pit which may represent the navel.

The other five figurine fragments (1-196586-90) are end pieces with no indication as to whether the head or the base sections are represented. There is nothing of particular note about these specimens other than that they are well made and obviously typologically equatable to the "Venus."

Possibly belonging to the series of eight pieces just noted are two slender fragmentary clay rolls (1-196584 and 1-196591) found in the 12-24 inch level. These are smaller in diameter and less well made than the eight specimens discussed, but may nevertheless represent a variation of the predominant figurine type at Karlo. It is possible that they may have been partially or poorly fired, although they were sufficiently hard to withstand a washing in water with a scrub brush. This indicates something more than mere sun drying. The fairly definite figurine fragments described above range from this hardness to a condition where scrubbing with a brush and water would carry away the soft clay.

Another specimen of doubtful classification is a fragmentary piece of fired clay which forms a dome-shaped object with a maximum diameter of 2.3

cm. This piece (1-196585) conceivably could be the basal portion of a figurine. It, and specimen 1-196583 (below) were both found in the 0-12 inch level.

The fourth questionable fragment of fired clay (1-196583) is in the form of a rough cylinder into which a straw or twig was thrust at one end, on the long axis. This artifact has a maximum fragmentary length of 3.1 cm. and a maximum diameter of 1.8 cm.

All four of these doubtful pieces of fired clay differ from the eight relatively unquestionable figurines in that their surfaces are shinier and the pieces themselves harder, as if purposely fired. Seven of the eight definite figurine fragments and two of the doubtful fragments came from the 12-24 inch level, which suggests a Karlo Period origin for them. The remaining specimens came from the 0-12 inch level.

A perusal of archaeological literature of western North America did not disclose any figurines which exhibited close typological resemblances to those from Karlo. Temporally, if the Karlo specimens are considered as from the Karlo Period, they may be contemporary with or perhaps older than the Middle Horizon specimens reported for central California (Heizer and Pendergast, 1955:181). They appear to be considerably earlier than those recorded for the Southwest, since the earliest figurines there are recorded from periods dating slightly before 1 A.D., e.g., Mogollon I. Concerning figurines of the Southwest, Wheat (op. cit., pp. 223-224) states that, "They appear more commonly among the Basketmakers, but occur earlier in Mogollon; therefore, it remains an open question as to whether the Mogollon introduced these into Basketmaker, or both received them from other sources." It is possible that the central California figurine specimens of the Middle Horizon are coeval with these early Southwestern occurrences. Also, on typological grounds, a relationship between some of the Southwestern specimens and some of the California specimens is observable (cf. Heizer and Pendergast, op. cit., p. 184). However, it is admittedly difficult to account for such relationships over the considerable distance between the Southwest and central and northwestern California. I feel that until a larger series of similar figurines is recorded between these two regions one can only continue to speculate upon the relationship between the figurines of both areas. A beginning in this direction is the recovery of figurines in Death Valley, one of which resembles both the Southwestern and California decorated specimens (Wallace, 1958:131-134).

The Karlo Period may be coeval, in part at least, with the Early Lovelock Period, which is dated as being between 2000 B.C. and 1000 B.C., approximately (see Bennyhoff, 1958). If the Karlo figurines belong to the early part of the Karlo Period, they probably are considerably older than the earliest ones recorded for the Southwest, and possibly may be older than those from central California in the Coastal Province Middle Horizon McClure facies. If the Karlo human figurines of clay form a tradition older than those traditions recorded for central and northwestern California and the Southwest, it may be the "answer to the problem of the source of the impulse for certain prehistoric Central California peoples to make figurines" (Heizer and Pendergast, op. cit., p. 185).

<u>Baked Clay Objects</u>

Great numbers of small baked clay pieces occurred at all levels in the deposit. Most commonly, these small lumps of baked clay are irregular masses about the size of the end of one's little finger. They are composed of the pumice silts which underlie the midden deposit, and in this respect they resemble the four questionable figurine specimens noted in a preceding section. Most of these pieces have rough surfaces with grass impressions commonly observable on them. A considerable percentage of the specimens also exhibit small limb impressions, and a few have mat impressions (Fig. 22a, b).

Positive evidence of the function of these clay daubs is lacking, but impressions of grass, limb, and dirt(?) on them suggest they are remnants of mud or clay which were plastered on grass covered structures having a willow(?) framework. The clay may have become dried by the sun and by fires within the house. The baking or firing may have come about when the houses were accidentally or purposely burned (in this region in ethnographic times a person's house was burned upon his death). The burning of houses from whatever cause would account for the vast number of these little pieces of hardened clay within the culture deposit.

Also not to be ruled out as an explanation, is that some of the baked clay fragments are remnants of mud daubing on earth ovens.

Another (remote) possibility, especially suggested by occasional thin, well fired clay fragments with quite smooth surfaces (such as have been produced by peeled willow limbs several inches in diameter, for example) is that thin-walled clay tobacco pipes are represented. Such pieces, however, most probably came from structural members which happened to be larger and smoother than the other elements of house coverings.

The firing and use of clay is an ancient trait for central California, as evidenced by the recovery of baked clay objects, some with basket impressions, in the Early Horizon (Heizer, op. cit., p. 33; Fig. 5f). The basket impressions on the Early Horizon specimens indicate twining exclusively (see below, under "Textiles").

Pigment

A small lump of green pigment was found in association with Burial 7. Small lumps of red pigment were found with Cremation 2 and Burials 3, 7, 10, 12, 23, 30, and 31. The red pigment evidently was reduced to a powder by the use of stone implements, as is shown by red paint found adhering to the grinding surfaces of some manos and metates.

Nineteen pieces of red pigment were recovered from the midden. Seven of them came from the 0-12 inch level, ten from the 12-24 inch level, and two from the 24-36 inch level. This distribution suggests an early interest in the use of coloring material at Karlo, and the recovery of red paint from seven burials and one cremation bears this out. The cremation and burials, except possibly Burials 30 and 31, are considered as belonging to the Karlo Period (Table 28).

Approximately 10 per cent of the Early Horizon burials of central California had red ochre in association (Heizer, op. cit., Table A). Of the thirty-one presumed Karlo Period interments (including all the cremations), six, or nearly 20 per cent had red paint in association. Of the nine burials at the site possibly belonging to the Late Period, two had red paint in association. The percentage of occurrence of red paint, therefore, is approximately the same for the presumed early and late Karlo burials, and in each case twice that recorded for Early Horizon central California burials.

Textiles

Since Karlo is an open site, no perishable materials were recovered from the midden deposit. However, evidence for use of such material was present in the form of baked clay which bore the impressions of matting (Fig. 22a, b). Twined tule or sagebrush bark mats were probably used with grass thatching for house covering, and clay daubed upon the house would receive the impressions of the objects upon which it was placed. In the putative matting examples, it will be noted that the wefts are quite close together, thus indicating relatively fine weaving. Possibly the impressions may also be, therefore, from a flexible twined bag in which clay was carried to the site.

The use of the twining technique is verified by the recovery of these clay impressions, but the technique of coiling as well at the site may be inferred from the recovery of sharp bone awls. Clear evidence of coiled basketry in the Early Horizon in central California is lacking. In the opinion of Heizer (op. cit., p. 29), "coiling must have entered Central California from either the east (Great Basin) or south (Southern California)."

The L-shaped scapula awls in the Early and Transitional levels at Lovelock Cave may have been used in the manufacture of coiled basketry. Scapula awls, as noted below, occur at Karlo. They also occur at Danger Cave in Levels III and IV. A number of coiled basketry fragments also were recovered from Level III at Danger Cave (Jennings, op. cit., Fig. 38). Thus, coiled basketry seems to have an antiquity of more than 3,800 years for this Great Basin site. There is little doubt, in view of these observations, that coiled baskets also were utilized by the people at Karlo during both the Karlo and Late Periods.

Evidence, of course, is lacking, but using Lovelock Cave as a comparison, we may assume that the Karlo people had a large inventory of textiles and other perishable items, including rabbitskin robes, footgear, feather regalia, and weapons.

Bone Awls

Bone awls from the Karlo site are classified in the following manner:

I. Metapodial
- A. Proximal
  1. With articulation surfaces (Fig. 20a)
  2. Without articulation surfaces
- B. Distal
  1. With one condyle (Fig. 20b)
  2. With two condyles
- C. (Fragmentary)

II. Scapula
- A. L-shaped
- B. Other
- C. (Fragmentary)

III. Rabbit tibia

Table 17 gives the depth location for the various awl types. It will be noted that awls are found in significant number in all three levels of the deposit, a situation unlike that of most of the other classes of artifacts.

The Type I awls are made from artiodactyl metapodials, and in those cases where identification was possible, they were of mountain sheep (Ovis canadensis). In most instances the metapodials were split lengthwise, with the resulting pointed splinters being ground into awls. There is no clear evidence of sawing being employed in the splitting process.

Lengths of the complete awls are as follows: Type IA1, 10 and 14.5 cm.; Type IA2, 13 and 14 cm.; Type IB1, 13.5, 14, and 17.8 cm.; Type IIA, 14.8 cm.; Type IIB, 9.2 and 12 cm.; Type III, 9.5 cm.

The Type II awls are made from portions of scapulae of artiodactyls (as in Type I, mountain sheep, where identifiable). Both right and left scapulae were utilized, and two kinds of awl were produced. One is the L-shaped type, represented by a single specimen (Fig. 20c); the other is simply a scapula awl without the L-shaped handle portion (Fig. 20d, e).

Those awls designated as Type III are of jackrabbit (Lepus sp.) tibiae (Fig. 20j, k, l). All but one of the specimens of this type are fragmentary.

The similarity between the collections of bone awls from Karlo and from Danger Cave is quite marked. Except for the Karlo Types IB2 (metapodial, with two condyles) and III (rabbit tibia), the two awl collections are nearly indistinguishable. Scapula awls are relatively numerous at Karlo (13 out of a total of 72 awls) if the fragmentary ones are considered. However, only one L-shaped scapula awl was recovered from Karlo. It resembles the Danger Cave specimens in that it, too, is not a "prime" specimen of the L-shaped awls commonly recovered from Basketmaker and earlier sites in western North America (cf. Jennings, op. cit., p. 193; Fig. 176d, e, k; Cressman, 1942, Fig. 92a).

TABLE 17

Depth Table for Awl Types from Las-7

Type	No Loc.	Surface	0-12 in.	12-24 in.	24-36 in.	Total
IA1	0	0	2	1	0	3
IA2	0	0	1	0	2	3
IB1	0	0	3	8	0	11
IC	0	0	7	5	6	18
IIA	0	0	0	1	0	1
IIB	0	0	1	1	1	3
IIC	1	0	3	3	2	9
III	1	0	3	3	2	9
Unclassified fragments	0	0	9	6	0	15
Totals	2	0	29	28	13	72

Although there is a generalized similarity between the Karlo awls and those from Ventana Cave, it is not nearly so striking as that between the Karlo and Danger Cave specimens. Scapula and rabbit tibia awls did not occur at Ventana Cave, and, also in contrast to the Karlo specimens, the Ventana Cave awls commonly exhibit considerable grinding of the distal condyles of the metapodial types (Haury, op. cit., p. 377; Fig. 86a-c, h-j). Only suggestions of this technique appear at Karlo.

Flaking Tools

Tools used for flaking stone by the pressure technique are of two basic types, made of two materials. A descriptive typology for these implements is as follows:

I. Blunt point
   A. Antler
   B. Bone

II. Sharp point
   (Material as above)

Type IA was the most common type found (see Table 19). It is of antler which has been formed by abrasion after a splinter or blank was split from the parent antler. One complete specimen of this type came from two levels (0-12, 12-24 in.) of the midden deposit, in two pieces (1-196434, 92; Fig. 11a). The other complete specimen was recovered from Burial 23 (Pl. 1D; 1-197030). These two complete specimens are rounded and blunt at both ends. One of the fragmentary specimens found has, in contrast, a chisel-like end.

All of the Type IB flakers are fragmentary, but a number of them appear to be the same as Type IA except for material of manufacture. One of the bone specimens has a chisel-like bit similar to that of the antler specimen noted above. Three of the bone flakers are more pencil-shaped than the two complete Type IA specimens, i.e., they are oval to round in cross-section rather than flat or concavo-convex.

Type II flaking implements have rather sharp, awl-like points, as contrasted to the round, blunt points of the Type I specimens. Type II flakers are distinguished from awls by numerous striations which cover the points and often the bodies of the specimens. Similarity between certain of the Type II flakers and some of the bone awls is notable. In such cases, relative bluntness of the point as well as the presence of striations were the deciding factors in separation of the two classes of artifacts. In short, the chief complication met in the classification of bone flakers is that, with only the points as guides in the fragmentary specimens, one cannot be sure if the whole specimen was a pointed flaking tool, an awl, or a large bone hair pin or spatulate implement. In a few cases, bone fragments which may have been gaming pieces could also be confused with flaking tool fragments (see section below on two latter types of artifact).

Not included in the above typology are those antler tines which show little or no modification other than having been cut from the complete antler. Only one such specimen (1-196416, Fig. 11f) was recovered, and its tip end was so damaged that positive identification as a flaking tool was not possible. Scratches on the body toward the tip suggest, however, that this antler segment was actually used for flaking stone. It is 12.2 cm. long and has a maximum diameter at its base of 3.2 cm. It was recovered in the 0-12 inch level. Two other antler fragments from the 12-24 inch level are probably of this same sort of implement if the scratches on their surfaces may be accepted as evidence of contact with stone during the process of pressure flaking. These are too fragmentary to allow a more complete description.

A fourth specimen not included in the typology is a splinter of rabbit(?) bone which is similar to the Type III (splinter) awls. Its point, however, is worn and blunt rather than pointed and sharp like the splinter awls. This light bone tool, for example, may have been used for delicate retouching on projectile points and knives.

Not exactly classifiable are three fragmentary specimens which were probably flaking tools. One specimen, from the 12-24 inch level, is almost the same as a Type IB1 (metapodial) awl. It is not so classed because its broken point prevents positive identification. It has been placed in the flaking tool category because the remaining point area is considerably scuffed, as if it had been used against stone. Fragments of several other bone implements came from this same level. They, too, appear to have been made from artiodactyl metapodials. The fragmentary specimens have been tentatively classed as flaking tools because of their observable surface striations.

Implements which I consider to have served as flaking tools are recorded from many archaeological sites throughout western North America. Wormington (1955:57; Fig. 38, right) illustrates three bone flaking tools from east central Utah. Two of them are closely similar to the Type IB flakers from Karlo. The third is like the Karlo specimen made from a metapodial. Karlo Type IA flakers are recorded by Kidder (op. cit., Figs. 230, 236) from Pecos in New Mexico, and Cressman (1942, Figs. 29, 92d) illustrates two identical specimens of the type from Roaring Springs Cave, Oregon. What appears to be a Type IB flaking tool came from Humboldt Cave, Nevada (Heizer and Krieger, op. cit., Pl. 10m). Types IA and IB flaking tools were recovered from Levels III and V of Danger Cave (Jennings, op. cit., Figs. 177, 179). Type I flakers are sometimes referred to as "quill flatteners" when found in the Great Plains area (cf. Lehmer, 1954, p. 67).

TABLE 18

Measurements of Flaking Tools from Las-7

Type	Length		Width		Thickness	
	Average (cm.)	Range (cm.)	Average (cm.)	Range (cm.)	Average (cm.)	Range (cm.)
IA	?	14-?(1)*	1.5	1.1-1.8(6)	0.7	0.5-0.8(7)
IB	(Fragmentary)		1.2	0.7-1.9(6)	0.5	0.3-0.6(7)
IIA	(Fragmentary)			0.7 (1)		0.5 (1)
IIB	?	12-?(1)	1.5	0.9-1.9(3)	0.7	0.4-1.1(5)

* Parentheses indicate number of specimens considered in each instance.

TABLE 19

Depth Location of Flaking Tools from Las-7

Type	Surface	0-12 in.	12-24 in.	24-36 in.	Total
IA	0	3	4	2	9
IB	0	4	3	0	7
IIA	0	0	0	1	1
IIB	0	0	5	0	5
Unclassified	0	1	6	1	8
Totals	0	8	18	4	30

Scapula Saws

Of the six scapula saw specimens from Karlo, only one is complete. This specimen (1-197019; Fig. 15a) was modified from the left scapula of a mountain sheep (Ovis canadensis), and was recovered from Burial 23. An incipient, unserrated, or perhaps unused, saw (1-197020; Fig. 15b), apparently from the right scapula of the same individual animal was in association. Both are approximately 25 cm. long.

These two modified scapulae have had the infraspinous fossa, the spine, the supraspinous fossa, and the anterior border removed as a unit. The remaining posterior border, therefore, provided a rigid member for the implement. The interior edge facing the infraspinous fossa of one specimen (Fig. 15a) was purposely cut in a wavy pattern, and is markedly serrated.

A third specimen (1-196568; Fig. 15e) is a mid-section of a saw of the same type as the complete specimen described above. This fragmentary implement is from the left scapula of a mountain sheep, and was recovered from Level 4.

The fourth scapula saw fragment recovered from Level 3 (1-196483; Fig. 15c), although from a mountain sheep, is different in type from the specimens already described. It is a right scapula which has not had the spinous section removed. The crest of the spine has been trimmed, however, and the infraspinous fossa and the posterior border have been removed as a unit. The serrations on both working edges give the implement the form of a "double-edged" saw.

Another fragment of a saw (1-116486; Fig. 15d) with the spine not removed also came from Level 3. It differs from the preceding specimen in that it was made from the right scapula of either a deer or an antelope, and in that its cutting edges exhibit no serrations. This may be due to excessive wear rather than to lack of original serration.

The last specimen considered here was so fragmentary as not to allow certain identification. Possibly it was of the same type as the complete specimen described above.

Some of the scapula saws from Humboldt Cave, Nevada, appear to have been made from mountain sheep scapulae, as evidenced by their overall size (cf. Heizer and Krieger, op. cit., pp. 16-17, 77; Pl. 9a; App. III, Table C). Smaller saws, presumably of deer and antelope scapulae, also occurred at Humboldt Cave, and one was found at Lovelock Cave (Loud and Harrington, op. cit., p. 40, Pl. 13j). No scapula saws were recovered either from Danger Cave or Ventana Cave. They occur (although referred to as "notched ribs") in the Pre-Pottery and Pine Lawn Phases of the Mogollon Culture of the Reserve Area, New Mexico (Martin et. al., 1952:192; Fig. 65b, c, d). In Heizer and Krieger's (op. cit., p. 77) discussion of scapula saws, it is observed that, "Apparently we are dealing with a very old implement and one that is common to the Great Basin-California-Southwest area."

Concerning the probable function of scapula saws, Heizer and Krieger (loc. cit.) suggest that they may have been used for a variety of jobs, including cutting grass, shredding bark and sinew, scraping hide, and cutting tules for making bows and arrows. An implement such as a scapula saw would be of great use in cutting the vast quantities of tule needed for the construction of houses or tule canoes. If grass (such as rye grass) were used instead of tule for thatching, such an implement would still be of much use. For the Karlo people, scapula saws would be important for cutting both tules and rye grass for their houses, if the house type they had was similar to the ethnographic one (see below, on "Houses"). Considering the apparent great utility of this implement type, it is perplexing that more specimens were not obtained from the excavations at Karlo. Possibly stone knives also were used for the purposes outlined above. It may be of interest that Burial 23, from which the complete and the incipient scapula saws came, was that of an adult male. It is known that during the ethnographic period the men cut, gathered, and erected the framework of the house, while the women would gather the covering material and install it (Riddell, n.d.b). From the slight evidence supplied by Burial 23, it would appear that the men during the Karlo Period may have additionally cut the thatch as well as the frame poles.

Spatulate Bone Implements

Classified as spatulate bone implements are eight specimens, all but three of which are fragmentary. Two complete specimens (1-145505, 06) from the same excavation pit and in the 12-24 inch level appear to be a matched pair (Fig. 17a, b). These polished, end perforated flat bone specimens are made from sections of the long bones of some large mammal. Their surfaces exhibit numerous striations, indicating that they had been shaped with an abrading stone and/or stone knife. The single end perforations suggest suspension of these objects, perhaps from about the neck of the owner.

Most closely analogous to them are specimens from Tommy Tucker Cave (Riddell, 1956, Fig. 5a-i) which have been described as "bone pendants." Possibly they were used also as head scratchers during the ethnographic period and by adolescent girls in this area at the time of the puberty ceremony. The ethnographic form for this region, however, is not known except for the reported use of a "stick" (Riddell, n.d.b).

Not unlike these two specimens is the bone implement illustrated from Humboldt Cave (Heizer and Krieger, op. cit., Pl. 10g). The cave specimen is provisionally identified as a thatching needle. "Bone pendants" from Deadman Cave, Utah, also bear a close resemblance to the two Karlo pieces (Smith, 1952, Fig. 18, No. 16). A decorated flat bone specimen with an end perforation from Lovelock Cave is also similar (Loud and Harrington, op. cit., Pl. 12h). Ventana Cave produced a single specimen of this type (Haury, op. cit., Fig. 89j) but Danger Cave produced none.

Under the category titled "Pendant," Gifford (1940:218-221, category Q) illustrates a series of rectangular to subrectangular bone pieces which are in many ways comparable to the two from Karlo. Those discussed by Gifford come from a number of places in California, including sites in the Humboldt Bay area; the San Francisco Bay region; from Santa Cruz, Santa Catalina, and Santa Rosa Islands; and from the mainland of the Southern Coast region of California. Those from the south often have punctate designs on their surfaces.

In several instances Gifford (op. cit., p. 175) compares the archaeological specimens with similarly shaped bone pieces used by Yurok girls during first menstruation as a "face wiper" and a "head scratcher." Specimens illustrated by Loud (1918, Pl. 20, Nos. 12, 13) from Site 67 (on Gunther Island in Humboldt Bay north of Eureka, California) are identified by him as probably head scratchers. The Yurok ethnographic specimens noted by Gifford (see above) are also illustrated by Loud (op. cit., Pl. 20, No. 15). One Yurok specimen is similar (except for being incised) to the two Karlo bone pieces. This specimen is recorded as having been used as a head scratcher. Bone specimens closely similar to the two Karlo pieces were recovered from the Middle Horizon Morse Site (Sac-66) of central California (Lillard, Heizer and Fenenga, op. cit., Pl. 21k, 1, m).

The two flat, end perforated, bone implements are possibly representative of the later period of occupation at Karlo, especially if we consider the similarities between these specimens and those from Tommy Tucker Cave.

The other complete spatulate bone implement (SIM 119/87, Fig. 16c) is pointed at one end and wide at the other. It was made from a section of long bone of a relatively large mammal, such as a deer, antelope, or mountain sheep, and even though it is well polished, both horizontal and longitudinal striations remain as evidence of abrasion during the process of manufacture. At the wide end a small biconically drilled hole has been placed close to the edge. This perforation, being so close to the edge, is quite frail and may have served as a place to tie a feather or other ornament rather than as a means of suspension. The implement is slightly concavo-convex in cross-section, and has a maximum thickness of 4mm. It has three areas of decoration upon its convex surface. The specimen appears to have been subjected to heat, as the point and adjoining area are considerably darkened, almost to the point of carbonization.

This pin-like object was recovered from the midden at a depth of 12-24 inches, and as with the two previously described spatulate specimens, there is no way to be certain of its function. It can be suggested however, that it may have served as a hair pin or as a part of a composite headdress.

There is a general resemblance between this unique Karlo specimen and the "awl spatulas" noted by Kidder (op. cit., pp. 220-222, Figs. 186-187) from the pueblo of Pecos in San Miguel County, New Mexico. One major difference, however, is that all of the thirty-nine Pecos specimens but three have had their broad ends sharpened, and none have the basal perforation such as does the Karlo specimen. Kidder suggests some may have been used as hair pins while others were probably used as knives for delicate skinning operations.

Two mammal rib (mountain sheep?) implements (1-196917 and 1-196918-19) were found in association with Burial 8 (Fig. 16a, b). Neither of them is complete, but their form appears to have been that of a rather carefully worked bone blade, one end of which had a V-notch. The other end, presumably, was either pointed or rounded. Specimens resembling this type were found in Tommy Tucker Cave (Riddell, 1956, Fig. 5k, l, m). Also similar are an antler blade from the Phelps Site (SJo-56) and three blades from the Windmiller Site (Sac-107), both Early Horizon sites within the delta region of central California and a short distance south of the city of Sacramento (cf. Heizer, op. cit., p. 27, Fig. 17e, f). Bone implements of this type and those like the first pair discussed above (i.e., rectangular with an end perforation) have been referred to as strigils, or sudatores, for removing perspiration from the body (cf. Gifford, op. cit., p. 172; Lillard, Heizer and Fenenga, op. cit., Pl. 10j; p. 88; Heizer, op. cit., p. 27).

Two specimens which may be presumed to be points of bone strigils were recovered from the site. One of them is plain and came from a depth of 12-24 inches (1-196495, Fig. 16g). The other, from the 0-12 inch level, shows three rows of faintly visible punctations (1-196473, Fig. 16d).

Possibly more properly classified as a bone ornament is a fragmentary, calcined bone specimen with a drilled perforation at one end suitable for suspension (1-103666, Fig. 14a). On its shallow, concave surface was incised a nucleated circle, presumably a decorative element. Because of its fragmentary nature, it is not possible to determine the complete form of this specimen. It was recovered from the surface of the site.

Tabular Bone Specimens

In the category of tabular bone specimens a number of artifacts have been placed which may or may not be functionally related (see Figs. 11k, l, n; 16e; 17f). Without evidence to the contrary, these tabular bone specimens are called gaming pieces, although some of the fragmentary specimens may as well have been parts of flat bone pins, or similar artifacts, such as body and/or head scratchers.

The tabular bone objects are of two basic outline forms: subrectangular and irregular-wavy. They all appear to be of mammal bone; thinned sections of dense (limb?) bone and of ribs. Those made of ribs are either split or whole sections and were fashioned by cutting and abrasion. Striations from the abrasion are clearly visible on most of the specimens, especially those made from dense bone material. Decoration is lacking except that one of the specimens (1-196537) has been shaped into a snake-like, irregular-wavy form (Fig. 17f). Both flat surfaces of this piece have nearly invisible pits which form a snake-like pattern, not unlike the form of the whole specimen.

An object closely similar to this specimen was recovered from the excavations at Paragonah, Utah (personal communication from C. W. Meighan).

These artifacts occur most frequently in the 12-24 inch level. Since these specimens are classified arbitrarily, mostly on the basis of being "tabular," the significance of their almost exclusive occurrence in one level of the deposit is not clear. With such a limited number of specimens, even granting that they are functionally related, it would perhaps be misleading to suggest that gambling with tabular bone pieces was a trait exclusive to the time represented by the middle level of the deposit. It will be noted below that bone and antler dice, as well as bone tubes and/or beads, were dominant in the 0-12 inch level.

The dimensions and depth location for the tabular bone pieces are presented in Tables 20 and 21.

TABLE 20

Measurements of Tabular Bone Specimens from Las-7

Length		Width		Thickness	
Average (cm.)	Range (cm.)	Average (cm.)	Range (cm.)	Average (cm.)	Range (cm.)
3.6	2.2-5.4(5)*	1.4	0.8-2.4(8)	0.3	0.2-0.6(8)

* Parentheses indicate number of specimens considered in each instance

TABLE 21

Depth Location of Tabular Bone Specimens from Las-7

Surface	0-12 in.	12-24 in.	24-36 in.	Total
0	1	8	0	9

Bone Tubes and/or Beads

Table 22 shows the considerable size diversity among bone tubes and/or beads from Karlo. The range is from short tubular sections of bone which have a relatively large diameter, to long slender tubes (Fig. 15f-i). In a number of cases these specimens almost certainly were used as beads for personal adornment. Some of the specimens, however, may have been used primarily as pipe stems, whistles, or even gaming pieces. The fragmentary condition of many of these bone tubes has prevented exact classification. The most common bone material used was rabbit or rodent (rabbit tibiae seemed to be particularly popular). Bird bone was used in only one or two instances. One tube, stouter than those from the long bones of rabbits and rodents, was made from the tibia of some animal about the size of a wildcat (Fig. 15f).

Decorated tubular bone specimens were scarce in the series recovered from the site. Only one specimen may be said to be decorated. This is a bead (1-196552; Fig. 15i) which is larger in diameter than in length and has four rows of transverse incisions on its exterior.

In most cases the bone tubes evidently were made by first scoring the bone and then snapping it at the scored place. Often the rough break was only slightly abraded, although some of the more carefully made specimens have been completely smoothed. Most of these tubes exhibit use-polish; there is only one, however, which shows wear and polish at the inside edge of its openings. Despite this fact, it seems reasonable to suspect that most of the tubes were strung and used as beads, especially the ones with small diameters. Those with the larger diameters may have been used, as previously stated, for pipe stems, whistles, or dice.

Cut bone tubes have a widespread distribution in Western North America. A central California ethnographic specimen in the collections at the State Indian Museum is a buckskin belt ("dance apron") with long fringes upon which various sized bone tubes are strung. One such garment, discarded and dispersed in an archaeological site, would provide a considerable number of bone beads similar to the entire range found at Karlo.

TABLE 22

Measurements of Bone Tubes and/or Beads from Las-7

Length		Diameter	
Average (cm.)	Range (cm.)	Average (cm.)	Range (cm.)
3.5	0.9-11.2(13)*	0.7	0.3-1.3(23)

* Parentheses indicate number of specimens considered in each instance

TABLE 23

Depth Location of Bone Tubes and/or Beads from Las-7

Surface	0-12 in.	12-24 in.	24-36 in.	Total
0	12	9	5	26

Bone and Antler Dice

Ten specimens recovered from the midden without burial or feature association are identified here as gaming pieces. At least two, and possibly three, of these pieces are made from segments of antler; all the others are apparently long bones of artiodactyls. All but one are concavo-convex in cross-section, and five have one or more prominent incised lines upon one or the other of their broad surfaces (Fig. 11m, s, t). Of those specimens sufficiently complete for identification, two have square-cut ends, the others have rounded ends which are similar to those of some of the Type I (round-ended) flaking tools (see p. 65).

Dice or gaming pieces were evidently finished with a coarse abrading stone which has left numerous striations upon the surfaces and the rounded ends. The scoring technique, in which the bone is girdled by a groove and then broken at the weakened place, was probably used to produce square-cut ends. Some of the ends were subsequently smoothed with an abrading stone.

The dimensions and depth locations in the midden of the gaming pieces are presented in Tables 24 and 25. Two of the gaming pieces were possibly associated with Burial 14 (Fig. 11j, q). One of these (of antler) has square cut ends, while the other (of bone) has rounded ends.

Dice of artiodactyl astragali also may have been used by the inhabitants of the Karlo Site. Numbers of astragali were recovered from the deposit and some may have been associated with burials. Since none of these showed any significant modification, however, there is no way to be certain that they served as dice. Other specimens used, or possibly used, as gaming pieces are discussed in various sections above, for example under "Large Chipped Stone Blades" and "Tabular Bone Specimens."

TABLE 24

Measurements of Bone and Antler Dice from Las-7

Length		Width		Thickness	
Average (cm.)	Range (cm.)	Average (cm.)	Range (cm.)	Average (cm.)	Range (cm.)
3.7	2.4-5.0(7)*	1.3	1.2-1.5(7)	0.4	0.3-0.6(9)

* Numbers in parentheses indicate the quantity considered.

TABLE 25

Midden Depth Location of Bone and Antler Dice from Las-7

Surface	0-12 in.	12-24 in.	24-36 in.	Total
0	6	3	1	10

Bone dice not unlike those from Karlo are found from pre-pottery through late phases at both Tularosa and Cordova Caves (Martin et al., op. cit., p. 190, Fig. 64). Gaming pieces from the Fremont Culture at the Turner Ranch Site in east central Utah show an even closer similarity to the Karlo specimens (Wormington, 1955:58-62, Figs. 40-42). The Paragonah Site in Iron County, Utah, has produced a series of gaming pieces, a number of which closely resemble those from Karlo (Meighan et al., 1956, Fig. 20a-w). "Gaming bones" similar to the Karlo pieces were obtained from another Utah site, N.M. 13 (Sky House), in Nine Mile Canyon, Utah (Gillin, 1955, Fig. 30d-g). All of these Utah sites are presumably later than the early part of the Karlo Site. However, it appears that gaming pieces occurred during both periods (Karlo and Late) at Las-7.

Recovered from the most recent level (Level V) of Danger Cave were "four well-polished little slabs of bone" (Jennings, op. cit., p. 202, Fig. 180b-d), which are like the Karlo ones. Ethnographic specimens most closely analogous to the Karlo pieces are four bones (from a split panther femur, used by women) for the hand game noted by Culin (1907:295, Fig. 385) for the Miwok Indians of Tuolumne County, California.

Gaming bones similar to the Karlo ones noted for other sites in the Great Basin and the Southwest seemingly are of a late tradition. It will also be noted that those from Karlo occurred most frequently in the 0-12 inch level, probably therefore indicating the main association of gaming pieces with the late period of occupation. However, if the two specimens listed from Burial 14 were indeed in true association (the burial was partly disturbed), they would provide evidence of considerable antiquity for the use of a type of artifact still in use into the late historic periods. Such a holdover may be seen also for the lemon-shaped charmstones (used for gambling by the Klamath in historic times) which occurred with cremations 2 and 8 (see Fig. 19b).

Miscellaneous Bone Artifacts

In this section will be described certain bone implements which did not occur in sufficient number at the site to merit separate description as distinctive types.

A fragment of a tubular bone whistle, 9 mm. in diameter (1-196498; Fig. 17i), came from the 12-24 inch level. It was made of a relatively heavy bone, probably of some small mammal, rather than of bird. It is not possible to tell in what position the original whistle hole was in relation to the total length of the tube. The prepared hole is round, and appears to have been cut into the tube with a stone knife and then further abraded and smoothed down. The edge of the hole was not sufficiently smoothed, however, to eradicate the knife cuts.

In association with Burial 31 was a fragment of a large bird bone whistle which was partially smashed during excavation. Enough of the specimen was salvaged, however, to give some idea at least of its size and the shape of its stop. Its length as found is 11.2 cm.--it must have had an original length of perhaps as much as 20 cm. The diameter of the piece at the stop is 11 mm. Although the stop is not complete, what remains indicates an elongate, ground oval, similar to those on whistles found at Humboldt Cave (Heizer and Krieger, op. cit., Pl. 30k, 1). The "burned," mineralized condition of the bone accords with the idea that the specimen represents the early or Karlo Period at the site. Bone whistles have been found in Lovelock Cave as well as Humboldt Cave (ibid., p. 84), but not at Danger Cave.

A splinter of long bone of a large mammal (mountain sheep?) from the 0-12 inch level (1-196423, Fig. 17c) has two distinct cuts or grooves across its convex surface and a number of scratches as well on both sides of the two cuts. The piece exhibits some polish but the fractured portions were not smoothed down.

A small bone pin-like specimen (1-196458; Fig. 16h) came from the 0-12 inch level. A spiral groove encircles its head, and the body exhibits abrasion scratches.

One fragmentary segment of a long bone of a large mammal was found in the 0-12 inch level, which had been grooved or scored with a knife and then broken at a right angle to the long axis of the bone (1-196463). Another fragmentary segment, of a rib of a large mammal (1-196549; Fig. 17l) from the 12-24 inch level had been cut to a length of 5.5 cm.

A short, awl-like bone pin from the 0-12 inch level has a series of lines incised at right angles to its long axis (1-196459; Fig. 17k). Longitudinal scratches apparently caused by abrasion during the process of manufacture may also be seen on its surfaces. The object seems to be too short to have been used as an awl; it is possible that it was attached to a stick at an acute angle and used as a hook for pulling rodents from their burrows. The incisions (basal grooves) on one surface may have been placed there to facilitate lashing for the latter purpose. A bone pin of the same size and shape recovered from Catlow Cave No. 1, southeastern Oregon, is regarded as a pin for the ball and pin game (Cressman (1942, Fig. 93j3).

UNMODIFIED ANIMAL BONE

Table 26 shows the occurrence by level of unmodified animal bone fragments. Data on the detailed identification of the bones are on file in the office of the University of California Archaeological Survey. It will be noted in the table that Lepus (hares, probably jackrabbit), Sylvilagus (rabbits, probably cottontail), and Canis (coyote), besides a great number of artiodactyl bones unidentified at the generic level, are the only bones which occur in significant quantity at the site.

The Lepus and Sylvilagus bones represent samples only, not a complete collection of all such bones. Although rib bones of other animals, especially of artiodactyls, did occur at the site, they were not saved. Presence of ribs in the midden may indicate that, if slaughtering of animals occurred off the site, the thoracic parts as well as the quarters were brought to the village.

TABLE 26

Depth of Unmodified Animal Bone from Las-7

Animal	Depth 0-12 in.	12-24 in.	24-36 in.	Totals
Aves (unidentified)	2	5	1	8
Mammalia				
Lepus sp.	174	192	70	436
Sylvilagus sp.	49	47	24	120
Canis latrans	22	10	3	35
Lynx rufus			1	1
Antilocapra sp.		2	1	3
Odocoileus sp.	6	3		9
Cervus sp.	1	2		3
Ovis sp.	2	4		6
- - - - - - - - - -				
Artiodactyla (unidentified)	162	47	39	248
Totals	418	312	139	869

HOUSES

House remains at Karlo consisted of a series of post holes which ranged in depth into the subsoil (sterile base of deposit) to a maximum of 17 inches, with an average depth of about 6 inches. The point of origin of these holes was impossible to determine because of the looseness of the sandy midden deposit in which they were originally dug. All of the holes in the subsoil were filled with midden soil.

By careful examination of the distribution of the post holes, it was possible to reconstruct a pattern which includes the outlines of three circular houses (see Map 3 and Pl. 2c). In plan view these outlines are seen partially to be overlapping, thus possibly indicating three periods of construction. All three structures have a diameter of approximately 10 feet. Clear evidence of the direction of the doorways is lacking.

The post holes range from 2 to 6 inches in diameter, with the average being slightly under 6 inches. The holes had been dug with a digging stick, as evidenced by the occasional marks left by this implement.

Burials were recovered within the perimeters of Houses 2 and 3. Burials 13 and 15 (House 2) were not complete and the probability is that the disturbance occurred during the construction of or during the period that House 2 was occupied. The only evidence of Burial 13 that remained, besides the shallow burial pit (only several inches into sterile base), was a fragmentary skull. All of Burial 15 was present except the skull, which evidently extended above the level of the post-cranial part of the burial. The floor level of House 2 was located almost at the same level as Burial 13.

Burial 19, undisturbed except for the lower vertebral column and the pelvic girdle, was removed from a shallow pit into sterile base almost in the center of House 3. Burial 19 may have represented an occupant of House 3 buried in the floor immediately after death. It will be recalled that, during the ethnographic period, houses were burned upon the death of an occupant. That such was not the case with Burial 19 was suggested by the recording of a burned area in the sterile base, within the burial pit and several inches in front of the skull of the burial. This may have had some connection with the former presence of a central fireplace in the house.

These structures may have been erected during the Late Period occupation rather than during the Karlo Period. However, there is good reason to attribute them to the early period of occupation, because of their situation with relation to the midden deposit proper. The post holes penetrate to an average depth of 6 inches into sterile, indurated base. If the midden deposit were several feet thick at the time of construction, it would not seem necessary to dig holes all the way to (and into) the hard base. In fact, the sandy nature of the midden deposit would probably make excavations into the hard subsoil almost impossible. It is true that later houses may have been erected over previously excavated pits but no evidence of this could be found.

Assuming that ecological conditions were essentially the same during the Karlo Period as they were during ethnographic times, a reasonable assumption with the data available from the site in the form of faunal remains, it is possible to suggest what the Karlo Period houses looked like. They probably consisted of a juniper pole framework covered with grass, or possibly tule, thatch. Willow may have been used for the frame, but the diameter and depth of the holes argue for reasonably substantial poles.

Local Paiute informants (Riddell, n.d.*b*) stated that houses in the

Secret Valley region were thatched with rye grass during the ethnographic period. The frames were either of juniper or willow, and the smokehole consisted of a hoop of willow to which the upright members were lashed to form a cone. The thatch was shingled in horizontal rows and bound down by bands of willow lashed horizontally to the frame. A pit approximately one foot deep might be excavated and the poles sunk into the ground in a circle at the rim. Such houses were winter type habitations and had a diameter of 10 to 15 feet.

Excellent illustrations of such Paiute houses have been provided by Merriam (1955, Pls. 25, 26a). The house frame pictured by Merriam apparently has a diameter slightly greater than any of the three Karlo houses.

BURIALS

Forty-two interments were recorded at the Karlo Site, including thirty-two burials and ten cremations (see Map 4). It seems safe to say that at least ten additional burials were lost to vandals or were removed by county road crews who used the sandy deposit of the site for road fill.

Although the uncremated human remains had in most cases become partially mineralized, the bones were in a relatively poor condition. In addition, rodents and other interments and pit excavations by the Karlo people had damaged many of the burials. Despite this discouraging situation, it was possible to remove enough of the remains from the deposit to allow a number of standard physical measurements to be made later on a series of skulls and long bones. These data are presented in Appendix A, along with a discussion of the physical appearance of the Karlo people. Illustrations of male and female crania from Karlo may be seen in Plate 4. Table 27 below shows the kinds of artifacts found associated with the burials and cremations. In some instances the specimens thought to be in true association with the burials may not in fact have been so, i.e., they could have been fortuitously associated with the burials when midden deposit was thrown over the body, or by some other disturbance.

Burial 4 was placed on top of Cremation 4, and it appears that the cremation pit had been enlarged to accomodate the burial. The cremation was concentrated beneath the pelvis of the burial, although burnt fragments were scattered within the pit.

The cremated remains of two adults and a child (six years of age) deposited together in a compact mass (designated as Cremation 5) lay directly above Burial 6, as well as just east of the latter and below it. The burial appears to have been partially disturbed by the cremations. The burial pit in this instance had a maximum diameter of 48 inches and a depth of 50 inches. The bottom of the pit was approximately 70 inches from the surface. A third cremation (Cremation 6) had taken place one foot below the north rim of the burial pit, and thus appears to have occurred at some time subsequent to interments represented by Cremation 5 and Burial 6.

Cremation 7 was scattered in and around Burial 8. It probably occurred at some time after the burial, since placing an adult into a grave would most likely serve to obliterate almost completely a small gathering of cremated remains. The scattered condition of the cremation here appears to have been due to rodent activity. The pit in which this cremation and burial occurred had a diameter of 31 inches and a depth into sterile base of about 22 inches. The bottom of the pit was approximately 34 inches from the surface of the deposit.

In association with Burial 9, an adult female, were the articulated remains of an infant. This dual burial seemingly represents a young mother and her baby.

Burials 9, 10, 11, and 12 were in rather close association on top of the hard sterile base, or in shallow pits excavated several inches into the base.

Post holes in the vicinity of Burial 13 suggest the possibility that this burial was destroyed (only skull fragments and shallow burial pit remained) during the construction of a house. The floor of the structure was at, or close to, the level of the burial.

The skull of Burial 15 may have been destroyed when the house that was built over Burial 13 was constructed. House posts enclose the burial pit of the latter on three sides.

Burial 20 probably was disturbed when Burial 21 was made. Burial 21, with its skull missing, had, in turn, evidently been disturbed by Burial 22. All three burials appear to belong to the late period of occupation at the Karlo Site as indicated by the "freshness" of the bones.

Burial 25 was salvaged from an area of the site which had suffered damage by earth moving machinery during borrow activities by the county road maintenance crew prior to the present investigations. Positive association of the specimens recovered with these remains could not be established.

Burial 26 had been almost totally destroyed by rodent activity. Only a small portion of the skull and several teeth remained in the burial pit.

TABLE 27

Burials. Cremations, and Associated Artifacts from Las-7

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10	B 1	B 2	B 3	B 4	B 5	B 6	B 7	B 8	B 9	B 10	B 11	B 12	B 13	B 14	B 15	B 16	B 17	B 18	B 19	B 20	B 21	B 22	B 23	B 24	B 25	B 26	B 27	B 28	B 29	B 30	B 31	B 32
Burial in midden	x		x																x		x		x	x				x		x	x	x			x		x	x		x	x	x
Burial into base		x		x	x	x	x	x	x		x	x	x	x	x	x	x	x		x		x			x	x	x		x				x	x		x			x			
Bone mineralized											x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x				x	x	x	x						
Male					?						x			?		?	x				x								x				x	?	x		?		?	?	?	
Female			x					x	x															?	?		?				x	?						?				x
Adult					x	x	x	x	x		x	x	x	x			x	x	x		x		x	x	x		x		x	x	x		x	x		x	x	x	x	x	x	x
Adolescent																										x						x										
Child					x										x	x						x						x														
Infant																			x	x																						
Square abalone shell bead		x			x						x	x	x	x			x																									
One perforation		x			x						x	x	x	x			x																									
Three perforations					x																																					
Four perforations					x																																					
Square mussel shell bead					x												x																									
Spire ground _Olivella_ bead		x									x	x	x				x	x			x						x												x		x	
Type I																	x	x																					x			
Type II		x										x					x																						x		x	
Type IIA		x										x	x				x																									
Type III		x									x		x				x				x						x														x	
Type IIIA		x											x				x																									
Rectangular _Olivella_ bead					x												x																									
Oval _Olivella_ bead												x					x																									
Macoma clam disc bead																																							x			
Abalone ornament		x										x					x	x																							x	
Type A1												x																														
Type C(1)1																																									x	
Type C(2)																	x																									
Type C(2)1																		x																								
Unidentifiable fragment		x																																								
Projectile point	x				x				x		x	x					x									x							x					x	x			
Type 1d									x																																	
Type 2a					x												x																					x	x			
Type 2d									x																																	
Type 3												?																														
Type 3d									x								x																x									
Type 4a					x				x								x																									
Type 4b																																						x				
Type 6a	x																																						x			
Type 6c									x										x																							
Type 9a	x																																									
Type 9c																										x																
Type 9g					x																																					
Type 9h	?																																									
Unique proj. pt.	x										x																															
Chipped stone crescent																	x										x															
Mano											x		x		x		x		x						x							x			x			x		x		x
Type IA2											x		x																						x					x		
Type IA3																	x																									
Type IB1a																																						x				
Type IB2																																			x							
Type IIA1																									x													x				
Type IIA1b																																x										

C = Cremation B = Burial

TABLE 27 [continued]

	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10	B 1	B 2	B 3	B 4	B 5	B 6	B 7	B 8	B 9	B 10
Mano [cont'd.]																				
Type IIC1																				
With torque																	x			
Unidentifiable fragment															x				x	
Metate																		x	x	x
Type IA1a																				x
Type IA1b																		x		x
Type IIB2b																				
Unidentifiable fragment																			x	
With red pigment																				x
Mortar																				x
Pestle		x												x						
Type I														x						
Type IA2		x																		
Type IB1																				
Type II																				
Type IIB																				
Unidentifiable fragment																				
Bone awl					x							x								
Type IB2																				
Unidentifiable fragment					x							x								
Flaking tool					x			x						x						
Type IA					?															
Type IB					x															
Type IIB														x						
Unidentifiable fragment					x			x												
Dice																				
Antler																				
Bone																				
Scapula saw																				
Spatulate bone implement					?			?	?									x		
Bone tube/bead									x											
Bone whistle																				
Tubular stone pipe								x												
Perforated stone discoidal																				
Scoria rubbing stone																				
Lemon-shaped charmstone		x						x												
Arrowshaft smoother								x												
Large chipped stone blade	x								?											
Flake scraper	x																x	x	x	
Flake knife																				
Chipped stone knife					x									x						
Chipped stone drill																				
Obsidian "blanks"	x								?											
Cracked obsidian nodule	x								x											
Red pigment		x											x				x			x
Green pigment																	x			
Core tool																				
Hammerstone																				
Battered quartz pebble																				
Unmodified pebble											x									
Obsidian prism																				
Mammal bone					x													x		
Whole abalone shell					x															

	B 11	B 12	B 13	B 14	B 15	B 16	B 17	B 18	B 19	B 20	B 21	B 22	B 23	B 24	B 25	B 26	B 27	B 28	B 29	B 30	B 31	B 32
Mano [cont'd.]																						
Type IIC1															x							
With torque																						x
Unidentifiable fragment																				x		x
Metate	x		x	x		x						x		x	x	x	x	x			x	x
Type IA1a	x					x						x		x		x		x				x
Type IA1b																						
Type IIB2b																					x	
Unidentifiable fragment			x	x											x		x	x			x	x
With red pigment																						
Mortar															x							
Pestle			x				x								x			x				
Type I																						
Type IA2																						
Type IB1							x								x							
Type II							x															
Type IIB																		x				
Unidentifiable fragment			x																			
Bone awl													x									
Type IB2													x									
Unidentifiable fragment																						
Flaking tool													x									
Type IA													x									
Type IB																						
Type IIB																						
Unidentifiable fragment																						
Dice				x			?	x														
Antler				x				x														
Bone				x			?															
Scapula saw													x									
Spatulate bone implement								?														
Bone tube/bead																						
Bone whistle																					x	
Tubular stone pipe																						
Perforated stone discoidal							x															
Scoria rubbing stone													x								x	
Lemon-shaped charmstone																						
Arrowshaft smoother																						
Large chipped stone blade																						
Flake scraper					x		x	x					x						x		x	
Flake knife													x								x	
Chipped stone knife								x					x									
Chipped stone drill								x														
Obsidian "blanks"																						
Cracked obsidian nodule																						
Red pigment		x											x							x	x	
Green pigment																						
Core tool								x														
Hammerstone																				x		
Battered quartz pebble								x					x									
Unmodified pebble																						
Obsidian prism					x																	
Mammal bone													x									
Whole abalone shell																						

Burial 27 lacked the "burned" (i.e., mineralized) appearance common to those burials thought to be typical of the Karlo Period of occupation. This non-mineralized condition suggests a more recent inhumation. This shallow burial was entirely within the midden deposit.

Burials 29 and 30 were considerably disturbed, hence listed artifact association is doubtful in this case. The skull attributed to Burial 30 actually may have belonged to Burial 31.

Burial 32 was a badly disturbed adult burial which occurred within the midden deposit. The lack of mineralization of the bones again suggests a late period interment.

Burned antelope skull remains (1-197906) were recovered from Cremation 5, suggesting the possibility that these remains represent either a portion of an antelope hunting disguise, a type of regalia, or a food offering for the departed individual. Antelope hunting disguises are recorded for the Hill Nisenan (Wilson, n.d.), for the Valley Nisenan (Kroeber, op. cit., p. 262), and other Nisenan (Beals, 1933:348). "A large antelope skull was present in the midst of a concentration of cultural debris in Area C" of Luster Cave on the Colorado-Utah boundary (Wormington and Lister, 1956:96, Fig. 61). This seemingly purposely buried head has remains of the skin adhering to it and its ears have been tied to the horns with sinew. Such a head may have been used as a hunting disguise.

SUMMARY

The importance of the excavation of the Karlo Site lies in its potentialities for illumination of prehistoric cultural and temporal relationships between California proper and the Great Basin. While it is true that previous work in the Great Basin has demonstrated certain prehistoric cultural affinities between the two regions, the excavations at Karlo have provided much additional specific data on these relationships: for the first time a large open Great Basin village and cemetery site has been excavated. The site has the particular virtue of revealing a cross-section of human activity which possibly began more than three thousand years ago in the region. This is in contrast to previous excavations in the western Great Basin where only specialized reports on archaeological sites were possible. I have specific reference to Lovelock, Humboldt, and Tommy Tucker Caves, from which certain aspects of the life of the occupants or users simply were not recoverable by archaeology. Since the Karlo Site evidently was a bona fide village site, it has provided a window into the past not previously afforded the student of Great Basin-California prehistory. The Karlo site may be set apart, for example, from other sites so far recorded in the Great Basin on the basis of the recovery there of forty burials and cremations, many richly endowed with grave goods. These grave lots have provided a unique record of associations which clearly link certain Great Basin cultural traits with those of central California.

The term "association," or possibly "relationship," is of prime consideration in archaeological research. It is for the purpose of discovering solid associations between culture areas or groups at different times in the past that the archaeologist interests himself in physical stratigraphy, caches, and grave lots. Surface collections (often large private collections) may provide a wealth of material, but seldom do these allow more than a seriation of artifacts upon typological grounds. It is much more satisfactory from the archaeologist's view point to excavate specimens with stratigraphic control. Unfortunately, this has been difficult in the Great Basin because of the thinness of culture deposit in the open sites. Collections from the surfaces of sites are particularly vexing because associations here are seldom useful. For example, glass trade beads may well lie side-by-side with artifacts which may be dated by millenia rather than by decades. The discovery and excavation of sites with rich or layered deposits, like Lovelock and Humboldt Caves in Nevada, Danger Cave in Utah, and of such open sites as the Rose Spring site in Inyo County, California, and the Karlo Site in Lassen County, have therefore been of crucial importance in the interpretation of Great Basin prehistory.

The cave sites mentioned above provide a certain stratigraphic control and preservation of organic material not ordinarily found in the open sites. From these protected sites both ordinary and exotic materials are available to the excavator and the yield in material goods compares with that from ethnographic collecting. Unfortunately, at least so far as attempts to build an overall picture of a functioning society are concerned, the two west central Nevada caves, Lovelock and Humboldt, served specialized functions. Primarily they seem to have served as temporary repositories for caches made in prehistoric times. Burials and grave goods were placed elsewhere. Furthermore, artifact classes such as milling implements and weapons are especially scarce.

Danger Cave, in western Utah, with its deeply stratified dry deposits, served a less specialized function than the two Nevada caves, hence provided a more complete picture of the aboriginal users of the cave than did the two Nevada caves. Despite the richness of all three of these, none of them yielded burials or structural (house?) remains. At Karlo, however, these elements were present, to augment the wealth of material and information provided by the three Great Basin cave sites which are used in this report as major points of reference and comparison.

In recent years there has been increased discussion of the "Desert Culture," a name for what is thought to have been a basic way of life early developed in the generally arid regions of the Far West. The discussion of the Desert Culture is partly a reaction to the term "Northern Periphery" (of the Anasazi region of the Southwest). The concept of a Desert Culture brings into clear focus the idea that the Great Basin culture is not an outgrowth of that of the Southwest at an early stage of Southwestern cultural development. Rather, it is proposed that the early culture of the Southwest <u>and</u> the Great Basin represented a common, or basic orientation from which the later Southwest culture developed, with the stimulus of certain outside influences. The Great Basin, however, remained comparatively static with respect to cultural change. This is not to imply, however, that change did not take place. Nor does it suggest that there was in the Great Basin a lack of specialized, local manifestations of the Desert Culture.

That the Desert Culture was not ubiquitous in the Great Basin is reflected in the statement by Wallace (op. cit., p. 19) that, "A desert way of life . . . does not appear to have become established in Death Valley until the beginning of the Christian era and perhaps not until a thousand years later. Therefore the concept of an ancient and persisting stratum is of doubtful validity here, and of no value in reconstructing the past history of this and contiguous areas." By definition, the Desert Culture consists of a series of general traits emphasizing the exploitation of local food resources, with particular attention being paid to the preparation of plant foods by means of seed grinding implements like the mano and metate. Wallace does not see how his Lake Mohave and Mesquite Complexes, both with a hunting economy (the latter with some seed collecting), fit into the definition of the Desert Culture. He feels that "a different frame of reference in terms of more specific cross-culturally recurrent artifact types would . . . be more helpful in working out a sound regional history" (ibid.).

It would seem that with respect to the concept of a Desert Culture, there are differing levels of definition of it by various students, and/or there are certain regions which do not exhibit its establishment. At Karlo the economy is clearly based upon both hunting and gathering, seemingly in no important way different from that of the ethnographic people of the region. In this respect, Karlo fits into the rather broadly defined Desert Culture. Yet, above all, the Karlo site is a manifestation of the Lovelock Culture, a culture which Heizer (1956:53) feels to be sufficiently distinctive as to merit not being swallowed by the generalized term "Desert Culture."

Concerning the placement of Karlo both culturally and temporally, we may consider a summary of the significant points discussed. First of all, it should be noted that shell beads and ornaments from Karlo are most responsive to cross-cultural comparisons. For the most part, the shell artifacts at Karlo are of types most commonly found in Early Horizon sites in central California. These types also occur in the early portion of the Middle Horizon of central California, hence suggest that Karlo may be dated as coeval with terminal central California Early Horizon and the beginning of the Middle Horizon. In round numbers, this would be approximately 4,000 years ago, or 2,000 B.C.

Where ceramics are totally absent, or very poorly represented, other classes of artifacts must be relied upon for making comparative studies between sites and areas. Shell beads and ornaments, in a way, fill this gap, but as a general rule artifacts of these classes are relatively rare in Great Basin sites. Most important, then, numerically, at least, are projectile points of stone. In this report careful attention was paid to the descriptive typology for projectile points. It was my intention to avoid "lumping" as I felt that such action could be taken later when more samples or collections are available for investigation. Two such samples have recently come to light. One is from a deeply stratified site at Rose Spring, in Inyo County, California (Riddell, n.d.c), where apparently good control on relative dating of a variety of projectile point types was possible. While the present report was being prepared, E. P. Lanning (n.d.) subjected the specimens from Rose Spring to intensive analysis, with the result that a useful background for the investigation of the Karlo points has been provided.

In addition to the Rose Spring analysis, the report on a Pinto site at Little Lake, located a few miles south of the Rose Spring site (Harrington, 1957) has proved of value in making long range areal comparisons with the Karlo material.

Karlo projectile points Type 4 and some specimens of Types 2 and 3 can be equated with Pinto points. With their tendency to have expanding stems, and usually definite barbs, the Karlo subtypes 2d and 3d points, for example, resemble Harrington's (op. cit., Fig. 39) "barbed" Pinto points. However, within these two subtypes, there is a sufficiently broad form range to necessitate the drawing of distinctions between points definitely similar to Pinto points, as defined, and those merely having a general resemblance to the latter. Thus, of the eight subtype 2d specimens, three are in the "definite" class. All of these are from the 12-24 inch level. They weigh 1.5, 2.4, and 3.3 grams, respectively. Of the thirty-three subtype 3d points, twenty can be classed as being definitely similar to Pinto points. One came from the surface, ten from 0-12 inches, seven from 12-24 inches, and two from 24-36 inches from the surface. In weight these twenty points range from 1.2 to 3.6 grams and average 2.1 grams.

Again, following Harrington (1957), it is possible to state that there is a marked resemblance between subtypes 9d and 9e and Pinto Shoulderless and Pinto Sloping Shoulders.

A portion of the other Type 9 points from Karlo, especially subtype 9a, may be regarded as having Pinto relationships as at Little Lake. Leaf shaped points at Little Lake were not numerous (only thirty-six were recovered).

Projectile points which clearly may be considered as Lake Mohave and Silver Lake points were not recovered at Karlo. Both forms, however, were recovered at Little Lake and tended to be stratigraphically earlier than the Pinto points (ibid.).

Although Jennings (op. cit.) does not strongly emphasize the comparability of Pinto points with those from Danger Cave, it would seem that the following types of Danger Cave specimens could have Pinto affinities: W6 (in part), W10, W11, W31 (in part), W33, and W41 (in part). Most of these types occur at all levels at Danger Cave except the lowest (Level I). The four specimens of W11 occur only in Levels II and III. Of the forty-four Type W31 points, seventeen come from Level II, twenty-three from Level III, and two each from Levels IV and V. These Danger Cave specimens comparable to Pinto points appear, in part, to be older than those at Karlo and at the Little Lake site. Level IV of Danger Cave has a C14 date of nearly 4,000 years before the present, and the two preceding levels are, accordingly, earlier. All of this suggests a considerable antiquity as well as a wide areal distribution for this point type (cf. Lister, 1953).

Considering the mass of projectile points from Karlo, it is of interest and possibly of some significance that the points tend to be rather finely made and light in weight compared, for example, to points from Owens Valley, which generally are either markedly larger or smaller (see Riddell and Riddell, op. cit., p. 30). The central California Early and Middle Horizons produce projectile points which are massive when compared to the Karlo assemblage. At Danger Cave the projectile points, as a group, are heavier than those from Karlo. In sum, Karlo can be typified as a site from which the projectile points are light in weight and usually excellently made, in contrast to other sites and areas noted above.

Let us now consider other aspects of the Karlo Period. Physically the Indians who lived and died at Karlo some three or possibly four thousand years ago were a short-statured people, fairly robust, and with a corresponding degree of muscular development. The men were about five feet three inches in height and the women about five feet, or slightly under (see Appendix A). These people were generally longheaded, with skulls having the striking characteristics of lateral flattening and a projecting occiput.

For weapons the people of the Karlo Period evidently used atlatls, and probably the bow and arrow. Since the Karlo Period at this site seemingly involves a period of time equivalent to Early Lovelock and a portion of Transitional Lovelock (Bennyhoff, op. cit.), the use of both types of weapons is to be expected. If the site were deeply stratified, it would presumably be possible to differentiate more clearly between Early, Transitional, and Late Lovelock phases at Karlo. As it is, therefore, the early portion of the occupation is called the Karlo Period, and the later period is designated the Late Period. This system equates the Karlo Period temporally with Early and Transitional Lovelock, as a unit, and suggests use of the Karlo village site intermittently for a considerable period of time.

Grinding implements used in the preparation of food consist of the mano and metate (used with a back and forth motion), the flat-surfaced mortar and blunt-ended pestle, the flat block mortar (hoppered?) which has a shallow cup-shaped pit, and the shaped (or unshaped) bowl mortar and elongate, pointed pestle. The flat-surfaced mortar and the hoppered (?) mortar may be one and the same, except that the latter exhibits more wear.

Not only was there a diversified use of grinding implements, but their abundance clearly demonstrates the importance of plant foods to the Karlo villagers. During the ethnographic period manos and metates primarily were used for the reduction of a great many kinds of wild seeds to flour. The mortar and pestle were generally reserved for the grinding of acorns. It seems reasonable, therefore, to suggest the same division in the function of the grinding implements for the Karlo Period. This implies that these people made trips to the Sierra for the gathering of acorns, thus paralleling the activities of the ethnographic Wadátkut who lived in Secret Valley.

The use of the hoppered mortar is a trait common in northwestern California among the ethnographic Klamath River groups. This trait also is found among the Pit River groups and the Northeastern Maidu, but is absent among the Paiute. The use of the hoppered mortar is quite widespread in California, and can be considered a Californian rather than a Great Basin trait. Taken in conjunction with the use of the lemon-shaped charmstone (which was used during ethnographic times by the Pit River people as a hunting and gambling charm, and by the Klamath as a gambling stone), it suggests a northern Californian affiliation for the people of the Karlo Period, rather than an orientation toward the Great Basin. The probable importance of the acorn to these people also strengthens the concept of a Californian relationship. One cannot but wonder if the people of the Karlo Period were not ancestral to the Pit River people.

The recovery of so many projectile points and projectile point fragments is strong evidence that hunting served as an important adjunct to the gathering of wild plant products. Animals hunted include deer, antelope, mountain sheep, and elk, as well as a variety of smaller mammals and birds. Stone boiling was probably of considerable importance in the cooking of food if the rather high percentage of thermal-fractured stone in the deposit is a criterion. Burned stones also may be an indication of the use of earth ovens.

The recovery of a number of bone awls indicates the manufacture of coiled baskets. However, textile impressions found on small lumps of burned clay appear to have come from soft, twined, open work bags similar to those found in the Early Lovelock period of the west central Nevada caves (Heizer and Krieger, op. cit., p. 88).

Ceremonial observances are suggested by the recovery of spatulate bone implements of both blunt and pointed form. Some of these implements look much like ethnographic northern Californian head and body scratchers, used by girls during the adolescence ceremony. The pointed bone pins may have served as hair pins, and possibly were decorated with feathers. The "killing" of stone blades, mortars, and pipes when placed in graves is another possible ceremonial element in the Karlo complex. The finding of large mammal bones or portions of such bones suggests that food (as well as artifacts) served as grave offerings. Remains of an antelope skull in a cremation may be part of a ceremonial headdress, or it may be part of a hunting disguise.

The fact that manos and metates were more common in the upper levels suggests that the use of plant products became more important in later times, or that there were more people using them (i.e., that there was a larger population at the village in late times). From the burials recovered, it is indicated that the heaviest (most continuous?) occupation, however, occurred in the early period (the Karlo Period). Data from mano and metate occurrence, therefore, support the suggestion that the late villagers had a greater concern for grinding their food than did the earlier people.

Also indicating the possibility that the milling of foodstuffs was of more significance in late times is the observation that mortars were more abundant in the upper levels of the site deposit. Pestles, however, were as common in the 12-24 inch level as in the top 12 inches.

Let us now consider the carbon 14 date obtained for the Karlo site. In preceding sections, cross-dating with artifact types which occur at Karlo and in the delta region of the Sacramento-San Joaquin Rivers in central California has been employed. A temporal correlation was seen between the Karlo Period remains and those from the later portion of the Early Horizon and the early portion of the Middle Horizon. On these grounds, the estimated date for the beginning of the Karlo Period was about 4,000 years before the present. The correlation, it will be remembered, primarily was made on the grounds of certain identities of shell beads and ornament types which occurred in the two regions.

A charcoal sample from the Karlo site was submitted to the Scripps Institution of Oceanography, University of California, at La Jolla, California, for radiocarbon dating. The sample, numbered LJ-76, returned a date of 2350 $\pm$ 150 years before the present (1959). This does not date what have been considered the Early Lovelock aspects found at the Karlo site but, instead, dates the presumed Transitional Lovelock Period at Karlo (see Table 28).

The charcoal sample was from a fire hearth in the 24-36 inch level, but above base. If these fire remains originated within an excavated pit, as seems possible, the depth at which the charcoal was removed may not represent the true, or undisturbed, stratigraphic association. In other words, any undisturbed material lying on base could be considerably earlier than that indicated by the charcoal, a possibility suggested by the burials and cremations with artifact types associated with the Early Lovelock Period.

As an interesting footnote, a stone atlatl spur was recovered from an Early Horizon site on Bear Creek, near Stockton, California, long after the major portion of the present report had been completed. This central California site (SJO-112) produced burials and artifacts which are beyond a doubt of the late portion of the Early Horizon. The specimen under consideration is of stone, and is of the same type as the two stone specimens from Karlo (Fig. 22f), except that it is slightly larger. The recovery of this specimen once again tends to reinforce the earlier conclusion that the Karlo Period is coeval with terminal Early Horizon and beginning Middle Horizon of central California.

In conclusion, it is hoped that results of the work done at Karlo and here reported will serve as a useful stepping stone for those who may continue archaeological investigations in the Great Basin and California, and in the neighboring regions of the western United States.

TABLE 28

Suggested Chronology for Californian and Great Basin Archaeological Sites and Regions

Pleistocene and Postglacial: Stage	Pleistocene and Postglacial: Dates	Central Calif.	West Central Nevada	Karlo	Tommy Tucker Cave	Amedee Cave
Medithermal	1950 AD	Late II	Dune Springs	Amedee		
Medithermal	1000 AD	Late I	Late Lovelock	Late		
Medithermal	BC/AD	Middle	Trans. Lovelock	Karlo Period		
Medithermal	500 BC	Middle	Trans. Lovelock	Karlo Period		
Medithermal	1000 BC	Middle	Early Lovelock	Karlo Period		
Medithermal	2000 BC	Middle				
Altithermal	3000 BC	Early	Leonard			
Altithermal	4000 BC	Early				
Altithermal / Anathermal	5000 BC	Early				
Anathermal	6000 BC	Early	Humboldt			
Anathermal	7000 BC	Early				
Anathermal / Late Pleistocene	8000 BC	Early	Fallon			
Late Pleistocene	9000 BC	Early				

APPENDIX A

DESCRIPTION OF HUMAN SKELETAL REMAINS FROM THE KARLO SITE

Grover Krantz

The Karlo skeletal material includes the remains of over thirty individuals, of which thirteen skulls (or parts thereof) and nine lots of post-cranial material are described here. The specimens not considered include cremations, immature individuals, and several which appear archaeologically to be much more recent than the main part of the collection.

The bones are partly mineralized and quite heavy, thereby giving a false impression of massiveness when handled. By and large, they are in a poor state of preservation. Some bones are dislocated and warped, making restoration impossible as they are now quite brittle.

Of the adult specimens, the ages at time of death range from about twenty years to middle age or around fifty years, as judged primarily from suture closure. Of the indubitable females, all are under twenty-five years, and the males are of all ages.

Sexing the skeletons proved to be quite difficult. The more complete crania, after careful examination, were judged to represent six males and four females. The remainder were too damaged for accurate diagnosis, but three are tentatively called male. These are the thirteen whose measurements are used here.

The pelves, in several cases, contradict the sex determination given above, i.e., some of the masculine skulls are associated with pelves showing shortened and widely-spaced ischia, and rather open ischial notches. Rather than setting up an intermediate category, I have elected to describe the skulls on the basis of their apparent sex without reference to any post-cranial material. There are then masculine and feminine categories, and these may not correspond to the actual sex of the individuals concerned.

Several of the skulls could be sexed easily by visual examination alone. The skulls judged to be those of males thus were quite large, and had more rounded optical borders, more muscular relief (particularly in the jaws), and larger faces than are seen in standard female crania. In general, the male skulls possessed the usual features thought to be characteristic of masculinity in any population.

Other skulls were sexed by careful metrical comparison with those of established sex. The measurements and indices which appeared to be sexually diagnostic are the ones given below (Table 1).

Male skulls are much longer and much higher than their female counterparts. Although both male and female skulls exhibit about the same average breadth, in the following features the male forms are larger than the female.

1. Total head size (as measured by cranial module and capacity).
2. Gross facial measurements--bizygomatic breadth and total facial height are great, as are all sides of the facial triangle from nasion to prosthion to basion.
3. Lesser facial measurements--only external palate breadth is distinctive here.
4. a. Mandibular symphysis.
   b. Breadths of ascending rami outstanding.

Referring to indices, the cranial index and the orbital index are low in males, while all others are similar in both male and female skulls.

Many of the usual sexing criteria seemed non-applicable. Mastoid processes, supra-orbital tori, malar size, and occipital crests showed no great distinctions between male and female specimens.

<u>Description of skulls</u>

Total size of the Karlo skulls is great by any standard. The male length of 197 mm. exceeds by one millimeter even the total skull size of Greenland Eskimos, who are among the world's largest in this respect. The great length is partially attributable to the brow ridges as well as what may be called an occipital bun. There is no outstanding thickening of the vault.

Cranial height, as measured both from basion (136 mm.) and auricularly (118 mm.), is also outstanding in the male specimens. Parietal breadths are rather low--about 132 mm. in both sexes, hence under the world average.

Endocranial capacity, as measured by formula, is not great--1484 cc. in males and 1301 cc. in females--but is at least equal to the world average and, in males, is probably higher. Since estimates of the whole human population range from 1350 cc. to 1450 cc., this is an awkward comparison. At any rate, the Karlo specimens are exceeded in capacity by European and Eastern Eskimos' skulls, and, in turn, are of greater capacity than those of Australians and most American Indians.

Other measures of the braincase, like cranial module and the various arcs, are large. The cranial capacity of these measurable Karlo individuals may follow from their dolichocephaly. This cannot be verified, however, as only two or three of the skulls are sufficiently complete for direct measurement.

There is considerable difference between the sexes in cranial length and height, but very little in breadth. Thus the female series appears to be distinctly more spherical than the male; this is not entirely a function of the male brows, but also stems from a distinct lateral flattening which is, by and large, common to the male crania.

The braincases of the specimens are closely matched in length and height measurements by Morant's (1930) series of Upper Paleolithic Europeans. The sex differences are also of the same order. Morant's skulls averaged about 9 mm. greater in breadth, and differed correspondingly therefore in capacity.

Cranial indices of the Karlo skulls are low--they show an average of 69.2, with a three point difference between the sexes. Length to height relation is not unusual in these skulls, but the skulls appear, on the other hand, to be more than usually narrow in relation to their height.

As with most American Indians, the Karlo people's faces are large. Bizygomatic breadths (average of 135 mm.) are only 5 mm. less than the European series. Here there is a good sexual dimorphism as the males' breadths are 10 mm. greater than the females' (138 mm. vs. 128 mm.). It will be noted that the male faces are 6 mm. wider than their braincases. Total facial height is 117 mm. in males, 110 mm. in females, again showing a sexual dimorphism.

Prognathism is slight or medium, and is generally more alveolar than mid-facial.

The facial height (nasion to prosthion) is the same as in the European series (71 mm. and 66 mm., male and female, respectively). Other parts of the facial triangle are slightly greater, e.g., nasion to basion is 104 mm. vs. 102 mm., and from basion to prosthion is 104 mm. vs. 97 mm. In the latter case, the Karlo males far exceed the females (112 mm. vs. 96 mm.), thus demonstrating that the males are more prognathous than the females.

Lesser facial measurements are in no way remarkable. The orbits are definitely chamaeconch (index of 78.0), and the palate is rather broad (65 mm.), with an index of 116, which is in the brachyuranic category.

The malars are very large and project anteriorly and laterally in a typically mongoloid fashion. Muscular relief is strong in both sexes. This may be correlated with the pronounced post-orbital constriction, which also results from the development of masticatory musculature.

Supraorbital tori are medium or large, especially in their lateral portions. The division into two parts over each eye is often vague. This results from the large size of the ridges and the relative lack of inclination to the orbits.

The nose is mesorrhine (index of 51.8). Nasal root and bridge height and breadth are of medium development, though root height tends to be low. There is little nasion depression. Nasal sills are mostly dull, but the spines are of medium size.

Tooth wear is considerable at all ages, and older skulls lack many teeth. There is no significant mal-occlusion or any evidence of caries. The bite is edge to edge in all but one case, where there is a small overbite. Where there is anything left of the incisor crowns, a pronounced shovel shape is observable.

Mandibles are large, as would be expected from observation of large faces. There is little mental eminence in most cases, but there is a fairly great range of variation noted here. Chins are about equally divided between median and bilateral types.

While the palates are consistently large and U-shaped, the lower dental arch tends to be narrow and more V-shaped. In the present writer's experience, this combination has been seen only in Eskimo skulls.

In detailed features not discussed here, the Karlo skulls do not appear to differ from the normal human condition.

Discussion

The general aspect of the skulls recalls what is usually termed "australoid." This is seen in the dolichocephaly (see Pl. 4A-C), large and laterally prominent brow ridges, large faces, alveolar prognathism, low noses, and little chin projection. These characteristics are so generalized, however, that European Paleolithic Aurignacians and Eskimos may fit the description fairly well.

Known populations of western North America which most closely match Karlo are the prehistoric (Early Horizon) people of Central California (with whom the Karlo people share certain cultural traits), and recent Indians of Baja California. The skulls from Baja California, now stored in the Robert H. Lowie Museum of Anthropology of the University of California, seem to correspond generally with the Karlo skulls, especially in the more important indices.

The most striking characteristics of the Karlo population, and those which best distinguish it from recent California Indians, are the lateral flattening of the crania and the projecting occiput. Otherwise there appears to be little significant difference.

Post-Cranial Material

Little of the post-cranial material was sufficiently preserved for measuring. Femora, tibiae, and humeri were the bones most frequently encountered in good condition. From these a number of stature estimates were made. Pearson's formulae were used.

Nine individuals had measurable long bones. Six of these are considered male and three female. The number of bones usable in each case ranged from one to eight. Stature estimates ranged from 1462 to 1686 mm. The average of all nine individuals was 1570 mm. Those designated as male were estimated at 1602 mm. (5 ft. 3¼ in.), while the females were estimated at 1504 mm. (4 ft. 11½ in.) in stature.

TABLE 1

Metrical Data on Skulls

Measurement	Group Mean (mm.)	Males (mm.)	Females (mm.)
Total skull length	191.0	197.0	181.0
Total skull breadth	132.0	132.0	131.0
Basion-bregma	133.0	136.0	128.0
Auricular height	116.0	118.0	112.0
Minimum frontal breadth	91.0	93.0	89.0
Bizygomatic breadth	135.0	138.0	128.0
Total facial height	114.0	117.0	110.0
Upper facial height	69.0	71.0	66.0
Nasion-basion	104.0	111.0	97.0
Basion-prosthion	104.0	112.0	96.0
Nasal height	51.0	52.0	49.0

TABLE 1 [continued]

Measurement	Group Mean (mm.)	Males (mm.)	Females (mm.)
Nasal breadth	26.1	27.2	24.5
Orbital height (both sides)	33.1	33.0	33.2
Orbital breadth (both sides)	42.1	43.7	40.3
Interorbital breadth from maxillo-frontale	20.1	21.2	18.7
Palate, external length	56.2	57.7	54.0
Palate, external breadth	65.3	66.9	62.7
Arc, nasion to opisthion	372.0	383.0	361.0
Transverse arc	304.0	310.0	294.0
Maximum circumference	521.0	539.0	500.0
Condylo-symphyseal	107.0	109.0	104.0
Bicondylar breadth	122.0	126.0	118.0
Symphysis height	35.9	37.8	34.0
Corpus thickness	13.0	13.5	12.2
Bigonial breadth	100.0	101.0	98.0
Ascending ramus height	57.0	59.0	54.0
Ascending ramus minimum breadth	34.5	36.0	32.2
Ascending ramus maximum breadth	44.1	47.2	39.0
Bimental diameter	41.3	42.3	40.3
- - - - - - -			
Cranial capacity (formula)	1417 cc.	1484 cc.	1301 cc.

Indices	Group Mean	Males	Females
Cranial	69.2	67.2	72.7
Height-length	69.3	68.0	70.9
Height-breadth	101.2	102.2	99.8
Fronto-parietal	68.3	68.3	68.3

TABLE 1 [continued]

Indices	Group Mean	Males	Females
Auricular height-length	61.1	60.5	62.0
Cranial module	152.0	156.0	146.0
Total facial	85.4	85.3	85.6
Upper facial	51.6	51.4	51.8
Cranio-facial	102.7	104.2	99.0
Nasal	51.8	52.9	50.3
Orbital (both sides)	78.0	76.0	80.9
External palatal	116.0	115.9	116.4
Zygo-gonial	76.2	72.8	83(?)
Fronto-gonial	110.1	115.2(?)	107.5

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Abbreviations Used

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APS	American Philosophical Society
-P	Proceedings
-T	Transactions
BAE	Bureau of American Ethnology
-B	Bulletin
-R	(Annual) Report
SWM	Southwest Museum
-M	Masterkey
-P	Papers
UC	University of California
-AR	Anthropological Records
-PAAE	Publications in American Archaeology and Ethnology
UCAS	University of California Archaeological Survey
-R	Report
UU	University of Utah
-AP	Anthropological Papers

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EXPLANATION OF ILLUSTRATIONS

* Accession 119 of the State Indian Museum; all other numbers (e.g., those with prefix "1-") are of the Robert H. Lowie Museum of Anthropology, University of California, Berkeley. In this and all following figures, "boxed" drawings show artifacts which are of different scale than those in the remainder of the figure.

Figure 10.
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g. Abalone shell ornament, Burial 8, 1-196911.

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j. Antler gaming piece, Burial 14, 1-196925.
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a. Cross-section of a vesicular basalt mortar, 1-197288.
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a. Spatulate bone implement fragment.
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f. Metapodial awl in fragmentary condition, Type IC, 1-196527.

g. Metapodial awl, Type IB2, from burial 23, 1-197023.

h. Decorated bone awl or pin fragment, 1-196438.

i. Metapodial awl, Type IC, 1-145512.

j. Rabbit tibia awl fragment, Type III, 1-196570.

k. Rabbit tibia awl, Type III, 1-197721.

l. Rabbit tibia awl fragment, Type III, 1-196433.

Figure 21. a. Modified scoria pebble, 1-196814.

b. Naturally formed basalt pebble which exhibits abrasive wear on flat under-surface, 1-196804.

c. Modified piece of scoria with partial longitudinal groove which may have served as shaft smoother, 1-195852.

d. Pestle fragment with pecked zig-zag groove on side and pecked ring at end of specimen, 1-197245.

e. Discoidal fragment of volcanic tuff from Burial 17, 1-196981.

f. Discoidal fragment of stone.

g. Fragmentary stone atlatl weight, 1-196853.

h. Fragment of a thick stone discoidal, 1-196856.

i. Fragmentary stone atlatl weight, 1-196807.

Figure 22. a. Reconstruction of a section of fiber mat(?) from an impression on a piece of baked clay.

b. Reconstruction of a section of fiber mat(?) from an impression on a piece of baked clay.

c. Bone atlatl spur fragment, 1-196518.

d. Fragmentary sandstone shaft smoother, 1-196810

e. Fragmentary stone atlatl spur, 1-196808.

f. Stone atlatl spur, 1-196837.

g. Scoria shaft smoother, 1-196842.

h. Side and top view of a basalt core.

i. Basalt core.

Plate 1.* A. Top row, left to right: Five "snub-nosed" scrapers, 1-145449, 1-196353, 1-196409, 1-196410, 1-196412.

Middle row, left to right: Drills, 1-196161, 1-196140, 1-196158, 1-196153, 1-196151, 1-196157, 1-196134, 1-196145, 1-196127, 119/71.

Bottom row, left to right: Drills, 1-196159, 1-202931, 1-196141, 1-196154, 1-196124.

B. Top row, left to right: Five basalt side scrapers, 119/154, 1-145509, 1-196308, 1-196328, 1-196258.

Bottom row, left to right: Shaft smoother, 1-197119, Cremation 8; lemon-shaped charmstone, 1-197120, Cremation 8; basalt scraper, 119/105.

C. Top row, left to right: Stone knives, 1-145444, 1-196299, 1-145360, 1-196345, 1-196365, last specimen unnumbered.

Right center, left to right: Stone knives, 1-196277, 1-196305.

Bottom row, left to right: Stone knives, 1-197007 from vicinity of Burial 19; 1-196999 from vicinity of Burial 18; 1-196271; stone engravers, 1-196400, 1-196399, 1-196150.

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* Scales in A and B are same as shown for C and D.

Plate 1. D. Top left: Four projectile points possibly associated with Burial 29, 1-196972, 1-196973, 1-196970, 1-196971.

Top right: Antler flaking tool, Burial 23, 1-197030; bone flaking tool, Burial 4, 1-196888.

Middle row, left to right: Projectile point, Burial 28, 1-196965; projectile point, Burial 23, 1-197040; knife, Burial 23, 1-197041; knife, Burial 23, 1-197042.

Bottom row, left to right: Abalone ornament, vicinity of Burials 30 and 31, 1-197086; obsidian knife, Burial 4, 1-196886.

Plate 2. A. Projectile point types 1 through 8.

B. Projectile point Type 9.

C. Post hole pattern and burial pit.

D. Burial 11.

E. Pit for Burial 6.

F. Burial 9, with infant.

G. Trench with Burials 1, 2, and 3. Note outline of burial pits in sterile base.

Plate 3. A. Vesicular basalt metate, Burial 31, 1-197078.

B. Basalt mortar used with flat-ended pestle. The original surface was probably a metate surface. 1-197259.

C. Top: Pestle of the type used on mortar illustrated in Plate 3B (scale same as for 3B). 119/86.

Bottom: Pestle with one end used on a flat mortar and the other end used in a deep mortar (scale same as for 3B). 119/103.

D. Scoria rubbing stone possibly used for cleaning green hides (scale same as for 3B). 1-197038.

E. Top row, left to right: Projectile points, Cremation 1, 1-197089, 1-197091, 1-197090; grooved stone fragment, Cremation 1, 1-196822, 1-197905; thinned antler tool fragment, Cremation 5; bone flaking tool fragment, Cremation 5, 1-197110; projectile points, Cremation 5, 1-197112, 1-197113, 1-197114.

Left center, left to right: Projectile points, Cremation 9, 1-197129, 1-197138, 1-197139.

Right center, left to right: Bone awl fragment, Cremation 5, 1-197111; obsidian crescent, 119/89; obsidian crescent fragment, Burial 7, 1-196904.

Bottom row, left to right: Projectile points, Cremation 9, 1-197130, 1-197131, 1-197132; projectile points, Burial 7, 1-196899, 1-196900, 1-196901.

F. Chipped stone specimens from mound at the mouth of Deschutes River, Oregon. Note curved specimens with bifurcated ends similar to Karlo specimens in Plate 3E. (Scale: approximately 1/2)

Plate 3. G. Bottom to top: Small obsidian tools: 1-196396, 1-196401, 1-196398, 1-145470, 1-196395, 1-196394, 1-196397.

Plate 4. A, B, C. Views of (male) skull from Burial 23. 12-9928.*
D, E, F. Views of (female) skull from Burial 9. 12-9911.

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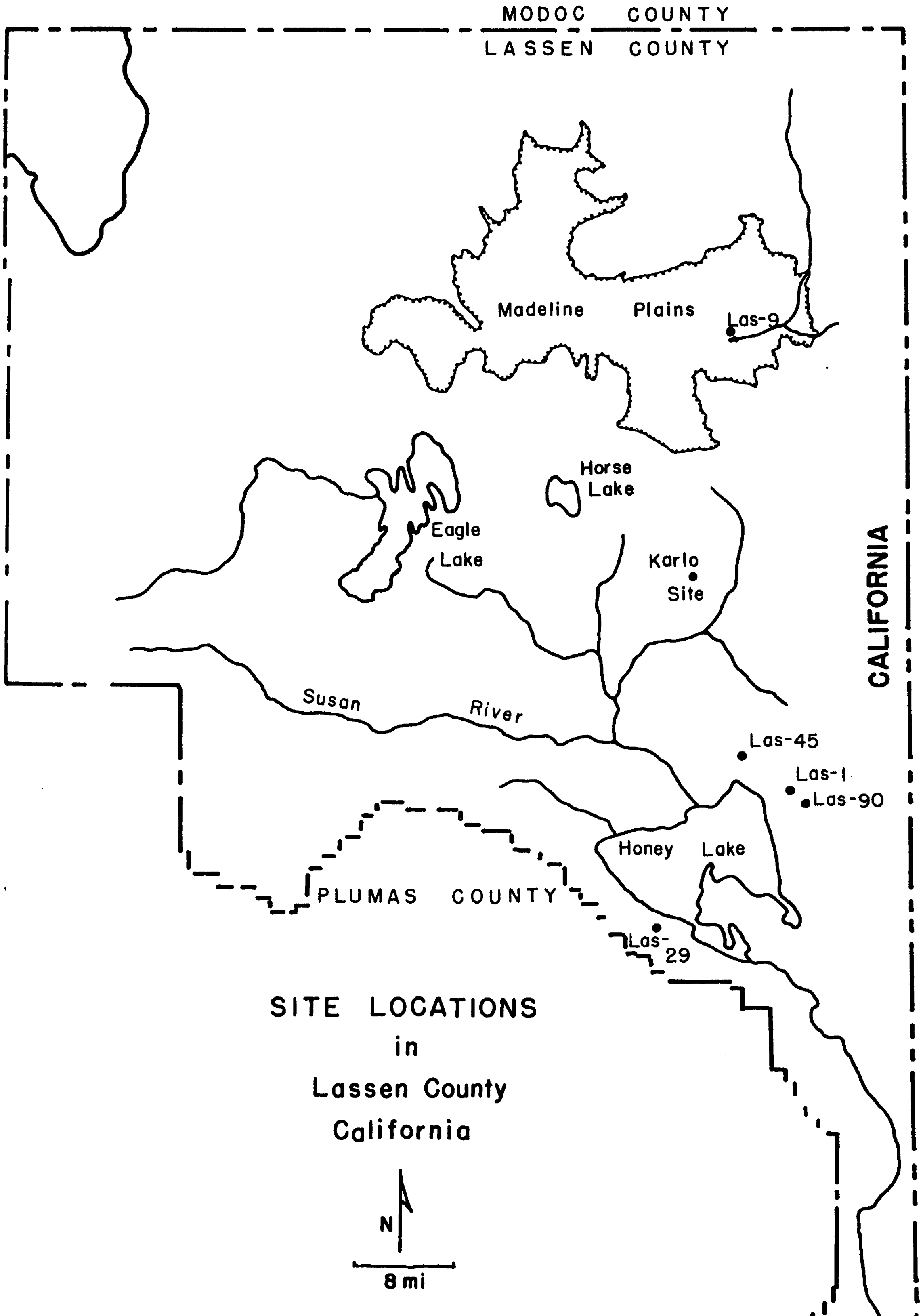
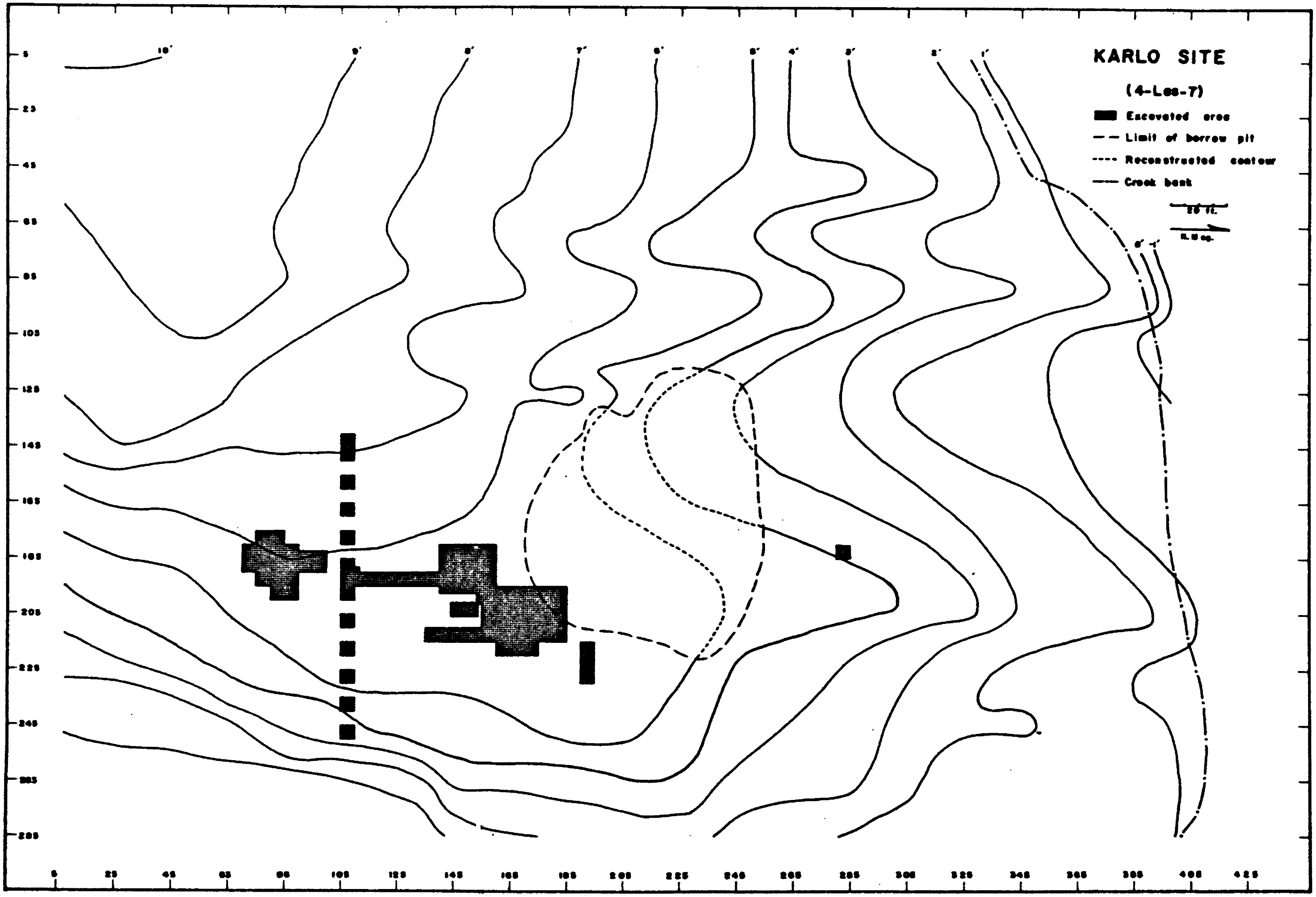
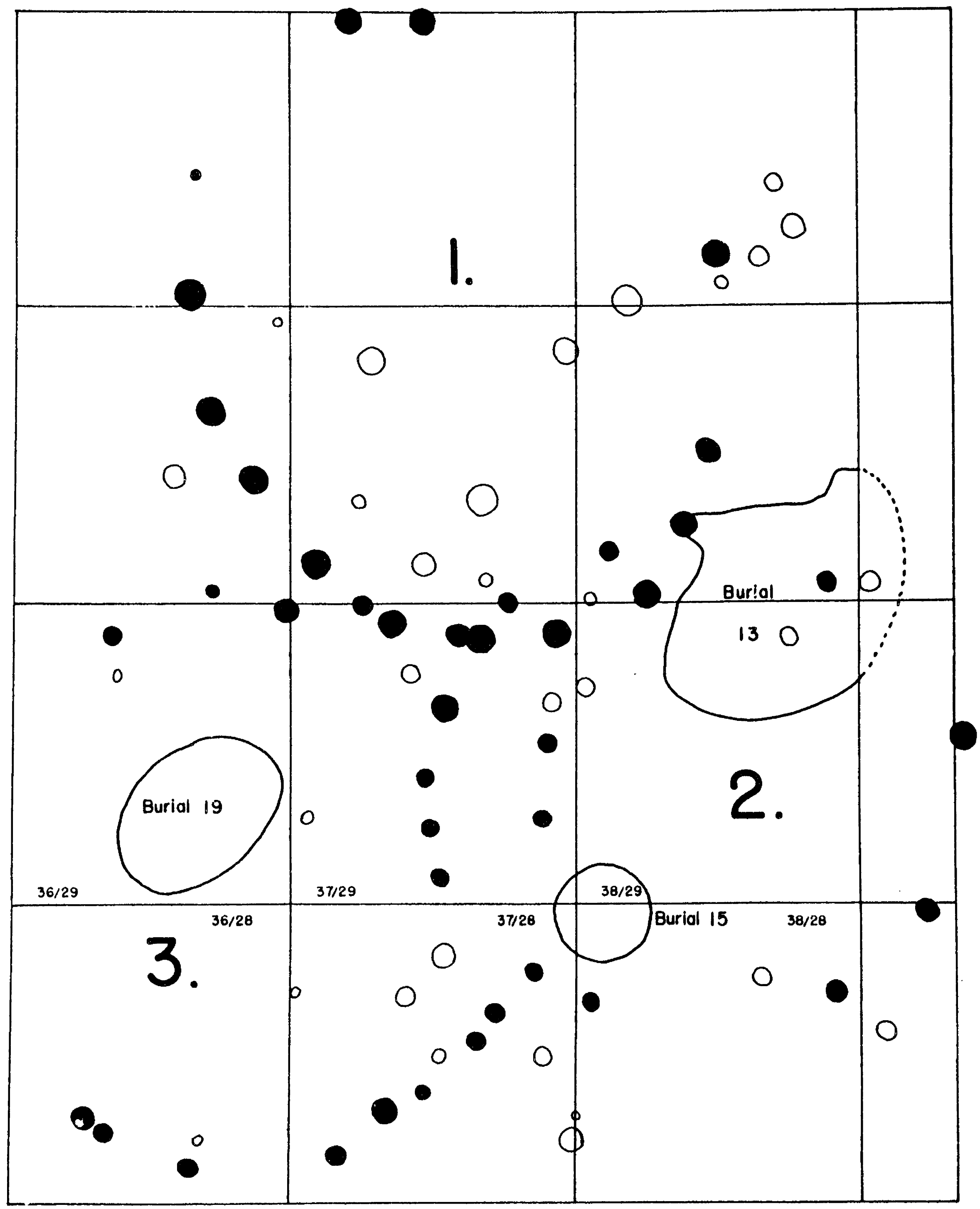
* Prefix "12-": skeletal material in Robert H. Lowie Museum of Anthropology.


MODOC COUNTY
LASSEN COUNTY
Madeline Plains
Las-9
Horse Lake
Eagle Lake
Karlo Site
CALIFORNIA
NEVADA
Susan River
Las-45
Las-1
Las-90
Honey Lake
PLUMAS COUNTY
Las-29
SITE LOCATIONS
in
Lassen County
California
N
8 mi

Map I


KARLO SITE
(4-Las-7)
Excavated area
Limit of borrow pit
Reconstructed contour
Creek bank
20 ft.

Map 2

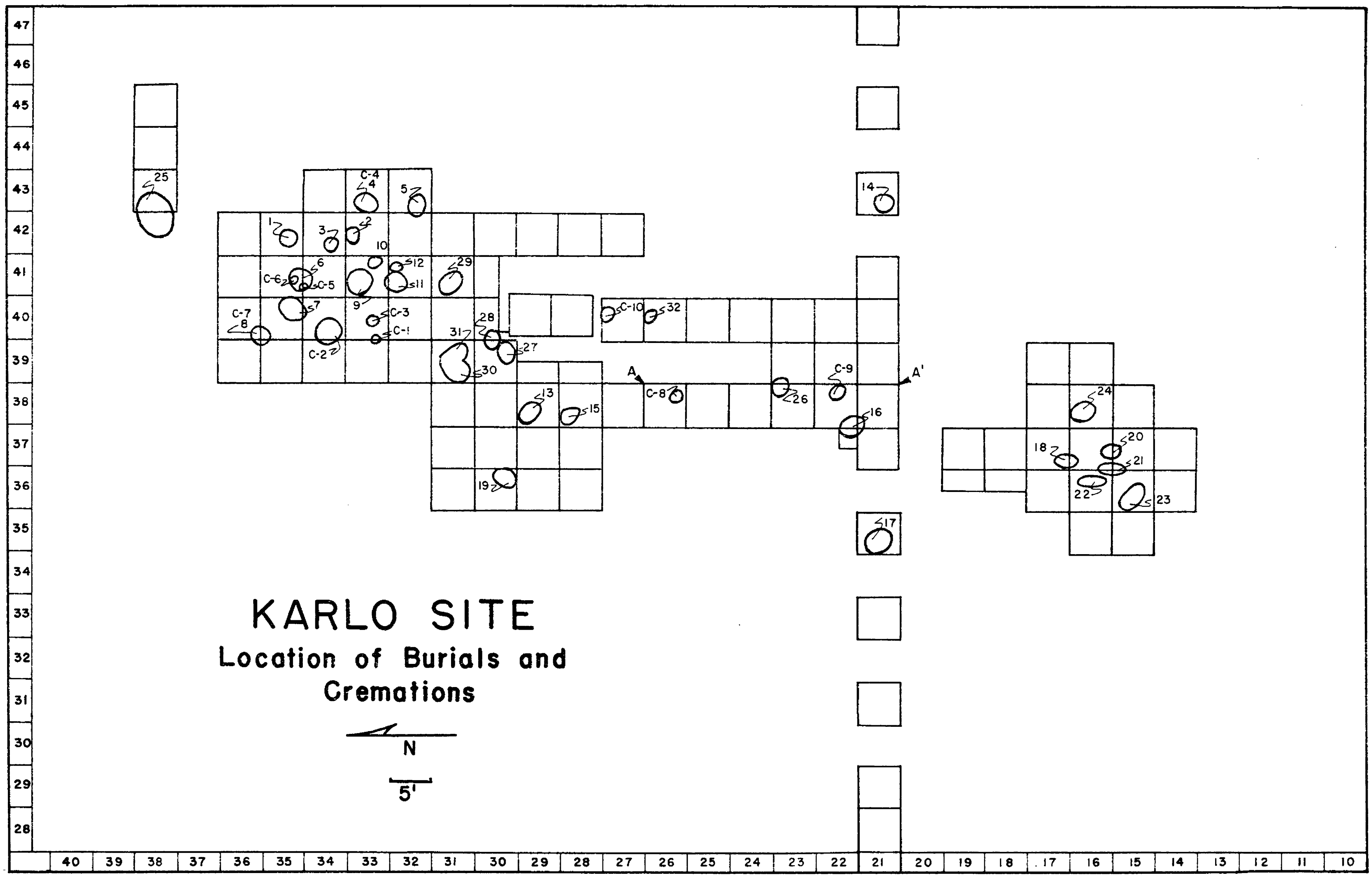


POST HOLE PATTERNS AT KARLO

Pattern post holes in black. Each square 5'.

mag. north

Map 3


KARLO SITE
Location of Burials and Cremations
N
5'
A
A'
C-1
C-2
C-3
C-4
C-5
C-6
C-7
C-8
C-9
C-10

Map 4

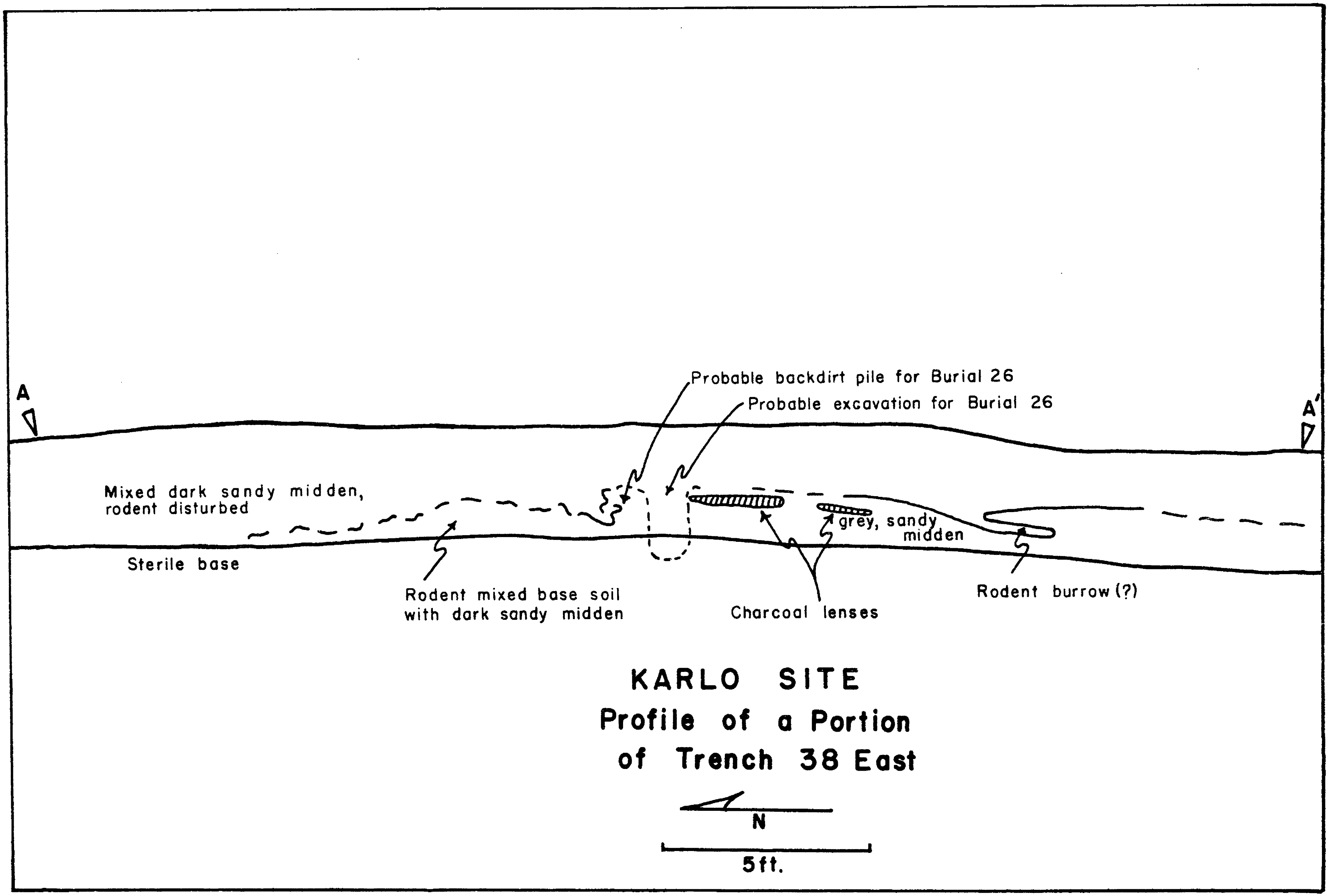

A
A'
Probable backdirt pile for Burial 26
Probable excavation for Burial 26
Mixed dark sandy midden, rodent disturbed
grey, sandy midden
Sterile base
Rodent mixed base soil with dark sandy midden
Charcoal lenses
Rodent burrow (?)
KARLO SITE
Profile of a Portion of Trench 38 East
N
5ft.

Figure 1

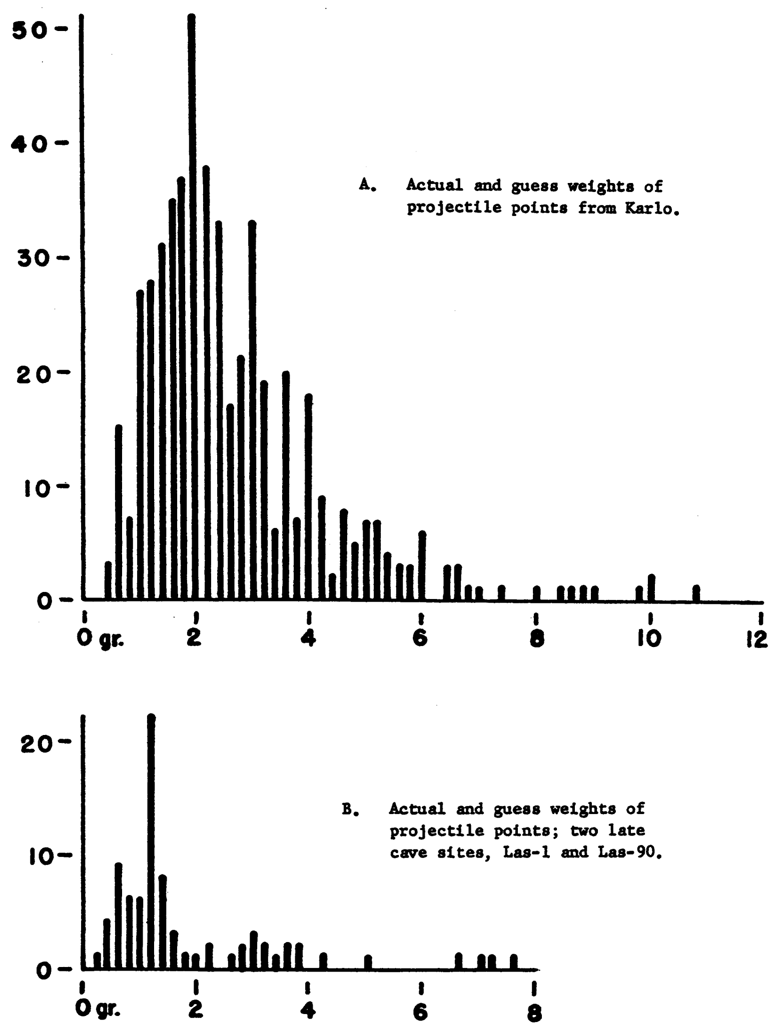


Figure 2

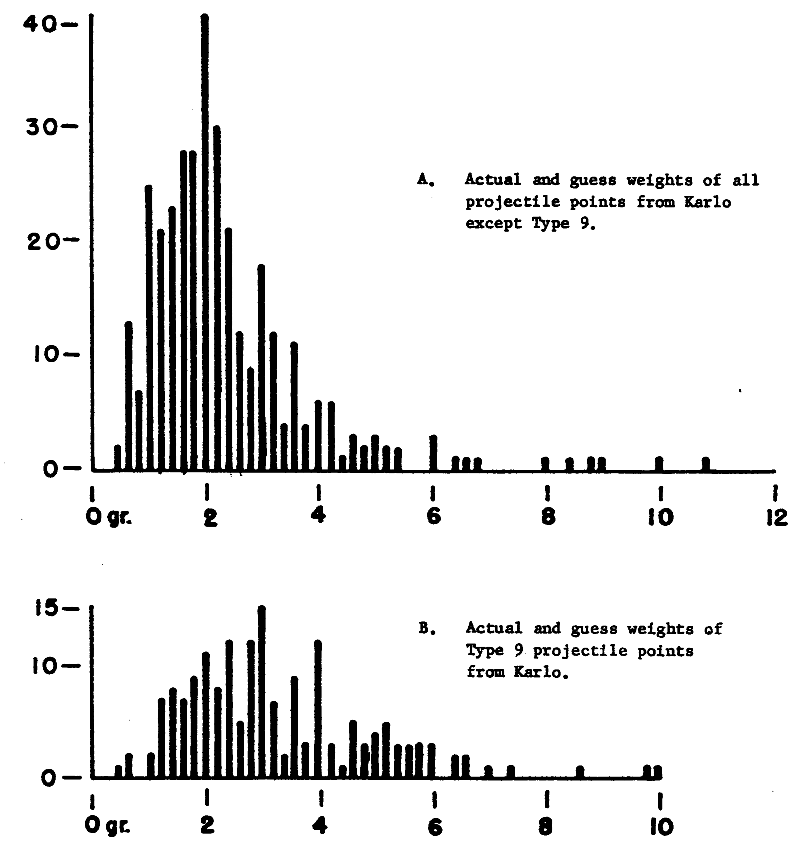


Figure 3

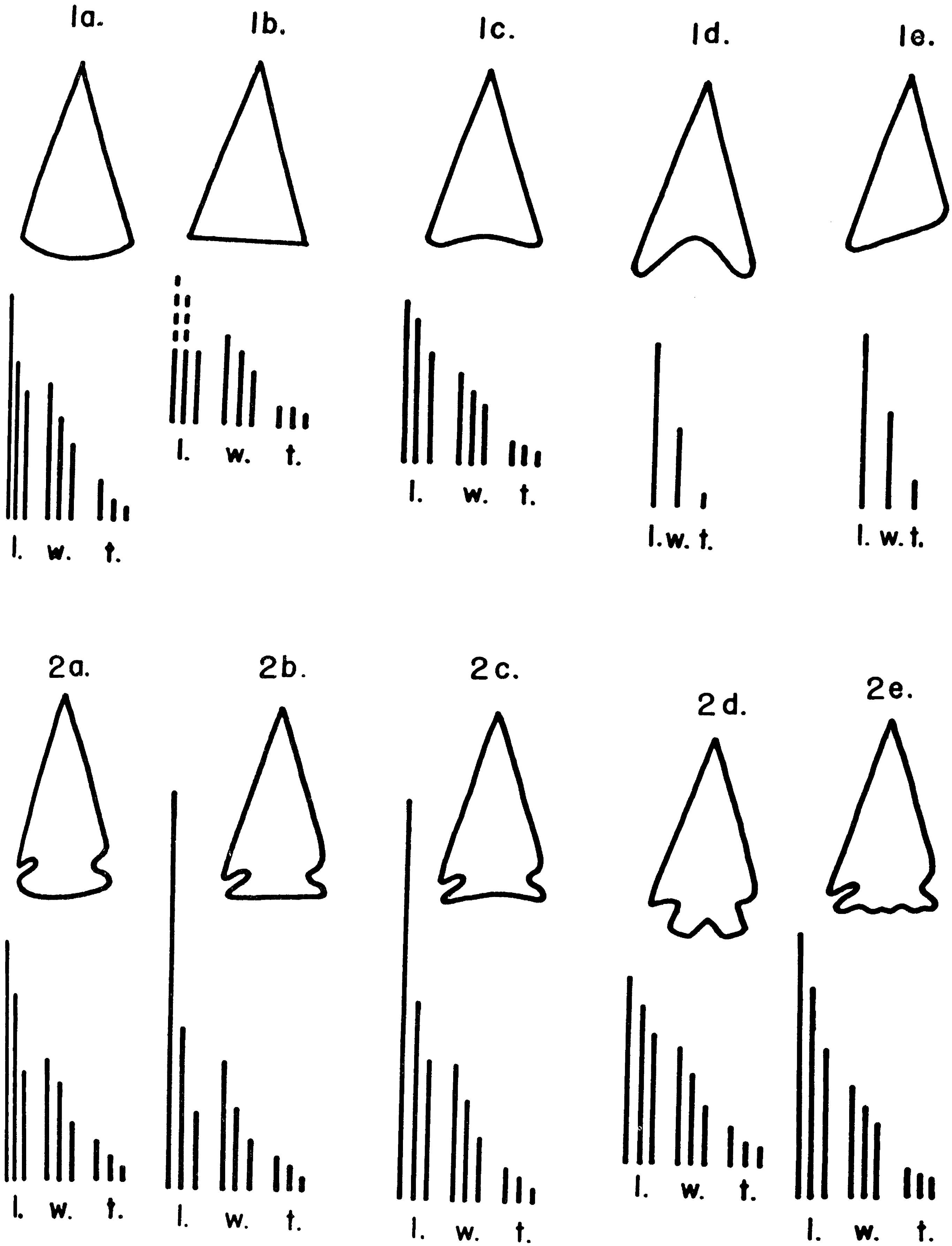

1a.
1b.
1c.
1d.
1e.
l. w. t.
l. w. t.
l. w. t.
l. w. t.
l. w. t.
2a.
2b.
2c.
2d.
2e.
l. w. t.
l. w. t.
l. w. t.
l. w. t.
l. w. t.

Figure 4

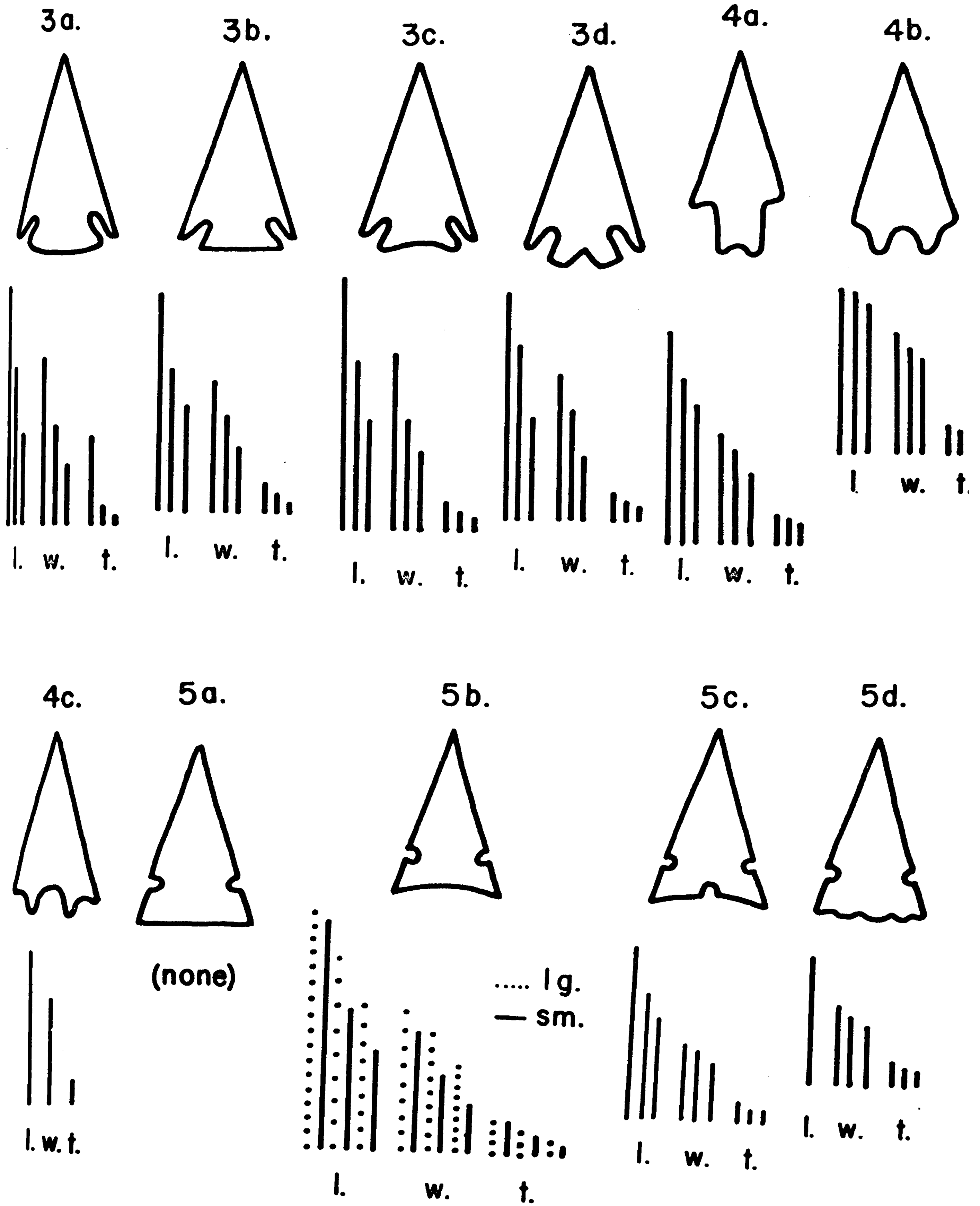

3a.
3b.
3c.
3d.
4a.
4b.
l. w. t.
l. w. t.
l. w. t.
l. w. t.
l. w. t.
l w. t.
4c.
5a.
5b.
5c.
5d.
l. w. t.
(none)
..... lg.
— sm.
l. w. t.
l. w. t.
l. w. t.

Figure 5

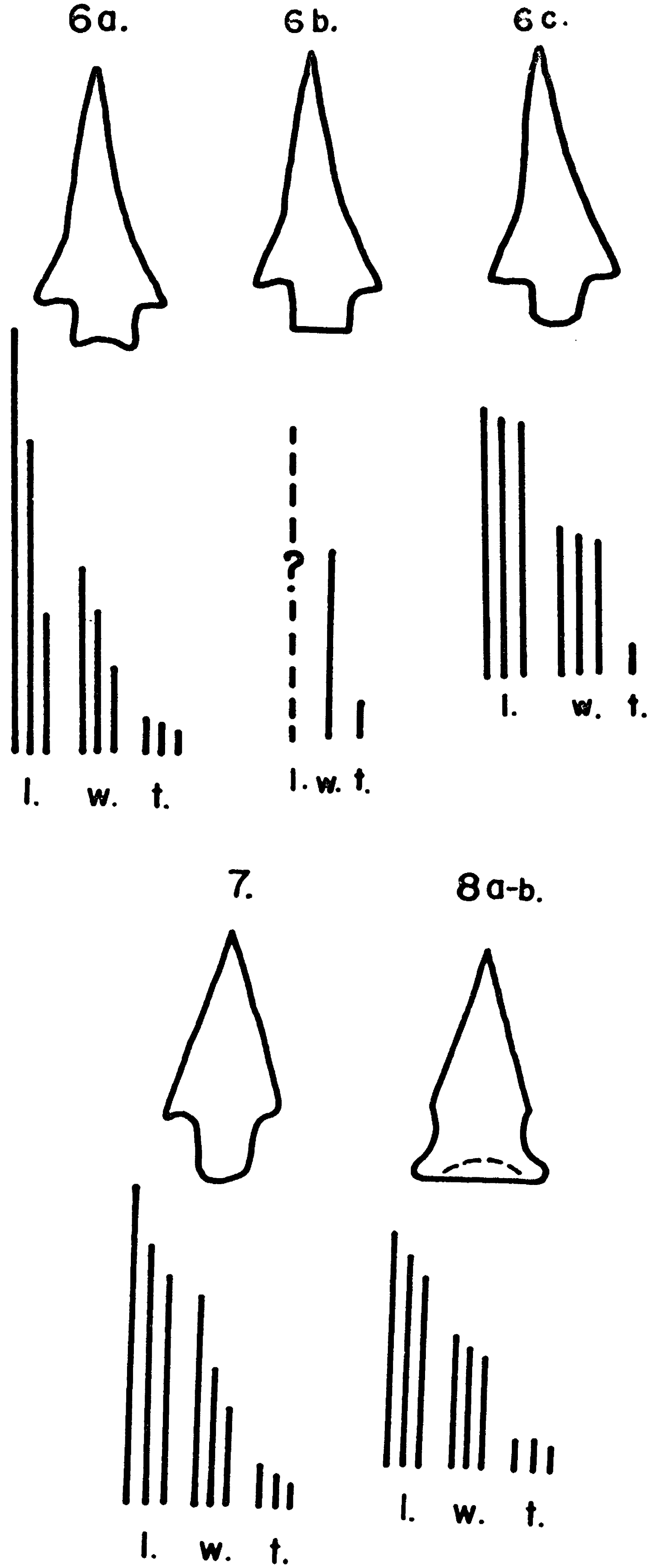


Figure 6

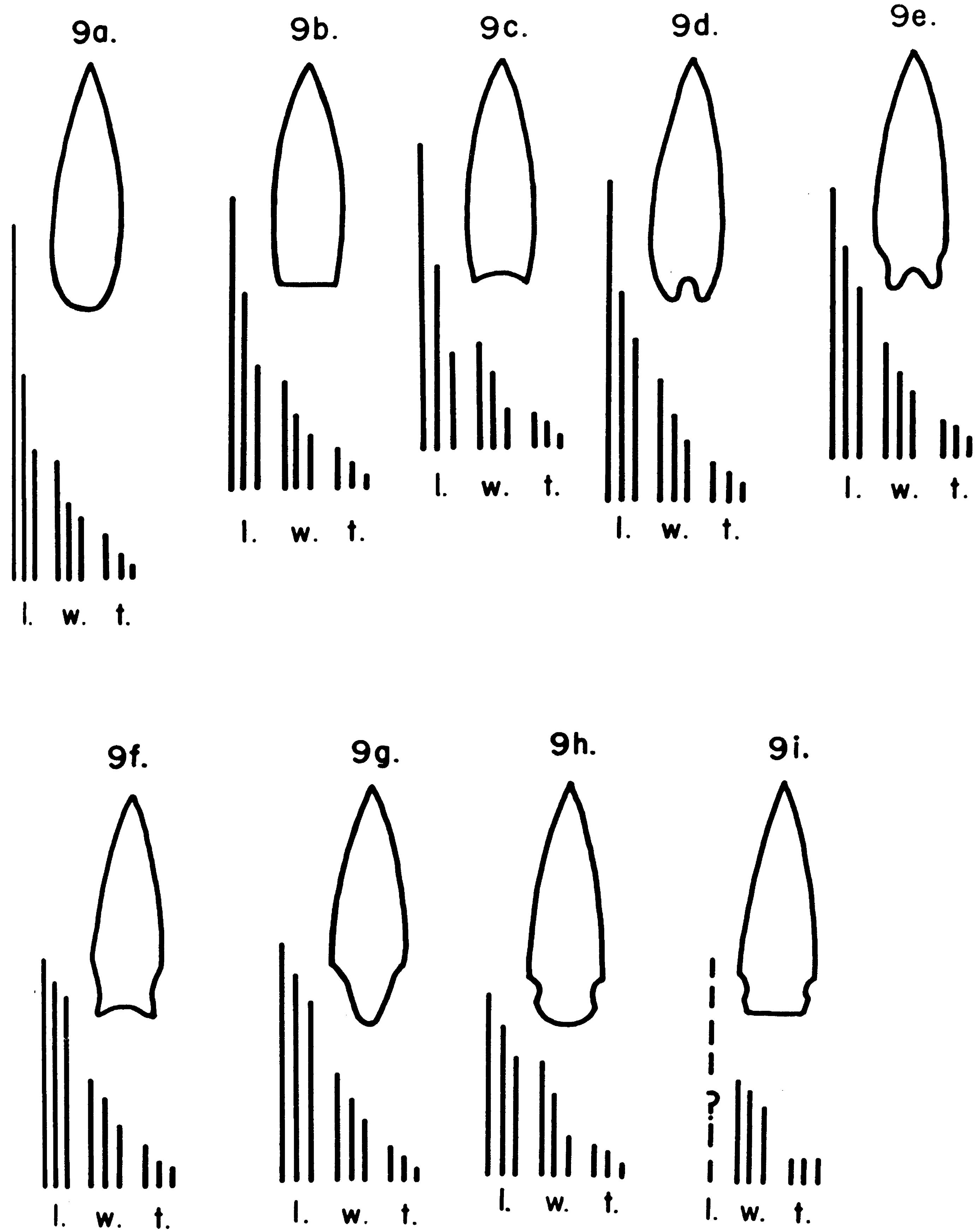


Figure 7

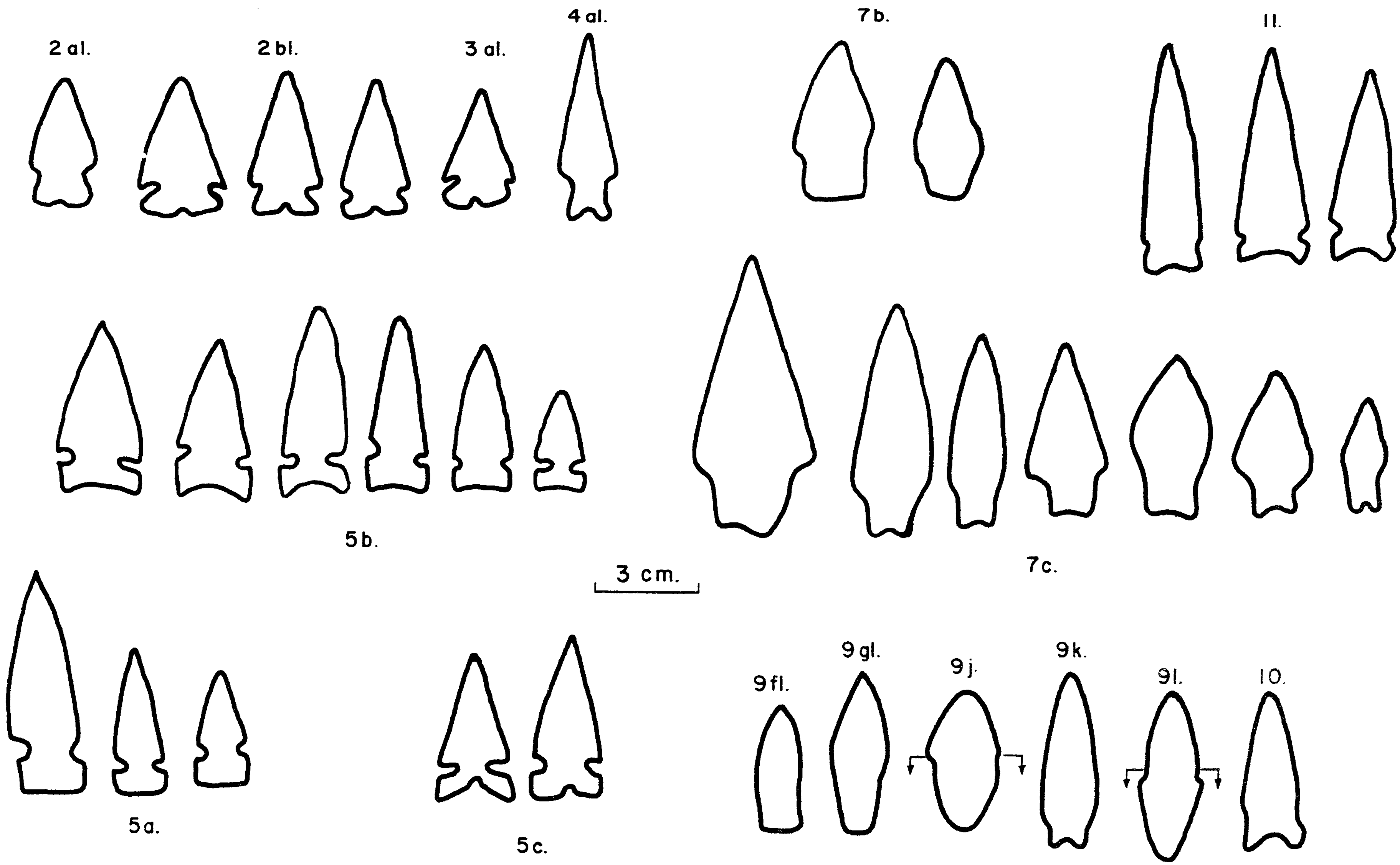
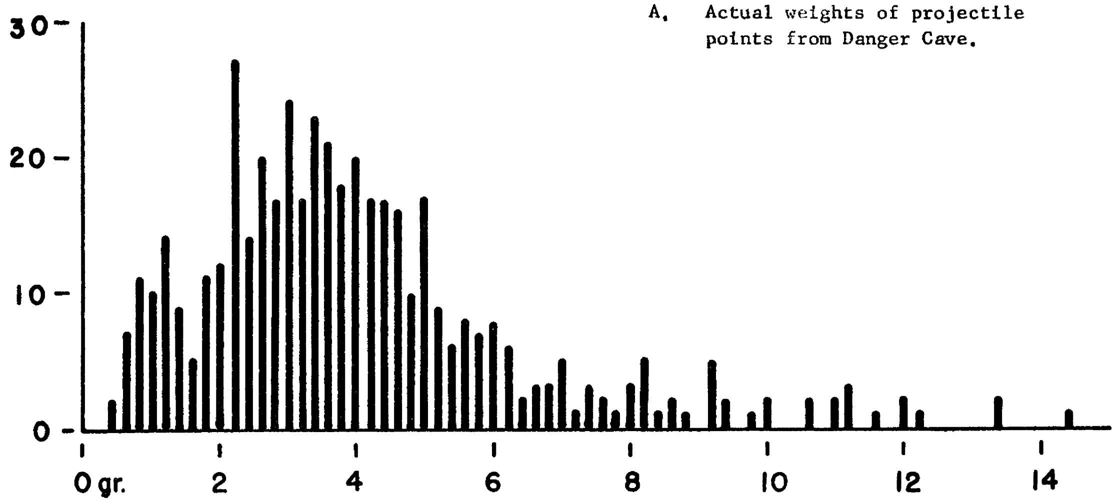
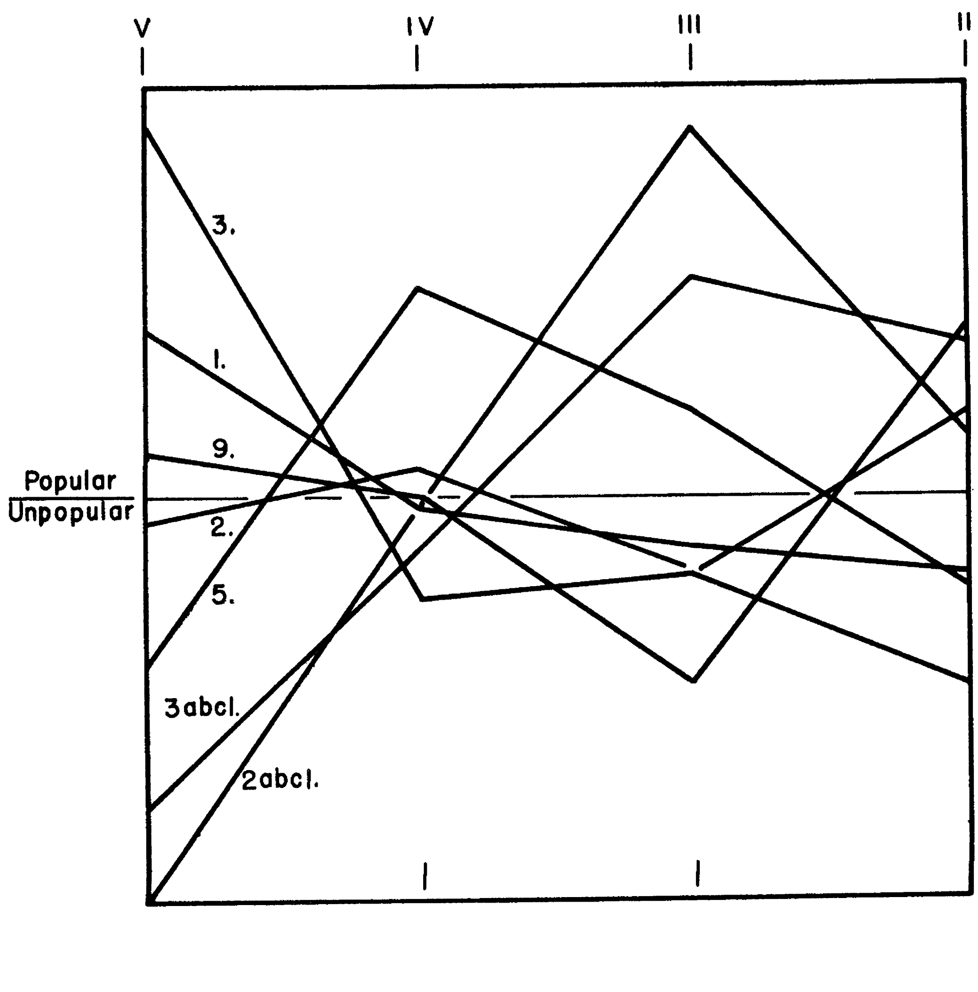


Figure 8



A. Actual weights of projectile points from Danger Cave.



B. Relative popularity, by level, of the major projectile point types from Danger Cave.

Figure 9

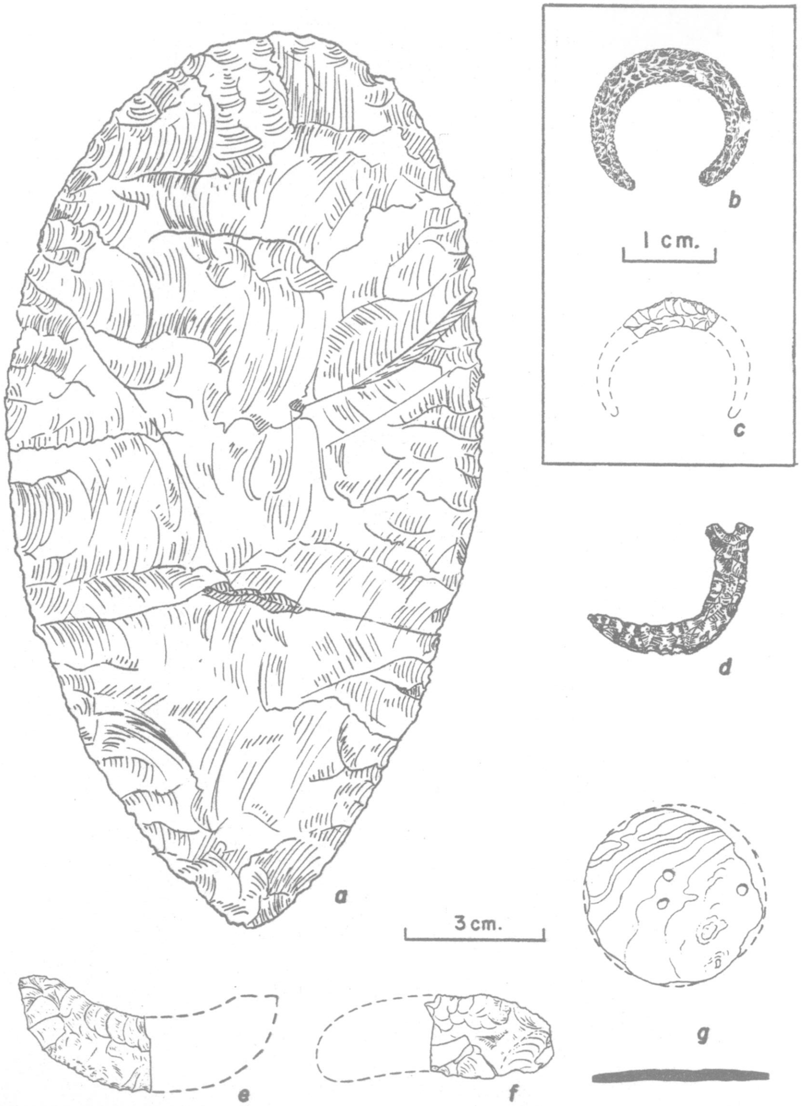


Figure 10

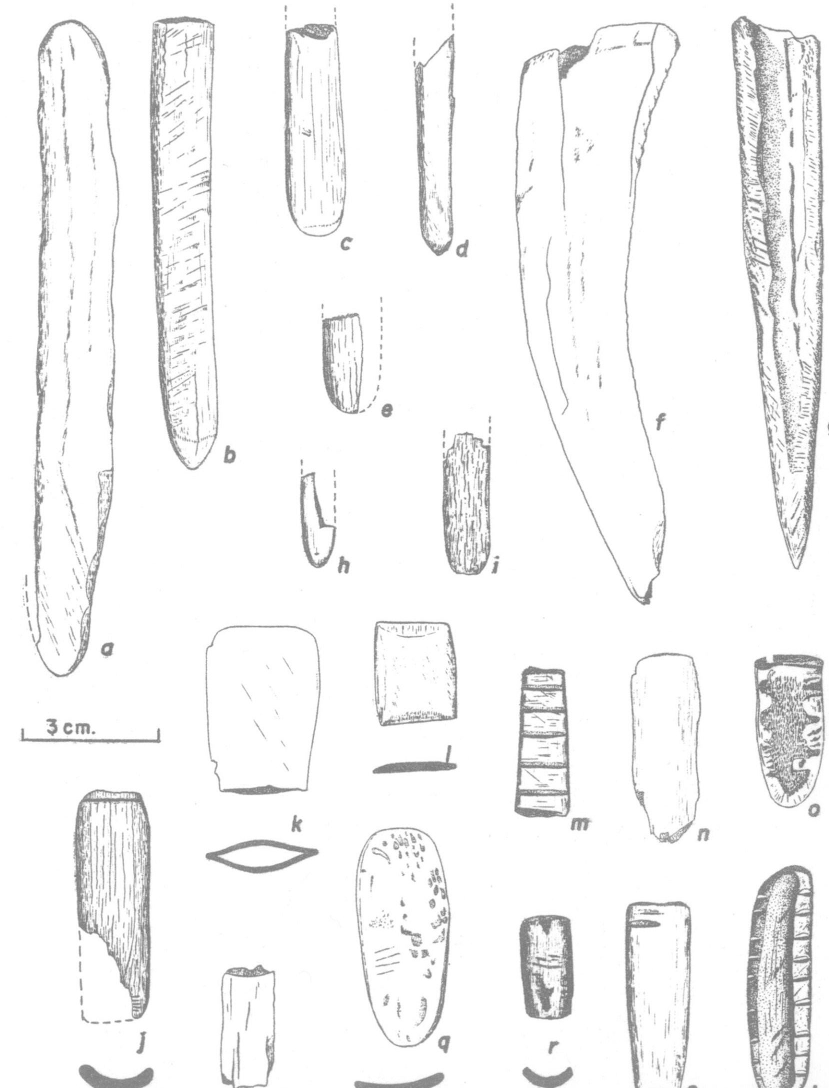


Figure 11

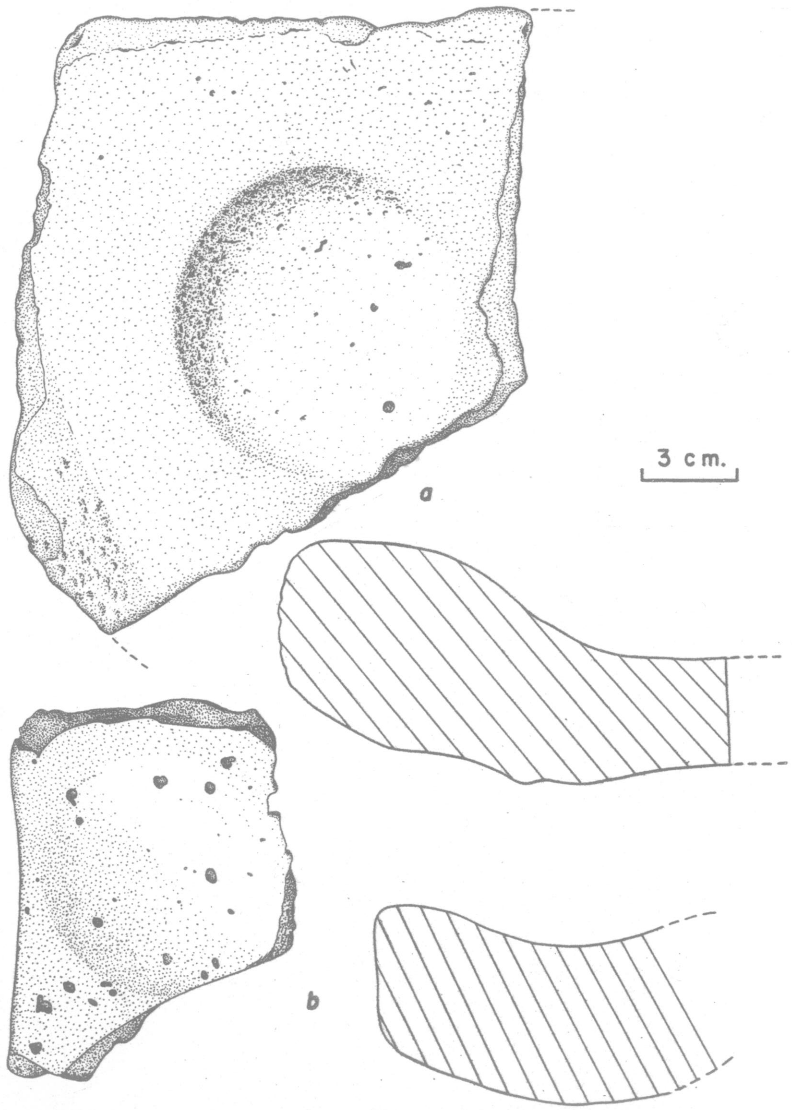


Figure 12

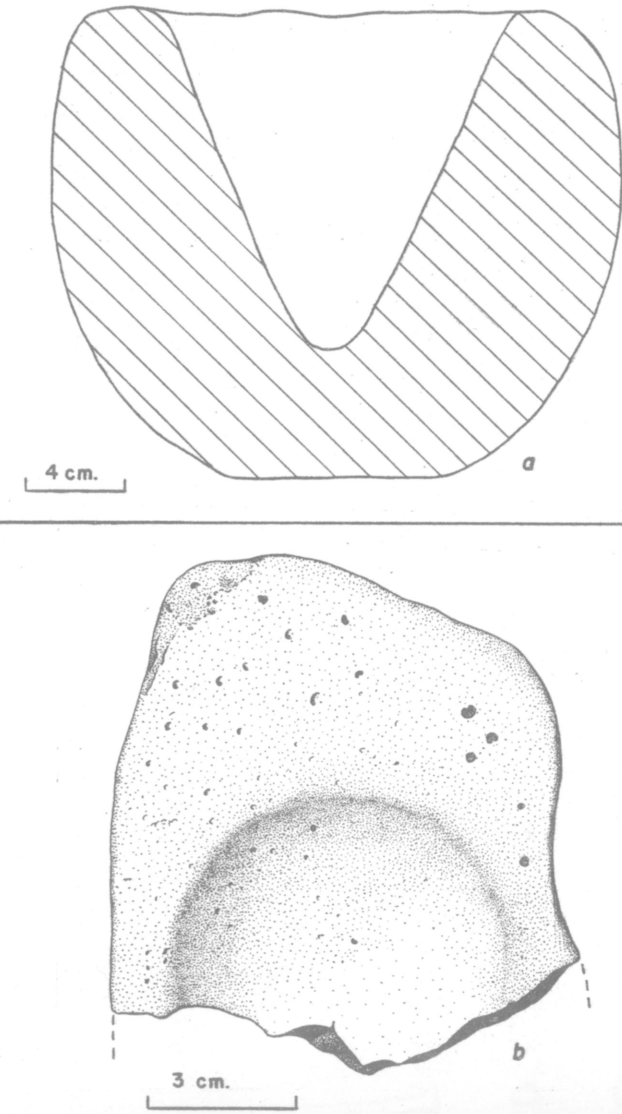


Figure 13

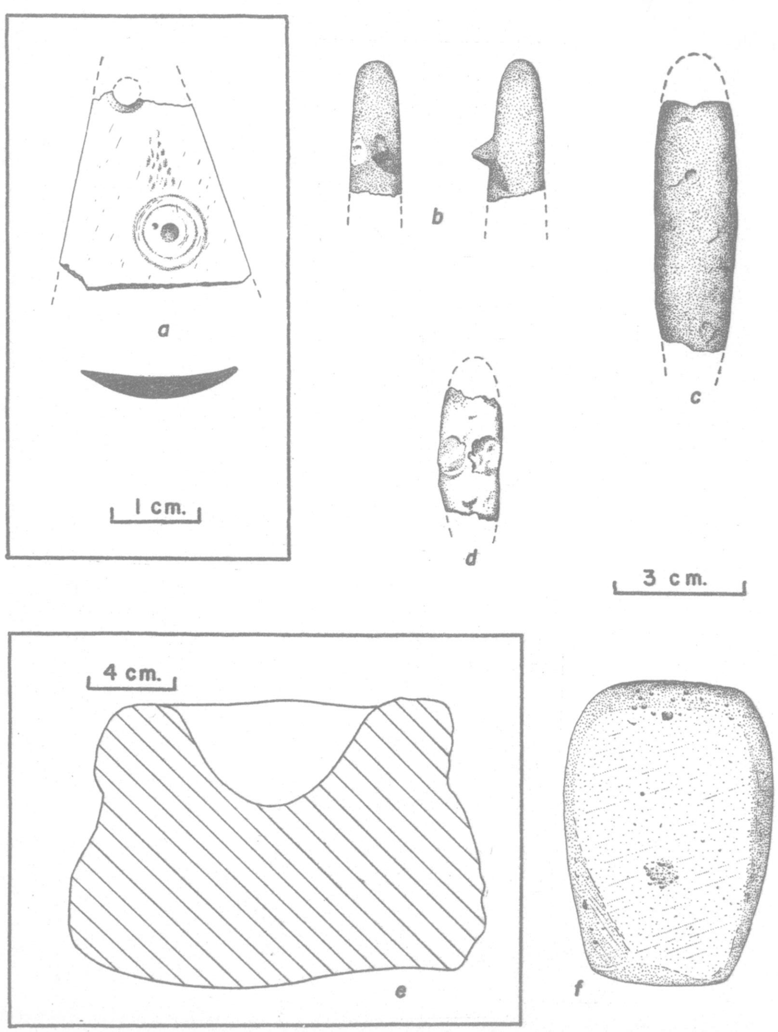


Figure 14

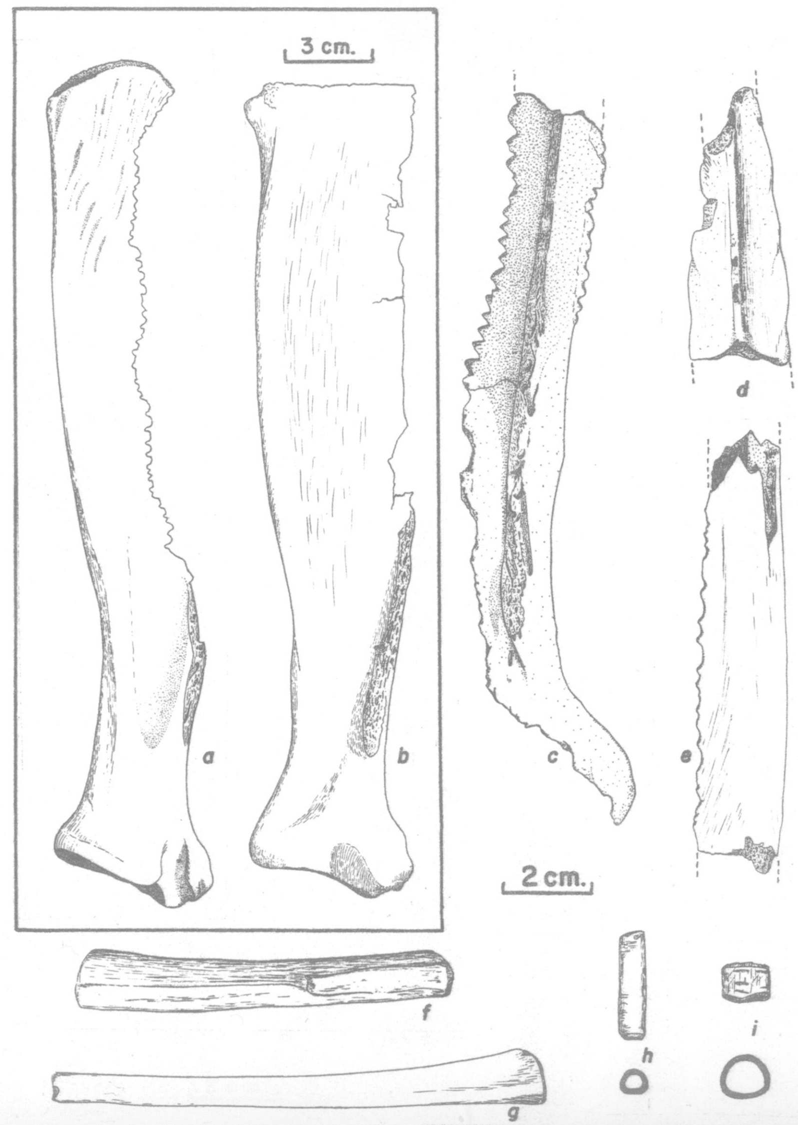


Figure 15

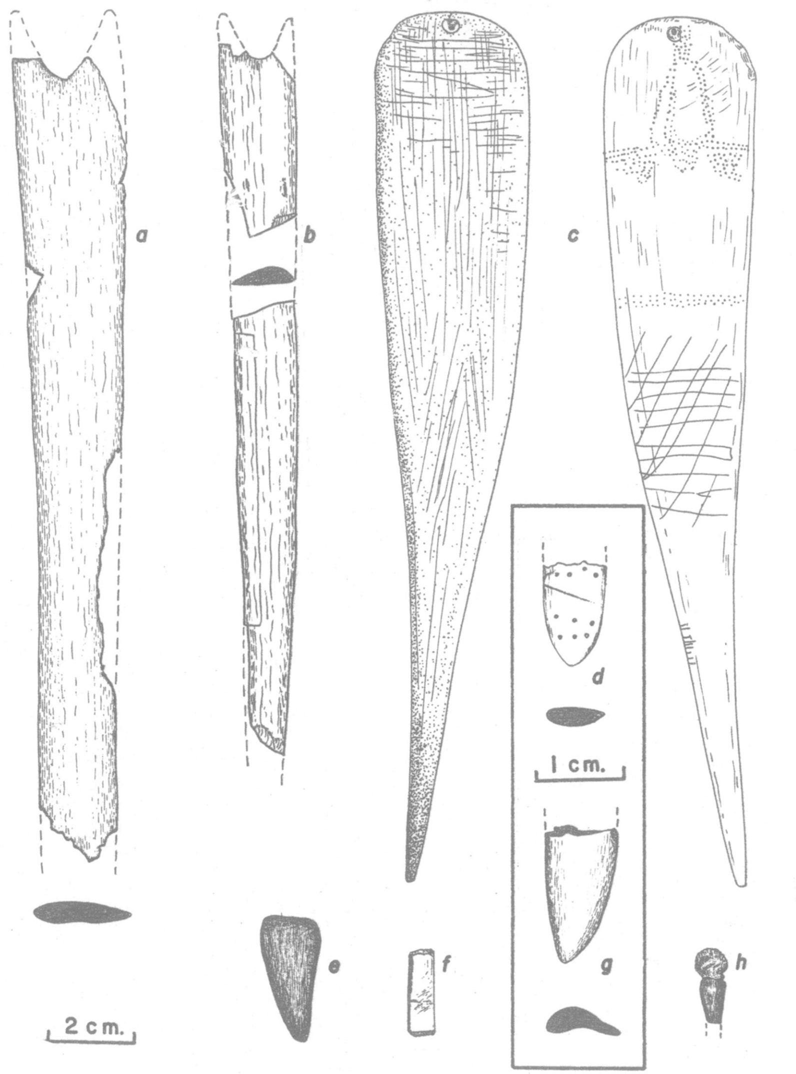


Figure 16

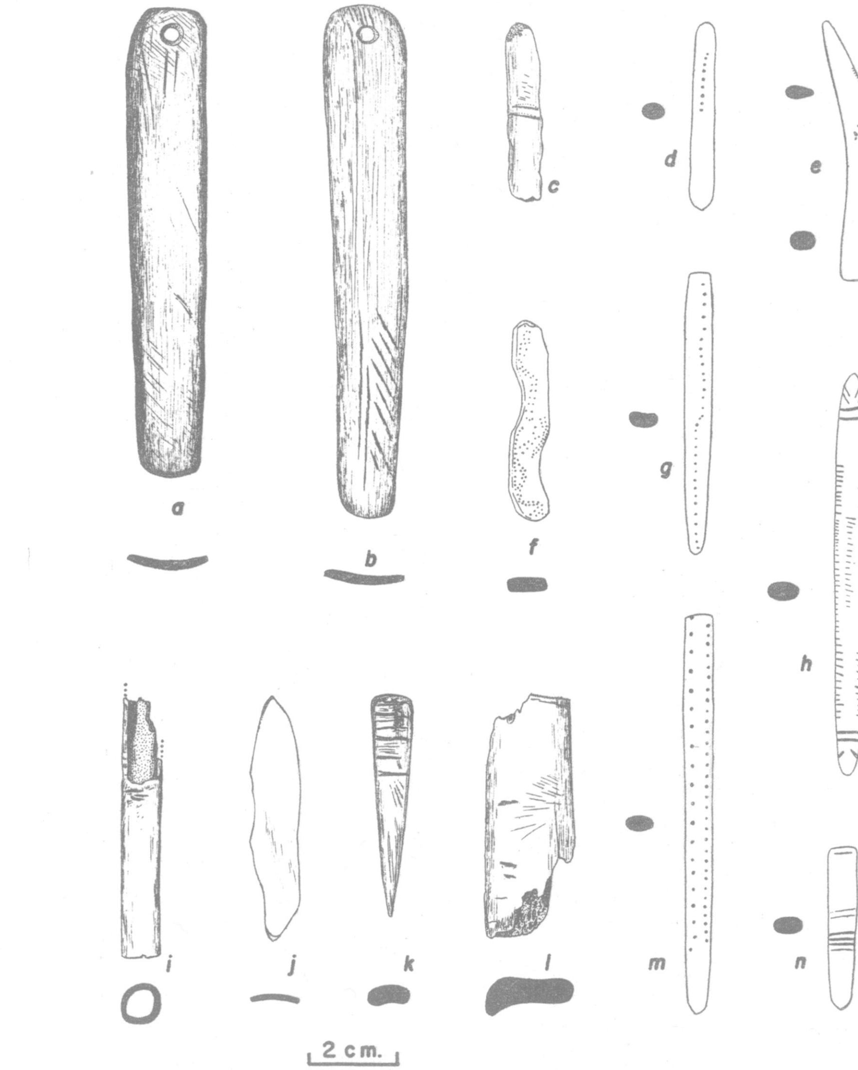


Figure 17

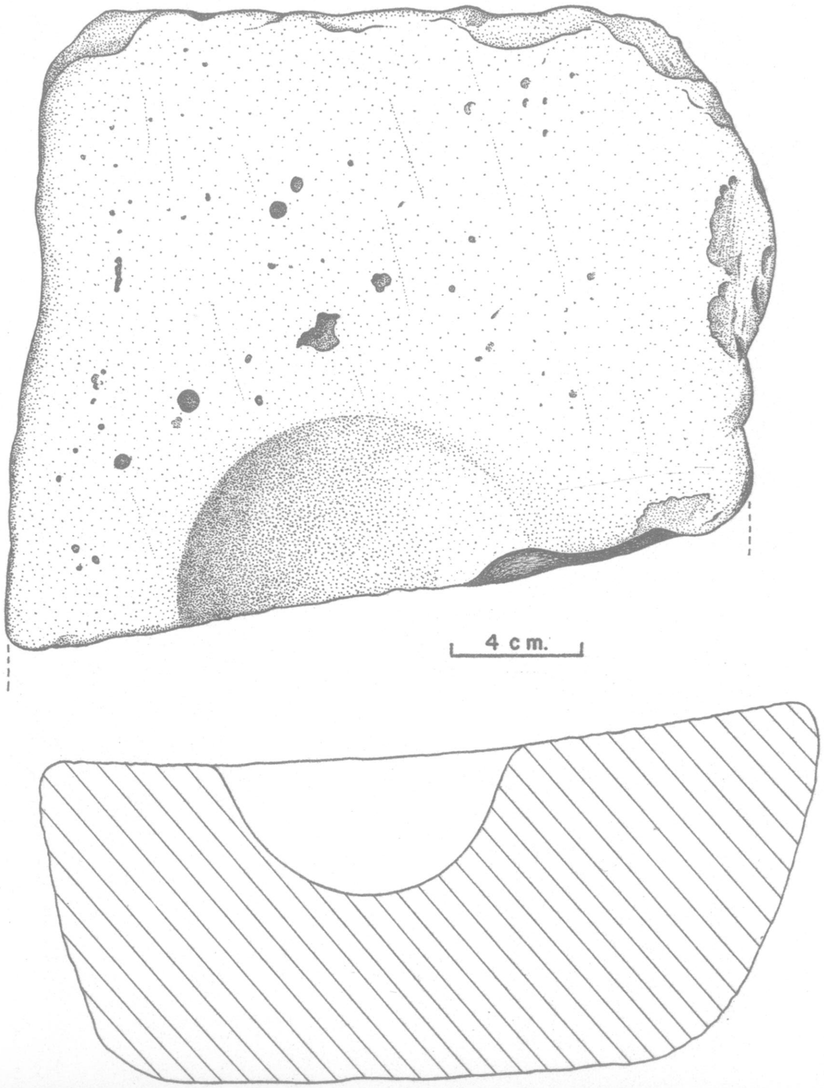


Figure 18

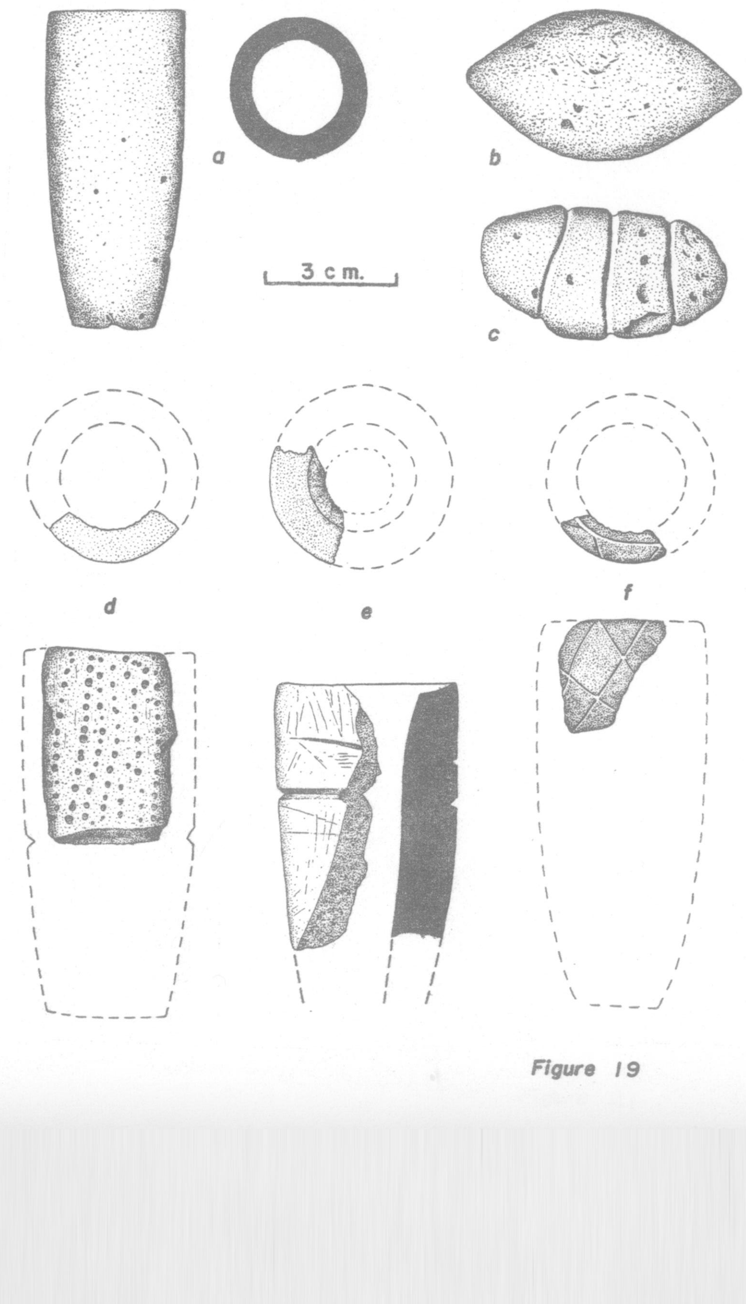


Figure 19

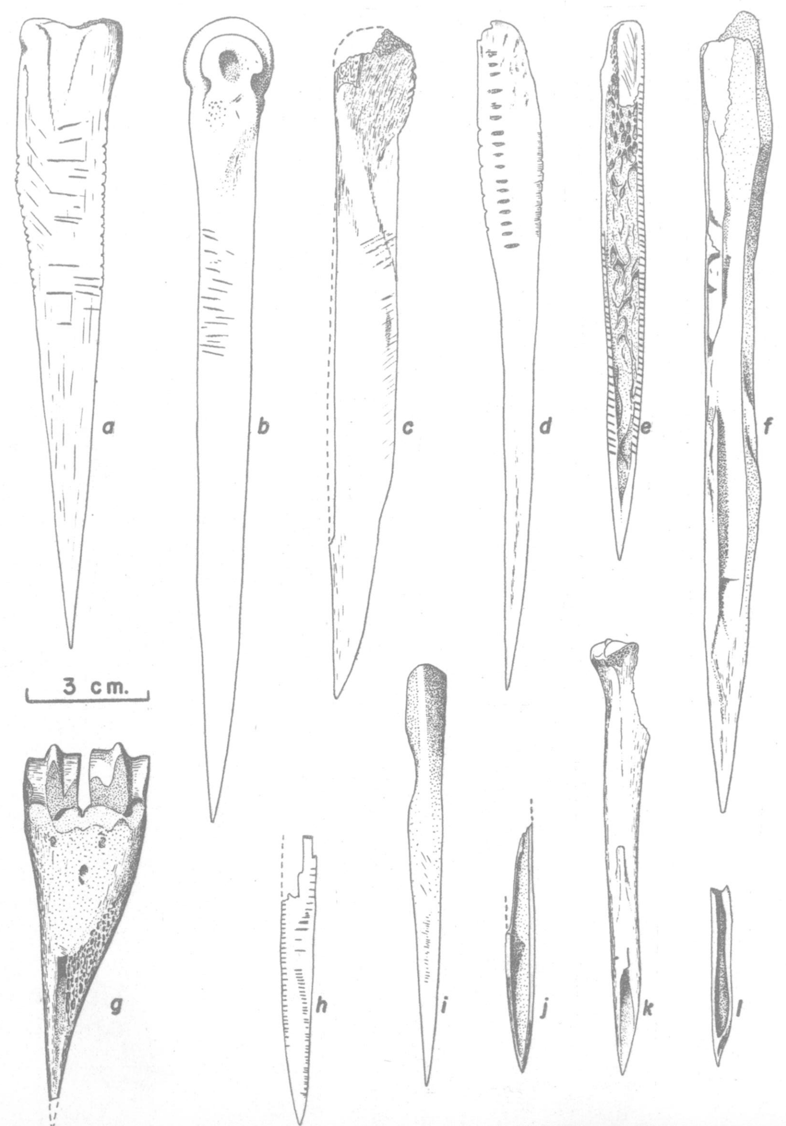


Figure 20

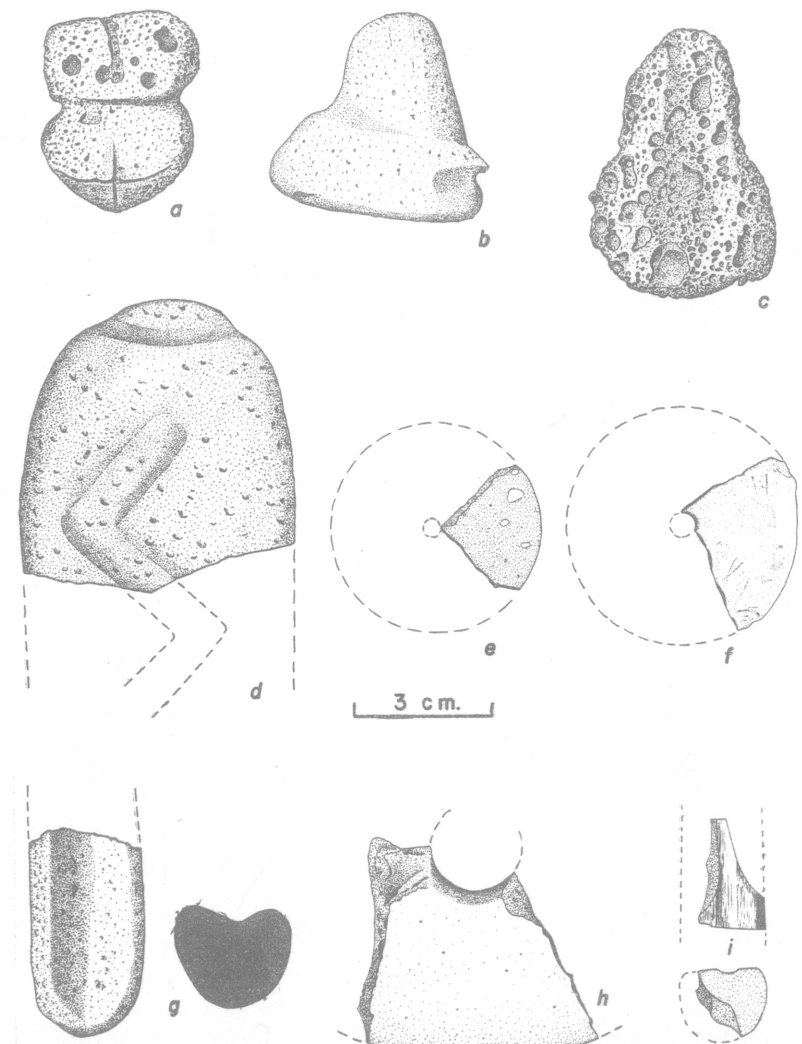


Figure 21

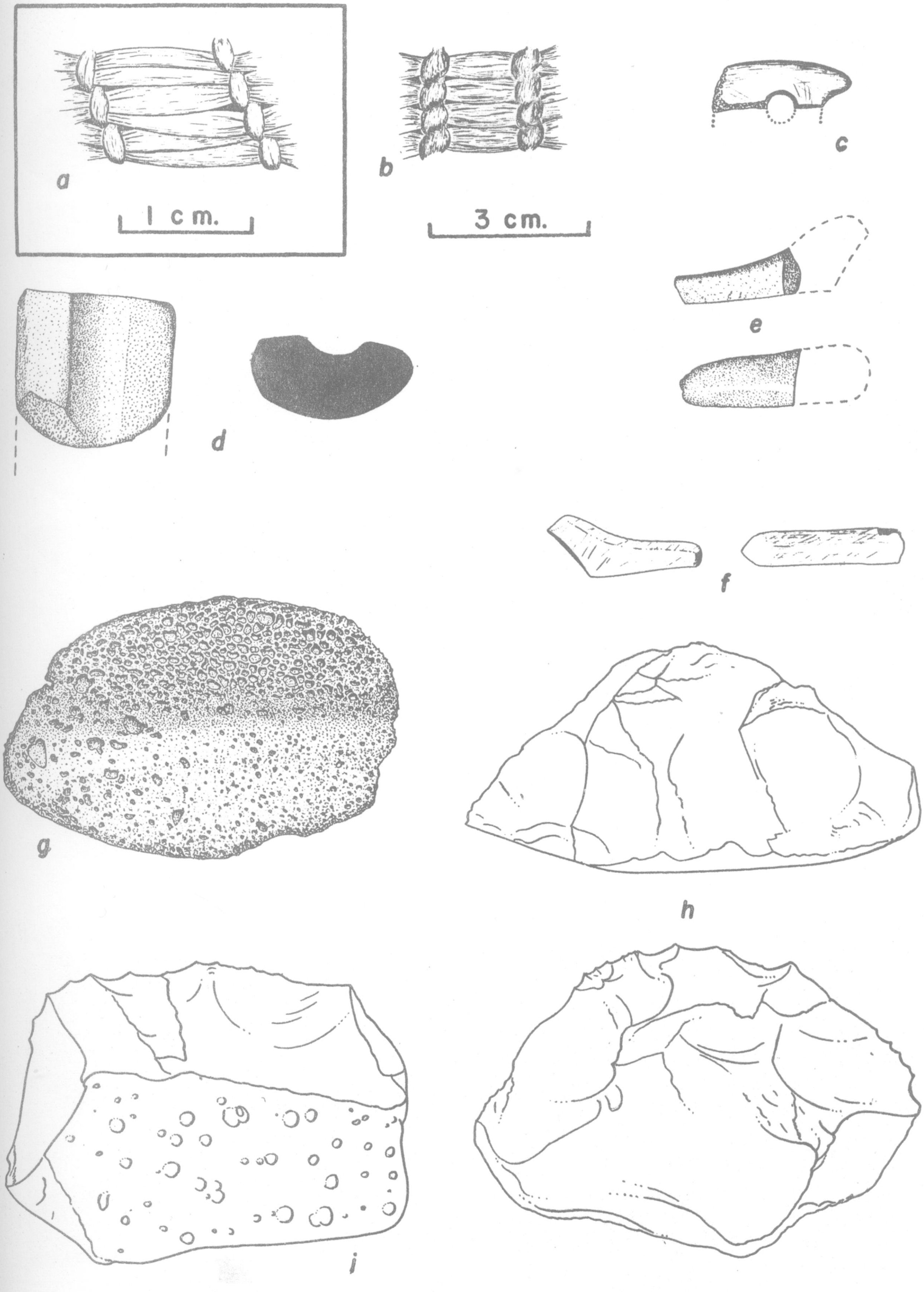
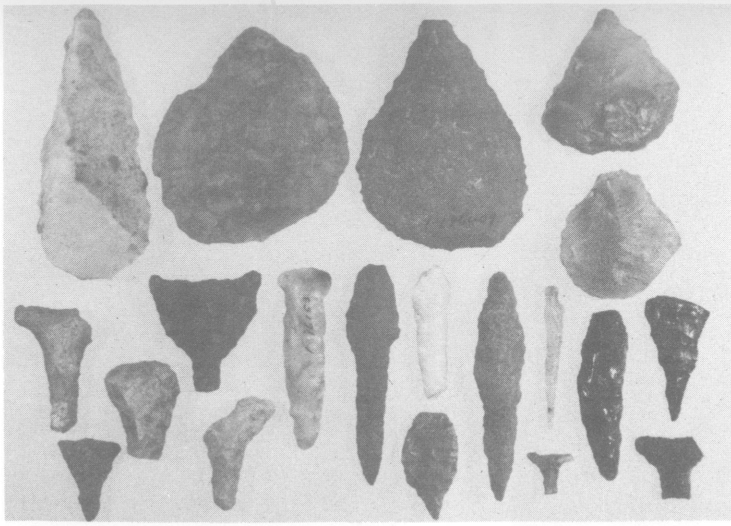
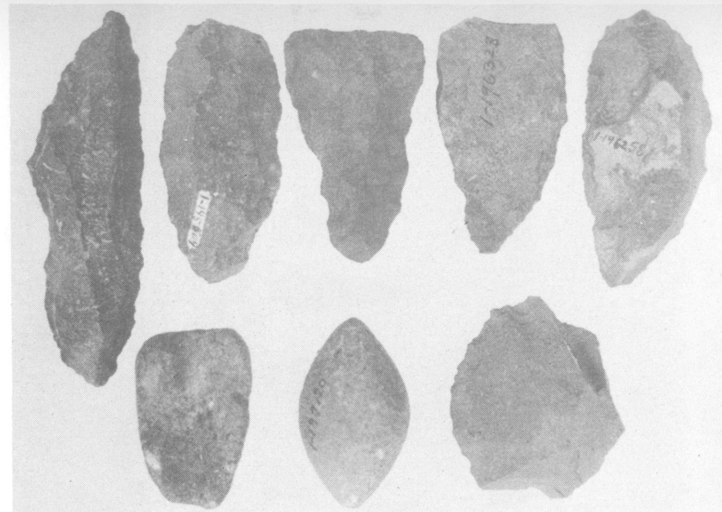


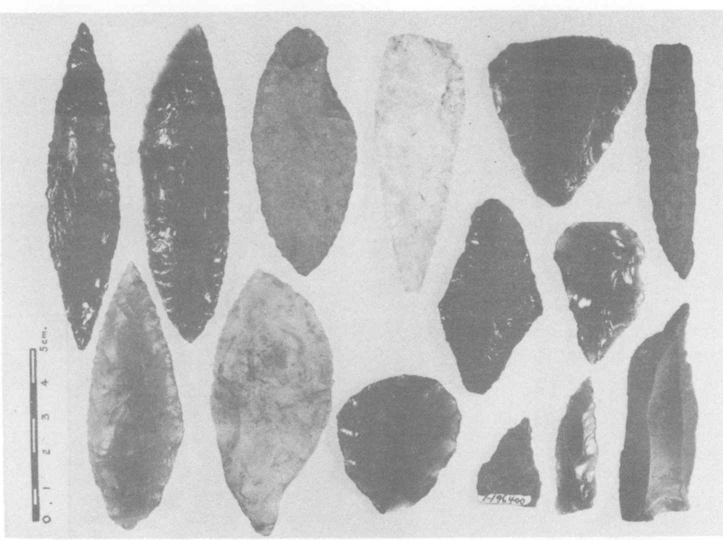
Figure 22



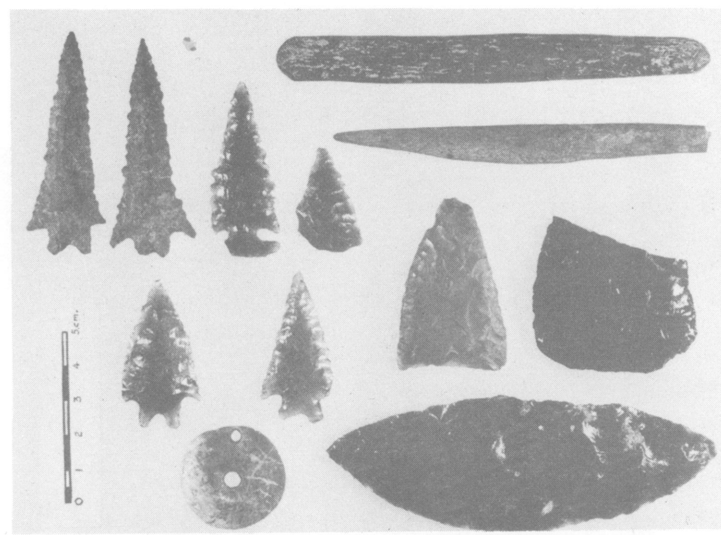
A



B



C



D

Plate I

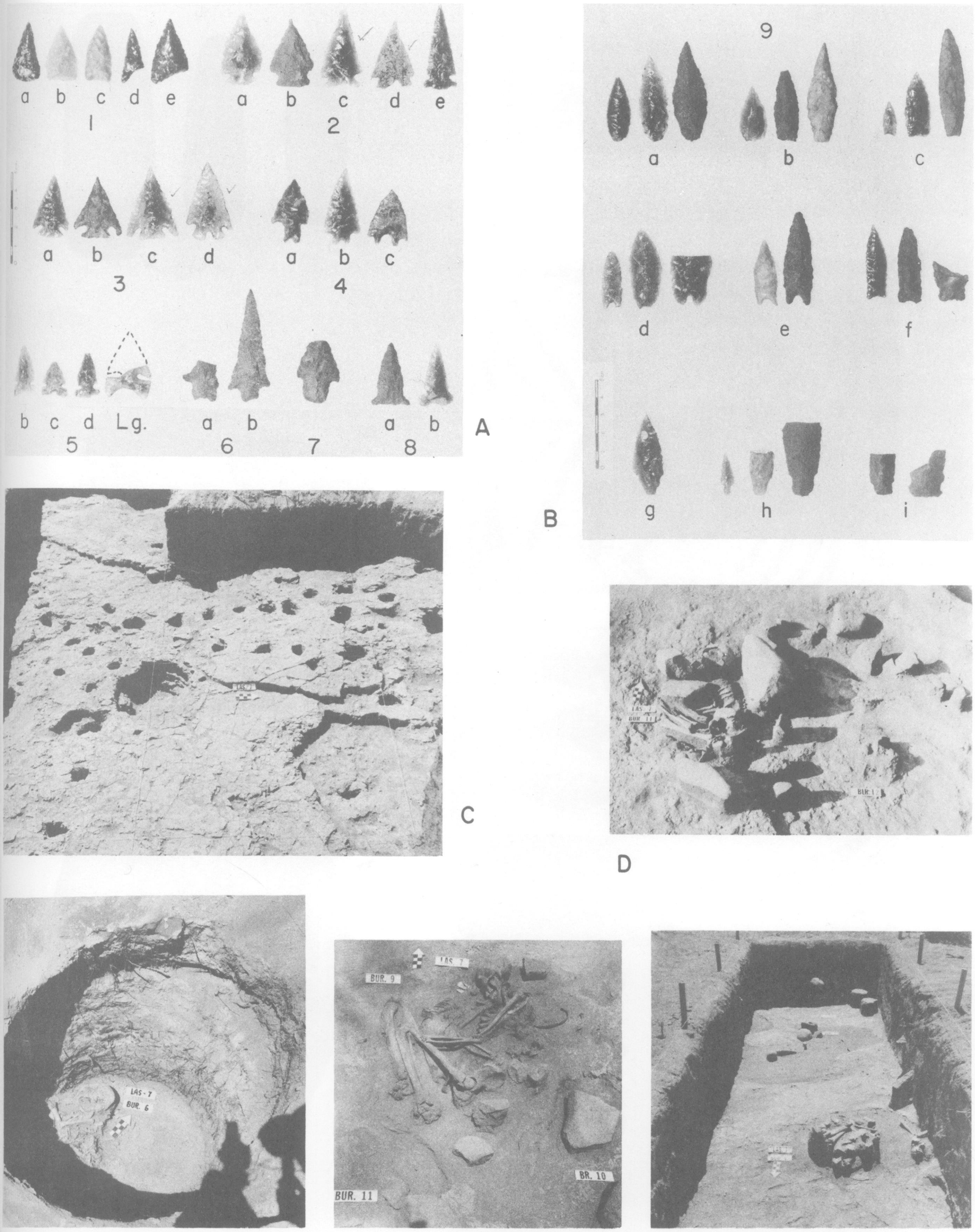

a b c d e
1
a b c d e
2
a b c d
3
a b c
4
b c d Lg.
5
a b
6
7
a b
8
A
9
a b c
d e f
g h i
B
C
D
LAS-7
BUR. 6
E
BUR. 9
LAS 7
BUR. 11
BR. 10
F
G

Plate 2

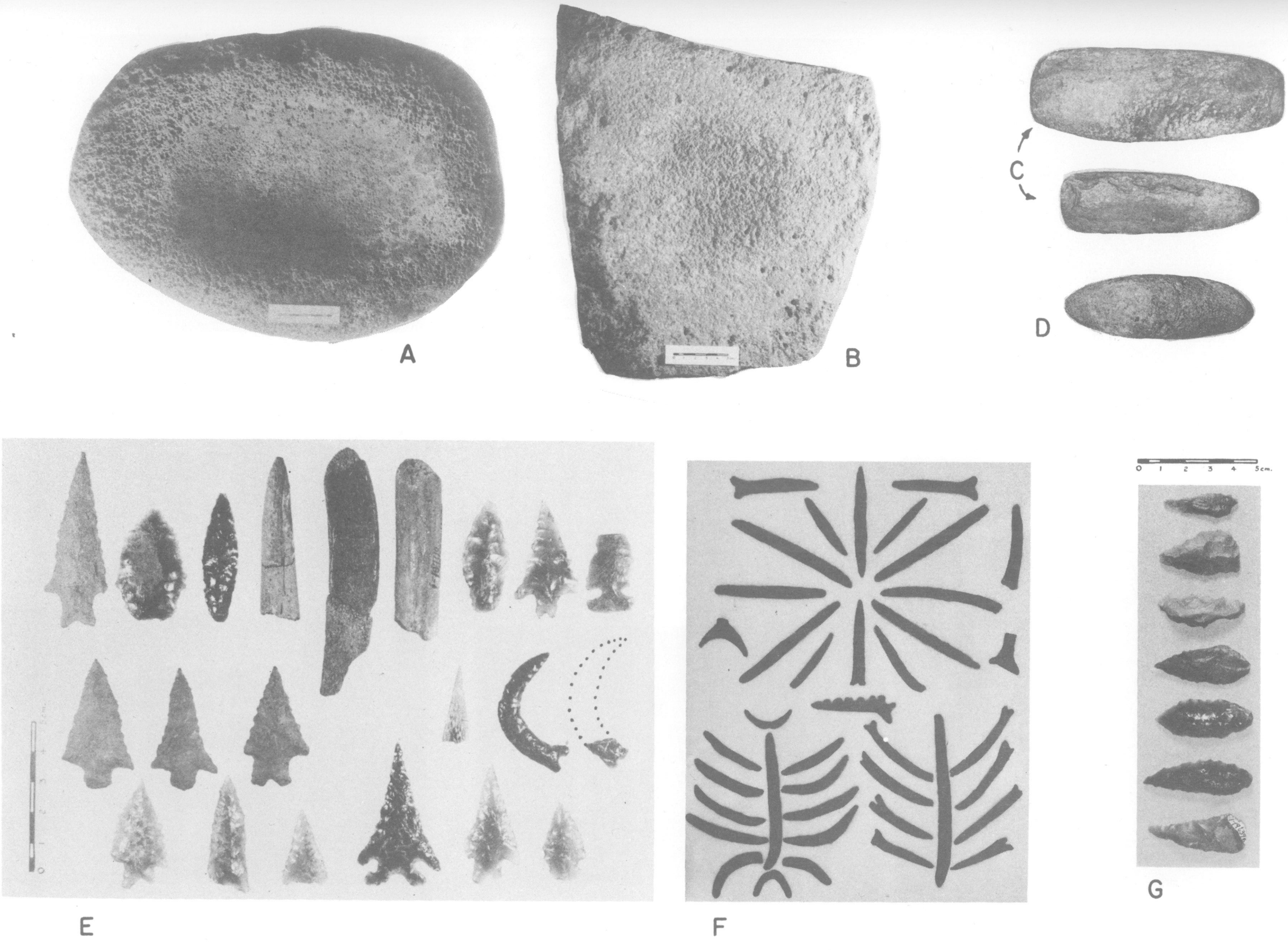


Plate 3

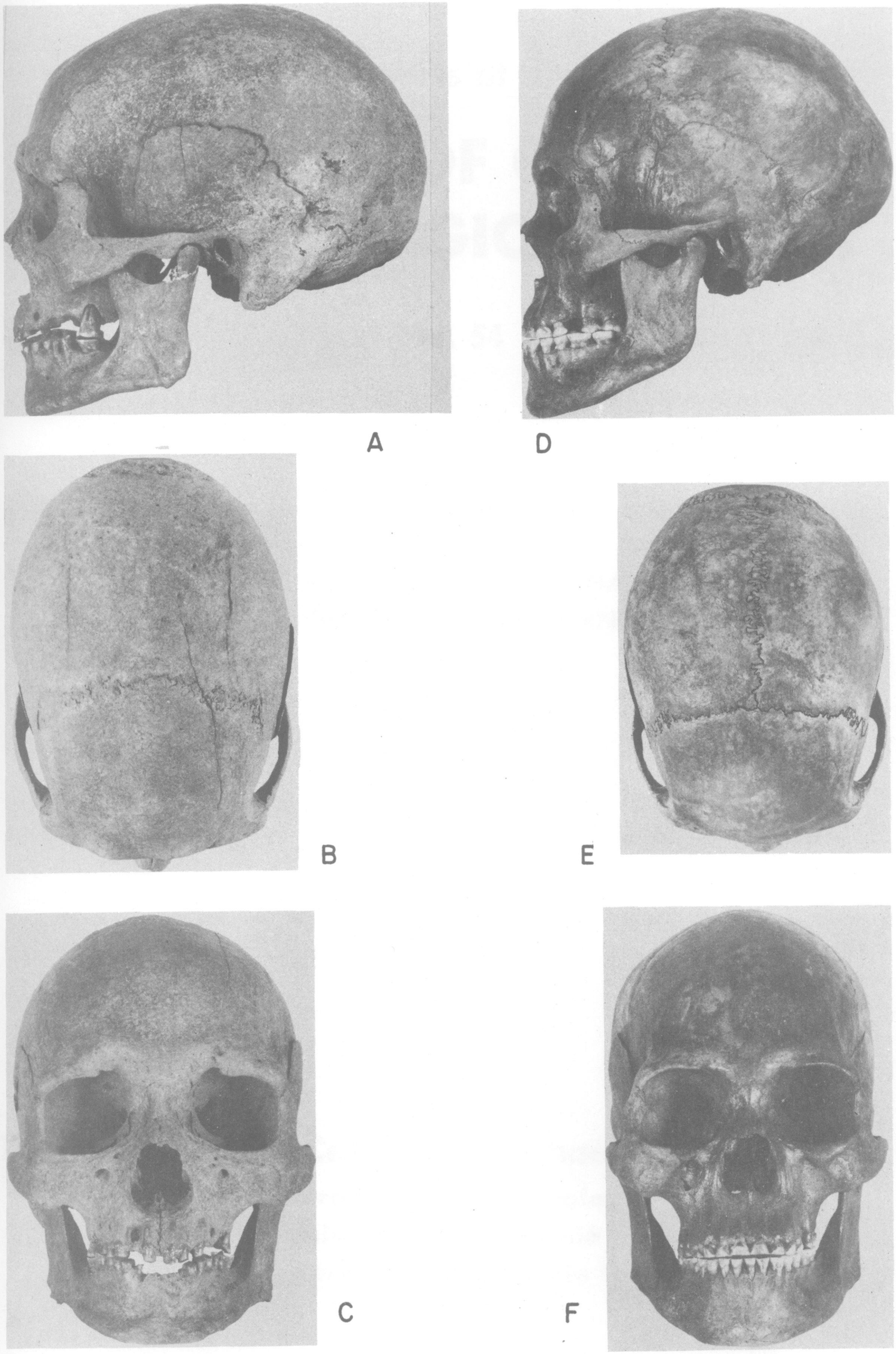


Plate 4