ARROYO SEQUIT--LAn-52

ARCHEOLOGICAL INVESTIGATIONS IN LEO CARRILLO BEACH STATE PARK, LOS ANGELES COUNTY, CALIFORNIA

by

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INTRODUCTION

This report describes the results of archeological investigations at the Arroyo Sequit shellmound (LAn-52),situated on a portion of Leo Carrillo Beach State Park, Los Angeles County, during June and July in 1962.

The Division of Beaches and Parks, which administered the funds, made an agreement (No. 4-022-011) with the Central California Archeological Foundation to conduct the investigation. The author was employed by the Foundation as project director in charge of field operations and was given the responsibility of submitting a final report. A progress report was submitted on June 25, 1962.

Field work on the site was conducted from June 22-July 9, 1962. The specimens collected from the excavation and a descriptive catalogue will be stored at the State Indian Museum in Sacramento, California.

A total of 732 man hours was spent in the field in surveying, clearing the land of brush and laying out the trenches, excavating, screening and sorting midden material, and in backfilling. The artifacts were washed, sorted, catalogued, numbered, and analyzed by the author at her home in Orinda, California.

ACKNOWLEDGMENTS

In addition to the project director, the only full time crew member was Barbara Bender. Miss Bender's dedication during the long hours of the excavation and her invaluable assistance are worthy of special mention.

It might be mentioned at the outset that there were no living facilities near the site. Through the consideration of Mr. Ed Hixson, Park Superintendent, Miss Bender and the author were able to avail themselves of the hospitality of Mr. C.N. Oliver, a park employee, to be his house guests for the duration of excavation. Were it not for the generosity of Mr. and Mrs. Oliver, excavation would have been well-nigh impossible. Recognition of this important aspect of the work is most gratefully acknowledged.

The enduring interest and assistance of Mr. Hixson is also gratefully noted at this time. Park employees, C. D. Ashabranner, J. Gilmour, D. C. Lokey, C.N. Oliver, and P. Watkins, were most cooperative in every way, especially in keeping watch on the excavation area while no crew members were there. Their efforts were of great value in protecting the excavation from possible relic hunters.

Part time crew members were: Janet M. Sloan, who did the microanalysis sorting and tabulating; Richard Berg and David Gorlick, excavators; and George Kritzman, who surveyed and laid out the pits, pedestaled most of the features and burials, and who drew the several maps for this report. The author wishes to express her thanks and sincere appreciation to each of these crew members for his personal sacrifices in making the excavation and this report possible.

Surveying and other equipment were obtained by loan through the courtesy of Dr. W. J. Wallace, Anthropology Department, University of Southern California, and Dr. C. Rozaire, then Associate Curator of the Southwest Museum, Highland Park, Los Angeles.

A large number of persons offered assistance on a volunteer basis: Irene Berchtenbreiter, Myrna Berg, Robert Browne, Linda Browne, Russell E. Croasdale, John Desautels, Roger Desautels, Hal Eberhart, Eva Elliff, Dennis Emery, Garry Golter, Madeline Golter, Herb Gonzales, Laurie Greenwood, Lisa Greenwood, Roberta Greenwood, Mary Hershey, Mark Kritzman, Peter H. Kunkel, Bill Kwapinski, Tony Kwapinski, Ann Leflang, Curtis Loser, Eleanor Meaney, Agnes Oliver, Pat Phillipps, Cecelia Ross, Gene Sterud, William Tennis, Don Vanitzian, Mildred Vera, Rosalie Witz, Sam Witz, Melissa Wright.

While the efforts of each and every volunteer worker is appreciated, regardless of the hours spent, or task performed, I wish to make special mention of the assistance of several of the above: Dr. Hal Eberhart, for bringing numerous students from his archeology and field classes to the site to assist in excavation; Roberta Greenwood, for her valuable comments on the artifact associations with other sites; and to Richard and Myrna Berg, who toiled long and difficult hours at the end of excavation to complete several pits to sterile base.

To all of the above the author owes a deep debt of gratitude and the acknowledgment that without them, the quantity of work accomplished would have been considerably less.

Thanks are also due to Dr. James A. Bennyhoff, Mr. A. B. Elsasser, Mr. David A. Fredrickson, and Dr. Charles Rozaire, who examined many of the artifactual remains recovered from the excavation and offered generous and valuable assistance in identifying specimens and establishing temporal relationships.

After excavation had been completed, the author had the good fortune to procure the services of a 7 foot bulldozer to backfill the trenches. This favor, from the Maze Equipment Co., which was doing contractual work at the park, saved the author several days of back-breaking work. Mr. Robert Gainer, operations boss, performed this task personally; it will be long remembered as a splendid contribution to the service of acquiring information about the aboriginal occupants of the site.

The author also wishes to acknowledge the many splendid photographs contributed to this effort by George Kritzman and William Tennis.

Numerous visitors with varying degrees of interest came to the site during excavation. Mr. Tom Meagher, State Fish and Game Warden, dropped by several times and offered helpful comments on temporally similar sites and their artifacts on Santa Cruz and San Miguel Islands. Mr. Jack Daughtery, Deputy County Engineer of Los Angeles County, was also an interested visitor whose comments were of value.

On July 6, 1962, Mr. Charles Quigley visited the site with a privately taught seminar group of 5th-7th grade youngsters. The author spent several hours explaining the purpose of the excavation and showing many of the specimens collected to the guests. The intelligent questions asked, and the warm interest shown by the twenty-four children made this visit one of the high-lights of the project.

Finally, my appreciation to my husband, Hal T. Curtis, who not only put in and took out vagrant commas and undangled many a participle from this paper, but who also drew the plates of bone and shell artifacts.

THE SITE AND ENVIRONMENT

A detailed description of LAn-52, the surrounding area and environmental factors, was made by the author in a previously published monograph (Curtis 1959). However, in order to set a framework for the present report, certain portions of the earlier paper will be condensed.

LAn-52 is located on a large bluff on the east side of Arroyo Sequit Canyon, south of Highway 101. The site now rests entirely within the confines of Leo Carrillo Beach State Park (Map 1).

The bluff, which contains the major portion of the site, measures 960 feet east/west, and its maximum width is 140 feet north/south. Highway 101 parallels the long axis and cuts through the occupation zone. Evidence of prehistoric occupation, eroding out of the highway banks, has led to considerable vandalism in the past (Figure 1).

The site is situated in one of the most favorable areas of the southern California coast, and is similar to other habitation sites found both to the north and south(Magu, Malaga Cove, Simomo, Mescalitan Island, etc.).

Fresh water is available all year round in the canyon except during long drought cycles. The climate is temperate with winter averages from 51°F-58°F, and summer averages from 56°F-73°F. Rainfall is confined to the winter months and averages about 15 inches a year. Thick sea fogs are frequent, especially in the early morning. The brisk wind which blows in from the ocean is usually most strong in the early afternoons.

While certain important and noticeable alterations in the flora of the area are evident, it is probable that the major aspects of the vegetation are essentially the same today as when the area was occupied by the peoples who inhabited the site before the arrival of the Spanish.

Of major importance for food were the two species of oaks, the California black walnut, western prickly pear, white sage, chia, manzanita, and numerous other seeds, berries and roots. A large variety of plants was also available for building, fuel, basketry, tools, seasonings, medicine as well as soap (Curtis 1959: Appendix 1 by Dr. Richard F. Logan, and Appendix II, pp. 131-144).

Indigeneous to the area are numerous small mammals such as weasels, badgers, skunks, raccoons, foxes, coyotes, and wildcats. The California mule deer is still common in the higher regions and often comes down to sea level. Common rodents are represented by squirrels, chipmunks, gophers, rats and mice, as well as the cottontail and jack rabbits.

The sea offers a ready supply of easily obtained food. Mussels, clams, abalone, limpets and crabs are numerous. Fish abound in the off-shore kelp. Sea mammals such as porpoises, sea lions, seals and whales are still fairly common. Sea otters once occurred in the area in quantity.

Marine birds such as gulls, pelicans, petrels, loons and grebes gather on the off-shore rocks. Surf birds include sandpipers, terns and kingfishers. Reptiles are represented by rattlesnakes, gopher and garter snakes and many varieties of lizards.

Sedimentary rocks supply a ready source of material for tools: quartz, shale, sandstone and outcroppings of vari-colored cherts. Intrusive metamorphic rocks are fine-grained black slate and quartzite. The most common igneous rocks are granite and basalt. Water-worn cobbles are common in the canyon mouth--especially after the rains.

The fused shale found among the stone tools is not local, but comes from Grimes Canyon, about 20 miles due north. Obsidian was probably obtained from tribes to the north and east. The serpentine and steatite are not native to the coast here, but occur in great quantity on Catalina Island, 40 miles to the southeast. Asphaltum can still be picked up along the beach; it comes from off-shore seepage. Larger inland tar pits at La Brea and Carpenteria were well known and used by the Canalino.

HISTORY OF THE AREA AND PREVIOUS EXCAVATIONS

The California coast was first visited by the Spanish in 1542 when Cabrillo and his crew spent 26 days in the vicinity of Arroyo Malibu. In his log Cabrillo makes mention of the Indian villages along the coast. Unfortunately, the village site at LAn-52 was not mentioned and no record of a village, at what is now Arroyo Sequit, was made. Perhaps the name was different, or, the community, for some reason, was non-existent or insignificant at the time of Cabrillo's arrival.

In 1769 California lands were occupied in the name of the King of Spain. Several missions were established in Chumash territory; San Buenaventura, built in 1782, is nearest Arroyo Sequit. San Fernando Mission, established among the Gabrielinos in 1797, is also close by, and may have been one of the places to which these peoples were scattered.

The Topanga-Malibu-Sequit Rancho was one of the thirty that was established in Alta California under the early Spanish grazing permits. It was granted to José Bartolomé Tapia in 1802. The Tapia heirs maintained ownership of the Rancho, which flanked the Pacific Ocean for many miles, until 1848. The Rancho was sold to Señor Victor Prudhomme, who later sold his

holdings to Don Mateo Keller in 1857. Ten years after the death of Don Keller, the Rancho was sold to Mr. and Mrs. Fredrick H. Ringe in 1892. In 1941, after the death of both Mr. and Mrs. Ringe, the title of the lands was in the name of the Marblehead Land Company. In 1942 and 1943 certain parcels of the Rancho Topango-Malibu-Sequit were sold to Mr. W. Phillips. The archeological site lies on a parcel he once owned and permission to do various early excavations were made by Mr. Phillips. In turn, Mr. Phillips sold these properties to the Division of Beaches and Parks, which has since created extensive public facilities upon them.

The archeological zone lies above and east of the public beaches and facilities. It is normally covered with a fairly dense growth of wild rye, mustard and cactus. As far as the author knows, no plans have been made to build upon or otherwise destroy the occupation zone.

Park personnel have steadfastly guarded the midden area to protect it from vandalism. However, the site was well known locally for many years prior to this care and there is no question but that many individuals and groups have made extensive collections from the site.

The earliest recorded work at Arroyo Sequit was done for the Museum of the American Indian, Heye Foundation, New York City, between 1939 and 1944. Discussions of the controversial, intricately carved and decorated steatite and serpentine effigies, cups, pipes and other items, recorded as having come from the burial area of LAn-52, have been dealt with in the author's earlier paper (Curtis 1959, Part 6, p. 111 and Part 7, p. 117).

Two salvage operations, one by the Archaeological Survey Association of Southern California (ASA) in 1951 and the other by UCLA students under Dr. Clement W. Meighan in 1954 resulted in two fairly large collections. The author attempted to co-ordinate and describe the results of these two excavations plus additional data collected from private and institutional sources in her earlier monograph.

In 1960 the author obtained a permit from the Division of Beaches and Parks to conduct further excavations at LAn-52 in an effort to discover discrete artifacts not previously recorded. A report of the findings was submitted in August, 1961. It was upon the basis of this report that the present contract was granted--in order to substantiate and/or elaborate the data coming from the several test pits laid down during the summer of 1960.

PURPOSES OF THE PRESENT EXCAVATION

The excavation was oriented about certain specific problems as stated in the agreement:

a) processing of midden in the occupation and burial areas;

b) investigating stratigraphy;

c) screening for microlithic tools;

d) taking of soil samples for phosphate testing in investigation of the organic and chemical components of the site;

e) collecting charcoal samples for radio carbon dating;

f) making a shell analysis for ecological interpretation;

g) investigating burial complexes and traits, especially steatite and serpentine burial offerings;

h) and recording any other indications of archeological remains that might be performed to the extent of the funds and time available.

It will be seen that the major part of these objectives was realized. However, due to circumstances over which the project director had no control, several of the objectives were not realized. These will be explained in the pertinent section of this report.

EXCAVATION PROCEDURES AND METHODS

The surface of the bluff was covered with a very dense and high growth of wild oats and mustard as well as numerous patches of cactus. Machetes were used to clear paths so that the screens, shovels and other materials could be brought to the top of the bluff (Plate 1a).

The area chosen for excavation lay nearly on the highest part of the bluff where disturbance was considered to have been minimal, and where maximum depth was anticipated. This choice was conditioned by the fact that while the ASA and UCLA salvage operations reported a maximum depth of 42" in the burial area at the western and lower end of the bluff, only the top 36" of midden in the trench dug by the ASA further east and higher on the bluff showed any quantity of cultural material. The three test pits excavated by the author in 1960 still higher on the bluff had recovery to 33" before reaching sterile base. Therefore, it was hoped that excavation shifted still further east from previously worked areas might prove more productive.

A new datum was established using telephone power pole #1090608E along the fence line paralleling the highway (See Figure 1 for contour map of the site and designation of the trenches and datum), and a five foot grid was laid out (Figure 2). A large area approximately 40' by 20' was cleared of growth and Trench M was laid out running east/west. Trench M was 25' by 5'; it was staked out and divided into 5 pits, each of which was 5' square. Running from east to west the pits were numbered M14-M18 (Plate 1).

Another area about 40' by 20' was cleared south and west of Trench M and in the center of it Trench T was staked out in similar fashion. The pits were designated as T21-T25. The datum corner of each excavation unit or pit was the northeast corner.

Lower down on the bluff, in the old burial area, the surface was also cleared and a 50' by 5' trench was staked down. This was designated as Trench XL. This trench was never dug primarily because the recovery of the burials and features in both of the upper trenches consumed so much time. Burials had not been anticipated in the area chosen for excavation on top of the bluff.

The surface of the areas to be dug was covered with fine wind-blown sand. Under this thin layer the midden proper was composed of dark, nearly black, friable and greasy soil, wherein lay the cultural material. Evidence of disturbance by small rodents--gophers and ground squirrels--was seen in the uneven surface, the burrow holes, and (in Trench T) the lighter-colored soil brought up from lower levels. Maintaining good side walls was difficult due to constant activity of these rodents, who tore away at the walls during hours when no excavation was being done. In fact, it was necessary to use extreme caution while walking along the trenches lest one fall into the pits by stepping through a burrow.

There was no evidence of recent relic hunting as artifacts were recovered from the surface: projectile points, beads and other obvious materials which even the least sophisticated collector would recognize.

In Trench M, units M14 and M15 were designated as Microanalysis pits, and were, for the most part, troweled and double-screened 1/4" over 1/8" mesh. However, at the 42-48" level, the midden soil became damp and compacted and would not readily go through the 1/8" screens. Therefore, only enough material was double-screened from 42" to 54" to assure at least a 400 gram sample from each level for shell analysis. Screening was done by 6 inch levels.

The processing of the Microanalysis pits was so time-consuming that it was impossible--in the time alloted--to process them to sterile base. In the 54-60" and 60-66" levels post-hole samples were taken in both screening sizes.

In units M16-M18 the midden material was troweled and put through 1/4" screens, also maintaining 6 inch levels. At 60" it was found necessary to stop excavation due to lack of time and man power. Artifacts in small number were still being encountered, and scattered shell fragments were visible in the dark, damp and compacted adobe-like soil. Pit M18 was post-holed to determine sterile base and at 72" there were no more shell fragments to be seen, although the soil remained dark and damp.

In unit M18 a human burial was exposed diagonally across the southwest corner at 24-30". In order to remove the complete burial, the southeast corner of the next unit on the grid, M19, was opened. This unit was never completed, but it served as the entrance to Trench M when the lower levels were reached.

In Trench T midden processing was similar to that in the three units of Trench M. However, sterile base was reached at approximately 54" all across the trench. This base was a tough yellow-brown adobe which gradually turned to a light sandy base.

Proper pit levels were maintained at all times with the use of small spirit levels strung on stout cord, which were permanently attached to the datum corner. In this fashion the cord could be extended to any portion of the pit, the level moved across it to the desired area, and depth established by dropping a steel tape from the level to the pit floor.

During the course of excavation all artifacts, stone chipping waste, earth pigments and asphaltum were collected from all the excavation units. Charcoal was also collected and put into plastic bottles. All the bone was saved from unit T25 and a representative collection of shells was made to aid in classification of the shell from samples in the Microanalysis pits.

Features and burials were pedestaled, photographed and recorded in the field on specially prepared forms. A photographic record was kept on the various phases of the excavation. The best and most pertinent have been incorporated into this report.

Midden soil samples were collected for pH factor in units M14 at 30", T23 at 15", T24 at 36" and M18 at 54". All samples had a pH6 factor.

A total of slightly over 43 cubic yards of midden was processed. No natural stratigraphy or disconformity occurred in either of the trenches.

TABLE 1

Volume of Soil Excavated by Units and Levels

Depth	No. of Units	Unit Numbers	Volume (Cubic Yards)
0-6"	10	M14-18, T21-25	4.63
6-12"	10	" "	4.63
12-18"	10	" "	4.63
18-24"	10	" "	4.63
24-30"	10	" "	4.63
30-36"	10	" "	4.63
36-42"	10	" "	4.63
42-48"	10	" "	4.63
48-54"	10	" "	4.63
54-60"	3	M16-18	1.39
Total	93		43.06

Soil samples for phosphate testing were collected on the surface at 20 feet intervals across the length of the occupation area just inside the fence line (Figure 3). Two sets of samples were made at 20 feet intervals across the width of the bluff as well. Peripheral to the site and across the highway two sets of samples were made at 20 foot intervals from the fence to the base of the hills--a total of 89 samples. These samples were contained in small round metal film holders with labels taped to the outside showing the location of the sample. A map similar to Figure 3 and additional explanatory notes were prepared. The samples, map and notes were delivered to Dr. R. F. Heizer and Dr. S. F. Cook of the Anthropology and Sociology Department, University of California, Berkeley for chemical analysis. Unfortunately, Dr. Heizer has informed the writer that time and funds will not be available to complete analysis on these samples in time for inclusion in this report. It is hoped that they will be processed in the not too distant future.

After all the excavation possible had been completed, the pits were back-filled with a bulldozer and the ground levelled so that there was a minimum of evidence of the archeological excavation.

Most of the sacked and labeled cultural material was taken back by the author to her home for analysis. Two large crates containing heavy stone tools had to be shipped as their size and weight precluded taking them the several hundred miles from the site to where they would be processed.

Before leaving, a group of large grinding tools, recovered by park personnel during bull-dozing operations on the parking lot at the western end of North Beach of Leo Carrillo Beach State Park, were measured, photographed and recorded. The area from which they came has tentatively been assigned the name of the "Bluff Site".

ARTIFACTS

The artifact section to follow is divided into several assemblages to facilitate description. Major assemblages are: small chipped stone tools, large chipped stone tools, pecked and ground stone, polished stone, asphaltum and asphalted artifacts, ochre, shell artifacts, worked bone, non-aboriginal material, and the grinding tools from the Bluff Site.

Several tables usually follow each individual artifact type or major group. Depth distribution tables indicate the occurrence of the discrete cultural materials in each trench (T and/or M). Where possible, or meaningful, another table will show comparison of depth distribution of the same materials as compiled from the 1959, 1961 and this, the 1963 reports--thus bringing together all the data from LAn-52.

While the depth distribution of artifacts in this excavation is shown by 6 inch levels for the two trenches, the comparative depth distribution charts will be shown by 12 inch levels. One of the excavations reported in 1959 was processed by 12 inch levels and it is now impossible to reconstruct a comparative 6 inch level distribution.

Where pertinent, a table comparing tool types collected during the past and present excavations (excluding those by the Heye Foundation and private collectors) will also be made. Following that or incorporated within it, will be figures which show certain important percentages of artifact types or clusters from the different excavation areas. A short discussion will terminate each artifact type or group.

A catalogue of cultural material (Table 2) precedes the descriptive section.

TABLE 2

Catalogue of Cultural Material

Small Chipped Stone--251

63 projectile points
18 blade fragments
54 drills
76 scrapers
30 used flakes

Large Chipped Stone--117

16 hammerstones
9 chipping hammers
12 choppers
30 scraper planes
2 pecking stones
1 core
21 cobble flake scrapers
26 unmodified flake knives

Pecked and Ground Stone--38

2 milling stones
3 milling stone fragments
6 manos
3 polished pebbles
1 miniature mortar
2 anvil stones
13 pestles
6 bowls or mortars

Polished Stone--30

3 steatite tubular beads
1 steatite disk bead
1 steatite pendant
1 steatite bowl rim fragment
1 steatite comal fragment
4 pieces modified steatite
6 serpentine beads
3 one-hole disk ornaments
2 disk blanks
4 slate punches
1 slate effigy-like object
2 polished pebbles
1 slate spatulate object

Bluff Site Artifacts--7

4 deep basin milling stones
2 slab milling stones
1 mano

Shell Artifacts--318

173 Olivella disk beads
54 spire-lopped Olivella
44 spire-lopped Conus
2 polished Mytilus calif.
5 limpet rings
1 clam scraper
3 clam ornament blanks
7 abalone beads
4 abalone pendants
1 incised abalone ornament
1 drilled abalone blank
22 fishhook fragments

Bone Artifacts--59

22 awl fragments
6 punch fragments
4 fine tip fragments
4 gorges
2 harpoon barbs
2 flakers
1 pry fragment
1 wand fragment
1 atlatl spur fragment
1 broken whistle
4 fish vertebra beads
6 bird bone beads
2 mammal bone beads
1 large mammal bone tube
1 antler tine, cut
1 sting ray spine

Asphaltum--22

16 amorphous pieces
6 plugs

Asphalted Stones--8

Ochre--48

Non-Aboriginal Artifacts--7

1 metal nut
1 mower spike
6 pieces rusted iron
1 shot shell

Chipping Waste--809

Small Chipped Stone Assemblage

The small chipped stone assemblage consists of projectile points, blade fragments, drills, gravers, scrapers and used flakes. The stone chipping waste will also be described in this section.

For the most part, the small utilitarian tools are simply made; pressure retouch is rare and flaking is minimal in many instances. Most of the specimens are made on secondary flakes.

The most common stone used is chert--in many shades and grades. Next in order of quantity used is fused shale. Obsidian tools are rare. A few examples of quartzite, quartz, quartz crystal, sandstone and basalt tools are present as well.

Projectile Points

The projectile point group consists of 63 specimens including fragments. Only 23 are complete or nearly so; 17 are large median sections, basal fragments or blanks which can be more or less typed with complete specimens. Nine tips, 11 median sections and 3 bases are either too small or shattered to be placed in any category. Aside from 3 large, atypical points, six basic forms are represented.

1. Triangular with concave base: (3 specimens;2 chert, 1 fused shale) All are well made with regular forms, slightly convex sides and thinned, shallowly concave bases. Cross sections are double-convex. One basal tip is missing on both of the chert specimens(Plate 2a, top row, extreme left).

Length	Width	Thickness	Weight
1.7 cm.	1.2 cm.	0.3 cm.	0.8 gr.
2,2 cm.	1.3 cm.	0.5 cm.	1.4 gr.
3.0 cm.	1.2 cm.	0.4 cm.	1.2 gr.

2. Narrow leaf: (15 specimens; 7 chert, 6 fused shale, 2 obsidian) Six specimens are complete or nearly so; 7 are median fragments and 2 are basal fragments. All of the complete or nearly complete points have weak shoulders and the greatest width is below the center of the blade. There is only occasional thinning at the base. Bases vary with straight, nearly pointed and slightly convex forms. Most of the specimens are keeled on both faces and cross sections are diamond-shaped. Workmanship is only fair; fine retouch is virtually absent. The stems are slightly constricted below

the widest dimension (Plate 2a, top row, extreme right).

Length	Width	Thickness	Weight
2.2 cm.	0.8 cm.	0.5 cm.	0.7 gr.
2.7 cm.	1.0 cm.	0.6 cm.	1.5 gr.
3.3 cm.	1.0 cm.	0.6 cm.	2.0 gr.
3.5 cm.	1.2 cm.	0.6 cm.	2.3 gr.
2.4 cm.*	0.9 cm.	0.4 cm.	0.8 gr.*
2.9 cm.*	1.4 cm.	0.5 cm.	1.5 gr.*

* estimated

The widths of the fragments which have been assigned to this category vary from 0.8 cm. to 1.2 cm., with 0.9 cm. as the average. Thickness varies from 0.4 cm. to 0.6 cm., with 0.5 cm. as the average.

3. Triangular with tapering stem: (2 specimens, chert) Both points are complete and fashioned on relatively poor quality stone. One has a straight base; the other base is pointed. The former is stubby with a wide blade and one corner removed. The latter is longer, more slender in the blade section and more rudely made; the tapering stem is twice the length of the blade. Both are double-convex in cross section (Plate 2a, middle row, extreme left).

Length	Width	Thickness	Weight
3.5 cm.	2.2 cm.	0.8 cm.	6.7 gr.
4.1 cm.	0.8 cm.	1.6 cm.	4.8 gr.

4. Broad leaf with convex base: (12 specimens;8 chert, 4 fused shale) Three specimens in this group are unfinished or blanks; 5 are more or less complete and 4 are basal fragments. Workmanship is varied but none show any high degree of finish or form. Only 3 have edge retouch. Bases do not appear to have been thinned except possibly in one broken example. Cross sections vary: 3 are plano-convex; 9 are double-convex. (Plate 2a,middle row, extreme right).

Length	Width	Thickness	Weight
2.2 cm.	1.5 cm.	0.6 cm.	2.8 gr.
2.6 cm.	1.6 cm.	0.7 cm.	3.2 gr.
2.7 cm.	1.0 cm.	0.6 cm.	1.5 gr.
2.3 cm.*	1.2 cm.	0.5 cm.	1.6 gr.*
3.0 cm.*	0.9 cm.	0.3 cm.	2.0 gr.*

* estimated

The three blanks or incomplete forms average 2.8 cm. in length, 2.0 cm. in width and 0.6 cm. in thickness. Average weight is estimated at 3.5 gr. Four small basal fragments are broadly convex and average 0.5 cm. in thickness at the break.

5. Small triangular thin flake with one worked face: (4 specimens; 3 chert, 1 fused shale) Unusual are these similar flakes which could conceivably have been used as projectile points. The flakes have been only superficially trimmed on the edges to make them regular in form. They were no doubt detached from a prepared, flaked core. The 3 of chert have broadly convex bases; the one of fused shale is crudely stemmed and has a straight base. All 4 are plano-convex in cross section. They are very nearly all the same size (Plate 2a, bottom row, extreme left).

Length	1.3 to 1.5 cm.; average 1.4 cm.
Width	1.0 to 1.1 cm.; average 1.1 cm.
Thickness	0.2 to 0.3 cm.; average 0.2 cm.
Weight	0.3 to 0.4 gr.; average 0.3 gr.

6. Stemmed: (1 specimen, chalcedony) A leaf-shaped point with a broken base has side-notched shoulders near the break. The stone is rudely flaked and rotten on one face. The cross section is double-convex. It is 3.1 cm. long at present, 1.4 cm. wide, 0.5 cm. thick and weighs 2.5 gr. (Plate 2a, bottom row, extreme right).

7. Unclassifiable: (23 specimens from small projectile points)

Tips: 9 specimens; 5 chert, 2 fused shale, 2 obsidian.
Median sections: 11 specimens; 7 chert, 3 fused shale, 1 obsidian.
Bases: 3 specimens; 2 obsidian, 1 chert.

Three larger and heavier points are represented by one of a kind only. They are included with the projectile points but were probably too heavy for use with the bow and arrow. They are considered to possibly have functioned as spear points.

8. Long, leaf-shape with short contracting stem: (1 specimen, black chert) This expertly made tool was found just below the major portion of the rocks in Feature #3. The long blade is keeled on both faces and the retouch on the edges gives it a slightly serrated appearance. The narrow base is almost straight; the cross section is diamond-shaped (Plate 2b, top row, extreme left).

Overall length	6.8 cm.
Length of blade	5.3 cm.
Length of stem	1.6 cm.
Width	2.1 cm.
Thickness	1.1 cm.
Weight	14.1 gr.

9. Broad leaf with pointed base: (1 specimen, obsidian) The base is slightly constricted and the widest part is below the middle of this fairly well made tool. Flaking on the faces is shallow but irregular and there is

no fine retouch on the edges. The cross section is broadly double-convex. It is 5.4 cm. long, 2.3 cm. wide, 1.0 cm. thick and weighs 11.7 gr. (Plate 2b, top row, center).

10. Triangular, corner-notched with long tapering stem: (1 specimen [broken], red jasper) Only part of the blade and the long stem remain of this heavy spear point. It is made of desert jasper and is no doubt intrusive. Flaking is rude; one face has no chipping across a large area of rotten stone. The corner notching is uneven. The blade is lenticular in cross section, but the stem is triangular in cross section as one face of it is keeled. Extrapolating, it may well have been at least 7.0 cm. long. It is 4.1 cm. wide at the base of the blade section and has a maximum thickness of 1.3 cm. (Plate 2b, top row, extreme right).

Blade Fragments

There are 18 blade fragments of bifacially flaked tools which may have been either projectile points, spear points or knives. Seven are median sections, 11 are bases. All are characterized by greater thickness and/or width than the 6 major classes of small projectile points described above. Most are even more rudely fashioned; only one shows any secondary edge retouch (Plate 2b, center and bottom rows).

1. Median fragments: (7 specimens; 5 chert, 2 obsidian) One small obsidian fragment has been retouched on both sides of the remaining edge. Another large fragment of pale tan chert is broadly serrated along the side by the removal of small flakes on the edge of one face. Another specimen shows use as a scraper on one long side. The narrowest fragment is diamond shape in cross section; all the rest are double convex. They range in width from 1.9 to 3.5 cm., in thickness from 0.6 to 1.1 cm.

2. Basal fragments: (11 specimens; 10 chert, 1 obsidian) Three of the chert bases are pointed and 7 are broadly convex. Cross sections are all double convex. The obsidian fragment is the largest and heaviest. It was probably originally triangular in shape and had a broad, straight base which has been unevenly thinned on both faces. The cross section at the break is diamond shape and both faces are steeply keeled.

	Width	Thickness
Chert tools	2.1 to 2.8 cm.	0.5 to 1.2 cm.
Obsidian tool	3.1 cm.	1.3 cm.

TABLE 3

Depth Distribution of Projectile Points and Blade Fragments

Depth		#1	#2	#3	#4	#5	#6	Frag.	Spear Pts.	Tot.	Blades
0-6"	T	1	1	1	-	-	-	-	-	3	2
	M	-	2	-	3	-	-	-	1[a]	7	1
6-12"	T	-	2	-	3	-	-	2	-	7	1
	M	-	2	-	1	-	1	1	-	5	5
12-18"	T	1	1	-	-	-	-	7	-	9	0
	M	1	1	-	-	2	-	4	-	8	1
18-24"	T	-	1	-	-	-	-	1	-	2	0
	M	-	2	-	-	-	-	2	-	4	2
24-30"	T	-	1	-	2	-	-	2	-	5	1
	M	-	2	-	1	-	-	2	1[b]	6	2
30-36"	T	-	-	-	1	1	-	-	1[c]	3	1
	M	-	-	-	1	1	-	1	-	3	1
36-42"	T	-	-	-	-	-	-	-	-	0	0
	M	-	-	1	-	-	-	-	-	1	1
42-60"	T	-	-	-	-	-	-	-	-	0	0
	M	-	-	-	-	-	-	-	-	0	0
Total:	T	2	6	1	6	1	0	12	1	29	5
	M	1	9	1	6	3	1	11	2	34	13
Total		3	15	2	12	4	1	23	3	63	18

a--#10; b--#9; c--#8

TABLE 4

Distribution of Stone Materials in Projectile Points and Blades

Category	Chert	Fused Shale	Obsidian	Total
#1	2	1	-	3
#2	7	6	2	15
#3	2	-	-	2
#4	8	4	-	12
#5	3	1	-	4
#6	1[a]	-	-	1
Unclassified	13	5	5	23
#8	1	-	-	1
#9	-[b]	-	1	1
#10	1[b]	-	-	1
Blade frags.	15	-	3	18
Total	53	17	11	81
% of Total	65%	21%	14%	100%
1959%	71%	28%	1%	100%

a--chalcedony; b--desert jasper

TABLE 5

Comparative Depth Distribution of Projectile Points and Blades

Depth		0-12	12-24	24-36	36-48	48-60	No Loc.	Total
Report of								
Triangular	1959	8	3	3	1	-	1	16
with concave	1961	1	-	-	-	-	-	1
base	1963	1	2	-	-	-	-	3
Narrow	1959	7	2	1	-	1	1	12
leaf	1961	1	-	1	-	-	-	2
	1963	7	5	3	-	-	-	15
Triangular/	1959	2	1	2	-	-	1	6
tapering	1961	-	1	-	-	-	-	1
stem	1963	1	-	-	1	-	-	2
Leaf-shaped	1959	2	1	1	-	-	1	5
with convex	1961	-	-	-	-	-	-	0
base	1963	7	-	5	-	-	-	12
Small	1959	-	-	-	-	-	-	0
triangular	1961	-	-	-	-	-	-	0
flake	1963	-	2	2	-	-	-	4
Stemmed	1959	2	-	-	-	-	1	3
	1961	-	-	1	-	-	-	1
	1963	1	-	-	-	-	-	1
Leaf-shaped/	1959	4	3	4	-	-	-	11
pointed	1961	1	1	1	-	-	-	3
base	1963	-	-	-	-	-	-	0
Serrated	1959	2	-	1	-	-	-	3
	1961	-	-	-	-	-	-	0
	1963	-	-	-	-	-	-	0
Fragments	1959	4	7	3	3	1	2	20
	1961	-	-	1	-	-	-	1
	1963	4	14	5	-	-	-	23
Spear	1959	-	2	-	-	-	-	2
points	1961	-	-	-	-	-	-	0
	1963	1	-	2	-	-	-	3
Blades	1959	8	9	5	1	2	3	28
	1961	-	2	-	-	-	-	2
	1963	9	3	5	1	-	-	18
Total	1959	39	28	20	5	4	10	106
	1961	3	4	3	-	1	-	11
	1963	31	26	22	2	-	-	81
Total		73	58	45	7	5	10	198

TABLE 6

Percentage Comparisons of Discrete Small Projectile Points

Basic Type	Report of 1959	1961	1963
Triangular/concave base	16	1	3
*	29%	13%	8%
Narrow leaf/weak shoulders	12	2	15
*	21%	25%	41%
Triangular/tapering stem	6	1	2
*	11%	13%	5%
Leaf-shaped/convex base	5	0	12
*	9%	0%	32%
Small triangular flake	0	0	4
*	0%	0%	11%
Stemmed	3	1	1
*	5%	13%	3%
Leaf-shaped/pointed base	11	3	0
*	20%	36%	0%
Serrated	3	0	0
*	5%	0%	0%
Total	56	8	37

*--percent of the total in its own report

Discussion

From Table 3 it can be seen that projectile point distribution is relatively constant from the surface to 18" with an increase at 12-15" and a drop-off from 18-24". However, the quantity increases again in the 24-30" level before it falls away again. All but one of the projectile points or fragments were recovered above 36".

The large fragment of a desert jasper spear point, found near the surface, was no doubt brought in or traded in as the stone is not of local type. The other two complete large points both lay near the lowest levels of point distribution. It is possible that the well-made chert specimen found under Feature #3 was locally made, but it is far superior in workmanship than the rest of the point assemblage. The large obsidian leaf-shaped point found at 24-30" may well be a trade item as it is atypical in form and finish.

The most common form among the small projectile points is certainly the long, slender, only fairly well-made leaf-shaped tool with weak shoulders and a slightly constricted or contracting stem or base. The distribution of this basic type is constant from 30" to the surface.

Next in quantity are the broad, leaf-shaped points with convex base. Their distribution is discontinuous with an hiatus in the two levels from 12-18" and 18-24". The small triangular form with concave base was only recovered in unexpectedly small quantity, and only in the top 18".

Comparison of the categories of projectile points reported in the 1959 and 1961 reports show that there were several types or sub-types not previously reported, or they were classified differently. For the purposes of Table 5, it has been necessary to re-evaluate the earlier typologies, and those specimens now considered to be most closely allied to the basic categories set up in this report are grouped together.

Probably the most significant fact is that the 1959 report shows a far greater proportion of well-made small projectile points--in the #1 group (triangular with concave base) and the long, slender, keeled, leaf-shape with pointed base, which are not part of the present assemblage (Table 6).

Table 4, which shows the percentage of stone types used in the manufacture of projectile points and blades, presents a problem in that only one obsidian tool was reported by the excavators in the 1950's. It is the writer's opinion that this unbalanced picture may be due to excessive vandalism, and that the considered "prettier" obsidian points were collected by unauthorized relic-hunters. The author personally knows of several dozen obsidian projectile points which come from the Arroyo Sequit site and which are in the hands of casual collectors.

The local cherts, of which there was a goodly quantity and variety, were used most frequently; fused shale, obtainable at not too great a distance, follows in frequency. Understandably, the obsidian, which had to be brought in from a greater distance or acquired in trade, constitutes the least quantity. The stone chipping waste (See Table 16) reveals that obsidian was not used to a great degree; the obsidian chips are always small and no doubt are the result of resharpening or reworking scarce tools. All of the stone material used in the projectile point assemblage fractures well conchoidally. However, it was seldom modified beyond necessity; the few tools that are well-made stand out in marked contrast to the rest.

Drilling Tools

The drilling tool assemblage consists of 54 specimens, divided into 46 stubby drills, 4 flake drills, 2 slender, bi-pointed tools, a drilling tool fashioned on a quartz crystal, and 1 reamer. Except for the 2 small, slender, bipointed drills, the rest of the assemblage is most simply made by percussion (Plate 2c).

1. Stubby drills: (46 specimens; 37 complete and 9 fragments). The most numerous individual type of tools recovered was the stubby, crudely fashioned drill, the majority of which were made of chert. They are characterized by multifacial percussion flaking on a small core. Generally, the widest dimension is near the center of the tool, especially in the numerous cases in which both ends of the tool were used.

Most of the drill points are well worn and many are thick and blunted from use. Along the sides of the used tips can be seen the abrasion marks which dull the cusps of the flake scars made to prepare the tapering point. Secondary chipping can be seen in several of the smaller tools near the tips; this retouch is not regular and is often nearly obliterated from use wear. A number of tips are undercut, and in most cases the tip end is apt to be sharply keeled. The drills seem to fall into three fairly well defined size groups--but all are similar in manufacture and configuration.

A. Small: (14 specimens; 13 chert, 1 quartzite) Ten have one end worked; 4 are bipointed. Range of dimensions:

Length	1.5 to 3.0 cm.; average 2.2 cm.
Width	1.1 to 1.9 cm.; average 1.5 cm.
Thickness	0.7 to 1.3 cm.; average 1.0 cm.

B. Medium: (12 specimens, all chert) Five have one worked end; 7 are bipointed. Range of dimensions:

Length	3.1 to 3.7 cm.; average 3.4 cm.
Width	1.7 to 2.5 cm.; average 2.0 cm.
Thickness	1.0 to 2.0 cm.; average 1.5 cm.

C. Large: (11 specimens, all chert) Eight have one worked end; 3 are bipointed. Range of dimensions:

Length	4.0 to 4.9 cm.; average 4.4 cm.
Width	1.5 to 2.5 cm.; average 2.2 cm.
Thickness	1.3 to 2.0 cm.; average 1.6 cm.

D. Fragments: (9 specimens, all chert)

2. Flake Drills: (4 specimens, all chert) This small group of drills differs from those described above in that they are fashioned on thin, flat-

tish flakes. All have one blunt keeled end showing modification and wear.

Length	2.1 to 2.8 cm.; average 2.2 cm.
Width	0.9 to 1.2 cm.; average 1.1 cm.
Thickness	0.4 to 0.8 cm.; average 0.6 cm.

3. Slender, bipointed drills: (2 specimens; 1 white chert, 1 fused shale) Both of these well-flaked slim tools are much more carefully and regularly made than any of the other drilling tools, and were no doubt intended for finer work than the more casually flaked stubby drills or the blunt-nosed flake drills. Each has one flattish face; the other face is sharply keeled on both ends. Flaking is regular and small. Both tools are roughly diamond-shaped in cross section in the center.

	fused shale	white chert
Length	1.8 cm.	2.2 cm.
Width	0.6 cm.	0.7 cm.
Thickness	0.5 cm.	0.7 cm.

4. Quartz crystal drill: (1 specimen) A small quartz crystal has been modified at one end to form a sharp tip which is worn from use. It is 1.6 cm. long, 0.9 cm. wide at the proximal end, and 0.7 cm. thick.

5. Reamer: (1 specimen, fine-grained sandstone) A stubby sandstone pebble tapers from the center to a blunt tip. The distal end of the tool is ridged with concentric lines formed from use. It is 4.4 cm. long, and 1.8 cm. in diameter in the center.

TABLE 7

Depth Distribution of Drilling Tools

Depth		Small	Med.	Large	Frag.	Flake	Bi-Point.	Total	
0-6:	T	1	1	-	1	-	-	3	
	M	1	-	1	-	-	-	2	
6-12:	T	-	-	1	1	-	-	2	a--one is quartz, b--one is sandstone
	M	2	1	1	2	-	-	6	
12-18:	T	2	1	2	-	-	-[a]	5	
	M	1	1	1[b]	-	1	2	6	
18-24:	T	-	-	2	-	1	-	3	
	M	1	2	1	2	2	-	8	
24-30:	T	3	4	-	-	-	-	7	
	M	1	2	2	-	-	-	5	
30-36:	T	2	-	-	1	-	-	3	
	M	-	-	-	-	-	-	0	
36-42:	T	-	-	-	-	-	-	0	
	M	-	-	1	-	-	1	2	
42-48:	T	-	-	-	-	-	-	0	
	M	-	-	-	2	-	-	2	
48-60:	T,M	-	-	-	-	-	-	0	
Total:	T	8	6	5	3	1	-	23	
	M	6	6	7	6	3	3	31	
Total		14	12	12	9	4	3	54	

TABLE 8

Comparative Depth Distribution of Drilling Tools

Depth		0-12	12-24	24-36	36-48	48-60	No Loc.	Total
Report of								
Stubby drills	1959	50	32	27	7	-	4	120
	1961	7	2	2	-	-	-	11
	1963	13	17	15	3	-	-	48
Flake drills	1959	-	2	-	-	-	-	2
	1961	-	-	-	-	-	-	0
	1963	-	4	-	-	-	-	4
Slender, bi-pointed	1959	5	4	3	-	-	1	13
	1961	-	-	-	-	-	-	0
	1963	-	1	-	1	-	-	2
Drills/ pressure retouch	1959	8	5	1	-	-	1	15
	1961	-	-	-	-	-	-	0
	1963	-	-	-	-	-	-	0
Total	1959	63	43	31	7	-	6	150
	1961	7	2	2	-	-	-	11
	1963	13	22	15	4	-	-	54
Total		83	67	48	11	-	6	215

TABLE 9

Percentage Comparisons of Drilling Tools

Basic Type	Report of 1959	1961	1963
Stubby drills	120	11	47
•	80%	100%	87%
Flake drills	2	0	4
•	1%	0%	7%
Slender, bipointed	13	0	2
•	9%	0%	4%
Drills/pressure retouch	15	0	0
•	10%	0%	0%
Reamers	0	0	1
•	0%	0%	2%
Total	150	11	54

•-- percent of the total in its own report

Discussion

From Table 7 it can be seen that nearly all of the drilling tools lay above 30" and there does not seem to be any particular pattern in the various sizes of stubby drills which might indicate temporal difference in the choice of size. As in many of the other assemblages, the largest cluster of drills falls in the three levels from 12-30", and then there is a marked falling off of all drill types. In the two earlier reports the major quantity of drills lay in the top 12" (Table 8).

A comparison of drilling tools from this report and from that of 1959 shows several differences in size, type and workmanship. The present collection has a larger number of small stubby drills and none so large as several of the largest reported in 1959. Also, not one of the present group of stubby drills showed a really sharply cut back tip, but a far greater proportion are bipointed and have two working blunt tips.

Altogether missing from the present collection are the slender, triangular-in-cross-section drills which have fine regular pressure flaking on all faces and delicate edge pressure retouch (Table 9).

No small bladelet drills were recovered either--such as were found in 1960 near LAn-52 on the surface in what was considered to have been a bead-making station. And no industry of prismatic blades struck from prepared platform cores, as was found in the excavation of 1960, was recovered in this latest excavation--even in the 1/8" screened Microanalysis pits.

Although no bladelet or micro-drills were reported in the 1959 report from the excavation of the 1950's, it is the author's belief that these very small and most frequently broken tools were overlooked in the course of 1/4" screening or shovel-broadcasting of the midden material.

No stone tools were recovered in the present drilling tool assemblage that could--from their present appearance--have served as drills for making holes in shell beads, with the possible exception of the quartz crystal drill and possibly one of the slender, bipointed tools. This, in spite of the fact that the holes in nearly all of the disk beads are fairly large (average 0.2 cm.). However, most of the drills recovered would have served excellently for drilling mussel or abalone shell in the manufacture of fish hooks, and the tips of most of the drills fit quite well into the hole started in a blank of abalone--found on the surface.

Gravers

A mixed bag of 10 tools have been grouped together as graving or incising tools. The method of their manufacture is almost as varied as the number of specimens.

1. Flake gravers shaped by concave adjacent sides: (4 specimens; 3 chert, 1 fused shale--all broken) The tips of these fragmentary tools were formed on amorphous flakes by more or less casual chipping on either side of the tip in order to form the projection. All the tips are very worn and none apparently were very long, judging from the thinness of the stone edges upon which they were made. The edge thickness varies from 0.2-0.4 cm.

2. Flake gravers with long tapering tips: (2 specimens; 1 chert, 1 quartz) These two tools differ from those described above in that the working tip is both longer and broader.

The chert tool is formed on an amorphous flake which is 0.6 cm. thick on the proximal end and 2.1 cm. wide across the straight base. It is 1.1 cm. long from base to tip and the tapering tip, formed by the side notches, is 0.7 cm. long.

The quartz tool at first glance looks like a stemmed projectile point, but the keeled tip is the thickest part of the tool and the thinned stem may have been used for hafting. The tip is crudely shaped and slightly at an angle. Under a lens it can be seen that the tip has seen enough wear to dull the flake scars. The tool is triangular in the blade section with uneven side notches and a short, slightly flaring stem with a straight base. The total length is 1.7 cm.; the length of the tapering tip is 0.6 cm. The maximum width of the blade is 1.0 cm., width of the stem 0.7 cm., thickness at the tip 0.4 cm., thickness of the stem 0.2 cm.

3. Beak-nosed gravers: (2 specimens, chert) Both tools are made of chert nodules, the cortex still showing on part of the larger tool. The noses are broad, steeply keeled, undercut from the bottom side, and chipped across the tip.

	a	b
Length	1.5 cm.	1.9 cm.
Width	2.5 cm.	2.6 cm.
Thickness	0.7 cm.	1.0 cm.

4. Bulbar flake with convex sides: (1 specimen, chert) The best made of all the small gravers is this grey-banded chert tool made on a thick,

interior flake struck from a larger core. The thin convex edge opposite the bulb of percussion has been trimmed just enough by fine chipping to leave a small knobby central projection. The bulbar face is unmodified; the opposite face has been trimmed by the removal of several deep flakes in order to flatten the tool. It is 2.7 cm. long, 3.1 cm. wide and averages 0.7 cm. in thickness.

5. Basalt flake graver: (1 specimen) This tool is considerably larger and heavier than any of the rest of the gravers. It is formed on a primary cobble flake. The cortex face has been left unmodified over most of the stone except directly above the graving tip; here several large and wide flakes have been detached, possibly to give better purchase in holding the tool. The well-shaped tip is flat on the bulbar face and keeled on the other; it was formed by the removal of several large transverse flakes from the edge. The graver is 6.1 cm. long, 7.1 cm. wide and 2.4 cm. thick in the center.

TABLE 10

Depth Distribution of Gravers

Trench	Depth	Type	Total
T:	12-18"	2/concave sides, 1/convex sides	3
	18-24"	1 large basalt flake	1
	24-30"	1/tapering tip, 1 beak-nosed	2
M:	6-12"	1 beak-nosed	1
	24-30"	1/concave sides	1
	30-36"	1/concave sides	1
	48-54"	1/tapering tip	1
Total			10

Discussion

There is little to compare in graving tools with previous excavations. None were reported in 1961. The 1959 report lists only 2; both of these had long tapering tips but they did not resemble those in the present collection as the former were bifacially flaked with fine pressure flaking. Both of them were recovered in the top 24". None of the 10 graving tools described in this assemblage have any fine pressure retouch about the tips, nor are any bifacially worked. A more diverse and cruder lot can scarcely be imagined and no manufacturing technique appears to have been preferred.

Distribution is also not very meaningful with so few examples.

Aside from fishhook shanks, only one incised ornament was recovered. No doubt, perishables, such as wooden artifacts, may have been incised.

Scrapers

A total of 76 small scraping tools is broken down into several categories, depending upon the shape of the area modified and general configuration: convex, end and side, nodule, plane, pointed, side, and flake.

Most of the tools are simply made on amorphous flakes. Although the size range is from tiny thin flakes with minimal modification to fairly good-sized cores, nearly 70% of them are practically the same size--averaging 3.5 cm. in length, 2.5 cm. in maximum width and 1.5 cm. in thickness. Only several are bifacially flaked.

1. Convex: (16 specimens; 13 chert, 3 fused shale) Of special interest in this group is one bifacially chipped, double convex tool with edge retouch, and one small red chert scraper which is also bifacially flaked across the working area, but much more rudely. The rest of the tools show varying degrees of modification and use. The largest has one small concave worked area opposite the convex one.

Length	1.4 to 5.9 cm.; average 3.5 cm.
Width	1.0 to 4.0 cm.; average 2.3 cm.
Thickness	0.3 to 1.7 cm.; average 0.8 cm.

2. End and side: (3 specimens, chert) All three tools are made of pale tan chert and are nearly rectangular in shape. Two are modified on the end and both long sides; the third is altered only on the end and one side.

Length	2.9 to 4.1 cm.; average 3.2 cm.
Width	2.4 to 2.5 cm.; average 2.5 cm.
Thickness	0.8 to 1.3 cm.; average 1.1 cm.

3. Nodule: (9 specimens; 6 chert, 3 chalcedony) Unique in the scraper assemblage is this small group of tools made by splitting or breaking off a fragment of a small chert or chalcedony nodule. All have the original cortex of the stone intact on the more convex face. The sharp edges of the broken stone have been more or less modified--more so in the case of all 3 chalcedony specimens. They all tend to be oval or ovoid in shape and several have been used all around the perimeter.

Length	2.1 to 4.0 cm.; average 2.9 cm.
Width	1.7 to 2.8 cm.; average 2.1 cm.
Thickness	0.5 to 1.7 cm.; average 1.2 cm.

4. Plane: (11 specimens; 8 chert, 2 chalcedony, 1 fused shale) The small scraper planes in this group are more or less domed. They have flat bases and modification along one or more edges of the bases. This modification is generally the result of the removal of flakes from the base up the wall in order to sharpen the edge.

Length	2.0 to 5.5 cm.; average 2.8 cm.
Width	2.0 to 5.0 cm.; average 3.2 cm.
Thickness	1.2 to 3.0 cm.; average 2.1 cm.

5. Pointed: (9 specimens, all chert) All the scrapers in this group are stubby and made of fairly thick flakes. One or more sides adjacent to a modified tip may be altered. The tip end is keeled in 6 of the 9 specimens.

Length	2.2 to 4.1 cm.; average 3.7 cm.
Width	1.5 to 2.7 cm.; average 2.5 cm.
Thickness	0.8 to 1.8 cm.; average 1.5 cm.

6. Side: (17 specimens; 11 chert, 5 fused shale, 1 basalt) All the scrapers in this group have at least one long straight side as the major modified area. Three are 2-sided tools. Flaking is random and minimal. The basalt flake has one flat face; all around the perimeter of this flat face, 9 flakes have been removed leaving a thinned edge. The small flake scars break through a thin brown patina on most of the rest of the flake.

Length	2.4 to 4.4 cm.; average 3.2 cm.
Width	1.5 to 3.1 cm.; average 2.5 cm.
Thickness	0.5 to 2.0 cm.; average 1.3 cm.

7. Flake: (5 specimens; 2 obsidian, 2 fused shale, 1 chert) All five tools are made of small interior flakes. One, of obsidian, is a thin, slender bladelet, similar to those used to make tools in the platform core-bladelet tradition. However, this is the only example of such a flake and is probably fortuitous. It has been used along one long side. The other four flakes have been slightly modified on a narrow end with occasional use on the sides.

Length	1.4 to 1.7 cm.; average 1.5 cm.
Width	0.6 to 0.9 cm.; average 0.7 cm.
Thickness	0.2 to 0.3 cm.; average 0.3 cm.

8. Fragments: (6 specimens; 4 chert, 1 chalcedony, 1 fused shale) Sections of scraping tools--probably of convex or side varieties--cannot be adequately measured.

TABLE 11

Depth Distribution of Small Scrapers

Depth		Convex	End/Side	Nodule	Plane	Pointed	Side	Flake	Frags.	Total
0-6:	T	1	-	-	-	1	-	-	-	2
	M	1	-	1	-	-	-	-	-	2
6-12:	T	-	-	-	-	-	1	-	1	2
	M	1	1	3	1	1	3	3	-	13
12-18:	T	2	-	-	1	1	2	-	-	6
	M	-	-	1	-	-	3	1	-	5
18-24:	T	1	2	-	3	1	-	-	4	11
	M	3	-	-	-	-	2	1	1	7
24-30:	T	1	-	-	-	-	1	-	-	2
	M	2	-	1	-	1	2	-	-	6
30-36:	T	-	-	-	1	-	1	-	-	2
	M	2	-	2	1	2	2	-	-	9
36-42:	T	1	-	-	-	-	-	-	-	1
	M	1	-	-	1	1	1	-	-	4
42-48:	T	-	-	-	1	-	-	-	-	1
	M	-	-	1	1	-	-	-	-	2
48-54:	T	-	-	-	-	-	-	-	-	0
	M	-	-	-	-	-	-	-	-	0
54-60:	T	-	-	-	-	-	-	-	-	0
	M	-	-	-	1	-	-	-	-	1
Total:	T	6	2	0	6	4	4	0	5	27
	M	10	1	9	5	5	13	5	1	49
Total		16	3	9	11	9	17	5	6	76

TABLE 12

Comparative Depth Distribution of Small Scrapers

Depth	0-12	12-24	24-36	36-48	48-60	No Loc.	Total
Report of							
1959	18	3	1	2	0	1	25
•	72%	12%	4%	8%	0%	4%	
1961	3	5	6	-	-	-	14
•	21%	36%	43%	-	-	-	
1963	19	29	19	8	1	-	76
•	25%	38%	25%	11%	1%	-	
Total	40	37	26	10	1	1	115

•--percent of its own total

TABLE 13

Comparative Quantities of Small Scraper Forms

Basic Form	Report of 1959	1961	1963
Convex	1	2	16
End and Side	1	-	3
Nodule	-	-	9
Plane	1	1	11
Pointed	5	-	9
Side	6	1	17
Flake	7	7	5
Concave	1	-	-
Round	3	1	-
Fragments	-	2	6
Total	25	14	76

TABLE 14

Comparative Distribution of Stone Materials in Small Scrapers

Stone Type	Report of 1959	1961	1963
Chert	20	12	55
Fused shale	3	1	12
Obsidian	1	-	1
Chalcedony	1	1	6
Basalt	-	-	1
Total	25	14	76

Discussion

Although all the tools in this assemblage have been classified as scrapers, many no doubt served for cutting, sawing and piercing as may be postulated from thin, sharp edges, degree of serration and modified tips. The variety of forms does not appear to the writer to be diagnostically significant. Actually, many of the specimens could have served as multi-purpose tools; classification was made on the basis of which area or configuration was most modified or different from other forms.

Table 11 indicates that a significantly larger quantity of scraping tools were recovered in Trench M and that all of the nodule and small flake scrapers also came from that trench. The presence of the small flake tools

can be accounted for easily; they were all recovered in Microanalysis units M14 and M15 which were screened to 1/8" and from which all the midden material was more carefully sorted.

Table 12 shows that scraper recovery (or collection) was relatively small from the earliest excavations--and that nearly 3/4 of those reported lay in the top 12". The test excavation and this latest one present a more similar distribution pattern--no doubt due to the greater depth of the midden in those areas as well as the possible diminution in activity at the close of occupation there.

Used Flakes

A total of 30 small, amorphous flakes showed evidence is use wear--usually along some portion of a naturally thin edge. There are 23 chert, 5 fused shale, and 2 chalcedony specimens. The largest, a broad, tabular chert flake with a rough sharp edge, has a patch of asphaltum on one end and scattered spots of asphaltum along the edges and one side. Range of dimensions:

Length	1.8 to 3.8 cm.; average 2.5 cm.
Width	0.9 to 3.1 cm.; average 1.7 cm.
Thickness	0.3 to 2.0 cm.; average 0.6 cm.

TABLE 15

Depth Distribution of Used Flakes

Depth	Trench T	Trench M
0-6	1 chert	2 chert
6-12	1 chert	3 chert, 1 fused shale
12-18	2 chert	5 chert, 1 chalcedony
18-24	1 chert	2 chert, 2 fused shale, 2 chal.
24-30	1 chert	1 chert, 1 fused shale
30-36	1 chert, 1 fused shale	1 chert
36-42	--	1 chert
42-48	--	1 chert
48-60	--	--
Total	7 chert, 1 fused shale	16 chert, 4 fused shale, 2 chalcedony

Chipping Waste

All the stone chipping waste was saved during the course of excavation. The total of 809 individual specimens was segregated by stone type. The cherts were divided into dark, light, red, and chalcedonic varieties, and accounted for the major part of the collection both in number and weight. Fused shale, obsidian, granitic and basaltic cobble flakes, metamorphosed shale, mica schist, sandstone, steatite, quartzite and quartz crystal comprise the balance in order of quantity recovered.

1. Cherts: (590 flakes)

   A. Dark cherts: (372 black, grey, mottled and banded)

Length	0.9 to 5.5 cm.; average 2.5 cm.
Width	0.7 to 4.0 cm.; average 1.7 cm.
Thickness	0.1 to 2.3 cm.; average 1.0 cm.

   B. Light cherts: (178; brown, tan, white, mottled and banded)

Length	0.7 to 4.5 cm.; average 2.0 cm.
Width	0.6 to 3.5 cm.; average 1.1 cm.
Thickness	0.2 to 1.9 cm.; average 0.6 cm.

   C. Red chert: (28)

Length	0.7 to 3.0 cm.; average 1.3 cm.
Width	0.6 to 1.8 cm.; average 0.7 cm.
Thickness	0.2 to 0.7 cm.; average 0.4 cm.

   D. Chalcedony: (12)

Length	1.0 to 4.6 cm.; average 2.3 cm.
Width	0.8 to 2.5 cm.; average 1.3 cm.
Thickness	0.3 to 1.7 cm.; average 1.0 cm.

2. Fused Shale: (110 flakes)

Length	0.7 to 2.3 cm.; average 1.6 cm.
Width	0.6 to 1.7 cm.; average 1.2 cm.
Thickness	0.1 to 1.0 cm.; average 0.4 cm.

3. Obsidian: (46 flakes)

Length	0.6 to 1.7 cm.; average 1.0 cm.
Width	0.5 to 1.6 cm.; average 1.0 cm.
Thickness	0.1 to 0.3 cm.; average 0.2 cm.

4. Granitic Cobble: (26 flakes)

Length	2.0 to 5.9 cm.; average 4.5 cm.
Width	1.4 to 4.6 cm.; average 3.2 cm.
Thickness	0.4 to 2.5 cm.; average 1.3 cm.

5. Basaltic Cobble: (15 flakes)

Length	2.5 to 6.4 cm.; average 4.5 cm.
Width	1.9 to 4.4 cm.; average 3.0 cm.
Thickness	0.5 to 1.7 cm.; average 0.8 cm.

6. Metamorphosed Shale: (6 flakes)

Length	2.0 to 9.3 cm.; average 2.5 cm.
Width	1.3 to 4.3 cm.; average 1.8 cm.
Thickness	0.5 to 1.5 cm.; average 1.0 cm.

7. Mica Schist: (5 flakes)

Length	1.5 to 4.4 cm.; average 3.7 cm.
Width	1.3 to 3.2 cm.; average 2.5 cm.
Thickness	0.2 to 0.7 cm.; average 0.5 cm.

8. Sandstone Cobble: (5 flakes)

Length	2.0 to 5.0 cm.; average 3.0 cm.
Width	1.5 to 3.2 cm.; average 2.8 cm.
Thickness	1.2 to 1.5 cm.; average 1.0 cm.

9. Steatite: (4 flakes)

Length	1.5 to 6.1 cm.; average 3.2 cm.
Width	1.1 to 4.0 cm.; average 1.7 cm.
Thickness	0.3 to 1.4 cm.; average 1.0 cm.

10. Quartzite: (1 flake)

Length	5.0 cm.
Width	5.0 cm.
Thickness	4.3 cm.

11. Quartz Crystal: (1 specimen)

Length	1.4 cm.
Width	1.0 cm.
Thickness	0.7 cm.

TABLE 16

Percentage Distribution of Stone Types in the Chipping Waste

Stone Type	Quantity	Percent of Total
Dark cherts	372	46%
Light cherts	178	22%
Red cherts	28	3%
Chalcedony	12	2%
Total cherts	590	73%
Fused shale	110	13%
Obsidian	46	6%
Granitic cobble	26	3%
Basaltic cobble	15	2%
Metamorphosed shale	6	3%
Mica schist	5	
Sandstone	5	
Steatite	4	
Quartzite	1	
Quartz crystal	1	
Total	809	100%

TABLE 17 (continued across page 35)

Depth Distribution of Stone Chipping Waste

Depth		Dark cherts	Light cherts	Red cherts	Chalce-dony	Fused shale	Obsidian	Granitic cobble
0-6:	T	21	2	4	-	5	2	-
	M	11	6	-	1	4	2	-
6-12:	T	40	23	4	1	13	2	-
	M	17	10	3	-	23	10	-
12-18:	T	37	14	5	1	8	3	1
	M	17	16	3	-	10	4	-
18-24:	T	49	9	3	5	10	6	1
	M	27	18	2	-	17	4	3
24-30:	T	43	29	2	-	9	3	1
	M	24	15	1	1	5	5	-
30-36:	T	30	12	-	1	3	1	1
	M	22	12	1	-	2	3	4
36-42:	T	7	3	-	-	-	-	2
	M	11	4	-	2	1	1	4
42-48:	T	5	-	-	-	1	-	3
	M	6	1	-	-	-	-	6
48-54:	T	2	2	-	-	-	-	-
	M	2	2	-	-	-	-	-
54-60:	T	-	-	-	-	-	-	-
	M	1	-	-	-	-	-	-
Total:	T	234	94	18	8	49	17	9
	M	138	84	10	4	61	29	17
Total		372	178	28	12	110	46	26

TABLE 18

Comparative Distribution of Stone Materials in Small Chipped Stone Tools

Material	Proj. pts.	Blades	Drills	Gravers	Scrapers	Used flakes	Tot.	% of Total
Cherts*	38	15	50	7	49	22	181	72%
Chalcedony	-	-	-	-	12	2	14	5%
Fused shale	17	-	1	1	12	6	37	15%
Obsidian	8	3	-	-	2	-	13	5%
Quartzite	-	-	1	-	-	-	1	3%
Quartz	-	-	1[a]	-	-	-	2	
Sandstone	-	-	1[b]	-	-	-	1	
Basalt	-	-	-	1	1	-	2	
Total	63	18	54	10	76	30	251	100%

*--dark, light and red varieties
a--crystal; b--reamer

TABLE 17 (continued from page 34)

Depth Distribution of Stone Chipping Waste

Depth		Basaltic cobble	Meta. shale	Mica schist	Sand-stone	Steatite	Misc.	Total
0-6:	T	1	-	-	-	1	-	36
	M	1	-	-	-	-	-	25
6-12:	T	1	-	1	-	2	-	87
	M	1	-	-	1	-	-	65
12-18:	T	1	-	1	1	-	-	72
	M	2	2	-	-	-	-	54
18-24:	T	1	-	1	1	-	-	86
	M	1	1	-	-	-	-	73
24-30:	T	-	-	1	-	1	1[a]	90
	M	2	1	1	1	-	-	56
30-36:	T	1	2	-	1	-	-	52
	M	1	-	-	-	-	-	45
36-42:	T	-	-	-	-	-	-	12
	M	1	-	-	-	-	-	23
42-48:	T	-	-	-	-	-	-	9
	M	1	-	-	-	-	-	14
48-54:	T	-	-	-	-	-	-	4
	M	-	-	-	-	-	1[b]	5
54-60:	T	-	-	-	-	-	-	0
	M	-	-	-	-	-	-	1
Total:	T	5	2	4	3	4	1	448
	M	10	4	1	2	-	1	361
Total		15	6	5	5	4	2	809

a--quartz crystal; b--quartzite

TABLE 19

Comparative Percentage Distribution of Small Chipped Stone Artifacts*

Form	Report of 1959	1961	1963
Projectile points	24%	17%	25%
Blades	8%	4%	7%
Drills	46%	23%	22%
Gravers	1%	2%	4%
Scrapers	11%	26%	30%
Used flakes	10%	2%	12%
Core/bladelet industry	-	26%	-

*--represents % of Small Chipped Stone Assemblage only

Discussion

The availability of good chert in the immediate vicinity is reflected in the large quantity of this easily flaked stone, which served so well in the manufacture of small tools. The fashioning of such tools naturally results in a great many small flakes.

Table 16 shows that all the cherty stone comprised 73% of the total chipping waste. This figure accords excellently with the 77% total of the chert artifacts as is shown in Table 18.

The size of the fused shale waste flakes is consistently smaller, on the average, than that of most of the cherts. Fused shale had to be imported to the site, and it comprised 13% of the total chipping waste. Fused shale tools accounted for 15% of the small chipped stone assemblage.

Obsidian, which was even more difficult to come by, and most probably had to be procured by trade, is represented by only 46 waste flakes. The individual flakes collected are the smallest of all the stone material in the débitage. It can also be seen that 6% of the total waste was composed of obsidian and that 5% of the small chipped stone tools were made of this more rare stone.

The large core tools recovered were often only trimmed of several flakes (See Large Chipped Stone Tools). This is reflected in the dimensions of the granitic and basaltic cobble waste flakes--on the average considerably larger than any of the other waste flakes collected.

No artifacts of metamorphosed shale or mica schist were collected during this excavation. However, they have been recovered from LAn-52 in the past in the form of simple ornaments.

The small quantity of steatite waste is consistent with the small number of steatite artifacts found (See Polished Stone Artifacts). Steatite from traded pieces was nearly always reworked if the original tools, vessels or ornaments broke,as this stone was highly prized for its workability and luster.

Table 17 shows that, overall, the concentration of chipping waste lay in the 6-36" levels. Chert flakes are the only type found from sterile base to the surface. Below 36" only 1 fused shale and 1 obsidian flake occurred. However, the largest concentration of granitic cobble flakes fell within the 30-48" levels--where the majority of the tools made of granitic rocks

were found. Basaltic cobble flakes are more or less evenly distributed from the surface to 48". The rest of the several kinds of waste, except for one large quartzite cobble flake, were all found above 36".

Very little sandstone waste was recovered. Many fire-cracked sandstone cobbles were noted in hearths and features; these were recorded and abandoned in the field. Some sandstone artifacts such as manos and pestles were made from cobbles, but they were either used as found or pecked and ground to shape--leaving little or no visible waste.

Large Chipped Stone Assemblage

This assemblage is differentiated from the small chipped stone assemblage in that most of the tools are formed on cobbles, cobble flakes or large pebbles. In all instances the only flaking technique employed was direct percussion.

Included in the group are hammerstones, chipping hammers, choppers, pecking stones (or picks),scraper planes, cobble flake scrapers, unmodified cobble flake knives, and a core.

Dark, fine-grained basaltic stone was used in a majority of the tools in this assemblage; granitic rock and quartzite were employed to a much lesser degree and there are several examples of chert and sandstone.

Hammerstones

The hammerstones have been divided into 3 groups: whole cobble, half cobble and flaked core. A total of 16 were recovered (Plate 2d,center row).

1. Whole cobble: (17 specimens; 4 granite, 2 quartzite, 1 basalt) Cobbles of disparate shapes have been used in varying degrees for hammering or pounding. Abrasion in this group is mainly on unaltered cobbles, but several are spalled or have a few flakes removed to give a sharp edge at one end; one specimen is modified at both ends. A long, slim granitic cobble is abraded at both ends, and may possibly have been a maul.

Length	6.9 to 20.0 cm.; average 8.7 cm.
Width	5.3 to 7.9 cm.; average 6.8 cm.
Thickness	3.7 to 5.5 cm.; average 4.6 cm.

2. Half cobble: (3 specimens, all quartzite) All three tools are fractured cobbles. One is abraded on the narrower end; the second has been

TABLE 20

Depth Distribution of Hammerstones and Chipping Hammers

Depth		Whole cobble	Half cobble	Flaked core	Chipping hammers	Total
0-12:	T	-	-	-	-	0
	M	-	-	-	-	0
12-18:	T	-	-	-	-	0
	M	2	1	-	3	6
18-24:	T	-	-	-	1	1
	M	1	-	-	1	2
24-30:	T	1	-	-	-	1
	M	-	-	1	-	1
30-36:	T	-	-	2	1	3
	M	-	-	-	-	0
36-42:	T	-	1	1	1	3
	M	1	-	1	-	2
42-48:	T	-	-	-	1	1
	M	-	-	-	-	0
48-54:	T	-	-	-	-	0
	M	2	1	1	1	5
54-60:	T	-	-	-	-	0
	M	-	-	-	-	0
Total:	T	1	-	3	4	8
	M	6	3	3	5	17
Total		7	3	6	9	25

TABLE 21

Comparative Depth Distribution of Hammerstones Plus Chipping Hammers

Depth	0-12	12-24	24-36	36-48	48-60	Total
Report of						
1959	4	2	2	1	1	10
*	40%	20%	20%	10%	10%	
1961	1	1	6	-	-	8
*	12.5%	12.5%	75%	-	-	
1963	-	9	5	6	5	25
*	-	36%	20%	24%	20%	
Total	5	12	13	7	6	43

*--percent of its own total

used on the rim of the break on one side; the third has 3 equi-distant battered areas which breach the break in the stone.

Length	6.7 to 8.4 cm.; average 7.7 cm.
Width	6.3 to 6.6 cm.; average 6.5 cm.
Thickness	3.1 to 6.3 cm.; average 4.0 cm.

3. Flaked core: (6 specimens; 4 basalt, 1 quartzite, 1 chert) These hand-size tools have been flaked over at least part of the cobble and many of the edges have been battered considerably by use.

Length	6.6 to 8.5 cm.; average 7.5 cm.
Width	5.2 to 7.5 cm.; average 7.1 cm.
Thickness	4.6 to 6.7 cm.; average 5.7 cm.

Chipping Hammers

Nine small chipping hammers are made of small smooth cobbles of pebbles. Four are of sandstone, 3 of basaltic rock and 1 each of quartzite and granite.

Three of the sandstone tools are complete cobbles, 2 of which are abraded at each end and one used at one end only. The last sandstone hammer is half of a small cobble with abrasion nearly all around the broken edge. The basaltic tools are composed of 2 long, thin, cigar-shaped cobbles used at each end, and one oval-shaped, flat, thin pebble fractured at one end from great use. The quartzite specimen is the smallest. It has been ground down on both sides to form a blunt, tapered nose, which has seen a great deal of use. The granite hammer is part of a cobble and is deeply pitted on the distal end.

Length	2.8 to 11.0 cm.; average 6.8 cm.
Width	2.5 to 5.0 cm.; average 4.0 cm.
Thickness	1.0 to 3.8 cm.; average 2.7 cm.

Discussion

As can be seen from Table 20 no hammer-like tools were recovered in the top 12" of the midden. Concentration is spotty with the largest groups at from 12-18", 36-42" and 48-54". The earliest report, on the other hand, as is shown in Table 21, showed a constant diminishing number from the surface to 36" and 2 isolated examples in the 36-60" levels--these latter in the burial area. Curiously, the bulk of the hammers reported in 1961 lay in the 24-36" range, but the quantity of midden processed was very small.

Table 26 (Quantitative Distribution of Materials Used in the Large Chipped Stone Assemblage) shows that while basalt and granite were the two most commonly used stones--as recorded in this last excavation--for the larger chipped stone tools, the test excavation reported in 1961 contained no basaltic hammerstones; they were primarily of granite and sandstones. The 1959 report also records no basaltic stone among the hammerstones, but they were composed only of sandstones of varying degrees of fineness--as the tools were mainly chipping hammers--and quartzite.

Admittedly the sample is small, but the absence of basalt and granite from the earliest reports is curious. The lack of concordance in percentages of this type of tool found in the various 12 inch levels is also interesting and may be indicative of differential use of particular types of hammers at different times--in the preparation of different types of tools.

Cobble Choppers

Twelve, crude, wedge-shaped chopping tools were collected: 10 are made of basaltic rock, 1 of granite, and 1 of quartzite (Plate 2d, bottom row). Several tools placed in this category might well have been placed with the scraper planes from the viewpoint of form, but all of these tools show a certain degree of blunting on a broadly convex edge. This blunting is conceived as having been caused by a downward motion rather than a flat pushing motion as for planing or scraping.

Flaking pattern is random among these tools. Seven of the 12 specimens have bifacial trimming to form the chopping edge; the other 5 are only unifacially trimmed. One cobble flake tool is patinated.

1. Bifacially flaked: (7 specimens)

Length	7.0 to 10.3 cm.; average 7.8 cm.
Width	5.5 to 8.1 cm.; average 7.1 cm.
Thickness	2.9 to 4.5 cm.; average 4.0 cm.

2. Unifacially flaked: (5 specimens)

Length	7.1 to 11.0 cm.; average 8.1 cm.
Width	5.8 to 9.7 cm.; average 7.2 cm.
Thickness	3.1 to 7.3 cm.; average 4.2 cm.

Pecking Stones (or Picks)

Two tapering basaltic cobbles with strong blunt points are made from thick cobble flakes. Both are flat and unmodified on their inner faces; the other faces are broadly flaked and the tip is keeled (Plate 3a, center row).

	a	b
Length	8.6 cm.	8.5 cm.
Width	6.6 cm.	7.9 cm.
Thickness	2.8 cm.	2.9 cm.

Core

A large mass of chalcedony impregnated with limestone has been stripped in several places where the chalcedonic mass is relatively clear of the limestone. It is 8.2 by 7.8 by 6.7 cm.

TABLE 22

Depth Distribution of Choppers, Pecking Stones and Core

Depth		Choppers	Pecking Stones	Core
0-12:	T	-	-	-
	M	-	-	-
12-18:	T	-	-	-
	M	2	-	-
18-24:	T	1	-	1
	M	-	-	-
24-30:	T	1	-	-
	M	2	-	-
30-36:	T	-	-	-
	M	2	1	-
36-42:	T	-	-	-
	M	1	-	-
42-48:	T	-	1	-
	M	3	-	-
48-60:	T	-	-	-
	M	-	-	-
Total:	T	2	1	1
	M	10	1	0
Total		12	2	1

TABLE 23

Comparative Depth Distribution of Choppers, Pecking Stones and Cores

Depth		0-12	12-24	24-36	36-48	48-60	Total
	Report of						
	1959	-	-	-	-	-	0
Choppers	1961	-	1	3	-	-	4
	1963	-	3	5	4	-	12
Pecking	1959	-	-	-	-	-	0
stones	1961	-	-	3	1	-	4
	1963	-	-	1	1	-	2
	1959	4	-	1	-	-	5
Cores	1961	-	-	-	-	-	0
	1963	-	1	-	-	-	1

Discussion

Table 22 shows that no choppers were recovered in the top 12"--the same pattern as was found in hammerstone recovery. The bulk of the heavy crude chopping tools were found in Trench M with at least one tool per level from 12-18" to 42-48" except for level 18-24".

Not one chopper was reported in 1959 (See Table 23 above). This lack seems unusual since even the test excavation reported in 1961 produced four of these cobble tools, which are, in most respects, similar to those in the present collection. And, the chopper is not a peculiar form limited to particular horizons in southern California archeology.

The pecking stones or picks are apparently not a common form in this area. Its use would possibly be similar to that of those tools used to peck or sharpen milling stones or manos; petroglyphs are not found in the immediate area.

Unmodified cores do not appear common either; every trimmed and percussion-flaked cobble collected for this report had been made into some sort of tool--scraper-plane, hammerstone or chopper. The single exception was the mass of lime-encrusted chalcedony, apparently only intended for flakes to make smaller tools. The only two chert cores found had also been modified, one to form a scraper-plane, the other a small hammerstone.

Cobble Scraper Planes

The 30 cobble scraper planes recovered are all made of basaltic cobbles except 1 example of granite and 1 of chert. In attempting to divide the scraper planes typologically, it was found that no definite shape, size or method of manufacture could be isolated. All the forms do possess a flat or nearly flat base, suitable for a planing surface.

Roughly, about a third of the specimens are partially modified, hand-size cobbles which are generally oval in shape and wider than they are high. Another third of the tools are more steeply shaped from a round base by angular flakes; these scraper planes tend to be as high or slightly higher than they measure in diameter. The balance of the tools are smaller and are fashioned on a percussion bulbar flake or cobble fragment (Plate 2d, top row).

Many of the tools have been sharpened or resharpened with small secondary percussion flakes removed at the base. Several tools have more than one planing surface.

Four tools with considerable alteration are formed on patinated cobbles. The flaked surfaces have also become patinated; in no case is the dark internal color of the stone visible.

1. Partially flaked with oval base: (10 specimens)

Length	6.6 to 13.5 cm.; average 8.8 cm.
Width	6.5 to 8.0 cm.; average 6.5 cm.
Thickness	4.2 to 6.3 cm.; average 5.7 cm.

2. Steeply flaked, high-domed with round base: (11 specimens)

Basal diameter	4.8 to 7.0 cm.; average 5.8 cm.
Height	4.3 to 7.2 cm.; average 5.5 cm.

3. Small, amorphous bulbar flakes or cobble fragments: (9 specimens)

Length	6.0 to 7.2 cm.; average 6.7 cm.
Width	4.0 to 6.2 cm.; average 5.0 cm.
Thickness	2.1 to 3.8 cm.; average 3.4 cm.

Cobble Flake Scrapers

Twenty-one large scraping tools are variously fashioned. All but one are made from percussion bulbar flakes; the one exception is a small modified cobble. Fifteen tools were struck from broadly flaked cores and 5 were stripped from unmodified cobbles. Sixteen are made of basaltic rock, 4 of

granite, and 1 of chert (Plate 3a, top row).

1. Flake scrapers struck from prepared cores: (15 specimens; 13 basalt, 1 granite, 1 chert) Most of these tools are broadly convex on the scraping edge which lies opposite the bulbar end. The working edge is thick and in several instances has been additionally modified with small secondary percussion flakes.

Length	5.3 to 8.8 cm.; average 6.6 cm.
Width	3.5 to 8.4 cm.; average 6.4 cm.
Thickness	0.8 to 3.2 cm.; average 2.7 cm.

2. Primary flake scrapers: (5 specimens; 3 granite, 2 basalt) These tools differ from the above in that the outer convex face is the original cortex of the cobble. They are also thinner and smaller than the flake scrapers made from the chipped cobble cores.

One tool is long and narrow with one side rudely chipped; the other long side and narrow side opposite the bulb of percussion have also seen a great deal of wear for cutting and/or scraping. The second is broadly convex and unmodified except by heavy use wear. Another has been altered across the thick bulbar end and used extensively on the thin convex edge as well. The fourth is a thick, wedge-shaped flake with the end opposite the bulb slightly chipped and signs of wear along another sharp edge. The last and largest specimen has a series of uneven flakes removed from two sides giving the tool a crudely serrated edge.

Length	5.6 to 10.0 cm.; average 6.0 cm.
Width	5.0 to 6.5 cm.; average 6.0 cm.
Thickness	1.0 to 1.5 cm.; average 1.2 cm.

3. Small modified cobble scraper: (1 specimen, basalt) A small flattish cobble has been chipped along a convex edge and several small flakes have been removed to make a thinned working edge. It is 4.8 cm. long, 3.8 cm. wide and 1.3 cm. thick.

Unmodified Flake Knives

Twenty-six primary cobble flakes with no modification except use wear have been classified as flake knives (one tool is a flake which has been detached from a scraper-plane base). All these flake tools share one important characteristic: they have a ledge-like shelf or platform where the index finger of the right hand can rest comfortably so that the thin, sharp edge showing wear is in excellent position for use to create a cutting tool.

The stone types represented are: 19 basalt, 2 granite, 2 chert, 1 red jasper, 1 quartzite, and 1 fine sandstone (Plate 3a, bottom row).

Length	4.0 to 9.1 cm.; average 5.7 cm.
Width	3.3 to 7.1 cm.; average 4.3 cm.
Thickness	0.7 to 2.7 cm.; average 1.4 cm.

TABLE 24

Depth Distribution of Cobble Tools:

Scraper Planes, Flake Scrapers and Unmodified Flake Knives

Depth		Scraper planes	Flake scrapers	Unmodified flake knives
0-6:	T	-	-	1
	M	-	1	-
6-12:	T	-	-	-
	M	-	-	-
12-18:	T	3	-	1
	M	2	2	2
18-24:	T	6	2	1
	M	2	2	2
24-30:	T	4	2	3
	M	3	2	4
30-36:	T	1	-	1
	M	1	3	2
36-42:	T	2	-	-
	M	-	-	4
42-48:	T	3	-	1
	M	1	4	3
48-54:	T	-	1	-
	M	1	2	-
54-60:	T	-	-	-
	M	1	-	1
Total:	T	19	5	8
	M	11	16	18
Total		30	21	26

Discussion

In comparing the occurrence of large chipped stone tools from the various tables, it will be seen that except for 1 cobble flake scraper and 1 unmodified cobble flake knife, no others occurred in the top 12 inches of the midden. Lack of the more massive stone tools in the top levels may be attributed to rodent activity, but stubby drills of considerable size were found in the upper levels and many of these were at least as large and as

TABLE 25

Comparative Depth Distribution of Cobble Tools:
Scraper planes, Flake Scrapers and Unmodified Flake Knives

Depth		0-12	12-24	24-36	36-48	48-60	Total
Report of							
Scraper planes	1959	-	-	-	-	-	0
	1961	-	2	3	1	-	6
	1963	-	13	9	6	2	30
Flake scrapers	1959	1	1	2	4	1	9
	1961	-	-	3	1	-	4
	1963	1	6	7	4	3	21
Flake knives	1959	-	-	-	-	-	0
	1961	1	1	2	1	-	5
	1963	1	6	10	8	1	26

heavy as several of the smaller scraper planes, flake scrapers and unmodified flake knives. The relative paucity of cobble flake waste in the upper levels also accords with the distribution of cobble flake tools--and many large pieces of chert were similar to the cobble waste flakes in size. It would not appear, therefore, that size and weight alone have conditioned the concentration of cobble tools and cobble waste flakes.

Considering the large quantity of scraper planes, cobble flake scrapers and unmodified flake knives collected, the writer must take pains to point out the complete lack of two of these three types of tools from the excavations of the 1950's. Dr. Charles Rozaire, who excavated at LAn-52 in 1951, is quite certain that no scraper plane tools, of the type shown him by the writer, were in evidence at the time (personal communication).

Unmodified flake knives are not readily recognized; pains-taking examinations of all the chipping waste and the patterns of use wear are required to isolate them. It is unlikely that such examination was made during the excavations by the ASA and UCLA, and, all the chipping waste was not collected by either field group during their salvage operations. It might also be mentioned that these particular tools were deliberately kept in mind both in the field and during analysis of the stone chipping waste. Since the latest excavation was not a salvage operation and its purposes were quite different from that of the excavators of the 1950's, it was possible to concentrate on specific, but not readily recognized, tools.

TABLE 26

Quantitative Distribution of Stone Materials
in the Large Chipped Stone Assemblage

Basic Form	Basalt	Granite	Quartzite	Chert	Sandstone	Chalcedony	Jasper	Total
Hammerstones	5	4	6	1	-	-	-	16
Chipping hammers	3	1	1	-	4	-	-	9
Choppers	10	1	1	-	-	-	-	12
Pecking stones	2	-	-	-	-	-	-	2
Cores	-	-	-	-	-	1	-	1
Scraper planes	28	1	-	1	-	-	-	30
Flake scrapers	16	4	-	1	-	-	-	21
Flake knives	19	2	1	2	1	-	1	26
Total	83	13	9	5	5	1	1	117
% of Total	71%	11%	8%	4%	4%	1%	1%	100%

TABLE 27

Comparative Percentages of Large Chipped Stone Artifacts*

Basic Form	Percent in Report of		
	1959	1961	1963
Hammerstones	33%	26%	13%
Chipping hammers	12%	--	8%
Choppers	--	13%	10%
Pecking stones	--	13%	2%
Cores	20%	--	1%
Scraper planes	--	20%	26%
Flake scrapers	35%	13%	18%
Flake knives	--	15%	22%

*--represents % of Large Chipped Stone Assemblage only

Pecked and Ground Stone

A relatively small but representative group of pecked and ground stone objects was recovered; most of them are primarily intended for the preparation of vegetal foodstuffs. Included in the total assemblage of 38 specimens are milling stones, miniature grinding stones, manos, polished pebbles, a miniature mortar, anvil stones, pestles and portable bowls or mortars.

1. Milling stones: (5 specimens; 1 complete, 1 nearly complete and 3 small fragments. All are made of sandstone.) The complete specimen is slab in form; the nearly complete one has a shallow basin.

A. Slab milling stone: (1 specimen, coarse grey sandstone) This complete, ovoid-shaped milling stone was recovered in excavation unit M16 at 30", but it does not appear to have been in association with the rock feature in the same unit and approximately at the same depth.

Pecking has shaped the perimeter and base but grinding is not well-defined. The base is somewhat convex and peck marks are broad, unevenly distributed and deep, especially in the center. The slab of stone was either naturally thicker on one long convex side or use has given a downward slant to the grinding surface. Resharpening marks are evident on the major part of the upper surface;most of them are small and shallow and they extend nearly to the rim of the slab.

Maximum length	36.3 cm.
Maximin width	32.2 cm.
Maximum thickness	8.3 cm.
Minimum thickness	5.0 cm.

B. Shallow basin milling stone: (1 specimen, coarse grey sandstone) Slightly over half of an extremely well-made, round milling stone was recovered from Feature #1 at 16" below the surface (See Feature #1). The tool is carefully pecked and ground down all around the perimeter; the base is flattened and also completely evenly pecked and finished--except for one small but not noticeable bump at one end. The shoulders are well defined and thickness is even all around the edge.

Extrapolating, the diameter would be about 30.5 cm. The edge thickness is 6.5 cm.; in the center the thickness is 4.8 cm., leaving a maximum depth of the grinding area of 0.7 cm. Resharpening marks are evenly distributed, small and shallow.

C. Milling stone fragments: (3 specimens) The central portions of three more rudely fashioned grinding stones were also found. They are from slab or slightly basined forms and all are fire-burnt and cracked.

The first has a nearly flat, rough base which is the natural contour of the stone. The upper surface is quite smooth and resharpening marks are well ground down. It is 6.0 cm. thick. The second fragment is coarse-grained and has a shaped, nearly flat base. The stone is heavily worn on the grinding surface; resharpening marks are still visible. It is 4.0 cm. thick. The last fragment is quite small and resembles in all aspects the second one mentioned above. However, it was found in the other trench and probably is a section of another tool.

2. Miniature grinding stones: (2 specimens, 1 broken) The complete tool

is made on a naturally flat, triangular cobble of extremely coarse-grained, light brown sandstone, which weathers at the touch. On one face, in the center, some few resharpening marks are still evident. There is no other modification. It is 19.0 cm. long, 13.0 cm. wide, and 6.3 cm. thick. It was found on sterile base in T24 at 53" with a cobble mano (Plate 3b, top row, left).

The broken specimen is of fine-grained grey sandstone, also a naturally flat cobble. However, it has been modified along the sides and there are several scattered peck marks on the upper surface. It is presently 12.2 cm. long, 12.5 cm. wide and 4.5 cm. thick at the break and 3.5 cm. thick at the edge (Plate 3b, top row, right).

3. Manos or Handstones: (6 specimens: 3 broken; 4 sandstone cobbles, 2 quartzite) All the manos in this group are monofacial and none show much use. Shoulders are not defined. All have convex grinding faces except one which is flat. All but one, of quartzite, have resharpening marks. Three have definite pitted areas in the center, and none are battered on the ends from use as hammers.

Length	9.3 to 12.5 cm. (for 3 complete tools)
Width	6.5 to 6.9 cm.; average 7.3 cm.
Thickness	2.8 to 4.8 cm.; average 3.3 cm.

4. Polished stones: (3 specimens) All three small sandstone pebbles were found together in a cache at 30-36" in unit M15. Each has a slight polished area from rubbing on one surface. Two are almost exactly the same size.

	a and b	c
Diameter	2.3 cm.	3.8 cm.
Thickness	0.8 cm.	1.2 cm.

5. Miniature paint mortar: (1 specimen) This small, shallow cobble was pecked and ground roughly into the shape of a ball and a depression pecked and worked out at one end. Thin spalls have broken off in three areas. Nevertheless, it stands upright even though the base is deeply convex. The grey sandstone is quite fine. Tiny flecks of red ochre are imbedded in the interstices of the peck marks in a number of places (Plate 3b, bottom row).

The maximum diameter at the waist is 10.5 cm.; it tapers to 8.5 cm. at the top. The diameter of the concavity is 6.4 cm., and its maximum depth is 2.5 cm.

6. Anvil stones: (2 specimens) (Plate 3b, center row)

A. A hand-size coarse-grained, oval sandstone cobble has a wide but shallow pit in the center of one flat face. It also has a small depression

near the bottom on one side, but this appears to be fortuitous. It is 10.0 cm. long, 6.3 cm. wide and has a maximum thickness of 5.2 cm. The pitted area is 2.8 by 2.2 cm. and 0.4 cm. deep in the center.

B. A very battered, coarse-grained, wedge-shaped sandstone cobble is pitted on both faces. The flat face has a shallow pit which measures 2.7 by 1.8 cm. and is 0.3 cm. deep. The more convex face has a larger and deeper pit which is 3.0 by 2.5 cm. and 0.6 cm. deep. Both ends and the thicker convex edge are abraded from pounding; the thin edge has been ground down on both sides. Over-all it is 8.7 cm. long, 6.0 cm. wide and 2.7 cm. thick on the convex edge and 1.0 cm. thick on the straight edge.

7. Pestles:(13 specimens, 7 tools complete or nearly so and 6 median fragments) Most of the tools are well-shaped and finished to a high degree. All are more or less round in cross section. Of the complete tools 5 are conical and 2 are cylindrical (Plate 3c).

A. Conical: (5 specimens; 4 fine sandstone, 1 coarse sandstone) All are carefully worked and polished. Three have sharp shoulders which divide the body from the convex, worked distal end. They all taper from a narrower proximal end to a broader distal end. Worn down resharpening marks are barely visible. Two of them ("a" and "b" below), a nearly matched pair, were found side by side.

	a	b	c
Length	14.0 cm.	14.5 cm.	17.8 cm.
Diameter at proximal end	4.1 cm.	3.7 cm.	3.9 cm.
Diameter at distal end	4.9 cm.	5.2 cm.	5.9 cm.

The other two conical pestles are battered and spalled at the distal ends and the larger is shattered at the proximal end as well. Both are fashioned of very fine sandstone. In contradistinction to the tools described above, these two tools taper from a broader proximal end to a narrower distal end. There are no definite shoulder lines on these tools, and they taper evenly to a broadly convex working end. The smaller has flecks of asphaltum imbedded in the abrasion marks on the spalled end. The larger was found in Feature #2 near the "killed" bowl and other unmodified rocks.

	a	b
Length	11.0 cm.	13.2 cm.
Diameter of proximal end	5.5 cm.	6.2 cm.
Diameter of distal end	3.8 cm.	4.9 cm.

B. Cylindrical: (2 specimens; 1 sandstone, 1 felsite) Both tools are made of cobbles which have been ground down more or less to make them symmetrical. The felsite tool has a definite shoulder at the distal end,which has seen considerable use and shows resharpening marks as well. The proximal end also has a slightly abraded surface. One side has a marked natural bulge and the other is somewhat flat.

The other pestle is the largest in this category of tools. The distal end is extremely battered and abraded from use, but the tool appears to have been used more in a pounding action than a rubbing one as there is no shoulder line. The proximal end is shattered and the whole surface is completely fire-blackened.

	felsite	sandstone
Length	21.3 cm.	23.3 cm.
Maximum diameter	8.5 cm.	9.2 cm.

C. Median fragments: (6 specimens; 4 sandstone, 1 siltstone, 1 sandstone conglomorate) The fragments exhibit varying degrees of finish, but are all regular in shape. The 5 smaller ones range from 4.8 to 6.0 cm. in diameter. The largest, of sandstone conglomorate, is from a much heavier and larger cobble; it is 8.5 cm. in diameter at the break and is blackened by fire. The other fragment is also badly burnt and spalled.

8. Portable bowls or dressed mortars: (6 specimens; 1 "killed", 3 rim fragments, 1 side wall and 1 basal fragment. Five are made of sandstone, 1 of quartzite and 1 basal fragment of vesicular basalt)

A. "Killed" bowl: This finely dressed sandstone bowl or mortar was recovered in Feature #2. It is polished inside and out, has a flat base and gently curved rim. The bottom has been knocked out and part of the side wall is missing. On the outside of the rim, where a small piece had once been broken off, asphaltum covers the area, and presumably it had served to mend the spalled section. A curious aspect of this bowl is that where the bottom has been broken through, the edge is not rough or jagged, but smoothed as though the bowl had seen use after the bottom was gone. However, the hole is much too small to have served as part of a basket-hopper. The texture of the stone is very fine (Plate 3d).

Height	15.0 cm.
Diameter at rim	24.0 cm.
Maximum diameter at waist	28.0 cm.
Diameter of flat base	12.0 cm.
Depth from rim to basal break	13.0 cm.
Maximum thickness of waist wall	5.1 cm.
Thickness at base	2.0 cm.
Thickness of rim	2.0 cm.

B. Body fragments: (5 specimens) The 3 rims are all gently curved and resemble the one described above. Workmanship is fine; all the bowls or mortars are polished both inside and outside. All are from relatively large bowls, not too disimilar to the "killed" bowl. Thickness of the fragments ranges from 3.7 to 5.0 cm.

A side wall fragment of a large bowl is 5.0 cm. thick; it is made of quartzite. The basal fragment, of vesicular basalt, has been smoothed on the inside; the outside is not so well finished. It is 4.2 cm. thick. This is the only example of vesicular basalt recovered.

TABLE 28

Depth Distribution of Pecked and Ground Stone Artifacts

Depth		Milling stones	Manos	Anvil stones	Pestles	Bowls/ mortars	Polished pebbles	Total
0-6:	T	-	-	-	-	-	-	0
	M	-	-	-	-	-	-	0
6-12:	T	-	-	-	-	-	-	0
	M	-	-	-	-	1	-	1
12-18:	T	-	-	1	1	-	-	2
	M	2	-	1	-	-	-	3
18-24:	T	1	-	-	2	-	-	3
	M	-	-	-	1	1	-	2
24-30:	T	1	-	-	2	-	-	3
	M	-	-	-	-	-	-	0
30-36:	T	-	-	-	-	-	-	0
	M	1	-	-	2	2	3	8
36-42:	T	-	-	-	1	1	-	2
	M	-	-	-	-	-	-	0
42-48:	T	-	1	-	1	-	-	2
	M	1[a]	-	-	1	1	-	3
48-54:	T	1[a]	2	-	-	-	-	3
	M	-	3	-	1	1[b]	-	5
54-60:	T	-	-	-	-	-	-	0
	M	-	-	-	1	-	-	1
Total:	T	3	4	1	7	1	-	16
	M	4	2	1	6	6	3	22
Total		7	6	2	13	7	3	38

a--miniature grinding stone

b--miniature mortar

TABLE 29

Comparative Depth Distribution of Discrete Clusters of Pecked and Ground Stone Tools

Depth	Report of	0-12	12-24	24-36	36-48	48-60	No Loc.	Total
Milling stones	1959	1	1	1	-	-	-	3
	1961	-	-	-	-	-	-	0
	1963	-	3	2	1	1	-	7
Manos	1959	5	1	2	2	-	1	11
	1961	-	-	1	-	-	-	1
	1963	-	-	-	1	5	-	6
Pestles	1959	9	7	3	1	1	-	21
	1961	-	1	2	-	1	-	4
	1963	-	4	4	3	2	-	13
Bowls or mortars	1959	10	6	4	1	-	-	21
	1961	-	2	-	-	-	-	2
	1963	1	1	2	2	1	-	7
Anvil stones	1959	1	-	1	-	-	-	2
	1961	-	-	-	-	-	-	0
	1963	-	2	-	-	-	-	2
Total	1959	26	15	11	4	1	1	58
	1961	-	3	3	-	1	-	7
	1963	1	10	8	7	9	-	35
Total		27	28	22	11	11	1	100

Discussion

While the proportion of milling stones and manos seems to be compatible, it is not quite clear in what the pestles were used. The bowls are all dressed inside and out; none show any signs of use on the insides, and if they were actually used as mortars, they certainly had very little use. No rude mortars, as are often found for processing acorns, appear to be present in this assemblage although both well-finished bowls and obviously used mortars have been found at the site in the earlier excavations. In order for the several pestles to have acquired such sharp shoulders some evidence of ridging should have been evident on the bowl fragments--and none was in evidence. Inspection of a number of mortars from other late coastal sites showed clear-cut marking from the use of pestles in them.

Distribution patterns of grinding tools is quite different in the pre-

sent assemblage than that recorded in 1959. In the earliest report, the shallow depth found in the midden area forced the concentration of both the milling stone-mano and mortar-pestle complexes within the 36" of deposit and their use appears to have been contemporaneous. In this latest excavation, distribution is scattered from 12-60" with the major part of the artifacts lying in the 12-48" levels--with the exception of the manos, nearly all of which lay near the bottom and which rarely showed much wear. Yet the milling stones, few in number, all lay considerably higher in the midden than the manos. Obviously, any relationships concerning the temporal use of milling stone-mano and mortar-pestle usage could only be made from a larger sampling than the present one.

Polished Stone Assemblage

Recovery in polished stone was meager with a total of 30 specimens. Most of the objects are ornaments of steatite, serpentine and various grades of fine sedimentary rocks. Slate is represented by a number of file or punch-like objects, a possible crude whale-like effigy, and a large spatulate object whose function is unknown.

1. Work in steatite: (11 specimens) Ornaments and work in steatite are simple and lacking in refinement. All of the pieces were found above 30".

A. Tubular beads: (3 specimens) All 3 crude steatite tubes are biconically drilled. The holes are irregular and apt to be slightly off-center. The exterior finish is casual. The smallest ("a" below) is smoothly polished on the ends and nearly square in cross section; the other two are more or less round in cross section (Plate 4a, third row).

	a	b	c
Length	1.2 cm.	1.3 cm.	1.8 cm.
Diameter	0.9 cm.	1.3 cm.	1.6 cm.
Diameter of hole	0.4 cm.	0.7 cm.	1.0 cm.

B. Disk bead: (1 specimen) A roughly polished disk bead has a conically drilled hole. One face is flat, the other slightly convex. It is 0.7 cm. in diameter, 0.4 cm. in thickness; diameter of the hole is 0.2 cm.

C. Pendant: (1 specimen) A tear-shaped ornament is thinned at the narrow end where a hole has been punched through a broad, shallow depression. There are 2 other natural depressions on the same convex face. The other face has been polished fairly smooth. Length 1.8 cm., width 1.6 cm.,

thickness in the center 0.5 cm. The hole is oval--0.3 by 0.2 cm. (Plate 4a, second row, extreme left).

D. Bowl rim fragment: (1 specimen) A 4.0 cm. long section of a shallow bowl has a thin curved rim, flat outer side wall and polished concave interior. The base is not modified, but naturally flat. Across one broken end of the base the soft stone is criss-crossed with deep striations. The maximum thickness is 2.0 cm.

E. Comal fragment: (1 specimen) The section of a comal is roughly polished on both faces and remaining edge. One face is convex, and the other flat. Traces of burned sand and charcoal can be seen around the rim of the convex base. It is presently 8.0 cm. long, 6.3 cm. wide and has a maximum thickness of 3.2 cm.

F. Polished steatite fragments: (4 specimens) Three pieces are too small to identify but all show polish or modification. The last may be the broad rim of a vessel as it is carefully curved and polished--but only 3.2 cm. long and 2.5 cm. wide; it is 1.5 cm. thick.

2. Serpentine beads: (6 specimens) Only the two largest beads are biconically drilled. All but one bead are well made with smoothly polished faces and sides, and all the holes are well-placed in the center of the disks.

Diameter	0.5 to 1.0 cm.; average 0.7 cm.
Thickness	0.2 to 0.4 cm.; average 0.2 cm.
Diameter of hole	0.2 to 0.4 cm.; average 0.3 cm.

3. Ornaments of fine sedimentary stone: (5 specimens; 2 shale, 1 siltstone, 1 mudstone, 1 fine sandstone)

A. 1-hole disk ornaments: (3 specimens) Two of the ornaments are fairly large disks; the last is a small disk bead. The 2 larger disks are broken across the central holes (Plate 4a, top row). The smaller of the broken ornaments is made of mudstone, not quite regular in shape and only superficially polished on one face; the other face is ground down smoothly. The larger broken ornament, of a very soft, greenish-grey shale, is well polished; striations on one face are probably fortuitous. Both disks are biconically drilled.

The small disk bead is made of fine sandstone. The outer edge is not rounded off but angular; both faces are polished. The hole is conical.

	mudstone	shale	sandstone
Diameter	4.4 cm.	3.4 cm.	0.8 cm.
Thickness	0.6 cm.	0.5 cm.	0.2 cm.
Diameter of hole	0.7 cm.	0.5 cm.	0.15 cm.

B. Disk blanks: (2 specimens) The smaller, of shale, is a thin, roughly shaped circular stone with some grinding on the edges and faces. It is 1.3 cm. in diameter and 0.25 cm. thick. The larger, of pale tan siltstone, is a natural pebble which has been slightly modified to make it nearly round. One face has some polish; the other is somewhat naturally fractured. It averages 2.5 cm. in diameter and is 0.5 cm. thick.

4. Polished slate: (7 specimens) The group of slate objects is of special interest in that the use or function of the specimens is altogether problematical.

A. File or punch-like objects: (3 specimens) All three tip fragments are most carefully polished and made of blue-black slate. While they look like files, they show no abrasion on the sides or flat faces. Only the tips show some wear and it appears as though they were used for punches in piercing soft materials (Plate 4a, bottom row).

Present length	2.9 to 4.2 cm.
Width at break	0.5 to 1.0 cm.
Thickness	0.3 to 0.35 cm.

B. Pencil-like object: (1 specimen) The tip end of a well polished object is round in cross section and also shows wear on the blunt tip. The stone is similar to that of the slimmer, flatter objects described above. The fragment is 2.8 cm. long and 1.0 cm. in diameter at the break (Plate 4a, second row, extreme left).

C. Effigy-like object: (1 specimen) A hump-backed, whale-like piece of dark slate resembles the one pictured in Figure 115d of the 1959 report (Curtis 1959, p. 106). However, it has no mouth-like incision at one end. The fine-grained stone has been polished to make a flat, narrow base; the sides are not modified but polish marks are evident on the upper rim across the hump and down the sides. It is 5.1 cm. long, averages 1.0 cm. in thickness and is 1.9 cm. wide at the center of the hump (Plate 4a, second row, center).

D. Polished stone: (1 specimen) A long, slender, slightly tapering, flat slate pebble has been polished across the convex narrower end and has some slight polish on one long flat face as well. It is also foliated at the narrow polished end, but this appears to be natural. The length is 7.7 cm.; it tapers from 1.3 to 0.8 cm., and is 0.7 cm. thick.

E. Spatulate object: (1 specimen) An unusual, large, wedge-shaped piece of dark, blue-black slate has been modified in a number of ways. Both

the narrow and broad curved ends have been polished smooth on the edges. One long, slightly convex edge is bevelled and polished, and the polish marks extend in a gentle curve across the face area adjacent to that edge. The opposite edge is foliated and along the rough edge several small spots show polishing marks. Its maximum length is 22.8 cm.; it is 10.3 cm. wide at the broader end and tapers to about 2.5 cm. at the narrower end. The maximum thickness is 2.3 cm. (Plate 4b).

F. Phyllite polished pebble: (1 specimen) A long, slender pebble has polish marks on one face and across both rounded ends. One face is also ground down but the other is unaltered except for spalls missing at the broad end. The slightly narrower end shows some abrasion. It is 5.5 cm. long, 1.2 cm. wide, and 0.6 cm. thick.

TABLE 30

Depth Distribution of Polished Stone Artifacts

Depth		Steatite orn.	Misc. steatite	Serpentine	Sed. stone ornaments	Slate punches	Misc. slate	Total
0-6:	T	-	-	-	-	-	-	0
	M	1	1	-	-	-	-	2
6-12:	T	-	1	1	-	-	1[d]	3
	M	-	-	1	1[a]	-	-	2
12-18:	T	-	2	3	-	-	-	5
	M	2	1	-	-	-	1[e]	4
18-24:	T	1	-	-	1[b]	1[c]	-	3
	M	-	-	-	1[b]	-	-	1
24-30:	T	1	-	-	-	1	-	2
	M	-	1	1	1[a]	-	-	3
30-36:	T	-	-	-	-	1	-	1
	M	-	-	-	1[a]	1	-	2
36-42:	T	-	-	-	-	-	-[f]	0
	M	-	-	-	-	-	1	1
42-48:	T	-	-	-	-	-	-	0
	M	-	-	-	-	-	1	1
48-60:	T	-	-	-	-	-	-	0
	M	-	-	-	-	-	-	0
Total:	T	2	4	4	1	3	1	15
	M	3	2	2	4	1	3	15
Total		5	6	6	5	4	4	30

a--1-hole disks
b--disk blanks
c--pencil-like object
d--spatulate object
e--effigy-like object
f--polished slate pebble
g--polished phyllite pebble

TABLE 31

Comparative Depth Distribution of Discrete Clusters of Polished Stone Artifacts

Depth	Report of	0-12	12-24	24-36	36-48	48-60	No Loc.	Total
Steatite ornaments	1959	5	2	1	-	1	-	9
	1961	-	-	-	-	-	-	0
	1963	1	3	1	-	-	-	5
Steatite bowls and fragments	1959	6	5	3	4	2	1	21
	1961	1	1	-	-	-	-	2
	1963	-	1	-	-	-	-	1
Arrow-shaft straight.	1959	3	-	-	-	-	-	3
	1961	-	-	-	-	-	-	0
	1963	-	-	-	-	-	-	0
Misc. steatite tools	1959	8	2	-	1	-	-	11
	1961	-	-	-	-	-	-	0
	1963	2	2	1	-	-	-	5
Serpentine ornaments	1959	1[a]	1	1	1	-	1	5
	1961	2	2	-	-	-	-	4
	1963	2	3	1	-	-	-	6
Fine sed. stone ornaments	1959	-	2	-	-	-	-	2
	1961	1	1	-	-	-	-	2
	1963	1	2	2	-	-	-	5
Slate ornaments and tools	1959	3	-	1	-	-	1	5
	1961	-	-	-	-	-	-	0
	1963	1	2[b]	3	2	-	-	8
Misc. sed. stone objects	1959	9	6	1	-	-	-	16
	1961	-	-	-	-	-	-	0
	1963	-	-	-	-	-	-	0
Total	1959	35	18	7	6	3	3	72
	1961	4	4	-	-	-	-	8
	1963	7	13	8	2	0	0	30
Total		46	35	15	8	3	3	110

a--effigy

b--one is the effigy-like object

Discussion

The small quantity of any type of polished stone artifacts makes comparisons among the 3 reports difficult. The substantial recovery of steatite bowls and bowl fragments made in the excavations of the 1950's by the

TABLE 32

Polished Stone Artifact Comparisons

Artifact Types	Report of 1959	1961	1963
Steatite			
tubular beads	-	-	3
disk beads	9	-	1
pendants	-	-	1
bowls and fragments	21	2	1
comals	4[a]	-	1
polished fragments	7	-	4
arrow-shaft straighteners	3[c]	-	-
Serpentine ornaments	5[b]	4	6
Fine sedimentary stone ornaments			
1-hole disks	-	-	3
disk blanks	-	2	2
pendants	4	-	-
misc. objects	9	-	-
Metamorphic rock artifacts			
punch-like objects	-	-	4
effigy	-	-	1?
beads	5	-	-
spatulate object	-	-	1
misc. polished objects	5	-	2
Total	72	8	30

a--one is made from a bowl fragments; b--one is a fish effigy; c--one is made from a bowl rim fragment

ASA and UCLA was not duplicated in the later excavations by the author. Also of interest is the fact that not a single arrow-shaft straightener has been recovered since the earliest reported diggings.

From this latest excavation as well as in previous ones, most of the steatite and serpentine came from the upper levels--except those few found in the burials in 1954. None of the steatite or serpentine is of special workmanship; that from the latest excavation even more crude than previously reported in 1959 and 1961.

The total listing of all polished stone material was made to show that no certain ceremonial objects or fancy items were found. The small serpentine fish effigy reported in 1959 and the possible effigy recovered during this excavation are the only objects to which no certain functional use can be attributed.

It would seem as though primary emphasis on decoration centered on the use of the many shell types easily available and more easily worked than stone. Otherwise, polished stone objects are confined to small and slender tools and limited, in the main, to the fine-grained sedimentary and schistose metamorphic rocks. These latter did not have to be imported or acquired in trade, either. Only steatite was worked in any quantity--no doubt due to the softness and luster of the stone. An additional value in steatite lay in its reworkability if the original object was broken.

The unusual spatulate object may have served as some sort of tool. However, the time lavished on polishing and bevelling a stone which foliates so easily militates against some postulated use such as a wedge, pounder, root digger, etc. It would appear that some effort went into the preparation of this object into some sort of non-functional artifact--possibly for ceremonial use.

Asphaltum, Asphaltum Plugs and Asphalted Stones

1. Asphaltum: Lumps of asphaltum of varying sizes were found sporadically throughout the excavation. No doubt very small pieces fell through the 1/4 inch screens. Those small pieces recovered are amorphous in shape and are probably broken from larger pieces.

The largest piece, which fell apart during screening, was probably at least 10.0 by 10.0 by 3.0 cm. It is encrusted with dirt, mussel fragments and other detritus. A somewhat smaller piece, 9.3 by 5.2 by 2.7 cm. was recovered in the 54-60" level of excavation unit M16. It, too, has broken shell adhering to one surface; the other surface has only some fine beach-like sand imbedded in it in several places.

TABLE 33

Depth Distribution of Asphaltum Lumps

Depth	0-6	6-12	12-18	18-24	24-30	30-36	36-42	42-60	Total
T	-	3	1[a]	3	-	1	1[a]	1[b]	10
M	-	-	1[a]	-	-	5	-	-	6
Total	0	3	2	3	0	6	1	1	16

a--large fragment; b--large fragment found at 54-60"

2. Asphaltum plugs: (6 specimens) The surface of these small plugs of asphaltum are clean, hard and appear squeezed and very compact. For this reason they have been considered as possible plugs rather than just other amorphous pieces. They are all approximately the same size and average 1.5 by 1.0 by 0.7 cm. Several other pieces may have been similar but they are broken and have abraded surfaces, so it is impossible to tell if they were, in fact, plugs. These latter were thus included with the amorphous lumps.

Three plugs were found together in T21 at 0-6"; one came from T22 at 12-18", and the other 2 from T25 at 12-18".

In 1959 a total of 110 asphalted plugs were reported and their depth range was from surface to 52" in the burial area. These latter specimens---considered to have been used in the manufacture of wooden plank boats and also possibly to have come from small wooden boxes in which it was claimed tightly flexed burials were placed--are described in detail by Curtis(1959, p. 104). The test excavation of 1960 did not produce any asphaltum plugs.

3. Asphalted stones: (9 specimens) These small pebbles and cobbles are covered with a thin coat of asphaltum. One broken pebble is tarred across the break. None show any sign of modification beneath the asphaltum.

Length	3.0 to 5.6 cm.; average 4.2 cm.
Width	2.5 to 4.7 cm.; average 3.1 cm.
Thickness	1.4 to 3.8 cm.; average 2.5 cm.

TABLE 34

Comparative Depth Distribution of Asphalted Stones

Report of	0-12	12-24	24-36	36-48	48-60	Total
1959	3	3	2	2	-	10
1961	-	-	2	1	-	3
1963	1	2[a]	3[a]	2	-	8
Total	4	5	7	5	-	21

a--one of the total is from Trench T; all the rest are from Trench M.

Ochre

A total of 48 small pieces of ochre was collected from the 2 trenches. They range in size from that of a small pea to that of an almond nut. Most of the larger pieces are coarse-grained and orange or orange-brown in color; the smaller pieces are frequently medium to fine-grained and of a deeper

and richer red hue.

No red ochreous stain was found on any of the skeletal material as was reported from earlier excavations at LAn-52.

TABLE 35

Depth Distribution of Ochre

Depth	0-6	6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-60	Total
T	1	1	-	6	9	-	1	1	-	19
M	2	9	2	9	2	5	-	-	-	29
Total	3	10	2	15	11	5	1	1	-	48

Shell Artifacts

The worked shell inventory consists of beads, pendants and other ornaments, ornament blanks, a possible scraper, and fishhook fragments--a total of 318 specimens.

For description, the above have been separated by shell type. Where possible, Gifford's (1947) classification will follow each type in brackets.

1. Olivella biplicata (The Purple Olive)

A. Body wall beads: (173 specimens) The majority of the Olivella beads are roughly round and more or less deeply cupped. Most have rudely fashioned perimeters; the conically drilled holes are frequently off-center. The largest beads tend to be more deeply cupped and more oval in outline.

a. Small, disk-shaped, slightly concave: (2 specimens) Both of these small beads were recovered in Microanalysis pit M14 in the 1/8" mesh. Outlines are very regular. They are almost exactly the same size. [X3bI]

Diameter	0.4 cm.
Thickness	0.1 cm.
Diameter of hole	0.1 cm. and 0.15 cm.

b. Medium, disk-shaped, concave: (16 specimens) The beads in this small group tend to be fairly regular in outline but not so consistently as in the smallest specimens described above. [X3bI]

Diameter	0.5 to 0.65 cm.; average 0.6 cm.
Thickness	0.1 to 0.15 cm.; average 0.15 cm.
Diameter of hole	0.1 to 0.2 cm.; average 0.15 cm.

c. Large, disk-shaped, concave: (121 specimens) This comprises the largest individual sub-type of shell ornament. The beads are variable

in degree of finish but most are only crudely shaped and rudely round--due to indifferent polish, incompleteness or fortuitous abrasion. [X3bI]

Diameter	0.5 to 0.65 cm.; average 0.6 cm.
Thickness	0.1 to 0.15 cm.; average 0.15 cm.
Diameter of hole	0.1 to 0.2 cm.; average 0.15 cm.

d. Large, oval, concave: (19 specimens) The beads in this group are similar to those in group "c" above but are slightly longer than they are wide and more deeply cupped. [X3bI]

Length	0.7 to 1.1 cm.; average 0.9 cm.
Width	0.6 to 1.0 cm.; average 0.8 cm.
Thickness	0.1 to 0.2 cm.; average 0.15 cm.
Diameter of hole	0.1 to 0.2 cm.; average 0.2 cm.

e. Large oval, deeply concave with shelf-like trace of inner whorl at one end: (10 specimens) Similar to group "d" above in manufacture is this group but the shell for the bead was cut higher up so that the whorl is incorporated into one end of the bead. [X2b]

Length	0.7 to 1.0 cm.; average 0.9 cm.
Width	0.6 to 0.9 cm.; average 0.8 cm.
Thickness	0.1 to 0.2 cm.; average 0.15 cm.
Diameter of hole	0.1 to 0.25 cm.; average 0.2 cm.

f. Large, oval, deeply concave with one edge thicker: (2 specimens) [X3bII]

Length	1.1 cm.
Width	0.9 cm. and 1.0 cm.
Thinner edge	0.1 cm. and 0.15 cm.
Thicker edge	0.2 cm. and 0.3 cm.
Diameter of hole	0.15 cm. and 0.2 cm.

g. Bead blanks: (3 specimens) Two of the 3 blanks have the hole completed but the outer perimeters have never been ground down. The third is a fragment of an Olivella body wall with a hole started at one end but the hole has not penetrated to the other side; the outer edge is jagged.

B. Whole shell, spire-lopped: (53 specimens) Only 7 of these shells show definite grinding at the spire tip; the rest of the tips are either naturally weathered off or were broken off and no further finish applied. The size of the hole at the top of the spire varies from pinpoint to that caused by the removal of the first two whorls. Several have holes opposite the top of the aperture near the beginning of the largest whorl; these holes are attributed to the carniverous snails, Nassarius fossatus (The Channeled Basket Shell), and/or Polinices reclusianus (The Southern Moon Shell). [?b] The dimensions of the 46 unground specimens are as follows:

Length	0.7 to 2.4 cm.; average 1.7 cm.
Width	0.5 to 1.3 cm.; average 1.0 cm.
Diam. of hole	pinpoint to 0.4 cm.; average 0.25 cm.

Dimensions of the 7 ground specimens:

Length	0.8 to 1.7 cm.; average 1.2 cm.
Width	0.6 to 1.0 cm.; average 0.7 cm.
Diameter of hole	0.1 to 0.25 cm.; average 0.15 cm.

C. Whole shell, top and bottom ground: (1 specimen) The spire end of this ornament is broken off but not ground down; the basal end of the aperture is ground away so that the general shape is barrel-like. The bead is burnt black. [Bla] It is 0.7 cm. long, 0.75 cm. wide and the diameter of the hole at the spire end is 0.3 cm.

2. Conus californicus (The California Cone): (44 specimens) All the shells in this group are spire-lopped and similar to group "B" of the Olivella above. None of the spire ends show any evidence of grinding. Twenty-seven were found in a cache in one pit level; an additional 7 were found in the level above in the same area. These 34 shells were all in the maximum size range. [F3]

Length	1.0 to 2.9 cm.; average 2.0 cm.
Width	0.7 to 1.7 cm.; average 1.4 cm.
Diameter of hole	0.15 to 0.4 cm.; average 0.3 cm.

3. Megathura crenulata (Great Keyhole Limpet)

A. Rings: (3 specimens, one broken) These 3 oval rings were formed by grinding away most of the outer portion of the shell and enlarging the apical opening. The ornament was then further abraded and polished in order to make the rings thin and smooth on both faces (Plate 5c). [H2aI]

	a	b and c
Length	2.0 cm.	2.5 cm.
Width	1.6 cm.	1.8 cm.
Width of ring wall	0.3 cm.	0.35 cm.
Length of opening	1.3 cm.	1.7 cm.
Width of opening	1.0 cm.	1.1 cm.
Thickness	0.2 cm.	0.2 cm.

B. Blanks: (2 specimens) Both limpet fragments show enlargement of the apical opening as in the formation of rings, but the ornaments were never completed, possibly due to having been broken in manufacture. Neither specimen has the surficial growth lines ground away nor has there been any thinning.

4. Mytilus californianus (The California Mussel)

A. Modified: (1 specimen) A fragment of a large and thick mussel has been shaped along one convex edge by grinding. Two deep notches at the narrow end and adjacent to the polished edge give the appearance of 3 saw-like teeth. It is 3.0 cm. long, 2.8 cm. wide and 0.45 cm. thick (Plate 5b).

B. Ornament blank: (1 specimen) A thin, pear-shaped fragment, devoid of epidermis has been shaped by grinding on the outer edge. One end is broken. It may have been intended for a pendant-like ornament. It is presently 2.0 cm. long, 1.3 cm. at its widest point and tapers to 0.8 cm. at the break. It averages less than 0.1 cm. in thickness.

5. Tivela stultorum (Pismo Clam)

A. Scraper? (1 specimen) A thick section of shell appears to have been modified for use as a scraping tool. It is 3.9 cm. long, 2.1 cm. wide and from 0.4 to 0.6 cm. thick (Plate 5a).

B. Blanks: (3 specimens) All 3 pieces of shell show some grinding or modification on the edges. Two are roughly round in shape.

Length	2.0 and 2.4 cm.
Width	1.7 and 2.2 cm.
Thickness	0.3 and 0.4 cm.

The third fragment is roughly half-moon in shape with one deeply convex edge thinned by grinding. The thicker, opposite, deeply concave edge has also been polished. Length 3.0 cm., width 1.6 cm., thickness of concave edge 0.5 cm., thickness of convex edge 0.3 cm.

6. Haliotis (cracherodii or fulgens) (Black or Green Abalone) A total of 14 worked abalone ornaments and blanks was recovered.

A. Beads: (7 specimens)

a. One-hole, flat disk beads, epidermis removed: (5 specimens) All are conically drilled and quite regular in outline. [K1]

Diameter	0.65 to 0.9 cm.; average 0.8 cm.
Thickness	0.05 to 0.15 cm.; average 1.0 cm.
Diameter of hole	0.2 to 0.3 cm.; average 0.25 cm.

b. Square bead with rounded corners and central hole: (1 specimen) The ornament measures 1.0 cm. on each side, is barely 0.1 cm. thick and the hole has a diameter of 0.2 cm. [S]

c. Two-hole bead or button: (1 specimen) This roughly square ornament has a central hole and another hole nearer to one corner. The off-center hole appears to have been punched through as it is larger on one face than the other. The outer edge of the bead has not been ground down smoothly. The sides are 1.1 cm. in length; it is 0.15 cm. thick and the diameter of the hole in the center is 0.2 cm. The other hole varies in

diameter from 0.1 to 0.2 cm. [K3]

B. Pendants: (4 specimens) All are irregular one-hole ornaments with the hole at one end. Two are broken across the hole; one of these is the thin section of the complete pendant. All are conically drilled. [AC2] Two have the epidermis on one face; one is of Haliotis fulgens ("a" below), one of Haliotis cracherodii ("b" below). The other two cannot be identified by species (Plate 5d-g).

	a	b	c	d
Length	1.8 cm.	2.0 (est.)	1.9 (est.)	1.6 cm.
Max. width	1.8 cm.	1.3 cm.	1.6 cm.	1.3 cm.
Min. width	1.5 cm.	1.2 cm.	1.4 cm.	1.1 cm.
Thickness	0.15 cm.	0.15 cm.	0.05 cm.	0.2 cm.
Diam. of hole	0.35 cm.	0.3 cm.	0.5 cm.	0.3 cm.

C. Incised ornament: (1 specimen) A trapezoid-shaped ornament with rounded corners and broken at the wider end, is incised all around the 3 remaining complete sides on the slightly concave face. The convex face has remnants of asphaltum imbedded in it. The epidermis has been removed and the edges thinned before incising. The deepest of all the shell ornaments, it was found on sterile base at 54" in Trench T (Plate 5h).

Present length	2.7 cm.
Width at break	2.7 cm.
Width at opp. end	1.8 cm.
Thickness on edges	0.2 cm.
Thickness in center	0.3 cm.
Average distance between incisions	0.2 cm.
Average length of incisions	0.1 cm.

D. Blank: (1 specimen) A large round piece of Haliotis cracherodii still retains its epidermis but there are signs of alteration around the perimeter. It is 2.7 cm. long, 2.2 cm. wide, and 0.7 cm. thick.

E. Drilled Blank: (1 specimen) A large lip section of thick Haliotis cracherodii has the beginnings of a central perforation on the inside face. The outer edge has been broken to make the fragment nearly round--possibly for a fishhook. It is 4.7 cm. long, 4.3 cm. wide and 0.6 cm. thick. The diameter of the started hole is 0.6 cm. (Plate 5i).

7. Fishhooks: (22 specimens) None of the fishhooks are complete: 3 are shanks and 19 are body fragments. Of the total, 19 are of mussel (Mytilus californianus) and 3 of abalone (Haliotis cracherodii). All are circular in form, and fit within the Gifford At2c series (Gifford 1947, p. 110).

A. Body fragments: (19 fragments; 17 mussel, 1 abalone)

Width of body wall	0.4 to 1.0 cm.; average 0.8 cm.
Thickness	0.3 to 0.6 cm.; average 0.45 cm.

B. Shank fragments: (3 specimens; 2 mussel, 1 abalone) (Plate 5j-l)

a. Elongate, grooved shank, nearly complete, abalone.

b. Knobbed shank, mussel.

c. Small, shelf-like grooved shank, mussel.

	a	b	c
Length	2.9 cm.	-	-
Overall width (est.)	2.0 cm.	-	-
Length of shank	1.2 cm.	1.1 cm.	0.9 cm.
Max. thickness of shank	0.3 cm.	0.45 cm.	0.3 cm.
Max. width of body wall	0.6 cm.	0.8 cm.	0.6 cm.
Maximum thickness	0.35 cm.	0.45 cm.	0.3 cm.

TABLE 36

Depth Distribution of Shell Artifact Classes

Depth		Olivella disk beads	Olivella spire-lop.	Conus spire-lop.	Mega. cren. rings	Misc. modified	Haliotis beads	Haliotis pendants	fishhooks	Total
0-6:	T	9	4	-	-	-	-	-	-	13
	M	-	-	-	-	-	-	-	1	1
6-12:	T	24	7	2	2	-	-	-	1	36
	M	2	2	-	-	-	1	-	3	8
12-18:	T	33	6	1	-	1[a]	2	-	-	43
	M	2	1	1	-	-	-	-	1	5
18-24:	T	34	6	-	-	1[a]	1	1	4	47
	M	2	1	1	-	-	-	-	2	6
24-30:	T	30	8	1	1	-	2	-	4	46
	M	-	4	-	-	-	-	-	-	4
30-36:	T	31	14	2	2	1[a]	1	1	2	54
	M	2	-	7	-	-[b]	-	1	2	12
36-42:	T	3	-	-	-	1[b]	-	-	-[d]	4
	M	1	-	27	-	-[ab]	-	1	3	32
42-48:	T	-	1	-	-	2[ab]	-	-	-	3
	M	-	-	1	-	-	-	-	-	1
48-54:	T	-	-	1	-	-	-	1[c]	-	2
	M	-	-	-	-	-	-	-	-	0
54-60:	T	-	-	-	-	-	-	-	-	0
	M	-	-	-	-	-	-	-	-	0
Total:	T	164	46	7	5	6	6	3	11	249
	M	9	8	37	-	1	-	1	12	69
Total		173	54	44	5	6	7	5	34	317
							plus one specimen with no loc.			1
										318

a--Tivela stultorum, b--Mytilus californianus, c--incised ornament, d--one is the fishhook blank, ab--one each mussel and clam.

TABLE 37

Quantitative Comparison of Shell Artifacts

		Report of 1959	1961	1963
Olivella biplicata				
A. Small, well made disk beads		3096	22	2
	*	75%	35%	1%
B. Medium, moderately well-made, concave disk beads		801	18	16
	*	20%	30%	10%
C. Large, crudely made, deeply concave disk beads		222	22	152
	*	5%	35%	89%
	Total	4119	62	170
D. Spire-lopped		116	9	54
Conus californicus, spire-lopped		18	-	44
Columella tubes		6	-	-
Megathura crenulata ornaments		3	-	5
Clamshell ornaments				
A. Small disk beads		68	-	-
B. Large disk beads		3	-	-
C. Tubular beads		56	-	-
D. Pendants		3	-	-
E. Ornament blanks, etc.		3	1	4
	Total	133	1	4
Mytilus californianus				
A. Disk beads		30	3	-
B. Misc. modified		2	-	2
Haliotis spp.				
A. Small disk beads		11	-	7
B. Pendants		11	-	4
C. Incised		2	-	1
D. Shell dishes		1	1	-
E. Misc. modified		17	-	2
	Total	42	1	14
Total		4469	76	293

*--% of total Olivella biplicata disk beads in its own report.

Discussion

Unfortunately, no depth distribution was made of the discrete types of shell beads and ornaments in 1959. There were several dozen different kinds of shell ornaments, many of them one-of-a-kind, and tabulation was not considered too meaningful at the time since some of the midden excavated was so shallow and homogeneous.

Also, much of the earlier excavations was done in a known burial area and the quantity of shell beads, mainly Olivella disk beads, was very high per cubic yard of midden processed. Yet, it is interesting to compare certain clusters of shell artifacts from the 1959, 1961 and this report, in spite of the disparate quantities collected (Table 37).

From Table 37 several facts can be elucidated. One of the most revealing is that while the majority of Olivella disk beads reported in 1959 were small, fairly well made and regular in outline, the bulk of the Olivella beads from this present excavation were large, rudely made and indifferently finished.

The 1961 report shows a relatively equal distribution among the various sub-types of Olivella beads, but this may be due to the fact that all the midden was screened to 1/8" and therefore a higher percentage of the smaller beads was attained. A total of 4.5 cubic yards was thus processed.

In the 2 pits of Trench M, in the 1962 excavation, which were screened to 1/8" for the Microanalysis, a total of 2.5 cubic yards was processed; this produced only 2 small Olivella disk beads.

In Table 36, however, it can be seen that the shallower Trench T had a far greater proportion of shell artifacts than that found in Trench M. As a matter of record, nearly all of the Olivella disk beads were collected from Trench T, as were most of the spire-lopped Olivella. Fishhooks were evenly distributed in the 2 trenches, but aside from Olivella ornaments, the other shell objects such as the more rare pendants and limpet rings also came from Trench T--lower down on the bluff and nearer to the older excavation areas. Only the spire-lopped Conus show a disproportionate quantity in Trench M and most of these were found in one pit as a cache.

Had only one or the other trench alone been excavated, one would have ended up either with barely no shell ornaments except spire-lopped Conus, or a fairly good range. The chances of adequate coverage in short term

excavation on a large midden can lead to distortion of the greatest magnitude in assessing the cultural debris for study of the site. The shell artifact list for this excavation is ample proof of this statement.

TABLE 38

Comparative Depth Distribution of Fishhooks

Depth	0-12	12-24	24-36	36-48	48-60	No Loc.	Total
Report of							
1959	36	33	12	8	-	5	94
*	38%	35%	13%	8%	-	6%	
1961	5	5	2	1	-	-	13
*	39%	39%	15%	7%	-	-	
1963	5	7	8	2	-	-	22
*	23%	33%	36%	8%	-	-	
Total	46	45	22	11			129

*--% of total in its own report

Discussion

The percentage comparison on fishhook recovery by depth shown above reveals that both the 1959 and 1961 reports are almost the same, sharing a degree of constancy in the top 24" and gradual diminution to 48". However, the latest excavation shows greatest strength in fishhook recovery between 12-36" and a decline in the top 12". The build-up from the 36-48" levels to the 24 inches above them is marked. Considering the large quantity of stubby drill-like tools, so suitable for initiating the holes in abalone and mussel for making fishhooks, it is strange that so few fishhooks were recovered in this latest excavation.

Bone Artifacts

The worked bone assemblage numbers 59 specimens and is represented by over a dozen different types of tools and ornaments. Most common are awl fragments, punch-like tools, tips of very fine tools (needles, pins, etc.), gorges, fish vertebae beads, mammal bone and bird bone beads. Also recovered were flakers, harpoon barbs, and single fragmentary specimens of an

atlatl spur, pry, wand, whistle and sting ray spine. All in all, the bone assemblage is simply made; no incised or fancy items, with the possible exception of the wand, were found. Numbers in brackets refer to Gifford's bone classification (Gifford 1940).

1. Awls:(22 specimens) Three proximal ends, 10 median sections and 9 tips.

A. Proximal ends: (3 specimens) All are made with the proximal end of deer cannon bone as the handle. They are well polished on all faces and edges. Two are only small fragments averaging 2.0 cm. in length; they are 1.2 cm. and 1.4 cm. wide at the break, and 0.6 cm. and 0.7 cm. thick. The last tool is presently 6.8 cm. long and broken near the tip. The maximum width--at the proximal end--is 1.5 cm., average thickness is 0.5 cm. (Plate 6a). [AlcII]

B. Median fragments: (10 specimens) Seven fragments are of deer cannon bone; the remaining 3 are made of solid, thin mammal bone. Since the fragments come from various sections of the awl stem, measurements are not particularly meaningful. None of the pieces is longer than 3.4 cm.; width ranges from 0.5 to 1.3 cm. and thickness from 0.4 to 0.6 cm. The cross sections of the 3 solid bone fragments are flattened ovals. [Al]

C. Tip fragments: (9 specimens) Several varieties of tips can be differentiated.

a. Deer cannon bone: (2 specimens) One fragment has a tip which tapers evenly away from the stem; the other has its tip angling away from one side of the stem at nearly a 45° angle (Plate 6b). Both tips average 0.5 cm. in thickness.

b. Thin, worked down mammal bone: (4 specimens) The largest section is 4.3 cm. long, 0.8 cm. wide and 0.45 cm. thick; the cross section is a flattened oval. Another fragment has an angled point similar to the one described above.

c. Reworked tips: (3 specimens; 1 cannon bone and 2 ground down mammal leg bones) [Al] All 3 tools appear to have been resharpened as the tips do not taper evenly from the stem as in the other two groups above. Grinding marks are heavy and uneven and no polish covers them. The actual tip is missing on one specimen,but the rough resharpening marks are visible above the break (Plate 6c). The fragments average 0.55 cm. in thickness; they are approximately 0.7 cm. wide at the break.

2. Punches: (6 specimens, all broken; 3 cannon bone, 2 ground down, small,

thin mammal bone and 1 antler) These tools are characterized by their wide and not excessively sharp tips. They would be more suitable for punching holes in skins than for making the usual coiled basketry.

The largest land mammal fragment is 4.0 cm. long, 1.5 cm. wide at the break and 0.5 cm. thick (Plate 6d). Average thickness of the other 4 tools is 0.45 cm. The antler fragment is sharply cut back and polished all over. It tapers to a heavy blunt tip. It is now 3.5 cm. long, 1.2 cm. wide and 0.9 cm. thick, and has been fire-hardened.

3. Tips of very fine bone tools: (4 specimens) Four very thin, sharp and finely made bone tools may be fragments of pins,needles or other slim tools or ornaments. One is a bone splinter; the other 3 are ground down mammal bone (Plate 6e). Cross sections are oval in 2 tips; in the others they are flattened ovals.

4. Gorges: (4 specimens) The several bone gorges are variable as to shape and only one is complete (Plate 6f) [T1g]

	a	b	c	d
Length	3.2 cm.	-	-	-
Width	0.7 cm.	0.85 cm.	0.5 cm.	0.7 cm.
Thickness	0.6 cm.	0.8 cm.	0.45 cm.	0.4 cm.
Cross section	flat oval	round	flat oval	elliptical

5. Harpoon barbs: (2 specimens) One well-polished and charred fragment is 2.3 cm. long, 0.5 cm. wide and 0.3 cm. thick. The other tool is shaped very much like a hockey stick (Plate 6i). At the end of the long stem are vestiges of asphaltum with wrapping marks. It is made of mammal rib bone. It is 3.2 cm. long; the length of the stem is 2.2 cm.; length of the barb is 1.6 cm., width at the break 0.5 cm,, width at the bend 0.6 cm., maximum thickness 0.3 cm., thickness at the bend 0.35 cm.

6. Flakers: (2 broken specimens; 1 antler, 1 land mammal rib) The antler fragment is cut back obliquely leaving a triangular, blunt nose which is very strong (Plate 6g) It is now 3.7 cm. long, 1.5 cm. wide and 1.0 cm. thick. [C series but in antler]

The rib tool is similar to the punch-like tools of Group 2 above, but it is much thicker in proportion to its width. The tip is polished and blunt and shows signs of excessive wear. Length 3.8 cm., width 1.0 cm., thickness 0.7 cm.; cross scetion is half-oval.

7. Pry: (1 specimen) A median section of split bone is broken at the distal end where a broadly angled tip might have served well for a pry or chisel-like tool. [D1]

8. Wand: (1 fragment) A well-polished, thin fragment of land mammal bone fits well along the edges of wand-like objects described by Gifford [K4] and Orr [K5a] (Orr 1949). This fragment was examined with more complete specimens from the Olson collection at the University of California, Berkeley, under the guidance of Dr. James A. Bennyhoff. Particularly noticed was the similarity of the thin edge, the shallowness and width of the bone and the fine degree of polish. This fragment is 0.3 cm. thick--exactly the same as other more complete specimens examined.

9. Atlatl spur: (1 fragment) A major part of a well-made atlatl spur was recovered in the 6-12" level of Trench M. It is made of mammal rib bone and is similar to one illustrated by Gifford [Z3, center specimen]. The conical head is 1.5 cm. long and 1.0 cm. in diameter. The flat, stem-like, but broken end is 0.9 cm. wide and 0.6 cm. thick. The total present length is 2.1 cm. (Plate 6h).

10. Whistle: (1 fragment) The proximal end of a whistle is broken at the base of the hole. The fragment is 1.1 cm. wide and 0.9 cm. thick. The end hole is slightly oval in shape--0.6 cm. long and 0.5 cm. wide. The side-wall hole begins 1.1 cm. below the top; it is 1.0 cm. long and 0.6 cm. wide (Plate 6l). [FF1]

11. Fish vertebrae beads: (4 specimens) All 4 beads are ground down so that the cellular structure of the bone shows on the outer walls. Only one has the center hole enlarged. Three are nearly the same size; one is somewhat smaller (Plate 6m). [CC5]

	3 larger beads	1 smaller bead
Diameter	1.9 cm. aver.	1.5 cm.
Thickness	0.8 cm.	0.9 cm.
Diameter of hole	2 are pinpoint; 1 is 0.5 cm.	pinpoint

12. Bird bone beads: (6 specimens) These ornaments are slender, long beads with polish marks on the surface and grinding on the ends (Plate 6k).[EE1a]

Length	1.0 to 1.4 cm.; average 1.2 cm.
Diameter	0.4 cm. average

13. Mammal bone tubes: (2 specimens) The function of these tubular objects is problematical. They may have been used as ornaments, but they are far more crude and irregular in every way than the bird bone beads described above. One possible use may have been for sucking tubes, or they may have served as gaming pieces--or even blanks for more elaborate objects. [EE1b]

	a	b
Length	1.5 cm.	1.9 cm.
Width	0.9 cm.	0.7 cm.
Thickness	0.7 cm.	0.55 cm.

14. Large bone tube: (1 fragment, broken in half vertically) The tube is made from a large section of mammal bone, polished carefully both outside and inside, and the ends are ground smooth. Length 3.1 cm., diameter 2.2 cm. (Plate 6j). [EE1b]

15. Cut bone: (1 specimen, antler tine) The only signs of modification are cutting marks at the break. It is not polished; a small abrasion on the tip is probably fortuitous. Length 3.1 cm., diameter 0.9 cm.

16. Sting ray spine: (1 fragment) There is no certainty this object was ever used. However, they have been collected as part of archeological assemblages in the past. [A5a]

TABLE 39

Depth Distribution of Bone Artifacts

Depth		Awls	Punches	Fine tips	Gorges, Barbs	Misc.	Fish vert.	Bird beads	Mammal tubes	Total
0-6:	T	1	-	-	-	-a	-	1	-	2
	M	2	-	-	-	1a	-	-	-	3
6-12:	T	1	2	-	-	-b	1	1	-	5
	M	4	-	-	-	1f	-	-	-	5
12-18:	T	1	1	-	2h	1c	-	1	-	6
	M	2	2	-	-	2f	-	-	-	6
18-24:	T	1	-	-	-	1d	2	-	-	4
	M	2	-	-	1g	1	-	-	1	5
24-30:	T	1	1	2	1g	-	1	-	-	6
	M	3	-	-	-	-	-	3	-	6
30-36:	T	-	-	-	-	-	-	-	-	0
	M	2	-	1	1h	-	-	-	1	5
36-42:	T	1	-	-	-	-	-	-	-	1
	M	1	-	-	-	1e	-	-	1	3
42-48:	T	-	-	-	-	-	-	-	-	0
	M	-	-	-	-	-	-	-	-	0
48-54:	T	-	-	-	-	-	-	-	-	0
	M	-	-	1	1h	-	-	-	-	2
54-60:	T	-	-	-	-	-	-	-	-	0
	M	-	-	-	-	-	-	-	-	0
Total:	T	6	4	2	1	3	1	6	0	23
	M	16	2	2	5	5	3	-	3	36
Total		22	6	4	6	8	4	6	3	59

a--cut antler tine, b--atlatl spur, c--wand and sting ray, d--pry, e--whistle fragment, f--flakers, g--barbs, h--gorges

TABLE 40

Comparative Depth Distribution of Discrete Bone Artifacts

Depth	Report of	0-12	12-24	24-36	36-48	48-60	No Loc.	Total
Awls	1959	31	21	14	1	1	1	69
	1961	5	5	2	1	-	-	13
	1963	8	6	6	2	-	-	22
Bipointed	1959	7	5	3	1	1	-	17
gorges,	1961	-	2	-	1	-	-	3
barbs	1963	-	3	1	2	-	-	6
Flakers	1959	3	5	2	-	-	1	9
	1961	-	-	2	1	-	-	3
	1963	-	2	-	-	-	-	2
Fish	1959	17	13	4	3	1	2	40
vertebrae	1961	-	-	1	-	-	-	1
beads	1963	1	2	1	-	-	-	4
Bird	1959	2	1	2	-	-	-	5
bone	1961	-	-	-	-	-	-	0
beads	1963	2	1	3	-	-	-	6

TABLE 41

Comparative Percentages of Bone Tool Classes*

Bone Tool Class	Report of	1959	1961	1963
Awls, punch-like tools, fine tips		48%	65%	54%
Fishing tools: gorges, barbs, pries		13%	14%	10%
Tools for chipping stone, i.e. flakers		6%	14%	3%
Ornaments		32%	7%	22%
Miscellaneous		1%	-	11%

*--percent of total bone artifacts in its own report

Discussion

The major part of the bone artifacts seem to be confined to the top 36" of the midden, except for several reported in 1959, which came from the burial area. In this latest excavation less than 10% of the total of 59 bone artifacts was collected below 36" although excavation went to 54" in one trench and 60" in the other.

Preservation of those pieces found below 36" was as good as in those found above and the soil is definitely alkaline. This would preclude the

TABLE 42

Quantitative Comparison of Bone Artifacts

Basic Type	Report of 1959	1961	1963
Awls	69	13	22
Punches	2	-	6
Fine tips	-	2	4
Gorges	5	-	4
Barbs	12	3	2
Pries	2	1	1
Flakers	9	3	2
Atlatl spur	-	-	1
Whistle	-	-	1
Wand	-	-	1
Cut antler tine	-	-	1
Sting ray spine	-	-	1
Fish verteorae beads	40	1	4
Bird bone beads	5	-	4
Mammal bone tubes	1	1	3
Cut whale bone	1	-	-
Total	147	23	59

Note: Other bone artifacts noted in private and institutional sources, and described in the 1959 report are:

Long bone tubes inlaid with Olivella disk beads;
Dagger-shaped ornaments inlaid with beads, both disk and rectangular;
Bone whistle decorated with beads and a quartz crystal;
5-hole flute decorated with inlaid beads and abalone shell;
Needles

destruction of bone by leaching, acid or time and allow the inference that there was actually little of modified bone to salvage from the deeper parts of the deposit.

Trench M was richer in bone recovery than Trench T with over 72% of the bone awls and all of the more unusual one-of-a-kind specimens.

Again, no particularly esoteric or highly ornamented bone objects were found. There was no incising, no bead inlay or decoration of any kind in the bone assemblage. (See Analysis of Unmodified Bone for comparison of bone resources available in the midden with the actual artifacts. Appendix 1 gives a detailed analysis of the unmodified fish bone remains.)

Non-Aboriginal Artifacts

Little of significance was collected from the excavation area that could be used in dating the upper time period of the site. Only several small pieces of rusted iron, a heavy modern mowing machine spike and its nut, and a shotgun shell were found.

The metal nut lay near the surface; its spike just below 6 inches. Three tiny pieces of rusted iron were also found near the spike and below it to 14", and all appear to be fragments that have broken from it. The last iron fragment had shifted to 18" below the surface; it lay in a rodent burrow run, and is quite certainly related to the rest of the iron.

The shotgun shell is imprinted U.M.C. No. 12. Majestic. It is a present day brass base and cardboard case type. The U.M.C. stands for Union Metallic Company. This company was organized in 1867 by Hartley and Graham of New York. It merged with the Remington Arms Company in 1910 as Remington-UMC (Karr and Karr 1921). This 12 guage base, therefore, dates between 1867 and 1910 (Fontana and Greenleak 1962).

The shotgun shell was recovered at 18-24" in Trench T. The diameter is 2.2 cm. at the proximal end and 2.0 cm. at the distal end. It is 1.2 cm. thick.

Discussion

No trade beads, buttons, coins, glass or china were found although extreme care was maintained, especially in the 1/4" screenings. Of the so-called Russian-type large beads, many strings of which were seen in Mr. Sanger's private collection (Curtis 1959, p. 109), not a sign was evident, even though these beads would not go through the 1/4" mesh screens.

These remarks are made because every collection reported in the 1959 report--from excavation, private and institutional sources--all reported trade beads of various sorts. Most of these were the small Venetian blue glass variety. No trade beads were recovered in the 1960 excavation although all the midden processed at that time was put through 1/5" screens. In this excavation of 1962 they were unable to find any certain early--or post-contact historical material.

FEATURES AND BURIALS

Six features were uncovered during the course of excavation. They were recorded in the field upon prepared Feature Record forms. After pedestaling, each feature was measured and photographed.

Feature #1 (Plate 7a)

Definition: Rock Feature
Location: Northeast corner of M17
Depth: 12-20", average depth 18"
Size: 18" North/South, 21" East/West
Stratification: None
Matrix: Shell midden
Associated objects:
7 unmodified sandstone cobble fragments ranging in size from 5.3 by 5.1 by 0.3 cm. to 7.9 by 6.4 by 2.5 cm. These were discarded in the field. None showed signs of charring or fire-cracking;
1 scraper plane, chert;
1 core chopper, basalt;
1 large fragment of a shallow basin milling stone.

Feature #2 (Plate 7b)

Definition: Possible Hearth
Location: Northeast corner of M16
Depth: 12-30", average depth 28"
Size: 43" North/South, 33" East/West
Matrix: Shell midden
Stratification: None
Associated objects:
35 unmodified burnt sandstone cobble fragments ranging in size from 3.8 by 2.7 by 1.8 cm. to 22.8 by 17.7 by 8.3 cm. All were discarded in the field;
1 "killed" sandstone bowl; 1 sandstone pestle fragment.

Feature #3

Definition: Hearth
Location: Southeast corner of T23 and southwest corner of T22
Depth: 20-28"
Size: 24" East/West, 18" North/South
Matrix: Shell midden
Stratification: None
Associated objects:
15 unmodified burnt sandstone cobble fragments ranging in size from 4.2 by 3.6 by 0.9 cm. to 13.2 by 11.6 by 4.7 cm. All were discarded in the field;
A dozen fragmentary human skeletal bones (unburnt), including an ulna and rib fragment. These were found at the north end of the feature;
A large, black, leaf-shaped projectile point with contracting stem and nearly straight base, found just below the major part of the burnt stones at the north end of the feature and possibly in association with the human bones;
From the hearth 6.5 gr. of charcoal was collected.

Feature #4

Definition: Rock cluster
Location: Northwest corner of M16
Depth: 48-58"
Size: 24" East/West, 25.5" North/South
Matrix: Compacted, very hard midden in dark, clay-like soil
Stratification: None
Associated objects:
26 unmodified sandstone cobble fragments only 3 of which were burnt. Size range 4.2 by 3.1 by 1.4 cm. to 17.6 by 11.9 by 6.3 cm. All were discarded in the field;

Feature #5

Definition: Burnt earth and fine white ash area
Location: Southeast corner of T24 under the east end of Feature #6
Depth: 36-42"
Size: 3" deep in the center, 2" deep on the periphery. Total area 12" East/West, 12" North/South
Associated objects: None
A sample of the burnt earth and ash was taken from the center of the feature.

Feature #6 (Plate 7d)

Definition: House floor
Location: Excavation unit T25
Size: Extended across the total surface of the pit, but was not delimited on the north, south or western sides. The eastern edge coincided with the eastern edge of unit T25. It varied in depth from 2½ to 6" with the greatest depth recorded on the southeast side.
Depth: 30-36"
Description: The surface of the floor was hard, compacted, reddish soil which rang when tapped with the trowel. It was riddled throughout with gopher burrows and was very uneven. No post holes were seen at the eastern edge.
Stratification: See Plate 8
Associated objects: None in the compacted area;
A soil sample was taken from the deepest part of the floor.

Burials had not been anticipated in the areas chosen for excavation outside the known cemetery. None had been reported in the earlier excavations on the higher areas of the bluff, and none encountered in the test excavation of 1960. Human bones eroding out of Highway 101 banks were not apparent either except at the western end of the site.

None of the 3 burials uncovered were complete. Disassociated and fragmentary individual human bones were also found sporadically in many of the other pits besides those with the 3 obvious burials. None of these bones could be positively related to the 3 burials described below. The chewed appearance of these disassociated human bones and their small size is no doubt due to the intensive rodent activity observed throughout excavation.

Burial #1 (Plate 7c)

Definition: Primary inhumation, loosely flexed on right side. Sex could not be determined of what appears to be a young adult. Bones absent were: spine, ribs, pelvis, part of the skull, fingers and toes.

Location: Skull fragments lay in the north central part of M18 with the long bones lying diagonally into the southwest corner of the pit and extending into the southeast corner of M19. (Note: Pit M19 was not part of the regular excavation in Trench M, but was cut into at 27" E/W and 32" N/S in order to remove the balance of the skeletal material.

Depth: Average 25"
Size: Maximum length 45"
Matrix: Shell midden
Stratification: None
Associated objects:

1 spire-lopped Olivella biplicata near the skull, probably only fortuitously so;

In the loose midden in pit M19 near the long leg bones were recovered a fragmentary fused shale projectile point, Type 2; 2 bone awl fragments; a broken disk, 1-hole ornament of slate and another spire-lopped Olivella. None of these are considered to have been intended as grave goods as they were scattered, fragmentary and at different depths.

Burial #2

Definition: Partial burial
Location: Center of T21
Depth: Average 22"
Size: 23.5" North/South, 24.5" East/West
Matrix: Shell midden
Stratification: None
Skeletal material present: Disarticulated and fragmented sections of long bones, a fragment of a mandible, and numerous small and broken rib, arm and spine fragments.
Associated objects:

1 broken hinge section of a medium-sized Tivela stultorum;
1 complete Saxidomus nuttallii;
1 complete, large Mytilus californianus;
1 large cobble flake scraper, chert;
1 uniface granite cobble chopper.

Burial #3

Definition: Disturbed young adult burial with associated small rocks.

Location: North wall of T22 from eastern end of the pit to within 12" of the western end.

Depth: 23-27"
Size: 48" East/West, 23" North/South
Matrix: Shell midden
Stratification: None
Skeletal material present: Skull fragments, long bones, vertebrae, arm and toe bones, several ribs and some very fragmentary and rotted unidentified pieces.
Associated objects:

6 small sandstone cobble fragments ranging in size from 3.2 by

by 3.0 by 0.8 cm. to 10.4 by 7.6 by 6.5 cm. These were discarded in the field;

8 basaltic cobbles and fragments ranging in size from 5.6 cm. by 4.2 by 2.8 to 6.1 by 3.9 by 1.3 cm. These were discarded in the field;

8 long, thin, flattish sandstone cobbles all lying near each other at the southwest end of the burial with some very small fragments of bone. None of the cobbles were modified, but all were complete and unbroken;

1 large piece of Haliotis fulgens;

1 chert side scraper lying among a jumble of bones and fragments of cobbles.

Discussion

Features

Features composed of clusters of unmodified and unburnt cobbles and cobble fragments have been reported from numerous southern California sites. The scattered condition of the stones, the lack of ash, charcoal or burned bone have indicated that these manifestations cannot be considered as fire pits or hearths. Artifacts are usually rarely found among the stones, and if they are present, they are broken. These clusters of stones do not cover burials; the rocks contained in them are often intrusive, and as yet no satisfactory explanation has been made as to their possible function, if there is any.

They appear to have occurred more commonly in the earlier horizon sites: The Little Sycamore Shellmound (Wallace et al 1956); Zuma Creek (Peck 1955); the Browne Site-Ven 150 (Greenwood, n.d.). However, they have been reported from sites much later in time: The Soule Park Site-Ven 61 (Sutia 1962); Muwu-Ven 53 (Woodward n.d.), etc. Two such features were found during this excavation: Feature #1 and Feature #4.

The only non-burial feature previously reported at LAn-52 was a hearth with many cobbles, burnt and unburnt, and with whale bone in association (Curtis 1959, Plate 6). Two hearths (Features #2 and #3), were quite dissimilar. The smaller hearth, Feature #3, contained considerable charcoal among the stones. The several human bones near the hearth stones were unburnt and probably represented a later partial burial or reburial that has no temporal relationship to the hearth itself. Feature #2, considerably larger, was more scattered both vertically and horizontally. It was closely associated with the "killed" sandstone bowl and broken pestle.

Feature #5, a fairly good-sized area of burnt soil and fine white ash,

which lay underneath and near the eastern end of the house floor, had no stone or bone in association. It was 0-6" below the lowest part of the house floor and may represent a shallow,scooped-out area where some perishable material was burnt by the occupants of the house. The ash and burnt soil did not extend under the house floor edge at all.

The large,compacted area (Feature #6) which covered all of pit T25 for the major part of the 30-36" level, was considered to be part of a house floor. It was devoid of any artifactual material on its surface or even in the many rodent burrows that riddled it. However, in the hard, compacted dark midden that extended from below the house floor to sterile base, a number of artifacts were recovered: a fragmentary projectile point(Type 5), an unmodified basalt cobble flake knife, 2 used flakes, a small piece of asphaltum, 15 pieces of chipping waste and an Olivella disk bead. On sterile base below the floor lay the incised abalone ornament and a large quantity of charcoal.

Excavation in unit T25 was the last to be done, and although it was obvious that the floor extended beyond the pit walls on at least 3 sides, it was not possible to delimit the floor in the remaining time. No post holes were seen on the floor edge that was delimited.

Practically no shell fragments were found on the floor once the midden cover was removed, nor was there any shell in the compacted, reddish, sandy thickness of the floor, except for some very small pieces in the rodent burrows.

The test excavation of 1960 had disclosed an unusual stratigraphic picture. The area laid out at that time was 15 feet long by 3 feet wide; in this, five 3 foot sections were marked off. Due to the friable nature of the midden, only alternate pits were excavated, making 3 in all. All these pits were taken down to sterile base--to depths ranging from 47-53". The profiles of all 3 pits and presumably at least 15 feet of length exhibited the same configuration (Curtis 1961b).

The first 16" from the surface consisted of black, friable soil with moderately scattered shell fragments;from 16-24" lay a band of heavily concentrated shell fragments, mainly mussel, but with some clam and oyster visible; from 24-42" the continuing black, friable soil was only thinly scattered with mussel shell. At about 42" below the surface the midden changed in composition from its soft nature to a tough, compact, yellow-

rown adobe, which contained gradually diminishing small shell fragments to he light-colored, sandy, sterile base.

Plotting of the artifacts recovered from this test excavation showed hat the majority of the large crude cobble flake scrapers, scraper planes, ammerstones, choppers, and pecking stones came from the 24-42" levels- elow the heavy concentration of shell. From 24" to the surface, the lith- ic complex consisted mainly of a small chipped stone assemblage, the worked one, worked shell and polished stone.

On the basis of 3 pits and such a small area, it was considered pre- umptuous to postulate cultural stratigraphy over the rest of the site, and he present excavation hoped to clear up this matter. However, no indica- ions of such a concentration of shell existed either in Trench H or Trench ; the midden profile showed no visible change from surface to sterile base xcept for the house floor unit. (See Microanalysis for the depth distri- ution of shell in samples from excavation units M14 and M15).

urials

As was mentioned earlier in this report, an area in the known cemetery as laid out for excavation. The time consumed in processing the 6 features nd 3 burials in the 2 trenches, however, precluded any further excavation or burials in the western end of the site, unfortunately.

Part of this project was to reinvestigate burial patterns in the known urial area. It was this large cemetery which first came to the attention f the archeologists when Highway 101 cut through it. Mr. Sanger, who ex- avated for the Heye Foundation for the American Indian, between 1937 and 944, reported 52 burials at one end of the cemetery alone. These were all tated to have been oriented east in a flexed position. Many were covered ith large piles of rocks; others were tightly wedged in small wooden boxes hose remains along with their asphaltum sealing plugs were found scattered bout. From these burials, purportedly, came the highly controversial and ever-duplicated steatite and serpentine artifacts.

The ASA reported as many as 20 mixed-up burials in one 3 foot square it--infants, adults, hundreds of Olivella disk beads, trade beads and more ommon midden trash and artifacts. However, they found no ceremonial or fancy" objects--either whole or fragmentary which might be related to the tarantulas", inlaid pipes, daggers, effigies, bowls, etc., some examples of hich may be seen in the store rooms of the County Museum, Los Angeles.

One partially disturbed burial, exposed by the UCLA group, lay over 50 feet east of the major burial concentration. It was the only primary inhumation reported during the excavations in the 1950's by the ASA and UCLA. The position was flexed, face downward and orientation was facing left and slightly south. It had one of the few obsidian tools in association.

Returning to the present burials, it can be seen that they certainly do not fit into the mass-grave, reburial pattern at the western end of the site. Each burial was an isolate, more in the manner of the one uncovered by UCLA at a distance from the major cemetery area. Such grave associations as there were were certainly meager--no hundreds of beads, no trade goods, no vast quantity of living debris--only a few shells, some broken tools and in Burial #3 some curiously flat pebbles in a cache. None were covered with piles of rocks and there was no evidence of wood, asphaltum or ochre with any of the burials.

The Bluff Site

In October of 1960 park personnel prepared to plant ground cover on an eroding bluff caused by construction of a parking ground. This area is 1/2 mile west of LAn-52, on the west side of Arroyo Sequit Canyon and on the south side of the highway. There, in one concentration were recovered 6 milling stones and 1 mano. No other tools, human skeletal material or other cultural debris as evidence of a living area were found with the grinding tools, although search was made in the immediate area.

The tools were brought to the park personnel office and were available for recording during the period of excavation at LAn-52. They are still at Leo Carrillo Beach State Park. They were photographed, measured and recorded by Barbara Bender (Plate 4c-d).

No relationships between the tools to be described and LAn-52 is postulated. Out of context, it is difficult to explain their presence. In 1960 the author walked the bluff before the parking ground was put in and saw occasional fragmentary shell, found several artifacts on the surface, and it is quite possible that another site existed on this bluff as well as the one which contains LAn-52. If it was an early site, as may be considered from the concentration of grinding tools, all evidence has since been destroyed.

Deep milling stones: (4 specimens)

	a	b	c	d
Sandstone texture	coarse	medium	coarse	coarse
Sandstone color	grey	red	grey	grey
Length	47.0 cm.	45.5 cm.	53.3 cm.	50.8 cm.
Width	39.3 cm.	30.5 cm.	35.6 cm.	35.6 cm.
Thickness	10.2 cm.	11.1 cm.	13.0 cm.	11.0 cm.
Shape	oval	oval	oval	ovoid
Pecked to shape	yes	yes	yes	yes
Resharpened	yes	yes	yes	yes
Basin length	30.4 cm.	35.3 cm.	35.5 cm.	30.4 cm.
Basin width	22.8 cm.	20.6 cm.	22.9 cm.	20.3 cm.
Max. basin depth	6.4 cm.	8.9 cm.	7.6 cm.	2.5 cm.
Condition	broken	"killed"	good	good

Slab milling stones: (2 specimens)

	a	b
Sandstone texture	medium	coarse
Sandstone color	red	grey
Length	39.3 cm.	46.1 cm.
Width	22.8 cm.	30.2 cm.
Thickness	9.0 cm.	10.5 cm.
Shape	oval	ovoid
Pecked to shape	yes	yes
Resharpened	yes	yes
Basin length	17.7 cm.	30.1 cm.
Basin width	10.1 cm.	19.1 cm.
Basin depth	negligible	
Condition	cracked	good

Mano: (1 specimen) A coarse-grained, grey sandstone mano, shattered on one face is 17.5 cm. long, 10.6 cm. wide and 5.5 cm. thick. Pecking marks on the surface are small; there is no end battering. The tool is badly weathered and appears to be monfacial.

MICROANALYSIS

A special control was established in two excavation units:M14 and M15. Here, to the extent possible, all the midden material was troweled and double-screened 1/4" over 1/8" mesh. Extreme dampness and the compaction of the midden (probably due to a small spring that was not flowing in aboriginal times) made total 1/8" screening of the 2 pits impractical below the 42" level.

Therefore, only enough of the 1/4" screenings were processed in the 1/8" screens to assure an unbiased sample of 200 grams for each screening size in each 6" level below 42". This procedure was followed to a depth of

54" at which point excavation had to be halted in the Microanalysis pits.

In an effort to obtain deeper samples, Pit M14 was post-holed from 54-60" and a 200 gram sample obtained for each screening size. The 60-66" post-hole sample in the same pit fell somewhat short of the 200 grams in each size due to an unfortunate error in judging the quantity in the field. The post-holer was unable to penetrate further and sterile base was never reached for the shell analysis. Later, it was established in Pit M18, at the other end of Trench M, that shell fragments ceased at 72". In Microanalysis Pit M15 similar samples of 400 grams were only taken to 54".

The non-sample screenings from the Microanalysis pits were treated the same as those in the other excavation units--except that they were sorted with even more care.

The Microanalysis was carried out to solve several problems:

1. To check the presence or absence of small or fragmentary bladelet tools and/or the prismatic blades used to manufacture them;
2. Assess the value of 1/8" screenings in that portion of the site;
3. To sample the unmodified shell by use of 400 gram unbiased samples for each level, 200 grams each for the 2 screening size meshes used;

The shell analysis samples from the Microanalysis pits were taken back to the author's home, washed, dried, sorted, classified and tabulated. It might be mentioned that a total of nearly 40 man hours were spent by Mrs. Sloan in processing the 7,922 grams in the 20 samples.

Not all of the total of 49 marine species collected were found in the Microanalysis pits. Gathering of identifiable shells from the other pits added to those sorted in the Microanalysis. Table 43 lists all the species; those tabulated in the Microanalysis are marked with an asterisk.

(Note: Many of the shell species,especially small univalves, were only found in trace quantities (Less than 0.1 gram) in the Microanalysis pits. In order to conserve space, only those species found in measureable quantity in at least several levels of both pits are tabulated in Table 44. The rest were found randomly scattered, in fragmentary condition, and it is doubtful if they afforded any appreciable amount to the diet or were used to manufacture ornaments or other objects.)

TABLE 43

List of Marine Species at LAn-52

Bivalves	
Mytilus californicus*	California Mussel*
Mytilus edulis	Bay Mussel
Septifer bifulcatus	Branch-Ribbed Mussel
Ostrea lurida*	Native Oyster*
Chama pellucida	Agate Rock Oyster
Pododesmus machrochisma*	Reversed Rock Oyster*
Pecten circularis	Equally-Grooved Oyster
Hinnites giganteus*	Purple-Hinged Pecten*
Trachycardium quadragenarium	Forty-Ribbed Heart Clam
Tivela stultorum*	Pismo Clam*
Saxidomus nuttalli	Washington Clam
Protothaca staminea*	Littleneck Clam*
Chione undatella	Wavy Cockle
Apolymetis biangulata	Yellow Metis Clam
Univalves	
Trimisculus recticulatus	Netted Button Shell
Conus californicus*	California Cone
Pseudomelatoma moesta*	Black Drill Shell*
Olivella biplicata*	Purple Olive*
Nassarius fossatus*	Channeled Basket-Shell*
Amphissa versicolor*	Joseph's Coat*
Ocenebra circumtexta	Circled Tritonalia
Thais emarginata*	Rock Purple*
Acanthina spirata*	Unicorn Shell*
Zonaria spadicea	Nut-Brown Cowry
Pusula solandri	CoffeeBean Shell
Cerethidea californica*	California Horn Shell*
Aletes squamigerus*	Scaly Worm Shell*
Hipponix tumens*	Horn of Plenty Shell*
Crepidula onyx*	Onyx Slipper Shell*
Polinices reclusianus	Southern Moon Shell
Acmaea digitalis*	Fingered Limpet*
Acmaea limatula	File Limpet
Acmaea incessa*	Seaweed Limpet*
Acmaea mitra	White Cap Limpet
Lottia gigantea	Owl Limpet
Astrea undosa*	Wavy Turban Shell*
Norrisia norrisii*	Red Top Shell*
Tegula gallina*	Speckled Top Shell*
Tegula ligulata*	Banded Top Shell*
Haliotis cracherodii*	Black Abalone*
Haliotis fulgens	Green Abalone
Fissurella volcano*	Volcano Key-Hole Limpet*
Megathura crenulata*	Giant Key-Hole Limpet*
Ischnochiton conspicua*	Showy Chiton*
Lepidochiton hartwegii*	Blue Chiton*
Strongylocentrotus purpuratus*	Purple Urchin*
Balanus tintinnabulum*	Red and White Barnacle*
Balanus nubilis*	Barnacle*

Crab (claws)* and Land Snails*

TABLE 44(Continued across next page)

Microanalysis: Depth Distribution of Cultural Materials

(Weight in Grams)

Depth	Pit	Mytilus calif.	Tivela stult.	Teg. gall.	Ostrea lurida	Proto. stam.	Balanus spp.	Chiton spp.	Strong. purpur.
0-6:	M14	270.6	5.2	4.0	2.2	1.5	1.4	1.8	0.9
	M15	295.8	2.7	1.0	1.3	0.7	0.9	1.2	Tr.
6-12:	M14	282.7	5.1	6.2	2.0	1.8	1.7	2.0	--
	M15	294.7	3.9	3.4	1.9	1.1	0.2	1.7	0.1
12-18:	M14	285.5	11.6	2.4	4.0	2.3	1.5	1.4	Tr.
	M15	280.6	4.0	3.1	2.8	0.4	0.6	1.1	0.3
18-24:	M14	348.9	1.9	2.2	1.8	0.5	0.7	1.2	Tr.
	M15	306.2	4.3	3.5	2.7	0.5	0.6	0.8	0.7
24-30:	M14	332.7	3.1	3.6	1.3	0.4	1.2	0.4	Tr.
	M15	313.4	3.7	4.1	2.2	3.1	1.6	2.3	0.4
30-36:	M14	317.9	3.0	2.7	0.7	0.7	0.2	1.0	0.6
	M15	311.2	8.7	5.2	3.0	2.0	2.0	2.0	0.6
36-42:	M14	330.4	3.5	4.2	0.7	1.2	1.5	1.6	0.7
	M15	309.2	4.1	6.6	1.6	3.8	2.8	2.4	2.1
42-48:	M14	301.5	3.0	9.2	4.9	4.2	1.8	1.5	3.9
	M15	298.5	4.5	6.8	2.0	2.7	4.3	2.4	2.2
48-54:	M14	271.9	--	15.7	1.7	5.3	2.8	3.2	5.8
	M15	269.4	3.4	10.4	2.4	5.2	2.6	4.2	4.9
54-60:	M14	255.2	0.7	14.9	1.1	5.7	1.6	3.3	10.0
60-66:	M14	176.3	--	7.8	0.5	1.9	2.5	1.8	0.2

TABLE 45

Microanalysis: Percentage Distribution of Cultural Materials

Depth	Pit	Mytilus calif.	Tivela stult.	Teg. gall.	Ostrea lurida	Proto. stam.	Misc. shell	Unmod. bone	Pebbles, sand, etc.
0-6:	M14	67.6%	1.3%	1.0%	0.5%	0.4%	1.9%	2.7%	24.6%
	M15	73.9%	0.7%	0.2%	0.3%	0.2%	2.2%	1.6%	21.9%
6-12:	M14	70.6%	1.3%	1.5%	0.5%	0.4%	1.7%	1.4%	22.6%
	M15	73.7%	1.0%	0.8%	0.5%	0.3%	0.7%	1.4%	21.6%
12-18:	M14	71.3%	2.9%	0.6%	1.0%	0.6%	3.5%	2.1%	18.0%
	M15	70.1%	1.0%	0.8%	0.7%	0.1%	3.4%	0.8%	23.3%
18-24:	M14	87.2%	0.4%	0.5%	0.4%	0.1%	0.9%	0.7%	9.8%
	M15	76.5%	1.1%	0.8%	0.7%	0.1%	0.3%	1.3%	19.2%
24-30:	M14	83.2%	0.8%	0.9%	0.3%	0.1%	0.8%	1.1%	12.8%
	M15	78.2%	0.9%	1.0%	0.5%	0.8%	1.5%	1.3%	15.7%
30-36:	M14	79.5%	0.8%	0.7%	0.2%	0.2%	0.5%	1.1%	17.0%
	M15	77.8%	2.1%	1.3%	0.8%	0.5%	2.5%	2.7%	12.2%
36-42:	M14	82.6%	0.8%	1.0%	0.2%	0.3%	1.2%	1.6%	12.3%
	M15	77.3%	1.0%	1.6%	0.4%	0.9%	2.1%	1.3%	15.4%
42-48:	M14	75.4%	0.8%	2.3%	1.2%	1.0%	3.6%	1.1%	14.6%
	M15	74.6%	1.1%	1.7%	0.5%	0.7%	2.5%	3.9%	15.0%
48-54:	M14	68.0	--	3.9%	0.4%	1.4%	3.5%	0.5%	22.3%
	M15	67.3%	0.8%	2.6%	0.6%	1.4%	4.1%	0.7%	22.5%
54-60:	M14	63.8%	0.1%	3.7%	0.3%	1.4%	5.1%	0.6%	25.0%
60-66:	M14	54.6	--	2.4%	0.1%	0.6%	3.7%	0.5%	38.1%

TABLE 44 (Continued from page 88)

Microanalysis: Depth Distribution of Cultural Materials

(Weight in Grams)

Fiss. vol.	Thais emar.	Cliv. bipli.	Pododes. machro.	Misc. spp.	Total shell	Peb-bles	Unmod. bone	Misc*	Residue (sand)
2.3	--	--	--	0.7	290.6	81.9	10.8	1.7	15.0
--	1.9	--	--	--	305.5	76.9	6.5	1.0	10.1
--	0.5	0.5	--	1.2	303.7	31.0	5.7	2.1	7.5
--	--	0.2	--	0.2	307.4	80.2	5.8	--	6.6
--	0.8	0.9	0.4	8.9	319.7	56.7	8.4	7.2	8.0
0.1	--	--	--	10.9	303.9	72.8	3.3	0.2	19.8
--	0.4	Tr.	--	1.1	357.7	29.6	3.0	--	9.7
--	--	--	--	0.7	320.0	53.6	5.1	5.8	15.5
--	--	--	--	1.6	344.3	44.2	4.3	0.1	7.1
0.2	0.5	--	--	0.1	331.6	52.6	5.1	3.0	7.7
0.3	--	0.3	Tr.	0.4	327.8	59.1	4.4	Tr.	8.7
--	--	0.8	--	4.8	340.3	27.1	10.9	2.1	19.6
Tr.	--	Tr.	--	0.2	344.0	28.3	6.6	11.7	9.4
0.1	--	--	--	0.5	333.2	52.2	5.1	1.5	8.0
--	0.6	--	1.3	5.5	337.4	41.6	4.4	3.9	12.7
0.4	--	--	--	0.1	323.9	45.8	15.7	0.9	13.7
2.2	Tr.	--	--	0.4	309.0	39.8	2.1	2.4	46.7
2.5	--	--	--	1.7	306.7	37.1	3.0	--	53.2
2.4	Tr.	--	1.7	0.8	297.4	51.0	2.4	2.3	46.9
0.2	--	--	2.7	0.8	196.3	66.3	1.6	1.3	57.2

*-- consists of small quantities of charcoal, bits of asphaltum and chipping waste.

Note: The total for each pit and level is 400 grams except for M14, 60-66" where the total is 322.7 grams.

Discussion

As was seen earlier in this report, the fine screenings from the Microanalysis pits did not produce any small or fragmentary bladelet tools or blanks. Whatever value derived from the Microanalysis for this problem lay mainly in this negative evidence. This lack of the by-products of prepared platform cores, coupled with the lack of platform cores themselves and any other prismatic blades from the rest of the excavation indicated that such an assemblage was probably not present in this portion of the site.

The 1/8" screenings did not produce any other small artifacts such as were found at SBa-60 at Goleta, California, (Curtis 1961a), where all the trade beads recovered came from the finer Microanalysis screenings. Except for some extremely small pieces of chipping waste and two small Olivella

disk beads, very little cultural material was added to the total collection from the 1/8" mesh.

Tables 44 and 45 clearly show what a preponderance of mussel there was at all levels from surface to 66". The core sample taken in Pit M18 from 66-72", where sterile base was encountered, showed considerable mussel fragments as well--and many small pieces of mussel were imbedded in the sterile soil. Careful watch in the rest of the pits supported this emphasis on mussel as little other shell was seen in them except for the numerous and small Tegula. A check count with samples from Trench T gave results comparable to those in the Microanalysis pit samples of M14 and M15.

A total of 67 shell species were recorded in 1959; the 49 species we have listed here cover the most common of the shells known to the southern California coast. No doubt several species were missed that might have been added if shell had been systematically collected and processed from all the rest of the pits.

The percentage of unmodified bone tends to remain fairly constant in the level samples and averages less than 2% of the total weight. Most of this bone consisted of small mammals, deer and sea mammal with occasional fish vertebrae and bird bones. (See Faunal Analysis for a more complete depth distribution of unmodified bone outside the Microanalysis pits.)

The sudden rise in residual material beginning at 48" in both M14 and M15 is attributed to the increased quantity of soil adhering to the shell. From 48-66" the midden became increasingly damp and compacted--probably due to a subsurficial spring. If it had been feasible to dry the screenings before taking the samples, there may well have been a higher percentage of mussel--probably as much as in the heart of the midden. In Trench T where sterile base was reached and no moisture was observed, the midden ended abruptly and appeared fairly rich and full of mussel fragments at the onset of occupation--just above sterile base.

The lower levels from 42-66" show a far greater quantity of Tegula gallina, Protothaca staminea, Balanus spp. and Chiton spp. than in the upper levels. Possibly the first occupants relied more on incidental molluscan forms. The inhabitants who occupied the site later in time no doubt found more satisfactory resources to exploit.

FAUNAL REMAINS

All the unmodified bone recovered in the 1/4" screenings in pit T25 s collected for a sample analysis. Identification of the mammalian and rd remains was made by Alan C. Ziegler, Curatorial Assistant, Museum of rtebrate Zoology, University of California, Berkeley. Nomenclature and der of the land and sea mammals and birds follow Simpson (1945).

The fish remains, identified by W. I. Follett, Curator of Fishes, California Academy of Sciences, San Francisco, include those listed below. See e Appendix by Mr. Follett for detailed analysis and discussion.

TABLE 46

Fanual Remains in Pit T25

Land Mammals	Sea Mammals
so sapiens--man	Pinnipedia--seals, sea lions
livagus sp.--cottontail rabbit	Otariidae--sea lions
omomys sp.--pocket gopher	Arctocephalus townsendi--Guadalupe fur seal
odomys sp.--kangaroo rat	Cetacea--small toothed (porpoises)
otoma sp.--wood rat	Medium to large unidentifiable sea mammal
all mammal--unidentifiable	
is sp.--coyote size	
rnivora--tooth root only	
ydra lutris--sea otter	
ocoileus sp.--deer	
dium to large unidentifiable land mammal	

Birds
Gavia sp.--loon
Podiceps sp.--grebe
Diomedea sp.--albatross
Phalacrocorax sp.--cormorant
Larus sp.--sea gull
Corvus sp.--crow

Fishes

- ...na ditropis Hubbs and Follett--salmon shark
- ...rus oxyrinchus Rafinesque--mako
- ...iakis semifasciata Girard--leopard shark
- ...patina californica Ayres--Pacific angel shark
- ...inobatos productus (Ayres)--shovelnose guitarfish
- ...liobatis californica Gill--bat stingray
- ...ralabrax clathratus (Girard)--kelp bass
- ...myraena argentea Girard--Pacific barracuda
- ...riola dorsalis (Gill)--yellowtail
- ...mber japonicus diego Ayres--Pacific mackerel
- ...rda lineolata (Girard)--California bonito
- ...unnus alalunga (Bonnaterre)--albacore
- ...romis punctipinnis (Cooper)--blacksmith
- ...elometopon pulchrum (Ayres)--California sheephead
- ...bastodes paucispinis (Ayres)--bocaccio

TABLE 46A

Supplementary List of Fauna

Additional faunal remains from pits other than T25 were identified in the field as follows:

Land Mammals

Lepus sp.--jack rabbit (black-tailed hare)
Citella beecheyi--ground squirrel
Thomomys bottae--pocket gopher
Microtus sp.--meadow mouse
Rodentia--miscellaneous, unidentifiable
Canis latrans--coyote
Taxidea taxus--badger
Odocoileus hemionus--California mule deer

Sea Mammals

Phocaena vomerina--Bay porpoise
Balaenoptera physalus--common finback whale
Zalophus californianus--California sea lion
Phoca vitulina--harbor seal

Birds

Pelecanus occidentalis--brown pelican

TABLE 47

Depth Distribution of All Unmodified Faunal Remains in Pit T25 by Weight

Depth	Mammal	Fish	Bird	Total
0-6"	43.0 gr.	2.7 gr.	0.6 gr.	46.3 gr.
6-12"	148.0 "	14.0 "	1.0 "	163.0 "
12-18"	66.0 "	11.2 "	0.6 "	77.8 "
18-24"	113.0 "	33.9 "	--	146.9 "
24-30"	211.5 "	38.6 "	2.5 "	252.6 "
30-36"	53.5 "	7.5 "	0.8 "	61.8 "
36-42"	60.5 "	14.6 "	0.2 "	75.3 "
42-48"	12.0 "	4.3 "	0.8 "	17.1 "
48-54"	56.5 "	2.0 "	--	58.5 "
Total	764.0 "	128.8 "	6.5 "	899.3 "
% of Total	85%	14%	1%	100%

TABLE 48

Depth Distribution of Faunal Remains from Pit T25

(Excluding Fish)

Depth	0/6	6/12	12/18	18/24	24/30	30/36	36/42	42/48	48/ster.	Tot.
Land Mammals										
Man	-	-	1	-	-	2	-	-	-	3
Medium to large land and sea mammal	33	116	49	65	148	25	40	5	2	479
Carnivore (tooth root only)	1	-	-	-	-	-	-	-	-	1
Sea otter	-	-	-	2	1	-	-	-	1	4
Canis sp. (coyote size)	-	-	-	-	-	-	1	-	-	1
Small mammal	-	3	-	-	2	-	-	-	-	5
Gopher	-	-	2	6	4	-	-	-	-	12
Kangaroo rat	-	-	-	-	-	1	-	-	-	1
Wood rat	-	-	-	-	1	-	-	-	-	1
Cottontail rabbit	-	3	1	4	2	-	-	-	-	10
Deer	3	4	2	3	4	2	-	-	2	20
Sea Mammals										
Seals, sea lions	1	-	1	2	-	-	2	1	1	8
Sea lion	-	2	-	1	1	-	2	1	-	7
Guadalupe fur seal	-	2	-	-	1	-	1	-	1	5
Porpoise	-	-	-	2	2	-	-	-	-	4
Birds										
Albatross	1	-	-	-	-	-	-	-	-	1
Sea gull	-	-	1	-	-	-	-	-	-	1
Cormorant	-	-	-	-	1	-	-	-	-	1
Loon	-	-	-	-	1	-	-	1	-	2
Grebe	-	-	-	-	1	-	-	-	-	1
Crow	-	-	-	-	-	1	-	1	-	2
Medium sized bird	-	1	-	-	-	2	1	-	-	4
Snake (vertebra)	-	-	-	-	1	-	-	-	-	1
Total	39	131	54	85	167	43	48			[illegible]

Note: The above represent individual pieces of bone.