The Archeology of Ven-100

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INTRODUCTION

Ven-100 is an important, relatively undisturbed Native American site in the Santa Monica Mountains of southern California, with remains that possibly extend back to 7000 B.P.

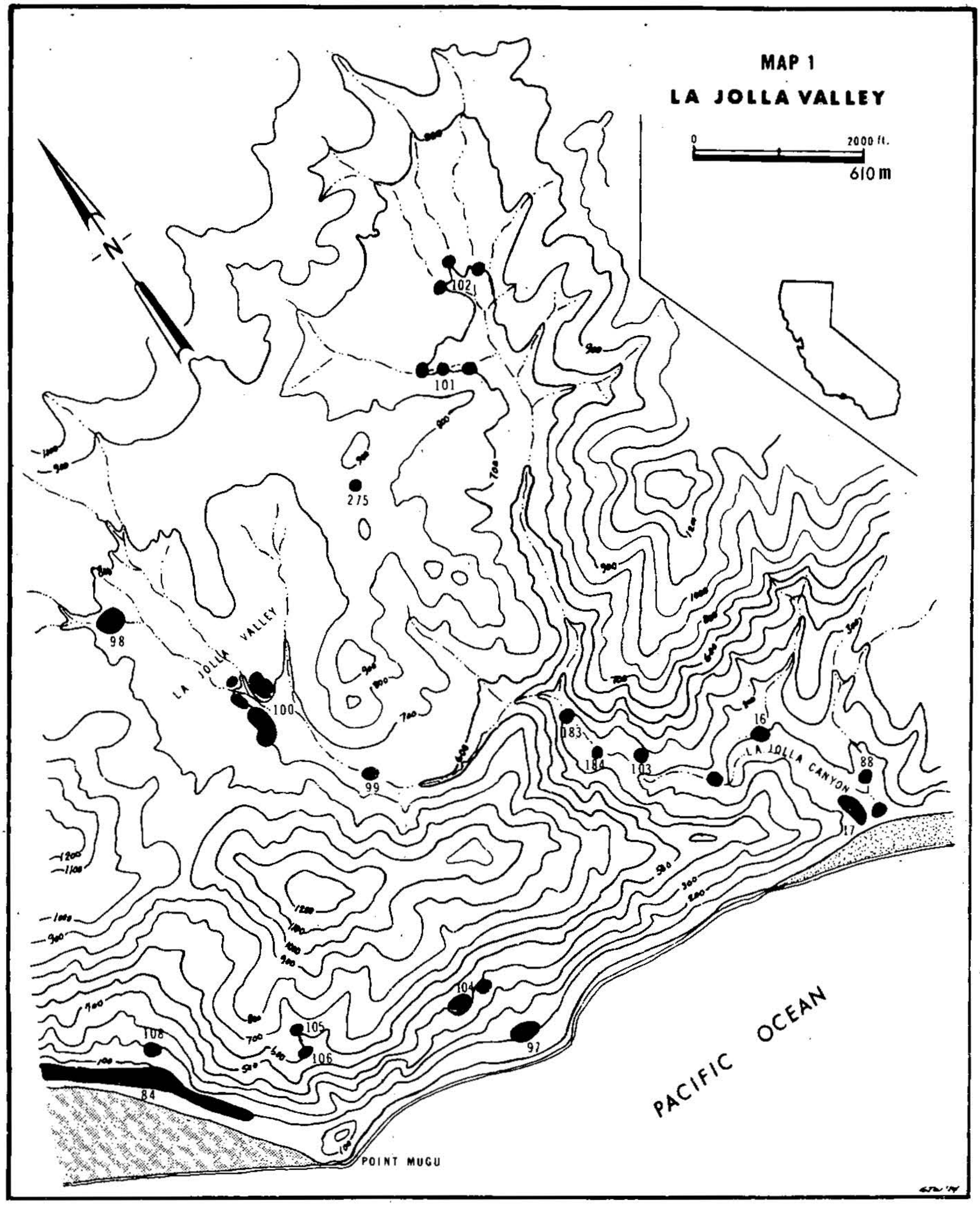
This report is based on test excavations of the site conducted over a two-week period in June 1968 by a California Department of Parks and Recreation crew directed by Eric Ritter. These excavations were made to determine the nature of the four separate but closely spaced deposits and how the deposits might be affected by recreational use of the area.

Only a small portion of the site was excavated. Because of this, the small sample of remains recovered prevents any significant statistical summary of the data. However, there is enough material to aid in the interpretation of the long cultural record of the area.

Unfortunately, undisturbed sites such as Ven-100 are rare. Most of the sites in the Santa Monica Mountains have been plundered by vandals, bulldozed out of existence, or covered by structures and roads. There is still hope for protecting Ven-100 since it is in a preserve of Point Mugu State Park.

Archeological data from each of the four areas are described in separate sections of this report and synthesized in the discussion and conclusions. A typology of artifacts and a detailed description of the vertebrate fauna of the site are in the appendixes.

Aerial of LaJolla Valley


MAP 1
LA JOLLA VALLEY
0
2000 ft.
610 m
N
LA JOLLA VALLEY
LA JOLLA CANYON
PACIFIC OCEAN
POINT MUGU
102
101
275
98
100
99
183
184
103
16
88
17
104
97
105
106
108
84

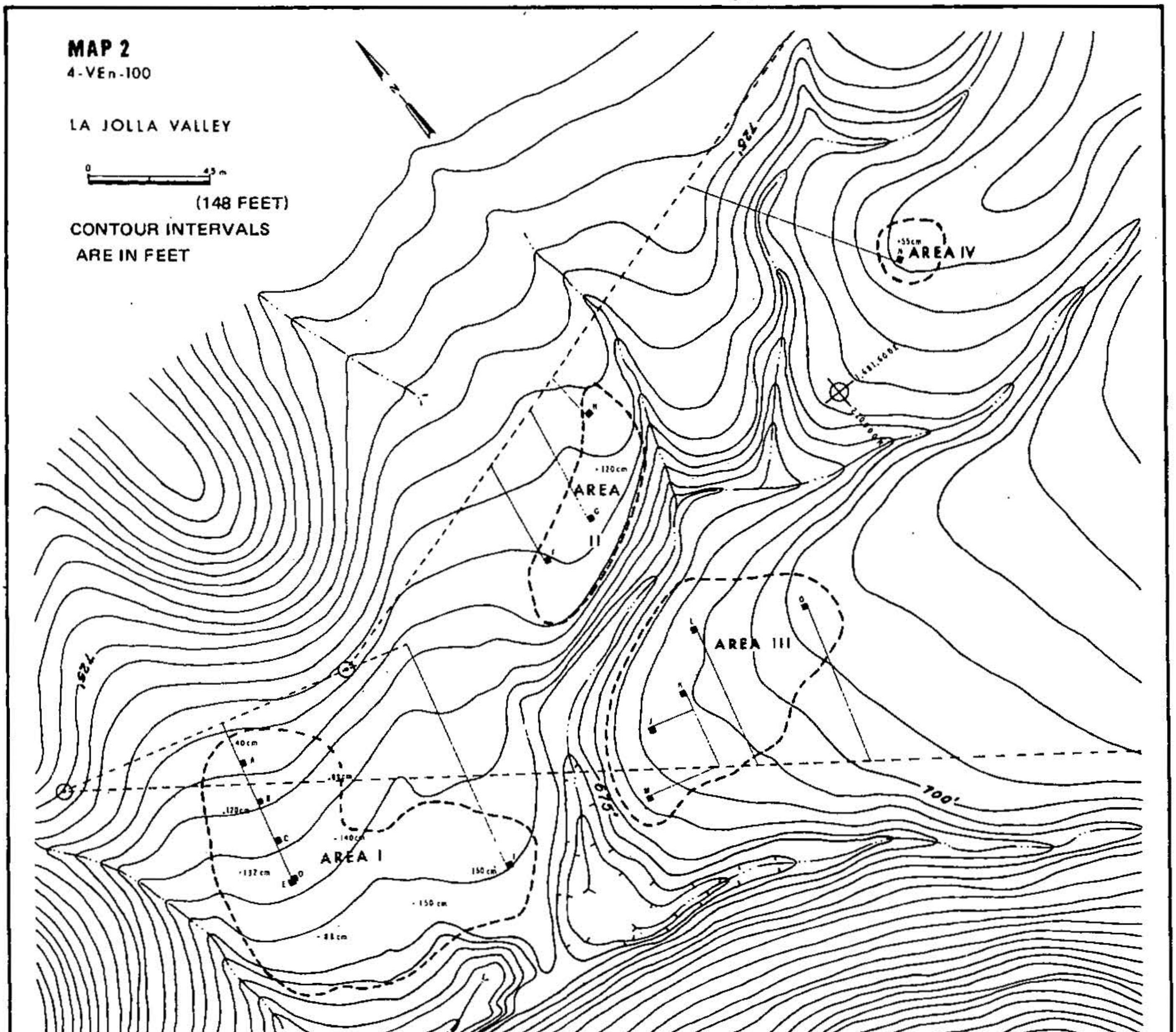
GENERAL DESCRIPTION

Setting

Ven-100 is located in the La Jolla Valley, Ventura County, California. This valley, part of Point Mugu State Park, is in the southwesternmost part of the Santa Monica Mountains, about 24 km (15 mi.) south of the city of Oxnard (latitude 34° 5' 30", longitude 119° 3')

The La Jolla Valley ranges in elevation from 198 to 265 m (650 to 870 ft.) above sea level. It is surrounded by hills rising to more than 457 m (1,500 ft.). The southern edge of the valley is separated from the seacoast by a steep ridge some 274 to 365 m (900 to 1,200 ft.) in elevation (see Map 1).

The site is located at the southern corner of the valley, where it narrows at the head of La Jolla Canyon. The four areas of midden (designated as Areas I, II, III, and IV) are located along an intermittent drainage that leads into La Jolla Canyon (see Map 2).



Geology

The Santa Monica Mountains are geologically very complex, consisting of thirteen well-defined topographical and geological units. The range extends from the Los Angeles River west to the Pacific Coast, forming the southern border of the Transverse Geologic Province. It is broken by a deep submarine trough off Point Mugu, then rises again as the Santa Barbara Channel Islands. The 200 km (125 mi.) long range is from 5 to 19 km (3-12 mi.) wide, with elevations varying from 150 to 915 m (450-3,000 ft.).

Exposed deposits of the western Santa Monica Mountains are composed of 915 to 4,570 m (3,000-15,000 ft.) of middle-Miocene clay shale, sandstone conglomerate, and schist breccia. The deposits have been invaded by sills, dikes, and chonoliths of diabase, basalt, and some andesite. Lenses of trachyandesites, andesite, and basalt form sections up to 1,525 m (5,000 ft.) thick in the upper part of the middle-Miocene deposits. Upper-Miocene diatomaceous shales commonly rest with an angular nonconformity upon rocks that are middle-Miocene and older. Post-Miocene orogeny has resulted in a folding and faulting of the upper-Miocene strata that now occupies the flanks of the mountains (Barry 1973). La Jolla Valley is filled with alluvium derived from these deposits.

Two main types of soil are found in the valley: Diablo clay and Zamora loam. Diablo series soils are well-drained clays 100-130 cm (40-50 in.) deep over soft, fractured calcareous shale. Zamora series soils are well-drained loams with a clay loam subsoil, and are formed on alluvium derived mostly from sedimentary rocks. Site Areas I and II have Diablo clay soils. Area III contains both types, while Area IV has Zamora series.

Flora

La Jolla Valley is unique in the Santa Monica Mountains because it is dominated by Central Valley grassland or prairie. Purple needlegrass *(Stipa pulchra)*, one of the main species of the Central Valley prairie, forms solid stands over about 40 hectares (100 acres) in the southern and western parts of the valley.

"The north end of the valley contains other elements of the Central Valley prairie. Tarweed *(Hemizonia ramosissima)* dominates on the heavier, more compacted soils." (Barry 1973).

South-facing hillslopes of the valley are mostly covered with coastal sage scrub communities, the dominants being *Artemisia californica, Rhus laurina,* and *Salvia leucophylla. Salvia* sp. forms extensive stands on the hillslopes just to the east of the site area. California chaparral, composed mainly of *Adenostoma fasciculatum, Rhus* sp., *Ceanothus* sp., and *Salvia* sp., is found on most other slopes. The small intermittent drainages are marked by arboreal species such as *Platanus racemosa, Quercus agrifolia,* and *Salix* sp.

La Jolla Valley has another important feature: it is relatively undisturbed. Past use of the valley was limited mostly to cultivation and grazing. Many of the native species of grass in the valley were replaced by exotic annual grasses, such as wild oats, *Avena fatua*. The decrease of grazing pressure since 1966, when the state acquired the property, apparently has allowed the native species to compete more favorably.

The occurrence of perennial native bunchgrass is closely related to soil conditions in the valley. It is on Zamora series soils that native bunchgrasses have made their most dramatic recovery (Point Mugu Resources Inventory Map, Soil Phases).

Fauna

A large number of animals can be found in and near La Jolla Valley. The deer *(Odocoileus hemionus)* is the most prevalent of large land animals. Carnivores such as coyote *(Canis latrans)*, bobcat *(Lynx rufus)*, and fox *(Urocyon* sp.) are common.

Smaller land mammals present are badger *(Taxidea taxus)*, two species of skunk *(Mephitis mephitis* and *Spilogele gracilis)*, raccoon *(Procyon lotor)*, jackrabbit *(Lepus californicus)*, and cottontail *(Sylvilagus* spp.*)*.

Some fourteen species of rodents are present, including ground squirrel *(Citellus beecheyi)*, pocket gopher *(Thomomys bottae)*, and wood rat *(Neotoma* spp.*)*.

Various pinnipeds are found along the shoreline at different times of the year; the elephant seal *(Mirounga angustirostris)* and the harbor seal *(Phoca vitualina)* are two of the more seasonal species. Steller sea lion *(Eumetopias jubata)* and California sea lion *(Zalophus californianus)* are year-round residents.

Prehistorically, there may have been a rookery near Point Mugu, since large amounts of pinniped remains (mostly juveniles) have been recovered at Ven-84, the Point Mugu shellmound (Lyon 1942). In addition, abundant sea otter remains have been identified at this site.

Cetacea (whales, porpoises, and dolphins) are seasonally common far offshore, and dead individuals occasionally wash ashore. In the past, mountain lion *(Felis concolor)* and grizzly bear *(Ursus arctos)* were present in the valley. An abundant variety of marine fishes and mollusks represented important resources for aboriginal populations. Tidal mud flats adjacent to Point Mugu contain many species of marine invertebrates not available along other parts of the shoreline (Warme 1971).

Resident and migrant waterfowl and shore birds – and their eggs – are other food resources found locally. Insects, such as grasshoppers, are common at times in the grassland and oak grassland vegetation communities.

(For a more detailed discussion of the local fauna, see Leonard 1971, and Appendix B, the vertebrate fauna from Ven-100.)

Climate

The climate of La Jolla Valley, on the edge of the fog belt, is classified by the Koppen System as Mediterranean cool summer with fog (Csbn).

Fluctuations in temperature are not great throughout the year. However, exceptions occur. Cold air drainage in the winter may cause frost in low-lying areas; hot Santa Ana-type winds blow in the late summer and fall.

Precipitation, mostly in the form of rain during the winter and early spring, is between 40 and 46 cm (16-18 in.) annually (Rantz 1969). On some summer days heavy dew is derived from the fog. Winds are predominatly onshore breezes from the west.

There is some debate about the extent of climatic and vegetational changes in the area during the last 8,000 years. Aschmann (1959:34) feels there has been little change except: "The so-called natural vegetation of many marginal districts has been moving toward a new equilibrium adjusted to drier climates." I assume these marginal districts are, for example, vegetation communities retreating to higher elevations, such as yellow pine communities in the Peninsular Ranges. Axelrod (1967), using more conclusive data from an analysis of the distribution of present-day plant communities and dated plant macro fossils, suggests more complex environmental changes similar to Antevs' (1952) post-Pleistocene climatic sequence for the Great Basin and the Southwest. However, even Axelrod's data are too limited for an accurate reconstruction of the environment.

A recent palynological study of marine sediments of the Santa Barbara Basin suggests significant changes in the ranges of plant communities over the last 12,000 years (Heusser 1978). Upland coniferous communities dominant in the early part of the record (12,000 to 7800 B.P.) were succeeded in importance by lowland and cismontane communities. In those communities, oak and members of the Compositae family reached optimal development 5700 B.P. Inferred climatic fluctuations involve the replacement of wet, cool conditions by warmer, drier climate culminating at 5700 B.P. Subsequently, chaparral and coastal sage scrub associations became increasingly important, particularly after 2300 B.P.

EXCAVATION PROCEDURE

A total of 34.45 m^3 were examined from 15 excavated units (designated A through O). The first excavation units were placed to determine the extent, depth, and general content of the midden. Later units were placed to facilitate the complete exposure of burials encountered in the initial units. No specific research strategy was employed.

Units measured 1.5 m^2 with the exception of units F, G, H, N, and O, which each measured 1 m^2. All units were equated to the state surveyor's points present in the valley. Arbitrary levels of 15 cm were used throughout, and the southwest corner was used as a unit datum.

Screen size varied from 3 to 6 mm (1/8-1/4 in.). Smaller-sized screens were used mainly in Area III, where small beads were present.

Due to a lack of time, many of the units were not completely excavated to the sterile base. However, an augur was used to find the depth of the midden in these units. An auger also was used to determine the depth of the midden in the unexcavated areas.

All shell, bone, and modified stone were saved. Unit records were made for each level, and pollen, charcoal, soil, and shell samples were collected. Profiles were drawn from one wall for most of the units. The artifact collection, field notes, maps, and photographs are now stored at the State Archeological Laboratory in Sacramento under accession number W-93.

As part of an Anthropology 199 class at the University of California, Davis, descriptions and typologies were prepared of the ground stone, flaked stone, bone, and shell artifacts. Some of these data were used in this report, although the format has been rearranged so that the artifacts from each area are described separately on an assemblage list.

Artifact descriptions are to be found in Appendix A. This is to facilitate comparison of one area to another in the interpretive section. In addition, some of the artifact terms and classifications have been altered according to the author's preferences. Some questionable artifacts that were previously described by students of the anthropology class have not been included.

ARCHEOLOGY OF AREA I

Area I, the largest and most southerly of the areas (measuring approximately 110 m by 130 m), was tested with six units: A, B, C, D, E, and I. Of these, units D and E overlap by one-half unit. Units A through E were placed along a perpendicular line from the surveyor's line to a point 41-E. Unit I, the deepest pit of the entire site (210 cm), was placed in the northeast corner of Area I (see Map 2).

Strata

Basically, the midden in this area can be described as having three strata with gradational contacts. They are as follows:

(1) *Upper stratum.*. Hard adobe-like, brown clay loam with a granular structure containing sparse shell, with some rodent disturbance (krotovina).

(2) *Middle stratum.* A friable, brown clay loam with abundant shell fragments, calcium carbonate deposits, and rodent disturbance (krotovina).

(3) *Lower stratum.* Light orange brown, gravelly, sandy clay with sparse shell and flecks of charcoal. It ranged from being very hard to plastic, depending on moisture content.

Features

Two possible house floors, a fire hearth, and a fire pit were noted along with four other individual features. The individual features have been designated as Features A, B, C, and D. Descriptions of features are as follows:

Feature A

Feature A consisted of a cluster of two large boulders and five smaller rocks in the southwest corner of Unit B. Its depth was from 32 to 45 cm. No artifacts were associated.

Feature B

Feature B (Fig. A-2), from Unit D at 65 cm was recorded as a house floor. However, it probably represents a concentration of calcium carbonate as found in the middle stratum. Several artifacts coated with calcium carbonate were found in the matrix of the "floor."

Calcium carbonate concentrations have been noted in other sites of a similar age (LAn-352 [West 1968], LAn-167 [King 1967:31], LAn-40 [Peck 1955]). They appear to have developed when groundwater, containing calcium carbonate derived from marine invertebrate remains, percolated down to more impervious strata, with higher pH levels. The calcium carbonate then precipitated out. These deposits usually are greatest on the upward-facing surfaces of rocks and artifacts.

Feature C

Feature C (Fig. A-3) is a house floor with a fire hearth ringed with stones. The fire hearth was found in the southwest corner of Unit I at a depth from 87 to 94 cm. Almost the entire circular hearth, with a diameter of about 60 cm, was exposed and, in some areas, a "peel line" radiating out from the hearth could be established. The fire hearth part of this feature was saved by pedestalling it. Several artifacts found on the same level may have been associated. They are: tarring pebble (786), hammerstone (789), scraper (794), ground stone fragment (787), core (791), and ocher (788).

Charcoal taken from the hearth was radiocarbon dated at 3830±225 B.P.

Feature D

Feature D consists of a cairn of two large millingstones, and a cairn of two large millingstones and a large boulder. Each cairn marked the remains of a poorly preserved burial (see Burials 13 and 14). The feature was from Unit I at 130 to 150+cm.

At a depth of 135 cm, a rock-scatter composed of stream cobbles, thermal-fractured rocks, artifact fragments, and charcoal was noted in Unit I. However, no discernible pattern was present and no function is proposed. Charcoal for radiocarbon dating was collected from this feature, but has not been processed.

A possible fire pit was noted in the north sidewall of Unit I at a depth of 181 to 190 cm. A light gray ash lined the surface of the pit. Unfortunately, rodent disturbance obscured the exact definition of the pit.

Two other possible house floors were noted in Unit I at 105 cm and 122 cm. Like Feature C, both floors appear to be associated with fire hearths.

Burials

Five burials were noted from Area I. All were fragmentary and poorly preserved. However, they appeared to be representative of primary inhumation. Sex and age were impossible to determine, but the size of the long bone fragments suggests they were adults. Most burials appeared to be in a tightly flexed position, and were under either cairns of broken rock and artifact fragments or millingstones. Descriptions of burials are as follows:

Burial 1

Burial 1 was at a depth of 60 to 75 cm in Unit D, and consisted of a partial cranium, three partial ribs, the long bones, patellae, and some phalanges. The top of the head was oriented toward the southwest. The burial had been placed on sterile subsoil in a tightly flexed position and covered with a pile of fist-sized, fire-blackened rocks and broken artifacts. *Haliotis* sp. shells were abundant.

Burial 2

Burial 2, located in Units D and E at a depth of 75 to 95+cm, consisted of a partial cranium, mandible, some long bones, and two phalanges. The top of the head was oriented toward the southwest. Burial 2 also was on sterile base in a tightly flexed position and covered with a poorly defined cairn of fire-blackened rocks, fragmentary artifacts, and a large, flat, rock slab.

Burial 3

Burial 3 was located in the north wall of Unit E at a depth of 65 to 80 cm. It was not completely excavated, and the burial position could not be determined.

The excavated portion consisted of a partial mandible and a long bone, possibly an ulna or radius. A schist slab, mano fragments, rocks, and shells of *Haliotis* sp. were found in association.

Burials 13 and 14

Burials 13 and 14 were found in Unit I at depths of 164 cm and 158 cm, respectively. Each was covered with two large millingstones whose working surfaces were face down. A large boulder also formed part of the cairn for Burial 14. Burial 13 consisted of fragments of the skull, radius, and femora, with the top of the head oriented toward the east. Two *Haliotis* sp. shells were associated. Burial 14 consisted of skull and femoral fragments. Its orientation could not be determined since rodents had gnawed much of the bone away, leaving only the midsections of the femoral shafts and small pieces of the cranium.

Assemblage for Area I

I. Ground stone
  A. Manos
    1. Unifacial
      a. Shaped unused surfaces
      b. Unshaped
    2. Bifacial
      a. Shaped unused surfaces
      b. Unshaped
  B. Millingstones (metates)
    1. Flat
    2. Basin
      a. Shaped
      b. Unshaped
  C. Mortars (bowls)
  D. Pestles
  E. Grinding palette
  F. Ground slate bar

II. Large flaked tools
  A. Cobble tools and hammerstones
    1. Uniface
    2. Biface
    3. Multiface
    4. Hammerstones
  B. Teshoa flakes

III. Small flaked tools
  A. Retouched flakes
    1. Convex
    2. Straight side
    3. End
    4. Pointed
    5. Untyped
  B. Cores
  C. Point
  D. Utilized flakes
  E. Planes

IV. Bone points

V. Beads
  A. Cylindrical *Tivela*
  B. Disc *Tivela*
  C. Spire-ground *Olivella*
  D. Lipped *Olivella*
  E. Small, lipped *Olivella*
  F. Bead blank

VI. Miscellaneous
  A. Asphaltum
  B. Tarring pebbles
  C. Incised steatite
  D. Ocher
  E. Schist slab

ARCHEOLOGY OF AREA II

Area II, upstream about 75 m east of Area I, covers the flat ground along the southern and western parts of the drainage dividing the site. The area was tested with three 1 m^2 units: F, G, and H. Their positions were equated to state survey lines and points (see Map 2).

Strata

The midden in this area has two main strata with a gradational contact. The strata are:

(1) *Upper stratum.* Adobe-like, gray brown clay loam with a granular to prismatic structure. It is hard in the upper portions, becoming friable with depth, mainly due to extensive rodent activity. Shell is sparse; the frequency increases slightly with depth. Small amounts of pea-sized, sandstone gravel and fist-sized rocks also are present. (Unit H has a light calcium carbonate deposit in the lower portions of the stratum.)

(2) *Lower stratum.* A light orange brown clay mixed with sand and gravel. Shell is present in sparse amounts.

Features and Burials

No features or burials were recovered in this area, although there was a possible burial noted in Unit F at 90 to 105 cm. It consisted of a partly exposed pelvis in the northwest corner on the contact with the lower stratum. However, further excavation to allow full exposure was not undertaken due to lack of time.

Assemblage for Area II

I. Ground stone

- A. Mano
- B. Millingstone fragment
- C. Pestle fragment
- D. Mortar fragment

II. Large flaked tools

- A. Cobble tools
- B. Hammerstones

III. Small flaked tools

- A. Retouched flakes
- B. Cores
- C. Trifacial bipoint (off prepared core)
- D. Plane
- E. Large lanceolate point

IV. Bone Artifacts

- A. Single-pointed

V. Miscellaneous

- A. Ocher

ARCHEOLOGY OF AREA III

Area III covers the tip of land at the conjunction of the main drainage for La Jolla Valley, which divides Ven-100, and a small drainage along the base of the steep slope of the eastern edge of the valley. It lies 40 m due north of Area I (see Map 2). Four 1.5 m^2 units (J, K, L, and M) and one 1 m^2 unit (Unit 0) were used to test the area. The surface is relatively flat and covered with a thin deposit of midden, approximately 40-95 cm deep.

There are several shallow round depressions which may be the remains of house floors. If so, they would be extremely rare for mainland southern California archeological sites. Some disturbance of the site may have occurred when the conjunction of the two drainages was dammed to form a stock pond. But if damage did occur, it was not determined from these limited excavations.

Strata

The midden in this area consists of a single layer of light gray brown loam with a high shell and ash content. The deposit is very hard in some areas for the first 15 to 20 cm, but becomes friable with depth. The midden rests on a light brown, sandy clay which, though the contact is gradational, contains no shell or artifacts. Rodent activity in the midden was apparent.

Features

Three features (D, E, F) were noted for Area III. They consist of broken rock and artifact concentrations. None of these were exposed enough to allow an accurate interpretation to be made. Descriptions of features are as follows:

Feature D

Feature D (Fig. B-1) was noted in Unit J at 60 to 75 cm. The exposed portion consisted of two clusters of broken rocks, cobbles, and artifacts which rested on the sterile layer. One complete mano and three fragments were associated. These two clusters may represent the remains of an earth oven.

TABLE 1

BURIALS FOUND IN AREA III

Burial Number	*Type of Disposal, Location, and Depth*	*Remarks*
4	Redeposited inhumation Unit K, 45-60 cm	Adult, poorly preserved and incomplete, associated with at least five other burials.
5	Primary inhumation (?) Unit K, 73 cm, north wall	Adult, well preserved. Associated artifacts: steatite bowl, two animal claws, asphalt-plugged abalone shells. (Excavation incomplete)
6	Primary inhumation Unit K, 49 cm	Adult, semi-flexed, face down, head to the south. Well preserved. Associated artifacts: flake scraper, charred remnant of a wooden pole. Probably a female.
7	Primary inhumation Unit K, 47 cm	Adult, fair preservation. (Excavation incomplete)
8	Primary inhumation Unit K, 45-60 cm	Adult, semi-flexed on left side, face down, top of head toward east. Collapsed vertebrae, arthritic foot bones. Associated artifact: bone point.
9	Undetermined Unit K, south wall	Adult, skull only. (Excavation incomplete)
10	Redeposited inhumation Unit K, 55-65 cm	Infant, less than 18 months of age. Close to Burial 6 which is probably a female.
11	Undetermined Unit K, 55-65 cm	Child, incomplete.
12	Undetermined Unit M, 83 cm	Adult, skull fragments and two vertebrae.
15	Primary cremation or grave pit burning Unit M, 83 cm	Child, tightly flexed on left side, head to the east. North-south orientation. Some bones burnt. Soil of burial pit burnt to oxidized red brown color. Associated artifacts: chert point (?) with heat spauls, shell bead, piece of calcium carbonate spring tufa. (Excavation incomplete)

Feature E

Feature E (Fig. A-4), in Unit L, was a portion of a broken rock, cobble, *Haliotis* sp. shell, and fragmented artifact-scatter located at the same stratigraphic level as Feature D. The distribution of elements appeared to be random, with fragments of mortars and manos making up the associated artifacts.

Feature F

Feature F (Fig. B-4), in Unit M at 15 to 30 cm, consisted of a partly exposed concentration of broken sandstone rocks with no artifacts associated. This feature may be a cairn or fill over Burials 12 and 15. However, the data are so limited that any associations are impossible to determine.

Burials

Ten burials were noted for Area III, consisting of primary inhumations, redeposited inhumations, and cremations. Bone preservation varied from poor to good. Table 1 contains a description of each burial.

Assemblage for Area III

I. Ground stone
  A. Manos
    1. Biface, unshaped
    2. Triface
    3. Untyped
  B. Millingstone fragments
  C. Mortar fragments
  D. Pestle fragments
  E. Bowl
  F. Steatite fragments
  G. Pipe

II. Large flaked tools
  A. Cobble tools
  B. Hammerstones

III. Small flaked tools
  A. Retouched flakes
    1. Convex
    2. Straight side
    3. End
    4. Pointed
  B. Cores
  C. Points
  D. Utilized flakes
  E. Planes
  F. Trifacial bipoint (drill)

IV. Bone artifacts
  A. Single-pointed
  B. Pipe mouthpiece
  C. Claws (some with shell inlay)
  D. Antler tip

V. Shell artifacts
  A. Asphaltum-plugged *Haliotis* shells
  B. Perforated *Littorina* shell
  C. Perforated *Haliotis* shell
  D. Drilled ovate *Haliotis* disc
  E. Two-holed *Haliotis* disc
  F. *Haliotis* rim section
  G. Beads
    1. Type 1
    2. Type 4
      a. Subtypes a,b,c
    3. Type 5
    4. Type 7

VI. Miscellaneous
  A. Ocher
  B. Asphalt lumps

ARCHEOLOGY OF AREA IV

Area IV is a small deposit of midden about 25 m in diameter with poorly defined boundaries. The area is on a small low knoll about 100 m north of Area II. It was tested with one unit (Unit N) measuring 1 m^2 (see Map 2).

Strata

The midden is a very hard, brown loam mixed with pea-sized gravel and fist-sized sandstone rocks. Shell is very sparse. The midden rests on a light orange brown deposit and is from 48 to 55 cm deep. Midden pH measured 7-7.5; sterile pH measured 8. Rodent disturbance is present.

No features or burials were noted. Only three artifacts were recovered: a core, hammerstone, and scraper. These artifacts are of little diagnostic value.

DISCUSSION OF FINDINGS

When compared with other areas of the Santa Monica Mountains, the range's far western end has a significantly higher number of known archeological sites. This area includes the La Jolla Valley.

There probably are several reasons for this larger number of sites, but the most important appear to be physiographic and ecological conditions related to the presence of Mugu Lagoon and the associated estuary. Besides the terrestrial, open shore, and offshore resources of other areas along the coast, the large lagoon and estuary provided additional, and more abundant, subsistence resources (Warme 1971).

However, coastal conditions may have changed significantly over the last 10,000 years as a result of postglacial sea level changes (Bloom 1970) as well as climatic changes already noted. It is not presently known how these changing environmental conditions affected the former inhabitants.

Given conditions as they existed before 1800, the location of La Jolla Valley would have allowed its inhabitants to exploit a large range of environments, including Mugu Lagoon and the estuary. The aboriginal peoples, particularly in latter period times, settled around their shores and nearby areas in a density not elsewhere noted in the Santa Monica Mountains.

La Jolla Valley contains several other fairly large sites in addition to Ven-100 (see Map 1). However, none of these other sites show evidence of being of major importance as far as time depth or the abundance of artifactual or faunal remains are concerned. There also are several small sites in the valley, but they consist of only sparse shell-scatters and their function is at this time undetermined.

How Ven-100 relates to these other sites is uncertain, but it is important to note that the other sites appear to be possibly Middle Period or, in most cases, Late Period sites. Although some of them contain millingstones, none at this time can be classified as part of the Millingstone Horizon as described by Wallace (1955). During the later period, it appears there was a proliferation of sites resulting from population increases coupled with the development of technological methods that allowed the exploitation of a greater range of subsistence resources. The latter assumption is suggested from the evidence present at Ven-100. Changing environmental conditions caused by climatic and sea level fluctuations may have contributed to the changes noted in the subsistence patterns.

It is apparent, even from these limited test excavations, that significant observations can be made from the data recovered at Ven-100. First, the content of cultural remains varies from area to area. Areas I and III are very distinct from each other. (Areas II and IV will not be discussed here since the small sample size limits any meaningful diagnostic interpretations.) The distribution of artifacts, features, burial patterns, and stratigraphy suggests two different cultural time segments: an early and a later period.

Area I is characterized by the presence of large numbers of millingstones, manos, cobble tools, and hammerstones. The burials are all adults in a flexed position, some under millingstones, and others under broken rock and artifact accumulations. Bead types are limited to four kinds. (Two subtype 4a beads were found in 0-15 cm of Unit I. However, I feel these are representative of the later component because of their depth and because all thirteen other beads of this subtype were found in Area III. The one subtype 4c bead is of questionable provenience.) One spire-ground *Olivella* and two *Tivela* disc beads are the other types and these forms are consistent with other data from the region (King, Blackburn, and Chandonet 1968).

Area III is distinct from Area I in several ways, with burial patterns being the most different. Burials in Area III were of individuals of all ages and were packed into what appears to have been a crowded cemetery. The earlier burials were disturbed by later burials, causing reburial in a random fashion. Artifacts, other than millingstones, cobble/broken artifact cairns, and abalone shell, are associated with the burials. Some of the burial goods are quite elaborate. Steatite is common. Bead* and point types are more diverse and abundant, and stone working is more elaborate

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* It was not until the 15 cm to 30 cm level in Unit K that a 3 mm (1/8") screen was substituted for a 6 mm (1/4") screen. The 6 mm (1/4") screen was used in all the other units. This probably had a significant effect on the recovery of the smaller beads.

and sophisticated. With the exception of marine invertebrates, faunal remains also are more diverse and abundant than those of Area I. Thus, there appears to be a difference in subsistence, as well as in artifacts and burials, between the two areas.

How these areas relate to one another, even at the simplistic level of the differences noted above, is explained readily by the cultural chronologies given by King, Blackburn, and Chandonet (1968), Wallace (1955, 1956), Warren (1968), and Rogers (1929). Although there is some variability to be described, Area I fits the Millingstone Horizon cultural assemblages as defined by Wallace (1955:220), or Warren's (1968) Encinitas Tradition. On the other hand, Area III is late and extends to early historic times as is evidenced by the presence of glass trade beads.

How the other two examined areas fit into the chronology or settlement pattern is unknown at this time.

It does appear, however, that Ven-100 through comparison of its cultural remains with locally dated sites and one radiocarbon date, represents occupation that extends to at least four to seven thousand years ago. Whether there was continuous occupation over this time span is questionable; the separate areas of cultural deposits suggest that breaks in occupation did occur.

Subsistence shifts are evident in both artifactual and faunal remains. These changes seem quite abrupt, considering the archeological record.

The presence of mortars and pestles in Areas I and III suggests that acorns were used. In Area I, however, millingstones and manos were the most abundant food-processing tools recovered, suggesting an emphasis on preparing small hard seeds such as those from grasses and chia (*Salvia* sp.).

Unlike other excavated Millingstone Horizon sites in the Santa Monica Mountains (Ven-1, LAn-225, LAn-352, LAn-40), no pitted stones or pitted artifacts were recovered at Ven-100. The function of pitted stones is conjectural, but the use of pitted stones as nut anvils by modern day natives in western Panama has been observed (West, personal observation, 1971). Their absence from Ven-100 might suggest that certain kinds of subsistence processes were not carried out at the site, but were carried out at other sites. The presence of mortars and pestles suggests the utilization of acorns, thus the function of pitted stones as acorn anvils is doubtful.

Faunal remains suggest that these people gathered marine invertebrates mainly from Mugu Lagoon, mammals from the local area, and fish from the shoreline. The variety and abundance of mammal (see Appendix B) and fish remains (M. Roeder, personal communication) shifts significantly from Area I to Area III. Thus, the range of food resources apparently expanded in the later period. These subsistence changes may be the result of both technological and environmental changes that occurred over the last 7,000 years.

There also may have been a shift in burial patterns in Area I. Evidence gathered from other sites (LAn-352, Ven-1) of the Encinitas Tradition in the Santa Monica Mountains shows that burials of the greatest depth usually were covered with cairns of whole millingstones on the sterile base of each deposit. The deepest burials found in Unit I were covered with a cairn of whole millingstones, while burials found in the southern portion of Area I were located under poorly defined piles of cobbles and broken artifacts. This shift, I feel, is a temporal one with the millingstone cairns representing an earlier time period.

The presence of house floors in Area I suggests that there were differentiated activities in the individual areas. It further suggests that the site was occupied at least on a semi-permanent basis. The radiocarbon age of 3830±225 B.P., determined from charcoal recovered from the hearth in the center of one of the house floors, is the earliest date of a hearth/house floor in coastal southern California. It is noteworthy that there was one house floor or possibly two, below the dated floor, which represents an earlier time period. In addition, cultural remains are in evidence to a depth of 210 cm, some 116 cm below the dated hearth.

Since the hearth/house floor probably represents the results of a shallow excavation of the original construction, it would not be unreasonable to assume that the lowest levels of Area I are probably close to 7,000 years old. This age also would be compatible with similar sites in the Santa Monica Mountains and other coastal areas of southern California.

Area III has several circular shallow depressions. These, too, may be house remains, but at present the evidence is inconclusive.

CONCLUSIONS

The following conclusions can be drawn from the test excavations:

1. The site of Ven-100 consists of four different areas. Of these, Areas I and III represent two distinct time segments – an early and a late period. Area I can be characterized in the context of the Encinitas Tradition (Warren 1968). Area III represents prehistoric and historic Chumash occupation. Both Areas II and IV have insufficient data for a determination of what they represent.

2. La Jolla Valley is in a unique physiographic and ecological situation. Therefore, its inhabitants were able to exploit terrestrial, near shore, offshore, lagoon, and estuarine environments. It is suggested that the emphasis on exploitation of these environments shifted over time, with marine resources becoming more important in the later period. There also appears to have been an overall expansion in the exploitation of the resource base over time. These changes may be the result of new technologies and a changing environment.

3. The evidence in Area I of a superimposed series of house floors, and a cemetery in Area III, suggest that differentiated activity loci were present.

4. One of the earliest dated house floors in the southern California coastal region may be present in Area I. This may imply a more sedentary settlement pattern than is generally ascribed to this period.

5. Burial patterns shifted through time. The earliest appears to be individuals flexed and placed under cairns of whole millingstones. Later, but apparently still within the Encinitas Tradition, they were placed under cairns of broken rock, milling tools, and *Haliotis* shells. In the Late-Period cemetery of Area III, flexed primary inhumations, reburials, and one possible cremation were noted. Grave goods consisted mainly of ground and polished stone (mostly steatite objects), bone ornaments, and large numbers of shell beads. (Unfortunately in some cases, due to the closeness and the aboriginal disturbance of the excavated burials, it was not possible to match individuals to burial lots.)

6. Finally, it is suggested that the various shifts noted in the archeological record appear to be quite abrupt. However, they may be due to the poor resolution of the chronological sequence obtained from the limited excavations. They also may be the result of a slow cumulative process, actual breaks in occupation for long periods of time, or the introduction of new cultural patterns from other areas. There does not appear to be any evidence of a Middle Period or Hunting Culture (Rogers 1929) at the site.

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APPENDIX A
TYPOLOGY

The purpose of this classification is to describe the artifacts with a minimum number of terms which connote the function of the artifacts. Their possible functions, however, are noted. Part of this classification system is based on data taken from the reports of University of California, Davis, students who did a typology of some of the site's artifacts for an Anthropology 199 class. However, a large number of major changes have been made by the author.

This first-step classification can be considered raw data to be used with the report's conclusions in a more functional and historical way. If needed, the descriptions can be applied to other types of interpretations, thus avoiding the need for a new system of classification.

The materials that were used in manufacturing the artifacts were mostly found locally. Some of the lithic materials (fused shale, obsidian, steatite, and serpentine) are not found locally and must have been obtained by trade or travel. For a description of sources of lithic material, see Greenwood (1969: 3-6).

Artifact Description

I. Ground Stone

A. Manos. Manos are made from stream cobbles. They have been divided into three classes according to the number of grinding surfaces. Two of these classes, uniface and biface, have been divided further into those that have modified unused surfaces or those that do not. Most of the grinding surfaces have been pecked to increase the efficiency of the tool.

1. Type 1: Unifacial. Definite grinding wear on only one face.

a. Sub-type includes manos that have pecked and/or shaped, unused surfaces. Four specimens.

Average length:	15.3 cm	Width:	10.3 cm	Thickness:	5.7cm
Range:	10.9-17.4		7.0-11.9		5.4-6.0

b. Sub-type includes manos that have not been shaped, except for grinding surface. Two specimens.

Average length:	13.0 cm	Width:	9.7 cm	Thickness:	7.1 cm
Range:	11.9-14.2		9.3-10.1		6.9-7.3

2. Type 2: Bifacial. Definite grinding wear on two faces.

a. Sub-type includes manos that have pecked and/or shaped surfaces. Five specimens.

Average length:	15.2 cm	Width:	10.4 cm	Thickness:	5.2 cm
Range:	13.2-17.3		9.3-11.7		4.3-6.7

b. Sub-type includes manos that have not been shaped, except for grinding surface. Five specimens.

Average length:	11.2 cm	Width:	9.1 cm	Thickness:	5.7 cm
Range:	10.4-13.1		7.6-10.5		4.1-7.3

3. Type 3: Trifacial. Definite grinding wear on three faces.

a. Triangular cross section. Three specimens.

Average length:	14.3 cm	Width:	8.9 cm	Thickness:	7.7 cm
Range:	12.7-16.1		7.7-10.0		6.3-9.8

4. Type 4: Ground pebble (Fig. D-120). One small unshaped sandstone pebble with one unpecked grinding surface.

Length: 35 mm Width: 45 mm

5. Untyped: Includes those manos that could not be definitely categorized because of their fragmentary condition.

B. Millingstones or metates. Two types are noted, flat slab and basin. The basin type can be subdivided further into shaped or unshaped. All the large (40+ cm long) complete millingstones were left at the site. The present collection consists only of fragments representing both types. Five pieces suggest basin types and three may represent flat types. Some show signs of pecking on the grinding surfaces (see Fig. C).

1. Type 1: Flat slab. Ground surface is flat.

2. Type 2: Basin-shaped. Ground surface is a sub-rounded or oval basin which may or may not be asymmetrical in depth.

   a. Sub-type exterior surface unshaped.

   b. Sub-type exterior surface shaped.

   (This category may be divided further if a flat platform around the basin is present or not. But data from field notes did not permit an accurate determination.)

3. Untyped: These are fragments that could not be categorized due to their small size.

C. Mortars. This classification meets three criteria: a concave, shaped, ground interior surface; a convex, shaped, exterior surface; and a wall thickness greater than 3 cm. All remains classed as mortars are fragmentary and were made mostly from sandstone. One large piece, which includes the only portion of a rim noted, has a groove, partially filled with asphaltum, incised along the top of the rim.

D. Bowls. A small, highly finished serpentine bowl (Fig. E-62) was found. Viewed from the side, it is half-round in shape and has an uneven incised line circling the outside of the rim approximately 5 mm from the edge.

Diameter (external):	94 mm	(internal):	82 mm
Height:	50mm	Basin depth:	41 mm

E. Pestles. Nine specimens were recovered. Only one is fairly complete and shows little modification from its natural form. Of the fragments, most are cylindrical in cross section. The ends that are present show signs of battering.

F. Pipe. Tubular pipe made of steatite (Fig. D-65). A mouthpiece of worked birdbone was associated. At the "bowl" end are two incised grooves at 4 mm and 7 mm, respectively. They are about 1.0 mm to 1.5 mm wide. (The wall is of equal thickness for the full length of the pipe except at the edge of the mouthpiece end where it tapers to a thin edge.) There must have been a plug to hold the mouthpiece in place since the diameters vary greatly.

Pipe:	Length	16.7 cm	
		Outside Diameter	Inside Diameter
	Bowl end	3.1 cm	2.0 cm
	Mouthpiece end	2.1 cm	1.5 cm
Mouthpiece:	Length	3.7 cm	
	Diameter	0.4 cm	

G. Steatite fragments. A number of steatite fragments were recovered. All are flat, some have rounded edges, and one has a round drilled hole at the edge. Average thickness is 2.6 cm. These pieces are probably the remains of "comals" and were found closely associated in Unit K.

H. Ground biface (Fig. D-389). Fragment of a thin, bifacially ground piece of sandstone. Edges were tapered to a point.

I. Edge-ground cobble. A well-marked grinding facet appears on one edge. Grinding striations are also present on one of the flat surfaces.

Length:	24.0 cm	Width:	19.7 cm	Thickness:	8.3 cm

J. Serpentine slab. Roughly shaped rectangular slab with the edges flaked and ground.

Length:	20.3 cm	Width:	11.5 cm	Thickness:	1.5 cm - 2.0 cm

K. Ground slate bar, rectangular cross section (Fig. D-813). All the surfaces are ground except one end.

Length:	106 mm	Width:	12 mm	Height:	9 mm

II. Large Flaked Tools

A. Cobble tools and hammerstones. This represents the largest category in number. Hammerstones exhibit heavy battering on one or more surfaces or edges. This category also includes broken and fragmentary artifacts showing heavy battering. Cobble tools are flaked tools that are subdivided further by the number of flaked surfaces, and whether or not they are cortex-backed.

1. Type 1: Uniface (Fig. E-102). Cortex-backed cobbles with unifacial flaking. Some have stepped flakes and/or a flattened working edge.

2. Type 2: Biface (Fig. E-638). Cortex-backed cobbles bifacially flaked. Some have stepped flakes. Working edge usually curved and battered from use.

3. Type 3: Multiface. Little or no cortex, irregularly flaked, with several edges showing use.

B. Teshoa flakes. These are plano-convex flakes struck from a cobble. One surface exhibits the cortex of the stone, and the opposite is flat, except for the bulb of percussion. The edges show signs of use: polishing, crushed edges, and/or flaking (Fig. F-53).

III. Small Flaked Tools

A. Retouched flakes. These are flakes divided into categories according to the overall shape of the flake and the position of the retouching.

1. Type 1: Convex. The worked edge is curved one-half to three-fourths around the perimeter of flake (Fig. G-19).

2. Type 2: Straight side. The retouched edge is straight and on the long axis of the flake.

3. Type 3: End. The retouched edge is around the shortest axis of a backed flake (Fig. G-114).

4. Type 4: Pointed. Retouching occurs at the tip or pointed end of a backed flake (Figs. G-461 and G-296).

5. Untyped: Flakes. Flakes retouched on more than one edge or point or flakes that have highly variable overall form.

B. Prepared flakes. These are flakes derived from prepared cores.

1. Type 1: Blades. Thin, flat flakes at least twice as long as they are wide. Includes those retouched along the edges.

2. Type 2: Trifacial bipoint. Long, thin flake with a triangular cross section with a twist of approximately 50°. Derived from a prepared core. Retouched along two or more faces (Fig. G-225). This may be a pipe drill and was found closely associated with the pipe described above.

3. Type 3: Large unifacial flake. Backed flake with retouching around the entire edge (Fig. G-130).

C. Cores. Prepared and amorphous. Prepared cores are those that were made to derive a particular type of specialized flake (Fig. E-634). Flakes of amorphous cores were removed in no discernible pattern.

D. Points.

1. Type 1: Broad, triangular, pronounced shoulder with barbs, contracting pointed stem (Fig. E-507).

2. Type 2: Large, broad, triangular, low-angle triangular base (Fig. E-838).

3. Type 3: Small, narrow, triangular, concave base (very shallow to deep), centricular cross section (Figs. E-239, E-368, and E-506).

4. Type 4: Small, narrow, leaf-shaped, convex base, centricular cross section (Fig. E-508).

5. Type 5: Large, lanceolate, base missing (Fig. E-650).

E. Utilized flakes. Show signs of use, but no purposeful retouch.

F. Planes. The two types are high-backed, convex and low, flat-backed. The planes have somewhat irregular outlines, ranging from oval to multi-angular. All have steep, high-angle flaking on all or part of the periphery (Figs. F-730 and F-747).

IV. Bone Artifacts

A. Type 1: Single-pointed tool, smoothly polished surface at point. Made from mammal scapula.

B. Type 2: Single-pointed tool, surface striations run either straight from the blunt end to the ground tip or diagonally from the blunt end down toward the tip end from left to right. One specimen (Fig. D-5) has asphaltum encrusted on the blunt end. These appear to be awls.

C. Type 3: Animal claws.

1. Small mammal, dog or fox (?) (Canidae) claws, asphaltum stains.

2. Large mammal, grizzly bear *(Ursus arctos)* claws, basally drilled.

3. Large bird, Golden eagle *(Aquila chrysaetos)* claws with pieces of *Haliotis* sp. shell inlaid with asphaltum used for cement (Fig. D-480).

V. Shell Artifacts

A. Perforated gastropod shell, *Littorina planaxis*. Perforation is on the concave, abraded surface of the largest and lowest whorl (Gifford 1947, noted as C4 category with distribution limited to southern California coast).

B. Abalone *(Haliotis* sp.*)* with asphalt plugged apertures. Chipped and ground, probably from use, along the periphery.

C. Small *Haliotis* sp. shell with large conical hole drilled (12.2 mm) from the outside.

D. *Haliotis* sp. Ovate disc, with a single biconically drilled perforation at one end (Fig. D-858). All edges are ground (length 20.8 mm, width 12.2 mm, thickness 2.1 mm, hole 2.8 mm).

E. *Haliotis* sp. Subcircular disc (Fig. D-146) with two centrally orientated, biconically drilled holes (maximum diameter 14.6 mm, thickness 0.6 mm, holes 2.8 mm and 2.2 mm). Similar to Gifford's K361 Type (1947:74), but it lacks a serrate edge.

F. *Haliotis* sp. Rim section (Fig. D-627).

G. Beads

1. Type 1: *Olivella biplicata* (purple olive shell) with both ends ground. Barrel form. King's Type 14 (1968:79). One specimen (Fig. D-444).

2. Type 2: *Olivella biplicata*. Spire-ground. King's Type 13 (1968:78) (Fig. D-808).

3. Type 3: *Tivela* sp. Disc.

   a. *Subtype 3a Tivela* sp. (Pismo clam). Large, very thick, cylindrical, biconically drilled bead (Fig. D-173).(Length 7.4 mm, diameter 10.4 mm, hole diameter 2.6 mm.)King's Type 11 (1968:78).

   b. *Subtype 3b Tivela* sp. Disc, large, thick, biconically drilled with square shoulders. King's Type 10 (1968:78). (Length 5.8 mm, diameter 13.0 mm, hole diameter 4.6 mm.) (Fig. D-521).

4. Type 4: *Olivella biplicata*, split shell (Fig. D-435). Three subtypes are differentiated using two criteria: Size (overall maximum diameter, see Chart 1), and the portion retained for the bead (lipped – includes a portion of the outer lip of the last body whorl; unlipped – part of the body whorl with no lip present). With the description of each subtype are measurement means and ranges. Individual measurements are given in Tables 2 through 5.

   a. *Subtype 4a* is characterized by large, lipped beads (Table 2). King's Type 2 (1968:76).

Diameter:	9.9 mm	Range:	6.7 mm – 13.0 mm
Thickness:	4.5 mm	Range:	3.4 mm – 5.6 mm
Hole diameter:	2.2 mm	Range:	1.9 mm – 2.5 mm

   b. *Subtype 4b* is characterized by large, unlipped beads. (These have been divided from subtype 4c, small, unlipped beads, on the basis of two size clusters separated from one another by a diameter measurement gap of from 6.5 mm to 7.5 mm where there are no beads present [Table 3].) King's Types 5A (1968:77).

Diameter:	8.4 mm	Range:	7.9 mm – 9.8 mm
Thickness:	2.6 mm	Range:	2.2 mm – 3.0 mm
Hole diameter:	1.9 mm	Range:	1.8 mm – 2.0 mm

   c. *Subtype 4c* is characterized by small, unlipped beads (Table 4). King's Type 4 (1968:77).

Diameter:	4.2 mm	Range:	3.2 mm – 6.2 mm
Thickness:	1.5 mm	Range:	1.0 mm – 2.4 mm

5. Type 5: *Mytilus* sp. (mussel) (Fig. D-199). Circular disc beads (Table 5). King's Type 7 (1968:78).

Diameter:	5.4 mm	Range:	4.2 mm – 6.8 mm
Thickness:	2.5 mm	Range:	2.2 mm – 3.2 mm
Hole diameter:	2.0 mm	Range:	1.8 mm – 2.2 mm

6. Type 6: Polished shell disc (*Tivela* sp. [?]) bead blank.

Diameter:	19.0 mm	Thickness:	3.0 mm

7. Type 7: Small glass trade bead. Flattened sphere. This bead may have been burnt. (Fig.).

Diameter:	0.3 mm	Thickness:	0.25 cm

TABLE 1
Bone Tools (Awls)

Catalog number	*Maximum length*	*Maximum width*	*Maximum thickness*	*Unit*	*Depth*
TYPE 1					
623	117.0 mm	22.0 mm	10.5 mm	K	45-60 cm
TYPE 2					
662	*	*	*	A	60-75 cm
707	*	5.2 mm	5.2 mm	A	105-120 cm
837	*	6.0 mm	3.5 mm	C	30-45 cm
187	*	*	*	D	0-15 cm
781	*	8.7 mm	5.4 mm	F	75-90 cm
412	*	10.1 mm	6.0 mm	K	15-30 cm
211	87.2+ mm	8.2 mm	3.4 mm	K	43 cm
319	*	*	4.8 mm	K	60-75 cm
5	133.0 mm	17.0 mm	9.0 mm	K	75-90 cm
448	67.4+ mm	9.8 mm	5.6 mm	L	45-60 cm
238	84.4+ mm	10.8 mm	5.1 mm	O	30-45 cm

* Indicates that fragmentation prevents determination of size.

\+ Indicates that the very tip or blunt end was missing; however, the measurement quoted is close to the intact measurement.

TABLE 2

Subtype 4a Lipped *Olivella* Beads

Catalog number	*Maximum length*	*Hole diameter*	*Maximum thickness*	*Unit*	*Depth*
198	10.2 mm	2.0 mm	5.0 mm	I	0-15 cm
199	12.0 mm	2.2 mm	5.6 mm	I	0-15 cm
148	6.7 mm	2.2 mm	3.6 mm	K	0-15 cm
431	10.2 mm	2.5 mm	3.8 mm	K	15-30 cm
498	9.0 mm	2.2 mm	4.2 mm	K	30-45 cm
487	13.0 mm	2.4 mm	4.8 mm	K	45-60 cm
797	9.0 mm	2.1 mm	5.2 mm	L	15-30 cm
862	11.8 mm	2.2 mm	5.0 mm	L	15-30 cm
861	7.9 mm	2.0 mm	4.0 mm	L	15-30 cm
456	10.8 mm	2.2 mm	4.9 mm	M	0-15 cm
859	10.2 mm	2.2 mm	4.2 mm	M	30-45 cm
323	9.0 mm	2.2 mm	3.4 mm	M	30-45 cm
240	10.6 mm	2.2 mm	4.8 mm	O	30-45 cm
100	8.0 mm	1.9 mm	4.5 mm	O	30-45 cm
?	10.8 mm	2.4 mm	4.2 mm	?	?

TABLE 3

Subtype 4b Large, Unlipped *Olivella* Beads

Catalog number	*Maximum length*	*Hole diameter*	*Maximum thickness*	*Unit*	*Depth*
851	9.8 mm	1.8 mm	2.9 mm	J	30-45 cm
497	8.0 mm	2.0 mm	2.2 mm	K	30-45 cm
485	8.0 mm	1.8 mm	2.6 mm	K	45-60 cm
452	8.0 mm	2.0 mm	2.2 mm	L	45-60 cm
783	7.9 mm	1.9 mm	3.0 mm	L	75-90 cm

TABLE 4

Subtype 4c Small, Unlipped *Olivella* Beads

Catalog number	*Maximum Length*	*Hole diameter*	*Maximum thickness*	*Unit*	*Depth*	
860	3.8 mm	1.4 mm	1.2 mm	C(?)[1]	30-45 cm	
470	3.8 mm	1.8 mm	1.4 mm	J	0-15 cm	
471	3.8 mm	1.4 mm	1.2 mm	J	0-15 cm	
416	3.4 mm	2.0 mm	2.8 mm	K	15-30 cm	
419	3.2 mm	1.2 mm	1.4 mm	K	15-30 cm	
425	4.2 mm	1.0 mm	1.4 mm	K	15-30 cm	
423	4.0 mm	1.2 mm	1.8 mm	K	15-30 cm	
414	3.2 mm	2.0 mm	2.0 mm	K	15-30 cm	
421	3.2 mm	1.6 mm	1.8 mm	K	15-30 cm	
424	3.8 mm	1.8 mm	1.4 mm	K	15-30 cm	
434	3.8 mm	1.4 mm	2.0 mm	K	15-30 cm	
428	3.6 mm	1.6 mm	1.6 mm	K	15-30 cm	
413	4.2 mm	1.2 mm	1.2 mm	K	15-30 cm	
415	3.6 mm	1.2 mm	1.0 mm	K	15-30 cm	
417	4.0 mm	1.6 mm	1.8 mm	K	15-30 cm	
422	4.0 mm	1.4 mm	2.4 mm	K	15-30 cm	
429	3.4 mm	1.6 mm	2.0 mm	K	15-30 cm	
420	4.0 mm	1.2 mm	1.0 mm	K	15-30 cm	
427	4.8 mm	1.2 mm	2.4 mm	K	15-30 cm	
418	3.4 mm	1.2 mm	1.4 mm	K	15-30 cm	
430	5.8 mm	1.8 mm	3.8 mm	K	15-30 cm	
432	5.2 mm	1.8 mm	3.2 mm	K	15-30 cm	
426	4.8 mm	1.4 mm	1.4 mm	K	15-30 cm	(burned)
433	4.4 mm	2.0 mm	2.2 mm	K	15-30 cm	
499	4.2 mm	2.0 mm	2.0 mm	K	15-30 cm	
501	4.6 mm	1.2 mm	1.6 mm	K	30-45 cm	
502	3.8 mm	1.8 mm	2.0 mm	K	30-45 cm	
500	3.8 mm	1.4 mm	1.6 mm	K	30-45 cm	
495	6.0 mm	1.4 mm	3.0 mm	K	30-45 cm	
496	6.2 mm	2.4 mm	3.0 mm	K	30-45 cm	
504	4.2 mm	1.2 mm	1.4 mm	K	30-45 cm	(burned)
481	4.4 mm	1.2 mm	2.2 mm	K	45-60 cm	
482	4.2 mm	1.8 mm	2.8 mm	K	45-60 cm	
484	4.2 mm	1.2 mm	1.4 mm	K	45-60 cm	
486	5.6 mm	1.4 mm	2.0 mm	K	45-60 cm	
483	3.6 mm	1.4 mm	2.0 mm	K	45-60 cm	

1 Catalogued with a question as to the correct provenance. It probably is not from Unit C and is not considered to be so in this report.

TABLE 5

Type 5 *Mytilus* sp. Disc Beads

Catalog number	*Maximum length*	*Hole diameter*	*Maximum thickness*	*Unit*	*Depth*
435	6.8 mm	2.0 mm	3.0 mm	K	15-30 cm
505	4.2 mm	1.8 mm	2.2 mm	L	10-15 cm
489	5.2 mm	2.2 mm	3.2 mm	K	45-60 cm

CHART 1

Histogram of Unlipped *Olivella biplicata* Beads (Subtype 4b and 4c)

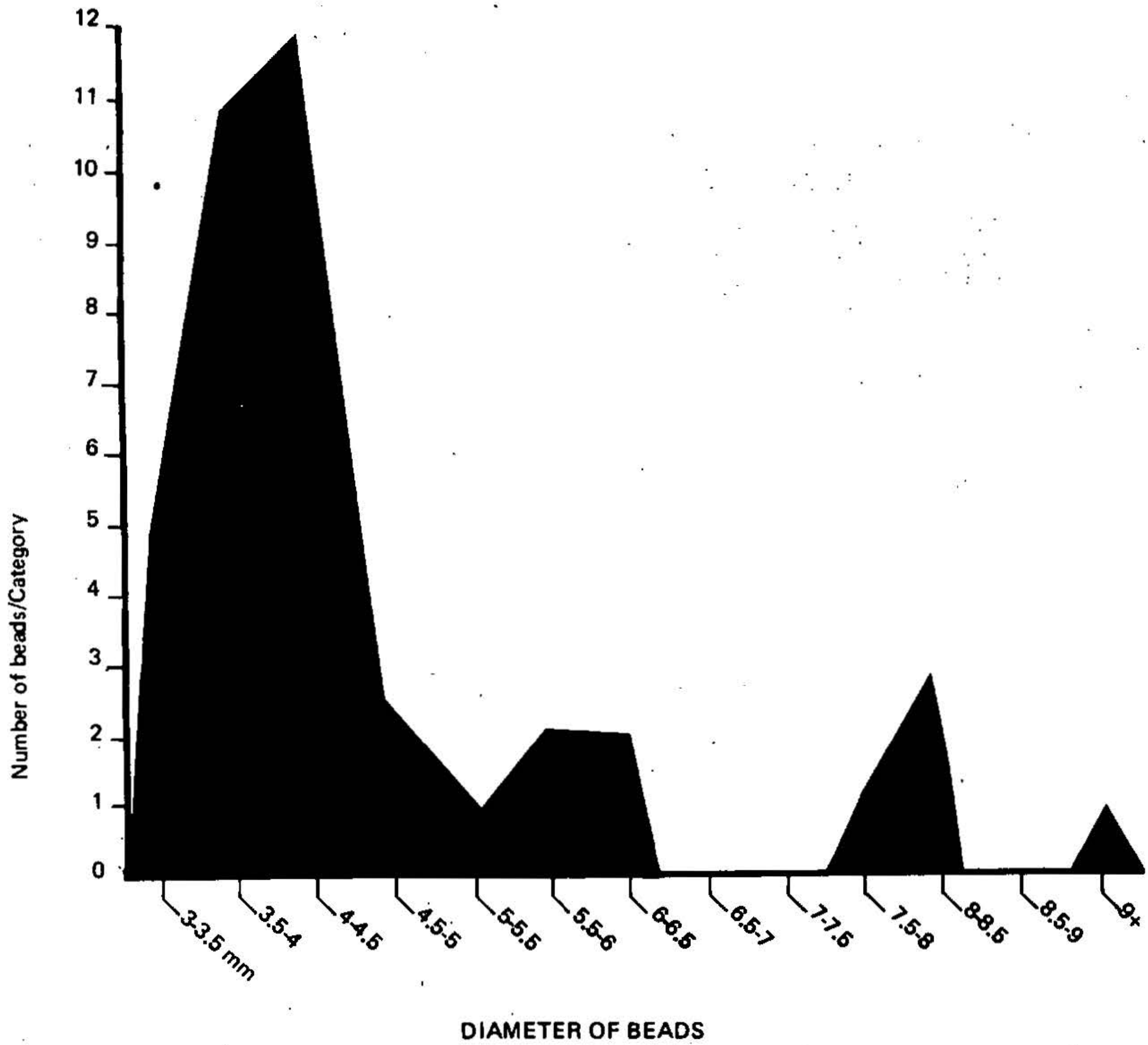


TABLE 6

Artifact Distribution by Area

	Area: 1	2	3	4
I. Ground stone				
A. Manos				
1. Type 1: Unifacial				
Subtype a	4	–	–	–
Subtype b	3	–	–	–
2. Type 2: Bifacial				
Subtype a	7	–	–	–
Subtype b	3	1	4	–
3. Type 3: Trifacial	2	–	1	–
4. Type 4: Ground pebble	1	–	–	–
5. Untyped and fragments	10	5	6	–
B. Milling stones				
1. Type 1: Flat slab	9	–	5	–
2. Type 2: Basin-shaped				
Subtype a	3	–	–	–
Subtype b	2	–	–	–
Untyped	1	1	–	–
C. Mortars (fragments)	2	1	5	–
D. Bowls	–	–	1	–
E. Pestles	4	2	2	–
F. Pipe	–	–	1	–
G. Steatite fragments	–	–	8	–
H. Ground biface	–	–	1	–
I. Edge ground cobble	–	–	1	–
J. Serpentine slab	1	–	–	–
K. Ground slate bar	1	–	–	–

TABLE 6 (continued)

			Area: 1	2	3	4
II.	Large flaked tools					
	A. Cobble tools and hammerstones					
	1. Type 1:	Uniface	19	1	1	–
	2. Type 2:	Biface	2	–	–	–
	3. Type 3:	Multiface	13	1	–	1
	4. Type 4:	Hammerstones	2	–	3	–
	5. Untyped		–	–	–	1
	B. Teshoa flakes		4	–	–	–
III.	Small flaked tools					
	A. Retouched flakes (presence +, absence –)					
	1. Type 1:	Convex	+	+	+	–
	2. Type 2:	Straight side	+	+	+	–
	3. Type 3:	End	+	–	+	–
	4. Type 4:	Pointed	+	–	+	–
	5. Untyped					
	B. Prepared flakes					
	1. Type 1:	Blades	3	1	5	1
	2. Type 2:	Trifacial bipoint	–	2	1	–
	3. Type 3:	Large unifacial flake	–	–	1	–
	C. Cores					
	1. Type 1:	Prepared	–	1	1	–
	2. Type 2:	Amorphous	22	3	5	1
	D. Points					
	1. Type 1		–	–	1	–
	2. Type 2		1	–	–	–
	3. Type 3		–	–	3	–

TABLE 6 (continued)

	Area: 1	2	3	4
4. Type 4	–	–	1	–
5. Type 5	–	1	–	–
E. Utilized flakes	8	3	6	1
F. Planes				
1. Type 1: High-backed	3	1	–	1
2. Type 2: Low-backed	2	–	3	–
IV. Bone artifacts				
A. Type 1	–	–	1	–
B. Type 2	4	1	6	–
C. Type 3	–	–	8	–
V. Shell artifacts				
A. Perforated *Littorina* shell	–	–	1	–
B. *Haliotis* with asphalt plugged apertures	–	–	1	–
C. *Haliotis* with large hole	–	1	–	–
D. *Haliotis* ovate disc	–	–	1	–
E. *Haliotis* disc with two holes	–	–	1	–
F. Rim of *Haliotis* shell	–	–	1	–
G. Beads				
1. Type 1	–	–	1	–
2. Type 2	2	–	–	–
3. Type 3				
Subtype a	1	–	–	–
Subtype b	1	–	–	–
4. Type 4				
Subtype a	2[a]	–	12	–
Subtype b	–	–	3	–
Subtype c	1[b]	–	35	–

TABLE 6 (continued)

	Area: 1	2	3	4
5. Type 5	–	–	3	–
6. Type 6	1	–	–	–
7. Type 7	–	–	1	–
VI. Miscellaneous				
A. Ocher	6	1	2	–
B. Asphalt lumps	1	–	1	–
C. Tarring pebbles	1	–	1	–
D. Green chert concretion	1	–	–	–

a 0-15 cm

b Questionable provenance

TABLE 7
Distribution of Artifacts by Depth
for Area I

					0-15 cm	15-30	30-45	45-60	60-75	75-90	90-105	105-120	120-135	135-150	150-165	165-180
I.	Ground stone															
	A.	Manos														
		1.	Uniface													
			a.	Shaped unused surfaces					1	1	1				1	
			b.	Unshaped					4			1				
		2.	Biface													
			a.	Shaped unused surfaces			1	2	1	1	4		1		1	
			b.	Unshaped	1				3	1			2	1		
		3.	Triface								1					
		4.	Untyped		1	3	1	1	5	1	2	2		1	3	
	B.	Milling stones (metates)														
		1.	Flat						2	1	1				1	
		2.	Basin													
			a.	Shaped											2	
			b.	Unshaped											2	
		3.	Untyped						3	1	1					
	C.	Mortars (bowls)							2				1			
	D.	Pestles						2	2			1			1	
	E.	Ground slate bar										1				
II.	Large flaked tools															
	A.	Cobble tools and hammerstones														
		1.	Uniface				1	1	8	4	3	3	3			
		2.	Biface										1			
		3.	Multiface						1							
		4.	Hammerstones				1	2	6	3	3	4	2		1	
	B.	Teshoa flakes					1	1	2							
III.	Small flaked tools															
	A.	Retouched flakes														
		1.	Convex						2	1						
		2.	Straight side			1		2	1							
		3.	End													
		4.	Pointed		1				1							
		5.	Untyped		1		1		1							
	B.	Cores			1	1		4	6	2	4		2		1	1
	C.	Point					1									
	D.	Utilized flakes			2	2			2		2					
	E.	Planes			1			1	1					2		
IV.	Bone points						1		1					2		
V.	Beads															
	A.	Type 4 (*Tivela*, cylindrical)								1						
	B.	Type 3 (*Tivela*, disc)						1								
	C.	Type 2 (*Olivella*, spire-ground)			1									1		
	D.	Type 4a (Lipped *Olivella*)			2											
	E.	Small, Lipped *Olivella*					1	(?)								
	F.	Type 6 (Bead blank)												1		

TABLE 7 (continued)

	0-15 cm	15-30	30-45	45-60	60-75	75-90	90-105	105-120	120-135	135-150	150-165	165-180
VI. Miscellaneous												
A. Asphaltum		1										
B. Tarring pebble							1					
C. Ocher	1		1	2	1	2	1					
D. Schist slab							1					

TABLE 8
Distribution of Artifacts by Depth for Area II

	0-15 cm	15-30	30-45	45-60	60-75	75-90	90-105	105-120
I. Ground stone								
A. Mano								
1. Unshaped biface						2		1
2. Untypeable					1	1		
B. Milling stone fragment					1	1		
C. Pestle fragment						2		
D. Mortar fragment						1		
II. Large flaked tools								
A. Cobble tools					1			
B. Hammerstones								1
III. Small flaked tools								
A. Retouched flakes	1				1			1
B. Utilized flakes					1	2		
C. Cores		1					1	
D. Trifacial bipoint		1				1		
E. Plane (high-backed)			1					
F. Point (large lanceolate)								1
IV. Bone Artifacts								
A. Single-pointed						1		1
V. Miscellaneous								
A. Ocher	1							
B. Drilled *Haliotis* shell			1					

TABLE 9
Distribution of Artifacts by Depth
for Area III

	0-15 cm	15-30	30-45	45-60	60-75	75-90
I. Ground stone						
A. Manos						
1. Biface, unshaped (2b)	1	1			2	
2. Triface					1	
3. Untyped		3		3		
B. Milling stone fragments	2	1	1		1	
C. Mortar fragments		2		1	1	
D. Pestle fragments		1				1
E. Bowl						1
F. Steatite (comal) fragments	7	1				
G. Pipe	1					
H. Ground biface	Surface					
I. Edge-ground cobble	Surface					
II. Large flaked tools						
A. Cobble tools				1		
B. Hammerstones		2		1		
III. Small flaked tools						
A. Retouched flakes						
1. Convex	1	1	1			
2. Straight side	3		2			1
3. End			3			
4. Pointed	1					
B. Cores	1	2			2	1
C. Points	5	3	1			
D. Utilized flakes	1	1		4		
E. Planes	2			1		
F. Trifacial bipoint (pipe drill)	1					
G. Blades						
IV. Bone artifacts						
A. Single pointed		2	2	6	2	1
B. Pipe mouthpiece	1					
C. Claws (some with shell inlay)			5	2		
D. Antler tip						1
V. Shell artifacts						
A. Asphaltum plugged *Haliotis* shells			1			1
B. Perforated *Littorina* shell		1	1			
C. Perforated *Haliotis* shell			1			
D. *Haliotis* ovate disc (drilled)			1			
E. *Haliotis* disc with two holes	1					
F. Rim of *Haliotis* shell				1		
G. Beads						
1. Type 1						1
2. Type 4						
a. Subtype a	2	4	5	1		
b. Subtype b			1	1		1
c. Subtype c	2	19	8	6		

TABLE 9 (continued)

	0-15 cm	15-30	30-45	45-60	60-75	75-90
3. Type 5	1	1				
4. Type 7		1				
5. Untyped				1	1	
VI. Miscellaneous						
A. Ocher		1				
B. Asphalt lumps		1		3	1	

TABLE 10

Marine Invertebrate Remains from Area I

I. Mollusks

A. Class Gastropoda

1. *Polinices* sp., moon snail
2. *Lottia gigantea*, owl limpet
3. *Crepidula* sp., slipper shell
4. *Thais emarginata*, dogwinkle
5. *Norrisia norrisi*, Norris' top shell
6. *Megathura crenulata*, giant keyhole limpet
7. *Acanthina* sp., unicorn

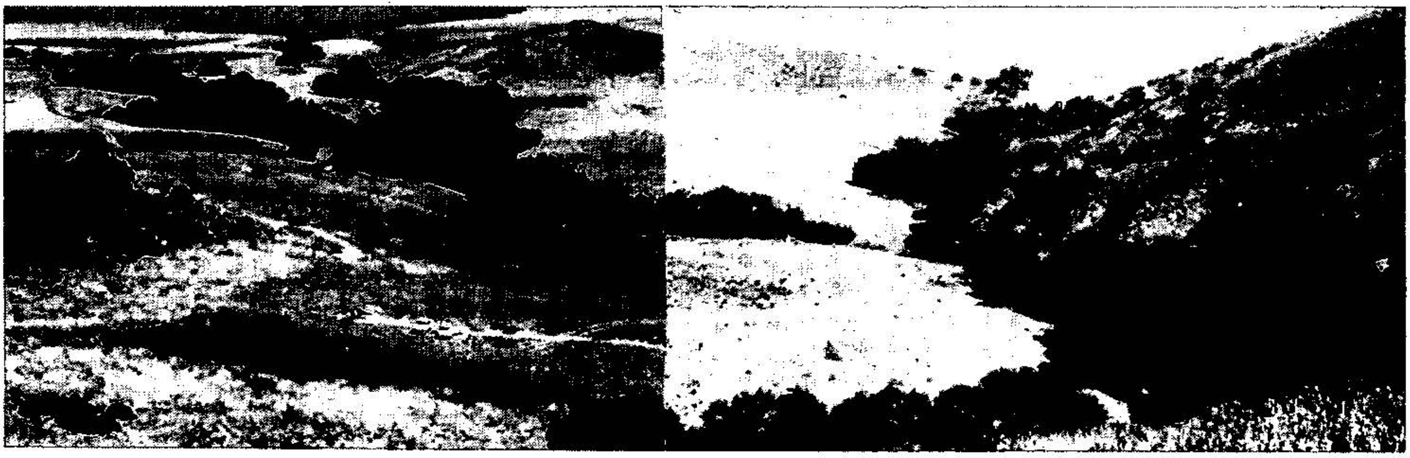
B. Class Pelecypoda

1. *Tivela stultorum*, Pismo clam
2. *Aequipecten aequisulcarus*, speckled scallop
3. *Chione* sp., chione
4. *Pecten diegensis*, San Diego scallop
5. *Mytilus californianus*, California mussel
6. *Ostrea lurida*, native oyster
7. *Saxidomus nuttalli*, Washington clam

II. Echinoderms

A. Class Echinoidea

1. *Strongylocentrotus* sp., sea urchin



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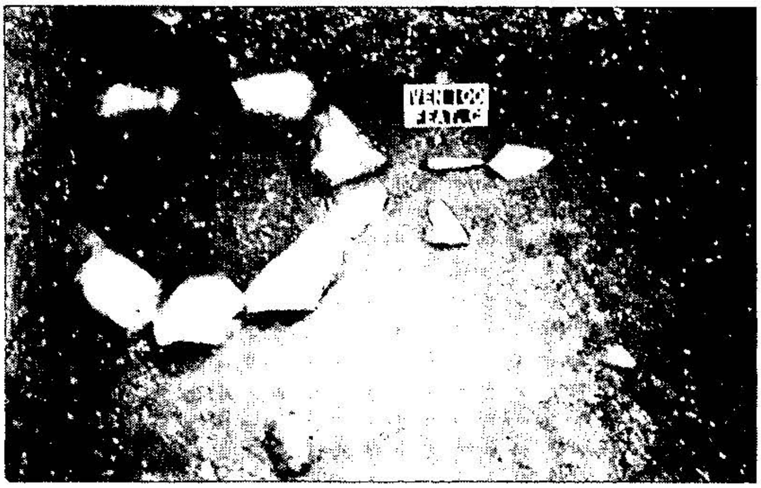
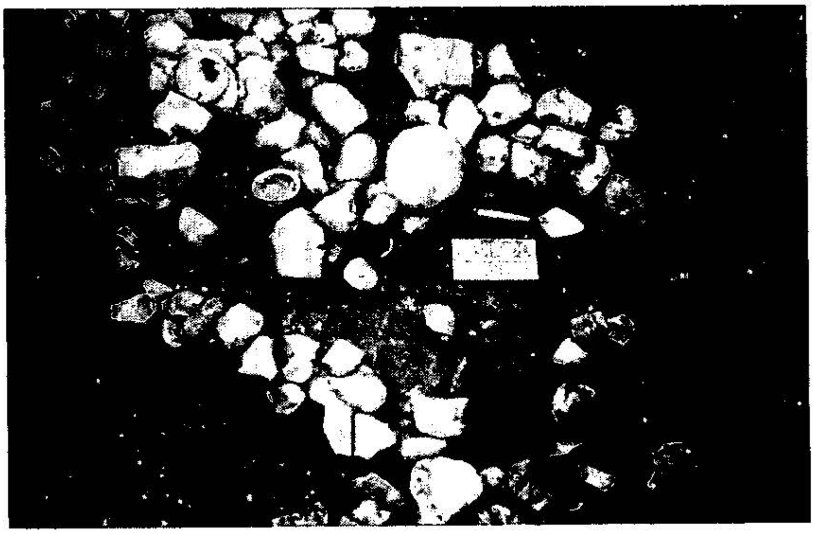
2



3

FIGURE A

1. View of La Jolla Valley. Area I in foreground, Units A-D visible. Area III in background.
2. Feature B, Area I, possible house floor.
3. Feature C, Area I, Unit I (87-94 cm), fire hearth and uppermost house floor.
4. Feature E, Area III, Unit L (60-75 cm), rock concentration at approximately the same depth as Feature D.



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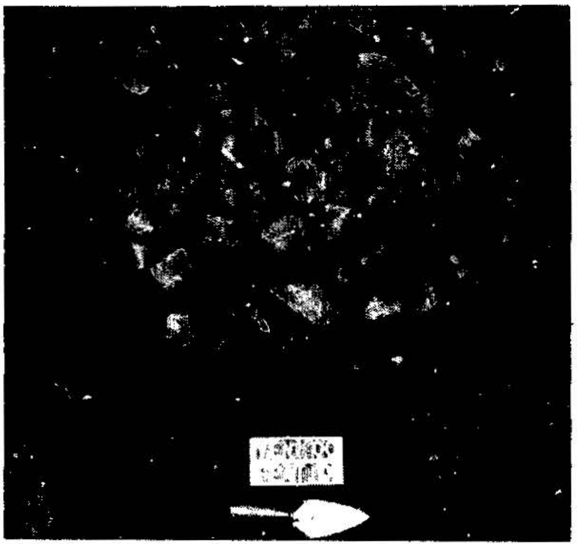

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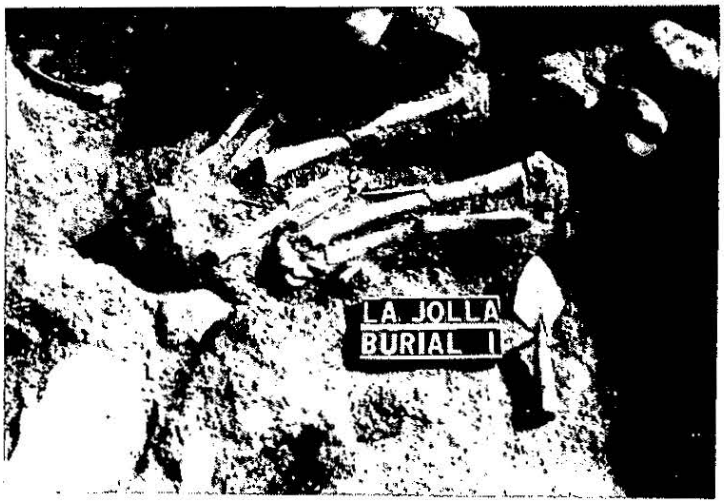


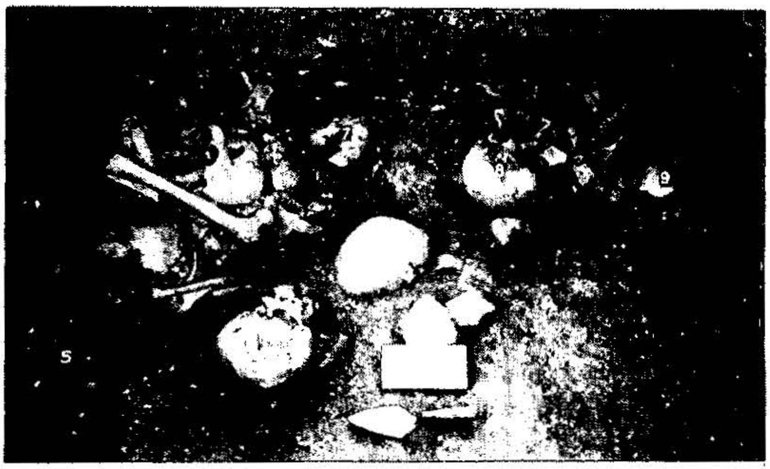
2

3

4

FIGURE B

1. Feature D, Area III, Unit I (60-75 cm), rock concentration, possible earth oven.
2. Burial 1, Area I, Unit D (60-75 cm).
3. Burial 2, Area I, Units D & E (75-95 cm+).
4. Feature F, Area III, Unit M (15-30 cm), rock concentration.
5. Burials 4, 5, 6, 7, 8 and 9, Area III.



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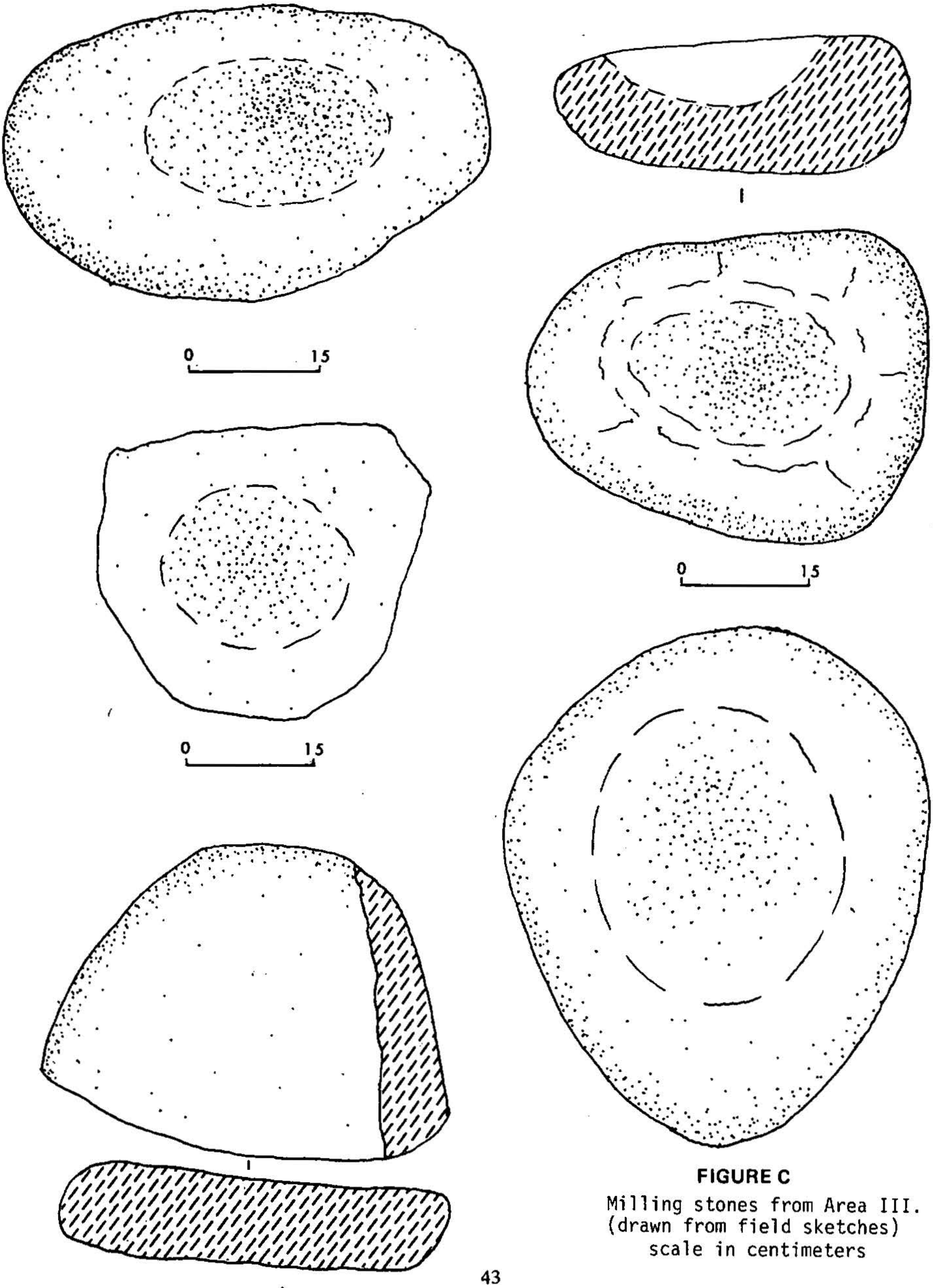


FIGURE C

Milling stones from Area III.
(drawn from field sketches)
scale in centimeters

FIGURE D

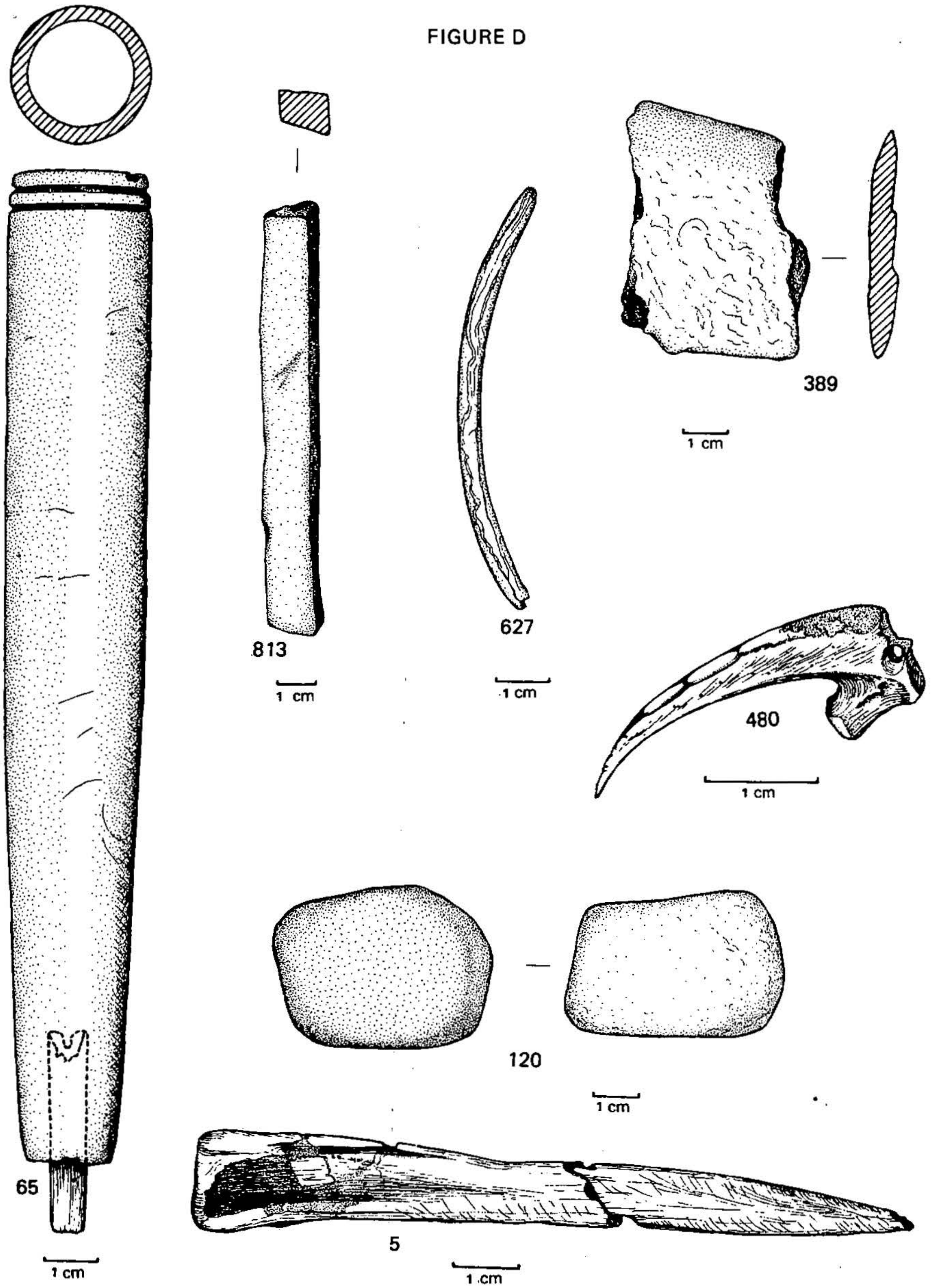
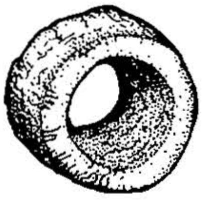


Figure D (Continued)

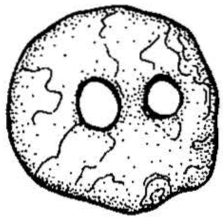
444

.5 cm



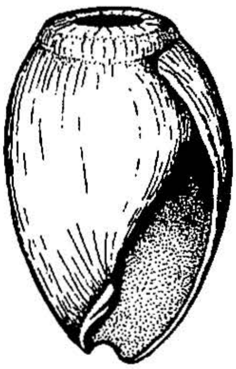
421

.5 cm



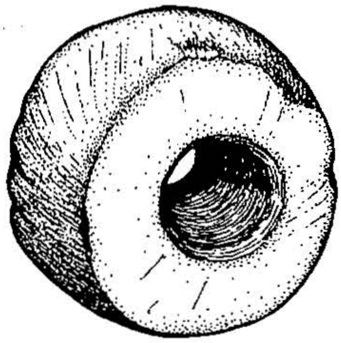
146

1 cm



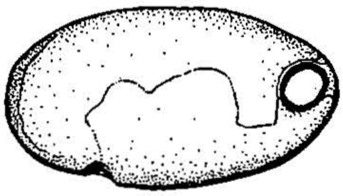
808

.5 cm



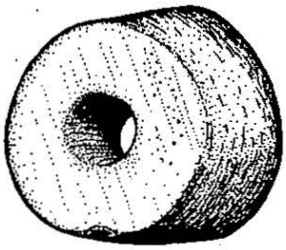
435

.5 cm



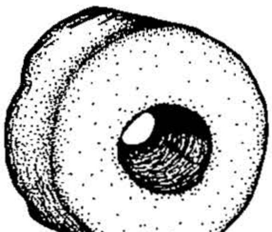
858

1 cm



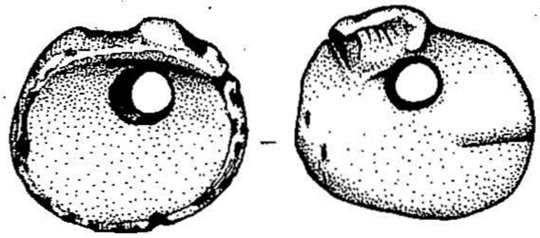
173

1 cm



521

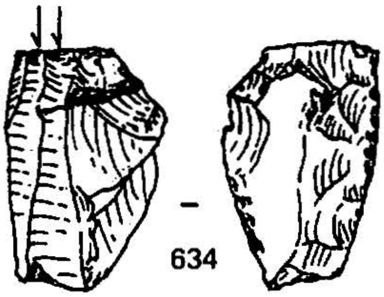
.5 cm



199

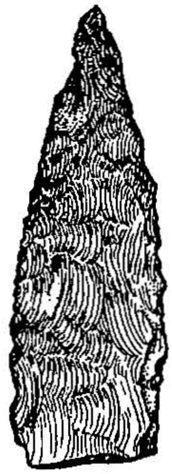
1 cm

FIGURE E



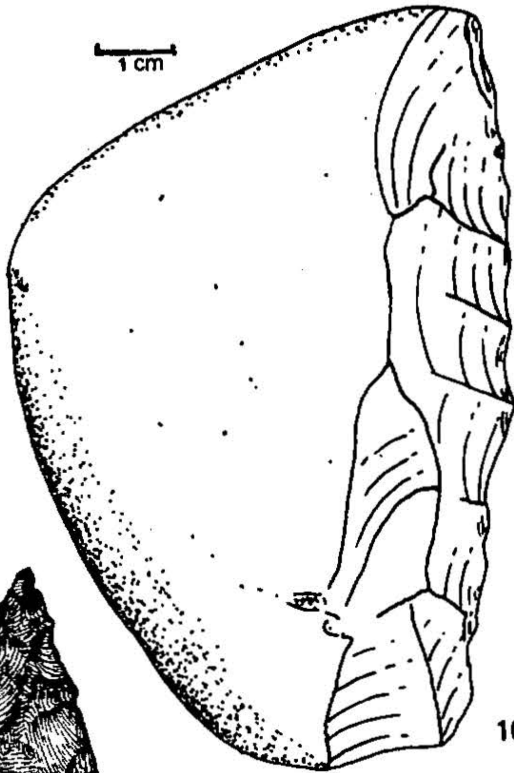
634

1 cm



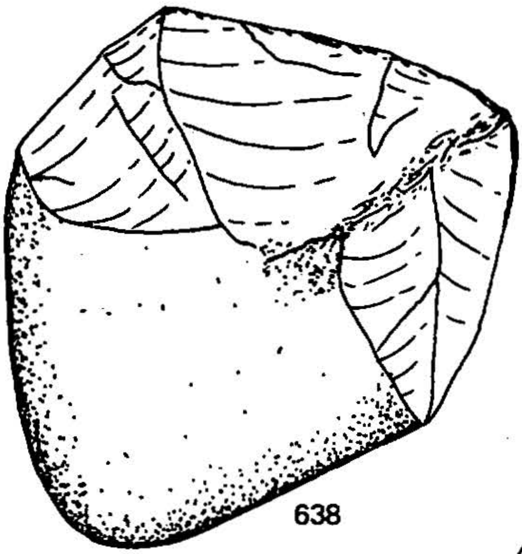
650

1 cm



1 cm

102



638

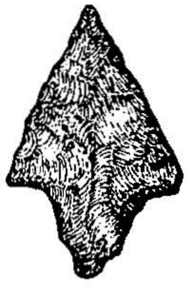
1 cm

258

1 cm

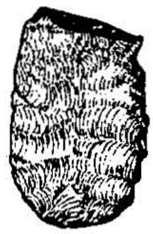
441

1 cm



507

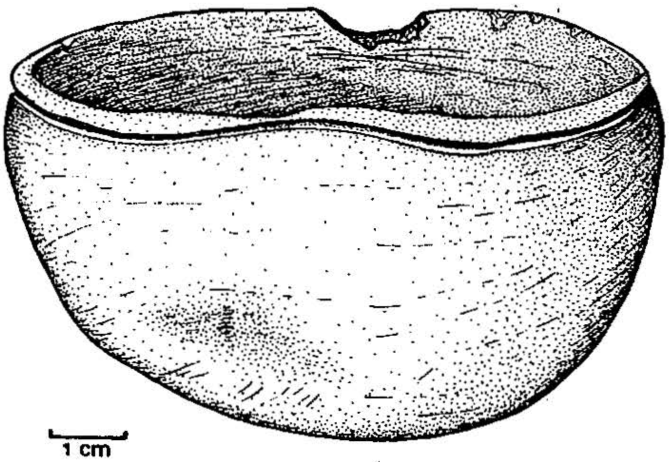
1 cm



508

1 cm

838



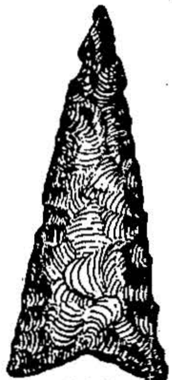
1 cm

239

1 cm

506

1 cm



368

1 cm

FIGURE F

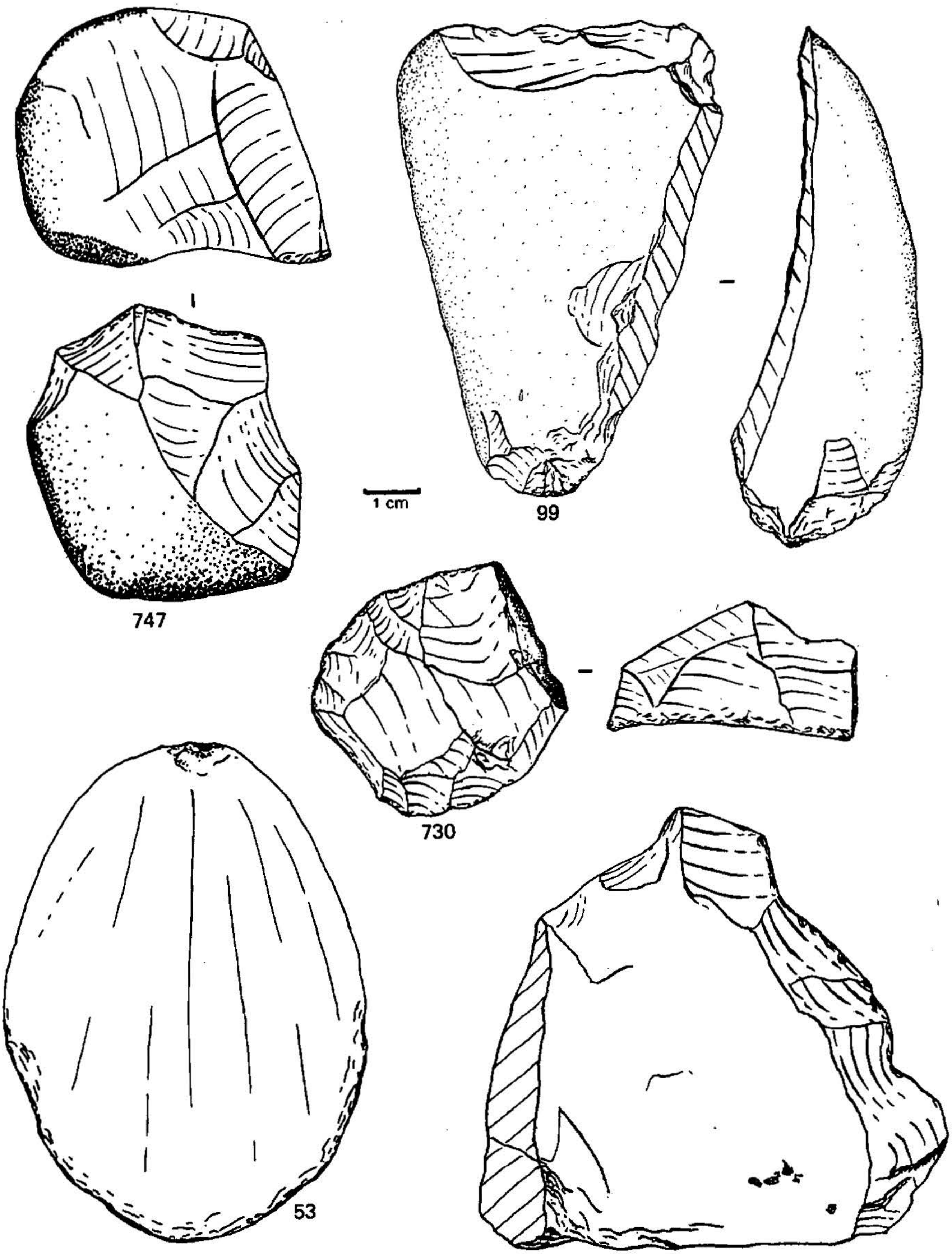
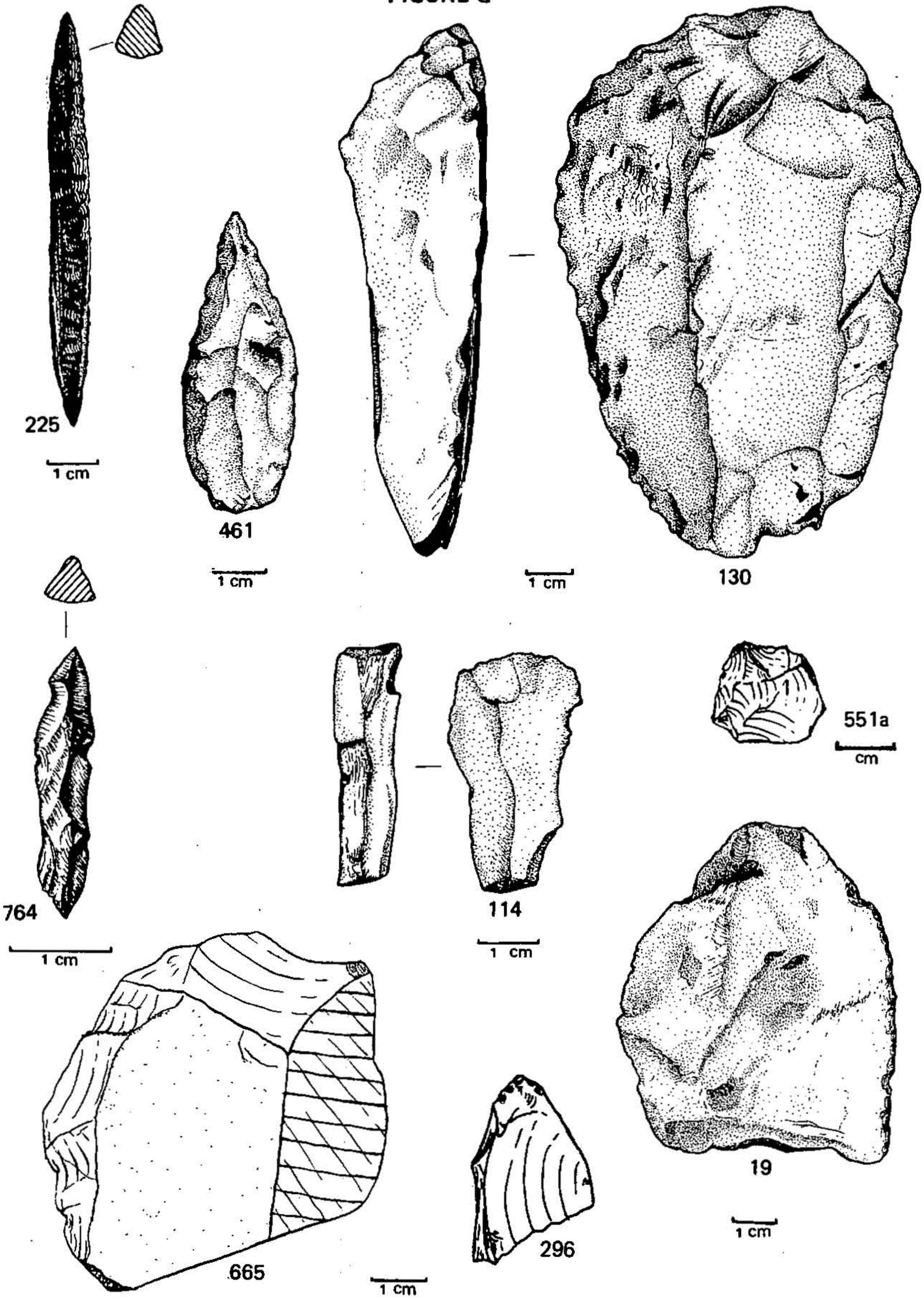


FIGURE G


225
1 cm
461
1 cm
1 cm
130
764
1 cm
114
1 cm
551a
cm
19
1 cm
665
1 cm
296

Appendix B

THE VERTEBRATE FAUNA FROM VEN-100 – REPTILES, BIRDS, AND MAMMALS

by

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INTRODUCTION

The following report deals with reptilian, avian, and mammalian remains found at Ven-100. Analysis of the faunal remains was hampered by the small sample. Quantitative analysis was impossible. However, a picture of the faunal spectrum in the various activity areas of Ven-100 did emerge. Of particular interest was the occurrence of four taxa that have since become extinct in the vicinity of the site. Other components of the faunal assemblage included artiodactyl and lagomorph remains.

An expansion in the faunal spectrum through the time the site was occupied was indicated in the activity areas.

TECHNIQUES

Faunal remains from Ven-100 were preliminarily sorted and partially identified before the principal investigator's analysis. To facilitate further analysis, elements from the site were color-coded for the unit and level they came from. The species level of the remains was then identified if possible. After consideration of various analytic techniques, it was decided to calculate raw counts of elements and minimum numbers of individuals present for each species. (See Chaplin 1971, Daly 1969, Hesse and Perkins 1974, Payne 1972, Thomas 1969, and Ziegler 1973 for discussion and/or critiques of each major analytical technique used in archeological faunal analysis.)

Following advice about standardization of analytic techniques voiced by Grayson (1972, 1974), calculation of raw counts of elements and determination of minimum numbers of individuals were made for each of the temporally differentiated activity areas present in Ven-100, since each of these areas was equivalent to differing temporal strata. Exact provenience was retained for all data collected and analyzed (see Simons 1976 for a complete listing of these data).

RESULTS

Table 1 summarizes the raw bone count for each of the mammalian taxa identified from Ven-100 by activity area, unit, and level. Element counts for each of the mammalian taxa are presented in Table 2.

In addition to mammalian remains which made up the overwhelming majority of the identifiable faunal sample, reptilian and avian remains were also found. Reptilian elements, mostly snake remains, were found in Areas I and III (14 vertebrae and 3 ribs from Unit D, 60-75 cm; 2 vertebrae from Unit K, 30-45 cm; 1 vertebra from Unit K, 45-60 cm; Unit L, 0-15 cm; and Unit L, 45-60 cm). Also, remains of the Pacific pond turtle, *Clemmys marmorata* (one costal plate fragment) were encountered in Area III, Unit K, 15-30 cm.

All avian remains came from Area III and represented two taxa: cormorant (1 left carpometacarpal from Unit K, 60-75 cm. 1 left femur from Unit M, 15-30 cm), and seagull (1 right coracoid from Unit L, 15-30 cm).

Table 3 shows the minimum number of individuals of each vertebrate taxa calculated to be present in each of the three temporally differentiated activity areas of the site. The most individuals (22) and identifiable taxa (14) occur in Area III. Fewer individuals (11) and taxa (7) are found in Area I. Area II has only 4 individuals representing 3 taxa. These data suggest that the greatest diversity in the faunal spectrum, for both the number of individuals and identifiable taxa, was greatest in the activity area dated as most recent (Area III), while the older activity area (Area I), possesses a narrower faunal spectrum. This indicates that there may have been an expansion through time of the spectrum of taxa that were used by humans.

The small sample size from all activity areas limited determination of the relative significance of each exploited taxa in the subsistence patterns of Ven-100 inhabitants. Hesse and Perkins (1974) noted that unless a faunal sample is quite large, it is of little use to employ minimum numbers of individuals as a technique for estimating species frequency and importance. They also observed that unless there are three hundred or more identifiable elements in a collection, estimating the frequency of representation and importance of species by raw counts of elements will be unsuccessful. This conclusion is also reached by Grayson (1974).

Since the total count of identifiable elements from all three activity areas is 196, it is impossible to discuss the frequency of occurrence or determine the relative importance of economically significant taxa at the site.

DISCUSSION

Thus, small sample size prevents a thorough quantitative analysis of Ven-100 faunal remains as well as the use of techniques that enable the importance of taxa in a subsistence system to be determined. These techniques have been discussed by Hesse and Perkins 1974, Thomas 1969, White 1953, and Ziegler 1973. Therefore, this discussion must be strictly in qualitative terms, focusing on several areas:

(1) potential use of different taxa
(2) hunting practices and emphases
(3) determination of seasonality of exploitation
(4) comments upon zoogeographical factors
(5) comparison with other sites

Potential Use of Different Taxa

Ethnographic accounts suggest that at least 14 of the 16 terrestrial vertebrate taxa identified from the three activity areas of the site may have been used in some fashion by prehistoric inhabitants of Ven-100. The gopher and meadow vole remains are probably only those of on-site inhabitants. Mammals that were probable food sources include deer, cottontail, and ground squirrel. Harrington (1942) noted that the Chumash ate snakes, dogs, coyotes, bear, and wildcats. Landberg (1965) added fur seals and sea lions to the list of edible species, as well as possibly gull and cormorant. Whale and pond turtle may have been food sources. Many of these species would also have provided a source of hides, fur, and feathers for clothing and adornment, as well as bone and sinew for tools and ornamentation.

Hunting Practices and Emphases

Details of hunting techniques used in taking grizzly bear, sea otter, sea lion, and fur seal are described later in this report. As for other exploited species, Landberg (1965:51) noted that in the region occupied by the Chumash, late summer was a critical forage season for deer due to aridity. The concentration of deer along watercourses at lower elevations made hunting easier at this time of year. Landberg observed that deer were taken by individuals who either ran deer down or wore deerhead disguises to stalk the animals.

Landberg (1965:54) has stated that lagomorphs and rodents were probably an important component of the Chumash diet. Techniques used by individuals for taking small game included slinging, clubbing, snaring, setting up deadfalls, burning rat nests, and smoking out ground squirrels. Harrington (1942) implied that there were also communal rabbit drives due to the presence of rabbit-drive officials among the Chumash.

Landberg (1965) noted that the remains of terrestrial carnivores were not abundant in Chumash sites. He suggested that this could be the result of cultural preference. However, their underrepresentation could also be due to the relatively small population sizes of most terrestrial carnivores. Because of this, Landberg concluded that:

> With an abundance of fish and easier to catch animals such as rabbits, rodents, and deer at hand the smaller populations and somewhat more elusive habits of the carnivores probably made their pursuit scarcely worth a hunter's time and effort. It seems reasonably safe to assume that the few archaeological remains of land carnivores found mostly represent individuals taken incidently by Chumash hunters while in pursuit of other game. (1965:55)

Determination of Seasonality of Exploitation

The nature of available evidence makes determining the seasonality of exploitation of animal resources by the prehistoric inhabitats of Ven-100 a somewhat speculative effort. All species presumed to have been important within the subsistance system of the site's inhabitants, the exception of fur seals and sea lions, were or are year-round inhabitants near the site and thus could have been hunted anytime. As for sea lions and fur seals, they would have congregated in their rookeries to give birth and then mate between late spring and early fall, which is when they were probably taken.

One of the deer bones from Area III belonged to a fetus. Ingles (1965) has noted that female mule deer carry their young from October-November to May-June, which suggests that this particular animal's mother was hunted sometime during the winter months.

Comments Upon Zoogeographical Factors

Four mammalian taxa which no longer occur in the vicinity of Ven-100 were identified from the faunal sample. These included grizzly bear (*Ursus arctos*), sea otter (*Enhydra lutris*), Guadalupe fur seal (*Arctocephalus townsendi*), and California sea lion (*Zalophus californianus*). The following section details the history of their extinction, comments on their current status, and presents a picture of how they were probably used by prehistoric peoples inhabiting the site and the surrounding region.

Grizzly Bear (*Ursus arctos*)

Before their extinction in California during the early part of the twentieth century, grizzly bears were abundant in the state. According to Storer and Tevis (1955:26), as many as 10,000 grizzlies lived within the state. The distribution of grizzly coincided closely with the valley grassland and chaparral communities. Grizzlies also preferred riparian woodland. Their greatest abundance seems to have been in the South Coast Ranges.

Extinction of the grizzly bear occurred in southern California during the latter part of the nineteenth century and the early part of the twentieth century (Storer and Tevis 1955:292). The last record of the grizzly in Ventura County was in 1882. The last grizzly in Los Angeles County was recorded in 1897; Kern County, 1898; and Santa Barbara County, 1912. In 1922, the last grizzly killed in Calfiornia was taken at Horse Corral Meadow in Fresno County (Merriam 1925). Several possible sightings of a grizzly were made in 1924 in Sequoia National Park in Tulare County (Grinnell, Dixon, and Linsdale 1937:93-94; Storer and Tevis 1955:29-30). This is the last record of the species in California.

Interactions between grizzlies and the prehistoric inhabitants of California occurred in several ways. Aschmann (1959) noted that due to their similar diets, grizzlies and the prehistoric human inhabitants of southern California placed extremely similar demands for subsistence on the environment. He further commented that this would have led to intense competition between grizzlies and humans, yielding somewhat mutually exclusive distributions. Aschmann observed that grizzlies probably would have been the better adapted to the mountains, while humans were the better adapted to lowland areas. Landberg (1965) summarized Aschmann's ideas, and suggested grizzlies might have held the competitive edge in some lowland area as well.

Notions of possible competition aside, Storer and Tevis (1955) have noted that the prehistoric inhabitants of California held the grizzly in great awe since it often attacked people as they hunted or gathered food. Possibly because of its awesome nature, the grizzly bear figured prominently in mythology and shamanism, with "bear-men" and "grizzly shamans" characterizing many California Native American groups, including the Chumash (Kroeber 1922; Harrington 1942).

Use of grizzlies as a resource took several forms. Bear flesh was eaten by the Chumash (Harrington 1942). Claws were made into necklaces (Harrington 1942), a practice apparently followed by the prehistoric inhabitants of Area III. Hides were saved by many groups for use as paraphenalia by grizzly shamans. Bolton (1930) noted the Santa Barbara coast Chumash made grizzly pelts into capes that were worn by fishing boat owners. The prehistoric inhabitants of the Santa Barbara-Ventura coast also fashioned grizzly bear femurs into round-bladed "wands/daggers/sweatsticks." These have been found at several sites along the Santa Barbara-Ventura coast (Orr 1947; J. West, personal communication), and may have served some ceremonial function.

Landberg (1965) noted that the hunting of grizzlies by the prehistoric inhabitants of California was avoided except as a feat of bravery or necessity. Because of the size and strength of the grizzly, hunting was usually done in groups. Storer and Tevis (1955:84-86) reported on several hunting methods, including trapping grizzlies in specially dug pits, erecting barriers over occupied dens and luring an animal out to be shot, or enticing the bears into ambushes.

Sea Otter (*Enhydra lutris*)

The pristine range of the sea otter was circum-North Pacific, starting at the north end of the island of Hokkaido. The range extended north through the Kuril Islands and the coast of Kamchatka, continued east through the Commander, Pribilof, and Aleutian islands to Prince William Sound, Alaska, and then south along the North American coast to Morro Hermoso (27° 32,' N. lat.) on the Pacific coast of Baja California (Kenyon 1969:133; Ogden 1941:6-7). Sea otters favor waters near rocky coasts with points of land, bays with extensive kelp beds, and areas with large underwater reefs (Kenyon 1969:57). They were abundant at many points along the California coast from Point Conception north. Although sea otters did not live in great numbers along the mainland coast of southern California from Point Conception to Point Loma, large populations lived near the Channel Islands and also off the northern coast of Baja California (Ogden 1941:7).

About 1784, Spanish, English, American, Russian, and Mexican hunters and traders began to make inroads on the extensive sea otter populations along the California coast (Ogden 1941). The ultimate result of this intense multinational exploitation was a severe decrease in sea otter populations along the California coast by 1850. An estimated 200,000 otters were killed along the California coast between 1786 and 1868 (Evermann 1923), and the California coastal population of sea otters was nearly exterminated. Between 1870 and 1937, sea otter sightings were rare along the California coast (Grinnell, Dixon, and Linsdale 1937:290, summarize sighting records). In 1938 a small population off the Monterey County coast was recorded. By 1974 this population had expanded to at least 1,600 with a range from Santa Cruz to Lion Rock, south of Morro Bay (Miller 1974:2).

The aboriginal people seemed to have used sea otters primarily for thier pelts. Harrington (1942) observed that sea otter capes and back aprons were worn by several Chumash groups, and also noted that sea otter skin capes were worn by fishing boat owners as a symbol of their rank. No existing records give evidence that sea otters were eaten by the Chumash, although Lyon (1937) suggests so.

While Landberg (1965:60) reported that there are no records describing Chumash sea otter hunting, he noted that L. Martinez has suggested that the Indians of the Santa Barbara Channel took sea otters in a fashion similar to that practiced by the Indians of Baja California. These techniques were described in detail by Fr. Sales. The hunters took advantage of the solicitousness shown to a young sea otter by its mother. A hunter would paddle out in a canoe and trap a young otter that had been separated from its mother. A cord with several hooks attached to it would then be tied to the leg of the young otter. After backing off in the canoe a short distance, the hunter would pull sharply on the cord, causing the young otter to cry out. The mother would usually attempt to rescue her offspring. At this point, the hunter could often easily approach and club the mother because she was either occupied in attempting to free her offspring or because she had become caught by the line of hooks. Ogden (1941:14) noted that other hunting practices were used to take sea otters. These included the spreading of nets over kelp beds, the use of snares, and taking animals asleep in the water. Another method was clubbing the animals when they had hauled themselves onto the beach for rest or safety in bad weather.

Guadalupe Fur Seal (*Arctocephalus townsendii*)

The pristine range of the Guadalupe fur seal extended along the coast of western North America from the Farallon Islands (37° 44' N. lat.) south to Islas San Benito (28° 1' N. lat.) (Scheffer 1958:81).

During the early 1800s, populations of this species were extensively hunted by Euroamerican sealers for their fur. Scammon (1874), Starks (1922), Evermann (1923), and Hubbs (1956) chronicled the rapid elimination of the Guadalupe fur seal from the California coast. Between 1810 and 1812, one party alone on the Farallones took 73,402 fur seal skins. From 1806 to 1834, an estimated 200,000 fur seals were killed on the Farallones. By 1834, the Farallone population was extinct. Including the fur seal catch from the Channel Islands, the southern California coast, and Baja California, the total number of fur seals killed along the west coast of California between 1806 and 1820 reached at least 400,000.

By 1850 the Guadalupe fur seal populations of California and Baja California were thought to have been nearly or completed exterminated. From 1876 to 1894 a population of fur seals on Guadalupe Island was exploited. From 1895 to 1950 Guadalupe fur seals were sometimes seen off the California coast and the coast of Baja California (Starks 1922; Grinnell, Dixon, and Linsdale 1937; Bartholomew 1950; Hubbs 1956). A small breeding population of Guadalupe fur seals was rediscovered on Guadalupe Island between 1926 and 1928 (Bartholomew 1950: Hubbs 1956) but it was apparently destroyed later. Bartholomew (1950) sighted a single male Guadalupe fur seal in 1949 on San Nicholas Island, California. In 1954 and 1955, Hubbs visited Guadalupe Island and sighted from 15 to 30 Guadalupe fur seals (Hubbs 1956). Subsequent monitoring (Peterson, Hubbs, Gentry, and De Long 1968; Brownell, De Long and Schrieber 1974) revealed that a population of 300 to 500 individuals had been attained by 1967 and 1968.

Among the reasons for the rapid disappearance of the Guadalupe fur seal was the rapacious nature of the Euroamerican sealers and the behavior of the animals when hunted. Bonnot (1951) observed that Guadalupe fur seals seem to have been neither as intelligent nor as adaptable to human predation as other pinniped species. For example, if a rookery was exploited repeatedly, the surviving animals would continue to return to it year after year until that particular breeding population was completely exterminated. This factor, coupled with the existence of a fairly discrete breeding season during the summer months (Peterson, Hubbs, Gentry, and De Long 1968; Browness, De Long, and Schrieber 1974), when animals are concentrated in their rookeries, helped ensure the demise of the Guadalupe fur seal. The populations that survived seem to have been those occupying caves, recesses, or rocky shores at the base of tall cliffs (Peterson, Hubbs, Gentry, and De Long 1968). They appear to have fairly secretive behavior.

The best account of the prehistoric exploitation of the Guadalupe fur seal along the Santa Barbara-Ventura coast comes from the work of Lyon (1937), who examined the extensive collection of sea mammal remains from the Point Mugu shell mound. Guadalupe fur seal remains were the most abundant pinniped elements from this site, with over 1,500 elements representing over 150 individual animals encountered. As for the use of this species, Lyon suggested that the Guadalupe fur seals may have been primarily hunted for their pelts, with food value being of secondary consideration. She further noted that the fur seals killed by the prehistoric human inhabitants of Point Mugu may not have been from a rookery, but instead were animals taken by some form of pelagic sealing. Landberg (1965:63) interpreted Lyon's data in a entirely different fashion, concluding that the Guadalupe fur seal remains from Point Mugu were those of individuals living in a rookery. He also discounted the probability of pelagic sealing and postulated that fur seals were taken on land. Using Scammon's (1874) description of sealing techniques, Landberg (1965:61-62) suggested that fur seals and sea lions were best hunted on land by groups of men armed with lances and clubs. This group of hunters would attempt to get between a herd of pinnipeds and the sea, panic the herd, and then move in to club or spear the disoriented animals. Night was an especially effective time for such a hunt.

California Sea Lion (*Zalophus californianus*)

Scheffer (1958:60-61) gives the range of the California sea lion as extending from Unlvelet, British Columbia (49° N. lat.), south to the Islas Tres Marias, Mexico (21° 30' N. lat.). Today, the California sea lion is all but gone from the southern California coast, with less than 100 animals being found from Point Conception to Point Loma (Frey and Aplin 1970). Like other pinnipeds, the California sea lion was taken in great numbers by commercial sealers during the nineteenth century as a source of oil and hides. Bonnet (1928, 1929) observed that the 1860s and 1870s were the chief period of exploitation of this species. By 1880 it had become unprofitable to hunt them, and their commercial exploitation ended. The continued slaughter of sea lions by fisherman lasted until 1909, when protection was extended to this species. The first censuses of California sea lions taken in 1929 and 1928 (Bonnet 1929) revealed a population of about 1,000 animals scattered along the California coast. In the 42 years from 1927 to 1969, the population of the California sea lion along the California coast expanded to about 25,000 individuals (Frey and Aplin 1970).

Thoughts on the prehistoric use of the California sea lion in the Santa Barbara-Ventura region are provided by Lyon (1937) and Landberg (1965). Lyon concluded that the prehistoric inhabitants of Point Mugu may have raided a California sea lion rookery in search of juveniles for food. This was suggested by the large number of bones belonging to immature individuals of this species that were found at Point Mugu. Landberg concurred with Lyon's ideas, further noting that the preference by this species for sheltered beaches and their large year-round populations probably accounts for their abundance at Point Mugu. He also postulated that similar hunting methods would have been used for both fur seals and sea lions.

Comparison with Other Sites

Inventories of mammalian genera from Ven-100, Areas I and III, were compared with similar inventories from sites in the surrounding region to assess how these components of Ven-100 related to the other sites. Eleven sites were chosen for comparison. Data on the postulated functional classification and temporal affinities of these sites are summarized in Table 4. Selection of sites for comparison was determined by studying the completeness of the analyses of animal remains presented in the site reports. Upon selection of the sites for comparison, it was decided to compare inventories of mammalian genera from each of the sites. An inventory from all sites is presented in Table 5.

Significant differences in recovery techniques between different sites made quantitative data from them statistically incomparable. Therefore, qualitative comparison of presence-absence data via cluster analysis formed an alternative method of intersite comparison. Comparison of presence-absence data from each of the sites via cluster analysis was carried out by computer. Perusal of various techniques of cluster analysis suggested that a clustering procedure based on the principles of numerical taxonomy (Sneath and Sokal 1973) provided the best means of processing and displaying the data. Cluster analysis of the matrix of presence-absence data on the inventory of mammalian genera from each of the sites was implemented by use of the MINT computer program for numerical taxonomic computations (Rohlf 1971).

Figure 1

Phenogram showing site clusters of sites whose mammalian faunal inventories were compared with Ven-100, Areas I and III.

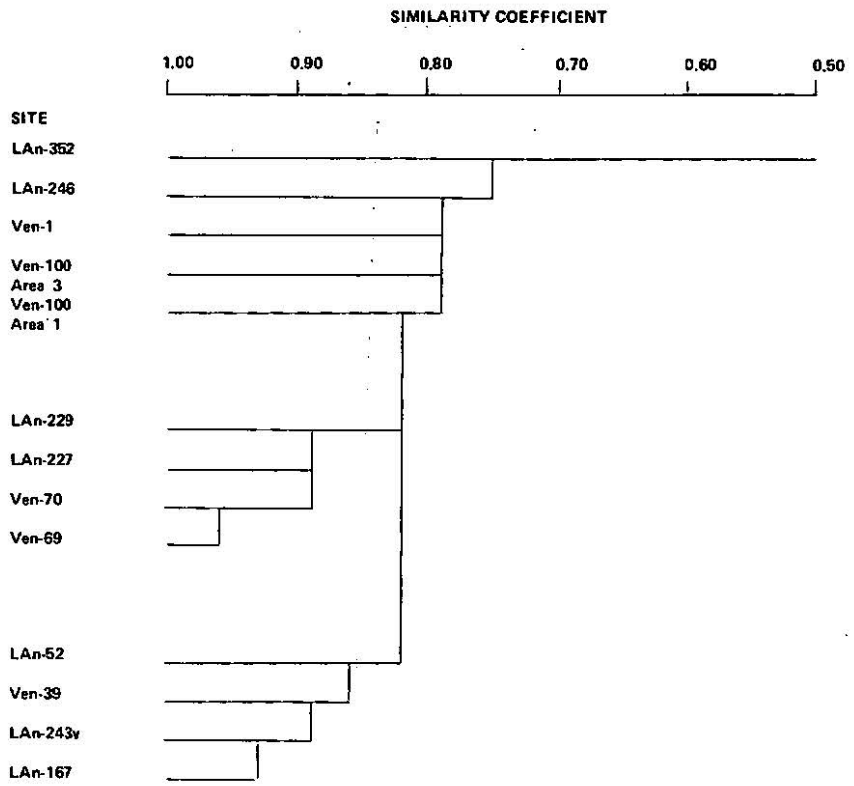

Figure 1 displays the results of the computer analysis of the data in the form of a phenogram. This phenogram was constructed by computation of simple matching coefficients for the data matrix. Single-linkage cluster analysis was then performed. The resulting output, a "tree" matrix consisting of a coded representation of a taxonomic tree, was then diagrammed.

Study of the phenogram revealed that the operational taxonomic units consisting of the various sites all clustered above the .750 level of significance. Two clusters of sites separated out at the .821 level of significance and then internally subdivided at higher levels of significance. One of these clusters was composed of LAn-167, LAn-243v, Ven-39, and LAn-52. In terms of functional classification, members of this cluster were a mixed group, respectively comprising a San Fernando Valley village, a Santa Monica Mountain village, a Santa Monica Mountain gathering station, and a coastal village dating from the last one to two thousand years. There was an average of 12.75 mammalian genera present at each site. Of these, ten were shared in common by all sites in the cluster (*Lepus, Sylvilagus, Citellus, Thomomys, Neotoma, Microtus, Canis, Zalophus, Phoca, Odocoileus*).

The major differences among the sites in this cluster were the terrestrial carnivores present. Other intersite differences among three of these sites (LAn-167, LAn-243v, Ven-39) have been revealed through quantitative analysis of cervid remains (Martin 1972). These may result from differences in butchering techniques, or differing intensities of cervid hunting at each site. In spite of these differences, the fairly tight cluster formed by this group of sites suggests that in the Santa Monica Mountains and San Fernando Valley, a faunal spectrum composed of lagomorphs, sciurid and cricetid rodents, canids, pinnipeds, and cervids comprised the basic mammalian resource base exploited by the region's human inhabitants during the last one to two thousand years before Euroamerican contact.

The second cluster at the .821 level of significance includes two Santa Monica Mountain gathering stations (Ven-69, Ven-70) and two Santa Monica Mountain villages (LAn-227, LAn-229) which date from the last one to two thousand years. Within this second cluster, there is an average of 6.25 mammalian genera present at each site. Of these, 4 are shared in common by all sites (*Sylvilagus, Citellus, Thomomys, Odocoileus*).

In comparision with sites comprising the first cluster, one encounters a more restricted faunal spectrum in the second cluster. The composition of this second faunal spectrum suggests that inhabitants of the second cluster of sites used a mammalian resource base composed of lagomorphs, sciurid rodents, and cervids. There are several explanations for the apparent restriction of the spectrum of exploitable mammalian resources at sites in the second cluster. They include the possibility of the existence of less intensive or sporadic occupancy of these sites due to seasonal use; utilization of only a limited number of key mammalian resources by the human inhabitants of the site; or presence of less intensive trading with other sites.

The remaining sites sorted out in the phenogram (LAn-246, LAn-352, Ven-1, Ven-100: Area I, III) form a fairly loose cluster at the .750 to .786 level of significance. One of the sites (LAn-246) seems quite comparable to members of the first cluster of sites described above, sharing the same 10 genera in common. However, it possesses a large total number of genera (19), which is probably the reason why this site did not cluster with the others. Of the remaining sites, all are near the coast, and three of these (LAn-352, Ven-1, Ven-100: Area I) date from the Millingstone Horizon. Thus, differences between these sites and those comprising the first two clusters either are the result of the existence of different patterns of mammalian exploitation at sites near the coast (as opposed to those characterizing inland sites), or the presence of differing patterns of mammalian exploitation during the Millingstone Horizon. The exploitative patterns practiced at sites comprising this loose third cluster of sites seem to have been focused upon taking lagomorphs, sea mammals, and cervids. Some dependence upon sciurid rodents and canids also is indicated.

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TABLE 1: Raw Bone Count for Mammalian Taxa of Ven-100 by Activity Area, Unit, and Level

	Sylvilagus sp.	*Citellus beecheyi*	*Thomomys bottae*	*Microtus californicus*	Cetacea	*Canis* sp.	*Ursus arctos*	*Enhydra lutris*	*Lynx rufus*	*Arctocephalus townsendi*	*Zalophus californianus*	*Odocoileus hemionus*
AREA I												
Unit A:												
120-135 cm												1
Unit B:												
45-60 cm										1		
60-75 cm												1
105-120 cm										1		1
Unit C:												
45-60 cm	1											
60-75 cm			7									
75-90 cm												1
90-105 cm	2											
105-120 cm			6									
Unit D:												
60-75 cm												

TABLE 1: Raw Bone Count for Mammalian Taxa of Ven-100 by Activity Area, Unit, and Level (continued)

	Sylvilagus sp.	*Citellus beecheyi*	*Thomomys bottae*	*Microtus californicus*	**Cetacea**	*Canis* sp.	*Ursus arctos*	*Enhydra lutris*	*Lynx rufus*	*Arctocephalus townsendi*	*Zalophus californianus*	*Odocoileus hemionus*
AREA I												
Unit I:												
45-60 cm	1											
60-75 cm	7										1	4
75-90 cm			8							1		2
90-105 cm												1
105-120 cm												2
120-135 cm			1									
135-150 cm			1									1
180-195 cm								1				1
Totals:	11		23					1		3	1	15
AREA II												
Unit F:												
0-15 cm			1									

TABLE 1: Raw Bone Count for Mammalian Taxa of Ven-100 by Activity Area, Unit, and Level (continued)

	Sylvilagus sp.	*Citellus beecheyi*	*Thomomys bottae*	*Microtus californicus*	Cetacea	*Canis* sp.	*Ursus arctos*	*Enhydra lutris*	*Lynx rufus*	*Arctocephalus townsendi*	*Zalophus californianus*	*Odocoileus hemionus*
AREA II												
Unit G:												
45-60 cm	1											
60-75 cm			1									
Unit H:												
75-90 cm			9									
105-120 cm			2									
120-135 cm												1
Totals:	1		13									1
AREA III												
Unit J:												
15-30 cm	2								1			1
30-45 cm	4	1										
45-60 cm	1			1								1
60-75 cm		1										

TABLE 1: Raw Bone Count for Mammalian Taxa of Ven-100 by Activity Area, Unit, and Level (continued)

	Sylvilagus sp.	*Citellus beecheyi*	*Thomomys bottae*	*Microtus californicus*	Cetacea	*Canis* sp.	*Ursus arctos*	*Enhydra lutris*	*Lynx rufus*	*Arctocephalus townsendi*	*Zalophus californianus*	*Odocoileus hemionus*
AREA III												
Unit K:												
0-15 cm	2											1
15-30 cm	8	1	2			7				1		2
30-45 cm	2					1	5					
45-60 cm	2	1	1									
60-75 cm	2		5									
75-90 cm	3											
Unit L:												
0-15 cm		1										
30-45 cm		1	7									1
45-60 cm												1
60-75 cm			3									
75-90 cm		1	3									
Unit M:												
0-15 cm	1											
15-30 cm	7	1			1	1						

TABLE 1: Raw Bone Count for Mammalian Taxa of Ven-100 by Activity Area, Unit, and Level (continued)

	Sylvilagus sp.	*Citellus beecheyi*	*Thomomys bottae*	*Microtus californicus*	Cetacea	*Canis* sp.	*Ursus arctos*	*Enhydra lutris*	*Lynx rufus*	*Arctocephalus townsendi*	*Zalophus californianus*	*Odocoileus hemionus*
AREA III												
Unit M:												
30-45 cm												1
45-60 cm	1		2									
60-75 cm			3									1
Unit 0:												
15-30 cm			4									
30-45 cm			1									
Totals:	35	8	31	1	1	9	5		1	1		9

TABLE 2: Skeletal Element Counts for Mammalian Taxa of Ven-100

Mammalian Element Counts Ven-100 All Areas and Units	*Sylvilagus* sp.	*Citellus beecheyi*	*Thomomys bottae*	*Microtus californicus*	*Canis* sp.	*Ursus arctos*	*Enhydra lutris*	*Lynx rufus*	*Arctocephalus townsendi*	*Zalophus californianus*	*Odocoileus hemionus*
CRANIAL											
Upper incisors			8		1						
Lower incisors			12								
Upper canines					1						
Lower canines											
Upper premolars/ molars	4		6		3						
Lower premolars/ molars	3		9								
Right mandibles	2		5								
Left mandibles	2		8								
Maxilla	3		6		1						
Other cranial		1									

TABLE 2: Skeletal Element Counts for Mammalian Taxa of Ven-100 (continued)

Mammalian Element Counts Ven-100 All Areas and Units	*Sylvilagus* sp.	*Citellus beechevi*	*Thomomys bottae*	*Microtus californicus*	*Canis* sp.	*Ursus arctos*	*Enhydra lutris*	*Lynx rufus*	*Arctocephalus townsendi*	*Zalophus californianus*	*Odocoileus hemionus*
POST CRANIAL											
Atlas											1
Axis											
Right scapula	2										1
Left scapula											
Right humerus	3		3						1	1	
Left humerus	4	1	1					1	1		1
Right ulna		1									
Left ulna	2										
Right radius	2										
Left radius	1		1								
Right pelvis	3	1			1						

TABLE 2: Skeletal Element Counts for Mammalian Taxa of Ven-100 (continued)

Mammalian Element Counts Ven-100 All Areas and Units	*Sylvilagus* sp.	*Citellus beecheyi*	*Thomomys bottae*	*Microtus californicus*	*Canis* sp.	*Ursus arctos*	*Enhydra lutris*	*Lynx rufus*	*Arctocephalus townsendi*	*Zalophus californianus*	*Odocoileus hemionus*
POST CRANIAL											
Left pelvis	5	1	1								
Right femur	2	1	1		2				1		
Left femur	1	1		1					1		3
Right tibia	1	1	3								2
Left tibia			3								
Carpals-tarsals	1										3
Metapodials	6						1				1
First phalanx											6
Second phalanx											4
Third phalanx						5					3
TOTALS	47	8	67	1	9	5	1	1	4	1	25

TABLE 3: Minimum Number of Individuals for all Vertebrate Taxa of Ven-100, Areas I, II and III.

Taxa	Area I	Area II	Area III
REPTILES			
Snake (Squamata)	1		1
Pacific pond turtle (*Clemmys marmorata*)			1
BIRDS			
Cormorant (*Phalacrocorax* sp.)			1
Seagull (*Larus* sp.)			1
MAMMALS			
Cottontail (*Sylvilagus* sp.)	3	1	3
Ground squirrel (*Citellus beecheyi*)			1
Pocket gopher (*Thomomys bottae*)	3	2	5
Meadow vole (*Microtus californicus*)			1
Whale (Cetacea)			1
Domestic dog/coyote (*Canis* sp.)			2
Grizzly bear (*Ursus arctos*)			1
Sea otter (*Enhydra lutris*)	1		
Wildcat (*Lynx rufus*)			1
Guadalupe fur seal (*Arctocephalus townsendi*)	1		1
California sea lion (*Zalophus californianus*)	1		
Mule deer (*Odocoileus hemionus*)	1	1	2
TOTALS	11	4	22

TABLE 4: Functional Classification and Temporal Placement of Sites Compared with Ven-100, Areas I and III.

SITE	Functional Classification	Temporal Placement
Lan-52	Coastal Village[a]	2-3000 B.P. - A.D. 1800[f]
Lan-167	San Fernando Village[a]	A.D. 435 - A.D. 1800[g]
Lan-227	Santa Monica Mountain Village[a]	A.D. 0 - A.D. 1000[a]
Lan-229	Santa Monica Mountain Village[a]	A.D. 1000 - A.D. 1800[a]
Lan-243v	Santa Monica Mountain Village[a]	A.D. 1400 - A.D. 1800[h]
Lan-246	Santa Monica Mountain Village[b]	A.D. 1200 - A.D. 1500[b]
Lan-352	Coastal Site[c]	'Millingstone Horizon'[c] 6000 B.C. - 2000/1800 B.C.[j]
Ven-1	Coastal Site[d]	'Millingstone Horizon'[d] 6960 ± 100 B.P.[i]
Ven-39	Santa Monica Mountain Gathering Station[a]	100 B.C. - A.D. 1000[h]
Ven-69	Santa Monica Mountain Gathering Station[a]	'Late Horizon'[j]
Ven-70	Santa Monica Mountain Gathering Station[e]	'Late Horizon'[e]

[a]King, Blackburn, and Chandonet 1968

[b]Galdikas–Brindamour 1970

[c]West, J. by personal communication

[d]Wallace 1956

[e]Leonard 1966

[f]Curtis 1963

[g]Ruby 1966

[h]Martin 1972

[i]Leonard 1971

[j]Glassow 1965

TABLE 5: Inventories of Mammalian Genera from Sites Compared with Ven-100, Areas I and III.

	Lan-52[a]	Lan-167[b]	Lan-227[c]	Lan-229[c]	Lan-243v[b]	Lan-246[b]	Lan-352[d]	Ven-1[e]	Ven-39[b]	Ven-69[f]	Ven-70[g]	Ven-100 Area I	Ven-100 Area III	Totals
Lepus	+	+	0	0	+	+	0	0	+	+	+	0	0	7
Sylvilagus	+	+	+	+	+	+	+	+	+	+	+	+	+	13
Citellus	+	+	+	+	+	+	+	+	+	+	+	0	+	12
Eutamias	0	0	0	0	0	+	0	0	0	0	0	0	0	1
Sciurus	0	0	0	0	0	+	0	0	0	0	0	0	0	1
Thomomys	+	+	+	+	+	+	+	+	+	+	+	+	+	13
Perognathus	0	0	0	0	0	0	0	0	0	+	0	0	0	1
Dipodomys	+	0	0	0	0	0	0	0	0	+	0	0	0	2
Neotoma	+	+	0	0	+	+	0	0	+	+	+	0	0	7
Microtus	+	+	0	0	+	+	0	0	+	0	0	0	+	6
Cetacea	+	0	0	0	0	+	+	0	0	0	0	0	+	4
Canis	+	+	0	0	+	+	+	+	+	0	0	0	+	8
Urocyon	0	0	0	0	0	+	+	0	+	0	0	0	0	3
Ursus	0	0	0	0	0	0	0	+	0	0	0	0	+	2
Procyon	0	0	0	0	0	0	+	0	0	0	0	0	0	1
Mustela	0	0	0	+	0	+	0	0	0	0	0	0	0	2
Taxidea	+	+	0	0	+	+	0	0	0	0	0	0	0	4
Mephitis	0	0	0	0	0	+	0	0	+	0	0	0	0	2
Enhydra	+	0	0	0	0	0	+	+	0	0	0	+	0	4
Felis	0	0	0	0	+	+	0	0	0	0	0	0	0	2
Lynx	0	0	+	0	+	+	0	0	0	0	0	0	+	4
Callorhinus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arctocephalus	+	0	0	0	0	0	0	0	0	0	0	+	+	3
Eumetopias	0	0	0	0	0	0	0	+	0	0	0	0	0	1
Zalophus	+	+	0	0	+	+	+	+	+	0	0	+	0	8
Phoca	+	+	+	0	+	+	+	0	+	0	0	0	0	7
Mirounga	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Odocoileus	+	+	+	+	+	+	+	+	+	+	+	+	+	13
TOTALS:	15	11	6	5	13	19	11	9	12	8	6	6	10	

[a] Curtis 1963
[b] Martin 1972
[c] Schwartz 1968
[d] West, J. by personal communication
[e] Wallace 1956
[f] Glassow 1965
[g] Leonard 1966