ARCHAEOLOGY OF THE THREE SPRINGS VALLEY, CALIFORNIA

A Study in Functional Cultural History

Edited by

Brian D. Dillon and Matthew A. Boxt

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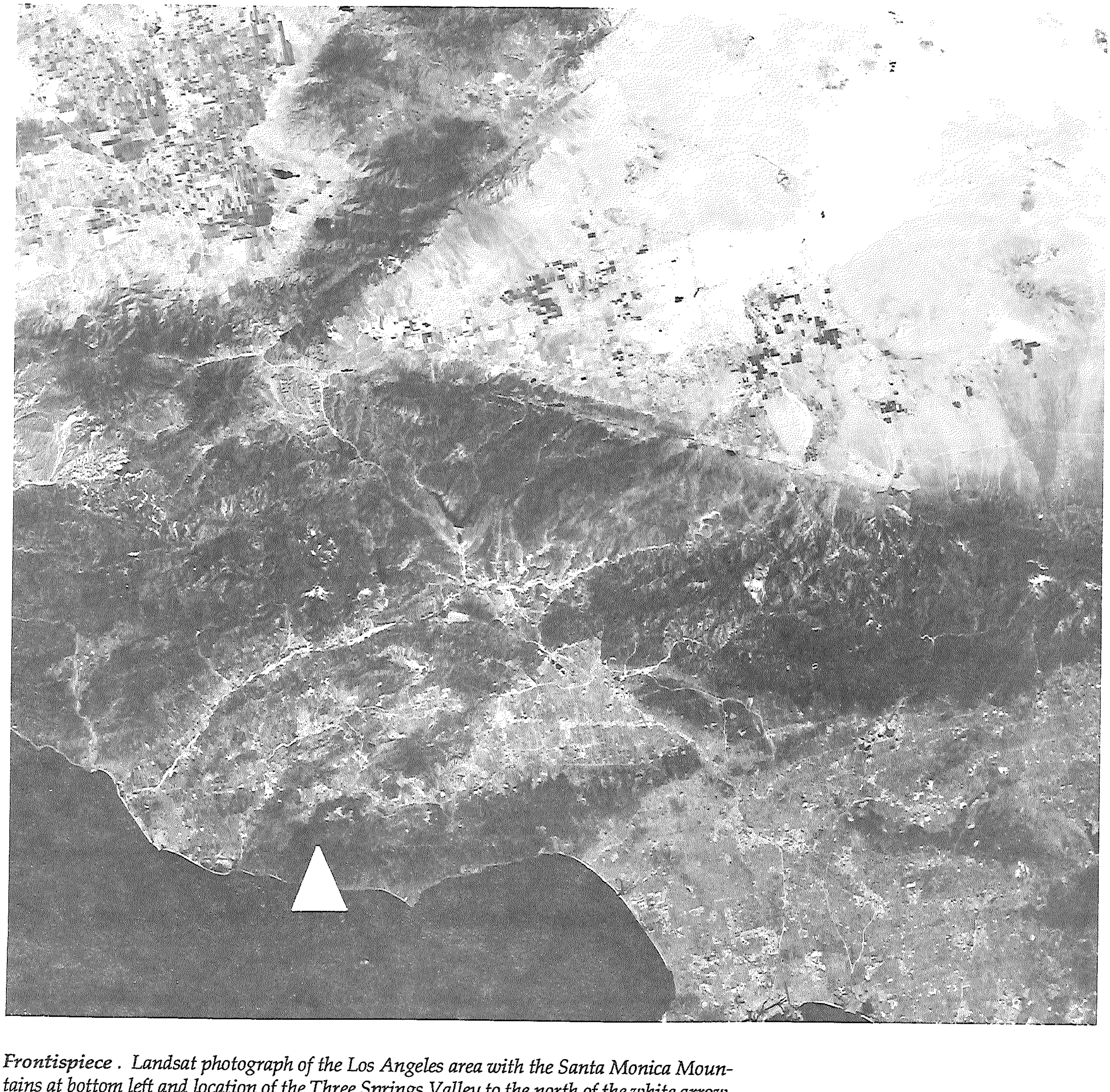

Frontispiece . Landsat photograph of the Los Angeles area with the Santa Monica Mountains at bottom left and location of the Three Springs Valley to the north of the white arrow. Courtesy of Kevin Pope, NASA Ames Research Center.

1. Archaeology of the Three Springs Valley, Los Angeles County, California: An Introduction

Brian D. Dillon

GEOGRAPHICAL AND HISTORICAL SETTING

The Three Springs Valley lies in westernmost Los Angeles County, less than a mile to the south of modern Westlake Village and approximately eight miles inland from the coast (fig. 1.1). The valley is named for three small seeps emerging high in the steep walls rising to the Santa Monica Mountains' crest: over the period of our exploratory visits and fieldwork (fall 1979 through spring 1981) at no time were all three springs completely dry. Most present-day southern Californians, taking imported water for granted, are minimally aware of the arid conditions that constrained aboriginal life: at the time of initial European contact, the Indians of the Santa Monica Mountains sometimes had to abandon villages and camps because of occasional scarcity of water (Font 1930:459-460). As its name implies, the Three Springs Valley, with its regular supply of water from subsurface seeps, had an advantage over more arid neighboring regions in the interior of western Los Angeles and eastern Ventura counties. Consequently, our research location would have been quite attractive for prehistoric utilization and perhaps settlement.

The Three Springs Valley drains a part of the northwestern foothills of the Santa Monica Mountains just to the east of the Ventura County line. Local topography incorporates fairly steep fingering ridges trending south and southwesterly as they rise toward the crest of the Santa Monicas and small, narrow valleys leading northward to much larger interior expanses of generally level terrain (fig. 1.2). These include the Russell and Conejo valleys to the northwest, the Triunfo Valley to the northeast, and western reaches of the San Fernando Valley farther northeast. At the time of the first European arrival on the northern slope of the Santa Monicas (the Portolá expedition of 1769), four Indian villages were noted in the foothills and interior valleys between the San Fernando Valley and Oxnard Plain. One of these, recorded by Miguel Costansó, Portolá's diarist, was "Triunfo," numbering probably no fewer than 30 but no more than 60 residents (Costansó 1911:317).

This small, Late Prehistoric/Protohistoric Chumash settlement may be identical to the ethnographic village remembered as "Hipuc" into the last quarter of the nineteenth century. These two locations in turn may equate with archaeological site LAn-242, unfortunately destroyed by development before it could be scientifically studied (Kroeber 1925: pl. 48; Heizer 1955:196; Glassow 1965:64, 67). As with most attempts to correlate ethnographic place names with recorded archaeological sites, many different archaeological candidates exist for just one "Hipuc," and there is no certainty that LAn-242, located where the Three Springs, Triunfo, and Russell valleys converge, is the same settlement recorded by Costansó in 1769. Despite our hesitation in positively locating the archaeological equivalent of "Triunfo/Hipuc," there is little doubt that a small, contact-period Chumash population inhabited the flat lands immediately to the north of the Three Springs Valley. Our study area would have been scouted and utilized by this population at least for resource acquisition and possibly for settlement, certainly during dry years when water would have vanished from the flatter lands at lower elevations.

The Three Springs Valley is a southerly extension of the Russell Valley, and Russell Valley is important as the divide separating the two major watercourses of the western Santa Monica Mountains. The Arroyo Conejo drains northwest into Calleguas Creek and reaches the coast at Mugu Lagoon, while Triunfo Creek drains southeast and joins with Malibu Creek to meet the ocean at Malibu Lagoon. Both coastal locations offered flat, sandy or silty intertidal zones ideal for shellfish collecting, and at the mouths of these two streams were large, Late Prehistoric Chumash villages with populations probably in the hundreds. We still know the locations today by their prehistoric names which, through a process of Spanish and English garbling, have been changed from "Muwu" to "Mugu" and "Humaliwu" to "Malibu."

The Santa Monica Mountains probably never presented much of an obstacle to prehistoric Indians of the interior en route to the coast and vice versa. Major drainages through the mountains and foothills such as Calleguas/Conejo and Triunfo/Malibu creeks would have served as connecting arteries between different ancient settlements, linking small sites such as those of the Three Springs Valley with much larger coastal villages. At least one archaeologist (Wlodarski 1985: fig. 5) feels that natural drainages in the area facilitated human travel and interchange to such an extent as to qualify as "possible major trade routes." Other authorities (e.g., Van Horn 1987:62) even suggest that interior villages such as El Triunfo/Hipuc were merely seasonally occupied satellites of the much larger coastal villages or "capitals" such as Malibu, kind of inland "poor cousins" to what was really the focus of local life down on the coast.

The first European contact with southern California Indians came in 1542, when Cabrillo visited both the Channel Islands and the mainland, and the Spaniards recorded observations on the Chumash and Gabrieliño. Although still somewhat controversial, some historians claim that the "Pueblo de las Canoas" visited by Cabrillo on October 10 may have been the Humaliwu site at the mouth of Malibu Lagoon (Rindge 1985; Doyle et al. 1985:13). Another location visited by Cabrillo in 1542, Mugu (or Muwu) near the L.A./Ventura County line may be the oldest recorded California place name still in use (Gudde 1960:202).

With the terrestrial expedition of Portolá of 1769, the Santa Monica Mountains formally entered the Historic period, with written records becoming a permanent fixture and permanent non-Indian settlers arriving to stay. The Malibu coast was visited by the de Anza expedition some seven years after Portolá, at which time it was first scouted for European usage. One member of the De Anza party, José Bartolomé Tápia, on February 22, 1776, rode through Las Virgenes and Malibu Canyon to the beach, marking the spot where a quarter-century later he would return to begin the first non-Indian land use activities after 1800.

The 13,000 acre ± Rancho Topanga Malibu Sequit was granted to Tápia by the Spanish crown as a "use" area for cattle ranching; and, in 1802 or 1803, a much larger concession of almost 50,000 acres on the northern slope of the Santa Monicas, including the Conejo, Russell, and Triunfo valleys, was granted to Ygnacio Rodriguez and José Palanco and also put into cattle production. So, from about 1800 onward, the Indians on both sides of the Santa Monica Mountains were in direct competition with cattle raisers for the use of their old lands. With conversion of the land to stockraising, the Indian population was removed to the coastal missions: most of the Chumash of the Malibu coast and Santa Monica Mountains interior went to San Buenaventura, while the Gabrieliño were removed to Mission San Gabriel and later to San Fernando. Contact-period sites on the coast and in the major stream drainages often incorporate glass trade beads, indicating some period of partial autonomy prior to assimilation into the mission system.

By the early 1830s, the Santa Monica Mountains and Malibu coast had no independent Indians remaining. Very little is known of the early post-contact period and how the final chapter of aboriginal life was played out in the Santa Monica Mountains interior. Possibly, renegade or holdout groups still managed to escape or evade the missions and conceal themselves in the interior for a time, and some survival of an-

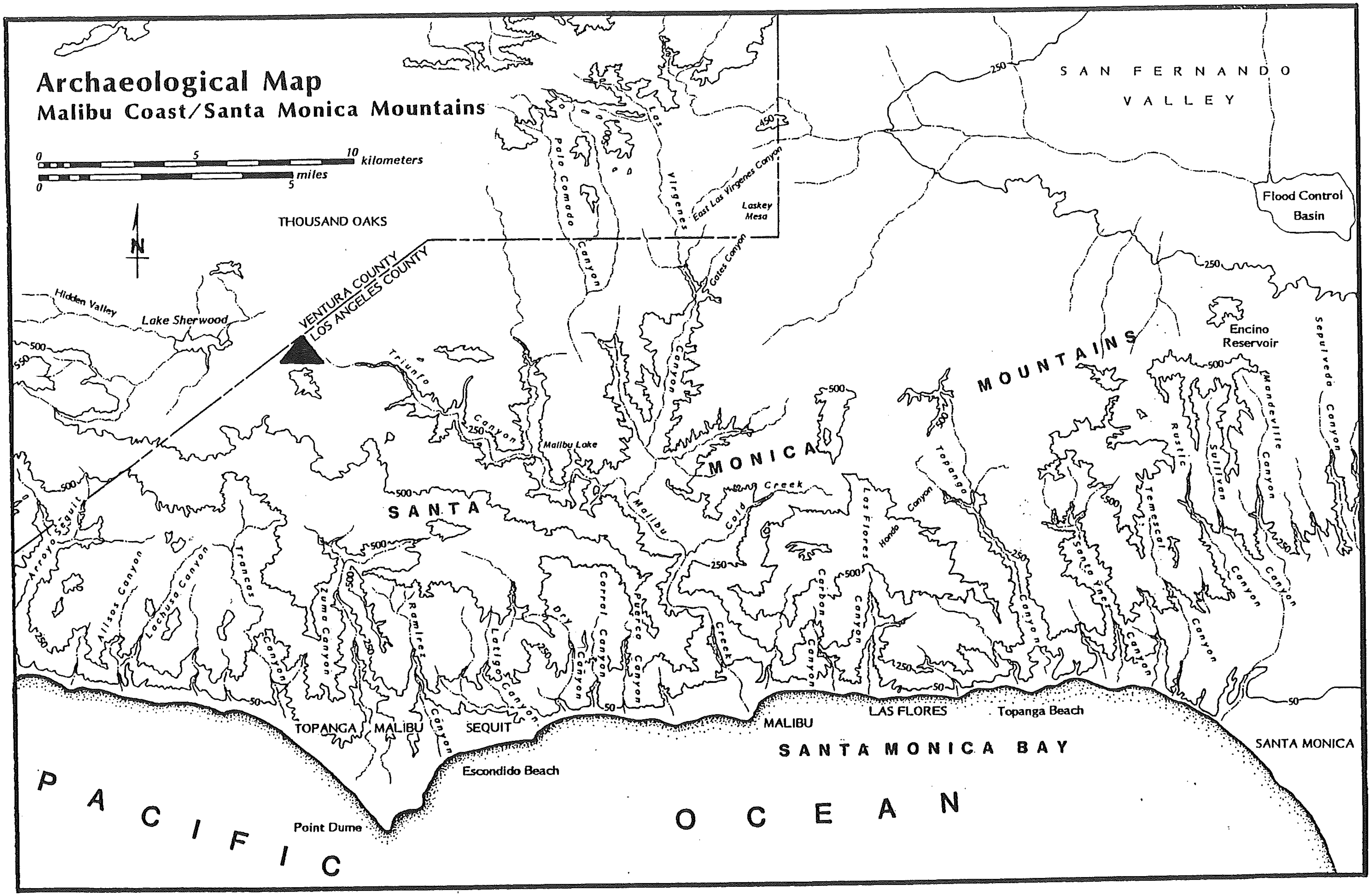

Figure 1.1. Location of the study area. Triangle at center left indicates position of the Three Springs Valley.

cient customs might have occurred, possibly even in the Three Springs Valley.

A generation later, by the 1860s, the Chumash and Gabrieliño populations were dwindling rapidly and acculturation of the survivors was progressing fast. By the third quarter of the century Stephen Powers, the state's first ethnographer, professed little interest in the Indians of Los Angeles and Ventura counties as he felt them too changed from aboriginal ways to be worthy of study and, so, concentrated on the more traditional, resilient Indians of northern California. Yet another generation later, Kroeber (1925: fig. 72) would note that by 1910, the southern California coast, in Indian terms, was the most depopulated part of the state, with less than 1% of its original estimated population remaining.

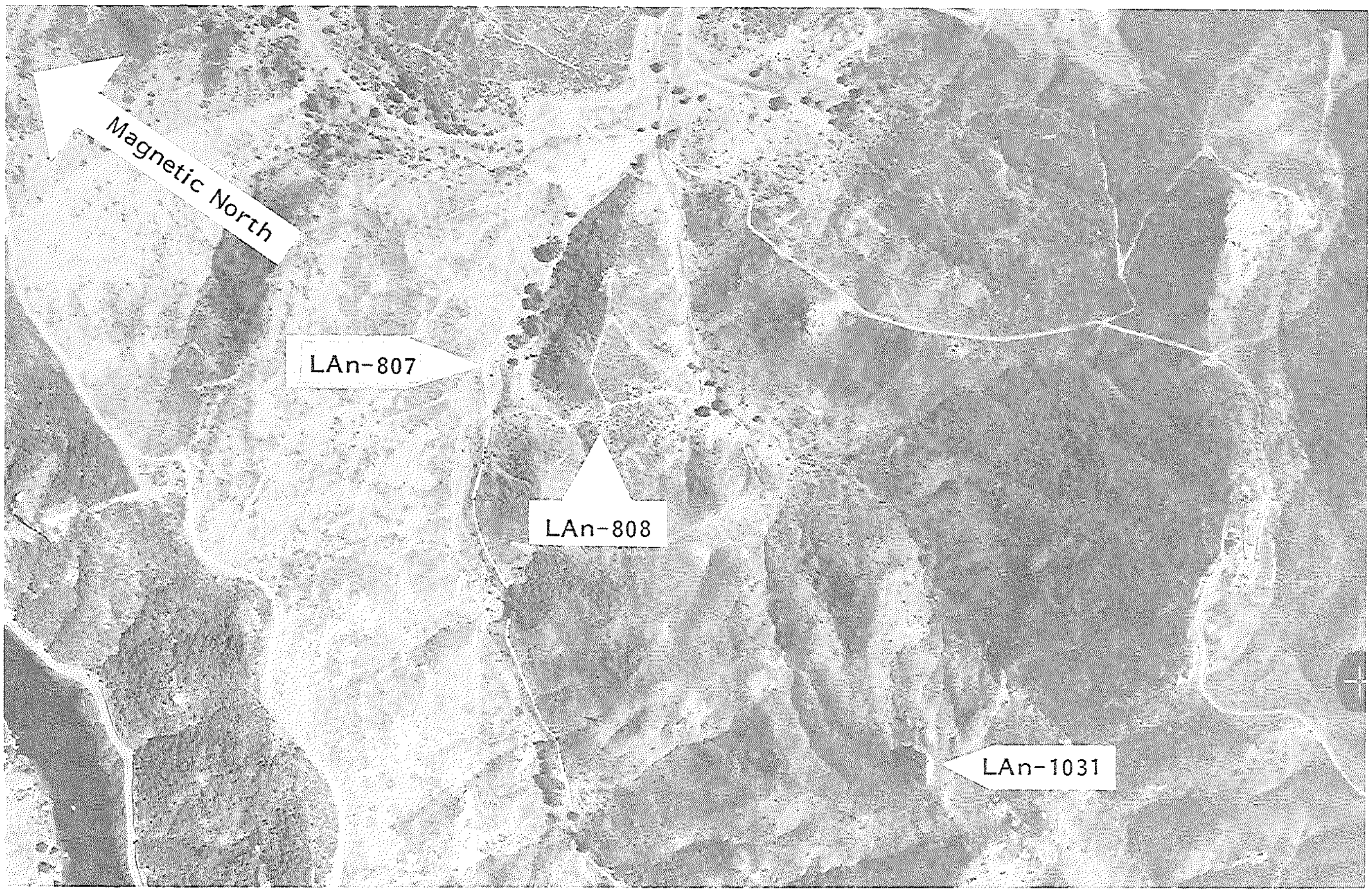

Figure 1.2.
The southern end of the Three Springs Valley. Photo taken October 23, 1979; courtesy of Walters & Associates, Canoga Park, California.

ARCHAEOLOGICAL BACKGROUND

The Malibu coast and Santa Monica Mountains of western Los Angeles and eastern Ventura counties could be considered one of the best-studied archaeological areas of California. The uniquely "archaic" (at least for western North America) level of aboriginal culture in the area had long been recognized (Meighan 1959a). Archaeological investigations, ranging in scope from simple, single-site excavations to more grandiose, long-term, problem-oriented research programs incorporating excavations at numerous associated sites, had been undertaken for more than a half-century.

One of the reasons why the Malibu coast/Santa Monica Mountains area was attractive to archaeologists was the diversity of site types. In addition to large coastal shell middens there were open sites in the interior (either of which might have associated cemeteries rich in offerings), cave or rock shelter sites in the walls of the numerous foothill or mountain valleys or in their peaks, and rock art sites incorporating primarily pictographic renderings. Despite this diversity, only the most rudimentary kind of functional classification was attempted during the early years of archaeological research, and little attention was paid to the possibility of multiple functions within any site type or at single sites.

The earliest archaeological investigations at shell midden sites along the westernmost fringe of the Santa Monica Mountains coastline are noted in Rogers's (1929) classic study of the Canaliño. J.P. Harrington investigated sites such as Muwu (Ven-11) in the mid-1920s, and Rogers himself excavated there in 1927, but the Malibu coast definitely took a back seat to archaeological areas farther inland during the first three decades of the century. Other early digging at Muwu was done by Arthur Woodward and C. Van Bergen of the L.A. County Museum between 1928 and 1932 but was only incompletely published (Woodward 1930, 1933).

Beginning in the late 1920s, as access along the coast improved, casual looting of coastal shell middens by artifact hunters began to reveal the prehistoric richness of the coastal strip. Looting and site destruction escalated dramatically over the next decade and a half with the construction of Highway 1, later called the Roosevelt Highway, and later still Pacific Coast Highway. This looting was stimulated by artifact collectors offering high prices for Malibu-area archaeological specimens, and it culminated in an orgy of pilferage and outright falsification of artifacts for pecuniary gain.

For many years, the Malibu coast has been famous as the reputed source of elaborate prehistoric steatite carvings, much more elaborate than simpler pieces earlier collected from the Channel Islands. The chief "archaeological" reference for these carvings, upon review and comparison with later, more scientific reports, appears highly unreliable. Many of the Canaliño steatite carvings reputed to have come from the Malibu coast now are presumed to be falsifications made in the 1930s and early 1940s specifically for sale to gullible Easterners.

Documentation of such carvings, supposedly "in situ," is offered by E. K. Burnett (1944), who represented the Heye Foundation's New York Museum of the American Indian in its collecting efforts. Some excavations were done at sites in Sequit Canyon, Lachuza Canyon, on Point Dume, Ramirez ("Ramera") Canyon, and Solstice Canyon which were apparently not under direct control of Burnett. Unfortunately, no documentation of specific discoveries nor of their contexts remains. Most of the steatite carvings are reputed to have come from mortuary contexts, and it is stated (ibid.:16) that 140 burials were encountered in a single site in Sequit Canyon (probably LAn-52). Yet, Burnett illustrates only three such burials probably from that site, and one other from "Lachuza Canyon." In all four photographs it is obvious that some manipulation of the supposed "offerings" has occurred, either repositioning at best or "salting" at worst.

Meighan (1976) points out that no such elaborate carvings have ever been found under scientifically controlled archaeological excavation conditions and describes a collection of bona fide Canaliño carvings from the Malibu site that have virtually nothing in common with the Burnett specimens. Freddie Curtis, who during the late 1950s and early 1960s excavated at another of the same sites pilfered by Burnett (LAn-52, Arroyo Sequit), found a complete absence of elaborate effigy carvings (Curtis 1959, 1963).

Truly scientific archaeology on the Malibu coast got its start just as the pseudoscientific digging of Burnett was drawing to a close. In 1940 and 1941 Ralph Beals of UCLA conducted field excavation classes at a midden site at the mouth of Deer Canyon a short distance west of the Los Angeles County line. The war interrupted the analysis of the finds, and this research was not published for many years (Wissler 1958), some time after other coastal archaeological projects had been completed. The Deer Canyon site is listed by Wissler as Ven-20 but is listed as Ven-2 in the UCLA site records; despite the clerical confusion over its listing, the site was found to have been occupied during the Late Prehistoric or Canaliño period and contained evidence suggesting that both terrestrial hunting and maritime fishing were important to its inhabitants. Wissler's report is also significant as an early example of ecological interpretation in archaeology.

From August 1947 to July 1948, another important archaeological project was conducted on the Malibu coast on the western side of Point Dume at Zuma Creek. Here numerous volunteers worked alongside George Brainerd's UCLA field archaeology class, and the excavation results were published by Peck (1955). Unlike Beals/Wissler's Deer Canyon site, the Zuma Creek pattern indicated minimal reliance on terrestrial hunting and, instead, featured great numbers of manos and metates suggestive of plant food collecting and processing. Even more surprising, especially for a site so close to the ocean, was the comparative unimportance of shellfish in the diet of the inhabitants. Obviously, along the Malibu coast, important changes in the archaeological record were beginning to emerge.

Four years after the end of the Zuma Creek excavations, scientific archaeology on the coastal strip of the Santa Monica Mountains was becoming the rule rather than the exception. An important excavation at the Little Sycamore Shellmound by the 1952 USC archaeological field school directed by William J. Wallace (Wallace et al. 1956) began to chronicle those adaptational changes leading up to the Late Prehistoric period even more fully, and it became clear that the pattern found at the Deer Creek site was only the tip of the archaeological iceberg.

Scientific investigations at open sites in the interior began in the San Fernando Valley with the work of Edwin F. Walker of the Southwest Museum in 1939 at the Chatsworth Cairn site (Walker 1939, 1951) but got a major boost in 1946, when the Topanga sites were first discovered (Heizer and Lemert 1947) in the drainage of the same name. The oldest prehistoric society in Los Angeles County was revealed through excavations at one of these open sites (the "Tank Site" or LAn-1) beginning the following year, and again final publication of results lagged somewhat behind field research (Treganza and Malamud 1950; Treganza and Bierman 1958). With the Topanga Canyon research it was becoming obvious that an archaeological presence much earlier than most sites yet known on the coast could be found in the interior.

A later investigation of an open site in the interior of the Santa Monicas, the Gilmore Ranch Site, by William Wallace (1955a) and another archaeological field class from USC coincidentally revealed an Intermediate period presence, chronologically intercalated between the early Topanga and late Deer Canyon sites. During the past 35 years, as coastal development has outstripped that in the interior and fewer coastal sites are left to investigate, archaeological projects in the interior have become much more common than ever before.

The earliest rock shelter excavations in the Santa Monica Mountains began at Canterbury Cave (Ven-12), lying less than a mile to the west of the Three Springs Valley near modern Lake Sherwood. In 1929 A. Woodward of the Los Angeles County Museum recovered an impressive collection of artifacts including rare and normally perishable remains, such as basketry fragments, from the shelter. Woodward unfortunately never published an account of the finds, but, more than a half-century after the collection was made, it is finally being analyzed in scientific detail Rigby (n.d.b).

In 1949 Joel Shiner published a brief account of his investigations at a series of rock shelters in the Simi Valley, north of the Santa Monica Mountains proper but, as subsequent work has shown, part of the same prehistoric cultural sphere. Shiner's (1949) report notes abundant small projectile points, shell beads and a possible shell bead workshop, steatite artifacts, and faunal remains from the site(s) and concludes that a "Fernandeño" or western Gabrieliño occupation is represented. This is most interesting in light of the subsequent, and abundant, references to "inland Chumash" control of the area by more recent authors.

The Triunfo Rockshelter (Ven-15), lying just to the west of Ven-11, was dug in 1953 and found to contain a probable early component as well as a possible late one (Kowta and Hurst 1960). Its excavators believe that the early occupation equates with the Millingstone horizon (see Wallace 1955) and note differences between the Triunfo basketry-making techniques and those of the Protohistoric Chumash which most likely have chronological significance. Curiously, no late indicators such as shell beads or projectile points were recovered from the Triunfo Rockshelter, although the ground stone and core/cobble tool components seemed most suggestive of a habitation site.

Also dug in 1953, but unpublished until some 30 years later, was the Gilmore Rockshelter in Little Sycamore Canyon in southeastern Ventura County (Wallace 1983). The Gilmore Rockshelter had several unusual features; not the least were pictographic rock art elements and two human burials, both associated with an excavatable midden deposit. The Gilmore Rockshelter probably is contemporaneous with the Triunfo Rockshelter or only slightly postdates it, but in its earliest levels predates the Late Prehistoric Conejo Rockshelter. A long period of use at the Gilmore Rockshelter site probably began in the Intermediate period, and, to judge from the rock art reported, continued into the Late Prehistoric.

The Conejo Rockshelter (Ven-69) was excavated in the early 1960s (Glassow 1965; Follett 1965) and produced predominantly Late Prehistoric artifacts and even a few Early Historic artifacts in the form of glass trade beads. Here, despite poor preservation of organic materials, numerous projectile points and other lithic artifacts, animal bone, and marine shell were recovered. Although debitage is not discussed in the report, it seems obvious from the nature and number of stone tools excavated that the Conejo Rockshelter witnessed much in the way of stone tool manufacturing, and the abundant shell connoted close contacts with the coast.

From investigations of these and other rockshelters it began to be clear that rockshelters in the Santa Monica Mountains may have had a long history of use yet no single or universal function. Some appeared to be habitation sites, some served as storage repositories, others as workshops either for stone tool or shell bead manufacturing, and at least in one case they were used for disposal of the dead. Caves or rockshelters in the interior in a very few cases also appear to have been repositories of unique, or near-unique, ritual objects; one such site, LAn-341, was excavated by Meighan (1969) and the 1962 UCLA archaeological field class in Topanga Canyon. It produced four painted rocks or "charm" pieces as well as a chipped stone crescent. The crescent finds a counterpart with one excavated by Johnson (1966) at LAn-2, an open site also in Topanga Canyon, giving a probable date of about 2500 B.P. Clewlow et al. (1979) identify two small and probably Late Prehistoric period caves in the Simi Hills as "shrines," based on their very limited and mutually exclusive artifact contents.

Formal rock art research was late to develop in the Santa Monica Mountains despite one of the earliest archaeological sites identified in L.A. County being a pictographic panel with historic pictographs showing mounted horsemen, inland from Point Dume at the Santa Monica Mountains crest. The site (LAn-717) was locally famous as early as the turn of the century and gained national attention with its publication on the cover of Grant's (1965) landmark work on Chumash rock art. Several other rock art sites in the area have been recorded; few of these have been studied with much rigor, and fewer still have been published (Ven-195 [Gibson and Singer 1970] is an exception).

The late 1960s and early 1970s saw the entry of what has come to be called the "New Archaeology" in western Los Angeles and eastern Ventura counties, and the research focus ceased to be on the type of site to be dug, changing instead to an ostensibly more broad-scale approach to areal prehistory. The "Santa Monica Mountains Research Project" incorporated the excavation of sites in both Los Angeles and Ventura counties (Leonard 1966; King, Blackburn, and Chandonet 1968), and eventually resulted in an excellent summary of Santa Monica Mountains culture history (Leonard 1971). This effort nevertheless left obvious major gaps remaining in the overall picture, especially in the inventory of basic evidence useful for chronometric determinations and the identification of individual site functions. Now, nearly two decades after Leonard's first study, perhaps a new review of Santa Monica Mountains prehistory might be offered, incorporating data obtained during the 1970s and 1980s.

The Santa Monica Mountains and adjacent Malibu coast have probably hosted a human occupation for at least the past 8000 years. Traditional thinking is that population density probably remained quite low until approximately A.D. 1, after which many large villages developed in the most favorable coastal locations, such as where the major freshwater streams meet the shoreline. In the larger interior valleys, especially at the confluences of the more reliable perennial drainages, smaller villages and hunting camps were occupied on a temporary, perhaps infrequently on a permanent, basis. Eyewitness reports by early Spanish explorers and colonists (Cabrillo 1929; Vizcaino 1908) note that some of the coastal settlements had populations in the hundreds; such estimates are corroborated by the size of the largest Late Prehistoric sites and their depth of deposit.

Yet, the "population boom" of the Late Prehistoric period may be more superficial than real: many more early sites are recorded than were known only twenty years ago, and many nominally "Late" sites, upon recent investigation, have been found to have buried early components, obscured by the Late Prehistoric deposits. Perhaps it is time to rethink the old idea of very low population density even as far back as the Millingstone period.

THE INITIAL PERIOD

One of the most controversial questions in California archaeology is the date of man's first arrival within what is now our state. Despite the claims of some archaeologists, a pre-American Indian, *Homo erectus* occupation at sites such as Calico Hills in the California Desert are not supported by archaeological evidence and are founded more upon speculation than fact. Although one or two archaeologists propose a "Calico-type" occupation for the Santa Monica Mountains area, no firm archaeological evidence has been produced in Los Angeles County that is universally accepted for such an early human occupation. Most if not all of these early claims are easily dismissed because it appears that natural objects have been confused with man-made artifacts (see, e.g., Graham and Heizer 1967; Haynes 1973; Payen 1982).

Other archaeologists are convinced of a much more recent but still considerably ancient human presence in southern California, dating back well before 10,000 years ago. Despite intriguing but so far unique and uncorroborated evidence for people ("Los Angeles Man") in the Los Angeles Basin over 20,000 years ago (Berger et al. 1971:47), most archaeologists are more comfortable with an initial human occupation of the area possibly no earlier than 10,000 years ago.

The earliest commonly accepted human skeletal remains from the Los Angeles area are those of La Brea Woman, dated (ibid.:46) to 9000 years ago ± 80. La Brea Woman is contemporaneous with the "Big Game Hunting Tradition" (Willey 1966:37-38) of North America, which featured large, frequently fluted projectile points and the hunting of Pleistocene megafauna. This technological tradition is best known from the Great Plains and Southwest, and abundant evidence supports a beginning point in these areas around 10,000 to 12,000 years ago.

In California, this most ancient big-game hunting culture is poorly developed and is best represented in the San Joaquin Valley (Riddell and Olsen 1969) and Lake County of northern California (Meighan and Haynes 1970). Convincing evidence for expansion of the "Big Game Hunting" tradition into the Los Angeles basin is still lacking, and no equivalent period of human occupation dating before 10,000 years can yet be defended for the Santa Monica Mountains area. Consequently, the culture to which La Brea Woman belonged is still unidentified in the archaeological record, and the earliest archaeological society we can identify in our study area is the Topanga Culture of the Early Millingstone horizon.

THE EARLY MILLINGSTONE PERIOD

The Topanga Culture is a constituent of the Early Millingstone horizon (Wallace 1955a; Leonard 1971; Meighan, n.d.). This cultural horizon is one of the most characteristic of all archaeological complexes in southern California, and is found from Santa Barbara County to San Diego County. Most early Millingstone sites feature crude, core-cobble tools and often have a great number of ground-stone implements which normally outnumber finely finished artifacts of flaked stone such as projectile points and knives. Also characteristic of this early period are "cogged stones" (Eberhardt 1961) of unknown function, made through pecking and grinding. Chipped-stone artifacts of the Millingstone horizon tend to be larger, heavier, and cruder than those of the later periods, and one characteristic of the period seems to be a preference for local stone over lithic materials imported from any distance.

The Topanga Culture is generally accepted as having been established as early as 6000 B.C.; Meighan suggests (1959a:289) that Topanga sites may date as early as 8000 B.C. Treganza and Bierman (1958:75, table 8) break the Topanga Culture into two phases, with phase I between 8000 and 4000 B.C. and phase II between 5000 and 2500 B.C. Later excavations at a second location (LAn-2; K. Johnson 1966) near the Tank site revealed that the tradition persisted until about 1000 B.C., changing only slightly. This latest expression of the Millingstone Culture can be assigned to the Intermediate period, for new technological ideas (such as the mortar and pestle complex) arrive to take up residence alongside the conservative, and much older, mano/metate tradition.

Because of their age, Early Millingstone sites are frequently buried and lack easily visible surface features or artifacts. Unlike at late sites, where surface collecting can often provide a representative sample of the subsurface component, at many Millingstone sites surface artifacts are meager at best. Other Early Millingstone characteristics include hardpan or "adobe" soil, very unlike the familiar middens of the late villages with their silty texture and black color; knolltop or ridgetop site locations; and frequently a generally small proportion of artifacts relative to the amount of earth excavated. This last criterion may not always be the case, however, as the example of the Tank site (LAn-1) points up: "The artifact occurrence in the Tank site is abnormally high, as compared with that not only of other local sites, but of Far Western sites in general.... [T]he average yield was one finished specimen per 1.5 cubic feet of earth" (Treganza and Malamud 1950:131). Stone tools used at this time frequently exhibit a much wider diversity of rock types as base material than is the case later. Indeed, it often seems that whatever was at hand and readily available was used, and few attempts at rigorous selection were made. Some technological aspects of the Millingstone horizon continued both on the coast and in the interior until European contact but usually in modified form and greatly lessened popularity.

The hallmark of the Millingstone horizon is the portable mano/metate complex, which bespeaks an almost overwhelming dependence on wild plant food processing. Such emphasis on vegetal food sources is correspondingly reflected in the general absence of faunal remains at Millingstone sites. In the interior, where later sites have abundant animal bone in their deposits (Colby, n.d.), faunal remains are absent in the early sites; and on the coast, where mollusk shells form the bulk of late site deposits (Curtis 1959, 1963), some Millingstone sites adjacent to the beach contain little or no shell at all (Peck 1955; Ruby 1961). Millingstone sites in the coastal area are virtually indistinguishable from those farther inland, and maritime resources seem to have played an insignificant role in the human diet. This characteristic absence of faunal remains at Millingstone sites is not universally attributable to limitations of preservation over time, as witnessed by human burials in some Millingstone sites (Treganza and Malamud 1950). However, some very early sites such as Malaga Cove (Walker 1951) and Little Sycamore (Wallace et al. 1956) probably contain a Millingstone occupation incorporating shellfish exploitation, so it would seem that even at this very early time no generalized pattern for the L.A. County coastal area can be uncritically accepted.

If the Topanga Culture first became established in the sheltered canyon of that name, its ecologic/economic adaptive pattern later spread northward over the crest of the Santa Monicas and into the San Fernando and Conejo valleys beyond. A Topanga Culture site on the divide at Mulholland Ridge (LAn-218, the Corbin Tank site) was possibly situated so that groups traveling between the Pacific slope of the Santa Monicas and the interior valleys could rest at the halfway point (Dillon, n.d.a); this site may form the last link of a chain of sites incorporating others such as LAn-162, the Santa Maria site (Dillon and Hyland, n.d.) and LAn-1248, the Montevideo site (Dillon, n.d.b.) in upper Topanga Canyon.

We know very little about the form that Early Millingstone settlements took. Most sites are so small that they can hardly be considered villages; even the Tank site with its thousands of finished artifacts contained so few burials that at best it might be termed a "hamlet." While rock features are comparatively common at Early Millingstone sites, these have been variously interpreted and not very frequently as architectural in nature. Evidence for actual dwellings is scanty but does exist (Dillon 1978); these were probably shallow pit houses with walls and roofs of branches and grass. Most archaeologists would agree that Millingstone communities in most cases represent camps occupied by extended families, probably never numbering over a few dozen inhabitants. What seems to become clearer with each passing year, however, is that the number and density of these early sites may be greater than was earlier thought.

THE INTERMEDIATE PERIOD

Approximately 4000 to 5000 years ago, the Millingstone tradition began to be supplanted by a new way of life directed away from terrestrial plant food resources and beginning to focus on animal protein, the sea and coastal areas. This time is referred to as the "Hunting period" or the Intermediate or Middle horizon, during which plant food processing slowly loses popularity.

Consequently, ground stone tools come to be displaced by small, chipped stone tools useful in hunting, especially projectile points. Recently Lathrap (personal communication) has suggested that the enigmatic Hunting Culture, which seems to have few or no direct antecedents on the mainland shore, is a "backwash" culture from the Channel Islands, returning to the mainland in a more developed form than the one in which it left. Simultaneously, maritime resources are exploited in coastal areas. The pattern of dependence on fish, sea mammals, and especially shellfish may have been imported from the Channel Islands to the mainland, for maritime-oriented sites have been dated as early as 2000 B.C. on Catalina Island (Meighan 1959b) and possibly even as early as 7000 B.C. on San Clemente Island (Meighan, personal communication). Few Middle period sites have been studied in detail on the Los Angeles County mainland; this may be because they are comparatively rare or because in some cases they may be obscured by later site deposits.

One site probably dating to the end of the Early Millingstone and beginning of the Intermediate period is the Little Sycamore shellmound, lying just over the Los Angeles County line in easternmost coastal Ventura County. The Little Sycamore site contains evidence of "a small population with an exceedingly simple culture" (Wallace et al. 1956:40). Precise dating of the Little Sycamore culture is still somewhat problematic, but the pattern is what one would expect if Topanga peoples had moved to the coast and begun to supplement their presumably primarily vegetarian diet with locally abundant shellfish. Projectile points recovered indicate an obviously pre-Canaliño temporal placement; the relative abundance of milling equipment likewise indicates a conservative hold on the salient economic feature of the old Early Millingstone adaptation. Wallace et al. (ibid.:41-42) suggest that the Zuma Creek site (Peck 1955) slightly precedes the Little Sycamore shellmound and that both the Malaga Cove (level 2) and Topanga (Tank) sites share enough features with Little Sycamore to be at least partially contemporaneous.

LAn-2 in Topanga Canyon (Johnson 1966) has already been mentioned as a place where the old Millingstone Culture of the interior was transformed during the subsequent Intermediate period: LAn-2 probably finds a chronological counterpart in the Gilmore Ranch site (Wallace 1955a) of eastern Ventura County. At Gilmore Ranch both manos and pestles are discovered in association; projectile points recovered are more advanced than the earlier Millingstone horizon points from Topanga yet are large and in some cases stemmed, unlike the Late period points found throughout both the mountain and coastal areas.

It may be that we can define the earliest and the latest parts of the occupational sequence for Los Angeles County but have trouble describing the intermediate. The question of whether a transition or a replacement of Early Millingstone by Canaliño took place is still unresolved to everyone's satisfaction, but what seems obvious now is that there was no overall or universal change at predictable intervals. It seems that some Early Millingstone sites persisted in conservative fashion much longer than others, while in different areas people established "Canaliño" sites without localized Millingstone antecedents. Conversely, we note an early presence on the coast at sites such as Little Sycamore (Wallace, et al. 1956), and a probable Intermediate period occupation might be defended for the lowermost levels of the Late Prehistoric Malibu site (Meighan, personal communication).

THE LATE PREHISTORIC PERIOD

The Late Prehistoric coastal hunting and gathering peoples of southern California developed a culture of remarkable sophistication, successfully incorporating many characteristics usually thought to be exclusive hallmarks of agriculturalists. The salient features of the Late Prehistoric period were summarized by Meighan (1954) nearly 35 years ago, and subsequent research has done little to modify his description of this most familiar of all archaeological periods in our study area. The Chumash and their eastern neighbors the Gabrieliño lived in large villages densely packed along the coastal strip and valleys leading to the interior. These settlements, with individual populations in the hundreds, may have constituted many thousands of souls all told. While it is true that the earliest focus of human settlement in L.A. County was the interior and the latest was the coast, it is incorrect to assume that all archaeological sites in the latter area will be late and those in the former early.

The Malibu coast and Santa Monica Mountains are within the area of the Late Prehistoric "Canaliño" culture (Rogers 1929) and incorporate the ethnohistoric boundary between the Gabrieliño and Chumash. Gabrieliño material culture (Johnston 1962; Blackburn 1963; Bean and Smith 1978) differed but little from that of their western neighbors, the Chumash (Landberg 1965; Grant 1965, 1978a, 1978b), and frequently distinctions between these two groups are archaeologically invisible or hard to detect. Although Kroeber (1925) concluded that the dividing line between the Chumash and Gabrieliño was Topanga Canyon, the precise boundary between the Chumash and their eastern neighbors, the Gabrieliño, is absolutely uncertain in the context of most interior drainages.

"Chumash" and "Gabrieliño" archaeological sites all fall within the Late Prehistoric period, usually considered to have begun around A.D. 1 but not to have reached full flower until after A.D. 500 with the introduction of new technological items such as the bow and arrow. The Late Prehistoric period conventionally ends with the development of the mission system and conversion and resettlement of the Indian population. Some of the large coastal shell middens, either of Chumash or unknown affiliation, have lower levels which can be dated earlier than this period, but in no case older than about 3000 years. A hallmark of these late coastal sites is dependence on shellfish and other marine resources; predictably, the most common late features are shell middens, and many interior sites contain much shell and fish bone imported from the coast.

Canaliño/Chumash village and mortuary sites are famous for the quantity and diversity of archaeological materials they contain and sometimes have considerable depth and development of deposit. Late Prehistoric sites can be identified by certain specific time markers such as small shell beads; small, finely chipped projectile points; and the use of carefully selected materials for stone-working, including imports such as fused shale and steatite (Hudson and Blackburn 1981). The very early colonization of the offshore islands (4000 to 9000 years ago, as now seems likely) suggests most strongly that a "pre-Canaliño" group was present. Thus a very long history of maritime adaptation presumably based upon seagoing canoes similar to those recorded ethnographically (Harrington 1978) may be inferred. Certainly by A.D. 1000 the Canaliño/Chumash/Gabrieliño maritime tradition featured deep-sea fishing and sea mammal hunting and island-mainland commuting on a such a regular basis as to be one of its most characteristic cultural features.

One Canaliño site that has been scientifically excavated and extensively published is LAn-52, or the Arroyo Sequit or Leo Carillo Beach site. Curtis's first season of work at the Arroyo Sequit site (1959) led to the conclusion that it hosted essentially a Late Prehistoric Canaliño/Chumash occupation, beginning around the start of the Christian era and terminating at the time of missionization, around 1800-1830. However, the later, 1962 excavations revealed a possible Intermediate component with crude, core/cobble tools underlying the later shell midden deposit. In some parts of the site the midden is over six feet, and Curtis (1963:103) feels that the initial time of occupation could be as early as 1000 B.C.

The Malibu site (LAn-264), at the mouth of Malibu Creek, has been dated to more than 3000 years B.P. by C-14 and obsidian hydration methods and was abandoned at approximately A.D. 1825 when its inhabitants were either resettled at the Catholic missions or dispersed (Meighan 1978). With more than five vertical meters of deposit and buried features such as fragmentary plank canoes, the Malibu site remains one of the richest in all southern California. The Sweetwater Mesa site (LAn-267), neighboring the Malibu site, has also been radiocarbon dated and may have been occupied as early as 5000 years B.P. (C. King 1967). Together these two sites exhibit the transition from the old, Millingstone way of life to a dependence on marine resources (Leonard 1971). Some archaeologists dogmatically assume that since the Malibu site was Chumash at the time of its abandonment, it was always Chumash, and they also see an unbroken "Chumash" development beginning with the earliest occupation at the Sweetwater Mesa site. Meighan (1976), however, raises the intriguing possibility that the Malibu site may have been in Shoshonean hands as recently as 1000 years ago; if this was the case, it would be anyone's guess as to who its occupants were at the time of its initial occupation.

The Chumash and Gabrieliño were responsible for the creation of some of the most distinctive and beautiful polychrome pictographic rock art known from North America (Grant 1965), rivaled locally only by the Yokuts Indians of the San Joaquin Valley to the north. One rock art site featuring primarily red monochrome paintings in the Santa Monica Mountains (LAn-717) was investigated by UCLA archaeologists and found to contain a succession of artifactual remains dating perhaps from Early Millingstone right up to the Historic period. Most importantly, the pictographic rock art was in direct association with the archaeological deposit. Representations of what might be the earliest contact between Los Angeles County Indians and Europeans in the interior have long been noted at this site (Grant 1965); some interpret the rock art panel as a native documentation of the 1769 Portolá expedition (Reinhardt 1981).

Other important Late Prehistoric sites are known in the interior Santa Monica Mountains area, many of which demonstrate close contacts with the coast. The Mulholland site (LAn-246) was found through radiocarbon age determinations to date approximately from A.D. 1200 to 1500. Although some 10 miles inland, its excavator nevertheless concluded that this site represented a permanent, sedentary interior village supported in large measure through trade with the coast (Galdikas-Brindamour 1970). Alternatively, the Daon site (LAn-669) in the Las Virgenes drainage was interpreted by Murray (n.d.) as being a hunting camp to which coastal peoples coming up the Malibu Creek drainage routinely brought food items from maritime sources. Murray sees no contradiction here between too rigidly "coastal" (maritime) and "inland" (terrestrial) subsistance patterns and/or populations because in his opinion different activities conducted by the same people are represented.

The Medea Creek site (LAn-243), arbitrarily divided into village (243v) and cemetery sections (243c), was reported on by Singer and Gibson (1970) and L. King (n.d.). The first report, "Functional Lithic Analysis," is remarkable for almost as many type categories as collected artifacts and for its lack of usable illustrations by which one might adjudge morphological differences between "types," while the latter is a model of completeness in California cemetery description and interpretation. For a good many years some archaeologists believed that the Medea Creek site had to have been a very large village because of the numerous burials in its cemetery. The curious thing about the Medea Creek site is that the archaeological "village" (243v) seems too small to have accounted for the large number of burials (nearly 400) recovered from the associated cemetery (243c). L. King suggests (n.d.:140) that the best explanation for this situation is that the Medea Creek cemetery was something of a necropolis and may have recruited from many settlements, both in the interior as well as on the coast, and that absolute village size need not have anything to do with absolute cemetery size.

Other sites in the interior seem to either have been cut off from the coast or had little to do with coastal patterns, if only to judge from the relative absence of shell and fish bone recovered from their middens. A group of small sites (LAn-711, 712, and 1060) in the Dry Canyon area may represent the archaeological frontier between the Late Prehistoric Chumash and Gabrieliño; possibly the general poverty of marine resources at these interior sites is somehow linked with their "frontier" status. The Dry Canyon sites have been rather more completely reported than many in the interior (Boxt and Rechtman 1981; Villanueva 1981; Brown, Murray, and Van Horn 1986; Murray, Brown, and Cheung, n.d.) yet even so, we cannot surely assign to them "Chumash" as opposed to "Gabrieliño" inhabitants.

The Gabrieliño, a Shoshonean-speaking group, by all accounts were comparative newcomers to the Santa Monica Mountains area. The majority of archaeologists think that they arrived around A.D. 500, or at most a few hundred years earlier, from the southern Great Basin or interior California deserts and began to displace the previous Hokan-speaking occupants of the coast

(Kroeber 1925:578-580). By at least A.D. 1200 three different Gabrieliño dialects may have been in use; Santa Catalina Island is thought to have had its own Gabrieliño dialect, different from both the language spoken in the Los Angeles basin and that of the San Fernando Valley (Dakin 1939; La Lone 1980).

Two recent large-scale excavations in the ethnohistoric Gabrieliño area have greatly expanded our knowledge of the prehistory of this enigmatic group. One, in Encino toward the western end of their territory in the San Fernando Valley, may have revealed the ethnohistoric village of "Encino," visited by Portolá during his 1769 overland exploration of the Los Angeles area. The other, focused on several sites at the old mouth of the Los Angeles river near Ballona Lagoon, perhaps is the earliest locality to come under Gabrieliño control upon their arrival in coastal Los Angeles County (Van Horn and Murray, n.d.; Van Horn, n.d.).

The original language of the eastern Santa Monicas was certainly not Gabrieliño, and we may never know what group was replaced by the late-arriving Shoshoneans after around A.D. 500. This being the case, there is virtually no likelihood that we will ever be able to determine what language was spoken by the Topanga people some 8000 years ago; all that is certain is that there is no demonstrable link between this early culture and any living or ethnohistoric southern California Indian group. We are likewise in the dark as to the linguistic affiliation of the still shadowy Intermediate period populations temporally transitional between Early Millingstone and Canaliño. Indeed, it is only during the final centuries of the Late Prehistoric period that we can with confidence assume that Canaliño sites in one part of our study area were Chumash and those in another were Gabrieliño.

RESEARCH GOALS

I first visited the Three Springs Valley in the late fall of 1979 at the suggestion of Dr. Clement W. Meighan, with an eye toward developing a location for the Spring 1980 UCLA field archaeology class. A recent fire had completely stripped the chaparral cover from the valley, rendering most of its ground surface visible. This facilitated the first comprehensive archaeological investigation since abandonment by its Indian population perhaps some two centuries earlier. During my initial visit it became obvious that the location could support a field training class; consequently excavations began at LAn-1031 in the early winter of 1979, continuing on sporadically until March 1980, when the formal course began. Then, for 10 weekends my field class studied the archaeology of the Three Springs Valley, completing research at LAn-808 and 1031, undertaking an additional 100% survey of the valley, and testing "sites" recorded by a previous visitor which we determined to be bogus. After the conclusion of the field class, several return visits were made to finish excavations at LAn-807, and our last day of digging was in early 1981. Study of finds began in earnest with my 1980 laboratory analysis class and continued long after the termination of fieldwork, until early 1983.

At the initiation of our research project in 1979, very little previous archaeological work had been done in the Three Springs Valley; that which had been completed gave a misleading and incorrect impression of its prehistoric nature. An earlier researcher (Singer, n.d.a) had mistakenly recorded natural features as prehistoric sites (LAn-888 and 889) yet had overlooked two of the three deposits we eventually spent hundreds of man-hours excavating (LAn-1031 and the midden at LAn-807).

In most Santa Monica Mountains archaeology, including that conducted by archaeological field schools, the research focus has usually been on single sites that are dug separately and sequentially from one another, with little ongoing comparative work of a kind which can facilitate interpretations on a daily basis. Some notable exceptions to this approach exist: the earliest of these was William J. Wallace's five-year (1952-1956) study of Little Sycamore Canyon, incorporating excavations at coastal shell midden, interior open, and rockshelter sites (Wallace 1955a, 1983; Wallace et al. 1956). A later example of the multi-site approach was the Century Ranch project (King, Blackburn, and Chandonet 1968) in which three sites in close proximity were studied, but artifact descriptions are "pooled" and provenience information is somewhat difficult of access.

The single-site approach normally leads to intensive study and recovery of much useful information but a lag in interpretation and almost secondary, or follow-up, studies when it comes time for comparative analysis with previously excavated sites nearby. At the opposite pole is the position of some archaeologists who downplay the notion of specific archaeological sites, arguing that since we presume the prehistoric Indians of our study area to have been transient, they must have located different kinds of activities in different places at different times. Such students have preferred to concentrate upon "activity foci" or the "site locus," loosely defined geographical subdivisions of a presumed larger entity (the "site" or "site cluster") that can be separated out because of a spatial, functional, or chronological distinction. This is a useful idea when not abused but sometimes results in a "plague of loci" that are really chronologically separate sites, not functionally different parts of the same site.

In our Three Springs Valley research project we chose to study the "valley" as the basic research entity, instead of either a single site or collection of "site loci." Our perception of our study area, then, was probably more similar to that of its ancient inhabitants, and this move furthermore happily facilitated intersite comparisons on an immediate basis. We had at our disposal a range of sites likely to be at least partially synchronic in time but divergent in function. LAn-807, 808, and 1031 were most likely utilized by what was probably the same group, depending on the function to be performed, probably at different times of the year and by different members of the group. Our primary research problem was the determination of site function without dependence on the fragmentary inheritance of incomplete ethnology and ethnohistory. As such, we hoped to let each archaeological site speak for itself, with the expectation that we might avoid putting the theoretical cart before the evidenciary horse.

Just digging one site out of the three would have led to a very incomplete picture of human events in the Three Springs Valley, and a reliance upon the "site loci" concept might have served to conceal actual changes that may have occurred over time within a single cultural sequence or changes resulting from a succession of different cultural groups. A different archaeologist, for example, might have considered LAn-807, 808, and 1031 to be simply different "loci" or "activity foci" of but a single archaeological expression in the Three Springs Valley. Such a position would have to assume contemporaneity among all three sites in order to work, but such an assumption would guarantee failure in any attempt to explain culture change over time, the archaeologist's primary obligation.

We know, as a result of our own work, that the three sites in the Three Springs Valley were contemporaneous at least in part, but this is only half the culture historical story. Each site has its own separate developmental history, and the cumulative archaeological evidence indicates use of the valley for approximately 1300 years. The Cazador site, a temporary hunting camp, was probably occupied first, and then a few hundred years later the Salsipuedes site was colonized from it, probably in the context of very specialized hunting activities. The Canasta Rockshelter was then visited for even more specific kinds of behavior, resulting in caches of valuables no doubt owned by people also using the two lower sites. Judging from the evidence recovered, LAn-808 fell out of use first, probably a hundred years or so before LAn-807 was also abandoned. LAn-1031 continued to be used as a cache site into the Historic period, as revealed by glass trade beads recovered from its deposit, so outpersisted its neighbors probably because of its special function.

The goals of our Three Springs Valley project were twofold: in addition to doing what I like to call "functional culture history" was our obligation to student training. My Three Springs Valley student crew of 35+ was divided into six teams, each led by a UCLA graduate student or by myself, and rotated through different field tasks each day on site (excavation at sites LAn-807, 808, and 1031 plus mapping, surface collecting, augering, and exploration). My teaching goal was to expose beginning students to as many different kinds of archaeological field research activities as possible, which not only eliminated the usual field school boredom coming from sitting in the same pit all season long, but also produced a cumulatively greater information yield each day than would have been the case had investigation programs proceeded in rigidly sequential fashion. From the beginning it was a multinational project, with not only local UCLA students and volunteers involved, but also foreign archaeology students and visiting scholars from countries as far away as Ghana and the Peoples Republic of China. No other field class in recent memory contained as many beginners that went on to become graduate students in archaeology, and, as can be the case with successful field classes, the students learned as much from each other as from the instructor.

Field class archaeology, especially in metropolitan areas such as Los Angeles, sometimes takes place at sites surrounded by urban or suburban development and either badly damaged or comparatively poor in artifacts. The result is that students obtain only a very limited exposure to different kinds of archaeological evidence and research methods and little conception of the original relationship of their site to its prehistoric natural and cultural environs. The Three Springs Valley, however, offered a basically pristine environment with not one but three different and intact archaeological sites worthy of investigation, each presenting different research challenges and different kinds of archaeological data.

Despite the admirable accomplishments of archaeological field classes touched on earlier in this introduction, during the past decade the institution of the archaeological field class has come under fire. This may be part of a general antiarchaeological sentiment (Dillon 1981), but criticism often comes from within the discipline itself. One of the two most frequently heard objections to field classes is that in training students to do archaeology well, they must first be allowed to do it poorly, and consequently sites suffer at the hands of novices. The other major criticism is that reports on sites dug by field classes are seldom published, so sites are damaged or destroyed without any usable record produced.

Suggestions for redressing the first problem range from those more reminiscent of science fiction than science (create "artificial" sites and dig them so as not to "archaeologically endanger" remaining legitimate sites) to positive recommendations such as closely supervise beginning students and go slowly. Common sense suggests that some knowledge about a site or archaeological area (even that produced by students) is preferable to no knowledge at all, and it has certainly been my own experience that beginning archaeology students under close supervision proceed with much greater caution than do some contract archaeologists working against deadlines.

In considering the second criticism, sometimes even used as a rationale against holding field classes, it should be pointed out that many fewer field school excavations remain unpublished in the Santa Monica Mountains/Malibu coastal area after long periods of time than do contract archaeology projects. The fact of the matter is that a good deal of local archaeological research and publication has been derived from archaeological field training classes; this has been so from the very birth of the discipline, and it will continue to be so as long as the archaeological discipline survives in southern California.

The Santa Monica Mountains/Malibu region is one of the best-studied and most richly endowed archaeological areas of California. While the broad outlines of human culture in this area are well known and generally accepted, the investigation of each new site adds important information to the total picture, and each new excavation project forces the reassessment and reevaluation of old conclusions and theories. With the publication of *Archaeology of the Three Springs Valley*, we add to this continuing scholarly process. The present volume incorporates some new discoveries and new research methods, and that is good; it also retains many of the old tried and true lessons learned from over 50 years of archaeological research in Los Angeles and Ventura counties. This continuity is also good, if only so that we don't repeat the mistakes and false moves of the past, but more so in that we can avoid reinventing our discipline with each new generation of California student archaeologists. Indeed, with the publication of this volume we welcome several such students to professional status. Our present offering is the product of those UCLA students and volunteers from my 1980 course, most of whom obtained their first California archaeological experience in the Three Springs Valley, and who began as neophytes but ended as professionals.

2.
A Brief Note on the Geology of the Three Springs Valley

Stephen L. Williams

Geologists and archaeologists share an interest in how aboriginal peoples made use of their physical environment, and the latter make frequent use of geological research methods in their culture-historical investigations. Archaeologists without geological training, however, sometimes misinterpret geological phenomena or misidentify culturally important lithic materials, and such errors are relatively easily made inareas as geologically complex as the Santa Monica Mountains. Few areas of California have as much geologic diversity in such a comparatively small expanse of terrain; young volcanics, old volcanics, sedimentary and metamorphic rocks are all found in close proximity and great variety.

The Three Springs Valley is situated on the northern flank of the Santa Monica Mountains, 14.5 km north of the Santa Barbara Channel. The valley is approximately 2.4 km long by 0.5 km wide and opens to the north into Russell Valley. One kilometer in from its mouth the valley branches; the eastern branch is presently occupied by a modern reservoir while the western branch continues southwest 1.4 km farther. The floor of the valley lies at an elevation of approximately 300 m and is surrounded by hills having a maximum relief of 200 m to the south but rising only 100 m to the east and west (fig. 1.1).

STRATIGRAPHY

The northern flank of the Santa Monica Mountains from Medea Creek on the east to Hidden Valley on the west is underlain by volcanic rocks and interbedded sedimentary rocks of the Conejo Formation (Taliaferro et al. 1924) deposited 13-16 million years ago (Blackerby 1965). In the Three Springs Valley, the Conejo volcanics consist of agglomerates (volcanic mudflow deposits), lava flows of dacitic, andesitic, or basaltic composition, and interbedded marine sediments derived from volcanic debris. Five km south of the area the Conejo Formation is underlain by sandstone, siltstone, and conglomerate of the Lower Topanga Formation (Blackerby 1965). These are overlain in turn along the northern margin of Russell Valley, 2 km to the north, by shale, siltstone, sandstone, porcelaneous shale, and chert of the Upper Topanga Formation (MacIvor 1955).

Topographic relief in the area is a direct result of differential weathering of the interbedded units in the Conejo Formation. The agglomerates often form resistant beds tens of meters thick that cap the heights to the south and east and which back the prominent ridge that outlines the western border of the valley. These units are interbedded with lava flows and sediments which are more subject to decomposition and disintegration by surface and ground waters. Rock overhangs and small rock shelters such as LAn-1031 are formed by differential weathering of the volcanic rocks promoted by subsurface water seepage along joints and bedding planes in the rock.

SOILS

The soils of the Three Springs Valley are typically poorly zoned silty sands and loams

Table 2.1. Comparative Analysis of Soil Samples

Sample	Grain Size	Color	pH	Total Organic Content
LAn-807 midden (upper 10 cm)	64% sand 27% silt 9% clay	10 YR 2/2 (dusky yellowish brown)	6.8	5.5%
Sterile soil 20 m SW of LAn-807, upper 10 cm)	66% sand 28% silt 6% clay	5 YR 3/3 (grayish brown)	6.6	1.3%

with a variable admixture of stony material (Nelson et al. 1920). These soils vary in depth from less than 50 cm on hillsides to a meter or more in the canyon bottom. Textures of these soils are determined largely by the nature of the underlying rocks. The agglomerate characteristic of the area consists of cobbles of dense volcanic rock set in a fine-grained matrix. Upon weathering, these rocks break down into loose cobbles and sand- to clay-sized materials which become admixed with organic matter from decomposing plant debris to form the local soils.

Samples taken from the midden at LAn-807 and sterile soil nearby are compared in sand-sized charcoal fragments in the midden (table 2.1). The neutral pH of the soil suggests that bone and shell (which are subject to dissolution in an acidic environment) should be preserved in the midden.

THE WATER SUPPLY

The water supply in the valley depends upon the physical character of the drainage basin (size, shape, relief, soil, and rock types) as well as the amount of seasonal distribution of precipitation falling in the drainage basin. The average rainfall in the nearby city of Thousand Oaks is approximately 400 mm per year, but the total may vary considerably from year to year. Ninety percent or more of the annual rainfall occurs during the cool rainy season from October to April. The warm season from May to September is normally dry except for occasional thunderstorms.

Drainage of the valley is to the northeast into Russell Valley. Regional drainage is from Russell Valley to the east through Triunfo Canyon and then southeast by means of the Malibu drainage system to the ocean at Malibu (Thomas et al. 1954). Surface flow occurs in the valley during the rainy season, but the upper creek beds are normally dry during the summer and early fall. Groundwater flow in the valley occurs in the fractured and weathered volcanics of the region. Measurements in wells in Russell Valley indicate that the top of the water table is at least 12 m below the ground surface (California Department of Water Resources 1963). Subsurface flow in Three Springs Valley, however, is sufficiently close to the surface to support stands of Phragmites (reed grass) and other pheratophytes in the creek bottoms. Permanent water supplies can presently be found in two areas in Three Springs Valley where water is able to reach the surface from the water table along zones of weakness in the underlying rocks. One spot is a small pool and seep north of LAn-807. The other is a seep located in the creek bed east of LAn-807 and north of LAn-1031.

LITHIC SOURCE AREA

Potential source materials for lithics are not abundant in the immediate area. Cobbles of andesite and basalt, weathered out of the agglomerates, can be found in the creek beds. Chalcedony and quartz occur as vug and fracture fillings in the volcanic rocks. Tuffs and sandstones are also interbedded with the volcanics. Poor quality banded chert with a splintery fracture occurs locally in the Upper Topanga and Modelo Formations to the north and east. Fused shale, good quality banded and unbanded chert with a conchoidal fracture, quartzite, asphaltum, talc, schist, and obsidian must be obtained from sources more distant than 10 km. Potential source areas for these nonlocal materials are described by Rosen (1979).

3.
Investigations at LAn-807, The Cazador Site

Matthew A. Boxt

PHYSICAL DESCRIPTION OF SITE

Archaeological site LAn-807 is situated at the base of a low ridge and at the confluence of two streams; these watercourses form the site's eastern and northern boundaries (fig. 3.1). The western boundary consists of a weathered outcrop of volcanic conglomerate ranging in height from 2 m above ground surface in one restricted area to 10 to 20 cm below the surface in others. The southern portion of the site is not delimited by any natural feature, but the midden deposit tapers off commensurately with increases in elevation of the mildly sloping ridge. LAn-808, the nearest neighboring archaeological site, rests on the saddle within this ridge system, and LAn-1031 lies just below one of its peaks at a much higher elevation.

LAn-807 was covered with non-native grasses at the time of the UCLA investigations. Two scrub oaks *(Quercus dumosa)* and a western sycamore *(Platanus racemosa)* were present on the site's perimeter. A riparian plant community flourished along the stream banks and in a low-lying area adjacent to the stream running along the site's eastern boundary. Water was present in this stream during the eight months of research, and the stream may have been capable of supporting the needs of the site's inhabitants to the exclusion of any other water source. Small seeps on either side of the ridge system hosting the LAn-1031 rock shelter provide the most continuous source of water for the LAn-807 streams; local rainfall and surface runoff contribute a good deal of moisture during the winter and early spring, but by May precipitation as a source of water becomes negligible. Today, a dense chaparral cover is found on the steeply sloping ridges surrounding the site, and at the time of fieldwork this vegetational complex was recovering from a recent fire.

The Cazador site is roughly oval in shape and occupies a horizontal area estimated at 484 m^2. Site depths ranged from 10 cm in auger holes 9, 16, and 14 to 110 cm in excavation unit 4. The average depth of the cultural deposit was calculated to be 0.55 cm. Multiplying the average site depth by the total estimated surface area, we deduced that LAn-807 was composed of roughly 270 m^3 of earth. Upon completion of two seasons at the study locale, it was estimated that UCLA archaeologists had excavated about 30 m^3 of deposit and sampled 11% of the overall site volume. Discounting lithic debitage, approximately 4.7 artifacts per cubic meter of earth were recovered.

HISTORY OF FIELDWORK

The Cazador site was originally recorded in 1978 (Singer n.d.a). At that time a few lithic flakes were collected, and a sketch map was made which indicated that the site's location was along a bulldozed dirt road leading to LAn-808, several dozen meters upslope from the position substantiated by the UCLA team. An intensive survey of this road led us to conclude that the artifacts collected by Singer were in fact the result of recent displacement and dis-

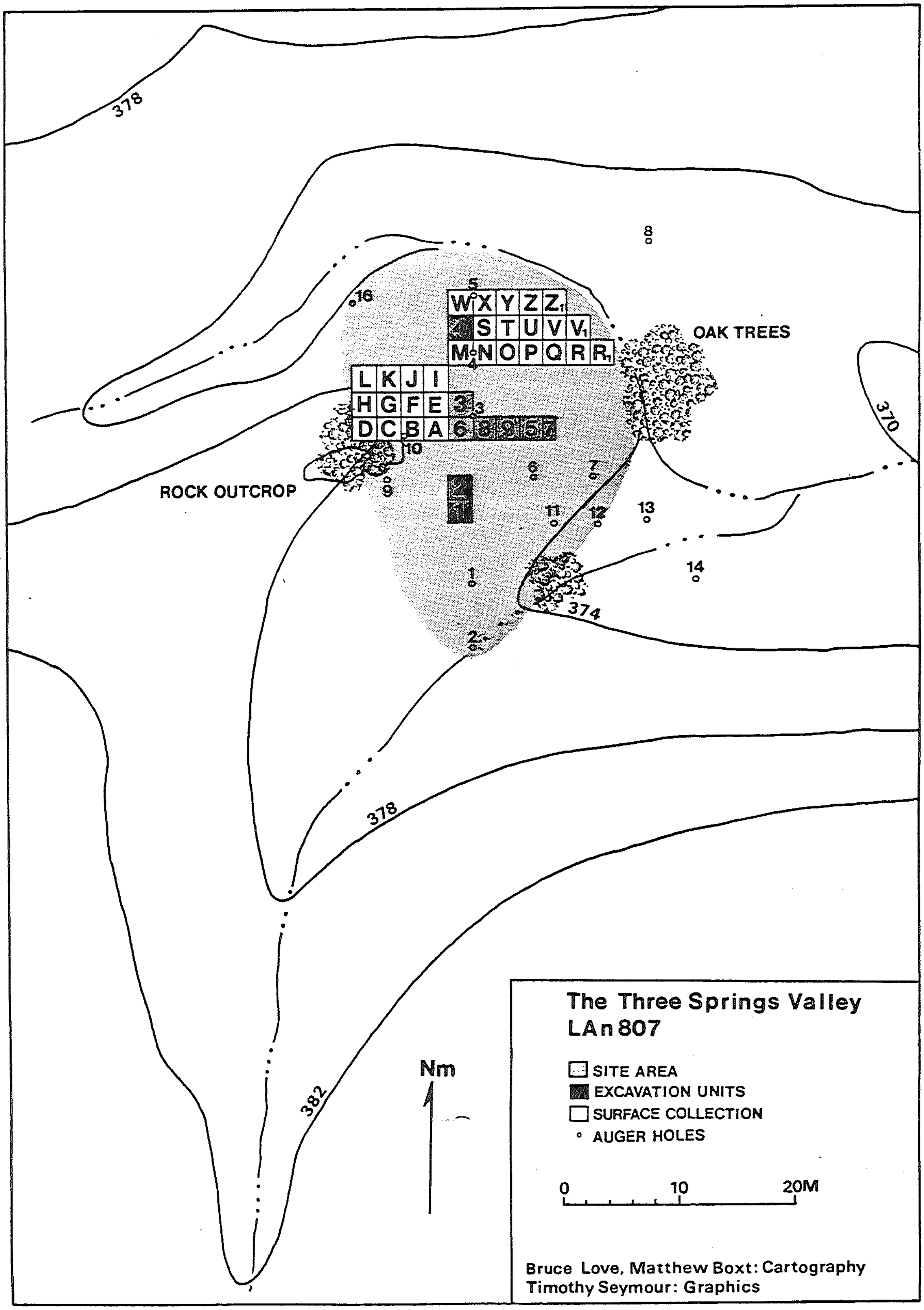

Figure 3.1. LAn-807 site map.

turbance to LAn-808 and did not constitute a separate site. LAn-807, as we eventually mapped it, has no deposit or surface manifestation continuous with or contiguous to the area originally claimed by Singer as the site of that number.

Surveying the Three Springs Valley in late 1979, Brian D. Dillon identified LAn-807, LAn-808, and LAn-1031; later, in May 1980, his UCLA field class returned to LAn-807 to accurately identify and assess the site's horizontal boundaries. Initially, surface inspections were restricted to that portion of the site previously recorded by Singer (ibid.). Because our findings were minimal here (and at the suggestion of Dr. C.W. Meighan), we surveyed downslope in a northwesterly direction. Approximately 60 m downhill we found a projectile point fragment. The immediate vicinity of the find was cleared and manicured with grass whips, hoes, and garden rakes; care was taken not to disturb the surface or subsurface midden component.

Upon removal of an obstructive grass cover it was apparent that the topsoil was a black and greasy humus; a surface habitation refuse layer was visibly composed of lithic debitage and marine shell fragments. This area was designated as LAn-807, the Cazador site. Subsequent testing proved this locus to be a bona fide archaeological site, rather than cultural materials washed or bulldozed downhill from the LAn-808 ridge.

Figure 3.2. Looking south over LAn-807, Unit 4 in foreground, Unit 3 at center, and Units 1 and 2 in background. Ridge at upper left leads to Canasta Rockshelter. April 1980. Photo B.D. Dillon

Four weeks before the end of the 1980 UCLA field class, work commenced at the Cazador site with immediate subsurface testing of the portion of LAn-807 where the projectile point fragment had been discovered. Four units measuring 2 m^2 and 10 auger borings were excavated before the field class concluded in June 1980 (fig.3.2). Sixteen auger borings and five additional units were excavated during fall 1980 in order to accurately establish the cultural parameters (vertical and horizontal) of this site. The soil ranged from a fine silt with a rich midden component to a light, tan-colored clay. Cultural materials were present in almost every auger hole: these test borings produced 22 marine shell fragments, 5 chalcedony waste flakes, 1 volcanic core, 13 chert waste flakes, 5 fused shale waste flakes, and 11 small fragments of mammal bone. Site boundaries were determined by the auger survey as described above.

One hundred percent of LAn-807's areal surface was scrutinized for cultural remains, and 26 2-m^2 units were gridded out and carefully troweled for surface cultural debris during the final two weeks of site testing in January 1981. These units were placed in reserved areas of LAn- 807 that had not been subjected to rigorous subsurface examination. Two artifacts and several chert, chalcedony, and fused shale waste flakes were recovered during this exercise.

Nine test units in all were excavated to sterile at LAn-807. Eight of these measured 2 m^2. Unit 7 was a 1 m long by 2 m wide extension of unit 5 and was excavated in order to determine the extent of the human burial first detected in the latter unit. All test units were excavated with trowels, picks, and shovels; dental tools were used when necessary. Levels were dug in increments of 10 cm until bedrock was encountered at a depth of 80 cm in units 1, 2, 3, 6, and 8; at 90 cm in units 5, 7, and 9; and at 110 cm in unit 4 (fig. 3.3). Cobbles were found below 40 cm in all units, and their numbers increased commensurately with the depth of each unit. The lower levels of all units were filled with cobbles, and the soil matrix contrasted considerably with that encountered in the upper strata of each unit. Frequently, excavation was impeded by these rocks. All midden was passed through 1/8" mesh screens. Bone, shell, and lithic artifacts, and waste materials, as well as ocher, were bagged at the site and brought to the UCLA Institute of Archaeology laboratory for analysis.

Site intrusion was minimal. Several .22-caliber shell casings were found on the surface of locus LAn-807, presumably from recent hunting or plinking. The subsurface cultural deposit was relatively unmolested by non-aboriginal human agency or erosion. Nevertheless, a meandering stream apparently eroded a minor portion of the site's eastern margin, and the eroded and fragmentary nature of the molluscan debris probably resulted from prehistoric human trampling, rainfall, and leaching. The presence of burrowing rodent bones in the archaeological record, as well as rodent tunnels and tree roots, represents additional site disturbance. The Cazador site was located some distance from vehicular and pedestrian traffic; thus, it was relatively undamaged by modern agency.

By the time archaeological investigations at LAn-807 concluded in January 1981, UCLA crew members had excavated a large sample through the artifactually richest portions of the site's north-south and east-west axes, addressing questions of site age and function. The result of UCLA's investigations of the Cazador site are presented below.

FEATURES

One human burial was discovered at LAn-807. Feature 1 was exposed at level 6 of unit 5. A fragmentary femur with rodent gnawings along its length and numerous decomposed shell fragments appeared to be surrounded by stone cobbles. Under the supervision of Dr. Dillon, the UCLA crew removed and bagged the bones, then cleared and ultimately removed the cobbles. Human long bone fragments were also found within this same general region of unit 5 but in the following level. In addition, a skull fragment was found protruding from the east sidewall balk at a depth of 70 cm. All bones were bagged separately, being cleaned with horse-hair bristled paint brushes and dental picks. Dirt was removed from this unit and screened carefully, with special attention devoted to any artifacts that might have been associated with the interment. Unit 5 was excavated to bedrock but yielded no further cultural materials. To explore the full extent of this feature we decided to expand this unit; hence, the excavation of unit 7.

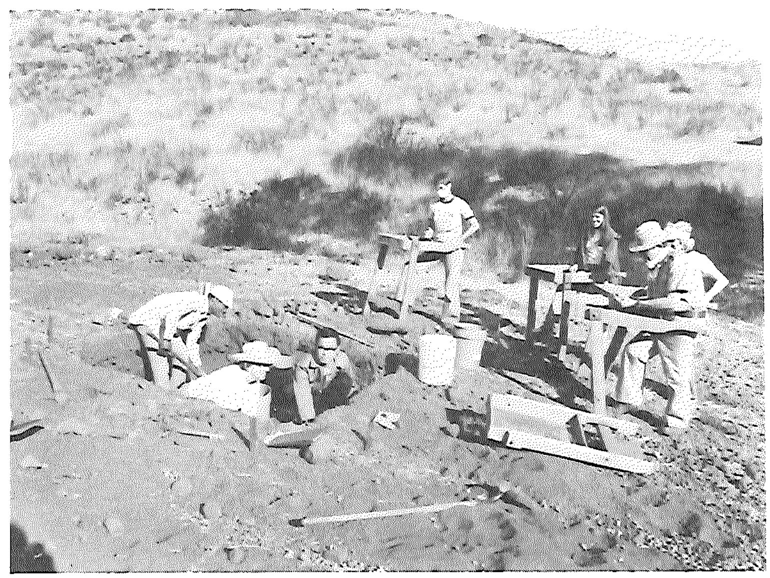

Figure 3.3. Distinguished visitors at LAn-807. Dr. Kofi Agorsah (left, Ghana) and Dr. Enzheng Tong (right, Peoples Republic of China) join D. Balsmeyer in excavating unit 4. Photo B. D. Dillon.

Unit 7 produced a fair number of artifacts. Two projectile point midsections were found in level 1, a small fused shale scraper in level 2, and a chert biface in level 3. Human bone remains, however, were not encountered until level 5, at 48 cm below datum, and a poorly preserved skull invaded by roots was exposed in level 6. The skull rested on its side; a portion of the ear orbit was visible, though mostly obliterated. Cranial remains were pedestaled and removed from the site while still embedded in the compact clay matrix. All skeletal remains were examined by Dr. Gail E. Kennedy, UCLA Department of Anthropology, and are more fully reported by Duque (chap. 4, this volume). The human skeletal material from LAn-807 consisted of 177 bone fragments weighing a total of 271.2 g. Of these specimens, only 27 are identifiable (table 4.1). These specimens were weathered; 17 were gnawed by small animals. No whole bones were uncovered. No bones were burned or cut.

It appears that an intrusive pit had been dug into the basement soil in the area of units 5 and 7, for the soil within this zone was loosely packed and brown in color, while a hard-packed clay surrounded the remains. Because of the severe disarticulation of the skeleton, spread about two ad-

Table 3.1. The Artifacts of LAn-807

% of Total	Artifact Class	Type	No. of Specimens	Material	Size Range (LxWxTh), in mm	Average Size
1.4	Metates	1b	1	V	111 x 93 x 50	——
		2	1	V	85 x 85 x41	——
3.6	Manos	1	5	QR (1)	123 x 97 x 45	——
		9		SA, QR (4)	70-130 x 50-95 x 28-78	101 x 73 x 48
39.0	Projectile pts.	Convex base	13	FS (3), CT (7), CL (3)	15-43 x 9-16 x 3-7	26 x 13 x 5
		Concave base	7	CT	13-23 x 7-15 x 3-4	19 x 11 x 3
		Straight base	2	CT	17-24 x 10-15 x 4	21 x 13 x 4
		Blank	1	CT	51 x 36 x 11	——
		Unclassifiable fragments	32	FS (5), CT (16), CL(9), O(2)	——	——
		Tips		CL (4), CT (1), FS (2)	5-17 x 4-12 x 1-4	11 x 8 x 3
		Midsections		FS (1), CT (9), O (1)	8-25 x 5-22 x 2-8	16 x 13 x5
		Tips and Midsections		FS (2), CL (5), O (1), CT (4)	17-34 x 7-20 x 3-10	24 x 14 x 6
		Bases		CT (2)	9-11 x 11-15 x 4-6	15 x 13 x 5
7.8	Biface	Unclassifiable	11	CT (8), FS (3)	23-45 x 10-30 x 6-12	33 x 20 x 8
0.7	Uniface	Unclassifiable	1	CT	36 x 20 x 6	——
7.0	Scrapers	Core	6	V (5), CT (1)	46-67 x 38-51 x 25-37	57 x 45 x 29
		Flake	3	Q,	67 x 35 x 13	——
				FS (1)	18 x 10 x 4	——
		Domed	1	V	47 x 26 x 20	——
2.1	Blades		3	V, SS, FS	28-92 x 11-41 x 3-18	63 x 25 x 1
1.4	Drills		2	CT, CL	30-35 x 15-17 x 5	33 x 16 x 5
10.0	Cores	1	14	QR (4), CT (4), CL(3), V(3)	16-98 x 11-81 x 8-43	47 x 38 x 24
0.7	Choppers		1	V	60 x 45 x 22	——
4.4	Hammerstones	2b	1	CT	41 x 35 x 25	——
		3	5	CL (2), QR(1), V (2)	30-77 x 23-75 x 22-49	67 x 47 x 35
2.1	Steatite	Olla fragment	1	ST	100 x 70 x 21	——
		Comal fragment	1	ST	67 x 46 x 23	——
		Arrrow shaft straightener	1	ST	55 x 46 x 23	——
7.0	Stone beads	See table 3.3	10			
7.8	Shell beads	See table 3.5	11			
5.0	Bone	See table 3.4	7			

TOTAL NUMBER OF ARTIFACTS= 141

ABBEVIATIONS: ST = Steatite; V = Volcanic; CL = Chalcedony; FS = Fused shale; O = Obsidian; CT = Chert; SA = Sandstone; QR = Quartzite; SS = Siltstone

junct units (7, 9), and the relative absence of teeth, vertebra, phalanges, carpals, and tarsals (bones which are likely to be lost in transport), a secondary burial is the most likely interpretation.

Feature 1 does not appear to be a formal primary burial, for the skeletal remains are piecemeal and the individual seems to have been laid to rest hastily. While it is remotely possible that the disarticulation may be due to its placement along the slope of a hill, or to erosion and bioturbation, it is more likely that a partial skeleton was exposed by the elements and/or animals in its original burial location somewhere off-site and was subsequently reburied at LAn-807. Unfortunately, concrete evidence of aboriginal mortuary customs is virtually impossible to ascertain from 27 disarticulated skeletal parts; their preservation was poor, pristine associations with excavated artifacts are questionable, and not enough of the individual was concentrated in any one particular area.

ARTIFACTS

Archaeological inquiries at LAn-807 produced 141 whole and fragmentary artifacts (table 3.1). Also represented in the LAn-807 artifact catalog are 2,830 nonutilized lithic waste flakes, 19 lithic flakes that exhibit damaged or worked edges, 23 quartz crystals, 2 geode fragments, and 75 pieces of ocher (table 3.2). A purposeful decision was made to segregate utilized from nonutilized waste flakes (see Busby 1979:74-75 for a comparison of utilized and edge-damaged lithic flakes). Discussions of faunal, fish, and molluscan remains are presented as separate papers in this volume by Duque, Roeder, and Horner, respectively. Obsidian samples were analyzed by the UCLA Obsidian Hydration Laboratory and are discussed in chapter 12.

Artifacts recovered from LAn-807 have been organized into four general categories: ground stone, chipped stone, a core/cobble complex, and miscellaneous. Ground stone artifacts include manos and metates; chipped stone artifacts include projectile points, drills, bifacially and unifacially flaked tools, blades, and scrapers. Core/cobble complex tools include choppers, hammerstones, and cores. The miscellaneous group includes steatite artifacts, stone and shell beads, and bone artifacts.

Quartz crystals, geodes, and ocher are not included in the artifact count, although their presence may suggest a cultural utilization, based on their association with identified artifacts (quartz crystals and ocher do appear naturally in this region). Quantitative data for these materials appear in table 3.2.

Because the Cazador artifacts are comparable to those found at nearby sites, their classifications and functional interpretations have been based largely upon established typologies. Dillon (1978:105-122) and M. Johnson (1980:202-215) were the sources for the mano and metate types; the Century Ranch report (King, Blackburn, and Chandonet 1968:65-69) was the basis for the projectile point types; and Singer and Gibson (1970:190-193) was used for the scraper analysis. Additional reports by Gifford (1947), Gibson (1974, 1975, n.d.), C. D. King (1974), and Brock (1986) have proven useful in the description of the LAn-807 shell beads.

All stone and mineralogical materials described herein conform to definitions established by the volume's editors with the help of geologist Dr. Stephen L. Williams.

Table 3.2. Weights of Flakes, Quartz Crystal, and Ocher, by Unit and Level

Unit/ Level	CL	CT	FS	O	V	Q	QR	SS	QC	Or	UC	UCl	UFS	UV	UQ	QS
1-1	6.0	10.6	0.3	–	–	–	18.5	–	–	0.5	–	–	–	–	–	–
1-2	3.7	7.8	0.9	–	0.6	–	22.2	–	–	1.0	–	–	–	163.9	–	–
1.3	14.6	10.0	2.4	–	25.2	–	–	–	–	–	–	–	–	–	–	–
1-4	41.3	19.3	5.2	–	87.3	–	272.6	–	0.1	0.5	–	–	–	–	–	–
1-5	–	–	–	–	–	–	–	–	–	1.2	–	–	–	–	–	–
1-6	2.2	2.1	0.6	–	–	–	54.0	–	–	1.4	–	13.3	–	–	–	–
1-7	16.7	8.3	2.8	–	0.4	–	5.1	0.6	–	0.1	–	–	–	–	–	–
1-8	3.5	–	–	–	5.0	–	–	–	–	6.2	–	–	–	–	–	–
2-1	2.5	3.4	–	–	–	–	–	4.0	–	–	–	–	–	–	–	–
2-2	3.2	3.1	1.5	–	–	–	10.0	–	1.1	–	–	–	–	–	–	–
2-3	87.0	8.8	2.5	–	–	–	16.4	–	–	1.0	0.3	32.5	–	–	–	–
2-4	17.7	3.1	1.1	–	7.4	–	21.6	–	0.4	–	–	–	–	–	–	–
2-5	24.3	5.6	2.0	–	–	–	5.6	0.4	–	0.1	–	–	–	–	–	–
2-6	37.0	3.5	2.6	–	–	–	22.6	1.8	0.8	–	7.4	–	–	–	–	–
2-7	10.3	8.0	1.6	–	–	–	0.8	–	–	3.2	–	–	–	–	–	–
2-8	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
3-1	21.1	4.1	1.2	–	11.6	–	49.5	1.6	–	0.7	–	–	–	–	–	–
3-2	32.3	18.6	8.1	–	–	–	164.2	3.9	0.4	1.5	–	–	–	–	–	–
3-3	19.0	44.3	6.5	0.2	1.6	–	17.0	–	0.4	0.3	–	–	–	–	–	–
3-4	14.6	8.2	3.2	–	2.7	32.5	–	–	0.5	1.3	–	–	–	–	–	–
3-5	9.2	5.8	2.7	–	6.1	–	–	–	–	1.5	–	–	–	–	–	–
3-6	3.5	9.0	1.7	–	–	2.7	–	–	–	–	–	–	–	–	–	–
3-7	33.0	2.5	0.4	–	–	–	77.8	–	–	–	–	–	–	–	–	–
3-8	–	0.3	–	–	–	–	–	–	–	–	–	–	–	–	–	–
4-1	3.0	3.6	0.1	–	–	–	–	–	3.8	–	15.2	2.9	–	–	–	–
4-2	9.0	7.3	0.5	–	43.0	–	–	–	–	–	1.8	–	–	–	–	–
4-3	19.0	13.2	1.0	–	32.6	–	–	–	–	–	–	–	–	–	–	–
4-4	16.6	10.0	0.6	–	0.9	–	–	–	–	0.1	–	–	–	–	–	–
4-5	3.0	2.5	0.9	–	69.7	–	–	3.0	–	0.1	13.5	–	–	–	–	–
4-6	1.0	0.1	0.1	–	–	–	0.9	–	–	0.6	–	–	–	–	–	–
4-7	0.8	–	0.1	–	22.5	–	–	–	–	–	–	–	–	–	–	–
4-8	0.1	2.0	0.1	–	–	–	–	–	–	–	–	–	–	–	–	–
4-9	–	1.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–
4-10	0.1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
5-1	38.6	26.5	0.5	–	2.9	–	–	–	0.7	–	–	–	–	–	–	–
5-2	20.0	20.3	2.9	–	7.1	–	–	–	–	–	–	–	–	–	8.3	–
5-3	21.0	7.2	0.8	–	–	–	–	0.9	0.7	–	–	–	–	–	–	–
5-4	19.3	22.5	0.5	–	12.8	–	–	–	–	0.2	–	–	–	–	–	–
5-5	1.9	6.5	0.3	–	–	–	–	–	–	–	–	–	0.2	–	–	–
5-6	9.4	8.2	0.7	–	1.7	–	–	–	–	–	–	–	–	–	–	–
5-7	1.7	0.9	–	–	4.3	–	–	–	–	–	–	–	–	–	–	–
5-8	1.3	0.4	0.2	–	–	–	–	–	–	–	–	–	–	–	–	–
5-9	2.3	1.7	–	–	–	–	–	–	–	–	–	–	–	–	–	–
6-1	4.6	2.8	0.3	–	4.3	–	–	–	0.3	0.6	–	–	–	–	–	–
6-2	9.8	17.6	2.2	–	26.3	–	–	4.6	–	1.3	–	–	–	–	–	–
6-3	3.9	73.5	10.3	–	79.2	–	–	–	0.4	–	–	–	–	–	–	–
6-4	4.5	6.4	0.4	–	67.4	–	–	–	–	–	–	–	–	–	–	–
6-5	5.5	10.6	1.5	–	74.5	–	–	–	–	–	–	–	–	–	–	–
6-6	0.8	–	0.7	–	–	–	–	–	–	–	–	0.6	–	–	–	–
6-7	0.7	6.0	0.7	–	–	–	–	–	–	3.4	–	–	–	–	–	–
6-8	15.5	–	0.3	–	13.0	–	–	–	–	–	–	–	–	–	–	–
7-1	0.3	0.1	–	–	-	–	–	–	–	–	–	–	–	–	–	–
7-2	0.6	1.3	0.1	–	76.2	–	–	–	–	–	–	–	–	–	–	–
7-3	2.5	11.9	0.4	–	–	–	–	–	0.2	–	–	–	–	–	–	–
7-4	5.9	1.5	0.4	–	–	1.4	2.0	–	–	–	–	–	–	–	–	–
7-5	9.7	1.9	0.5	–	–	–	0.6	–	–	0.4	–	–	–	–	–	–
7-6	0.2	0.2	–	–	–	–	–	–	–	–	–	–	–	–	–	–
7-7	1.3	–	0.1	–	–	–	–	–	–	–	–	–	–	–	–	–
8-1	2.1	7.4	0.5	–	–	–	–	–	0.2	–	–	–	–	–	–	–
8-2	10.2	–	3.7	–	–	–	83.4	–	0.4	5.2	–	–	–	–	–	–
8-3	20.3	12.8	3.5	0.1	–	–	7.2	–	0.1	–	13.5	-	–	–	–	–
8-4	10.2	1.0	0.9	–	6.3	–	–	0.5	–	–	–	–	–	–	–	–
8-5	3.6	6.9	1.5	–	–	–	5.1	3.6	–	–	–	–	–	–	–	–
8-6	2.0	5.5	0.9	–	–	–	–	–	–	–	–	–	–	–	–	–
8-7	2.8	–	1.9	–	–	–	–	3.6	–	–	–	–	–	–	–	–
8-8	0.4	5.4	0.4	–	–	–	–	–	–	–	–	–	–	–	–	–
9-1	10.7	–	0.6	–	–	–	–	–	–	–	–	–	–	–	–	–
9-2	20.2	1.6	1.8	–	–	–	–	–	–	–	–	–	–	27.0	–	–
9-3	5.4	10.0	0.5	–	102.1	–	–	–	–	0.2	–	–	–	–	–	–
9-4	51.7	9.2	1.0	–	247.7	–	–	–	–	0.4	–	–	–	–	–	–
9-5	7.7	2.8	2.8	–	96.1	–	–	3.9	–	–	–	0.9	–	–	–	–
9-6	13.4	27.0	3.9	–	88.5	–	–	–	1.3	–	–	–	–	–	–	74.6
9-7	6.0	38.7	2.0	–	–	–	22.6	–	0.2	–	–	–	–	–	–	–
9-8	9.1	13.6	0.9	0.1	17.1	–	4.6	–	–	–	8.2	–	–	–	–	–
9-9	13.5	4.2	1.1	0.4	–	–	–	–	–	1.2	–	–	–	–	–	–

CL=Chalcedony, CT = Chert, FS = Fused Shale, O = Obsidian, V = Volcanics, Q = Quartz, QR = Quartzite, SS = Siltstone, QC = Quartz Crystal, Or = Ocher, UC = Utilized Chert, UCl = Utilized Chalcedony, UFS = Utilized Fused Shale, UV = Utilized Volcanics, UQ = Utilized Quartzite, USS = Utilized Siltstone

Ground Stone Artifacts

Manos: Five whole and fragmentary manos were recovered from excavations at LAn-807, two of sandstone, two of quartzite, and one of granite. Mano definitions utilized in this report adhere to morphological criteria established by M. Johnson (1980:202-215), whose large sample serves as an excellent data base for local mano comparisons. Mano specimens listed below are classified according to the presence or lack of shaping, the number and configuration of grinding surfaces, and the relationship of these grinding surfaces to one another. The manos and mano fragments were not concentrated in any one area within the study site; rather, they were recovered both on the surface and as deep as 50 cm.

Type 1. Unshaped Uniface. An ovoid cobble that exhibits wear on one surface as a result of abrasion and/or grinding. The unused portion of the cobble remains in its original state. One example, artifact 639-158, has a pecked or pitted surface, an enhancement for finer grinding (fig. 3.4a).

Type 9. Untypeable. Mano fragments that lack sufficient morphological characteristics for adequate classification have been placed into this category. Specimens 639-784 and 639-253 (fig. 3.4b, 3.4c) exhibit pecking; artifacts 639-784 and 639-553 (fig. 3.4b, 3.4d) have two grinding surfaces, and specimen 639-253 (fig. 3.4c) has one visible grinding surface. Artifact 639-48 (fig. 3.4e) is broken in half and exhibits a single grinding surface.

Metates: Two small metate fragments were recovered from the center of the Cazador site. Although fragmentary, they can be classified utilizing Dillon's (1978:101-105) typology. While it is impossible to ascertain the original size or shape of these specimens, we presume they were rectangular.

Type 1b. Unshaped Flat Slab. Unshaped, flat slab (639-286) that exhibits no appreciable depression from abrasion on the grinding surface (fig. 3.4f).

Type 2. Shallow Basin. Manufactured from a slab of stone or a boulder. The grinding surface is prepared and worn down to no more than 5 cm. Specimen 639-343 has a shallow basin with gently sloping sides. In addition, a red and black pigment may have been ground on a portion of the basin. The artifact is manufactured from a vesicular andesite (fig. 3.4g).

Chipped Stone Artifacts

Projectile Points: Fifty-five whole and fragmentary projectile points were recovered. Twenty-two of these specimens are classifiable, while 33 are too fragmentary to type precisely (figs. 3.5, 3.6). A blank of poor quality chert was also found. The projectile point collection from LAn-807 is similar in type, manufacture, and materials to those from other Late Prehistoric sites within the region (Galdikas-Brindamour 1970; Glassow 1965; King, Blackburn, and Chandonet 1968; Leonard 1966; Pritchett and McIntyre 1979; Walker 1951; Wallace 1955a; Wells 1978; Whitley et al. 1979; Wissler 1958).

Thirteen specimens have convex bases (fig. 3.5a-m), seven specimens have concave bases (figs. 3.5n-s, 3.6a); and two have straight bases (fig. 3.6c, f). Fifty-eight percent of the entire collection is manufactured from chert, 24% from chalcedony, 15% from fused shale, and 3% from obsidian.

There are a few anomalous specimens in the projectile point collection. The size and shape of artifact 639-204 (fig. 3.6p) suggests that it may have been a dart point (adhered to a spear rather than an arrowshaft and propelled by hand or by atlatl, not by means of a bow). It is considerably outside the size range of other specimens within the projectile point category. Specimen 639-635 (fig. 3.6k) may have been a knife; it is broken but originally could have been longer and wider than other specimens in this category. Consequently, "heirloom" status might be considered as an explanation for its presence in this late site. Artifact 639-346 is manufactured from a very low grade chert and might be considered to be a projectile point blank or preform; however, this interpretation is conjectural, for the intended form or function of this artifact is undiscernible in its present state (fig. 3.6q).

Bifacially and Unifacially Flaked Artifacts

All fragmentary and unclassifiable bifacially and unifacially flaked tools found at LAn-807 are included within this category.

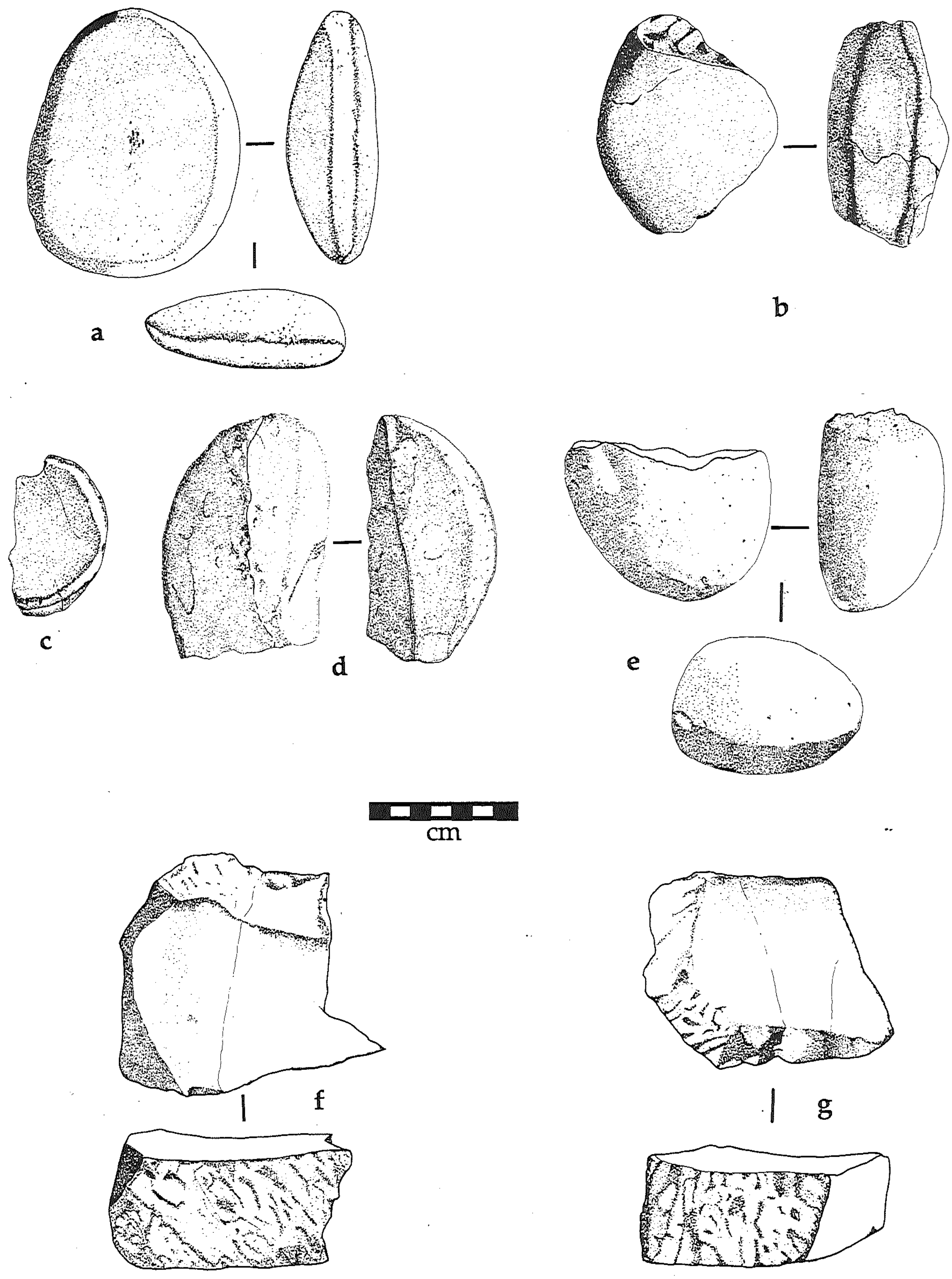

Figure 3.4. Ground stone artifacts from LAn-807. (a) Mano, Type 1, unshaped, unifacial; (b-e) mano fragments, untypeable; (f) metate fragment, flat slab, unshaped (Type 1b); (g) metate fragment, shallow basin (Type 2).

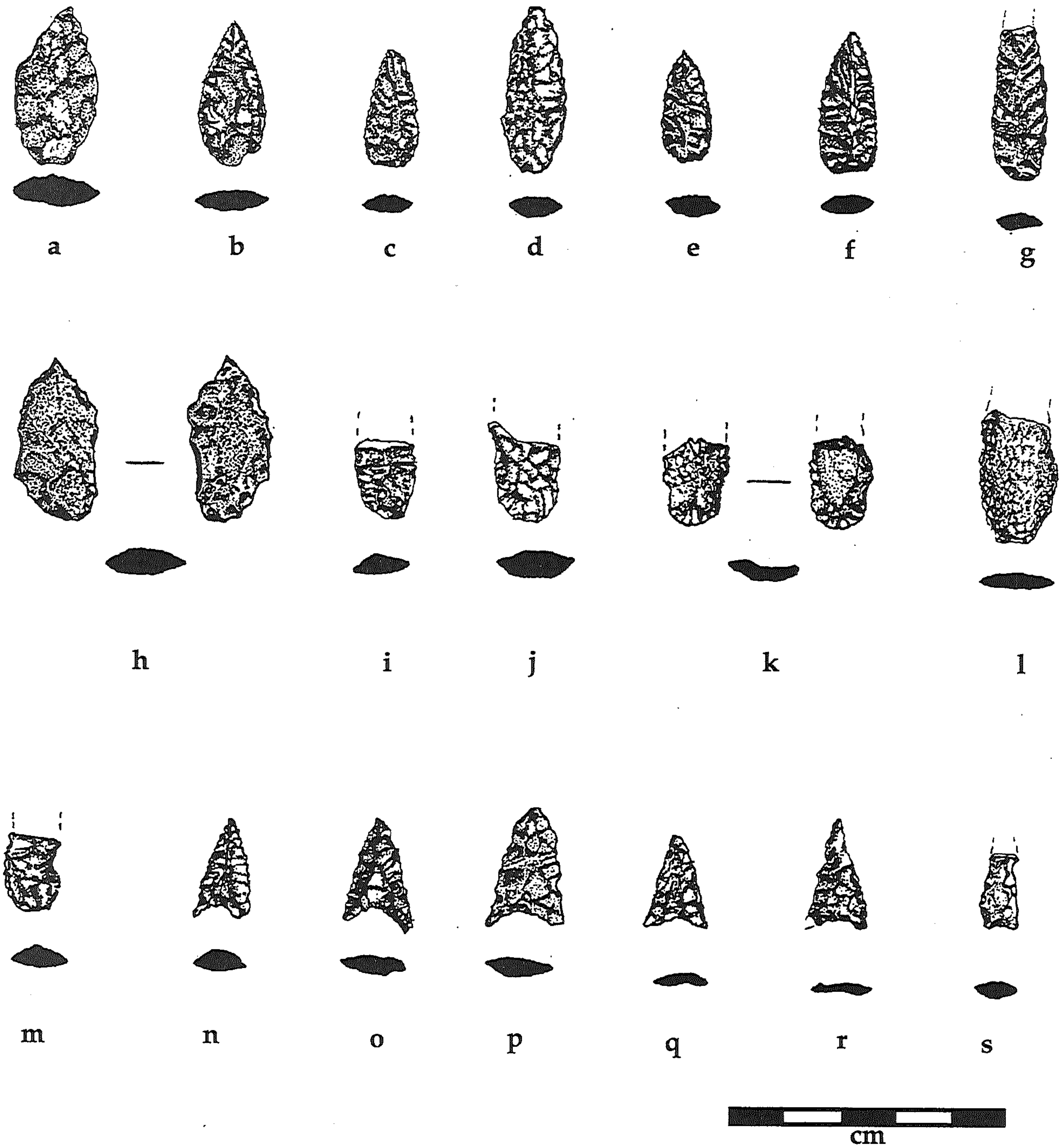

Figure 3.5. Chipped stone artifacts from LAn-807. (a-m) Convex base projectile points; (n-s) concave base projectile points. (a, d, l) Chalcedony; (b, c, e-g, i, m-s) chert; (h, j) fused shale; (k) volcanic.

Although their fragmentary condition precludes an accurate functional interpretation, artifact 639-119 (fig. 3.7a) may have been a crude projectile point, and specimen 639-188 (fig. 3.7b) could have been the basal portion of an unfinished projectile point. Specimens 639-560 and 639-187 show a considerable amount of cortex as well as minimal wear patterns on their edges (fig. 3.7c, d); artifact 639-663 displays use-wear along one edge (fig. 3.7e). Specimen 639-793 (collected by Singer in 1978 [fig. 3.7f]) is bifacially pressure flaked and was manufactured from fused shale; it is a primary flake, plano-convex in cross section, and retouched around its periphery with extensive wear patterns on one edge.

Additionally, five members of this category may represent "biface knives" (Singer and Gibson 1970:194; Wells 1978:156; Johnson 1980:236-238). These specimens appear to be fragments of larger

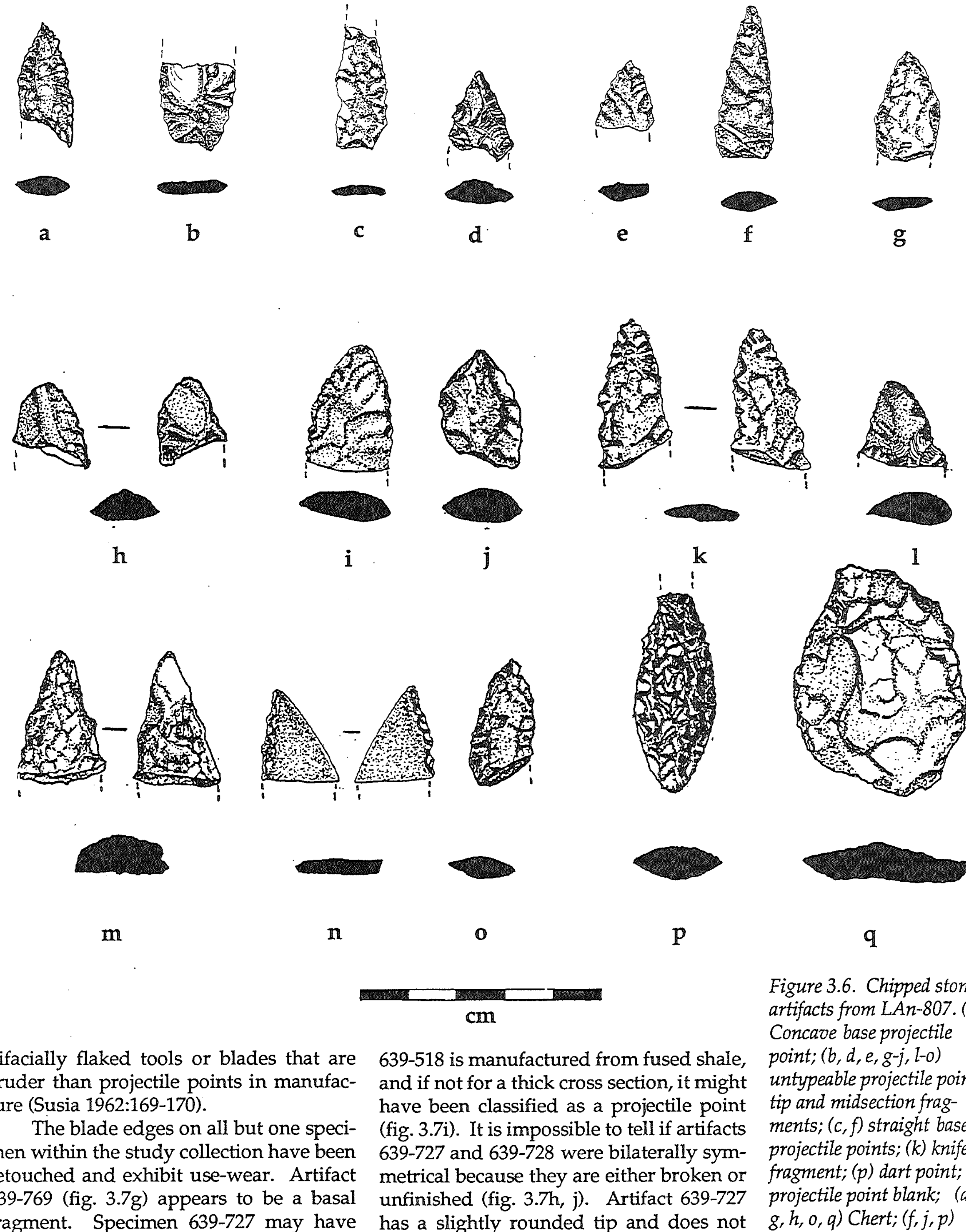

Figure 3.6. Chipped stone artifacts from LAn-807. (a) Concave base projectile point; (b, d, e, g-j, l-o) untypeable projectile point tip and midsection fragments; (c, f) straight base projectile points; (k) knife fragment; (p) dart point; (q) projectile point blank; (a-e, g, h, o, q) Chert; (f, j, p) fused shale; (k) volcanic; (i, m, n) chalcedony. (l) obsidian.

bifacially flaked tools or blades that are cruder than projectile points in manufacture (Susia 1962:169-170).

The blade edges on all but one specimen within the study collection have been retouched and exhibit use-wear. Artifact 639-769 (fig. 3.7g) appears to be a basal fragment. Specimen 639-727 may have broken during manufacture, for about 50% of the cortex is visible and the artifact has been slightly flaked (fig. 3.7h). Specimen 639-518 is manufactured from fused shale, and if not for a thick cross section, it might have been classified as a projectile point (fig. 3.7i). It is impossible to tell if artifacts 639-727 and 639-728 were bilaterally symmetrical because they are either broken or unfinished (fig. 3.7h, j). Artifact 639-727 has a slightly rounded tip and does not exhibit the same fine pressure flaking associated with projectile points from the LAn-807 collection. Although fragmentary, 639-

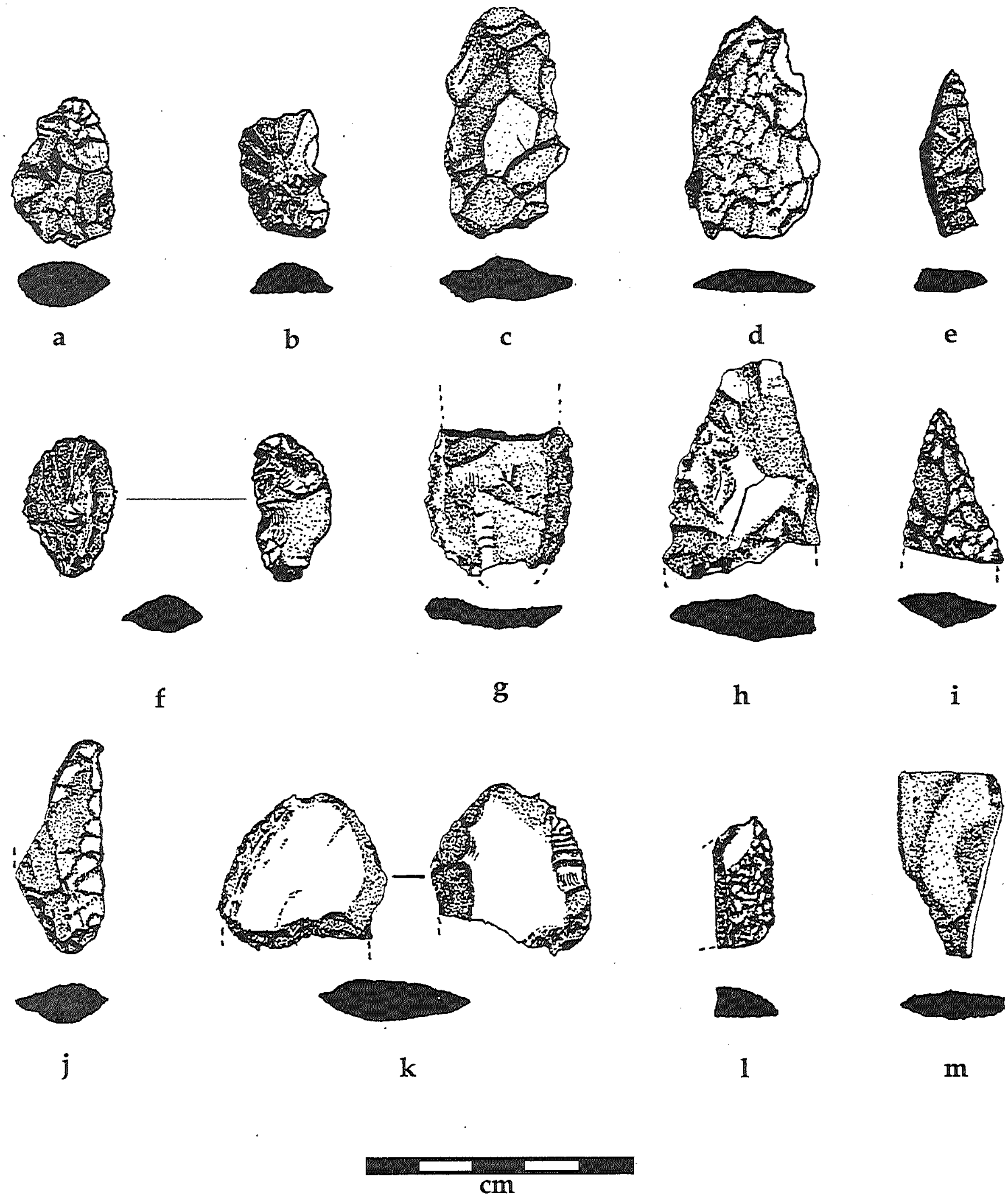

Figure 3.7. Chipped stone artifacts from LAn-807. (a-i) Unclassifiable bifacial tools; (m) unifacially modified chert flake. (a) Chalcedony; (b-d, f-m) chert; (e) fused shale.

661 appears to have a rounded, not pointed, distal end (fig. 3.7k). Nine bifacially flaked specimens are manufactured from chert and three from fused shale.

One unifacially flaked chert tool was found at the Cazador site. Two flakes have been removed from opposite sides of this specimen. We detected pressure flaking along one edge in order to create a tip. Thus, the roughly square or proximal end (to one's hand) can fit securely between the thumb and index finger (fig. 3.7m). The tip of this artifact has been blunted and partially broken from use.

Scrapers

Scrapers are tools that have been intentionally modified, often with steep retouch on one side; they have been altered through percussion and/or pressure flaking to create working edges. Ten specimens from LAn-807 fall into this category. As noted by M. Johnson (1980:241), scrapers could have served a variety of tasks: cutting, sawing, incising, slicing, or scratching. Several scraper typologies exist in the southern California archaeological literature (Glassow 1965; M. Johnson 1980; King, Blackburn, and Chandonet 1968; Singer and Gibson 1970; Whitley et al. 1979). All specimens found at LAn-807 can fit neatly within any one of these typologies.

Six scraper planes, or expended cores exhibiting unifacial wear patterns on at least one edge, were recovered from the study site. These specimens are comparable to Type 1 Core-Scraping Planes defined by Whitley et al. (1979:19). Five of these specimens are manufactured from volcanic material (andesite, basalt [fig. 3.8a, c-f]); the sixth example is made from chert (fig. 3.8b). The chert scraper also has slightly rounded and chipped edges, probably from battering or pounding. (Scraping planes were also reported from the Medea Creek Village site [Singer and Gibson 1970:191].)

Artifact 639-595 is a quartzite flake that exhibits retouching along the entire length of its straight edge (fig. 3.9a). Its opposite edge bears a bulb of percussion and much of the original surface cortex of the object from which it was removed. This specimen is comparable to the Straight Edged Flaked Scraper defined by Singer and Gibson (1970:192). Flaked scrapers were also found at the Century Ranch. King, Blackburn, and Chandonet (1968:63) define Type 2 Flake Scrapers as artifacts produced on amorphous flakes, varying in size and amount of retouch around the periphery. Artifact 639-664 is a basalt flake that exhibits use-wear and retouch along one edge and may have been an exhausted core that was subsequently flaked and further modified, creating a utilizable working edge (fig. 3.9b).

One interesting artifact recovered from LAn-807 is a small fused shale flake that may have fragmented from a blade (639-552). The artifact is rectangular in shape and has been pressure flaked and retouched around its perimeter, producing serrated or denticulated edges. The artifact has two concave parallel edges as well as a high back (fig. 3.9c). Artifact 639-793, previously

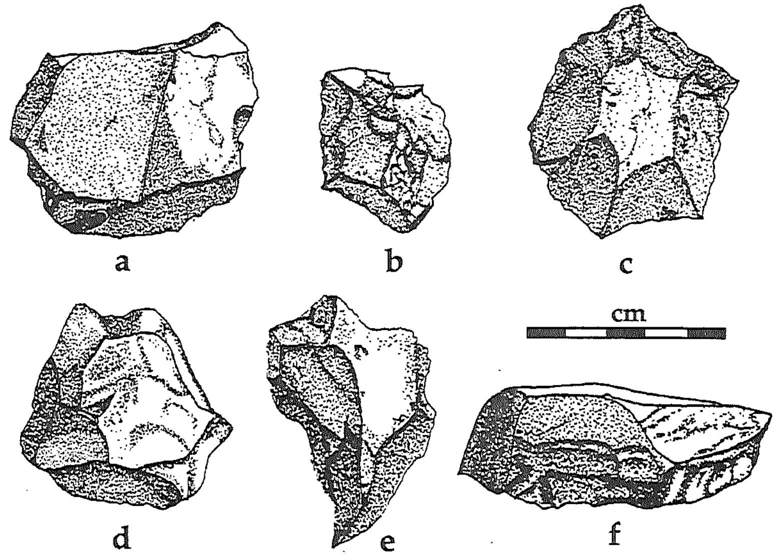

Figure 3.8. Core-scraping planes from LAn-807. (a, c-f) Core-scraping planes manufactured from volcanic tuff; (b) core-scraping plane, chert. Each specimen exhibits use-wear on at least one edge.

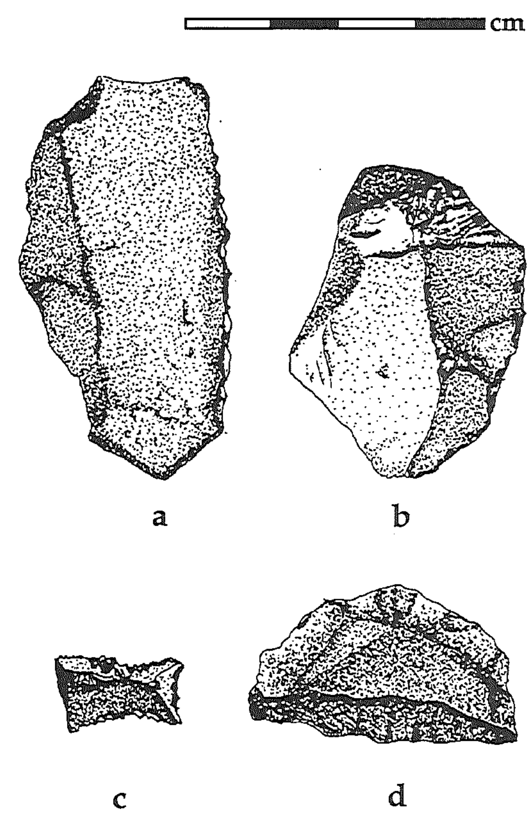

Figure 3.9. Flake scrapers from LAn-807. (a) Flake scraper, quartzite; (b) flake scraper, basalt; (c) flake scraper, fused shale; note serrated or denticulated edges; (d) domed flake scraper, volcanic tuff.

assigned bifacial tool status, may also have functioned as a flake scraper, for more than 90% of its periphery exhibits use-wear (fig. 3.7f). Finally, artifact 639-633 is a small fragment of a domed scraper (King, Blackburn, and Chandonet 1968:55). This artifact was produced on a plano-convex flake fragment. It is ovoid in shape and trapezoidal to triangular in cross section. Its steep back was formed by means of percussion flaking around most of its surface, leaving little of the original cortex remaining. The specimen appears to have been broken in half and displays use-wear on approximately 50% of its periphery. It also has a flat basal surface and appears to be burnt (fig. 3.9d). All artifacts within this category were distributed randomly throughout the site and were not concentrated within one circumscribed area; none were found deeper than 60 cm below surface.

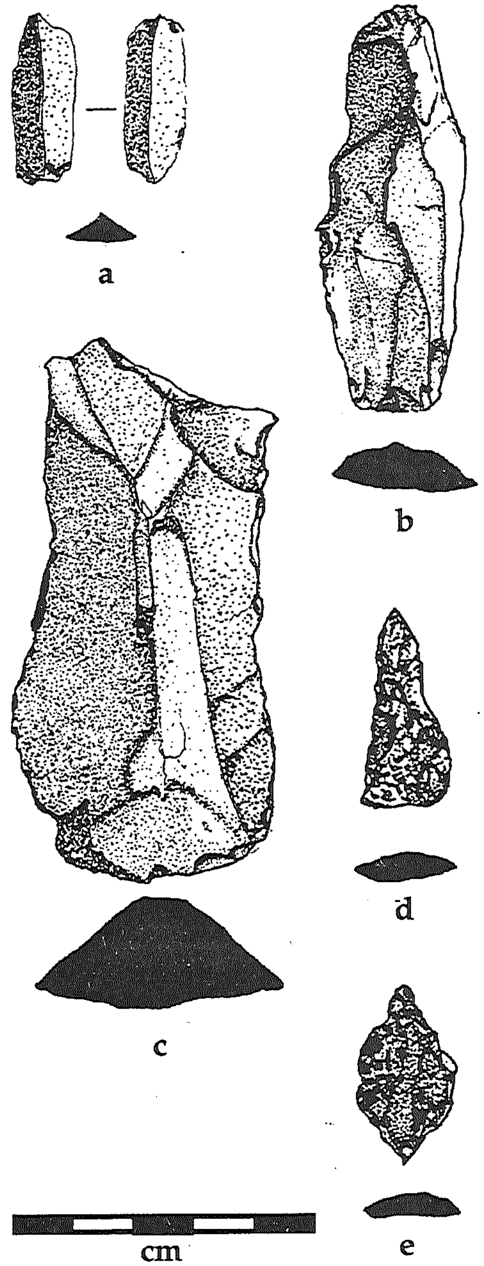

Figure 3.10. Blades and drills from LAn-807. (a) Blade fragment, fused shale; (b) blade manufactured from siltstone; (c) basalt flake; note use-wear around periphery; (d) drill, chert; (e) drill, chalcedony.

Blades

A blade is defined as a "long thin relatively narrow flake with more or less parallel sharp edges and having a rectangular or trapezoidal cross section. Blades are characterized by: (a) being detached from the core in one specific direction; (b) having edges and ridges straight and parallel; (c) being thin with relatively constant thickness/width ratio; and, (d) having the angle formed by the striking platform and the blade surface be usually 90 degrees" (Loy and Powell 1977:41). Simply, a blade might also be characterized morphologically as being twice as long as it is wide.

Three artifacts of this type were recovered from LAn-807. Use-wear is evident on all but one portion of these artifacts: their proximal ends, where they were struck and removed from a core. The specimens were manufactured from locally accessible materials and were not found deeper than 30 cm; they were located within the central portion of the Cazador midden. Specimen 639-493 is unique in that it was manufactured from fused shale (fig. 3.10a). Most blades reported from interior southern California were made from chert, siltstone, quartzite, or fine-grained volcanics. Fused shale blades, however, were reported at the Conejo Rockshelter (Glassow 1965:33-34; see Swartz 1960 and Whitley and Clewlow 1980 regarding aboriginal southern California blade industry). Artifact 639-224 is a siltstone blade with a well-used retouched or reworked edge (fig. 3.10b). Specimen 639-189 is a large basalt flake with a prismatic cross-section (fig. 3.10c).

Drills

A drill is defined as a tool usually having a wide proximal end that sharply decreases to a parallel-sided or tapering distal end which is thick in cross-section; its function is to bore holes in relatively hard material (Loy and Powell 1977:47). Singer and Gibson (1970:195) indicate that these artifacts have blunt tips. Artifact 639-9 was manufactured from chert, exhibits pressure flaking around its surface, and has a blunted tip (fig. 3.10d).

Artifact 639-790 was surface collected by Singer during his 1978 reconnaissance. This "perforator" (fig. 3.10e) is manufactured from a small white amorphic chalcedony flake with a low plano-convex cross section; one side has been pressure flaked to form a pointed tip, blunted from use. Although this drill appears to be bi-pointed, it is impossible to state with any certainty whether this was the result of human or natural modification. A similarly shaped object was found in level 3 at the Malaga Cove site (Walker 1951:62) and at LAn-229 (King, Blackburn, and Chandonet 1968:70 [Type 1A]). Additionally, artifact 639-635 (subsumed within the projectile point category), exhibits a blunted tip, possibly resulting from a secondary utilization as a knife or graver (fig. 3.6k).

Core/Cobble Complex

Cores are lithic objects from which flakes have been removed and which exhibit numerous bulbs of applied force (Loy and Powell 1977:45). Whitley et al. (1979:19) suggest that cores are unused lithic waste material whose predominant morphological characteristic is the presence of numerous percussion or flake removal scars. It is also assumed that wasted or exhausted cores were of no further use to the manufacturer. The following core identification is based upon the Ring Brothers Site Complex typology.

Only one core type was recovered from archaeological investigations at the Cazador site. The exhausted or wasted core (fig. 3.11) is comparable to Type 1 at the Ring Brothers Site Complex (Whitley et al. 1979:24) and the Type 2 core found at the Century Ranch (King, Blackburn, and Chandonet 1968:59).

Type 1. Multiplatform Wasted Core. This category includes cores characterized by a number of platforms from which flakes have been struck, resulting in an equal number of flaked surfaces. Fourteen specimens of this type were recovered at LAn-807. Cores were manufactured from volcanics (andesite and basalt), chert, chalcedony, and quartzite.

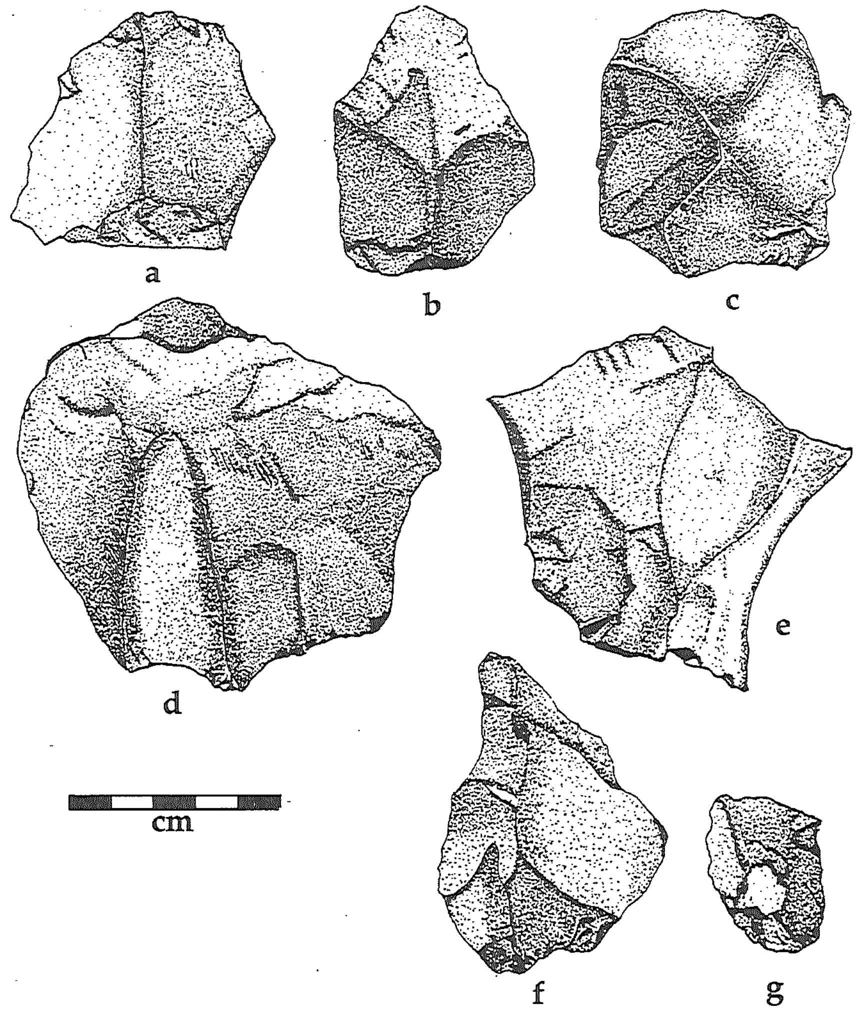

Figure 3.11. Core/cobble artifacts from LAn-807, Type 1, multiplatform wasted core. (a, b, e) Quartzite; (c, d, f) volcanic; (g) chalcedony.

Choppers

Choppers are defined as tools manufactured from rough angular flakes or cores which have been modified either by intentional battering (usage) or bifacial percussion flaking in order to create sharp working edges (fig. 3.12). This tool type is associated with cutting activities. M. Johnson (1980:227) distinguishes choppers from hammerstones on the basis of the sharpness of their edges. Hammerstones tend to have battered or rounded edges rather than the sharp edges that would facilitate cutting or chopping. Artifact 639-28 was either a large primary flake modified around roughly 90% of its periphery, creating sharp working edges, or was produced from a Type 1 core (fig. 3.11a). In any case, almost all of the original cortex was removed by bifacial flaking, producing several sharp edges. This artifact compares to M. Johnson's Type 2 Core Choppers (1980:227) and also resembles the angular chopper reported by King, Blackburn, and Chandonet (1968:54). Visible wear patterning on artifact 639-28 suggests its possible dual function as a scraper.

Hammerstones

Hammerstones are lithic objects that show battering on one or more sides or ends (fig. 3.12); generally, they represent a convenient utilization of a natural form or material with no obvious—or a minimum of—manufacturing (Loy and Powell 1977:51). Also included within this category are exhausted cores that have been reused, exhibiting battering and rounding. Hammerstone types presented below are based upon those devised by M. Johnson (1980:222) and Whitley et al. (1979:18).

Type 2b. Flaked Cobble Hammerstone. This type is defined as a split cobble that has been modified by percussion flaking along the cortex to increase the number of usable edges. One LAn-807 specimen falls into this category; it is a small white chert cobble with flaking and battering around one-half to two-thirds of its entire surface (fig. 3.12b). This specimen also appears to have been smoothed on one side, possibly by abrasion.

Type 3. Irregular Core Hammerstone. Artifacts subsumed within this category are multiplatformed or exhausted cores that have been percussion flaked around their periphery, creating numerous working edges. Edges are often battered and rounded from pounding. Five artifacts of this type were recovered at the study site (639-725, 639-738, 639-414, 639-328, and 639-148 [fig. 3.12 c-g]). Use-wear on artifacts 639-148 and 639-738 may indicate their dual function as scraping implements. Of the five specimens recovered from LAn-807, two were located in unit 9 and one each was found in units 2, 4, and 5. Two samples are made of chalcedony, two are volcanics, and one is quartzite.

Miscellaneous Stone, Bone, and Shell Artifacts

Steatite: Three fragmentary steatite artifacts were recovered. Artifact 639-345 was probably an *olla* (cooking vessel) rim fragment (fig. 3.13a); this specimen was burned (fig. 3.14). Artifact 639-210 may also have been part of an olla; however, its present condition, shape, and wear patterning suggest its use as a *comal*, or griddle (fig. 3.13b). It was probably an interior body fragment because it does not have a clearly defined rim or base. The basin of this specimen is slightly curved, and there are notch marks, possibly indicating an attempt to drill a hole through the object's exterior wall (see Wlodarski and Larson 1974 for a discussion of soapstone and steatite artifacts). Steatite comal fragments were reported at LAn-246 (Galdikas-Brindamour 1970:150), at LAn-229 (King, Blackburn, and Chandonet 1968:51), and at Ven-70 (Leonard 1966:228).

One steatite arrowshaft straightener (fig. 3.13c) was found at LAn-807. It is fragmentary, blackened by fire, and has a slightly curved and worn underside. It, too, is comparable to artifacts found in this region. According to Kroeber (1925), arrowshaft straighteners were used throughout California . Geographically, arrowshaft straighteners are found most often in southern California and in the California desert; they are rarely found north of the Tehachapi Mountains. On the whole, these artifacts are approximately 2.5 cm thick, 10-13 cm long, and have a 0.6 cm diameter groove in their middle (Clement Meighan, personal communication). A partial list of southern California sites where steatite arrowshaft straighteners are documented includes: Malaga Cove (Walker 1951:64), Ven-69 (Glassow 1965:46), Arroyo Sequit (Curtis 1959:56), Ven-70 (Leonard 1966:228), Ven-39 (UCLA Museum of Cultural History artifact catalog), and LAn-1031 (chap. 8, this vol.). Arrowshaft straighteners manufactured from materials other than steatite are also reported in southern California (see Prichett and McIntyre 1979:93).

Stone Beads: Ten stone beads are present in the LAn-807 catalog. Six were manufactured from steatite, three from serpentine, and one from chert. Artifact 639-660 is a globular steatite bead that has fractured in half (fig. 3.15a). If reconstructed, it would be comparable in size and shape to artifacts reported at Ven-115 (Wallace n.d.) and at LAn-229 (King, Blackburn, and Chandonet 1968:52). Specimen 639-678 (fig. 3.15b) is

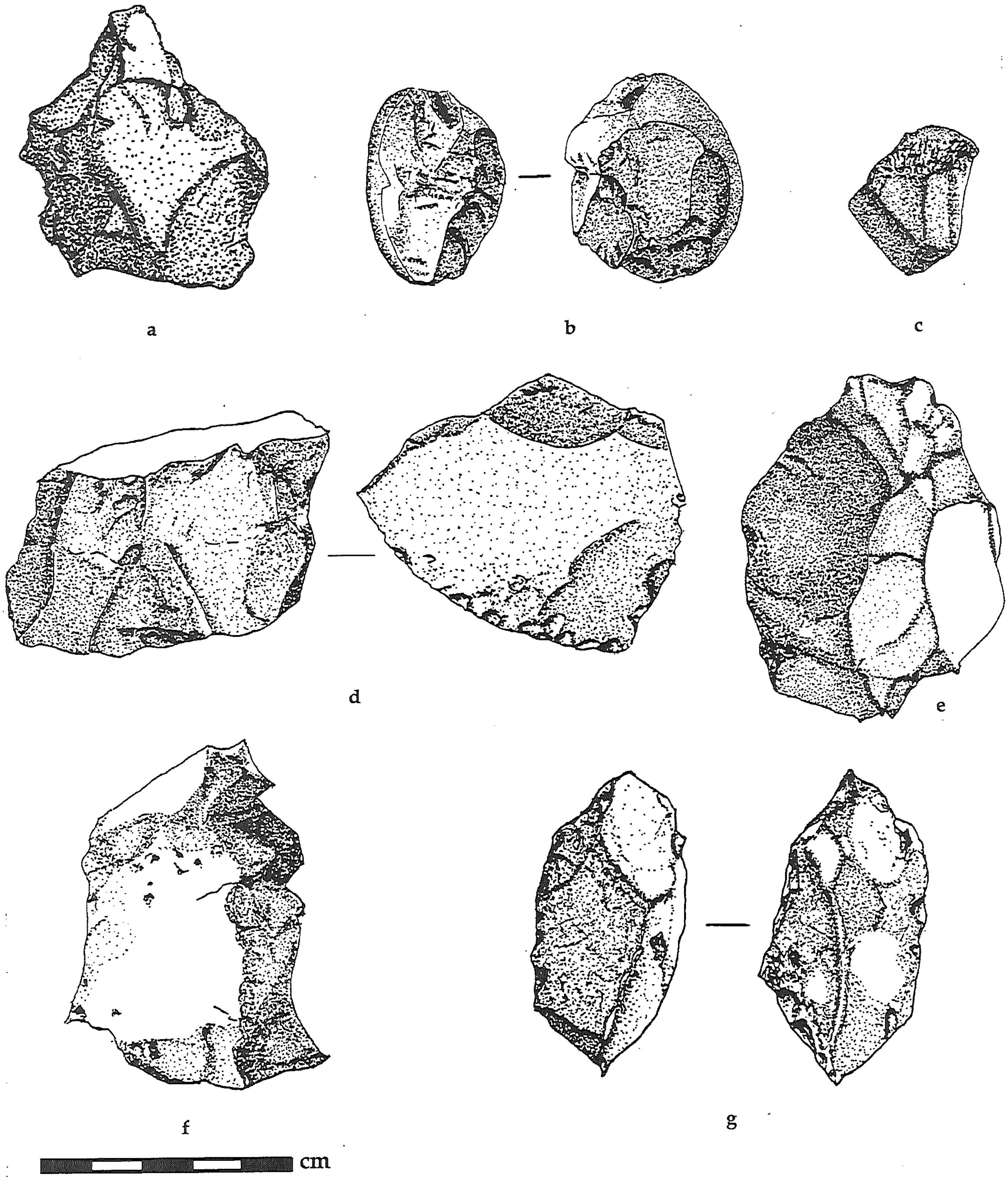

Figure 3.12. Choppers and hammerstones from LAn-807. (a) Chopper manufactured from primary flake or exhausted core, volcanic; (b) flaked cobble hammerstone, Type 2b, chert; (c) irregular core hammerstone, Type 3, chalcedony; (d) irregular core hammerstone, Type 3, quartzite; (e, f) irregular core hammerstones, Type 3, volcanic tuff; (g) irregular core hammerstone, Type 3, chalcedony.

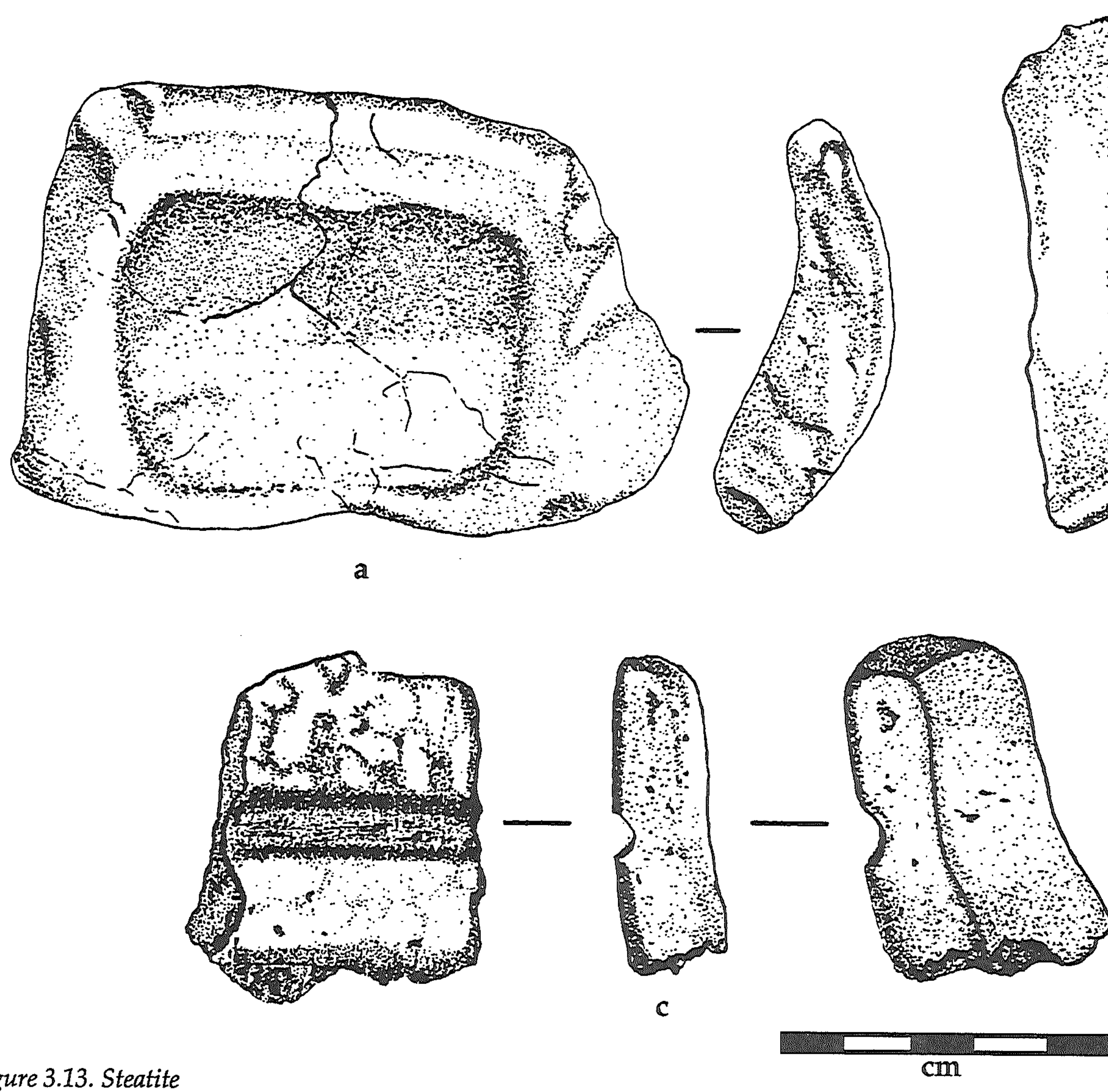

Figure 3.13. Steatite artifacts from LAn-807. (a) Olla fragment; (b) comal fragment; (c) arrowshaft straightener fragment.

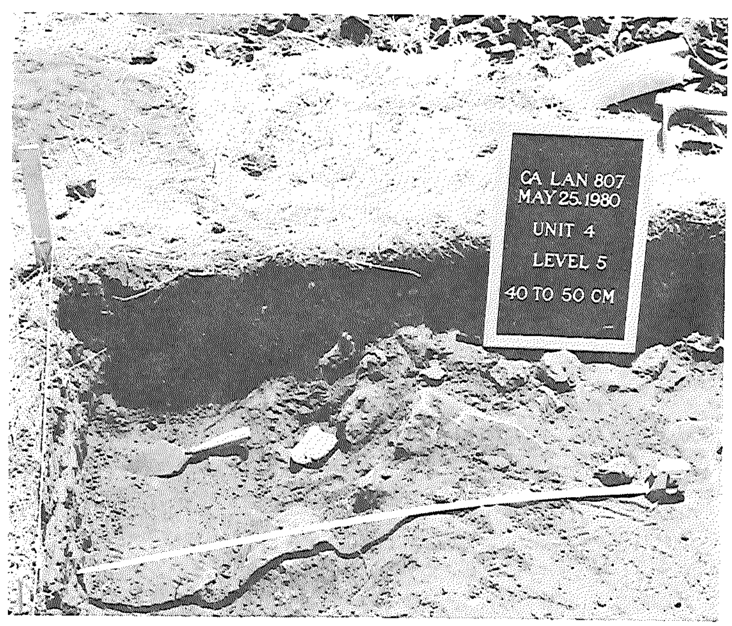

Figure 3.14. Excavation unit 4, the Cazador site. Note steatite olla fragment, 639-345, to right of trowel, and the rocky midden. Tape extended 1 m. Photo B. D. Dillon.

also a globular steatite bead fragment and possibly a piece of 639-660; both specimens were discovered in unit 9, levels 2 and 3, respectively.

Artifact 639-796 was originally collected by Singer (n.d.a) during his survey of the Three Springs property. It is spherical in shape and biconically drilled, with an incised groove around its circumference. The large central perforation may have been intentionally drilled off-center in order to produce one thin and one thick edge; this is only guesswork, however, as the bead is partially broken (fig. 3.16). UCLA investigators also recovered two fragmentary biconically drilled tubular beads (fig. 3.15c [639-474], fig. 3.15d [639-35]), and a small piece of steatite that has been drilled (fig. 3.15g [639-173]).

One complete and two fragmentary serpentine beads were found. Artifact 639-327 (fig. 3.15f) is tubular-shaped, tapers at both ends, and is slightly rectangular in cross section. A bead similar in shape was found by Wissler (1958:81) near Deer Canyon, Ventura County. Artifact 639-212 (fig. 3.15e) is too fragmentary to classify. However, originally it might have resembled artifact 639-327. Specimen 639-567, manufactured from serpentine, displays an incised lip and may also be part of a tubular-shaped bead (fig. 3.15h). Artifact 639-469 is a square-shaped piece of drilled chert that might have broken in half during its manufacture (fig. 3.12i). Data for the Cazador stone beads are presented in table 3.3.

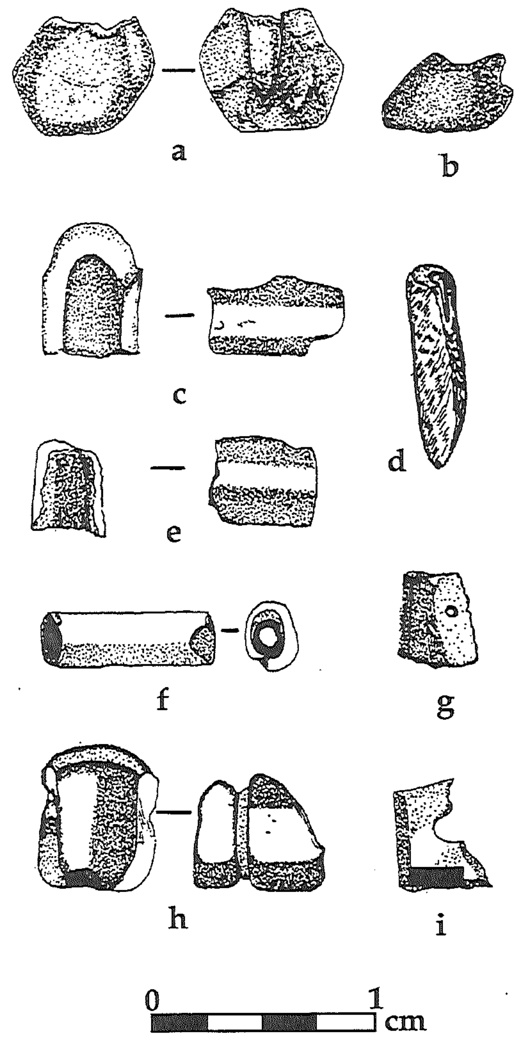

Figure 3.15. Miscellaneous artifacts from LAn-807. (a, b) Globular bead fragments; (c-f, h) tubular beads and fragments; (g, i) drilled flakes. (a, b, g) Steatite; (c-f, h) serpentine; (i) chert.

Bone Artifacts

Seven fragments of artifacts manufactured from mammal bone, presumably deer, were recovered by the UCLA crew (table 3.4). Specimen 639-206 (fig. 3.17a) is highly polished and is morphologically similar to flat spatulate knives, chisels, and scrapers documented by Gifford (1940). Its spatulate end exhibits "nibbling" or use-wear. Artifact

Table 3.3. Steatite, Serpentine, and Chert Beads

Artifact	Unit	Level	Weight	Shape	Dimensions	Material	Hole Diameter
639-660	9	2	0.6	Globular	11 x 8.3 x 4.8	Steatite	3.0
639-678	9	3	0.1	Globular	8.9 x 5.2 x 2.8	Steatite	—
639-796		Surface	4.0	Spherical	13 x 13.8 x 11.1	Steatite	10.8
639-474	6	2	0.3	Tubular	10.2 x 7.2 x 2.2	Steatite	3.6
639-35	1	3	0.5	Tubular	13.2 x 6.0 x 3.6	Steatite	2.7
639-173	2	7	0.2	Rectangular	12.6 x 6.3 x 2.4	Steatite	1.3
639-327	4	3	0.2	Tubular	12 x 4.9 x 1.1	Serpentine	2.7
639-212	3	2	0.2	Tubular	7.0 x 6.2 x 2.2	Serpentine	3.7
639-567	7	4	0.7	Tubular	10.8 x 9.0 x 3.0	Serpentine	5.4
639-469	6	1	0.1	Square	8.7 x 7.3 x 1.9	Chert	3.2

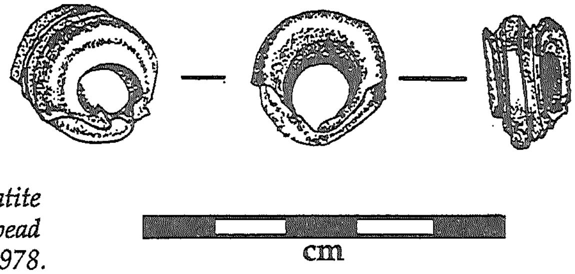

Figure 3.16. Steatite biconically drilled bead surface collected in 1978.

639-267 (fig. 3.17b) is a deer antler tine. Deer antler tines have been reported at other sites within this region (King, Blackburn, and Chandonet 1968:74; Walker 1951:42). Kroeber (1925) and Gifford (1940:186) noted the use of antler flakers in the ethnographic record. The Cazador site specimen is slightly blunted, possibly from pressure flaking stone artifacts. Specimens 639-278 (fig. 3.17c), 639-37 (fig. 3.17d), 639-150 (fig. 3.17f), and 639-797 (fig. 3.17g) are too fragmentary to adequately classify; however, originally they may have been awls, gouges, needles, or any number of other bone tools.

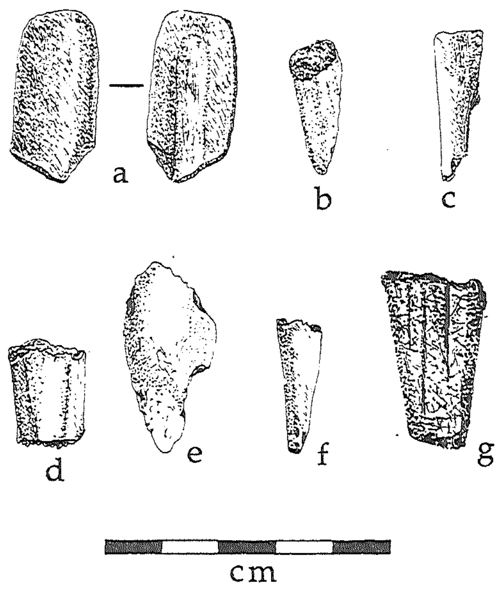

Figure 3.17. Modified bone artifacts and antler tine.

Table 3.4. Modified Bone Artifacts and Antler Tine

Artifact	Unit	Level	Weight	Size,in mm (LxWxTh)
639-206	3	2	1.8 g	30.4 x 14.6 x 3.5
639-267	3	5	0.8 g	22.2 x 8.6 x 9.4
639-278	3	6	1.0 g	25.2 x 7.8 x 4.2
639-37	1	4	1.4 g	19.2 x 13.2 x 5.1
639-686	9	5	1.5 g	33.7 x 11.9 x 3.5
639-150	2	6	0.4 g	12.0 x 4.9 x 5.0

Although its fragmentary condition precludes any typing or comparison, specimen 639-686 (fig. 3.17e) displays a worn surface, presumably from abrasion.

Shell Beads

Eleven shell beads represent approximately 8% of the LAn-807 artifact inventory. Materials and shell bead types described herein conform to those reported from the Century Ranch (King, Blackburn, and Chandonet 1968), the Ring Brothers Site Complex (Simon 1979), LAn-63 and -64 (Rigby, n.d.a), LAn-669 (Brock 1986), and numerous other archaeological sites in southern California.

Four beads were manufactured from *Mytilus californianus* (fig. 3.18a-c, g) and seven were made from *Olivella biplicata* (fig. 3.18d-f, h-k). Gifford (1947:34) notes that *Olivella biplicata* shell beads represent one of the most numerous orders of shell artifacts in California's archaeological record.

Interestingly, the shell beads of LAn-807 were concentrated in units 2, 3, 6, and 8. Dillon (personal communication) suggests that since the LAn-807 bead distribution and the contents of feature 1, the LAn-807 burial, seem to be mutually exclusive, there is very little reason to consider fea-

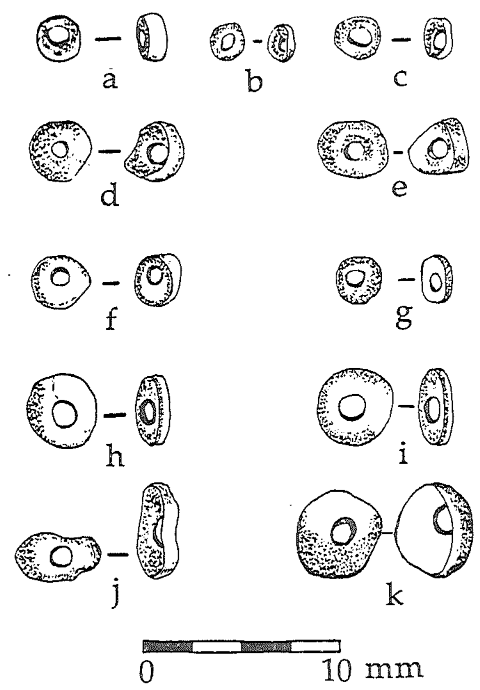

Figure 3.18. Shell beads.

Table 3.5. Shell Beads

Museum and Accession #	Material	Provenience	Type	Dimensions L x W x Th (mm)	Hole Diam. (mm)	Figure #	Gifford's Type	Gibson's Type
639-144	*Mytilus californianus*	Unit 2, level 5	Disc	4.0 x 4.0 x 1.0	1.0	3.18a	V1aV	
639-157 (2 specimens)	*Olivella biplicata*	Unit 2, level 6	Saucer	5.8 x 5.8 x 1.0 5.4 x 5.2 x 1.0	1.8 1.0	3.18h 3.18i	X3b1 X3b1	16 16
639-259	*Olivella biplicata*	Unit 3, level 4	Saucer	6.8 x 5.3 x 1.0	3.0	3.18j	X3b1	16
639-634 (2 specimens)	*Mytilus californianus*	Unit 8, level 5	Disc	4.4 x 4.2 x 1.0 4.0 x 3.6 x 1.8	2.2 2.0	3.18c 3.18b	V1aV	
(2 specimens)	*Olivella biplicata*	Unit 8, level 5	Cup	6.0 x 5.3 x 2.5 5.3 x 5.0 x 2.0	1.8 2.2	3.18f 3.18e	X4 X4	8 8
639-533	*Olivella biplicata*	Unit 6, level 7	Saucer	7.0 x 7.0 X 1.0	2.0	3.18k	X3b1	16
639-715 (1 specimen)	*Olivella biplicata*	Unit 8, level 6	Cup	5.0 x 5.0 x 2.0	1.4	3.18d	X4	8
(1 specimen)	*Mytilus californianus*	Unit 8, level 6	Disc	4.0 x 4.0 x 1.0	1.3	3.18g	V1aV	

ture 1 as contemporary with the Late Period occupation of the site. The non-association of shell beads with the human remains is consistent with a secondary burial of low priority. It is worth noting that these shell artifacts were stratigraphically restricted to levels 4-7 (not being found above 40 cm from datum) and were recovered from excavation units that bore the greatest quantities of molluscan debris. Shell beads could have been made on-site to invoke hunting magic but more likely were imported from the coast as were the edible shellfish. Table 3.5 provides data concerning shell beads of the Cazador site.

LITHIC DEBITAGE

Utilized Flakes

Utilized flakes are not presented here as a formal artifact category inasmuch as they were not purposefully manufactured but were the utilized by-products of other tool production. They are differentiated from lithic waste in the sense that they were employed in some unspecified cultural activity of unknown duration.

Nineteen specimens subsumed within this category were identified. There does not appear to be any noticeable trend to their vertical or horizontal distribution, for they were located on the surface and in almost every unit and level throughout the site. Eight specimens were of chert, five of chalcedony, three of volcanic materials, one of fused shale, and one of siltstone. Specimen 639-377 is a volcanic flake that seems to display use-wear (fig. 3.19d), though it is often difficult to adduce whether use-wear was the result of human or natural agency (particularly since the artifact was surface collected).

The common morphological characteristic among all specimens in this category is that they are primary or secondary flakes that exhibit varying amounts of "nibbling" or edge wear on their lateral edges. They are all unmodified utilized flakes that exhibit no retouching (fig. 3.19a-k).

Non-Utilized Flakes

A total of 2,830 lithic waste flakes resulting from artifact manufacture were collected at the Cazador site (tables 3.6, 3.7, 3.8, 3.9 and fig. 3.20). All materials, with the exception of obsidian, were quarried locally or regionally. We assume that Coso was the source of the obsidian recovered from the

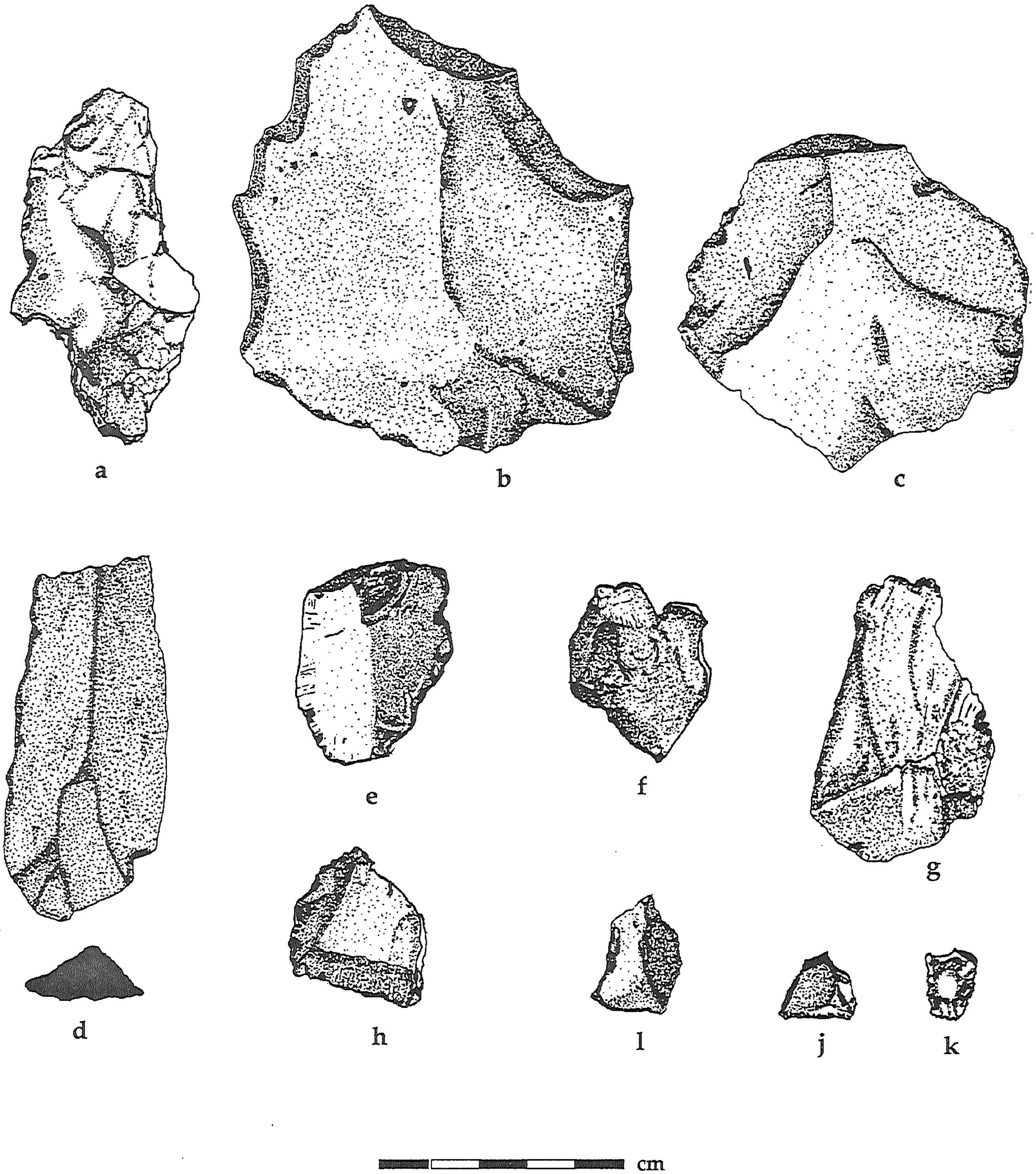

Figure 3.19. Utilized flakes from LAn-807. (a, g, j) Chalcedony; (e, f, h, i, k) chert; (b, d) volcanic.

Table 3.6. Excavated Non-Utilized Lithic Waste Flakes: Quantity by Unit and Level

Unit	Level	CT	Q	CL	SS	V	FS	O
1	1	5	2	23	–	–	3	–
1	2	12	4	16	–	2	14	–
1	3	30	5	12	–	2	27	–
1	4	64	13	47	–	20	45	2
1	5	–	–	–	–	–	–	–
1	6	5	6	18	–	–	11	–
1	7	21	1	10	1	2	5	–
1	8	–	–	1	–	1	–	–
2	1	–	–	5	1	–	–	–
2	2	10	3	7	–	–	9	–
2	3	17	4	30	–	–	21	–
2	4	11	2	27	–	5	10	–
2	5	26	3	29	2	–	24	1
2	6	13	7	14	1	–	23	–
2	7	21	3	16	–	–	23	–
2	8	–	–	–	–	–	–	–
3	1	9	4	14	2	3	12	–
3	2	42	5	24	4	–	21	–
3	3	43	3	33	–	2	35	3
3	4	38	–	45	–	9	45	–
3	5	19	–	28	–	3	27	–
3	6	14	–	9	–	–	14	–
3	7	5	2	13	–	–	4	–
3	8	1	–	–	–	–	–	–
4	1	3	–	3	–	–	5	–
4	2	17	1	11	–	3	6	–
4	3	21	–	23	–	6	16	–
4	4	13	–	18	–	3	15	–
4	5	6	–	9	–	4	15	–
4	6	2	2	6	–	–	4	–
4	7	–	–	2	–	–	2	–
4	8	3	–	2	–	–	1	–
4	9	1	–	–	–	–	–	–
4	10	–	–	1	–	–	–	–
5	1	11	–	14	–	1	5	–
5	2	30	–	16	–	4	9	–
5	3	11	–	13	2	–	11	–
5	4	10	–	15	–	1	5	–
5	5	14	–	–	–	–	4	–
5	6	10	–	14	–	1	8	–
5	7	1	–	2	–	1	–	–
5	8	2	–	–	–	–	1	–
5	9	3	–	2	–	–	–	–
6	1	8	–	12	–	3	4	–
6	2	23	–	9	1	4	16	–
6	3	23	–	14	–	2	16	–
6	4	9	–	3	–	1	8	–
6	5	13	–	4	–	1	9	–
6	6	–	–	2	–	–	2	–
6	7	13	1	4	–	–	6	–
6	8	–	–	5	–	1	4	–
7	1	1	–	2	–	–	–	–
7	2	5	–	9	–	1	1	–
7	3	12	–	11	–	–	4	–
7	4	4	1	2	–	–	3	–
7	5	7	1	8	–	–	3	–
7	6	2	–	1	–	–	–	–
7	7	–	–	2	–	–	1	–
8	1	13	–	11	–	–	7	–
8	2	9	2	8	–	–	7	–
8	3	27	1	38	–	–	19	1
8	4	8	–	12	1	1	8	–
8	5	4	2	9	1	–	8	–
8	6	4	–	9	–	–	4	–
8	7	–	–	4	1	–	7	–
8	8	5	–	5	–	–	4	–
9	1	–	–	2	–	–	4	–
9	2	8	–	6	–	–	1	–
9	3	14	–	11	–	1	7	–
9	4	19	–	25	–	12	18	–
9	5	11	–	36	1	2	18	–
9	6	39	–	29	–	2	26	–
9	7	28	1	11	–	–	19	–
9	8	17	1	13	–	2	11	1
9	9	11	–	7	–	–	9	–

Abbreviations:
CT = Chert Q = Quartz CL = Chalcedony SS = Siltstone V = Volcanic FS = Fused Shale O = Obsidian

Table 3.7. Archaeological Indicators Recovered from Surface Collecting and Auger Boring Operations, Weight (in g)

Auger Boring	Quadrant	Chalcedony	Chert	Fused Shale	Volcanic	Ocher	Utilized Volcanic
1	-	0.1	-	-	-	-	-
2	-	20.0	-	-	-	-	-
3	-	-	0.5	-	35.3	-	30.5
4	-	0.1	0.1	0.1	4.2	-	-
6	-	3.5	-	0.1	-	-	-
10	-	-	0.3	0.1	-	-	-
11	-	0.1	0.4	-	19.6	-	-
12	-	-	-	-	-	-	-
15	-	-	0.5	0.1	41.0	-	-
-	B	2.3	-	-	-	1.2	-
-	F	9.4	3.1	0.5	-	-	-
-	G	-	1.2	-	-	-	-
-	I	0.2	7.3	-	-	-	-
-	S	-	-	1.2	-	-	-
-	W	2.0	-	-	-	-	-

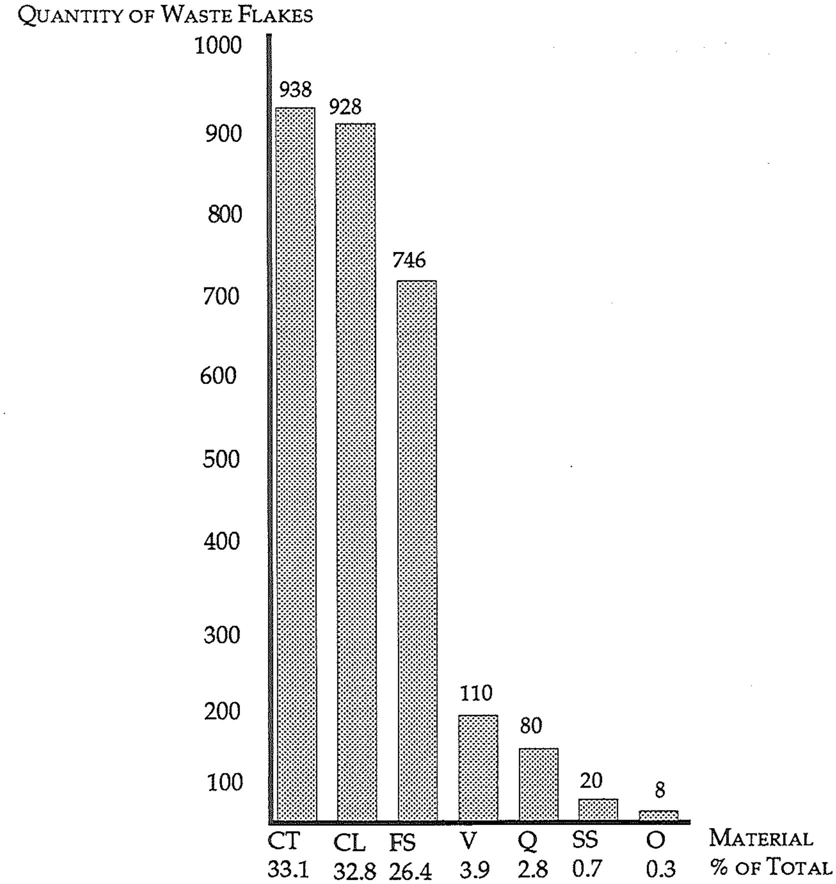

Figure 3.20. Comparison of lithic waste flakes by material, quantity, and percentage of the entire debitage collection.

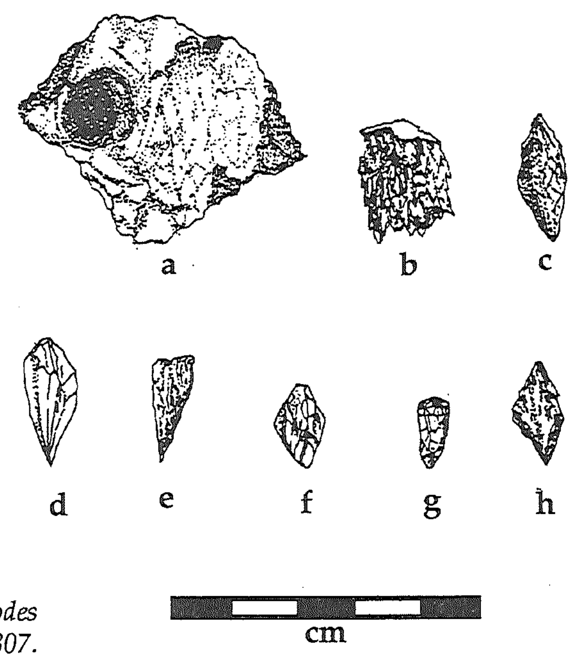

Figure 3.21. Quartz geodes and crystals from LAn-807. (a, b) Geode fragments; (c-h) examples of quartz crystals.

Table 3.8. Non-Utilized Lithic Waste Flakes Recovered from Auger Borings and Surface Collecting Quadrants

Auger Boring	Quad	Number of Pieces CL	CT	FS	V
1	-	1	-	-	-
2	-	1	-	-	-
3	-		3	-	1
4	-	1	2	2	1
5	-	-	-	-	-
6	-	1	-	1	-
7	-	-	-	-	-
8	-	-	-	-	-
9	-	-	-	-	-
10	-	-	2	1	-
11	-	1	4	1	-
12	-	-	-	-	1
13	-	-	-	-	-
14	-	-	-	-	-
15	-	-	2	1	1
-	B	1	-	-	-
	F	1	4	1	-
-	G	-	1	-	-
-	I	1	2	-	-
-	S	-	-	1	-
-	W	1	-	-	-
		9	20	8	4

Table 3.9. Lithic Debitage Recovered from Uncontrolled Surface Collecting Operation

Chalcedony N	Wt (g)	Chert N	Wt (g)	Fused Shale N	Wt. (g)
17	10.8	23	58.8	5	3.7

Three Springs Valley, for it represents the nearest source of this material. Lithic waste at LAn-807 was uniformly distributed throughout all units and levels.

QUARTZ CRYSTAL

Twenty-three quartz crystals and geodes were found during investigations at the study site . Quartz crystals were located in every excavated unit, buried as deep as level 7 in unit 9 and as shallow as level 1 in units 4, 5, 6, and 8, though they were most frequently found in levels 1 through 3. Examples of quartz crystals (fig. 3.21c-h) and geodes (fig. 3.21a, b) are illustrated in this report.

OCHER

Seventy-five pieces of ocher, weighing a total of 35.5 g, were recovered from LAn-807.

Specimens weighed between 0.1 and 6.2 g and were uniformly distributed throughout the site, collected from every unit. Ocher was excavated from level 1 in units 1, 3, and 6 and as deep as 90 cm in unit 9. The colors ranged from red and reddish brown to yellow and a chalky white. Most ocher recovered from LAn-807 was fragile, piecemeal, and in various stages of decomposition. Although this substance can be associated with artifact and body decoration and with funerary offerings, it does occur naturally and need not have any cultural significance.

CONCLUSIONS

The ongoing urbanization of western Los Angeles County poses a threat to the few remaining archaeological sites left unaffected by southern California development. Archaeological inquiry at LAn-807 sheds light on problems of function, settlement, subsistence, and chronology in a murky prehistoric past that grows dimmer daily. It was our good fortune to have had sufficient time to investigate and analyze the LAn-807 data (fig. 3.22).

Rescue operations at LAn-807 seem even more significant at present. After the 1981 field season the site was destroyed. A modern housing project covers the Three Springs Valley and its prehistoric sites. This report documents one of the dozens, if not the hundreds, of small settlements that once dotted the southern California landscape prior to European contact. Few remain for scientific analysis, and fewer still have been adequately studied.

The analysis of functionally sensitive Cazador site artifacts and cultural indicators (e.g., faunal and molluscan remains) enables us to comment on the various activities undertaken by the site's inhabitants. When combined with additional Three Springs Valley data and collated with other southern California archaeological data, a clearer picture of this region's prehistory emerges. Our understanding now is of a practical people who established strategically located permanent settlements, semi-permanent campsites and/or special-purpose activity sites to exploit specific resource zones. With little effort, occupants of the Three Springs Valley could have successfully tapped the full range of natural resources available in this region, exploiting the intermontane valleys, coastal plains, and littoral valleys (Beals and Hester 1956). The nature of these specialized sites, however, and their relationship to larger population centers, is unresolved and open to discussion (see chap. 12).

Figure 3.22. The UCLA field crew upon completion of last excavation unit. Spring 1981. Photo B. D. Dillon.

Specialized communities such as hunting camps or knapping stations, for example, might have supplied food, raw materials, or finished artifacts to nearby settlements. In the case of the Three Springs Valley, the "parent community" or "home *ranchería*" could have been Hipuc, ethnographically recorded less than a mile to the north (Applegate 1975; chap. 12, this vol.). Conversely, these campsites quite possibly functioned independently of parent settlements.

Excavation and surface collecting operations at LAn-807 yielded numerous artifacts associated with subsistence activities. A minimum of these were ground stone artifacts (manos represent 5% of the total artifact collection). Thus it appears that plant-food processing was not a major subsistence practice at the Cazador site and that we have not erred in conferring that name upon it. These data suggest that LAn-807 did not have a large year-round population and that the number of women present at any given time was limited. Greater quantities of all artifacts, especially ground stone tools, would be expected at a permanent habitation or "village" site, where women would constitute at least 50% of the population. While we cannot specify the exact month or duration of site use, it is bowls (as revealed by a thorough surface reconnaissance of the Three Springs area), contrasts markedly with the abundance of animal, fish, and molluscan remains found, suggesting that these were the primary foods eaten at the site. Perishable foodstuffs, e.g,. acorns, roots, seeds, or berries, would round out the aboriginal diet. We may interpret the presence of marine fauna at LAn-807 as evidence either of inland-coastal exchange or simply the remains of coastal peoples, exploiting interior areas for subsistence goods (Van Horn 1987).

The predominant tool types of LAn-807 are those associated with hunting, especially small, finely chipped concave-, convex-, and straight-based projectile points used in conjunction with the bow and arrow. Indeed, it appears that hunting and consuming freshly killed game were the dominant cultural activities here; consequently many archaeologically discernible activities carried out at the site were male-associated.

Cazador hunters pursued and killed local game, then apparently brought the butchered carcasses back to camp to eat. This inference is based on the quality and quantity of animal bones and broken projectile points in the archaeological record (e.g., tips and bases may be the remains of arrow points that shattered on impact or when pulled from animal carcasses). Enough faunal remains and hunting-oriented lithic artifacts and indicators were recovered from the LAn-807 site to suggest even a possible meat surplus: it is probable that portions of this meat were supplied to Hipuc for consumption. Limited plant food processing was undertaken here—probably only enough to feed a small group of people while engaged in the hunt. Fish and molluscan remains complement a meat and vegetal food diet.

Whole and fragmentary projectile points were found in all units and represent roughly 40% of the entire artifact collection. The majority of these artifacts are manufactured from chert, chalcedony, and fused shale. Chalcedony is available in close proximity to LAn-807. Chert and fused shale, however, may have been imported as blanks and preforms. The nearest chert source is on the coast near Malibu in the Conejo Corridor, and fused shale is found in Grimes Canyon. Nevertheless, most geological materials used by occupants of the Cazador site were readily available and well suited for artifact manufacture. It is no accident that these three materials also predominate the lithic waste category (table 3.6).

Cores of chert and chalcedony were significantly smaller than those of quartzite, basalt, or andesite, indicating preference for the former materials for small tool production. About 60% of the site's artifact inventory was chipped stone tools; of these, most were made from chert and chalcedony. This situation is also reflected in the lithic flake count; most consisted of chert and chalcedony. Fused shale was the third most preferred material utilized by LAn-807's chipped stone tool manufacturers. The varying amounts and sizes of chert, chalcedony, and fused shale lithic waste flakes (primary and secondary miniscule trim flakes) indicate that projectile points were manufactured and maintained here.

The presence of steatite artifacts in sites on the southern California mainland can indicate a sophisticated degree of formal exchange with inhabitants of Catalina Island, a rich quarry site for this valuable material, or with the Sierra Pelona of northwest Los Angeles County. Steatite is frequently associated with cooking activities because of its durability and resistance to breakage when exposed to extreme heat. It is precisely for this reason that cooking vessels, comales, and arrowshaft straighteners were produced from this material. The lack of steatite debitage in the LAn-807 archaeological record suggests that artifacts of this material were transported to the site subsequent to their production.

Chronology

The full range of typeable Cazador site projectile points is similar to those defined by Wallace (1955b) as being diagnostic of the Late Horizon (A.D. 1000-Spanish contact). Moreover, an absence of all projectile points associated with earlier periods (e.g., stemmed and lozenge-shaped points) supports this argument through negative evidence. Diagnostic Late Prehistoric period projectile points at depths of 60 cm to 80 cm suggest that the site was intensively utilized during one single period of the region's prehistory, even though this occupation may have spanned 500 years.

stemmed and lozenge-shaped points) supports this argument through negative evidence. Diagnostic Late Prehistoric period projectile points at depths of 60 to 80 cm suggest that the site was intensively utilized during a single period of the region's prehistory, even though this occupation may have spanned a millennium.

In addition to projectile point forms, the presence of steatite can be used to establish the age of the site. Leonard (1971: 126) suggests that steatite is found in southern California sites after A.D. 1300. Eberhart (n.d.:175) indicates that the arrowshaft straightener diffused into southern California by about A.D. 1000. Thus, steatite arrowshaft straighteners make excellent time markers in southern California archaeological sequences. Prehistoric communities containing these artifacts in situ generally have occupation sequences that range well into the Late Canaliño phase (Meighan 1959b:393). This information complements the chronological interpretations suggested by our shell beads, projectile points, and obsidian hydration readings.

According to the morphological and chronological criteria set forth by Gibson (n.d.) and C. King (1974), the shell beads discovered at the Cazador site would have been manufactured and utilized during the region's Late Prehistoric period (A.D. 800 through approximately A.D. 1750).

Absolute dates derived from obsidian hydration readings range from A.D. 554 to A.D. 1368, falling well within the Late Prehistoric period in southern California. One radiocarbon date provided by the UCLA Isotope Laboratory (chap. 5, this vol.), was based on the human skeletal remains recovered. This C-14 determination implies an extremely early age for the Cazador burial and is inconsistent with all other LAn-807 chronological data, but is acceptable if the burial is a secondary interment of a very ancient individual recovered from an earlier site.

Judging from the size of the Cazador site and the kinds of artifacts recovered, it is relatively safe to assume that the site functioned as a temporary hunting camp. Water was abundant as was a variety of game in the Three Springs Valley during ancient times. From analysis of subsistence remains (chapters 6, 10, and 11), we infer a limited seasonal utilization of the Cazador site; used by kinsmen during extended hunting forays when deer, rabbit, and other game animals were plentiful. Rather than serving as a satellite to a parent site, LAn-807 was probably integrated within the Three Springs Valley context (chap. 12, this vol.), functioning interdependently with LAn-808 and LAn-1031, and largely independent of sites outside the Three Springs Valley territory.

ACKNOWLEDGMENTS

Work at the Cazador site was undertaken in conjunction with Dr. Brian D. Dillon's spring 1980 and fall 1981 UCLA Anthropology Department classes in archaeological field training. I am indebted to Dr. Dillon for his tireless encouragement during all phases of field and laboratory research and for reading and commenting on various generations of this report. I wish to express my deepest appreciation to those students in Dr. Dillon's class who worked Saturdays in Westlake Village and assisted me loyally Mondays through Fridays at the UCLA Institute of Archaeology's Current Projects Laboratory, washing, sorting, and laboriously cataloging our weekly finds. My special thanks to Sophie Dahan for illustrating the Cazador site artifacts, to Timothy Seymour for his efforts in the graphic presentation of this chapter, and to Carol Leyba, UCLA Institute of Archaeology, whose editorial acumen improved the quality of this paper.

4. Human Skeletal Remains from LAn-807

Mercedes Duque

Feature 1, Burial 1
- Location: Units 5-7-9
- Depth from Surface: 50 cm
- Age: Adult
- Sex: Unidentified
- Burial Type: Secondary
- Position: Not Known
- Preservation: Poor
- Associated Burials: None
- Associated Artifacts: None

The human skeletal material from site LAn-807 was very fragmentary (no complete bones being present), a common occurrence within southern California. The largest single piece was an 11.4 cm portion of a femur shaft. Many pieces were very weathered and exhibited gnawing by rodents, but none of the bones were burned or cut. A total of 177 bone fragments, weighing a total of 271.2 g, were associated with feature 1. Of these 171 (15%) were identifiable, and are listed in table 4.1.

No nonmetric variables could be noted. Although both right and left temporals were found, no auditory ossicles were present in either auditory meatus. No true indices could be determined, and stature estimates could not be made.

Sex could not be determined. Although the skull had a rather blunt superior orbital margin suggestive of male gender, sexual dimorphism is not pronounced in California Indian crania (G. E. Kennedy, personal communication), and care must betaken when inferring sex from such limited data. There were no pelvic bones for evaluation, and femur head size could not be determined.

Age could be determined by the fact that all bones appeared to be of adult size. Epiphyseal fusion could not be determined except in a proximal portion of a radius which was fused and is normally considered united by 18 years of age. The third molar, which erupts at about 18 years of age was absent from the bone material. The extreme attrition of the molar (M1 or M2), #34, the only tooth found, may be considered to place this individual as an older adult.

Among California Indians such as the Late Prehistoric Canaliño and certainly among earlier peoples the use of grinding tools (such as metates and mortars)—as well as the ingestion of mammal bones—contributed much to the attrition (frictional wear of the teeth) and abrasion (the result of abrasive food) of the tooth occlusal surface (Knott 1979:2). This is considered a natural phenomenon (rather than a pathological one) among the aboriginal peoples of California. Finally, no pathology could be noted; trauma, osteoarthritis, osteoporosis or periostitis are absent.

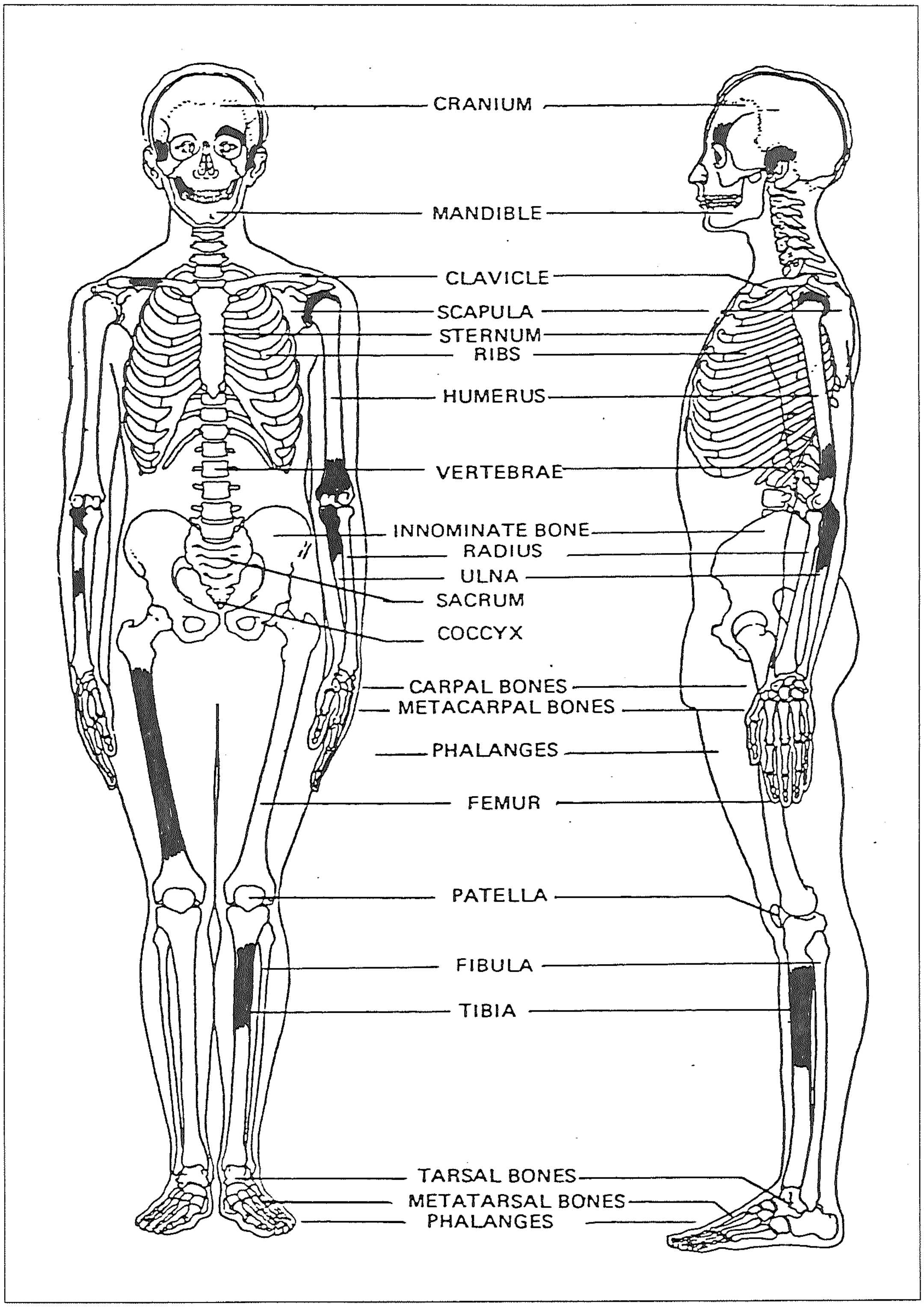

Figure 4.1. Human skeleton. Blackened areas indicate portions of bone found at LAn-807.

Table 4.1. LAn-807 Feature 1 Burial

No.	Description
1	Probable skull fragment (1). Too small (1.3 x 1.0 mm) for a positive identification. It has an exterior and an interior surface and diploe and is 5 mm thick. The cerebral surface exhibits a vessel groove.
2	Long bone fragments (2), bone fragments (4). Unidentifiable. A and B of #3 (Unit 5, level 5) are long bone fragments and fit with #7B (Unit 5, level 6). The other four pieces are similar in thickness (0.4 to 0.6 cm), exterior surface, and weathering.
3	Femur, proximal right shaft fragment (1), long bone fragments (4), bone fragment (1). Consists of six fragments of femur shaft which fit together, found with #6 at the same level. These pieces form a shaft 22.5 cm in length; both ends are missing. The largest piece has the linea aspera which fixes it as a right femur. The shaft is round and smooth. It has been gnawed at a broken end and there are cut marks midway on the fragments which may have occurred during excavation. Long bone fragment #4A has the nutrient foramen and is gnawed; #4B has been gnawed; #6 is weathered and possibly gnawed, with a punched-in hole, not a foramen.
4	Tibia, left shaft fragments (5), bone fragment (1). Consists of five fragments which fit together with #7A, forming a section of the left tibia shaft containing the nutrient foramen on the uppermost part, with 5.5 cm of bone extending below it. Two fragments exhibit 9 cm of the anterior crest; the proximal bone is quite gnawed. The tibia shaft is triangular with a sharp anterior crest edge. No epiphysis area is present. A Platycnemic Index, expressing the degree of medio-lateral flatness of the tibia, was attempted from the portion present because it had the nutrient foramen, the level at which these measurements are taken. It was in the Platycnemic range (55.0-62.9) at 61. Platycnemic Index: $\frac{\text{Medio-lateral nutrient diam.} \times 100 = 2.2}{\text{Anterior-posterior nutrient diam.} \quad 3.6} = 61$ (Bass 1971:187)
5	Femur shaft fragment (1). Joined with #4.
6A	Tibia shaft fragment (1). Fits with #5.
6B	Long bone fragment (1). Fits with #3A and B. Bone fragments (9). Unidentifiable, may be pieces of long bones, femur and/or tibia from same level. One piece probably fits with #5, two are cancellous.
7	Long bone fragments (2). These fit together and may be a radius shaft. A positive identification could not be made. Both pieces are gnawed.
8	Bone fragments (7)—all unidentifiable.
9	Long bone fragment (1)—unidentifiable.
10	Bone fragment (1).
11	Bone fragments (2)—unidentifiable.
12	Bone fragments (2)—unidentifiable.
13	Humerus, left distal shaft (1). This is the distal end of the left humerus shaft broken at the superior area of the olecranon fossa. The trochlea, capitulum, medial and lateral epicondyles are missing. It is not possible to tell whether there was a supra-condyloid foramen. Two small pieces of #21 join proximally to #14. The part of the shaft which presents the nutrient foramen is missing. The least circumference of the shaft could not be measured for a Robusticity Index as that area, the second third of the shaft, distal to the deltoid tuberosity, is missing. The distal epiphysis unites at

Table 4.1. LAn-807 Feature 1 Burial, continued

No.	Description
	approximately 17-18 years, the medial condyle at 19 years. This could not be determined as the bone was broken at that area.
14	Radius, proximal end, probable right (1).
	Part of the head and neck are present but broken above the radial tuberosity. The epiphysis is united; this occurs at about 15 to 18 years (Bass 1971: 124) and is usually united by 19 years (McKern and Stewart 1957:47). At the best approximation, the diameter of the head is 1.9 cm.
15A	Ulna, left proximal shaft (1).
	The shaft is triangularly shaped; the sharp edge of the interosseous crest is present and fits with #20, which has the semilunar notch. #16A has the nutrient foramen, which seems high and may be an individual variation.
15B	Probable radius shaft (1).
	This is probably the midshaft, below the radial tuberosity. It has a section of interosseous crest; the area of the nutrient foramen is missing. There is no epiphyseal area.
16	Possible humerus, left shaft (2).
	The shaft is rounded and flattened on one side. The nutrient foramen which is present, is in the middle of the fragment; therefore, this would be the distal shaft below the deltoid tuberosity and radial groove. The smallest circumference of the shaft was noted, because it is measured about a centimeter distal to the nutrient foramen.
17	Frontal, left supra-orbital border with supra-orbital notch (1).
	There is no supra-orbital foramen but a vessel foramen is present on the interior surface below the notch. There is a small segment of superciliary arch medial to the supra-orbital notch. The supra-orbital border is somewhat blunt, which could indicate a male although it is not diagnostically assured; aboriginal southern California women were robust.
18	Probable humerus head fragment (1).
	There is no sign of a fovea capitis (femur) but, with this small piece, it could easily be missing. There is no epiphyseal area; the head of the humerus fuses at about 20-24 years of age, the head of the femur at about 18 years (Bass 1971:111, 116, 172). Measurement of the maximum diameter of the head was attempted, 43 mm, but cannot be considered because of the fragmentary portion. It was considered humerus because it does not have the orderly alignment of cancellous tissue that gives strength to it for weight bearing, as seen in a cross section of a femur head. This fragment is spongy, less dense, and not as hard as a femur head (G. E. Kennedy, personal communication).
19	Ulna, left proximal fragment (1).
	A portion of the coronoid process and part of the floor of the semilunar notch are present. The epiphyseal area is missing. Fragment fits with ulna shaft #16.
	Bone fragments (3).
	Unidentifiable; one is cancellous, one has a rounded surface and is cancellous, one is flat.
20	Humerus (2). Fits with #14.
	Bone fragments (31). Seventeen are cancellous.
21	Bone fragment (1). Weathered, gnawed, 0.6 cm thick.
22	Bone fragments (2)—unidentifiable.
23	Bone fragments (4)—unidentifiable.
24	Clavicle fragments, right (1).
	Distal fragment, with conoid tubercle and small area medial and lateral to it, is all that is present; a rough area of muscle attachment is present in the area distal to the conoid tubercle. The ends are missing so it is not possible to tell if the

Table 4.1. LAn-807 Feature 1 Burial, continued

No.	Description
	epiphysis was united; the medial epiphysis begins to unite at 17 or 18 years and is the last piece to unite at about 25 years (Bass 1971:100-103).
25	Bone fragments (4). Largest piece weathered and gnawed.
25A	Clavicle fragment (1). Joined with #25.
26	Bone fragments (5). Two cancellous, two flat.
27	Bone fragment (1). No provenience—unidentifiable.
28	Bone fragments (6)—unidentifiable. One cancellous, three flat.
29	Bone fragment (1)—unidentifiable. Weathered, vessel groove along the edge.
30	Long bone fragment (1). Gnawed, very hard piece of bone.
31	Bone fragment (1). Too small for identification, flat.
32	Long bone fragments (2) #33A and #33B fit together. Unidentifiable. #33A has been gnawed. Bone fragments (7)—Unidentifiable; one piece is cancellous.
33	Molar, maxillary (upper) 1st (M1 erupts 6 years) or 2nd (M2 erupts at 12 years). This was the only tooth found. It has 3 roots (lowers have 2), and still has fragment of maxilla attached. There is severe attrition, the cusp pattern is not present, the enamel has worn away except for a 1-3 mm wide bit on the buccal and mesial sides. The rest of the tooth is worn to the neck. The degree of wear of the molar would be classified as 7, according to Molnar (1971:178); the crown (enamel) has worn away on at least one side and there is extensive secondary dentine. This could be considered 3rd degree, as classified by Leigh (Knott 1979:4); the tooth has been considerably shortened, even approaching the neck, completely exposing the dentine. The occlusal surface form is flat, the attrition occurring on an obtuse plane slanting from the buccal to lingual side (the highest to lowest oblique points) as seen from the mesial view; or more marked attrition on the lingual margin (Type 2, Molnar 1975). According to Leigh, attrition in maxillary teeth is on an obtuse plane, more marked on the lingual margin. Mandibular teeth are less slanted and toward the buccal side.
34	Temporal, right fragment (2) These pieces fit together, and #35A possesses part of the zygomatic process and the external auditory meatus; the mastoid has broken off. No auditory exostosis was noted although the area is broken. #35B is the petrous portion and contains the internal auditory meatus and the styloid process.
35	Temporal, left fragment (1) Petrous portion with the internal auditory meatus.
36	Probable fragments of temporal bone (4).
37	Probable skull fragments—irregular (14).
38	Long bone fragment (1)—unidentifiable, gnawed.
39	Long bone fragment (1)—unidentifiable, gnawed.
40	Long bone fragment (1)—unidentifiable, gnawed.
41	Bone fragments (6)—unidentifiable.
42	Bone fragments (22)—unidentifiable.

CONCLUSION

The human skeletal material from LAn-807 consisted of 177 bone fragments weighing a total of 271.2 g. These fragments were weathered; 17 were gnawed by rodents, and overall preservation was poor. The sex of the individual could not be determined, and the only indications of age were a united radial epiphysis which occurs in the age range of 15 to 18 years, and a maxillary molar, M1 or M2, with the extreme attrition which would suggest an adult. No stature estimates could be made, no non-metric variables could be noted, and no pathology could be detected.

It is possible that the scattered skeletal remains could have been buried, presumably through accidental agency, after lying on the surface for some time, but it is much more likely that the bones represent a secondary interment. Brian D. Dillon (personal communication) suggests that the LAn-807 burial's position is more commensurate with shoving the bones down an existing ground squirrel or coyote hole in random order rather than placement in a purposefully excavated grave.

Because of the disarticulation of the skeletal material and the absence of many teeth, phalanges, and dense bones, which are more likely to be preserved than other bone, and because of the hard-packed clay surrounding the remains, which was different from the loosely packed brown soil within the unit, a secondary burial must be considered.

Secondary burials, of course, are interments in which the corpse has been relocated, reburied, or in some way physically moved some time after death and after normal processes of decay have set in. They are characterized by incomplete representation of all bones of the skeleton—usually small or inconspicuous bones such as fingers or toes have been lost in transit—and by non-articulation of the bone.

Teeth, phalanges, carpal and tarsal bones usually are better preserved than other bones but are easily lost during transport. The absence of these bones as well as that of vertebra and most of the LAn-807 skeleton leaves very little option other than interpreting the Cazador burial as a secondary burial.

Kroeber (1925:556-557) states that the Chumash alone among their neighbors buried their dead rather than cremating them. The bodies were tied in a flexed position, face down, with the head toward the west. Cemeteries in villages were usually marked by rows of stones or planks. Reburial was practiced to make room for new burials. Offerings of bowls, pestles, shell beads, weapons, and charmstones were made. At the archaeological site which may be Hipuc, the nearest ethnohistoric village site to LAn-807, a burial in a stone bowl was found (UCLA Archaeological Information Center records).

Obviously, the Cazador site burial does not fit the ethnohistoric pattern for the Late Prehistoric Chumash, so it must be interpreted as either a non-Chumash, or a pre-Chumash burial. The comparatively early dating of the burial (McJunkin and Berger, this vol.) supports the notion that a much earlier burial, possibly dating to the Intermediate period, was discovered eroding out of its original location of interment and was secondarily reburied at LAn-807 during the Late Prehistoric period.

ACKNOWLEDGMENTS

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5. Radiocarbon Dating Human Bone From LAn-807

David McJunkin and Rainer Berger

The direct dating of human remains is the best method to determine when an individual was alive and the site of discovery was occupied. Dating of artifacts is useful, but the problem of spurious association with a given population is always present and often lends controversy to the interpretation which could otherwise be avoided.

Given sufficiently good preservation, the method of choice for dating recent and late Pleistocene human bone is radiocarbon. The radioactive decay of ^{14}C is a nuclear process which is unaffected by physical conditions other than the passage of time. With sufficient attention given to selection, decontamination, conversion, measurement, and calibration, an accurate analysis can be made. The interpretation of what the results mean archaeologically should be made by collaborative effort between the field archaeologists and the laboratory investigators. The earlier this collaboration begins, the more useful the results will be.

The sample (UCLA 2522) from Feature 1, LAn-807, submitted for analysis, was 95 g of partially degraded human long bone with no associated, datable charcoal. In order to get an accurate date, contaminates older and younger than the bone were removed. In coastal southern California it is important to inspect the material for contamination by fossil carbon, such as natural petroleum, which is not unknown in the region (see Ho, Marcus, and Berger 1969). The LAn-807 sample appeared to be free of tar and other gross petroleum products. Most of the carbon in bone is in the mineral portion and is subject to exchange with groundwater which may be either radiometrically enriched in atmospheric carbon or contain radiometrically dead carbon from limestone of great antiquity. The organic fraction is chiefly composed of the protein collagen which is useful for radiocarbon dating (Berger, Horney, and Libby 1964).

To determine whether or not there was sufficient collagen preserved for dating the sample, about 50 mg was taken and assayed by the micro-Kjeldahl technique for nitrogen, which is directly proportional to the residual protein. The bone contained 0.6% nitrogen (modern bone ≈ 4.5%); about 13% of the original protein was left. Given 95 g of sample, there should be sufficient native protein left to yield a useful date.

After initial cleaning of rootlets and soil, the mineral fraction of the bone was dissolved in dilute, cold HCl (1 N) which is not strong enough to hydrolyze the collagen. The collagen did not have enough integrity to leave a pseudomorph, but the insoluble residue was filtered off. Subsequently it was washed with dilute NaOH to extirpate any fulvic or humic acids that could have been deposited in the bone via percolation in the ground. The sample was then rewashed with HCl to get rid of any artifactual bicarbonate, then rinsed repeatedly with distilled water and dried.

The prepared collagen was then introduced into an isotopically pure quartz oven and pyrolized in a stream of argon, then combusted in analytically pure oxygen (both approximately 1000°C). The resulting CO_2 and other gases were passed through an exhaustive purification train to remove halogens, CO, electronegative impurities, and water. After waiting for more than a month for the ^{222}Rn (a radioactive, noble gas with a similar freezing point to CO_2) to decay, the sample was found to contain certain unknown impurities and was recleaned by absorption into 4N NaOH (carbonate free) and liberated with the addition of HCl and recleaned as before.

The sample was then measured in our 200 ml gas proportional counter because of the small amount of CO_2 evolved from the sample. It was found to give a radiocarbon age of 3780 ± 275 years before present. This date is based on the Libby half-life, and the error is one sigma standard deviation counting error. A measurement of $^{13}C/^{12}C$ was made and found to be -26.14 per mil. This shows a diet consistent for this region and no appreciable isotopic fractionation during preparation.

New World archaeological dates can be conveniently calibrated by the Suess bristlecone tree-ring curve which adjusts for variation in prehistoric cosmic ray influx and differential production of ^{14}C in the upper atmosphere (Suess 1981). Using this calibration curve the dates fall between 1720 B.C. and 2940 B.C. This rather broad range is the result of the conjunction of the small sample size due to suboptimal preservation and the unfortuitous section of the curve.

Since the cultural assemblage and the settlement pattern of the Three Springs site are apparently typical of the Late Prehistoric or Canaliño period, this burial is most reasonably from a somewhat earlier occupation, and very likely a reinterment.

6.
Fish Remains from LAn-807

Mark A. Roeder

Archaeological excavations at CA-LAn-807 produced 50 fragments of marine fish, totaling less than 10 g. No fish remains were found at LAn-808. Less than a half- dozen possible examples were encountered at LAn-1031; these specimens could not be positively identified and are not discussed here. Our review of fish remains from the Three Springs Valley of Western Los Angeles County thus relies entirely upon evidence from a single site, LAn-807.

Although not very much marine fish was found at the site, at least in comparison with any nearby site on the coastal littoral, fish remains at LAn-807 were fairly evenly distributed through units 2, 3, 5, and 8; they were found as shallow as level 1 (in unit 9) and as deep as 70 to 80 cm in units 3 and 6. Vertebrae were by far the most common bones preserved; in most cases speciation was done with very fragmentary material.

Not all the specimens could be identified; however, the following species are probably present within the sample: shortfin mako *(Isurus oxyrinchus)*, angel shark *(Squatina californica)*, bat ray *(Myliobatis californicus)*, shovelnose guitarfish *(Rhinobatos productus)*, tuna (*Thunnus* spp.) and sheepshead *(Semicossyphus pulcher)*. All of the above-named species have been reported from "inland Chumash" sites (Roeder 1979). In addition to those fish named above, centra of Triakids (leopard shark family) suggests that either the leopard shark, the gray or brown smoothhounds, or the soupfin shark is also represented; radiographs must be used to differentiate these species when evidence is as fragmentary as that derived from LAn- 807 (Roeder 1978). It is possible that other species, especially smaller fishes and sharks, may have been present at the Three Springs Valley sites. Many identifiable fish remains are small enough to pass through standard 1/8-inch mesh archaeological screens (Fitch 1967, 1969, 1972, 1975). Additional species might have been recovered with the use of finer mesh screens, such as 30 mesh, or 30 openings per inch, but the existing sample is adequate for general interpretation.

The relative dearth of fish remains at LAn-808 and LAn-1031, at least in comparison with terrestrial faunal remains (Duque, this volume) perhaps indicates that marine fish played a very minor role in the total food resources utilized by the inhabitants of the Three Springs Valley. Although Landberg (1965:91) suggests that the "inland" Chumash made annual trips to the coast to fish, no fishing gear such as shell hooks, bone gorges, or stone net weights were recovered from any of the study sites. The prehistoric inhabitants of the Three Springs Valley thus may have bartered with coastal fishermen for foodstuffs and materials not available in the inland zone.

The presence of tuna in the LAn-807 site may indicate that it was occupied during the summer months, especially July through September, when such fish are locally abundant. It it quite possible that coastal fishermen took large amounts of these game fish during the summer and traded them inland, using their excess catch in barter for interior foodstuffs, skins, or other materials not abundant on the coast. It is equally possible, however, that these game fish were carried over by coastal peoples for their own sustenance during their seasonal forays into the interior.

Table 6.1. Distribution of Fish Remains by Quantity and Level: LAn-807

Unit	Level	Museum #	Qty	Species Identification and Additional Information
1	7	639-74	2	2 Triakid shark centra
2	4	639-122	1	1 bat ray centrum
2	5	639-137	1	1 Triakid shark centrum
2	6	639-150	3	2 Triakid shark centra; 1 bony fish hyomandibular spine
2	7	639-163	3	2 bony fish vertebrae; 1 bony fish quadrate
3	3	639-114	2	1 angel shark centrum; 1 Triakid shark centrum
3	4	639-238	3	1 Triakid shark centrum; 2 bony fish atlas vertebrae
3	5	639-260	1	1 bony fish atlas vertebra
3	6	639-295	1	1 tuna vertebra
5	3	639-404	1	1 unidentifiable bone fragment
5	4	639-417	1	1 sheephead tooth
5	5	639-427	1	1 bony fish vertebra
5	8	639-449	2	2 bony fish vertebrae
6	4	639-502	7	2 bony fish vertebrae; 5 unidentifiable bone fragments
6	6	639-529	1	1 tuna vertebra
6	8	639-541	2	1 shark centrum; 1 bony fish vertebra
7	2	639-555	1	1 bony fish vertebra
7	5	639-581	2	1 shovelnose guitarfish centrum; 1 bony fish vertebra
8	3	639-620	3	1 bony fish spine; 2 unidentifiable bone fragments
8	5	639-642	1	1 shovelnose guitarfish centrum
8	6	639-647	2	1 shovelnose guitarfish centrum;1 Triakid shark centrum
8	6	639-651	1	1 shortfin mako shark tooth
8	7	639-720	2	1 sheephead jaw fragment; 1 bony fish vertebra
9	1	639-654	1	1 bony fish vertebra
9	6	639-735	2	2 bony fish vertebrae
9	7	639-745	3	2 shark centra; 1 unidentifiable bone fragment
		Total:	50	

7. ARCHAEOLOGY OF LAN-808, THE SALSIPUEDES SITE

Rita S. Shepard

INTRODUCTION

Located in the lower foothills of the Santa Monica Mountains, the Salsipuedes site (LAn-808) occupies a low saddle approximately 100 m southeast of LAn-807 and reaches its limits when the slope exceeds 5% (fig. 7.1). A stream from an intermittent spring that waters LAn-807 passes about 65 m northwest of LAn-808 and most likely was the aboriginal water source. Generally hilly terrain around the site supports a chaparral community containing no plants larger than shrub size. Dark brown compact loam, almost adobe, covers the bedrock found just below the surface along most of the ridgeline.

A narrow dirt road transects LAn-808 from east to west; a dirt bike trail joins it perpendicularly, destroying an estimated 6.5% of the site. Dirt bikes traversed the Three Springs Valley during UCLA's investigation, nature enthusiasts and hikers frequented the study site, and small game hunters were encountered during the preliminary 1979 winter season. Consequently, artifacts of modern manufacture were being deposited on the site even while we were excavating it. Fresh deer and rabbit droppings as well as new rodent burrows further attest to site disturbance.

HISTORY OF FIELDWORK

Clay Singer (n.d.a) initially recorded LAn-808 in February 1978. He reported a small midden containing lithic cores, waste flakes, a hammerstone, and a scraper, but no faunal remains. Singer estimated that the site incorporated approximately 1,000 m^2. A party from the UCLA Archaeological Survey under the direction of Brian D. Dillon revisited Salsipuedes in December 1979 and completed preliminary surface survey, mapping, and test excavation. A discarded pestle discovered on the surface determined the placement of 2 x 2 m test unit 1; it proved sterile despite excavation to 20 cm (fig. 7.4). Later, UCLA archaeologists discovered that the pestle rested more than 12 m from the next closest artifact and surely had not been found in its original location. One explanation for its position suggests that hikers or hunters tossed it uphill during the recent past.

Extensive investigation of the site began in spring 1980 when Dillon's UCLA field class devoted ten Saturdays of investigative time; Elsie Sandefur, a UCLA graduate student, acted as field supervisor during the 1980 excavations. Students cleared the area completely with machetes and laid out a grid containing 109 4 x 4 m quadrants. The team completed a 100% surface collection within the grid. Additionally, a series of 14 auger borings were made along the north-south and east-west site axes to aid subsurface investigation (figs. 7.1-7.3). Investigators excavated four additional 2 m^2 units in areas that displayed the greatest concentrations of surface artifacts and debitage. The site was excavated in arbitrary 10 cm levels down to sterile bedrock and all soil was passed through

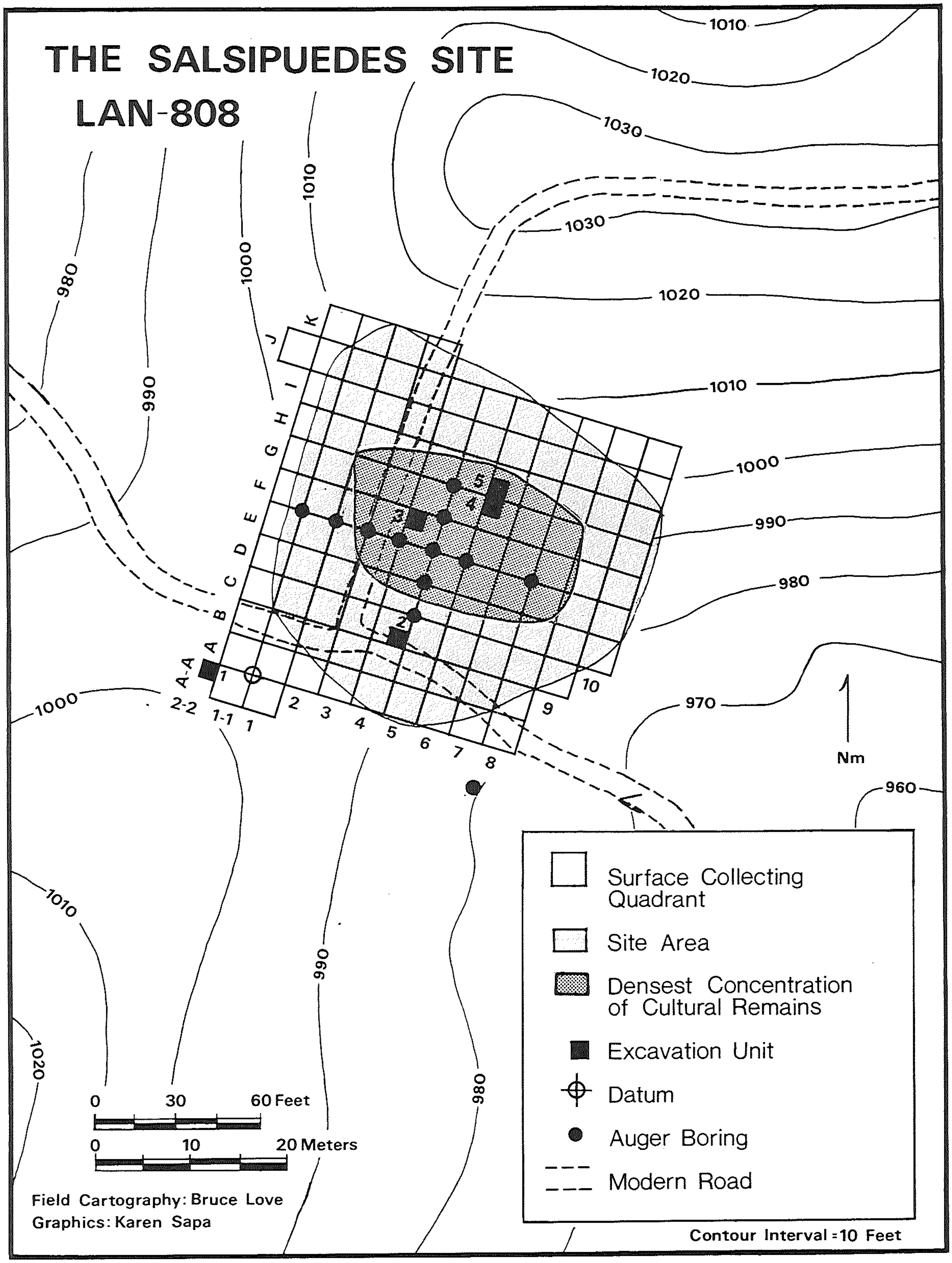


Figure 7.1. The Salsipuedes Site, LAn-808.

Figure 7.2. LAn-808 at center (cleared area in small saddle) and LAn-807 at center left, beneath large oak tree. April 1980.

Figure 7.3. LAn-808, with auger crew in foreground, surface collecting teams in background, and excavation unit at lower right. LAn-1031 rockshelter visible (note backdirt pile) at top center, just below peak. April 1980. Photos B.D. Dillon

1/8 inch mesh screens. Units 3 and 4 contained cultural material as deep as 60 cm; units 2 and 5 revealed artifacts to a depth of 40 cm. Dillon's UCLA field class excavated 8.8 m^3 of deposit at LAn-808, including the abortive unit 1. The site soil was a brown adobe with no visible "midden" characteristics such as featured at LAn-807 downslope: absent were the black color and greasy texture, and shell and faunal remains were sparse as constituents. The Salsipuedes site soil was heavily compacted in the area of the dirt bike trail, more friable in areas covered with chaparral vegetation.

The surface artifact scatter occupied approximately 1,296 m^2 and contributed almost two-thirds of the cultural material recovered from the Salsipuedes site (i.e., 394 of 616 specimens). The densest artifact concentration suggests that the center of the site occurs along a generally east-west axis, not surprisingly through the flattest part of the ridge's saddle, and that this area incorporates only 320 m^2, or about 25% of the site's total surface area (fig. 7.1). Recent disturbance caused by erosion, road-cutting, and vehicular traffic undoubtedly accounts for much of the original surface artifact dispersal. The steepest slope leading away from the site drops southeast and, predictably, yields the greatest amount of redeposited material. Site volume is estimated to be 170 m^3; thus UCLA archaeologists excavated approximately 4.7% of the site. Excavation units yielded 2.3 artifacts (excluding utilized flakes) per cubic meter, whereas the surface collection produced nearly 23 artifacts and utilized flakes per square meter. Obviously, with half the artifact/cubic meter excavated yield ratio of LAn-807, no shell and meager faunal remains in its deposit, the stratigraphic and volumetric data suggest that LAn-808 is best characterized as a surface site with a very low artifact density.

ARTIFACT DESCRIPTIONS

Archaeological investigations yielded 44 whole and fragmentary lithic artifacts, 43 utilized lithic flakes (damaged or worn edges indicate aboriginal use), and 524 lithic waste flakes. Nine quartz crystals and a single piece of ocher are also represented in the collection. The catalog includes crystals and ocher because regional natives used them ceremonially (Grant 1966:40, 1978b: 514). Both minerals, however, also appear naturally in the study area (Stephen Williams, personal communication). Fifty-two faunal fragments, including one small piece of unidentifiable shell, were recovered, but no bone or shell artifacts were found.

This report divides lithic artifacts into four general categories: ground stone, chipped stone, utilized flakes, and miscellaneous. The ground stone category comprises manos, metates, and pestles. Chipped stone artifacts encompass projectile points, bifacially and unifacially flaked tools, and expended cores. Utilized flakes are unretouched lithic flakes which have edge wear indicating use. I created the miscellaneous category because several specimens, technically classified as ground stone, were unique relative to other artifacts. They include three polished incised stone fragments which are most likely pipe pieces (Clement Meighan, personal communication), a tabular fragment with linear incising on both faces, and a small handstone abraded on one end. Quantitative data for all lithic artifacts appear in table 7.1. Table 7. 2 presents data for debitage.

Because the Salsipuedes site is geographically close to LAn-807 and is most likely associated with it, I use the same functional artifact descriptions as Boxt (chap. 3, this vol.). However, I concur with Dillon (1978) and Clewlow, Whitley, and McCann (1979:58-59) in their reluctance to assign functional attributes to stone tools. Therefore, I shall use functional and morphological descriptions jointly in this report. Stephen Williams assisted me in establishing lithic and mineralogical definitions. Obsidian specimens were sent to the UCLA Obsidian Hydration Dating Laboratory for analysis.

Figure 7.4. LAn-808, unit 3, level 4, showing metate fragment (to left of trowel) in situ. Trowel points north, tape extended to 1 m. April 1980. Photo B.D. Dillon

Table 7.1. Artifacts LAn-808

Artifact Type	No.	Material	Size Range L x W x Th (mm)	Average Size	Depth
GROUND STONE					
Manos					
Type 1	1	PR	7.62* x 7.85* x 5.79		S
Type 3A	1	SA	4.45* x 6.81* x 4.59		S
Type 9	1	AN	4.26* x 5.20* x 4.44*		S
Metate	1	SA	18.50* x 15.40* x 9.90*		20-30 cm
Pestle	1	SA	17.0 x 5.36 x 5.09*		S
Abraded stone	1	AN	6.96* x 6.14* x 3.38*		20-30 cm
Incised tablet	1	TF	7.90* x 5.51* x 1.06		30-40 cm
CHIPPED STONE					
Points					
Convex base	2	CL, CT	1.70* x 1.31* x 0.64*	1.70* x 1.28* x 0.60*	S
Straight base	1	FS	0.93* x 2.0* x 0.57*		S
Unclassified fragments	9	CT, CL			S-60 cm
Small bifaces					20-30 cm
Discoidal	1	QT	4.44 x 3.34 x 1.65		
Unclassifiable fragments	6	SS, CH JS, FS	3.23* x 1.95* x 1.10*	2.21 x 1.52 x 0.99	S-60 cm
Large bifaces	4	TF, AN, CT	4.47 x 7.19 x 3.78	6.96 x 5.14 x 3.40	S
Small unifaces	4	CT, FS	3.20* x 2.23* x 1.37*	2.83 x 1.81 x 0.83*	S-40 cm
Large unifaces	4	AN	7.52 x 6.44 x 2.67	6.75 x 5.93 x 1.95	S-40 cm
Expended cores	3	AN, CT	3.09 x 2.12 x 1.56	2.75 x 1.88 x 1.69	S-60 cm
OTHER STONE OBJECTS					
Pipe fragments	3	IS	3.67* x 1.26* x 1.24*		0-10 cm

* Denotes broken edge, thus an incomplete measurement

PR - Porphyritic rhyolite   SA - Sandstone   AN - Andesite   CL - Chalcedony   JS - Jasper   IS = Indurated Siltstone
CT - Chert   FS - Fused Shale   QT - Quartzite   SS - Siltstone   TF - Tuff

Table 7.2. Comparison of Chipped Stone Artifacts to Debitage

Material	# of Artifacts	% of Artifacts	# of Flakes	% of Flakes
Chert	15	44	256	49
Chalcedony	4	12	148	28
Fused shale	4	12	77	15
Jasper	1	3	-	-
Siltstone	1	3	1	1
Obsidian	-	-	2	1
Indurate tuff	1	3	-	-
Andesite	7	20	36	7
Quartzite	1	3	4	1

Ground Stone Artifacts

Manos. Investigators found no complete manos at LAn-808; however, they recovered three fragments during the surface collection. Two specimens are sandstone and one is a porphyritic andesite cobble. Mano definitions below follow those of Dillon (1978:105-106) and M. Johnson (1980: 202-215).

Type 1. Unshaped Uniface

1 specimen: porphyritic andesite (632-464; fig. 7.5b). This is an ovoid cobble, broken approximately medially across its short axis, exhibiting wear on one surface as a result of abrasion. In addition, the unbroken end of the cobble shows evidence of battering.

Type 3a. Unshaped Biface

1 specimen: sandstone (632-248; fig. 7.5c). Broken across its short axis, this ovoid cobble exhibits abrasion on two domed and opposing surfaces, producing an ovoid cross section. A portion of one surface has been pecked, presumably to create better grinding friction.

Type 9. Unclassifiable

1 specimen: sandstone (632-326; fig. 7.5a). Sufficient morphological evidence does not exist to classify this fragment in any category. It does display abrasion on the two extant surfaces, one bearing evidence of pecking. The outer surfaces are fire-blackened.

Metate . Only one metate fragment was recovered from LAn-808; it was excavated from the 20-30 cm level of unit 3. I based this classification on Dillon (1978:101-105).

Type 2. Shallow Basin

1 specimen: sandstone (632-142; fig. 7.6a). The fragmentary nature of this metate prevents precise description of the vessel's original size and shape. However, it was manufactured from a sandstone slab exhibiting a prepared grinding surface with gently sloping sides, worn down no more than 5 cm. Although there was no mano in direct association, investigators discovered a small, minimally abraded "handstone" (632-69) in the same level of adjacent unit 5 (fig. 7.5d).

Pestles.

1 specimen: sandstone (632-519; fig. 7.6b). Archaeologists recovered one nearly complete sandstone pestle from the area later designated test unit 1. As discussed above, it was found outside subsequently established site boundaries.

Since researchers have not established a pestle typology for southern California, archaeologists describe specimens individually. Partially broken on its long axis, this specimen nevertheless retains the majority of its polished surface. If complete, the tool would be a symmetrical cylinder with no evidence of tapering. A convex base and sloping sides form a definite shoulder. Interestingly, the tool is well polished and exhibits little or no wear.

Chipped Stone Artifacts

Projectile Points. Although projectile points are an almost universally recognized functional subclass of chipped stone artifacts (Clewlow, Whitley, and McCann 1979:59), archaeologists can misidentify even these when they have only fragmentary specimens. (See discussion below of artifacts 632-391 and 632-393.) Furthermore, bifacially retouched and pointed tools could have been used as knives, drills, or gravers. No complete points were recovered from LAn-808. I could classify only four basal sections collected from the surface, includ-

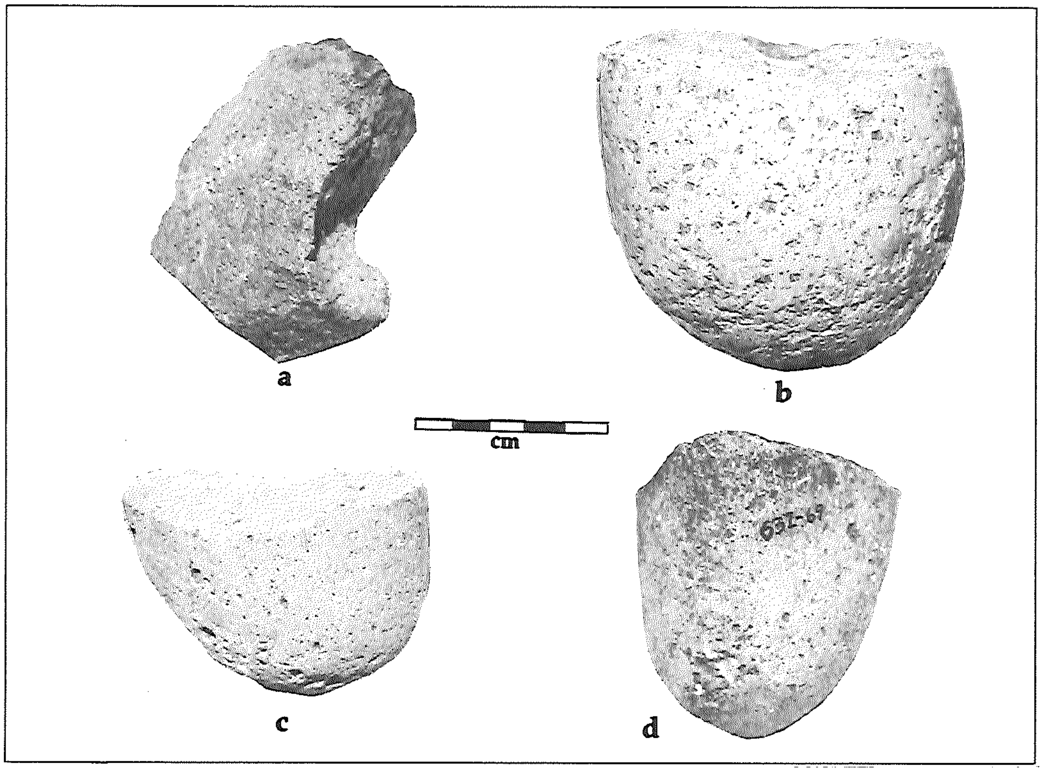


Figure 7.5. (a-c) LAn-808 mano fragments; all recovered from surface; (d) LAn-808 abraded handstone with possible asphaltum residue; unit 5, level 3. Photo M. A. Boxt.

ing one concave based specimen (fig. 7.7a; the others are described below).

Convex Base

2 specimens: 1 chalcedony (632-249); 1 chert (632-393; fig. 7.7b). Point 632-249 is broken on both axes and has a high back, making it triangular in cross section. Artifact 632-393, broken across the short axis, has nearly parallel sides and is lenticular in cross section (cf. fig. 3.5a-m). The specimen from LAn-808 does not show much wear but is possibly chipped at the unbroken end.

Straight Base

1 specimen: fused shale (632-482). Not illustrated (cf. fig. 3.8d). Fractured along its short axis, the fragment presents a lenticular cross section. It flares from the break to the base, suggesting that this was a side-notch point. The basal edge has been thinned by bifacial pressure flaking (see Villaneuva 1981:36, fig. 7.15f).

Unclassifiable Fragments

9 specimens: 6 chert (632-46, 223, 229, 253, 391, 552); 3 chalcedony (632-14, 15, 210). Five tips (fig. 7.7 c-g) and four midsections comprise this category; thus, they remain unclassifiable. It seems likely that 632-46 and 632-552 are parts of the same artifact. They were manufactured from apparently identical material and can be fit together although chips are missing. Investigators found both in unit 4, though at different levels.

Small Bifaces

1 complete specimen: quartzite (632-107; fig. 7.8a).
6 fragments: 1 siltstone (632-414); 1 jasper (632-547); 3 chert (632-303, 373, 549); 1 fused shale (632-55).

Artifacts in this category weigh less than 21 g and are less than 4.50 cm in length. They exhibit percussion and/or pressure flaking on two or more surfaces. All display edge nibbling, indicative of use. All seven tools are manufactured from fine-grain material. However, all specimens in this group have highly varied morphologies suggesting wide functional diversity. Two deserve individual discussion. Tool 632-107 (fig. 7. 8a) is a nearly complete discoid which has percussion flaking around

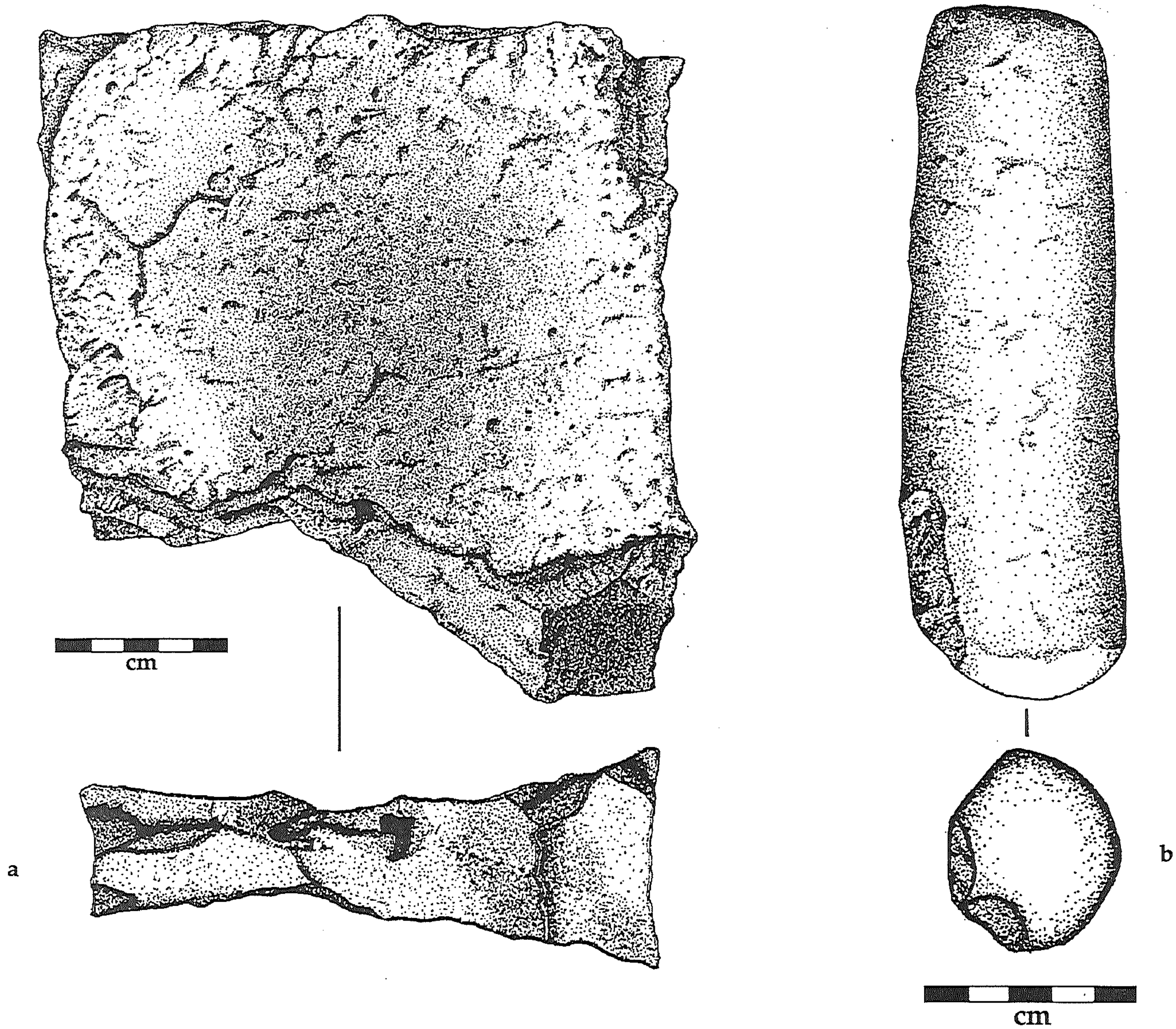


Figure 7.6. (a) LAn-808 sandstone metate fragment from unit 3, level 3. (b) LAn-808 sandstone pestle recovered from surface.

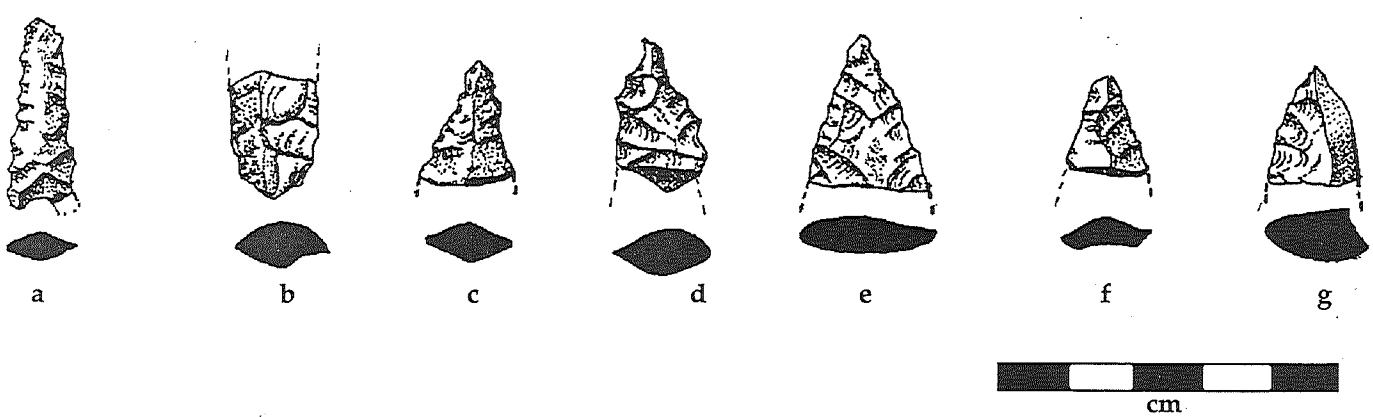


Figure 7.7. LAn-808 projectile point fragments. (a) Chert midsection, possible concave base; surface; (b) chert convex base fragment; surface; (c-g) point tip fragments, unclassifiable.

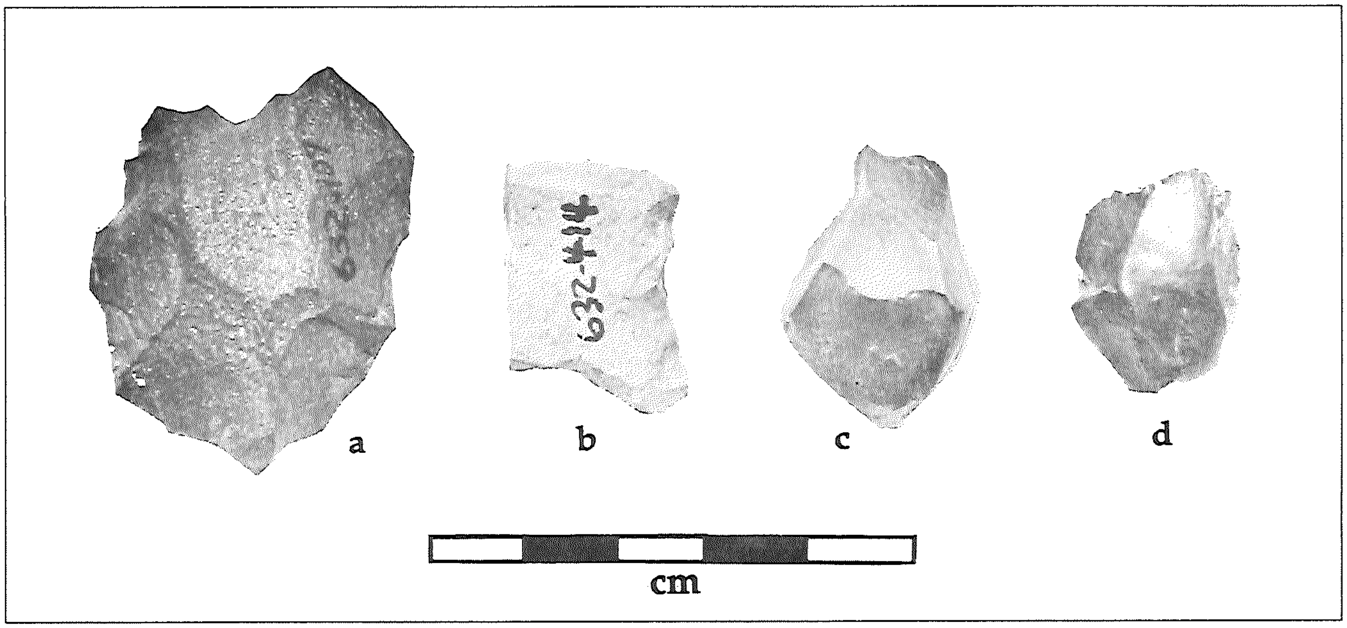


Figure 7.8. LAn-808, small bifaces and expended cores. (a) Quartzite discoidal biface; unit 2, level 3; (b) siltstone blunt point biface; surface; (c) chert expended core; unit 3, level 4; (d) fused shale expended core; surface. Photo M. A. Boxt.

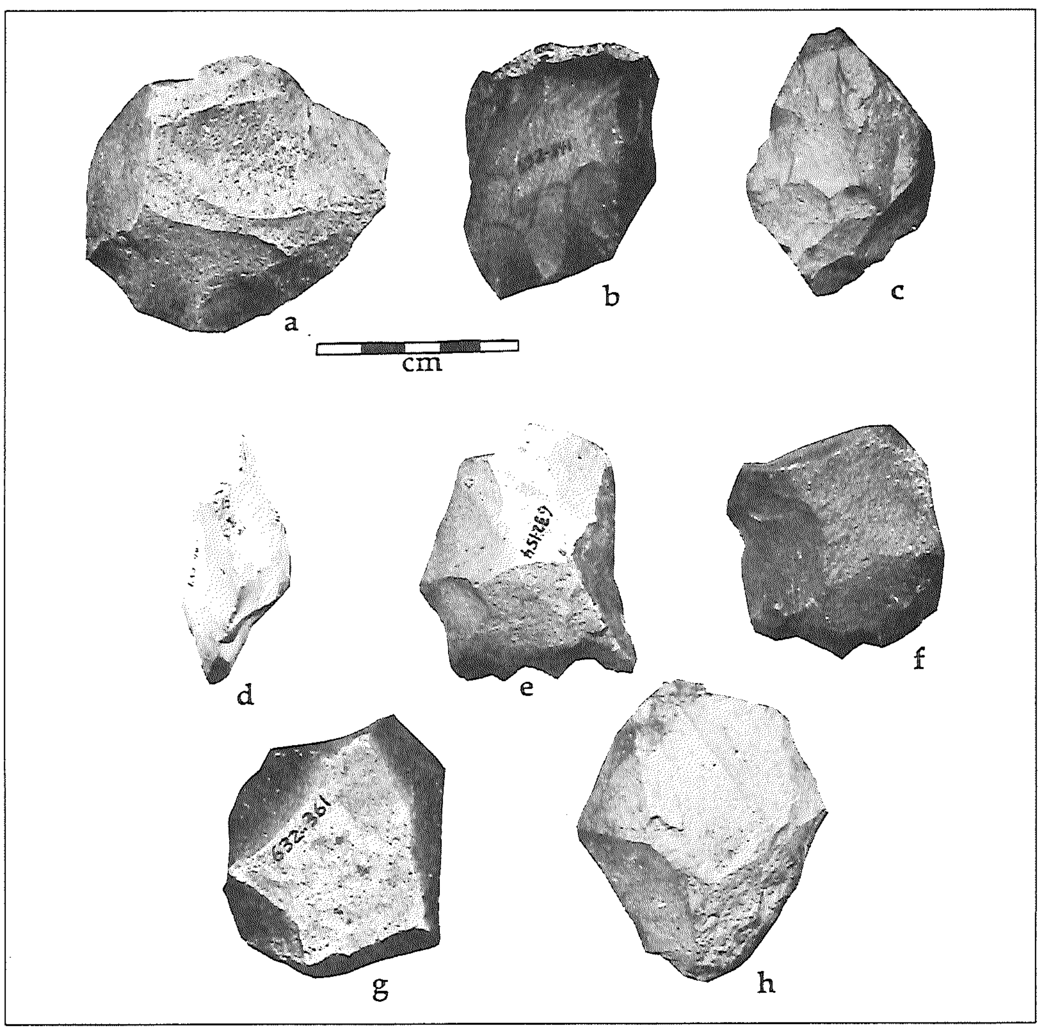


Figure 7.9. LAn-808, large bifaces and unifaces. (a) Andesite core-chopper; surface; (b, c) tuff core-choppers; surface; (d) chert small core-chopper; surface; (e) andesite denticulate edge scraper; unit 3, level 4; (f) andesite scraper with battered end; unit 4, level 1; (g) andesite tabular flake scraper; surface; (h) andesite flake scraper; unit 3, level 4. Photo M. A. Boxt.

both surfaces and is double convex in cross section. The ventral surface shows less flaking, but a spall off one portion mars the original finished surface. A small planar platform rises from the dorsal surface. Wear patterns around one half of the circumference indicate probable scraping or cutting use.

Implement 632-414 (fig. 7. 8b) has been percussion flaked, and pressure retouch on the unbroken edges of one surface formed a blunted point.

Large Bifaces (Core-Choppers)

4 specimens: 2 tuff (632-341, 360); 1 andesite (632-426); 1 chert (632-487; fig. 7.9a-d). Often described as core-choppers (M. Johnson 1980:227), these tools retain little or no cortex, and bifacial flaking produces a sharp working edge. All examples from LAn-808 show evidence of edge attrition. Classified as "large" because of their massiveness, artifacts weigh between 30.7 g and 166.3 g. I included the small chert specimen in this category because of its morphology; nevertheless, size argues for a functional difference.

Small Unifaces (Flake Scrapers)

4 specimens: 3 chert (632-91, 281, 320); 1 fused shale (632-79). This category contains only artifact fragments which weigh less than 10 g. All display percussion and/or pressure flaking on only one surface. Each evidences wear, but their fragmentary nature precludes assigning a specific function. The fused shale specimen is notched and has a longitudinal fracture on one surface, implying that it may be a spall from a larger artifact.

Large Unifaces (Scrapers)

4 specimens: andesite (632-154, 632-1, 632-361, 632-153; fig. 7.9e-h). All four artifacts are large primary flakes which have been struck dorsally to produce at least one sharp edge; the ventral surface varies from planar to slightly convex. All are manufactured from andesite and are approximately the same size, ranging from 5.62 cm to 7.52 cm in length and 4.97 cm to 6.48 cm in width; they weigh between 79.6 g and 100.6 g. Here similarities end.

Artifact 632-1 (fig. 7.9f) appears to be a dual purpose tool. No cortex remains; one half of the dorsal surface has been worked from a steep back to form a sharp edge on which flake scars and polish indicate scraping or chopping. The alternate side is minimally modified and more massive, coming to a blunt point. The blunted terminus displays extensive battering common to hammerstones.

Tool 632-153 (fig. 7.9h) is only slightly modified and is plano-convex in cross section. Dulling and battering around approximately one third of the circumference indicates a cutting or scraping function.

High-backed and triangular in cross section, example 632-154 (fig. 7.9e) has one denticulate edge which exhibits only slight wear.

Specimen 632-361 (fig. 7.9g) is tabular and trapezoidal in cross section. Cortex remains on the large dorsal surface. Percussion flaking around the entire circumference forms sharp edges. The longest edge is nibbled and worn, indicating use.

Expended Cores

3 specimens: 1 andesite (632-52); 1 chert (632-149); 1 fused shale (632-527; fig. 7.8c, d). Small ovoids weighing less than 12.5 g comprise this category. These artifacts have had flakes removed to a point beyond which further removal would be extremely difficult. They are not otherwise modified, nor do they show wear patterns.

Miscellaneous Artifacts

Pipe Fragments

Siltstone (632-2a, b, c; fig. 7.10). The UCLA field class recovered three incised and polished fragments of highly indurated siltstone from LAn-808. Two pieces, 632-2b and 632-2c, fit together. Originally, because of their shape, I assumed that they were bowl rim fragments. However, the small estimated diameter of the whole artifact suggests a large stone pipe (Clement Meighan, personal communication).

Burnett (1944:19, 20) describes elaborate, shell-inlaid tubular pipes approximately this size from illicit excavations along the Malibu coast, but their provenience data,

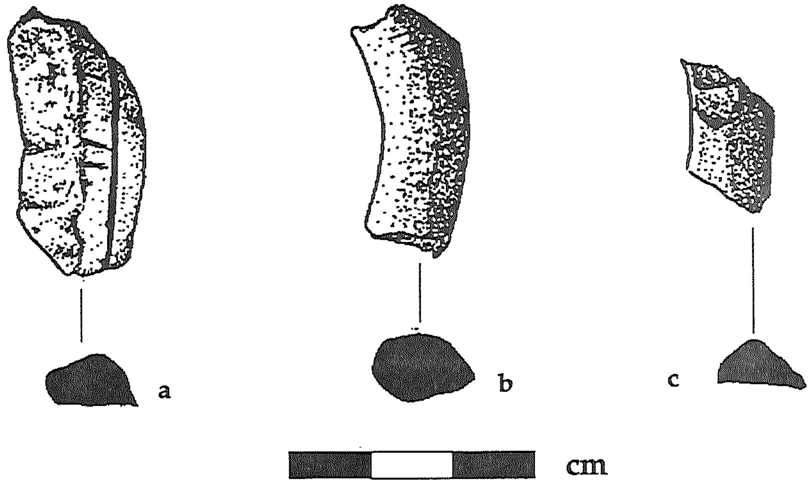


Figure 7.10. Siltstone pipe fragments, unit 1, level 4.

however, are incomplete and not universally accepted (see chap. 1, this vol.). Therefore, I prescribe caution in drawing comparisons with Burnett's sample. Landberg (1965:100) also illustrates steatite pipes from the Malibu area but does not discuss or describe them.

Nevertheless, in well documented excavations, Walker (1951:112) lists tobacco pipes in the Big Tujunga Wash artifact collection; and Meighan and Eberhart (1953:120) report "incised tubes and pipes" from archaeological investigations at San Nicolas Island. Kroeber (1925:564) reports that the average Chumash pipe is about five inches long, tapering from bowl to mouth, occasionally bent at an angle near the middle, and most frequently fashioned of steatite—but does not discuss average diameter so comparisons with the LAn-808 fragments are difficult. Through ethnographic analogy, Kroeber proposes both shamanic and profane uses for North American pipes (ibid.).

Incised Stone Slab

1 specimen: tuff (632-148; fig. 7.11). Archaeologists frequently recover individual incised or engraved stones from southern California sites: these are found as far north as coastal Monterey County. Artifact 632-148 is a tabular fragment of light gray tuff, 1 cm thick, which displays linear incising on both surfaces. Lines on one side are nearly parallel and cross perpendicularly, forming a rectangular grid design (fig. 7. 11b). Incising on the opposite surface also consists of parallel crosshatch lines; however, these intersect obliquely and form a more slanted pattern (fig. 7.11a). The artifact has one concave end with a smooth edge, suggesting that it may have been originally ground to a specific shape.

Incised crosshatch lines are an often-observed motif in southern California rock art. In addition to examples on portable objects such as pipes, bowls, tablets, effigies, and pendants (LAn-225; Bingham, n.d.), researchers find them painted, scratched, engraved, or pecked on boulders and walls at pictograph and petroglyph sites (L. King 1981:36-37). Walker (1951:60, 95) discovered incised soapstone specimens similar to the LAn-808 fragment at the Chatsworth Cairn site and at Malaga Cove, tentatively identifying them as "gorgets." In 1957, Keith L. Johnson excavated LAn-2 in Topanga Canyon and recovered four incised stones exhibiting very much the same crosshatch designs. While Johnson does not speculate on their function, he nevertheless uses incised stones, combined with the increased incidence of mortars and pestles, a greater variety of point types, stone-lined earth ovens, and flexed burials to demark Phase III of the Topanga Complex (Johnson 1966:19). Meighan (1980:113-115) describes an example from the Sierra foothills of Madera County. Meighan speculates that the artifact, manufactured from green schist, may have functioned as a bannerstone or spearthrower weight. Linda King (1981:46) examined similarly incised and scratched tablets recovered from the Great Basin and argues that they and the southern California examples belong to a "single general style." In her study a

b

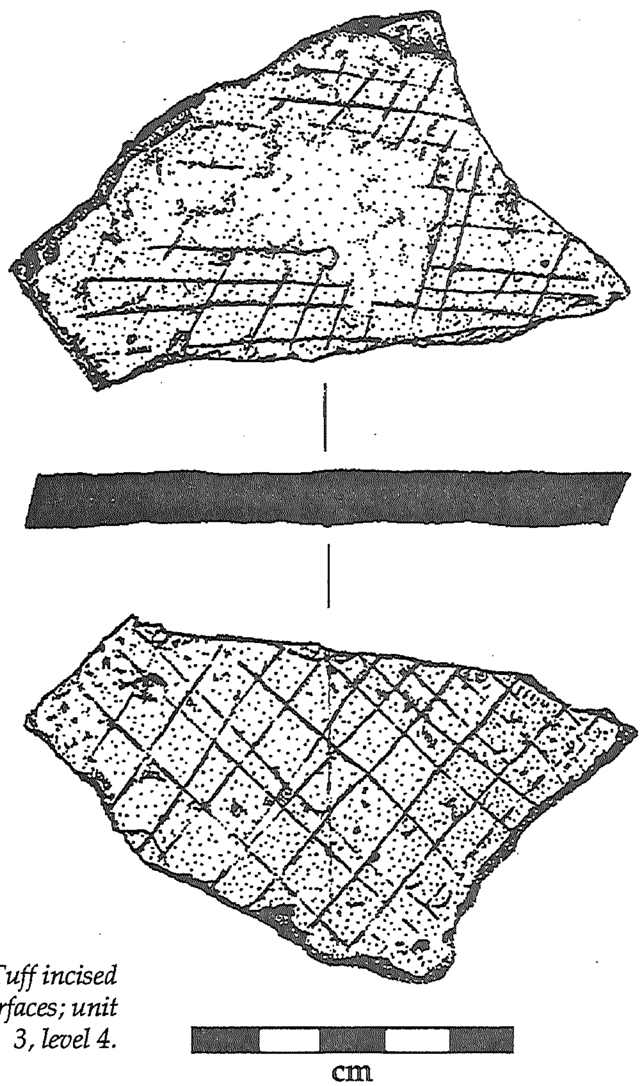


Figure 7.11. Tuff incised fragment, two surfaces; unit 3, level 4.

of over 125 incised stone artifacts, Lee (1981:41-45) proposes three possible uses: healing stones, calendric factoring, or simple notational records. But she concludes that the "apparently random markings" have not yet been definitely attributed to any specific rite or function. A more mundane consideration is that the tablet functioned as a sharpening tool or honing stone. However, the relatively soft lithic material and precise, nonrandom arrangement of the incising make this unlikely. Finally, Meighan (1980:114) points out that although archaeologists find incised stones geographically distributed over a wide area of southern California, no formal typology has been constructed and their function remains an enigma.

Abraded Stone

1 specimen: andesite (632-69; fig. 7.5d). This wedge-shaped andesite cobble fragment is broken across its short axis and is triangular in cross section. One surface of the unbroken end is worn smooth and one longitudinal edge appears pecked. Additionally, a small amount of black residue, possibly asphaltum, remains on the abraded surface.

Unifacially abraded stones, too small to be considered manos, have been reported by M. Johnson at Ven-271 (1980:215), Whitley et al. at the Ring Brothers' Complex (1979:52), Greenwood at SLO-AS-585 (1972:63), and Peck at Zuma Creek (1955:33). However, the morphology of the LAn-808 specimen does not conform to the descriptions of other investigators. At level 3, Malaga Cove, Walker (1951:61) excavated "large asphaltum stained stones . . . such as the historic Indians used in calking their board boat." Furthermore, Kroeber (1976:561) details how the Chumash employed hot stones covered with asphaltum or tar to waterproof the insides of baskets. The possibility that there is asphaltum residue on the artifact's surface suggests that it might have served as such a tarring tool.

UTILIZED FLAKES

The 43 artifacts subsumed within this category vary significantly in size and composition. They weigh from 0.2 g to 124.7 g and include coarse and fine-grained material. Yet, the majority, about 75%, are fine-grained and the average weight per flake is 14.9 g. At LAn-808, I define utilized flakes as unmodified lithic debitage which exhibits "nibbling" along at least one edge, indicating native use. Nevertheless, I must emphasize that edge-wear does not necessarily prove that a flake functioned as a tool. The manufacturing process itself may result in edge abrasion; or, damage may occur after the flake was abandoned (Sheets 1973:215).

LITHIC DEBITAGE

Investigators collected 520 nonutilized waste flakes at the Salsipuedes site (fig. 7.12). All materials, except obsidian, are found locally (Rosen 1979). We assume that Coso was the source for obsidian recovered at the study site (see chap. 12, this volume, for a discussion of the LAn-807 and LAn-808 samples). Chert comprises nearly 50% of the lithic debitage category, and chalcedony represents approximately 25%. Figure 7.13 presents quantitative data for the LAn-808 debitage. Forty-four percent of the waste was recovered from excavation units. Unit 4 provided nearly half (45%) of the excavated flakes, with unit 3 containing the next heaviest concentration (29%). These two units are within parameters delimiting the site's core. Units 2 and 5, having significantly smaller debitage percentages (7% and 17%, respectively), remain outside these boundaries. Likewise, crew members recovered the heaviest concentration of surface collected lithic waste (66%) from the 320 m² which comprise the site's nucleus. Surface collecting quadrants D9, D10, E9, and E10 contain an unusually heavy percentage (27%) of waste material, yet are outside the defined center. I suspect that downslope movement and erosion are responsible for this displacement of debitage from the highest part of the saddle. Table 7.2 presents a materials comparison of chipped stone artifacts and debitage.

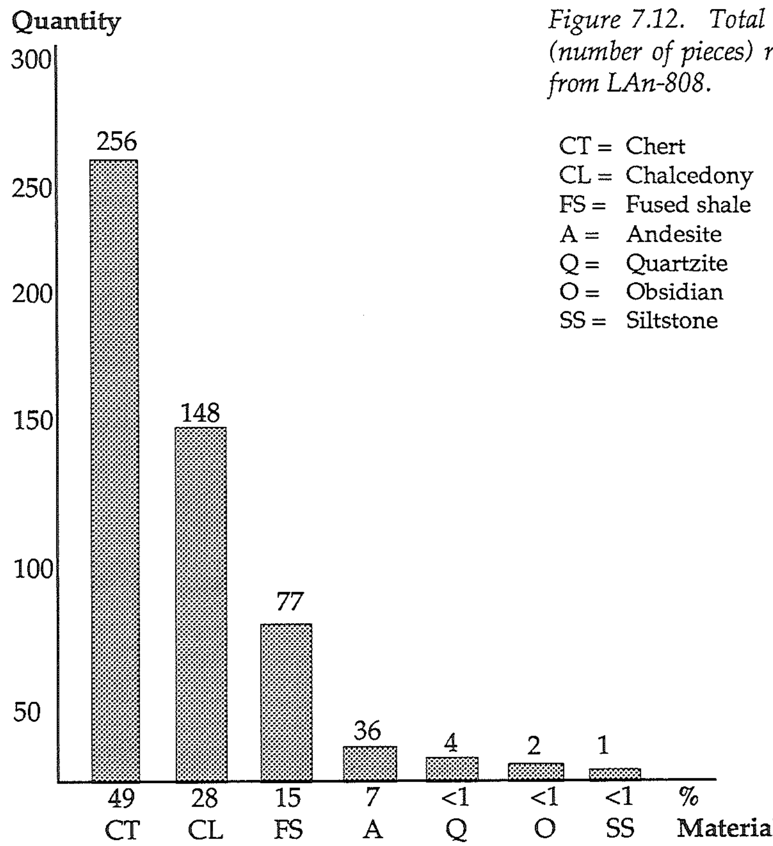


Figure 7.12. Total debitage (number of pieces) recovered from LAn-808.

DISCUSSION AND CONCLUSIONS

Investigations at the Salsipuedes site recovered limited cultural remains spread over a small area with relatively shallow deposition. The five units excavated within the 1,296 m² of surface scatter represent less than 1% of the potential excavation units, if we were to assume that subsurface site boundaries were identical to the surface scatter. Conversely, however, the test pit excavations and auger borings revealed that the subsurface deposit incorporated a much smaller area than that covered by the surface artifacts. The excavated artifacts nevertheless—in combination with the 100% surface collection provide—ample evidence of the kind of artifact diversity traditionally associated with food procuring and processing and stone tool manufacturing activities. Therefore, despite limited excavation and small amounts of cultural remains, tentative conclusions can be drawn concerning chronology, function, and intersite relationships (i.e., with LAn-807 and LAn-1031).

Absolute dates derived from obsidian hydration analysis and relative dates provided by representative artifacts suggest site utilization during the Late Prehistoric or Canaliño period. Hydration analysis of two obsidian specimens from LAn-808 produced dates of A.D. 818 and A.D. 972 (UCLA Obsidian Hydration Dating Laboratory). The obsidian hydration values obtained for neighboring site LAn-807 (A.D. 554-A.D. 1368) indicates that the two sites were at least partially contemporaneous, and this direct dating is corroborated by other lines of evidence. Small, finely chipped projectile points recovered from both sites are stylistically homologous and diagnostic of Late Horizon cultures increasingly dependent on bow and arrow hunting (Elsasser 1978:56).

Additionally, a relationship is implied with the third site excavated in the Three Springs Valley, the Canasta Rockshelter (LAn-1031). High on a hill southeast of LAn-807 and LAn-808, yet clearly visible from them, this rock shelter is believed to be a cache site (see chap. 8, this vol.). Al-

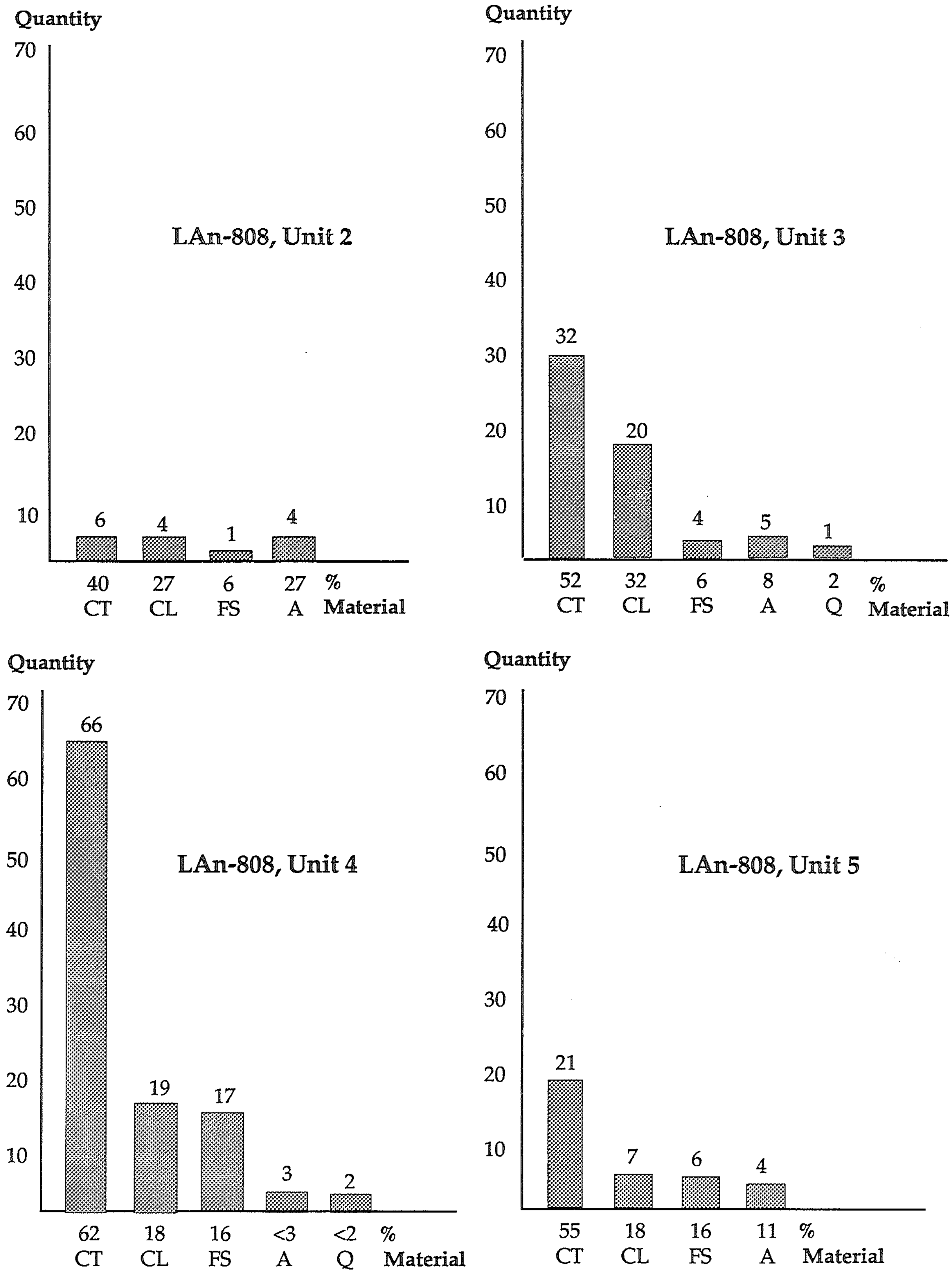


Figure 7.13. LAn-808 debitage quantification (number of pieces) per excavated unit. See figure 7.12 for key.

though LAn-1031 produced evidence of use during the Early Historic period, its excavators also believe it likely that it was functionally associated with the two lower sites during the Prehistoric period. If so, LAn-1031 might have served as the repository for a personal cache, or for items too valuable to leave unprotected at either LAn-807 or 808.

Several interpretations can be examined which might account for the function of the Salsipuedes site. If we attribute special significance to the "unique" artifacts (i.e., pipe fragments and incised tablets), arguing that they are religious or ceremonial, it suggests that LAn-808 may have functioned as a cache for valuables, a curing locale, or even a burial site. Fages describes native use of pipes in burial ceremonies (Priestley 1937:34; Hudson and Blackburn 1980:118-131); however, since no burials were found at the Salsipuedes site, such rituals seem an unlikely function. Harrington states that special stones are "the hotwater bottle of the Indians; it was heated and laid against the paining part" (Lee 1981:38). Moreover, fragmentary or broken artifacts (the majority at LAn-808) often indicate ritualistic destruction. Lack of faunal remains strongly implies that people did not live there. Thus, occupants of LAn-807 or other nearby communities, bereft of such artifacts, may have visited Salsipuedes solely for ceremonial activities. Such an interpretation, while attractive, cannot explain LAn-808's function unless we are prepared to ignore what the full range of artifacts discovered at the site can tell us. In other words, what about the debitage? How can a "burial" site have no burials?

The "ceremonial" designation is a convenient catch-all for unknown functions of whole sites or individual artifacts and is easily invoked when unique artifacts or those of unknown function are discovered. Yet, for an area to be "ceremonial" or "sacred," artifacts typical of secular or "profane" activities (such as debitage) must be absent, and this is clearly not the case at LAn-808. Although we cannot preclude the possibility of some form of ceremonial function for the site, neither should we too readily accept it.

A better alternative explanation of LAn-808's function might be that of a temporary campsite used by different groups over a long time period. Two nearby water sources and the site's elevation make it a perfect point to observe game or intruders. Furthermore, temporary visitors pursuing game and/or seasonal rounds would not have remained on the ridge long enough to develop specialized task loci within the site. Sporadic utilization would explain artifact variety and site depth relative to the small number of collected artifacts. In this case, the pipe and tablet may have had more secular uses. Yet, even at temporarily occupied sites some midden deposit normally develops, and an expectable component of the site deposit at Late Prehistoric sites is shell and animal bone. The absence of such indicators at LAn-808 (see chaps. 10, 11, this vol.) argues against LAn-808 functioning as a habitation site, even for a short period, so we must search for a functional interpretation in yet another direction.

A third interpretation proposes that geographic determinants associated with specific hunting activities influenced not only site function but site location. Situated on an elevated saddle between two streams, the LAn-808 ridge effectively creates a box canyon out of the eastern fork of the Three Springs Valley. This being the case, the archaeological site is strategically located if game were hunted by the hammer and anvil method, by which beaters drive the animals up the valley, into the box canyon, while marksmen wait at the natural trap, i.e., the LAn-808 saddle (Dillon, personal communication). Who might these ancient hunters have been? Probably the inhabitants of LAn-807, who would not only form the "anvil" of the communal hunt, but could also observe animals at a greater distance from LAn-808 than from the other site. The entire range of artifacts recovered from the site then would represent the results of "time passing" activities while the Indians were waiting for animals (e.g., manufacture or resharpening of lithic tools, ritual smoking to ensure good hunting, and possibly caching or ritual burial of the incised tablet either for safekeeping or as an element in some form of hunting magic. As such, LAn-808 seems best interpreted as an extension of LAn-807, a place where some, but not all, Cazador site activities were duplicated yet other activities unique to the Salsipuedes site were also performed.

Southern California archaeology requires further study of interior sites and site associations so that a regional compilation of data can be expanded. The Salsipuedes site, LAn-808, provides an important key to unraveling the prehistoric story played out in the Three Springs Valley, and the Valley itself contributes to the growing body of information that provides a clearer understanding of the culture history of the Santa Monica Mountains.

ACKNOWLEDGMENTS

My sincere thanks go to Brian D. Dillon for offering me the opportunity to write this report and for his encouragement and counsel throughout the endeavor. Also, I am indebted to Matthew A. Boxt for his advice, assistance, and unceasing enthusiasm during the entire enterprise. Elsie Sandefur deserves special recognition for supervising investigations as well as for long hours of work on preliminary artifact sorting, washing, and cataloging. Many thanks to Clement W. Meighan for his consultations and particular help in identifying the pipe fragments. Stephen Williams has my deep appreciation for his aid in lithic analysis. Further thanks go to Mimi Horner for her excellent drawings and to Karen Sapa for her rendering of Bruce Love's original site map. Finally, I extend my deepest thanks to Gregory A. Reinhardt for his many years of guidance, challenge, support, and faith.

8. ARCHAEOLOGY OF LAN-1031, THE CANASTA ROCKSHELTER

Brian D. Dillon and Barbara Beroza

INTRODUCTION

The LAn-1031 site was discovered by Dillon in the fall of 1979, shortly after a major fire had burned through the Three Springs Valley and removed much of the chaparral vegetation. The archaeological site was christened the "Canasta" Rockshelter after abundant basketry fragments (normally rare in Los Angeles County sites) were encountered during later excavations. No artifacts were visible on the surface of the site deposit owing to the amount of roof fall and recently rodent-introduced organic material. This seems typical of most caves and shelters in the area and has probably resulted in some archaeological sites being mistaken for natural features and overlooked. On the first day of examination, troweling towards the rear of the LAn-1031 shelter produced fragments of a very large mussel shell at approximately 30 cm below the modern surface. The roof-fall obscuring the cultural deposit was suspected of also preserving any artifactual material which might be present, and the decision was made to excavate the site.

SITE DESCRIPTION

The Canasta Rockshelter is located on the northern slope of the Santa Monica Mountains at approximately 1580 feet elevation. LAn-1031 is bracketed by two springs that doubtless were important as sources of water during the prehistoric period, one lying approximately 250 m away to the west-northwest, the other to the east-southeast at 170 m distance. The site, in a small natural cave, lies just over a half kilometer southeast of the Ventura/Los Angeles County line and only slightly more than that distance to the east of Ven-12, the large and important Canterbury Cave site. Dominating the Three Springs Valley, LAn-1031 rests approximately 150 m directly above LAn-807 and 808 and can be seen from either of the two lower sites (fig. 8.1) as well as from the Ventura Freeway from Triunfo corner to the Agoura overpass. The shelter affords a good view of the entire Three Springs Valley and could have served as an important prehistoric game-spotting location since at the time of our excavations game animals could be spotted from the site over an area incorporating several square kilometers. LAn-1031 also affords a spectacular view of the Russell Valley and what is now Westlake Village: certainly

Figure 8.1. Looking south toward the mouth of the LAn-1031 rockshelter. Note backdirt pile below lip, burned vegetation from 1979 fire. April 1980. Photo B. D. Dillon.

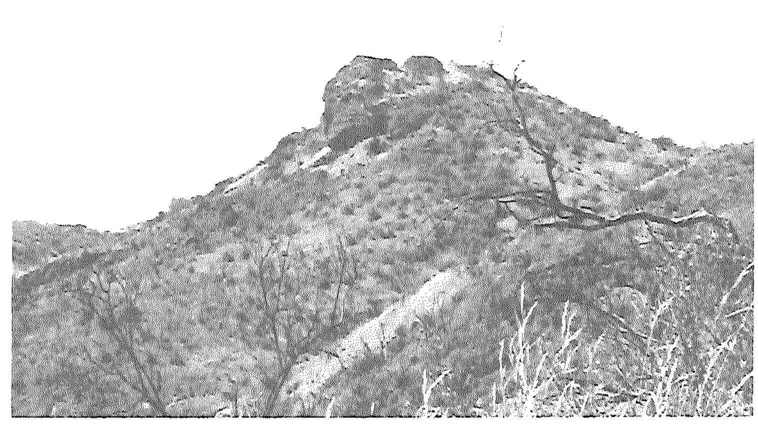


Figure 8.2. Excavating the Canasta Rockshelter. B. Beroza, C. Singleton, A. Troxel, and A. McNulty, left to right; note low ceiling. Photo B. D. Dillon.

the Late Prehistoric site that may equate with the ethnohistoric village of Hipuc, obliterated with the construction of Westlake Village, would have been visible from the LAn-1031 rockshelter. Farther to the northwest, the Conejo corridor can be seen, as can a large portion of the modern city of Thousand Oaks.

The Canasta Rockshelter is a natural enlargement of a crack or horizontal zone of weakness on the north-northeast face of an exposed and eroding volcanic plug just above the more gradually sloping detrital shoulder of the ridge it surmounts. The ceiling is over 2 m high at the shelter opening, but averages 1 m above the floor within as the floor slopes upward steeply to the southwest (fig. 8.2). The opening is roughly 12 m across from east to west, with a column near its mouth on the east side of the shelter. The shelter extends 8 m into the hillside (fig. 8.3) and has a total surface area of roughly 80 m^2.

The archaeological deposit at the time of discovery was found to extend only slightly beyond the drip line of the shelter, as the cave entrance is bordered by a sheer drop of approximately 3 m, with no talus. Access to the shelter was gained only by a steep trail entering its northwest corner. The rockshelter's roof is quite weathered: ongoing weathering has no doubt enlarged the shelter since its time of abandonment and has contributed much gravelly rooffall to the archaeological and post-abandonment deposit as well.

EXCAVATIONS

In December 1979 a trail was cut along the ridge system leading from neighboring sites LAn-807 and 808, and a temporary field camp was built inside the Canasta Rockshelter. LAn-1031 was excavated in two phases: first, with UCLA graduate and undergraduate student volunteers, who lived in the cave for over a week during the 1979-1980 Christmas holidays, and later with Dillon's 1980 Spring UCLA Field Class. Approximately 75 man-days were devoted to the recording and excavation of LAn-1031 during the preliminary investigations conducted in December 1979 and during the activities of the field class there in April and May 1980.

The LAn-1031 rockshelter area was gridded into 2 m squares for excavation, each unit identified by an alpha-numeric coefficient with the numerical axis running east-west and the alphabetic axis running north-south. One of these units (C2) was further subdivided into 10 cm^2 sub-units for more accurate horizontal provenience control when it was found to contain abundant basketry fragments. Each unit was excavated in arbitrary 10 cm levels, using surface elevation at the southwest corner stake of each unit as datum. The use of arbitrary levels was necessitated by bumps and dips in the surface of the shelter and the instability of the deposit, which made following the original surface contour unfeasible. All dirt removed was sifted through 1/8 inch screen. Cultural materials were bagged and taken to the laboratory for identification and analysis. All organic materials, including faunal and shell remains, were collected from all units.

Seventeen complete or nearly complete 1 m^2 units and seven additional fractions of 2 x 2 m units (constrained in size by the undulations in the shelter's wall) were excavated between December 1979 and May 1980, and five 2 x 2 m units were left unexcavated (E5 through E7, D5 and B3) as a means of preserving some portion of the original site deposit. The excavation sample totaled approximately 22 m^3, or roughly 80% of the LAn-1031 deposit (fig. 8.3). With a total of 140 artifacts recovered from the site (excluding recent historical artifacts, debitage, utilized flakes, and ecofacts) a yield ratio of 6.36 artifacts per cubic meter

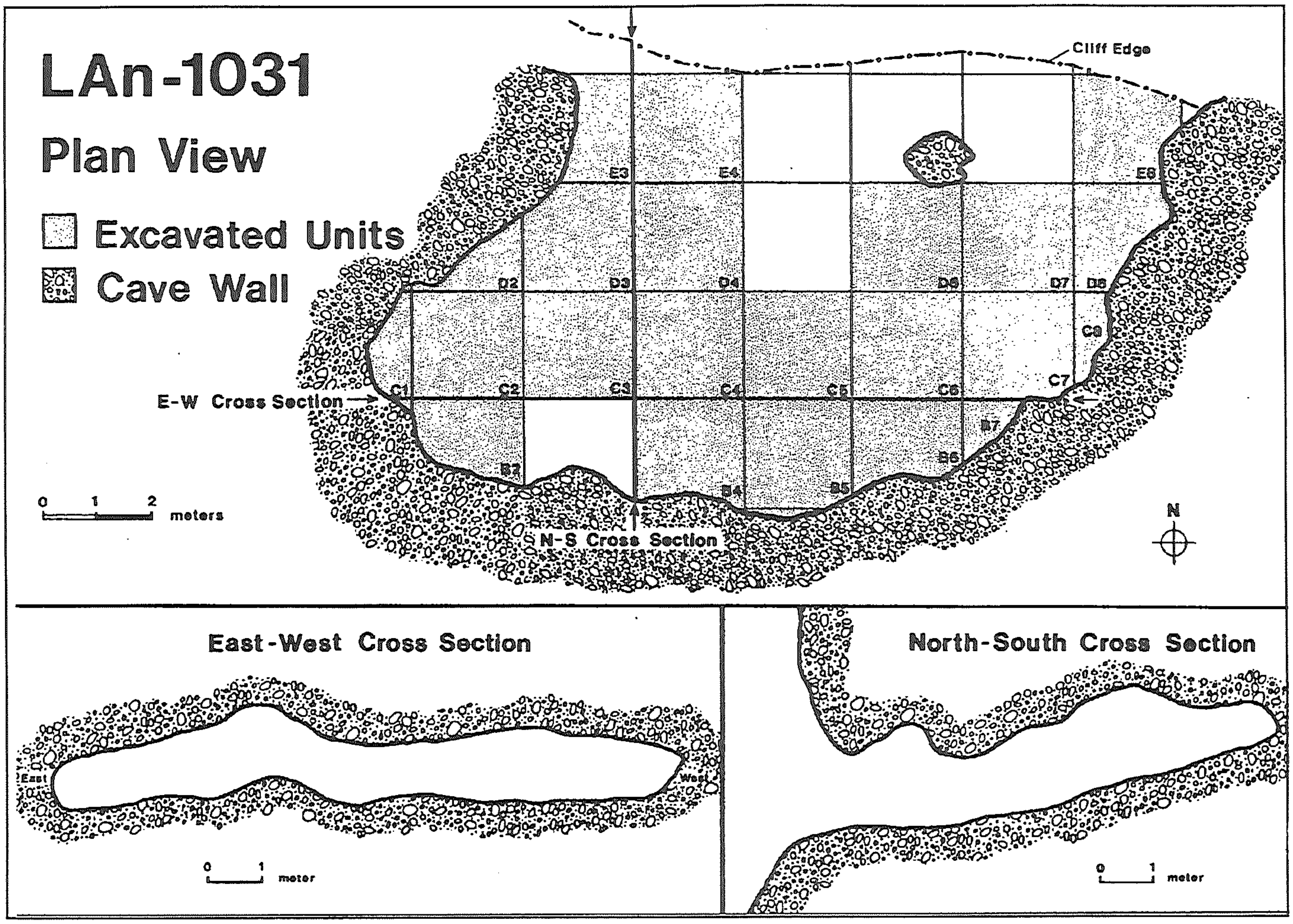


Figure 8.3. The Canasta Rockshelter, plan and profile views.

excavated was obtained. This ratio, while not high, nevertheless indicates a higher yield than that obtained for the LAn-807 site and is nearly triple that of LAn-808.

Although searched for, no natural stratigraphy was found in the LAn-1031 deposit. And, although arbitrary stratigraphic segregation resulted in the majority of artifacts being discovered below 30 cm, the normal law of superposition (i.e., earliest artifacts in deepest levels) was found to be inoperable at the site. The very latest artifacts (Mission period glass trade beads), for example, appeared in some of the lowermost excavated levels, and this probably indicates intentional burial for concealment by the rockshelter's users.

While the archaeological deposit contains some decomposed and much recent organic material, it is not a true "midden" in the archaeological sense. It consists primarily of roof fall, fragmented bedrock from the cave floor, aeolian dust and silt, animal droppings (the bulk of this is jackrabbit), and rodent nest materials; admixed with this natural cave deposit are both imperishable and normally perishable cultural remains. The site deposit is very loose and rocky and subject to considerable dislocation from human and rodent activity. The average depth of the deposit exceeded 30 cm only in isolated pockets in the southwest corner of the shelter and along portions of the western wall near its opening; the deepest of these cracks reached 90 cm below the present surface. Although preservation was excellent in parts of the shelter, the deposit was not entirely dry. Water seepage through faults in the bedrock walls was noted after rains during our periods of fieldwork in the winter months.

NONCULTURAL DEPOSIT CONSTITUENTS

Hundreds of small pieces of wood, twigs, and vegetal fibers were recovered and cleaned and analyzed in the lab in the hopes that basketry fragments might be encountered. Wood was found in units C2, C4, B4, E3, D4 and D2; most specimens were rodent gnawed. In some cases these fragments appeared charred, but whether remnants of campfires, recent or ancient, or simply rodent scavenged after natural brushfires could not of course be determined. A very few sections of cane were found, sometimes burned, and it is tempting to speculate that in some cases these might have been portions of arrow shafts, but their extremely fragmentary condition precludes a firm identification.

All scat of any kind was collected and bagged for two reasons: we hoped to be able to determine the extent of site disturbance through natural agency, and we hoped to be able to identify, if present, human fecal remains or "coprolites." Quantitatively, rodent scat was found to be the most abundant cave constituent after roof fall, and its sheer volume suggested that human use of the cave probably was never so concentrated as to drive the animal residents out for anything more than short periods of time. This somewhat obnoxious collecting task did pay off, however, with the discovery of the first archaeologically provenienced human coprolites discovered in Los Angeles County (chap. 9, this vol.).

POSTDEPOSITIONAL DISTURBANCE

The LAn-1031 deposit, unlike most Los Angeles County sites, was minimally disturbed by recent human activity. Only three recent historic artifacts (table 8.1) were discovered in the cave, all within just two of the 29 quadrants within the shelter and all within the uppermost 30 cm of deposit. It is easy to see these artifacts as deriving from a single visit by a single individual in the five years prior to the beginning of our investigation at the site. Thus we may conclude that the Canasta Rockshelter offered an essentially pristine deposit without the usual traces of recent pot hunting or illicit excavations characteristic of most Los Angeles County archaeological sites.

The Canasta Rockshelter's deposit, nevertheless, was badly mixed, not through cultural but through natural agency of "faunalturbation." Large amounts of rodent scat were encountered in every quadrant and nearly every excavated level, as deep as 80 cm below surface. There was also some mummification of faunal remains; for example, in unit D3 at 60-70 cm below surface, desiccated rat hindquarters were found. This of course indicates endemic small-scale burrowing, while the limited amounts of coyote scat recovered probably indicate periodic localized site disturbance of larger scale. In addition to providing evidence for postdepositional disturbance, the excavated animal fecal materials also constitute an important caveat against the erroneous impression that archaeological sites, if left to themselves (a standard bureaucratic "do nothing" approach), will somehow be preserved in a kind of steady-state condition of nondisintegration.

INORGANIC ARTIFACTS: LITHICS

Relatively few lithic artifacts were recovered from the rockshelter and little debitage was present. One projectile point, one knife, a perforator, and an arrowshaft straightener constitute the most interesting and immediately identifiable of the lithic artifact inventory. Two beach pebbles—one with worm holes and a blackened surface, the other used as a tarring pebble—also were recovered. In addition, 6 retouched flakes, 3 utilized flakes, 5 cores and core fragments, and 7 quartz crystals were found. Sixty-six fragments identified as debitage and lithic material exotic to the deposit were also recovered.

CHIPPED STONE ARTIFACTS

Projectile Point

Cat. No.	629-766
Description	Chert, leaf shape, convex base
Provenience	D6 20-30 cm
LxWxTh, cm	4.3 x 1.8 x 1.1
Wt., g	7.9

The Canasta Rockshelter projectile point (fig. 8.4:2) is leaf-shaped, generally symmetrical, but not finely finished; its thickness is suggestive of an alternative interpretation as an almost-finished preform. This complete specimen is convex based and similar in style to common Late Prehistoric period points in Los Angeles and Ventura counties, large examples being normally of chert and small ones of fused shale.

The Canasta Rockshelter point is similar to Curtis's (1963:13-14; pl. 2a) Type 2 Narrow Leaf type, only larger in size, and possibly identical to King, Blackburn, and Chandonet's (1968:66) Type 2A point from the Century Ranch sites. The Century Ranch points have rounded bases, are elongate, and have slightly curving sides, but unfortunately are not identified as to material. A very close similarity also exists between the Canasta shelter point and Susia's (1962:167; pl. 10) Leaf Shaped, Convex Base projectile point type. In comparison with bifaces from the Conejo Rockshelter (Ven-69), the Canasta specimen in terms of size falls between the projectile point and knife categories. It is similar to Glassow's (1965:37) Convex Based Point type, except for larger dimensions (half again as long and twice as thick). This being the case, by definition of a different tool type for the Conejo shelter (ibid.:38), the Canasta example could perhaps also be identified as a "knife" because Glassow's Convex Based Knife category (ibid.:fig. 3tt) is also quite similar but for its slightly larger size. The Canasta Rockshelter specimen is also similar to Rosen's (1978:55-56, 58) Type XII, Convex Base, and to those recovered from Ven-122 (Whitley, Schneider, Simon, and Drews 1979:93-96) but for its lack of serrate edges and larger size.

Biface Knife

Cat. No.	629-705
Description	White chert with basal asphaltum hafting remnants
Provenience	C6 60-70 cm
LxWxTh, cm	5.6 x 2.8 x 0.9
Wt., g	12

The LAn-1031 knife (fig. 8.4:3) is bifacially retouched from a thin flake and slightly curved along its long axis. Originally it was socketed (presumably in a wooden handle) up to about a third of its length from its irregular base; this area is discolored and a small remnant of the asphaltum used as an adhesive remains attached. The Canasta Rockshelter knife was probably hafted in a fashion similar to a series of knives without provenience from the Malibu coast (Burnett 1944: pl. XLIV; see also Landberg 1965:32). The LAn-1031 specimen is similar to Glassow's (1965:37) Medium-sized Point or Knife from Ven-69, except that the Canasta example is up to twice the size of those from the Conejo Rockshelter and more finely finished. Interestingly, one of the Ven-69 specimens, the only one of chert, also had asphaltum adhering to its base for aid in hafting.

The LAn-1031 knife is similar to but much more "knife-looking" (i.e., symmetrical and broad) than specimens from Ven-271, a site on the north side of the Russell Valley visible from LAn-1031 and excavated by M. Johnson (1980:232-239), including both Biface Knives (588-1414) and lozenge shaped artifacts identified as projectile points. It is also similar to a specimen illustrated by Prichett and McIntyre (1979:46-47) from Ven-65, a Millingstone site, except that the Canasta example is smaller. King et al. (1968:64) illustrate an Expanding Base Knife from the Century Ranch sites, narrower than the Canasta example and unfortunately without precise measurements.

Table 8.1. Recent Historic Artifacts from LAn-1031

Cat. No.	Object	Provenience	Depth, cm
629-664	Paper cigarette butt	C5	10-20
629-678	.22 shell casing	C5	30-40
629-721	1974 copper penny	C7	20-30

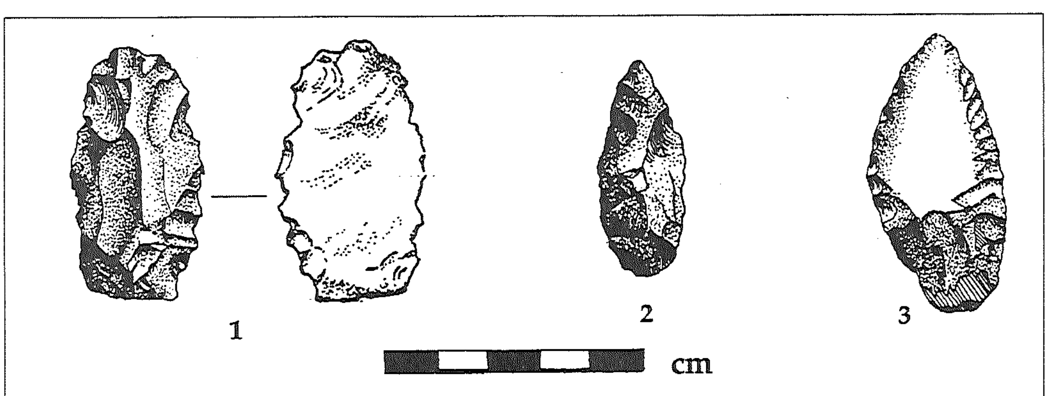


Figure 8.4. Chipped stone artifacts from LAn-1031. (1) Scraper; (2) projectile point; (3) biface knife.

Flake Scraper

Cat. No.	629-103
Description	Unifacially worked cherty siltstone
Provenience	C2 40-50 cm
LxWxTh, cm	5.1 x 2.8 x 0.9
Wt., g	14.5

This artifact (fig. 8.4:1) is an elongated flake-scraper or simple, two-edged unifacial knife which exhibits on one side the flattish, slightly concave surface characteristic of core-struck flakes and on the opposite side, the heavily parallel-scarred surface typical of the outer core's surface. Light retouching has been done around the tool's periphery on three sides so that an appearance of intentional shaping has resulted, and some edgewear is discernible on its concave surface. The Canasta specimen is a very fine example, at least by comparison with flake scrapers from other Santa Monica Mountains collections which are usually amorphous in shape (cf., King, Blackburn, and Chandonet 1968:61).

Perforator

Cat. No.	629-116
Description	Fused shale
Provenience	E3 30-40 cm
LxWxTh, cm	2.6 x 1.7 x 0.7
Wt., g	2+

This small tool has a single pointed end and is slightly less than twice as long as it is broad. It was pressure chipped from a thin flake and presumably used as an awl or hand drill for boring holes in wood or leather. No systematic classification of perforators yet seems available for Santa Monica Mountains sites, and it is probable that many "retouched flakes" at previously excavated sites are actually perforators.

Natural Basal Blades

Blades are stone tools normally quite thin in cross section, with a length at least twice their width. Frequently their sides are parallel, and not uncommonly they assume the form of flattened prisms. Blades can be struck from prepared cores or detached through indirect pressure; a complete, usable tool results without any need for retouch. Core-struck blades in southern California, however, are comparatively rare, probably because the core preparation involved and the specialized nature of the detachment process is better suited to non-local lithic materials such as obsidian. Local materials used in prismatic blade manufacture, such as siltstone or cherty siltstone, are so soft that blades made from them are suitable only for light use.

In some Los Angeles and Ventura county archaeological sites, however, basalt or "fine-grained volcanic" blades are reported that are frequently two to three times the size of blades made of other materials such as chert. Seven of these blades (table 8.2) were found inside the LAn-1031 rockshelter, each one in a different quadrant, all near the middle of the shelter, in depths from 30 to 100 cm.

Comparative material for these is not abundant, yet five basalt blades from the Conejo Rockshelter (Glassow 1965:33-34; fig. 3L), one from Ven-125 (Wells 1978:159), one from LAn-807 (figs. 3.10c, 3.19d), and one from LAn-669, the Daon Site (Murray 1982:62-65, 164) are possibly related to those found at LAn-1031. A better comparative collection of blades from the Ring Brothers site complex (Ven-535-537) has been described by Whitley et al. (1979:80-89; fig. 24). This collection incorporates 47 specimens of which 8 are of either basalt or "fine-grained volcanic rock." The only one of these illustrated (ibid.: fig. 24, #602-581) is identical to the LAn-1031 specimens. It is tempting to see the Ring Brothers blades—made from other materials such as chert, siltstone, or fused shale—being patterned after the basalt/volcanic blades. Even more to the point, it is our opinion that in some, if not most, cases such "volcanic" blades are naturally produced and are "artifactual" only in the sense that they are intentionally collected and used without modification.

Upslope from the Canasta Rockshelter's opening were discovered natural outcrops of parallel-fractured, fine-grained volcanic rock, either basalt (black) or rhyolite (reddish). The parallel fracture produces thin, elongated rocks ranging in shape from rectangular to prismatic, the latter ranging in length from 5 to 15 cm, in width from 1 to 5 cm, and in thickness from 0.5 to 1.5 cm. The Canasta Rockshelter site's prehistoric Indians obviously took advantage of these natural blades which could simply be picked up off the mountainside without any manufacturing necessary. It is also likely that

Table 8.2. Natural Basalt Blades from LAn-1031

Cat. No.	Provenience	Depth, cm	Dimensions, cm LxWxTh
629-090	E3	40-50	4.6 x 3.6 x 1.3
629-092	D3	40-50	1.8 x 1.3 x 0.4
629-094	C2	30-40	2.6 x 2.4 x 1.0
629-095	C2	30-40	9.5 x 3.7 x 1.8 (Rhyolite)
629-111	C3	40-50	3.8 x 3.5 x 0.7
629-669	C5	20-30	Small fragment
629-814	D6	90-100	Small fragment
629-847	D7	50-60	Small fragment

blades similar to those found at the Ring Brothers site(s) may have derived from the LAn-1031 source or one similar to it, but not yet discovered, in Ventura County.

Fused Shale Blade

Cat. No.	629-08
Description	Blade fragment
Provenience	E3 40-50 cm
LxWxTh, cm	1.8 x 1.5 x 0.4
Wt., g	1.1

As opposed to the several naturally occurring basalt blades, only a single example of an intentionally core-struck fused shale blade was recovered from the Canasta shelter; it is similar to the LAn-807 specimen (fig. 3.10a). The best comparative material available for this artifact again comes from the work at the Ring Brothers site(s) where one of the largest collections of blades and blade-like tools so far discovered in the Los Angeles/Ventura County border area is described by Whitley et al. (1979).

Miscellaneous Chipped Stone

At LAn-1031 comparatively little lithic waste was found, yet enough to indicate that some flintknapping was going on, but only of the most casual nature. Local chert was the favored material used for chipping, although a greater number of utilized flakes were of fused shale than of any other material. It is interesting to note the high proportion of expended cores (table 8. 3) to debitage, which indicates that cores were being introduced into the shelter without being reduced there. The explanation for this may be as simple as flaking taking place at the mouth of the shelter (where the light is certainly better than inside), with subsequent disappearance of most debitage downslope, or as complicated as cores being brought to the shelter from nearby sites such as LAn-807 and 808 for some arcane and possibly ritual purpose.

GROUND STONE ARTIFACTS

The ground stone artifact component at LAn-1031 was minimal, represented by only two steatite artifacts. Completely absent in the Canasta Rockshelter are utilitarian artifacts of ground stone, such as manos/metates or mortars/pestles, which are expectable either at habitation sites or sites at which females are presumed to have resided. Manos/metates and/or mortars/pestles are, of course, found at the other Three Springs Valley sites (LAn-807, chap. 3; LAn-808, chap. 7) and at rockshelters in the vicinity of the Three Springs Valley (Ven-12, Rigby, personal communication; Ven-15, Kowta and Hurst 1960; Ven-69, Glassow 1965), which makes their absence at the Canasta Rockshelter all the more compelling. Possibly females were excluded from participation in the use of LAn-1031 in prehistoric and early historic times.

Steatite Shaft Straightener

Cat. No.	629-101
Description	Arrowshaft straightener
Provenience	C2-10 20-30 cm
LxWxTh, cm	6.3 x 5.5 x 1.9
Wt., g	114.6

A steatite arrowshaft straightener (fig. 8.5:1), possibly manufactured from a broken bowl fragment, was recovered from LAn-1031. Shaft straighteners have a wide distribution in southern California; Chumash examples, including some with multiple grooves, are discussed by J. P. Harrington (1942). Eberhardt (n.d.:175) believes that shaft straighteners diffused to California from the greater Southwestern area sometime after AD 1000, with a "best guess" dating of AD 1300 and afterward. Glassow (1965:53-54) notes that shaft straighteners occur in southern California's coastal area in small numbers, normally one or two per site, and this pattern is borne out by the Three Springs Valley evidence.

Another steatite shaft straightener was found in the LAn-807 site just downslope from the rock shelter (chap. 3, this vol.). This artifact type is also represented at Ven-12, Canterbury Cave, a short distance west of the Canasta Rockshelter (Rigby, personal communication); at Ven-70 (Leonard 1966:228) in the Potrero Valley; and at Bower's Cave (Elsasser and Heizer, 1963:29-30). The LAn-1031 artifact is similar to an example found in the Conejo Rockshelter (Ven-69, Glassow 1965:46) except for its larger size. Other comparative examples, obviously made from steatite bowl sherds, have been recovered at LAn-52, the Arroyo Sequit site (Curtis 1959:56); Century Ranch (King, Blackburn, and Chandonet 1968:89); and level 4 of the Malaga Cove site (LAn-138, Walker 1951:64). Not all specimens are of steatite: an unusual shaft straightener of volcanic tuff is reported at Ven-261 by Prichett and McIntyre (1979: 93).

Steatite Sherd

Cat. No.	629-903
Description	Modified fragment
Provenience	D8 70-80 cm
LxWxTh, cm	5 x 3.9 x 0.4
Wt., g	7.4

This artifact is probably a bowl fragment or sherd, although no indication of a rim can be found. Steatite sherds are comparatively common at village sites on the coast—and especially so in the Channel Islands—but are comparatively rare in the interior. The material itself is of quite restricted distribution. Two main sources were available, the first (Holmes 1919:114-115) on Catalina Island, controlled by the Gabrieliño during the Late Prehistoric period, and the second in the Sierra Pelona of northeastern Los Angeles County (Landberg 1980), probably controlled by the "Serrano" or the Alliklik. Steatite bowls or vessels, once broken, were "recycled," and their sherds or fragments were apparently traded into and throughout the interior because of their value as a source of raw material for beads, pendants, and ornaments. Consequently, the steatite fragment from LAn-1031 can be seen as raw material in storage against the time when it will be converted into some other artifact form, possibly by downslope residents at LAn-807 where other steatite fragments were found (chap. 3, this vol.).

MISCELLANEOUS LITHIC ARTIFACTS

Tarring Pebble

Cat. No.	629-894
Description	Disk-shaped with slight trace of asphaltum on edge
Provenience	D8 60-70 cm
LxWxTh, cm	4.4 x 4.2 x 0.9
Wt., g	32.4

Tarring pebbles were used to spread asphaltum over basketry, wood, and shell artifacts for the purposes of either waterproofing or gluing. Tarring pebbles are found as early as level 1 of the Malaga Cove site (Walker 1951: fig. 12), and perhaps equally early in the interior. Kowta and Hurst (1960:209) discovered 1 specimen in the Triunfo Rockshelter (Ven-15), and Susia (1962:171-172) recovered 4 large "tar stones" and 68 smaller tarring pebbles from the Soule Park site (Ven-61). Curtis (1963:61) recovered 21 specimens from the Arroyo Sequit site; Glassow (1965:44) describes 5 examples from the Conejo Rockshelter; Leonard (1966:228) recovered 2 from Ven-70, an interior Santa Monica Mountains site; and Wells (1978:170) identifies 2 possible tarring pebbles from Ven-125, a late period open site in the upper Medea Creek drainage, despite the fact that no asphaltum was remaining on them. Rosen (1978:81) reports two additional specimens from Ven-294, a nearby site with both early and late components, noting that "quantity of tarring pebbles increases through time in Chumash sites and reflects the increased usage of asphaltum in the later period."

Charmstone

Cat. No.	629-1009
Description	Siltstone beach pebble with worm holes
Provenience	D3 27 cm
LxWxTh	7.6 x 4.4 x 1.4
Wt., g	60.2

Table 8.3. Cores, Flakes, and Debitage from LAn-1031

Cat. No.	Material	Provenience	Depth, cm	Dimensions, cm LxWxTh	Weight,g
Cores and Core Fragments					
629-124	Chalcedony	D3	50-60	4.0 x 3.5 x 2.6	42.2
629-889	Chalcedony	D8	50-60	- - -	20.0
629-135	Chert	D2	30-40	1.3 x 0.7 x 1.4	0.3
629-885	Chert	D8	40-50	- - -	14.9
629-735	Chert	C7	40-50	- - -	23.3
629-756	Fused shale	C8	40-50	- - -	15.1
629-107	Fused shale	B2	40-50	3.6 x 2.5 x 1.5	10
Utilized Flakes					
629-103	Chert	C2	40-50	5.1 x 2.8 x 1.1	-
629-708	Chert	C6	60-70	- - -	1.1
629-733	Fused shale	C7	40-50	- - -	18.7
629-844	Fused shale	D7	50-60	- - -	9.4
629-890	Fused shale	D8	50-60	- - -	14.5
629-892	Fused shale	D8	60-70	- - -	11.9
629-109	Quartzite	C3	40-50	5.1 x 4.1 x 1.5	21.2
629-696	Chalcedony	C6	30-40	- - -	10.9

Debitage	Material	No. Pieces	Weight, g
	Chert	32	160.3
	Chalcedony	19	72.3
	Fused shale	6	9.8
	Andesite	5	44.8
	Quartzite	4	75.9

This object (fig 8.5:2) is a flattish siltstone beach pebble or cobble with naturally rounded edges. It features several marine worm holes bored into its surface and one entirely through it. Similar natural cobbles are found along the Malibu coast, in fact on the beaches immediately adjacent to Malibu Creek and Arroyo Sequit. Similar worm-bored stones are not reported from interior sites, and the LAn-1031 example seems unique at present. "Charmstones," unusually shaped or colored natural pebbles or cobbles, are of course known from sites on both the Malibu coast (the Arroyo Sequit site, LAn-52 [Curtis 1959:54, 60], produced a cache of eight unpainted and unmodified pebbles) and the Channel Islands (Meighan, personal communication). The shape and size of the Canasta specimen would lend itself to suspension, possibly as a pectoral or ornament, if a decorative function is inferred. Similar artifacts identified as "amulets" are cited from Santa Barbara County, albeit intentionally manufactured (Grant 1964:19; pl. 14a).

Painted Rock

Cat. No.	629-902
Description	Flat piece of chalcedony with traces of red pigment
Provenience	D8 70-80 cm
LxWxTh, cm	5.4 x 3.1 x 0.6
Wt., g	18.7

Other small painted rocks are known from Ven-15 (Kowta and Hurst 1960:209), LAn-341 (Meighan 1969), and Ven-69 (Glassow 1965). The example from the Triunfo Rockshelter was painted red, while that from the Conejo Rockshelter (Glassow 1965:47) was a quartzite cobble, abraded and painted with a faint black band. Walker (1951:65, 67) describes 9 specimens of painted stones from the Malaga Cove site's level 4; Peck (1955:54; pl. 20) notes 3 from the Zuma Creek "A" site; and Wallace et al. (1956:17) describes 1 from the Little Sycamore site. The Arroyo Sequit site (Curtis 1959) produced a red-painted pebble and an incised and painted stone. Painted stones range from quite elaborate (Malaga Cove)

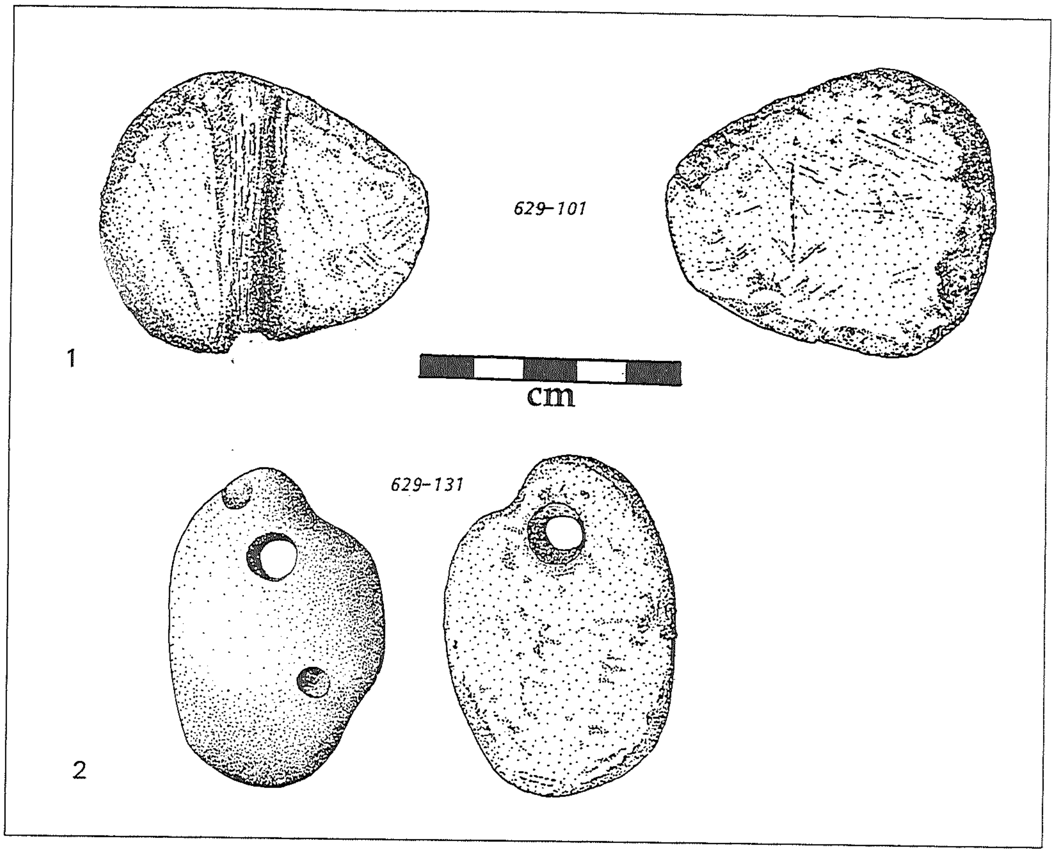


Figure 8.5. (1) Steatite shaft straightener. (2) Worm-bored beach pebble from LAn-1031.

to very simple (LAn-1031), and while no overall study has been made, it seems likely that regional variation is the rule rather than the exception. Just as the incised palette from LAn-808 (chap. 7, this vol.) can be considered "portable rock art" (Lee 1981) in the sense that it is a miniature petroglyph, so the very rare painted stones such as the LAn-1031 specimen may be considered portable pictographs, albeit of extremely simple nature.

QUARTZ CRYSTALS

Seven quartz crystals were discovered in the Canasta Rockshelter, at depths from 20 to 70 cm below the present ground surface and restricted in their horizontal distribution to the area immediately behind the natural column or pillar at the cave's mouth. Depositionally, the quartz crystals seem completely unassociated with the LAn-1031 basketry, which was found in the opposite end of the cave in quadrant C2, but tend to conform to the depositional pattern of both asphaltum and shell beads in their eastern expressions. Conceivably, the asphaltum, shell beads, and quartz crystals in the C6 and D6 quadrants and associated area constitute separate elements of a single depositional episode—or this may have been a location that the depositor returned to in order to make "withdrawals" or "additional deposits."

Quartz crystals are commonly found in Los Angeles and Ventura County sites, sometimes because of natural geological occurrence, but more commonly as imports for still poorly understood magico-religious functions. In the latter cases, we presume that quartz crystals were found objects, presumably kept as heirlooms. Hoover (1975) and Bean (1976:414) comment upon the function of quartz crystals as cult objects in contact period Chumash ceremonials or shamanistic activities. Blackburn (1963:30) reports their use as fetishes amongst the Gabrieliño. Rogers (1929:416) reports the general Canaliño practice of socketing crystals into wooden holders with asphaltum. One of the crystals (629-719) from the shelter may have been similarly mounted

Curtis (1959:108) reports asphaltum-attached crystals along with beads on a bone object. Four quartz crystals were recovered from the Conejo Rockshelter (Glassow 1965:47), all of them imperfect speci-

Table 8.4. Quartz Crystals from LAn-1031

Cat. No.	Provenience	Wt., g
629-700	C6 40-50 cm	0.2
629-719	C7 20-30 cm	12.2*
629-731	C7 40-50 cm	0.1
629-763	D6 10-20 cm	1.6
629-783	D6 30-40 cm	3.2
629-807	D6 60-70 cm	0.7
629-899	D8 60-70 cm	1.9

* Multiple crystals, asphaltum on base

mens and unmodified. Susia (1962:172) reports 10 quartz crystals of small size from Ven-61, the Soule Park site. Twenty-five quartz crystals were recovered from Ven-122 (Whitley, Schneider, Simon, and Drews 1979:122, 126-27). Six quartz crystals were recovered from Ven-125 and are interpreted by Wells (1978:168) as a "disturbed cache." Ten quartz crystals were excavated at Ven-294 (Rosen 1978:81), three of which appear to have been modified for greater ease of hafting. Prichett and McIntyre (1979:94) recovered 64 quartz crystals from Ven-261, a late period occupation site.

ORGANIC ARTIFACTS

Asphaltum

Fifteen separate discoveries of asphaltum (totaling 580.7 g in weight) were made in LAn-1031 during excavation, at depths ranging from 10 to 60 cm. Especially interesting was the spatial distribution of asphaltum within the cave, for this indicated two separate cached locations. The first of these was a small piece in quadrant C2, the richest single excavation at the site in terms of perishable materials; from this original placement the tiny fragment recovered from quadrant D3 is presumed to have been displaced. The second, or eastern, location was in a north-south line behind the natural column near the mouth of the shelter, in quadrants D6 (356.7 g), C6 (22.1 g), and B6 (165.6 g). It is probably no accident that these quadrants incorporate the best-shaded and consequently coolest part of the cave year-round. Much smaller amounts of asphaltum found in neighboring quads C5, C7, and D7 are almost certainly displaced outwards from the north-south depositional line.

Asphaltum, or native tar or bitumen, was in common use by the Chumash and Gabrieliño at the time of initial European contact, being employed as an adhesive, as a waterproofing agent, and as a paint. Gutman (1979, 1983) has reviewed the Late Prehistoric uses of asphaltum as well as attempting the first correlations between archaeological specimens and natural sources. Asphaltum occurs naturally in areas adjacent to the Santa Monica Mountains: terrestrially as close as the La Brea Tar Pits and in submarine seeps off Redondo Beach.

While asphaltum is an expectable late artifact in the Santa Monica Mountains area, it does occur at early sites as well (see Walker 1951). Asphaltum is not especially common at open sites although LAn-52 produced 22 specimens (Curtis 1963:60-61), and Ven-125 (Wells 1978:170) and Ven-261 (Prichett and McIntyre 1979:95) both produced a single piece. Conditions for asphaltum preservation are most favorable in rockshelters, and small to large chunks of the material have been found in caves in the Simi Hills (Ven-373, Clewlow, Whitley, Drews, and Simon 1979:145-146); in Ven-69, the Conejo Rockshelter (Glassow 1965); in Ven-12, Canterbury Cave (Rigby, personal communication); and in caves near Encinal Canyon on the Malibu headlands (LAn-1081, Dillon n.d.d).

The frequent discovery of the material in rockshelters does not indicate that asphaltum working was done in caves and rockshelters, simply that caves were routinely used for storage of this comparatively unstable substance. Asphaltum melts during hot weather, and caves and rockshelters, when not exposed to the sun, are normally much cooler than open sites. Consequently, cached lumps of asphaltum, when stored in sites such as LAn-1031, would be much more likely to maintain cohesion and to resist picking up impurities than when emplaced in almost any other kind of culturally-selected location. The location of the vast majority of the asphaltum at the Canasta Rockshelter—in the coolest and most shaded part of the cave—does not contradict this argument.

Modified Animal Bone

The three modified bone fragments (629-728, 629-737, 629-982) recovered from the

Canasta Rockshelter are too small to identify either as to function or to species, although mule deer seems a logical candidate in each case. The three artifacts are either incomplete fish gorges, needles, or basketry awl fragments. All are fairly common artifact types throughout Los Angeles and Ventura counties, preservation permitting, except that the fish gorges are expectably found nearly exclusively on the coast (see Wallace et al. 1956). Even in sites where basketry is not preserved (such as Ven-69), basketry awl fragments of polished bone are relatively abundant. Kowta and Hurst (1960:208) describe five specimens from the Triunfo Rockshelter (Ven-15) associated with basketry fragments. It may be significant to note the lack of association between the worked bone implements from LAn-1031 and the basketry fragments, most of which were found in quadrant C2. This may indicate a use other than basketry awls for the Canasta shelter worked bone artifacts, one more consistent with nonfemale task associations, as suggested by the relative absence of other female-oriented tools.

Artifact 629-896 is probably a flaking tool for pressure retouch work on artifacts such as 629-705, a stone knife. Antler flaking tools are described by Holmes (1919) and by Gifford (1940) and are expectable artifacts throughout California wherever conditions for preservation encourage their survival. Again, a male-oriented use seems indicated by this artifact.

Unmodified Animal Bone

The faunal remains from LAn-1031 are described in detail by Duque (chap. 10). Inside the rockshelter were found the bones of mule deer, bobcat, coyote, weasel, jackrabbit, cottontail, gopher, woodrat, ground squirrel, mouse, vole, and snake, turtle, fish and bird, with a minimum of 48 individual animals represented. A small percentage of the bone, most of it from deer, exhibited butchering marks and evidence of burning. All burned bone was recovered from the eastern end of the shelter. This location was far away from the cached basketry in the western end and in the area of the cave where the roof was lowest (i.e., the most likely place to toss garbage). A much smaller percentage of the total bone recovered from LAn-1031 was burned than was found to be the case at LAn-807. This probably indicates that a sizeable percentage of the animal bone in the rockshelter was introduced through nonhuman agency (i.e., through coyotes, raptoral birds, etc.).

Modified Shell

Cat. No.	629-198
Description	Complete *Haliotis cracherodii* shell with vents asphaltum-plugged
Provenience	C2-6 30-40 cm
Wt., g	122

One large abalone shell with its siphon holes or vents closed with asphaltum plugs was found in quadrant C2 associated with the basketry and other artifacts (fig. 8.6). Such shells were used as waterproof containers, dishes, bowls, cups or spoons, and as canoe bailers at the time of initial European contact (Gifford 1947:7; J. P. Harrington 1942: 12; Hudson and Blackburn 1982:278-279). Whole shells used as containers have a long history in Los Angeles County; they were found holding asphaltum in level 1 of the Malaga Cove site (Walker 1951:52; fig. 11). Rogers (1929:396) discusses other examples from the Santa Barbara Channel, and a single abalone shell dish was recovered from the Arroyo Sequit site (Curtis 1959). Such vessels or "dishes" are quite common in archaeological sites on the Channel Islands and are sometimes decorated by incision (Hudson and Blackburn 1982) or by gluing shell beads into the asphaltum plugs (Landberg 1965:52). An interesting variant from Bower's Cave in the Alliklik area (Elsasser and Heizer 1963:29) had its siphon holes plugged with S-twist cordage rather than asphaltum.

Shell Beads

Forty-seven shell beads were recovered from the Canasta Rockshelter, all of them quite small and of late type. Bead dimensions, with but one or two exceptions, are so close that they all could have come from one or at most two strands of simultaneous manufacture. With only four *Mytilus* exceptions, all the LAn-1031 shell beads were of *Olivella*, and both *Mytilus* and *Olivella* beads were of identical form: small disk, with minimal curvature and very small

Table 8.5. Asphaltum Recovered from LAn-1031

Cat. No.	Provenience	Depth, cm	Dimensions, cm LxW	Weight, g
629-456	C2-8	40-50	4.3 x 3.5	14.7
629-466	D3	10-20	2.0 x 1.4	1.7
629-660	B6	40-50	11.5 x 9.3	165.1
629-662	B6	50-60	1.3 x 0.9	0.5
629-676	C5	30-40	5.5 x 3.8	17.8
629-688	C6	10-20	4.3 x 3.7	10.5
629-688	C6	10-20	2.2 x 1.3	5.3
629-693	C6	30-40	2.8 x 2.1	4.1
629-699	C6	40-50	2.5 x 1.2	2.2
629-723	C7	30-40	1.7 x 1.3	1.2
629-788	D6	40-50	fragments	68.3
629-796	D6	50-60	4.5 x 4.3	42.1
629-797	D6	50-60	13.7 x 10.5	246.3
629-816	D7	0-10	1.3 x 0.5	0.2
629-820	D7	10-20	2.2 x 1.9	7.0

Table 8.6. Bone Artifacts from LAn-1031

Cat. No.	Description	Provenience	Depth, cm	Dimensions, cm LxW
629-728	Shiny cylindrical fragment, broken and slightly blackened at both ends	C7	40-50	3.5 x 0.3
629-737	Shiny, abraded mammal bone fragment	C7	50-60	6.7 x 0.6
629-982	Bone fragment with diagonal abrasion	D7	60-70	2.9 x 1.2
629-896	Section of deer antler with one tine broken off, other intact and showing wear damage	D8	60-70	16.5 x 2.7

hole. As such, the Canasta beads would seem to fit somewhere between Brock's (1986:2-3) Type A and D categories from the Daon site. The LAn-1031 beads feature smaller holes than Brock's Type A and smaller diameters than Type D. When multiple beads (2 or 3) are entered under a single accession number, this is because they were found stuck to each other with small bits of asphaltum.

Most interesting is the spatial distribution of the shell beads within the shelter, for this indicates two geographically separate depositional episodes: one in the eastern end of the cave in quadrant D6 behind the vertical column near the cave mouth and the other in the shelter's western end in quadrants C2 (where virtually all the site's basketry was found) and C3. The C3 quadrant, perhaps not coincidentally, is also where the only two Mission period glass trade beads were found, and it is likely that deposition of the Late Prehistoric/Early Historic period shell beads was made simultaneously with the trade beads. The eastern bead deposit, concentrated in quadrants D6 and C6, seems associated with all quartz crystals recovered from the cave and is also in the area where most of the asphaltum was found.

The stratigraphic distribution of shell beads in LAn-1031 (table 8.7) is as instructive for the purpose of depositional reconstruction as is the horizontal provenience data: it would seem that when beads were introduced into the site, they were probably deposited on the old surface (between 30 and 40 cm below the present surface) and eventually covered by roof fall. The almost perfect battleship curve or tapering off of beads above and below level 4 seems to be the result of postdepositional rodent disturbance.

Table 8.7. Stratigraphic Distribution of Shell Beads

Level	No. of beads
0-10	1
10-20	2
20-30	8
30-40	21
40-50	6
50-60	5
60-70	2
70-80	1
80-90	1

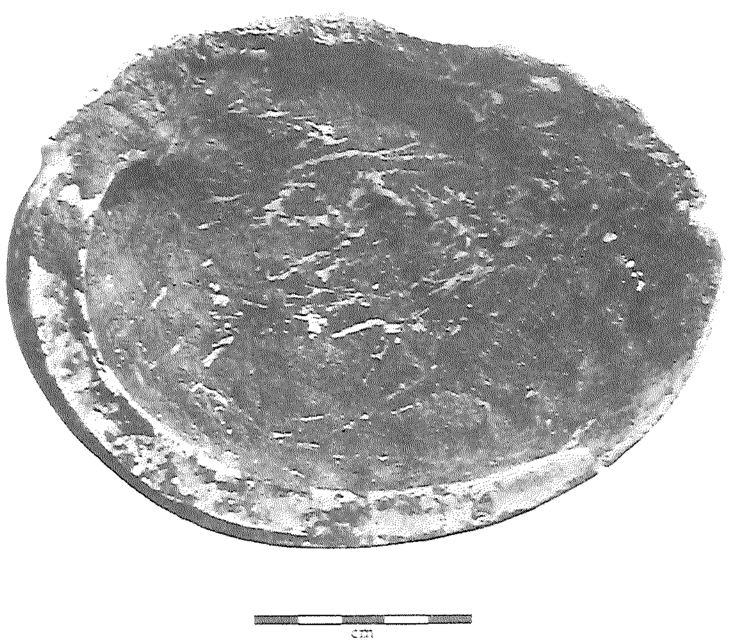


Figure 8.6. Complete Haliotis cracherodii *shell from LAn-1031 with asphaltum coated interior (629-198). Scale in cm. Photo Robert Woolard.*

Small *Olivella* disk beads are one of the most common bead types at Late Prehistoric period sites in coastal and interior Los Angeles and Ventura counties. The Canasta *Olivella* beads are most similar to the Century Ranch Type 4 beads (King, Blackburn, and Chandonet 1968:77) which have long been accepted as indicators of the Late Prehistoric period. The Century Ranch sites also produced *Mytilus* disk beads (Type 7, ibid.:78), and the excavators suggest that the smaller examples (like those of LAn-1031) seem to be the later. Prichett and McIntyre (1979:111) at Ven-261 note a single *Mytilus* disk bead similar to the Canasta examples. One hundred twenty-five small *Olivella* disk beads similar to those of the Canasta rockshelter were recovered from the Ven-69 Rockshelter (Glassow 1965:48) but none of *Mytilus*. Wells (1978:163-168) describes over 450 shell beads recovered from Ven-125, a Late Prehistoric period inland site, noting that 92% of these were of *Olivella biplicata*, and none would seem to date much before A.D. 700, according to Gibson's (n.d.) provisional typology. For LAn-52, the Arroyo Sequit site (Curtis 1963:62), the most common beads are *Olivella* body wall or "cup" beads, but a few small disks were also recovered. It is likely that more small *Olivella* disk beads would have been recovered from this site if more of the excavated sample had been screened through 1/8" mesh.

Six of the *Olivella* beads recovered had been filled with asphaltum, presumably to emphasize the design pattern. Five of these were recovered from the C2/D6 area; the sixth was found in D3. These are equivalent to Gifford's Type X5a (Gifford 1947) and King's Type 23 (C. King 1974). Gifford (1947:4) reports they are more plentiful on Santa Cruz Island than elsewhere, but they have been reported from a number of late sites in the general region of LAn-1031. Susia reports their presence at Ven-61 (1962:173), Greenwood and Browne recovered 26 from Ven-3 (1969:14), Whitley found 1 at Ven-609 (1980:101), 17 were recovered from the historic cemetery at Malibu (C. King 1974:87, Gibson 1975), and 1126 were recovered from the cemetery at LAn-243 (L. King 1969; C. King 1974:87). C. King dates this bead form to the 1769-1816 period in the Santa Monica Mountains area.

Unmodified Shell

The shell sample from LAn-1031 has been studied in detail by Horner (chap. 11, this vol.), who concludes that the sample is so small that it would not even represent enough meat to feed one person for one

Table 8.8. Shell Beads from LAn-1031

Cat. No.	Species	Diam.	W	Diam. Opening	Provenience	Depth
629-211	*Olivella*	0.5	0.1	0.1	B4	40-50
629-208 (2)	*Olivella*	0.4	0.15	0.1	C2 -2	30-40*
629-208	*Olivella*	0.4	0.1	0.1	C2 -2	30-40*
629-208 (2)	*Olivella*	0.4	0.1	0.1	C2 -2	30-40
629-224	*Olivella*	0.4	0.2	0.1	C2 -7	30-40
629-217	*Olivella*	0.4	0.1	0.1	C2 -8	30-40
629-218	*Olivella*	0.4	0.1	0.1	C2-8	40-50
629-209	*Olivella*	0.4	0.1	0.1	C3	40-50
629-212	*Olivella*	0.4	0.1	0.1	C3	20-30
629-213	*Olivella*	0.4	0.1	0.1	C3	60-70
629-216	*Olivella*	0.3	0.1	0.1	C3	40-50
629-216	*Olivella*	0.4	0.2	0.1	C3	40-50
629-216 (3)	*Olivella*	0.4	0.1	0.1	C3	40-50
629-221 (2)	*Olivella*	0.4	0.1	0.1	C3	30-40
629-666	*Olivella*	0.5	0.1	0.1	C5	20-30
629-685	*Mytilus*	0.4	0.1	0.1	C6	10-20
629-692	*Olivella*	0.5	0.1	0.1	C6	30-40
629-214 (3)	*Olivella*	0.4	0.1	0.1	D2	30-40
629-220	*Olivella*	0.4	0.1	0.1	D3	20-30*
629-215	*Olivella*	0.4	0.1	0.1	D3	40-50
629-222	*Olivella*	0.3	0.1	0.1	D3	50-60
629-765	*Olivella*	0.5	0.1	0.1	D6	20-30
629-765	*Olivella*	0.4	0.1	0.1	D6	20-30
629-765	*Olivella*	0.3	0.1	0.1	D6	20-30
629-771	*Mytilus*	0.4	0.1	0.1	D6	30-40
629-785 (3)	*Olivella*	0.4	0.1	0.1	D6	40-50
629-793 (2)	*Olivella*	0.4	0.1	0.1	D6	50-60*
629-793	*Olivella*	0.5	0.1	0.1	D6	50-60
629-793	*Mytilus*	0.3	0.1	0.1	D6	50-60
629-803	*Olivella*	0.5	0.1	0.1	D6	60-70
629-809	*Olivella*	0.5	0.2	0.1	D6	70-80
629-826	*Olivella*	0.3	0.2	0.1	D7	20-30
629-836	*Olivella*	0.5	0.1	0.1	D7	40-50
629-863	*Mytilus*	0.3	0.1	0.1	D7	80-90
629-219	*Olivella*	0.4	0.1	0.1	E3	10-20
629-225	*Olivella*	0.3	0.1	0.1	E3	20-30
629-911	*Olivella*	0.4	0.1	0.1	E4	surface

Note: Measurements are in cm. *These beads had oblique, parallel incisions along edges.

day. Furthermore, an interesting aspect of the collection is the representation of some species by but a single, very large-sized example, almost as if the ancient users of the cave had kept a shell "collection" as a kind of reference sample. Horner concludes that the unique nature of the LAn-1031 shell sample seems best interpreted as that of an intentionally deposited cache, a conclusion not contradicted by the other kinds of evidence found in the Canasta shelter.

Ten different species of mollusks were found in the LAn-1031 rockshelter, totaling some 202.7 g. Most of the shell was found in two areas of the cave: in and around quadrant C2, the location where most basketry and other artifacts had been cached, and in the D6, C6 and surrounding quads in the eastern end of the cave where most of the asphaltum was found. Little or no shell was found along the back wall of the shelter nor was much found at its mouth.

Basketry

Sixty-four identifiable basketry fragments were recovered from the deposit, all but four of them from quadrant C2. Only 33 of the fragments are large enough to analyze construction techniques in any detail; these measurements are tabulated in table 8.9. The remaining 31 fragments all appear to be from coiled basketry and represent foundation rods or fragments of coiled sewing strands.

Analysis of fragments followed guidelines set out in Adovasio (1977) where possible. Examination was somewhat hampered by an encrustation shared by many of the fragments that obscured construction details and hampered exact measurement of basketry components. In most cases, the size of the fragments also precluded taking multiple measurements from different portions of each specimen to arrive at an average value. In spite of these difficulties, a surprising diversity in the fragments is apparent when coil width, number of coils per centimeter, and width of sewing strand are compared.

No rim fragments or starts were present in the sample preserved. At least 12 distinct weaves were identified. First, 629-607 is the only fragment with a bundle foundation of *Muhlenbergia rigens (Epicampes rigens* Bent.) with a *Juncus* sewing strand; all other coiled fragments have three-rod *Juncus* foundations with *Juncus* sewing strands. Several fragments have significantly larger coils than other pieces (629-588: 0.6 cm; 629-590: 0.8 cm; 629-606: 0.6 cm; 629-638: 0.5 cm; 629-643: 0.5 cm; 629-652: 0.5 cm; 629-776: 0.5 cm). Examination of sewing strands, number of coils per centimeter, and surface characteristics of these fragments suggests four distinct pieces of work are represented (629-643 and 629-776 are similar enough to be fragments of the same piece; 629-590 and 629-638 also seem comparable to each other). One of these pieces, 629-606, exhibits color variation which may represent a design remnant, but the small size of this fragment prevents a conclusive determination.

The remaining coiled fragments are characterized by tighter weaves and smaller sewing strands than the above pieces but also show variability in coil size and size of sewing strand, as well as in stitch spacing and surface characteristics. Fragments 629-600, 629-605, 629-618, 629-620, and 629-653 appear to be from the same piece, based on similar stitch and coil size, as well as the similar encrustation on the surfaces of these fragments. For similar reasons, 629-589, 629-601, 629-603, 629-615, and 629-625 appear to be fragments of the same basket. Fragments 629-613 and 629-654 appear to derive from the same piece judging from their unusually thin sewing strands. Two other sets of fragments that can be matched are 629-591 and 629-651, and 629-609 and 629-640. Fragment 629-612, although heavily encrusted, has a distinctive closely coiled pattern which sets it apart from the other fragments.

Only one fragment from the rock shelter appears to be twined, and its thick coating of asphaltum makes measurements somewhat problematical. The piece appears to be made with up-to-the-right slant of turns, is quite unevenly woven, and is apparently constructed of tule or sea grass rather than *Juncus*.

Although Chumash basketry is not as well known as that of other native California groups, the number of documented and attributed pieces has increased significantly since Dawson and Deetz reviewed known pieces in 1965. Silva and Cain (1976), Herold (1977), and more recently Hudson and Blackburn (1983) have added to the published repertoire, as have scattered archaeological finds. The estimated number of Chumash baskets has increased from fewer than 200 to over 300. This remains a small sample of what was an important and diverse part of Chumash material culture. Chumash basket production probably stopped after the secularization decrees of 1834 (Herold 1977: 71), although a limited number of later documented baskets are known (Dawson and Deetz 1965:208). This early date of disruption of traditional Chumash culture and the concomitant scarcity of ethnographically collected baskets, in addition to the Chumash trait of caching material stored in baskets in caves and rockshelters, lend particular importance to archaeologically recovered basketry from the historic Chumash area.

Basketry is rarely preserved in open-air sites except as carbonized fragments or impressions in asphaltum or clay, although a number of such instances are recorded in the region (Greenwood and Browne 1969; L. King 1969; Rozaire 1976; Rozaire and Craig 1968). A more important source for archaeologically recovered basketry is dry caves, where environmental conditions permit its preservation. Most such sites are apparently quite recent, as historical arti-

Table 8.9. Large Basketry Fragments from LAn-1031

Cat. No.	Basket No.	Provenience	Coil Width, cm	Coils, cm	Str W width, cm	Dimensions, cm LxW	Comments
629-588	XII	C2-7 30-40cm	(0.6)	5.5	0.1+	7.7 x 0.7	Heavy juncus, rightward coiling; not the same basket as 629-606.
629-589	V	C2-7 30-40cm	0.35	6	0.15	1.6 x 1.0	Three-rod, split juncus, non-interlocking stitching, rightward coil direction, fag ends trimmed on work face; appears encrusted and possibly coated on one side with asphaltum.
629-590	VII	C2-7 30-40cm	0.8	3-4	0.2	3.2 x 0.9	Fragment of a coarse, large basket with non-interlocking stitching; may be base fragment (if not warped) (fig. 8.7:2).
629-591	III	C2, 10-20 cm	0.4	6	0.1+	1.4 x 0.5	
629-600	I	C2, 10-20 cm	0.25	6+	0.1+	1.6 x 0.9	Slight encrustation. Three-plus rows present.
629-601	V	C2, 10-20cm	0.35	6-7	0.1	1.9 x 1.1	
629-602	X	C2, 10-20cm	-	5.5	0.1+	3.2 x 0.4	This fragment is similar to 629-605 but stitches are narrower and not as even.
629-603	V	C2, 10-20cm	0.35	6	0.1+	2.1 x 0.6	
629-605	I or VIII	C2-7 10-20 cm	0.3	6-7	0.1+	3.5 x 1.6	Finely stitched basket, rightward coil direction, outside workface. Possibly coated, perhaps with asphaltum. Might be fragment of globular "fancy" basket (fig. 8.7:3).
629-606	XI	C2 -7 20-30cm	(0.6)	5	0.1 +	2.3 x 0.7	Strands jerked tighter than 629-588. Possible design remnant; appears to have one clear and three dyed stitches.
629-607	VI	D3 30-40cm	0.3	5	0.1-	3.6 x 1.3	*Muhlenbergia rigens* bundle formation. Spaced stitching with rightward coil direction. Splice visible (fig. 8.7:4).
629-608		C2-12, 30-40 cm	0.25	6	0.15	1.6 x 0.7	Short and stubby stitches, finely woven. Possible traces of asphaltum.
629-609	IV	C2-10, 20-30 cm	*	6-7	0.1	2.3 x 0.4	Coated on one side.
629-610		C3, 40-50 cm	0.35	6	0.15	2.7 x 0.8	Coated on one side. Spaced stitches. Poor condition, coils deteriorated.
629-612		C2-6, 20-30 cm	0.35	6	0.15	2.5 x 0.8	Neat, short, unspaced stitches unlike any other fragment. Heavily encrusted. Disintegrating on what probably was the workface.
629-613	II	C2-6, 20-30 cm	0.4	5	0.1-	2.9 x 1.0	Thin sewing strands.
629-614		C2-6, 20-30 cm	(0.4)	(5.5)	0.15	2.3 x 0.6	
629-615	V	C2 -6 20-30cm	0.35	6	0.1	1.8 x 0.7	
629-618	I	C2-6, 20-30 cm	0.35	6	0.1+	1.4 x 0.5	Coated on one side. Two rows present. Slight encrustation.
629-619		C2-6, 20-30 cm	*	4-5	(.15)	4.2 x 1.0	Finely-woven with slight spaces between stitches. Possibly the remains of repair. Trace of asphaltum.
629-620	I	C2-6, 20-30 cm	0.3	6	0.1	1.9 x 0.7	Slight encrustation.
629-625	V	C2 -6 20-30cm	0.35	6	0.1+	2.5 x 0.6	Non-interlocking stitching, rightward coil direction, fag ends trimmed on work face.
629-638	VII	C2-11 20-30cm	0.5	5	0.1	4.9 x 1.0	Spaced stitches, large coils. Possible fragment of a base or lid due to curved, flat coils (fig. 8.7:1).
629-640			0.25	6-7	0.1+	1.7 x 0.5	
629-643	IX	C2 40-50cm	0.5	4	0.1	(3 x 1)	Finer sewing strands than 629-590 but also a large basket with spaced stitches.
629-651	III	C2, 10-20 cm	0.4	6	0.1	2.9 x 0.5	
629-652		C2, 10-20 cm	(0.5)	6	0.2	2.5 x 0.5	
629-653	I	C2, 10-20 cm	0.35	(6)	0.1+	1.5 x 0.7	Slight encrustation.
629-654	II	C2, 10-20 cm	0.4	5	0.1-	2.7 x 0.6	Thin sewing strands.
629-776	IX?	D6, 30-40 cm	(0.5)	4	0.15	4.4 x 0.7	Gaps between stitches similar to 629-643. Large; looks like wall fragment.
629-777	VI	D6, 30-40 cm	N/A	N/A	*	7.7 x 6.9	Twined fragment. Up-to-the-right slant of turns. Tule or seagrass with heavy asphaltum coating.

() = estimated measurement * = could not be determined from fragment present

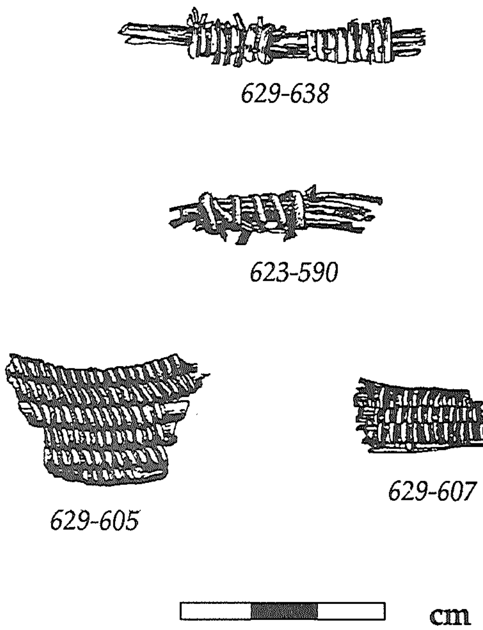


Figure 8.7. Basketry fragments from LAn-1031.

facts such as glass beads are present (Dawson and Deetz 1965:198), although others such as nearby Ven-15 may date to an earlier time period (Kowta and Hurst 1960).

Unlike ethnographic collections, archaeologically recovered basketry seems to be predominantly twined. In the general area of LAn-1031, twined fragments have been reported from Ven-373 (Clewlow, Whitley, Drews, and Simon 1979), and both twined and coiled basketry fragments were recovered from nearby Ven-12 (Rigby n.d.b), Ven-15 (Kowta and Hurst 1960), and in a recently discovered series of caves and rockshelters in eastern Ventura County (Simon, personal communication). Coiled basket fragments have also been recovered from Ven-609 (Whitley et al. 1980) and LAn-50 and LAn-294 (Hector, personal communication). An asphaltum-coated twined water bottle was recently recovered by Dillon during a cave excavation in the Montcrief Ridge area of eastern Ventura County.

Types of Chumash baskets have been thoroughly reviewed by Dawson and Deetz (1965) and Hudson and Blackburn (1983). Despite the extremely fragmentary nature of the LAn-1031 finds, some correlations between ethnographically known basket forms and these pieces may be possible.

Large coils are the foundations for corresponding large baskets, made with larger sewing strands than the smaller, more finely woven pieces. The fragments from the rockshelter with the largest coil size probably represent pieces of the larger known coiled basket forms, such as burden baskets and storage baskets. Hudson and Blackburn (1983:54-58) present ethnographic descriptions of large storage "granaries" used in Chumash households, but all actual examples described and preserved are baskets recovered from dry caves. Several have portions of their exterior, particularly the base, coated with asphaltum, presumably to prevent rotting (Elsasser and Heizer 1963:5-8; Heye 1926:196-197). The Chumash used both twined and coiled burden baskets; coiled burden baskets are described by Craig (1967:99-100) and Hudson and Blackburn (1979:260-261). The example of this type illustrated by Dawson and Deetz was also recovered from a dry cave (1965). Clearly, the size of fragments recovered from the Canasta Rockshelter limits elaboration on these possibilities, but the presence of either of these forms in the rockshelter context would be consistent with previous finds.

The more finely woven fragments recovered may represent any number of coiled basketry forms reported. At least one fragment (629-605), due to its slight curvature in addition to the fineness of the stitching, appears to represent a small globular storage or "trinket" basket. Craig (1967) and Hudson and Blackburn (1983) have reviewed Harrington's notes on these baskets and illustrated numerous examples of this form. These baskets were often decorated and were used to store beads and other valuables, but not food (Craig 1967:101-102; Hudson and Blackburn 1983:397). Craig (1966:12) also reports a similar form, coated with asphaltum, which was used to store seeds.

The twined fragment is somewhat difficult to interpret, because its heavy coating of asphaltum prevents a close examination of construction details. The piece may represent a twined water bottle, although this would be particularly unusual for the area, as mainland pieces tend to be manufactured of *Juncus* rather than tule or seagrass (Mohr and Sample 1955:350). It may instead represent the remains of some type of mat or the remains of a repair to a coiled basket.

The number of different weaves identified in the rockshelter sample require some further explanation, particularly in light of the relatively small mass of material present in an area where conditions were fairly favorable for its preservation. First, the variation could indeed represent a large number of different baskets which, through rodent or other agencies of mechanical destruction, were reduced to the small mass recovered from the rockshelter deposit. It is also possible that the assumption of a regularity in stitch and coil size is erroneous, and the variation observed could be found in a single woven vessel. More likely, however, is the possibility that some or many of the different weaves identified represent patches or fragments of patches to baskets. The presence of woven patches on Chumash basketry is extensively documented, particularly for baskets recovered from caves (Craig 1967:137; Dawson and Deetz 1965:203; Elsasser and Heizer 1963:7; Grant 1964:8; Harrington 1942:141-142; Heye 1926:196; Hudson and Blackburn 1983:178; Kroeber 1925: pl. 53). Patches are often of significantly different weave from the original vessel, and even some instances of patching twined baskets with coiled work have been described (Mohr and Sample 1955:350). Some Chumash repairs were apparently made with fragments of other baskets (Grant 1964:8), and pieces with multiple patches, all of distinct weaves, have been recovered (Elsasser and Heizer 1963:7). Patches were often adhered with asphaltum in addition to weaving, which may also account for some of the asphaltum apparent on specimens recovered from the rockshelter.

The concentration of fragments in the C2 area suggests a grouping of baskets placed behind the small rise in the cave floor there. Some flatter basket forms may have been used as lids for storage baskets as reported by Grant (1964:8) from a Chumash cave site. In any case, the baskets were subjected to considerable trauma to reduce them to the small fragments recovered from the site. Our examination of the deposit suggests that rodents were the active agents in this development.

Of the many vegetal fragments collected and brought into the laboratory for more complete examination, several showed cultural modification or were clearly exotic to the cave environment. These pieces are distinct from the basketry fragments summarized above. Sorting of these materials revealed the following components:

Possible raw material for foundation rods:

629-315	*Juncus acutus* section	C2-6, 20-30 cm
629-629	*J. acutus* basal section with angled cut, possibly from steel knife	C2-8, 30-40 cm
629-986	Basal sheaths and parts of stalks of *J. acutus*	C2-7, 30-40 cm
629-990	*J. acutus* section	C2-12, 30-40 cm

Possible raw material for sewing strands:

629-316	Prepared stand of *J. textilis*	C2-6, 20-30 cm
629-772	Cut, charred section of *J. textilis*	D6, 30-40 cm
629-790	*J. textilis* fragment	D6, 40-50 cm
629-986	Basal sheaths of *J. textilis*	C2-7, 30-40 cm
629-990	*J. textilis* fragment, apparently remnant of piece split while material was being prepared for use, and another piece of scraped *J. textilis* which had been prepared for use	C2-12, 30-40 cm

Other materials recovered:

629-986	*Scirpus* sp. stem; piece of woody part of *Apocynum cannabinum* stalk	C2-7, 30-40 cm
629-990	*Scirpus* sp. stem; piece of woody part of *Apocynum cannabinum*; piece of *Phragmites australis* (?) stalk	C2-12, 30-40 cm

Juncus, *Phragmites*, and *Scirpus* all grow in wet or moist environments (Munz 1974), not found near the Canasta Rockshelter, and we must assume these specimens were transported to the shelter by human agency. *Apocynum* also favors a damp environment, thus its occurence in the immediate vicinity of the shelter would be unlikely.

These four plant materials are known components of a variety of Chumash manufactures, and some of the pieces recovered do show some alteration. Two of the *Juncus textilis* pieces show modification constant with preparation of sewing strands for basketry, when pieces are split to form evenly sized strands and scraped to remove pith. This process of splitting and cleaning the *Juncus* strand with a shell was described by Candelaria, one of Harrington's Chumash informants (Craig 1966:206-207). The size of these strands, and the size of the

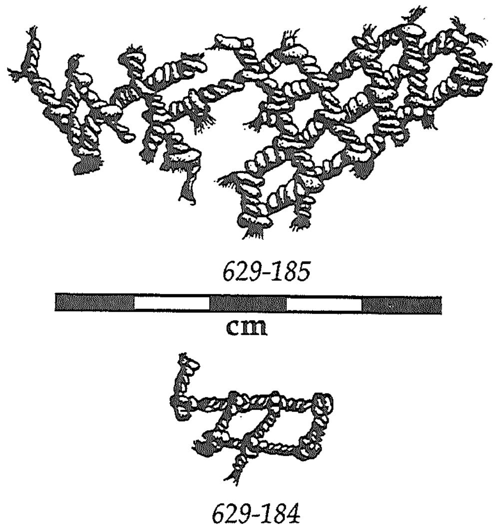


Figure 8.8. Knotted netting from LAn-1031.

Juncus stems found would be consistent with materials required to produce three-rod utilitarian basket forms (Bates, personal communication).

The fragments of the three other plant species are more difficult to interpret, as they show little or no modification. A review of their uses by the Chumash reveals that *Scirpus* was widely used in a variety of manufactures, including cradleboards, tule balsas, burden baskets, mats (Hudson and Blackburn 1982), housing, bedding (Hudson and Blackburn 1983), and storage containers (Hudson and Blackburn 1985). *Apocynum cannabinum* was used in the production of cordage and netting for various purposes. The fragments present are stem fragments and may possibly represent refuse from cordage production (Bates, personal communication). In southern California *Phragmites* was widely used in the production of arrows (Heizer and Elsasser 1980: 117). Its use for home thatching, cordage, and nets is also recorded (Heizer and Elsasser 1980:249).

The vegetal refuse recovered from LAn-1031 suggests that the site may have seen some slight use for the preparation of basket materials or, perhaps, for weaving baskets as well. The fragmentary bone tools recovered would fit in with this theory. Some production of *Apocynum* fiber cordage may have taken place there also.

Fiber Netting and Cordage

Two fragments of knotted netting (fig. 8.8) were recovered from the Canasta Rockshelter, just inside the western mouth of the cave and unassociated with any basketry. Both specimens are made of two-ply S-twist construction, and all knots seem to be square. The larger of the two fragments (629-185; figs. 8.8:1, 8.9b) has comparatively thick cordage (2 mm) for its mesh size (6-7 mm) and is probably made of *Apocynum cannabium* fibers. The smaller fragment (629-184; figs. 8.8:2, 8.9:a) has finer cordage (1-2 mm), a smaller mesh aperture (0.8-1 cm), and is also probably *Apocynum*.

That two separate nets are represented is obvious, but specific function is difficult to determine. Nets were of course used in both maritime fishing and in terrestrial small mammal hunting. Fiber netting was used as the foundation for feather skirts and capes (Grant 1964:6; Hudson and Blackburn 1985:38, 122), and nets were also worn in the hair by men (Hudson and Blackburn 1985:178-179). They were also used for carrying loads—in the form of a kind of expanding string bag—and for suspension storage. A "best guess" explanation of function for the two nets in the Canasta Rockshelter favors that of storage bags suspended above the cave floor, presumably to prevent depredations by ground dwelling rodents. What was stored in the two "string bags" is moot, although foodstuffs would be logical. Hudson and Blackburn (1981:84-85) discuss "storage caves" where foodstuffs were placed within baskets, which were sometimes set on mats; a similar function with suspended net bags is reasonable.

Fiber Netting and Cordage from LAn-1031

Cat. No.	629-184
Description	Plant fiber netting
Provenience	D3 50-60 cm
LxWxTh., cm	2.2 x 1.8
Cat. No.	629-185
Description	Plant fiber netting
Provenience	E3 40-50 cm
LxWxTh., cm	4 x 3
Cat. No.	629-773
Description	Cordage
Provenience	D6 30-40 cm
LxWxTh., cm	6.4 x .2 (diameter)

Both Canasta fragments have a much smaller weave and more pedestrian knotting than

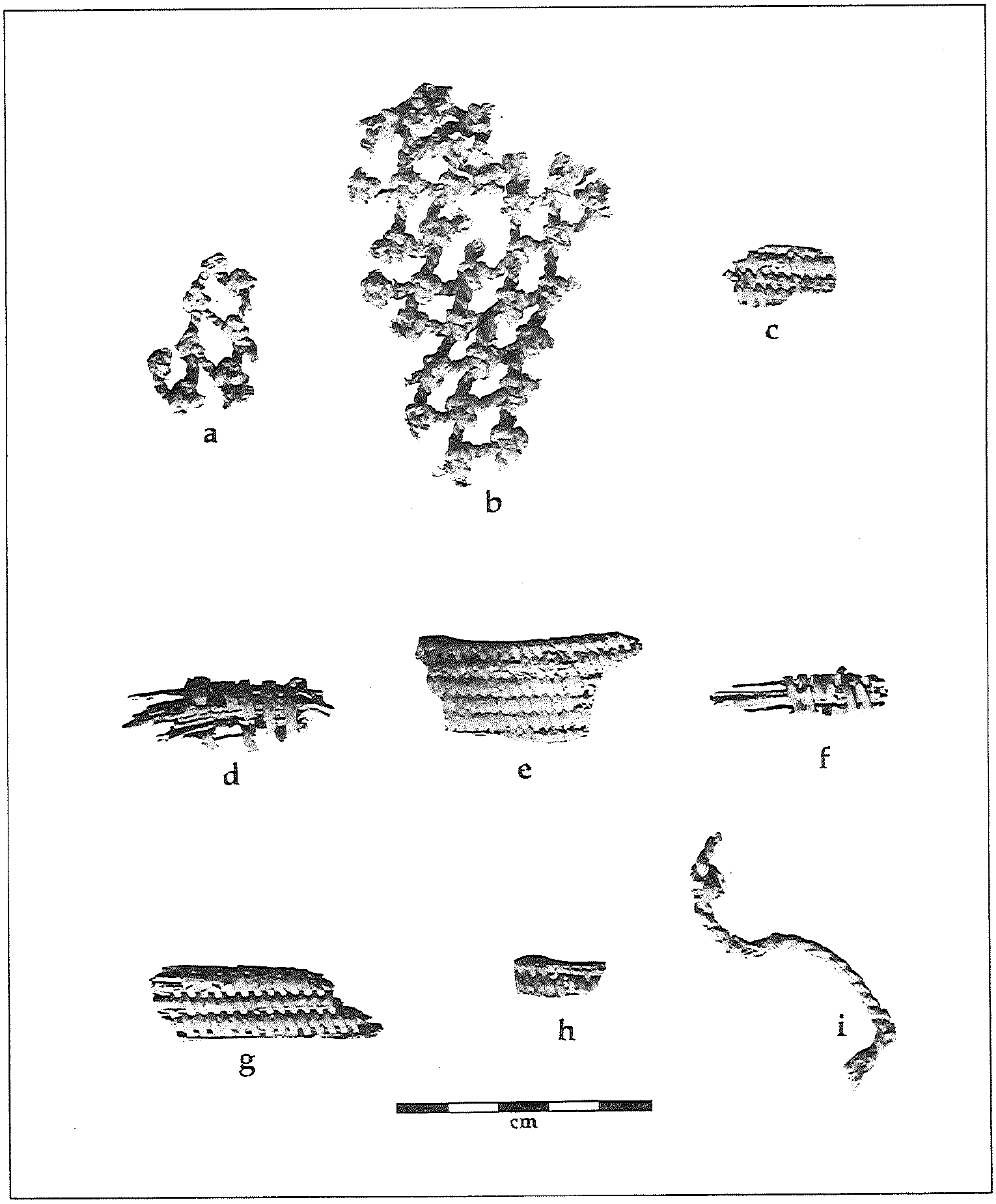


Figure 8.9. Basketry and cordage fragments from LAn-1031. Netting fragments: (a) 629-184; (b) 629-185. Coiled basketry fragments: (c) 629-589; (d) 629-580; (e) 629-605; (f) 629-606; (g) 629-607; (h) 629-618. Cordage: (i) 629-773. Photo by Robert Woolard.

many other archaeological specimens from southern coastal California. Cordage in general and knotted netting in particular is much rarer than basketry in Los Angeles and Ventura County archaeological sites, and the comparative corpus is quite small. On the Channel Islands netting was made from marine plants such as sea grass (Landberg 1965:16), but virtually no mainland examples are of nonterrestrial plant origin. Grant (1964:13) notes that for the Santa Barbara area three different materials were used for cordage and netting: "the coarsest is *Yucca;* the softest (similar to cotton string), *Apocynum;* the intermediate texture may be either *Asclepias* or *Urtica.*"

A carbonized netting fragment was recovered from nearby LAn-243 (Craig 1967:146); its mesh is somewhat smaller (an estimated 3 mm) than either of the LAn-1031 fragments. Another pair of finely woven netting fragments from Dos Pueblos is illustrated by Wheeler (1879: pl. XIV). A fairly comparable piece, recovered from a dry cave in Simi Valley, has a 6 mm mesh (Hudson and Blackburn 1982:283-284). The fiber and width of cordage of this piece are not specified.

We can probably safely assume that cordage size and material were related to functional requirements to some degree. From the small sample preserved in the archaeological record, it is impossible to draw firm conclusions, but practical considerations might suggest that the more delicate netting represents hair nets or articles of apparel. That these specimens were found in a mortuary contents is suggestive. The somewhat larger nets would be more suitable for storing and transport. The storage function would be in keeping with other finds at LAn-1031.

A fragment of cordage was also recovered from the rockshelter. This two-ply S-twist strand is cut at one end and knotted at the other. Its diameter is comparable in size to the netting fragments, but this piece was recovered from the opposite side of the shelter in D6.

Two somewhat thicker (5 mm) specimens of cordage of an unidentified plant fiber were recovered from the Triunfo Rockshelter (Kowta and Hurst 1960:206). In Bower's Cave (Elsasser and Heizer 1963:16) the cordage used for feather bands was made from dogbane (*Apocynum cannabinum*) and is of two-ply S-twist. The knots used are overhand, square, granny, two half hitches and a reeving line bend. Other examples from Santa Barbara County (Grant 1964:12-13; pl. 6a, c) are of two-ply S-twist manufacture, with one having cord thickness of 1.5 mm and 1.5 cm mesh; the other has 3 mm cord thickness and 4 cm mesh. Cordage and netting of *Asclepias* fiber is reported from Ven-12, (Rigby, personal communication).

Leather

Four fragments of animal skin were found in the Canasta Rockshelter in a highly disintegrated condition (table 8.11). It is impossible to determine whether the Canasta specimens are all part of a single item or represent multiple items. There is some color variation represented in the sample, as noted below. All four specimens were discovered in the northeast corner of quadrant C2 or the southwest corner of adjacent quadrant D3, at depths from 30 to 70 cm below the present ground surface.

Hudson and Underhay (1981:76, 424) suggest that leather or hide bags were used for the storage of either food or shell bead treasure, but the shell bead distribution in the Canasta shelter argues against this interpretation of leather remains. Most stone tool chipping, on the other hand, proceeded with the aid of leather or hide protective pads, which kept sharp flakes from accidentally cutting the flintknappers' hands and fingers. The presence of an antler flaking tool in LAn-1031 lends credence to this interpretation, but there is little or no direct correlation between the leather and either expended lithic cores or debitage as one would expect if a "flintknapping kit" were inferred.

The only other leather specimens from Santa Monica Mountains cave sites comes from Ven-12, Canterbury Cave, where a Mission period leather sandal was found (Rigby, personal communication). Consequently, the Canasta shelter material apparently is the first to be described for the Los Angeles/Ventura County border area. The only other comparative material consists of a single fawnskin storage bag, with the hair left on, from a cave in the Cuyama area (Grant 1964:15; pl. 7a). A pair of leather sandal soles is also reported (ibid.) from a cave site in Santa Barbara County.

Feathers

Eleven feather fragments were discovered in the Canasta Rockshelter, the majority of these in or adjacent to quadrant C2, where virtually all the LAn-1031 basketry was found. The concentration of feathers in the same location as the basketry (itself being coiled or "fancy ware" and at least in one case with woven designs) most strongly

Table 8.11. Leather from LAn-1031

Cat. No.	Provenience	Depth, cm	Color	Dimensions, cm LxW
629-414	C2	20-30	Dark brown	10.0 x 8.5
629-431	C2	30-40	Brown	3.3 x 1.9
629-415	D3	50-60	Yellow	1.3 x 1.0
629-413	D3	60-70	Dark brown	1.1 x 2.8

Table 8.12. Feathers

Cat. No.	Provenience	Depth, cm	Color	Length, cm
629-450	C2	20-30	Gray	<1
629-446	C2	30-40	Gray	<1
629-447	C2	30-40	Mottled brown and black	<1
629-453	C2	30-40	Gray/yellow	<1
629-448	C3	40-50	Gray	2.3
629-451	C3	40-50	Gray	1.1
629-449	C4	20-30	Black/yellow	3
629-452	D2	30-40	Dark gray	1.9
629-800	D6	50-60	Brown	<1
629-862	D7	80-90	Shaft fragment	<1

suggests that the feathers formed some part of the LAn-1031 basketry cache, either as internal contents or even perhaps as decorative additions. The Canasta shelter feathers are too fragmentary to allow for easy species identification, but the colors and sizes are reported in table 8.12.

As a caveat against a too-ready acceptance of this interpretation, however, it must be noted that predatory birds (hawks and owls) frequently kill other birds, including songbirds. Scavenging birds and animals such as vultures and coyotes also eat avifauna, and any of these natural agents could have introduced feathers to the Canasta shelter. On the other hand, the depositional pattern for the feathers looks too much like intentional placement, and the more random disposal of feathers resulting from animal predation seems lacking.

Feathers are extremely rare in mainland southern California archaeological contexts, being known only from Ven-12 (Rigby, personal communication), Bower's Cave (Elsasser and Heizer 1963:13-17) and the Cuyama area (Grant 1964:6). The Ven-12 feather component may be naturally introduced, rather than remnants of cultural artifacts; but in the Bower's Cave find, 33 individual feather bands incorporating hundreds of feather specimens were recovered, and 11 different bird species were represented, including flicker , pelican, condor, egret, bald eagle, bluejay, and others.

Desiccated Feces

The LAn-1031 fecal material is discussed in much greater detail by Duque (chap. 9, this vol.), who provides the first archaeological corroboration of dietary patterns ethnohistorically observed (see Landberg 1965). Also notable is the diversity of identifiable plant specimens recovered from the human scats, incorporating amaranth, sunflower, bullrush and chia, and the lack of animal and fish bone, despite abundant evidence (Horner, this vol.) of both in the Three Springs Valley area in general and LAn-1031 in particular. July through September in the Three Springs Valley would seem to be the time of year when most of the seed-producing plants represented in the scat samples were harvested; this may be accepted as some slight evidence for seasonal usage of the shelter (see Landberg 1965). The identification of *Geranium* sp. in the specimen is of some interest. The two members of this species now reported in the Santa Monica Mountains area (Raven and Thompson 1966:90), *G. carolinianum* and *G. molle*, are not native to California. *G. molle* is an introduction from Eurasia (Robbins et al. 1941:244), and *G. carolinianum* is an annual naturalized from the eastern United States which was established by the period of Mexican settlement, 1825-1848 (Frenkel 1970:144). The use of introduced species for food by the Chumash has been ethnographically recorded for grass species (Craig 1967:126; Timbrook et al. 1982:173). The presence of either *Geranium* species in these specimens is both a demonstration of its (perhaps accidental) inclusion in the native diet and proof of the early presence of an exotic in California. The presence of sunflower in the scat sample probably also indicates at least a partial posthistoric usage; this, of course, is supported by the discovery of the two glass trade beads in the shelter.

The Canasta Rockshelter is the first site in the Santa Monica Mountains area to produce preserved human fecal material. This situation is probably due as much to care in screening the site deposit and retention of all organic materials as it is to favorable conditions for preservation. Possibly other rockshelter deposits with some deposit remaining might still yield up additional samples. Stratigraphically (table 8.13) the bulk of the scats at 30-40 cm below present surface are found on what was probably the original cave surface at its time of abandonment. Those found in higher levels were probably displaced though post-depositional faunalturbation, whereas the two found in the 40-50 cm level were probably intentionally covered while still fresh.

Table 8.13. Provenience of Positively Identified Desiccated Human Feces

Provenience	Depth, cm
B2	30-40
C2	10-20
C2	30-40
C2	30-40
C3	40-50
C3	40-50
D3	30-40

Perhaps the preserved human fecal remains provide the best evidence of any material recovered from the Canasta Rockshelter for the depositional reconstruction of the site. It seems evident that with as many as nine separate specimens indicating perhaps nine responses to separate calls of nature, a single-visit use of the LAn-1031 rockshelter cannot be defended. One could of course alternatively interpret this evidence as resulting from up to nine individuals simultaneously defecating in the rockshelter, but this seems unlikely.

Seed Concentration

In the southwest corner of the shelter, in quadrant C2 behind a small natural rise in the shelter floor, a concentration of seeds was found in association with the majority of the basketry fragments recovered and in close proximity to the arrowshaft straightener, the *Haliotis* shell, and a piece of hide. The seeds have been identified as *Cercocarpus betuloides* by Jacquelyn Chesi, Seed Botanist of the California State Department of Food and Agriculture, Division of Plant Industry, with the assistance of Christine Hastorf, Ethnobotany Laboratory, UCLA Institute of Archaeology.

There is some question as to whether the seed concentration was cultural or represented a rodent cache. Abundant evidence of extensive rodent activity throughout the deposit and the lack of carbonization or other evidence of cultural modification make this a serious possibility.

A search for documentation of native use of the seeds of *C. betuloides* was negative, although multiple sources note the medicinal use of its bark and leaves (Almstedt 1977:26; Balls 1962:40-41; Murphey 1959:51-54; Romero 1954:70; Train et al. 1941:54) as well as the use of its wood for construction and tool manufacture (Chestnut 1902:354; Mead 1972:56; Murphey 1959:13). However, knowledge of southern California ethnobiology is not exhaustive, and the lack of documentation could represent a lack of knowledge rather than negative evidence for seed storage and use.

In short, the evidence is inconclusive, but the concentration of cultural remains in the immediate vicinity is difficult to dismiss. Prehistoric and protohistoric use of caves to store foodstuffs is recorded by Harrington (Hudson and Blackburn 1983:84) as is the sacrifice of seeds at hilltop or promontory shrines (Blackburn 1974:104), both possible explanations for the presence of seeds at this site.

HISTORICAL ARTIFACTS

Glass Trade Beads

Two nearly identical, very small globular glass trade beads were recovered from the shelter, both just inside its western mouth. Glass trade beads were first introduced to southern California in 1542 with the Cabrillo visit but are extremely uncommon until the Portolá expedition of 1769 and subsequent founding of the missions. Clement Meighan (personal communication), in comparing the LAn-1031 glass beads with those excavated at the Malibu site, is of the opinion that the Canasta Rockshelter examples are of the type commonly given to the Indians at the southern California missions around 1810.

Glass Beads

Cat. No.	629-210
Provenience	D3 30-40 cm
Color	Blue-green
Diameter, mm	3

Cat. No.	629-223
Provenience	D3 70-80 cm
Color	Blue
Diameter, mm	3

These two beads conform to Greenwood and Browne's (1969:42) trade bead Type 6c3 at the site of Ven-3, or Shisholop, adjacent to Ventura Mission. Ventura Mission could have been the source of the two LAn-1031 glass beads; Gibson (n.d.) analyzes a very large sample from historical archaeological work at the presumed source of supply. Similar small blue glass trade beads were recovered from the Arroyo Sequit site (Curtis 1959:96), the Conejo Rockshelter (Glassow, 1965:48, 56), the Century Ranch sites (King, Blackburn, and Chandonet 1968:80), and Ven-12, the Canterbury Cave site (Rigby, personal communication).

Metal

A single metal fragment of nonrecent manufacture was recovered from the Canasta shelter in a very corroded and tarnished condition. The silvery appearance of one surface after polish indicates nonferrous origin, and the most likely material is tin or a tin alloy. That the metal piece is a fragment of some larger sheetmetal artifact probably of Mission period age seems likely; sheet metal artifacts of tin or primitive alloys were not common during the Mission period, but some objects such as candle lanterns, inexpensive bridle fittings, etc. were in circulation. To our knowledge, no comparative materials exist for this piece at any other Santa Monica Mountains rockshelter site. Numerous metal artifacts have been reported from the historic Malibu cemetery, however (Bickford n.d.:8-9).

Cat. No.	629-226
Description	Fragment (tin?) heavily tarnished
Provenience	D4 70-80 cm
LxWxTh., cm	1.2 x 0.6 x 0.1

COMPARISONS AND CONCLUSIONS

LAn-1031 presents typological similarities to other archaeological sites such as LAn-807 and 808 in the Three Springs Valley as well as to others in the Santa Monica Mountains area beyond. But is the LAn-1031 site different from other excavated sites in Los Angeles and Ventura counties? Few archaeologists would dispute the conclusion that rockshelter excavations offer a better artifactual return on the hour of digging than any other site type in southern California because conditions for preservation of normally perishable artifacts cannot be matched by non-cave sites. If we are interested in site function, we cannot do better than to study those sites best equipped to provide us with the complete range of artifacts, both perishable and imperishable, in use at specific times. Those sites in our study area are rockshelters.

A common impression is that rockshelter functions are determined to a large degree by natural variables such as the absolute size of the shelter, proximity to water, ease of access, etc. Yet, can it always be true that lower-elevation shelters of large size served as habitation sites whereas smaller shelters at higher elevations served as caches or shrines? Could functions have been multiple or have changed over time? Even a cursory analysis of rockshelters in the Santa Monica Mountains area (table 8.14) reveals no common pattern; local examples may have served as habitation sites or shrines, as cache locations or in other ways not yet fully understood.

Kowta and Hurst (1960) believe that the Triunfo Rockshelter (Ven-15) may have experienced two major periods of occupation: the first possibly as early as the Early Millingstone period, the later during the Late Prehistoric period. We would presume at least seasonal habitation in the cave during the early period and probably a more casual use later, if only to judge from the lack of obviously sumptuary artifacts.

Glassow (1965:66) believes that the Conejo Rockshelter (Ven-69) was a habitation site occupied by perhaps a dozen people, and possibly year round, where the principal activities were food-getting, stone tool manufacturing and some basket making, and possibly ritual activities. The

LAn-341 rockshelter in Topanga Canyon contained painted pebbles apparently intentionally buried, and Meighan (1969) interprets this site as a shrine or ritual repository of special artifacts.

Clewlow, Whitley, Drews, and Simon (1979) report on two small rockshelters, Ven-68 and Ven-373 in the upper Medea Creek drainage, and interpret them as "caches of very specific items so different [as to suggest] that they may represent the remains of sacred or ceremonial activities." (ibid.: 147). Consequently, these authors presume that both shelters were "sacred places." There is an expectable tendency to view unusual (or, at least, newly discovered) archaeological situations as the result of shamanistic activities; yet, such interpretations are sometimes expressed so frequently that one wonders if all the prehistoric inhabitants of a given study area are being claimed as shamans. Comparative analysis of the Ven-68 and Ven-373 sites reveal them not to be so much sacred places but secret places, where perishable or valuable items could be hidden away for later retrieval or where a single visit by shellfish eating persons left a scatter of conchological trash.

In light of this brief discussion of comparative examples amongst rockshelters excavated in Los Angeles and Ventura counties, the LAn-1031 site seems unique in some respects. It is the first scientifically excavated site in the Santa Monica Mountains to produce preserved human fecal specimens, important for the reconstruction of ancient diet. It is the first to produce leather, feathers, netting, and basketry in association, found in contexts allowing for depositional reconstruction and, ultimately, for a formal interpretation of site function. No exclusively female-associated artifacts were found in the shelter (basketry, made by women, was, of course, used by both sexes, and beads, made by men, were also used by both sexes). Finally, the Canasta Rockshelter is the first cave site in which specific activity areas can be isolated.

While the artifact component from the site is not large, it is surprisingly varied, with no obvious common functional theme. Consequently, we may conclude that the LAn-1031 site cannot be evaluated by the same set of expectations as simpler sites or those with less well-preserved deposits. The Canasta Rockshelter, because of its Spanish colonial artifacts, can be dated to the Early Historic period, but it is likely that its earliest use began in the Late Prehistoric period: at least two phases of occupation and two basically different functions may be identified for the site.

The first use of the Canasta Rockshelter probably was made during the Prehistoric period and was generalized and nonspecific. Some shellfish and game animals were imported and eaten, and some chipped-stone artifacts were made inside the cave while it was in use as a temporary shelter or possible game lookout. Small shell fragments, animal bone, and debitage are haphazardly distributed and fairly random throughout the lower levels of the cave. All the modified bone artifacts and natural blades are presumed to have been deposited at this time; indeed, the original attraction of the shelter to its earliest exploiters may have been its proximity to the natural source of basalt blades. If the activities carried out in the shelter were associated with hunting, it is likely that the sole users of LAn-1031 at this time were males—a reasonable expectation given the normal California fear of female contamination of

Table 8.14. Rockshelter Comparative Data

Site	Elevation Feet MSL	Accessibility	Floor Area	Max. Height, m	Midden Present	Function
LAn-1031	1580	Difficult	80 m²	1	no	Cache
Ven-68	1650 (?)	N.I.	3 m²	1	no	Cache
Ven-373	1660	Difficult	15 m²	2	no	Cache
LAn-341	1200	Difficult	22.5 yds	?	no	Shrine
Ven-12	1200	Easy	420 m²	4.57	yes	Habitation
Ven-15	900	Easy	583.3 yds	4	yes	Habitation
Ven-69	900	Easy	213 yds	3	yes	Habitation

hunting implements and actions and the absence of female-associated artifacts.

A completely different and more specific function, that of a cache or special repository for culturally significant artifacts, seems to postdate the first presumed function. We can assume that cache sites such as LAn-1031 could have represented offerings made for some votive or religious reason; or, equally plausible, they may have resulted from more secular, materialistic concerns. A location such as the Canasta Rockshelter would have had advantages over many other available cache locations. Why might the LAn-1031 rockshelter have been used as a cache? Because, visible for miles around, it could always be relocated, and possessions, even if buried or hidden inside it, could be found when needed. Unlike open sites, where one presumes that cached items were constantly getting lost or possibly being discovered by the wrong persons, a rockshelter hard to reach yet visible for miles around could have served as the equivalent of a temporary safety deposit box. Emplaced objects would be known to be safe, intruders easily spotted, and the cave would have provided protection from accidental and occasional fires.

At least two, and possibly more, separate and intentional episodes of deposition can be identified within the shelter. These are spatially distinct from each other and incorporate different kinds or proportions of artifacts. One of these intentional depositional episodes (a "cache" or "offering") was made behind the column in the eastern end of the cave and incorporated all the quartz crystals, the projectile point and biface knife, most of the asphaltum, and some of the shell beads recovered. Lacking any obviously historical artifacts, we must presume that this deposit was made in the Late Prehistoric period.

The second deposit was made in the western corner of the cave and incorporated at least two and possibly more baskets, two storage nets, the whole shells and abalone dish, leather, feathers, and steatite shaft straightener, as well as the two glass trade beads, all presumably emplaced as a group. The glass beads firmly date this second cache or offering to the Early Historic period, perhaps as late as 1810. Again, no artifacts obviously associated with female functions are known from either deposit, suggesting once more that a male or males are making the trek up the mountainside to place their valuables in the shelter. One is tempted to believe that the last visit was made to the site during a time when the old prehistoric villages in the valleys below had already become abandoned through removal of their population to the Missions; consequently, we might interpret the final visitation to the LAn-1031 site as the final archaeologically identifiable aboriginal act played out in the Three Springs Valley.

ACKNOWLEDGMENTS

Dillon directed investigations of LAn-1031 during the first episodes of excavation; Beroza served as crew chief during the second and did most of the laboratory analysis subsequent to fieldwork. Douglas Armstrong, Kofi Agorsah, and Keith Johnson provided splendid assistance during the early days of excavation, and we are most grateful. Our thanks to Mercedes Duque for her analysis of the coprolites and faunal remains from the shelter and to Mimi Horner for her perceptive analysis of the shell remains. Craig Bates lent his considerable expertise to our examination and analysis of the basketry and netting fragments. Jacquelyn Chesi and Christine Hastorf were responsible for identifying the seeds recovered from the deposit. Jenny Corsiglia produced the superlative artifact illustrations, and Jeff Rigby and Joe Simon both contributed information from their own unpublished studies on local cave sites. Finally, Clem Meighan visited us at the Canasta shelter on several occasions during its excavation, served as mentor to both of us, and was a constant source of information and encouragement: to him we dedicate this report.

9. ANALYSIS OF COPROLITES FROM LAN-1031

Mercedes Duque

Excavation of the LAn-1031 rockshelter (chap. 8, this vol.) resulted in the discovery of large amounts of animal feces and seven samples of human origin. One unit (C2) and level (30-40 cm below surface) contained several such samples in association with shell and basketry fragments and some shell beads. This study offers an analysis of the preserved feces from this unit and level, as well as those thought to be of human origin from adjacent units.

Various problems attend the identification of coprolite components and the reconstruction and comparison of prehistoric diets in any location, the most basic of which concern preservation. Human fecal remains preserved through desiccation are commonly encountered in extremely arid regions and are known from southeastern California and the greater American Southwest. Archaeological feces are almost nonexistent in southern California, and it is possible that the specimens from LAn-1031 are the first to be scientifically excavated and studied from Los Angeles County. The Three Springs Valley rockshelter provided an excellent preservation environment not only for the fecal material recovered, but for basketry and fragments of comparatively rare fiber netting as well. It is probable that LAn-1031 is not unique in the Santa Monica Mountains or in Los Angeles County for its preservation characteristics, and that as improved excavation techniques are employed at other sites in the vicinity, a larger coprolite sample will be obtained that will be useful in the reconstruction of dietary patterns and differences over space and time in southern California.

It is well, although somewhat discouraging, to recognize the inherent limitations of coprolite analysis before any such study begins. Samples recovered are often fragmentary or too small to be analyzed adequately, and there is no absolute method to differentiate human from animal feces in all cases. Dogs and coyotes, for example, can ingest human feces and their own excreta will naturally reflect what they have eaten. Certain things may be accidentally ingested, such as grit from stone grinding, dirt, insects, or background pollen in or on certain foods. On the other side of the problem, likely or expectable components that are absent in the sample must also be considered. Some foods digest more readily than others and may not be represented in the fecal residue at all; chemical reactions, which can differ in various materials, can change the components' physical appearance. Muscle fiber, for example, is usually digested in the intestinal tract, and its absence in human fecal remains should not be considered as convincing proof that the defecator was a vegetarian. Furthermore, it is difficult if not impossible to reconstruct the yearly dietary cycle if there was only seasonal or occasional occupation at a site. It is likewise difficult to assess the total range of day-to-day dietary items through studying only a few coprolites, if they have come from a site occupied over a long stretch of time. Napton and Heizer (1970) in a comparative study discovered ratios ranging from one coprolite for every 9 years of occupation at Hogup Cave, Utah, to one for every 365 years of occupation at Lovelock Cave, Nevada. Fortunately, methods of coprolite analysis have become somewhat standardized in recent years, and this situation guarantees that comparisons between sites, regardless of sample sizes, can be effected with confidence.

LABORATORY PROCEDURES

The general appearance, measurements, weight, texture, contents, and odor of each specimen were noted, following the suggestions of Bryant (1974a, 1974b), Bryant and Williams-Dean (1975), Callen (1967, 1970), Fry (n.d.), Heizer (1970), Heizer and Napton (1969), Napton and Heizer (1970), Wilke (1978), and Wilke and Hall (1975). Dr. Wilke was kind enough to personally advise me on basic laboratory procedures, and Dr. Kathryn Bolles of the UCLA Biology Department, Elsie Sandefur of the Bone Lab, and Christine Hastorf of the Ethnobotany Laboratory, the latter two of the UCLA Institute of Archaeology, generously aided in the identification of plant and animal remains.

Each specimen from LAn-1031 was cut in half lengthwise, and one-half was saved as a control specimen for future study. The remaining half was then weighed and placed in a screw-top jar, and an aqueous solution of 0.5% trisodium phosphate ($NaPO_4$) was added so that the specimen was covered; this amount usually worked out to approximately 60 cc. The $NaPO_4$ solution hydrates the specimens without structural harm and separates debris from undigestible material. Wet analysis is thought to reconstitute the sample to its original size, and the rehydration makes it easier to identify and separate components. The solution also removes some of the bile. The specimens were soaked from 11 to 18 days, after which the color, translucency or opaqueness of the solution, and presence of odor and scum were noted. Specimens from herbivores turn the trisodium phosphate solution a pale yellow to light brown and translucent; carnivores, white, pale brown, or yellow-brown and translucent. Human coprolites turn the solution dark brown to black and opaque. It has been suggested that a scum or chemical skin on the surface of the solution denotes the presence of meat, although Callen (1967) states that the scum only appears when the coprolites contain a mixture of meat and vegetal material, not meat alone. None of the LAn-1031 specimens produced a scum on the solution. Animal coprolites give off a musty odor after rehydration, but human specimens are said to reproduce their original odor. This may not be due to active intestinal bacterial putrefaction but to the breakdown of protein producing 3 methyl indole, responsible for the odor.

The soaked contents of each jar were poured through a 20-mesh and a 100-mesh screen. None of the specimens were entirely broken up but were softened enough to gently break apart. There does not seem to be an ideal time for the specimen's removal, although 90 days of soaking has been suggested, with hard and quick shaking each day to break up the specimen. Specimens have been kept up to three years with no adverse effect (Wilke 1980, personal communication). The liquid was measured and saved for any future analysis. The solid remains were dried, weighed, and a general description of the contents noted, using a 10x lens and binocular microscope. The specimens were then placed in medium (for 20-mesh screening), and small (100-mesh screening) plastic bottles with snap lids and labeled. See tables 9.1 and 9.2 for results of this analysis.

ANALYSIS

Herbivore

Two specimens, #5 (oblong) and #6 (round), were considered herbivore. Both were firm pellets of vegetal material containing tiny twigs and were still firm after soaking. The solutions were both yellow-orange to light brown and cloudy, or transparent, with no odor or scum.

Specimen #5 was identified as from *Neotoma fuscipes* (dusky footed woodrat) or *Neotoma lepida* (desert rat) by Dr. Bolles. *Neotoma fuscipes* is the most likely as it is a chaparral dweller. Specimen #6 was confirmed by Bolles as *Lepus californicus* (black-tailed hare or jackrabbit).

Table 9.1. Coprolite Analysis from the Three Springs Valley

#	Museum Number	Unit	Depth (cm)	Color of Specimen	Dimensions L (cm)	W (cm)	Th. (cm)	Weight (g)	Wt Soaked (g)	Wt after Soak 20-mesh	Wt after Soak 100-mesh	Sedi-ment in Liquid	Color of Solution	Trans-lucency of Sol.	Odor	Scum	Days Soaking
1	692-995 Bag 2	C2	10-20	brown	3.0	2.5	1.3	2.15	1.00	1.4	trace	none brown	dark cloudy	slight	no	no	11
2A	629-996	C2 Sq 7	30-40	dark brown; hard, fine-grained, few black specks	1.1	0.9	0.6	0.60			DID NOT SOAK						
2B	629-997	C2 Sq 7	30-40	dark brown	2.1	1.7	0.7	0.50	0.40	0.3	trace	none	orange	slight cloudy	no	no	11
2C	629-998	C2 Sq 7	30-40	dark brown	2.2	2.1	1.0	1.00	0.40	0.5	trace	none	orange-brown	clear	no	no	11
2D	629-999	C2 Sq 7	30-40	brown; Probably part of 2B & 2C; twigs, leaf frags., white specks	3.8	2.6	1.7	2.30									
3	629-1000	B2	40-50	red to brown	4.2	3.1	1.7	5.15	2.10	2.6	0.9	large amount	black-brown	opaque	no	no	15
4A	629-1001	C3	40-50	brown	2.1	1.8	1.5	1.50	0.40	0.3	trace	trace	orange-brown	clear	no	no	11
4B	629-1002	C3	40-50	lt. gray yellow-gray	2.6	1.7	2.8	2.10	0.80	0.7	trace	small amount	yellow-gray	cloudy	yes	no	11
4C	629-1003	C3	40-50	brown	3.8	3.0		4.80	2.60	2.0	trace	small amount	yellow-gray	opaque	no	no	11
5	629-1004	C3	40-50	dark brown; brn.-black gray & brn.	0.1-0.5	0.8-1.0		0.50	(10.) 5.00	4.5	0.2	small amount	orange-brown	cloudy	no	no	15
6	629-1005	C3	40-50	dark brown	0.1-1.5	0.8-1.0		aver. 0.30	(10.) 3.00	3.6	trace	large amount	yellow-orange, brown	cloudy	no	no	18
7	629-1006	C3	40-50	gray light brn.	2.7	1.7	1.6	2.40	1.30	2.7	0.3	small amount	yellow-brown	cloudy	yes	no	18
8	629-1007	D3	30-40	brown	2.6	1.8	0.6	1.25	0.75	0.8	trace	small amount	orange-brown	slight cloudy	no	no	15
9	629-1008	D3	30-40	light gray	1.8	1.2	1.0	0.40	0.15	0.1	trace	none	pale yellow	clear	no	no	11

Carnivore

The carnivore specimens, #4B, #7, and #9, were gray, chalky, and crumbly, containing fur, hair, and bone fragments, and were clumped together with gray claylike debris. White and chalky remains were considered most likely of canine origin. Hair is little affected by the digestive process. Carnivore specimens can often be identified by the hard outer coating of dried intestinal lubricant secreted as protection against intestinal wall perforation by ingested small sharp pieces of bone (Callen 1967). One sample, #7, had this shiny coating. Though coprolites containing bone, cartilage, and meat are sometimes difficult to break up, I found this not to be the case with the LAn-1031 specimens. The carnivore solutions were pale yellow-gray and yellow-brown, and both #4B and #7 were cloudy. Only #9 was pale yellow and clear.

#	Bone	Hair	Contents	Botanical/Faunal Analysis	Specimen
1	0	0	Translucent rock (1); light brown fiber, crushed yellow fiber; black shiny seed	Lamiaceae; Asteraceae composite; *Geranium* sp.; *Amaranthus* sp.	Human
2A	0	0	-	-	Probably human
2B	0	0	White/yellow cartilagelike object; crushed yellow fiber or pod; brown fibers; light brown twigs	Lamiaceae, species unknown; *Helianthus* sp.	Human
2C	0	0	Translucent rock (1); yellow seeds; fibers; gray/brown pods	*Scirpus* sp.; long grass (species unknown Poaceae); composite Asteraceae	Human
2D	0	0			Probably human
3	0	0	Finely crushed mass clumped together; no whole seeds	No identification	Human
4A	0	0	Yellow-brown twigs, 0.7 mm wide; tarlike substance	Thin composite-type seeds (Asteraceae)	Human
4B	x	x	10 bone fragments, 1 tooth, 1 claw, black & white hair; gray clay, 3 black seeds or rocks (?)	Bone identified as *Sylvilagus* sp.	Carnivore *Canis latrans* (coyote)
4C	0	0	Brown-black fibers; black shiny seeds; yellow seed	*Salvia columbariae*, chia	Human
5	0	0	Twigs	?	Herbivore *Neotoma fuscipes* (dusky-footed woodrat)
6	0	0	Brown, finely crushed twigs, fibers; all vegetal material	-	Herbivore *Lepus californicus* (jack-rabbit, black-tailed hare)
7	x	x	Bone fragments; black & white hairs; hard, dry twigs, dirt, fur, hair on dry specimen; shiny substance on surface	Bone identified as *Sylvilagus* sp.	Carnivore *Canis latrans* (coyote)
8	0	0	Translucent pieces; yellow twigs; gray barklike fiber; no seeds	No identification for twigs	Human
9	x	x	Gray claylike lumps; white hairs; auburn hairs; bone fragments too broken for identifcation	-	Carnivore *Canis latrans* (coyote)

The only specimens which had an objectionable odor were #4B and #7; these contained bone fragments and hair and had an odor before soaking. Interestingly, specimen #9, the other carnivore sample, lacked odor. I considered #4B, #7, and #9 to be coyote. Bone fragments in #7 were identified by Elsie Sandefur of the UCLA Zooarchaeology Laboratory as *Sylvilagus bachmani* (brush rabbit) or *Sylvilagus auduboni* (desert cottontail).

Human

The human fecal samples—#1, #2B, #2C, #3, #4A, #4C, and #8—tended to color the solution more darkly than those thought to be herbivore or carnivore and were cloudy but not opaque, except for #3. Sample #3 had the darkest solution and seemed to be the one in which the material was most pulverized. What has been eaten is probably the most important determinant for the solution's color. No samples produced the opaque solution and scum thought to be the result of a combination of meat and vegetable.

Rehydrating the human fecal remains did not increase their size. It is probable that samples #2B, #2C, and #2D are all fragments of a single specimen. Most specimens absorbed approximately 10 cc of the liquid and could have benefited from a longer soaking as they all had to be separated after soaking, except for #3. Feces with mixed contents of plant fiber, burned bone fragments, charcoal flecks, mammal hair, cracked or ground seeds, seashell, eggshell, nutshell, feathers, and insect chitin (exoskeleton) are most likely human. The LAn-1031 specimens seemed to consist of vegetal material, seeds, and tobaccolike brown fibers. Leaves may be altered in form from chewing and digestion, but vegetal fiber may be little affected. Testa or the outer coats of seed may be excreted almost unchanged in the feces. No fish scales or insect chitin were identified in the samples. There was a musty but non-fecal odor in the human samples, which may have been due to their lack of protein material.

One translucent stone was found in each of two human samples, #1 and #2C. These could be grit from grinding seeds, an accidental ingestion with food or water, or they may have gotten into the sample after defecation. The material in all the human specimens seemed well chewed and/or digested, and it was difficult to pick out more than a few seeds or vegetal material for identification. The plant material which could be identified in the human samples included:

#1 Family: Lamiaceae. Possibly *Mentha arvenis*, wild mint.
Family: Amaranthaceae. *Amaranthus* sp., amaranth.
Family: Asteraceae. *Aster* sp., aster.
Family: Geraniaceae. *Geranium* sp., cranesbill.

#2B Family: Apparently Lamiaceae. Species unknown.
Family: Asteraceae. *Helianthus* sp., sunflower.

#2C Family: Cyperaceae. *Scirpus* sp., tule or bullrush.
Family: Poaceae. Species unknown, grass.
Family: Asteraceae. Species unknown, possibly *Grindelia*, gum plant, *Madia*, tarweed, or *Helianthus*, sunflower.

#3 Contained no whole seeds and was too finely crushed to be identified.

#4A Family: Asteraceae. Pieces of twigs, fibrous material. 0.7 mm wide.

#4C Family: Lamiaceae. *Salvia columbariae*, chia.

#8 No seeds; unidentified twigs.

CONCLUSIONS

Coprolite analysis can form an integral part of the overall study of an archaeological site through providing information about the actual diet of the site's ancient inhabitants, patterns of seasonal subsistence, and the presence/absence of certain plant and animal species in the surrounding area. The human fecal remains from the Canasta Rockshelter, interestingly in light of the faunal remains recovered from this site and from LAn-807 below, are suggestive of a diet exclusively vegetarian, but the lack of indicators for meat (bone fragments, hair, etc.) could indicate vegetarianism by chance as easily as by design for only a few days prior to defecation. Dillon (personal communication) suggests that forgoing meat for extended periods of time was a characteristic aspect of many kinds of male oriented behavior in aboriginal southern California. Abstaining from meat was associated with certain kinds of ritual or quasi-ritual purification, such as that associated with puberty initiations, "vision quests," or even preparations for hunting ventures. Defecation inside the Canasta Rockshelter instead of outside it may have been the result of self-induced confinement for periods of time longer than a single day, which would also be consistent with ritual abstemious behavior.

The characteristic vegetation of the Three Springs Valley was probably a mixed chaparral and oak woodland during the time of the site's occupation and should have provided an adequate supply of plant material, nuts, grass seeds, small animals, and birds, as well as larger game for human subsistence. While the vegetal materials identified in the rock shelter specimens cannot in most cases be precisely speciated, the plant families to which they are thought to belong in all cases are represented in the Three Springs Valley area, and it is likely that the meals the coprolites represent were eaten locally.

While the LAn-1031 coprolite sample is small, it is nevertheless of extreme importance, since it is the first concrete evidence of archaeological diet to be recovered from Los Angeles County and the Chumash/Gabrieliño boundary area. It is hoped that this study will stimulate other regional excavations devoted to the discovery and analysis of human fecal remains, and that a much larger body of such evidence can be accumulated. Few avenues of research offer greater potential for understanding ancient diet, subsistence, and forms of adaptation to the local environment than coprolite analysis.

10.
ANALYSIS OF FAUNAL REMAINS FROM THE THREE SPRINGS VALLEY

Mercedes Duque

INTRODUCTION

The three sites investigated by the UCLA Archaeological Survey during Brian D. Dillon's 1980-81 field classes are all situated in chaparral, oak parkland, and brushy areas. The same animal species represented archaeologically in the Three Springs Valley in most cases also inhabit the area at the present time. Mammals that are still common, for example, are deer, brush rabbit, jackrabbit, woodrat, coyote, bobcat, gopher, and mouse. Reports still occur of exotic species, such as the puma, wandering into the valley (Dillon, personal communication), but such large predators have now been largely replaced by feral and domestic dogs. Migratory waterfowl such as ducks make limited use of the streams and puddles in the valley bottoms, but quail, doves, and other edible birds are found in great quantity during the fall and summer months. Amphibians are common in the wetter stream bottoms, and reptiles, principally lizards and snakes, are ubiquitous; several rattlesnakes, for example, were encountered during the 1980 field season.

Animals indigenous to this area but not represented in the Three Springs Valley bone sample are:

Mountain lion *(Felis concolor)*
Badger *(Taxidea taxus)*
Raccoon *(Procyon lotor)*
Virginia opossum *(Didelphis marsupralis)*
Striped skunk *(Mephitis mephitis)*
California mole *(Scapanus latimanus)*
Chipmunk *(Eutamias merriami)*

In a standard faunal analysis such as the present exercise, most whole bones, teeth, and articular surfaces are identifiable; ribs, vertebrae, and long bone fragments are more difficult (if not impossible) to analyze. Large and dense bones (such as the astragalus, calcaneus, teeth, and mandibles) survive chemical and mechanical weathering best. All bones are better preserved if quickly buried, protected from scavengers and the weather, than if they are left exposed.

It is an unfortunate truism that absolute amounts of bone as originally deposited cannot often be discovered archaeologically, for even under the best of circumstances only a small percentage of the bone laid down at a prehistoric site is recovered. Dispersal of bone by animals after disposal and damage by burrowing animals after burial are particularly acute problems in southern California sites; the chief culprits in such contexts are the common coyote and the ground squirrel. On the other hand, simply because animal bone is found at an archaeological site is no guarantee that it represents some ancient cultural use; this is particularly true when large quantities of well preserved small mammal bone are found in sites otherwise devoid of faunal remains. Despite such problems, faunal analysis is useful and normally concentrates

Table 10.1. Total Amount of Bone, Percentage Burned, Amount Cut (Butchered), and Minimum Number of Individuals at LAn-807

	No. Pieces of Bone	Wt. Grams	Total Burned	% Species Burned	Cut	MNI
ARTIODACTYLA						
Mule deer *(Odocoileus hemionus)*	24	88.0	3	12	1	2- 1 adult, 1 juvenile
Large mammal	1178	475.4	441	37	22	-
CARNIVORA						
Bobcat *(Lynx rufus)*	3	6.6	-	-	-	1
Coyote/Dog *(Canis* sp.)	3	2.3	-	-	-	1
Gray fox *(Urocyon* sp.)	2	2.2	-	-	-	1
LAGOMORPHA						
Jackrabbit *(Lepus* sp.)	3	1.6	-	-	-	1
Rabbit *(Sylvilagus* sp.)	71	17.1	4	5	-	3
Medium mammal	836	74.6	319	38	2	3
RODENTIA						
Gray squirrel *(Sciurus griseus)*	5	1.3	-	-	-	1
Gopher *(Thomomys* sp.)	22	3.9	-	-	-	3- 2 adult, 1 juvenile
Woodrat *(Neotoma* sp.)	12	2.9	-	-	-	2
Kangaroo rat *(Dipodomys* sp.)	3	0.5	-	-	-	2- 1 adult, 1 juvenile
Ground squirrel *(Spermophilus* sp.)	11	2.3	-	-	-	2- 1 adult, 1 juvenile
Small mammal	354	22.6	86	24	-	-
Mouse *(Peromyscus* sp.)	6	0.3	6	-	-	1
Mouse Size mammal	7	0.2	-	-	-	-
Fish	50	17.3	6	11	-	2
Bird	16	1.9	2	12	-	1
Turtle	3	1.3	-	-	-	1
Snake	1	0.1	-	-	-	1
TOTAL	2610	722.4 grams	867	33%of bone burned	25	28

upon such topics as the nature of the animal food present (or meat eaten); the kinds of tools, ornaments, and weapons made from animal bone; and the clothing and shelter derived from skin or hides.

FAUNAL ANALYSIS: LAn-807

A total of 2,610 mammal, fish, bird, and reptile bone specimens, almost all small fragments (under 2 cm and 1 g), were excavated from LAn 807 (table 10.1). Only 165 pieces or 6% could be identified to genus or species (tables 10.2, 10.3). Because of the extremely high fragmentation of the bone, only 22 whole bones (8%) were recovered, with the exception of some rodent teeth and fish vertebrae from small or medium-sized mammals (table 10.4). Fragmentation of the bone was the result of several food preparation techniques. The Indians of southern California prepared meat by pounding, grinding, boiling, and roasting. Meat and fish were sun dried (Landberg 1965:187). Small mammals were pounded and pulverized in a mortar, crushing the bones prior to cooking and/or eating (Harrington 1942:9). The degree of frag-

Table 10.2. Identified Bone by Genus and Species at LAn-807

Unit	Level	Element*	No.	Wt.	Cut	Burned	Comments
Odocoileus hemionus (mule deer)							
1	10-20	Tibia	1	9.0	x	-	-
1	20-30	Tibia, Rt. Proximal	1	3.7	-	-	Shiny
1	40-50	Rib	1	1.8	-	-	-
1	40-50	Scapula	4	6.0	-	-	-
1	60-70	Naviculo-cuboid, Rt.	1	5.5	-	-	Gnawed
2	30-40	Tooth, Upper PM or M	1	1.0	-	-	-
3	30-40	Antler	1	2.7	-	x	-
3	40-50	Pelvis	3	26.2	-	-	-
4	30-40	Humerus, Rt. Distal	2	8.4	-	x(1)	Fit together
5	40-50**	Teeth	2	0.2	-	-	-
5	70-80	Metatarsal	1	1.7	-	-	-
7	40-50	Metatarsal, Proximal	1	1.7	-	x	-
8	10-20	Talus, Rt.	1	3.6	-	-	-
8	40-50	Femur, Rt. Distal	2	2.6	-	-	Cancellous
9	40-50	Metatarsal	1	1.4	-	-	-
9	60-70	Tibia, Rt. Distal	1	12.5	-	-	-
Lynx rufus (bobcat)							
5	20-30	Metapodial	1	0.5	-	-	-
8	50-60	Vertebra	1	1.9	-	-	-
8	60-70	Tibia, Rt. Prox.	1	4.2	-	-	
Canis sp. (coyote)							
5	40-50	Vertebra	2	1.3	-	-	Prob. *C. latrans*
5	40-50	Femur, Distal Condyle	1	1.0	-	-	Small: juv. or female
Urocyon Cinereoargenteus (gray fox)							
8	00-10	Vertebra	1	1.6	-	-	*U. californicus*
8	40-50	Mandible, Rt.	1	0.6	-	-	-
Lepus sp. (jackrabbit)							
5	20-30	Metapodial	1	0.2	-	-	-
5	40-50	Tibia, Distal	1	1.1	-	-	*L. californicus*, Prob. male
7	10-20	Calcaneus*	1	0.3	-	-	-
Neotoma sp. (woodrat)							
1	60-70	Mandible with Teeth, Lt.*	1	0.3	-	-	-
2	70-80	Mandible, M1, M2,* Incisor	1	0.4	-	-	-
3	40-50	Mandible, Rt., 2 teeth Incisor, Rt. Lower	4	0.3	-	-	-
5	50-60	Maxilla	1	1.5	-	-	-
6	40-50	Incisor	1	0.1	-	-	-
7	40-50	Molar	1	0.1	-	-	-
9	10-20	Tooth	1	0.05	-	-	-
9	50-60	Tibia, Distal	1	0.1	-	-	-
		Radius, Distal	1	0.1	-	-	-
Dipodomys sp. (kangaroo rat)							
6	60-70	Tibia*	1	0.1	-	-	-
8	70-80	Tibia, Prox.	1	0.1	-	-	*D. merriami*
9	80-90	Femur, Rt.*	1	0.3	-	-	Juvenile, epiphysis missing
Spermophilus sp. (ground squirrel)							
1	60-70	Maxilla, Incisor	2	0.1	-	-	-
		Pelvis	1	0.2	-	-	-
3	30-40	Mandible, Rt.	1	0.7	-	-	-
3	40-50	Humerus, Prox.	1	0.2	-	-	Juvenile
		Tibia, Distal	1	0.1	-	-	-
5	40-50	Pelvis, Lt. (Acetabulum)	1	0.3	-	-	-
5	70-80	Mandible, + M1	1	0.3	-	-	-
6	40-50	Tibia, Prox.	1	0.2	-	-	Juvenile
9	80-90	Calcaneus, Lt.*	1	0.1	-	-	-

Table 10.2, continued

Unit	Level	Element	No.	Wt.	Cut	Burned	Comments
Sylvilagus sp. (rabbit)							
2	40-50	Mandible, Lt. Teeth	1	2.6	-	-	-
		Maxilla	2		-	-	-
		Vertebra, Lumbar*	1		-	-	-
		Scapula, Rt.	1		-	-	2 individuals
		Tibia, Rt. Proximal	1		-	-	-
		Radius, Rt. Proximal	1		-	-	-
		Pelvis (acetabulum) Rt.	2		-	-	2 sizes pelvis
		Ulna, Lt. Proximal	1		-	-	-
2	50-60	Frontal, supraorbital	1	0.1	-	-	-
2	50-60	Pelvis	1	0.4	-	-	-
3	20-30	Tibia, Lt. Proximal	1	0.3	-	-	-
3	30-40	Tooth	1	0.05	-	-	-
		Calcaneus, Lt.*	1	0.3	-	-	-
		Scapula, Lt. Distal	1	0.2	-	-	-
3	40-50	Scapula, Rt.	1	0.1	-	-	*S. auduboni* (desert cottontail)
		Pelvis, Rt.	1	0.7	-	-	-
		Mandible, Rt, + tooth	2	0.3	-	-	-
3	50-60	Metapodial*	1	0.1	-	-	-
5	00-20	Metapodial, Distal	1	0.1	-	-	-
		Mandible, Rt.	1	0.2	-	-	-
5	20-30	Pelvis, Ilium	1	0.5	-	-	-
5	40-50	Calcaneus, Lt.*	1	0.3	-	-	*S. auduboni*
		Phalanx*	1	0.2	-	-	-
5	50-60	Phalanx*	1	0.1	-	-	-
5	60-70	Phalanx*	1	0.1	-	-	-
6	20-30	Phalanx	3	0.2	-	-	-
6	30-40	Femur, Distal	1	0.5	-	-	-
		Metatarsal	1	0.1	-	-	-
6	40-50	Mandible	1	0.2	-	-	-
		Humerus, Lt. Distal	1	0.2	-	-	-
		Radius, Rt. Proximal	1	0.1	-	-	-
		Femur, Lt. Distal	1	0.5	-	-	-
6	50-60	Metatarsal, Distal	1	0.1	-	-	-
7	20-30	Metapodial	1	0.2	-	-	-
7	40-50	Scapula (glenoid fossa)	1	0.1	-	-	-
8	20-30	Mandible	1	0.1	-	-	-
8	30-40	Scapula	2	0.3	-	-	-
8	40-50	Mandible, Rt.					
		Mandible, Lt. P4, M1, M2	2	1.5	-	-	-
8	50-60	Pelvis (Ilium)	3	0.8	-	-	-
8	60-70	Scapula (glenoid)	1	0.2	-	-	Small, female?
		Phalanx	1	0.2	-	-	-
8	70-80	Ulna, Proximal	1	0.1	-	x	-
		Tibia, Distal	1	0.2	-	-	-
		Skull	1	0.2	-	-	-
		Radius, Head, Proximal	1	0.2	-	x	Prob. *S. bachmani* (brush rabbit)
		Pelvis, Rt. (Acetabulum)	1	0.1	-	-	-
Peromyscus sp. (mouse)							
2	60-70	Femur, Rt.*	1	0.05	-	-	Juvenile
5	60-70	Femur, Lt.*	1	0.1	-	-	*P. californicus*
		Mandible, M1, M3	1	-	-	-	*P. californicus*
		Maxilla	1	0.1	-	-	-
		Skull	1	0.1	-	-	-
8	20-30	Mandible, Rt.	1	0.1	-	-	-
9	10-20	Mandible, Rt.	1	0.2	-	-	-
		Femur	1	0.6	-	-	S. bachmani
9	30-40	Tibia, Rt., Distal	1	0.2	-	-	-
		Humerus, Distal	1	0.3	-	-	-
9	50-60	Mandible, Rt.	1	0.3	-	-	-
		Scapula, acromion process	1	0.2	-	-	Small, juvenile
		Radius, Proximal	1	0.1	-	-	-
		Tibia, Distal	1	0.1	-	x	-
		Phalanges 2 + 3, Lt.	2	0.1	-	-	-
9	60-70	Mandible, Lt., Rt. Incisor + M1	2	1.1	-	-	-

Table 10.2, continued

Unit	Level	Element	No.	Wt.	Cut	Burned	Comments
Sylvilagus sp. (rabbit), continued							
		Teeth	2	0.2	-	-	-
9	70-80	Phalanx*	1	0.1	-	-	-
		Scapula, acromion process	1	0.4	-	-	-
9	80-90	Tibia, Rt., Distal	1	0.3	-	-	-
Sciurus griseus (western gray squirrel)							
3	50-60	Humerus, Rt. Distal	1	0.3	-	-	-
8	50-60	Femur, Distal	1	0.3	-	-	-
8	60-70	Femur, Head, Proximal	1	0.2	-	-	-
9	50-60	Mandible, Lt.	1	0.3	-	-	-
9	80-90	Metatarsal*	1	0.2	-	-	-
Thomomys bottae (valley pocket gopher)							
1	40-50	Tooth, M1	1	0.1	-	-	-
2	40-50	Tooth	1	0.1	-	-	-
2	50-60	Mandible, Rt. + 3 teeth	4	0.4	-	-	-
3	00-10	Skull, Mandible*	3	1.1	-	-	-
3	20-30	Femur, Rt.*	1	0.1	-	-	Juvenile
3	40-50	Mandible, Rt.	1	0.1	-	-	-
3	50-60	Mandible, Rt. + Lt.	2	0.5	-	-	-
3	70-80	Mandible, Lt., Incisor, M1, M2, M3	1	0.4	-	-	-
5	50-60	Sacrum, Ilium	1	0.4	-	-	-
		Incisor, Lower Left	1	0.1	-	-	-
5	60-70.	Frontal, Zygomatic, Rt.	1	0.1	-	-	-
7	60-70	Incisor	1	0.1	-	-	-
8	70-80	Tibia, Lt., Distal	1	0.2	-	-	-
9	10-20	Mandible, Rt. + M2	1	0.2	-	-	-
9	30-40	Incisor	1	0.1	-	-	-
9	70-80	Tooth	1	0.05	-	-	-

* Indicates whole bones, all others are fragments.
** Unit 5, Level 1 = 0-20; Unit 5, Level 2 = 20-30 which is different from all other units in depth.

Table 10.3. Skeletal Elements Represented at LAn-807

MAMMAL	Skull	Maxilla	Mandible	Tooth	Vertebra	Scapula	Humerus	Radius	Ulna	Rib	Pelvis	Femur	Tibia	Tarsals	Metatarsals	Phalanges	Totals
Odocoileus hemionus antler	1	-	-	3	-	4	2	-	-	1	3	2	3	2	3	-	24
Lynx Rufus	-	-	-	-	1	-	-	-	-	-	-	-	1	-	1	-	3
Canis sp.	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-	-	3
Urocyon cinereoargenteus	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	2
Lepus sp.	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	3
Sylvilagus sp.	2	2	11	4	1	9	2	4	2	-	8	3	6	2	5	10	71
Sciurus griseus	-	-	1	-	-	-	1	-	-	-	-	2	-	-	1	-	5
Thomomys sp.	3	-	7	9	-	-	-	-	-	-	1	1	1	-	-	-	22
Neotoma sp.	-	1	3	6	-	-	-	1	-	-	-	-	1	-	-	-	12
Dipodomys sp.	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	3
Spermophilus	-	1	2	1	-	-	1	-	-	-	3	2	-	1	-	-	11
Peromyscus sp.	1	1	2	-	-	-	-	-	-	-	-	2	-	-	-	-	6
	7	5	27	23	5	12	7	5	2	1	15	13	15	6	11	10	165

Table 10.4. Whole Bones at LAn-807

Element	Fauna	Catalog Number	Unit	Level
Skull and Mandible	*Thomomys bottae*	#73	3	1
Mandible and Teeth, Left	*Neotoma* sp.	#35	1	7
Mandible and Teeth, Left	*Neotoma* sp.	#71	2	8
Lumbar Vertebra	*Sylvilagus* sp.	#51	2	5
Femur, Right, Juvenile	*Thomomys* sp.	#81	3	3
Femur	*Dipodomys* sp.	#493	9	9
Femur, Right Juvenile	*Peromyscus* sp.	#65	2	7
Femur, Left	*Peromyscus* sp.	#214	5	6
Tibia	*Dipodomys* sp.	#273	6	7
Tibia	*Peromyscus* size*	#41	1	7
Calcaneus	*Lepus californicus*	#283	7	2
Calcaneus, Left	*Sylvilagus* sp.	#89	3	4
Calcaneus, Left	*Sylvilagus audubonl*	#188	5	4
Calcaneus, Left	*Spermophilus* sp.	#495	9	9
Calcaneus, Left	*Spermophilus* size*	#101	3	5
Metatarsal	*Sciurus* sp.	#494	9	9
Metapodial	*Sylvilagus* sp.	#122	3	6
Phalanx	*Sylvilagus audubonl*	#189	5	4
Phalanx	*Sylvilagus* sp.	#196	5	5
Phalanx	*Sylvilagus* sp.	#207	5	6
Phalanx	*Sylvilagus* sp.	#479	9	8
Unidentified	Small mammal size*	#486	8	8

* Unidentified mammal

Table 10.5. Amount of Bone per Surface Collecting Unit, Auger Boring, ExcavationUnit, and Level for LAn-807

	N	Wt., g
Surface Collecting Unit F	6	1.2
Surface Collecting Unit I	2	0.6
Auger Boring 6	1	0.2
Auger Boring 11	5	1.2
Auger Boring 13	1	0.1
Auger Boring 15	5	0.4
Totals	20	3.7

Level	Depth	1		2		3		4		5		6		7		8		9		Totals	
	(cm)	N	Wt	N	Wt	N	Wt	N	Wt	N	Wt	N	Wt	N	Wt	N	Wt	N	Wt	N	Wt
Surface & Auger																				20	3.7
1	0-10	1	0.3	4	1.1	18	8.0	-	-	-	-	18	5.3	3	1.1	18	6.8	4	1.0	66	23.6
2	10-20	12	21.6	-	-	-	-	-	-	29	7.9	17	5.7	24	6.4	28	12.1	16	5.0	126	58.7
3	20-30	4	5.1	24	14.5	53	15.7	5	2.2	53	12.5	50	13.1	29	4.7	89	30.1	15	3.7	322	101.6
4	30-40	153	19.7	50	12.8	126	36.0	3	8.7	52	17.0	28	7.0	68	15.3	17	5.5	89	15.6	586	137.6
5	40-50	96	25.5	62	22.6	126	47.4	9	4.7	68	18.7	27	6.9	54	10.0	22	13.0	58	11.6	522	160.4
6	50-60	-	-	55	21.5	39	7.7	9	2.0	80	18.4	35	7.8	1	0.5	64	17.3	135	25.4	418	100.6
7	60-70	29	14.3	37	8.4	2	0.2	1	0.1	85	19.1	23	4.9	7	1.5	38	11.6	90	26.3	312	86.4
8	70-80	-	-	3	1.0	3	1.1	-	-	23	8.0	7	2.8	-	-	44	5.9	80	16.0	160	34.8
9	80-90	-	-	-	-	-	-	-	-	11	2.3	-	-	-	-	-	-	63	10.9	74	13.2
10	90-100	-	-	-	-	-	-	-	-	8	1.8	-	-	-	-	-	-			8	1.8
	Totals	295	86.5	235	81.9	367	116.7	27	17.7	409	105.7	205	53.5	186	39.5	320	102.3	550	115.5	2614	722.4

N = Number of pieces
Wt = Weight, in grams

Table 10.6. Cut or Butchered Bone, LAn-807

Bone Lab Catalog No.	LAn-807 Catalog No.	Unit	Level	N	Wt., g.	Deer Size	Rabbit Size	Long Bone Frags.	Bone Frags.	Comments
9	639- 19	1	1	1	0.7	x	-	-	x	Burned
10	639- 11	1	2	2	9.0	x	-	x	-	*Odocoileus* tibia
11	639- 11	1	2	1	0.3	x	-	-	x	-
14	639- 37	1	4	4	1.1	x	-	-	x	1 burned
22	630- 56	1	5	1	0.4	x	-	x	-	-
23	639- 56	1	5	3	2.1	x	-	x	-	Burned
43	639-103	2	3	2	1.2	x	-	-	x	-
118	639-278	3	6	1	0.2	-	x	x	-	-
140	639-333	4	4	1	0.9	x	-	-	x	-
190	639-437	5	5	1	0.3	x	-	x	-	-
220	639-504	5	7	1	0.5	x	-	-	x	Burned
336	639-620	8	3	1	0.1	-	x	-	x	-
350	639-646	8	6	1	1.9	x	-	x	-	-
375	639-717	8	7	1	2.3	x	-	x	-	-
448	639-736	9	6	1	3.6	x	-	x	-	Burned
476	639-744	9	7	1	0.3	x	-	-	x	-
489	639-756	9	8	3	1.7	x	-	1	2	Burned
			Totals	25***	26.6	23*	2**	11	14	

*2 rabbit-size mammals: 1 long bone fragment, 1 bone fragment; neither burned

**23 deer-sized mammals: 10 long bone fragments, 13 bone fragments; 5 burned

***Total pieces of bone: 2,614; total pieces of cut bone: 25, or 0.95%

mentation of the large mammal pieces indicates the smashing of the extremities for marrow extraction (Langenwalter 1978: 187).

All excavated bone that appeared in the 1/8-inch mesh screens was saved, and modified bone was separated from the faunal material before submitting it to the UCLA Zooarchaeology Lab for identification and analysis. Bone artifacts are discussed in chapter 3. The bone was sorted by unit and level: units 1 through 9 and levels 1 (0-10 cm) through 10 (90-100 cm).[1] Surface units F and I and auger holes 6, 11, 13, and 15 were included (table 10.5).

The bone was then sorted into identifiable and unidentifiable categories. Each identifiable bone was classified to genus and to species when possible. Identifications were made through comparisons with the reference collection of modern specimens in the Zooarchaeology Laboratory of the Institute of Archaeology at UCLA. Age was noted whenever possible, based on standard indicators (e.g., bones with unfused or missing epiphyses were adjudged juvenile). Burned bone was studied separately, and right and left sided examples noted when recognized. It was not possible to determine the sex of the animals represented by the very fragmentary collection, except for 2 pieces of deer antler; only male deer have antlers. Some of the specimens exhibited cut marks, probably the result of butchering with sharp stone tools, while others had signs of rodent gnawing (table 10.6).

Unidentified bone fragments were placed in four categories: large-sized mammal bone was assumed to be deer; medium-sized mammal bone was presumed to be rabbit; small-sized bone was gopher or rat size; and, finally, a few mammal bones were put into a mouse-size category (table 10.1). Unidentifiable bone pieces were then divided into "long bone" fragments, indeterminate or unidentifiable fragments, or burned and unburned fragments.

All bone was weighed and counted, and each identifiable bone was bagged, labeled, and cataloged on a UCLA Zooarchaeology Laboratory sheet.

SPECIES PRESENT AT LAn-807

Twelve genera of mammal were represented: blacktail/mule deer (*Odocoileus hemionus*), bobcat (*Lynx rufus*),[2] coyote or dog (*Canis* sp.), gray fox (*Urocyon cinereoargenteus*), jackrabbit (*Lepus* sp.), rabbit (*Sylvilagus* sp.), western gray squirrel (*Sciurus griseus*), pocket gopher (*Thomomys* sp.), woodrat (*Neotoma* sp.), kangaroo rat (*Dipodomys* sp.), ground squirrel (*Spermophilus* sp.),[3] mouse (*Peromyscus* sp.) (table 10.7).

Artiodactyla

Blacktail/Mule Deer (*Odocoileus hemionus*). Deer flesh was used for food, the hide for clothing, and the bone for tools; metapodials and ulnas were made into awls (Harrington 1942:13).

Two antler fragments (one burned) were recovered from the archaeological site. Two pieces do not necessarily indicate hunting nor seasonality. The antlers of the male mule deer are shed annually; they branch equally on each side with four major tines. The antler tines found in southern California archaeological sites were commonly used as flaking tools. Since antlers are shed, a piece could have been picked up and brought back to the site as a tool. The age of deer cannot be determined by the number of antler points. Male fawns have antler "buttons" at about three months and develop antlers as yearlings. These yearlings normally have forked antlers with two points on each side. Their growth and development is dependent upon their nutrition. Deficient diets result in thin spike antlers. The annual antler cycle begins in April or May and growth is completed by late summer. Antlers are usually shed in late August and September although individuals may shed as late as March.

Table 10.7. Percentage of Bone Pieces and Weight Per Species at LAn-807

	No. of Pieces	Wt., g	% of Bone Pieces	% of Wt.	Total % of Bone	Total % of Wt.
Artiodactyla						
Mule deer (*Odocoileus hemionus*)	24	88.0	0.9	12.0		
Unidentified large mammal	1178	475.4	45.1	66.0		
Carnivora						
Bobcat (*Lynx rufus*)	3	6.6	0.1	0.9	46.3	79.5
Coyote/dog (*Canis* sp.)	3	2.3	0.1	0.3		
Fox (*Urocyon cin.*)	2	2.2	0.07			
Lagomorphia						
Jackrabbit (*Lepus* sp.)	3	1.6	0.1	0.2		
Rabbit (*Sylvilagus* sp.)	71	17.1	2.7	2.3	34.8	13.0
Unidentified medium mammal	836	74.6	32.0	10.3		
Rodentia						
Squirrel (*Sciurus griseus*)	5	1..3	0.2	0.11		
Gopher (*Thomomys* sp.)	22	3.9	0.8	0.5		
Woodrat (*Neotoma* sp.)	12	2.9	0.5	0.4	15.6	4.6
Kangaroo rat (*Dipodomys* sp.)	3	0.5	0.1			
Ground squirrel (*Spermophilus* sp.)	11	2.3	0.4			
Unidentified small mammal	354	22.6	13.5	3.0		
Mouse (*Peromyscus* sp.)	6	0.3	0.2		0.5	0.07
Unidentified mouse-size mammal	7	0.2	0.3			
Fish	54	17.3	2.0	2.0		
Bird	16	1.9	0.6			
Turtle	3	1.3	0.1		2.8	2.8
Snake	1	0.1	0.03			
	2,614	722.4				

Twenty-four other pieces of deer bone were identified; three were burned and one had cut or butchering marks. One juvenile individual was noted (juveniles are usually born in June or July). The small number of ribs (six fragments), scapulae (four pieces), pelves (three fragments), and the general absence of skull, teeth, and vertebrae suggest that primary butchering was done elsewhere. It is presumed that meat arriving at the site came attached primarily to the appendicular (pectoral and pelvic girdles and legs) skeletal parts (in "quarters"), the majority of the axial (skull, vertebrae, sternum, and ribs) skeleton having been left elsewhere. Burned deer bone fragments are best interpreted as having been discarded in cooking fires or roasted along with the meat adhering to them. The generally fragmentary nature of the long bones is consistent with the known ethnographic practice of shattering large mammal bones to extract the edible marrow.

Large Mammal Bone, Unidentifiable

The large bone is probably deer. Because of its size, it was better preserved archaeologically and therefore more easily seen and collected during excavation.

Most of the unidentifiable bone fragments, 1,178 pieces (45% of the total), were from large, deer-sized animals. These included 355 long bone fragments, 173 (49%) of which were burned, and 823 indeterminate bone fragments, 268 (33%) of which were burned.

Carnivora

BOBCAT (*Lynx rufus*). The bobcat frequents brushy chaparral and rimrock areas which support rabbits and rodents, his principal prey. He is nocturnal and solitary. At LAn-807, the bobcat was represented by a metapodial, vertebra, and the right proximal end of a tibia.

COYOTE, DOG, WOLF (*Canis* sp.) It is difficult to separate remains of the dog family into coyote, dog, or wolf; even documented differences in the skull are not always discernable when the skull bones are in a highly fragmented condition. Both the coyote (*Canis latrans*) and domestic dog (*Canis familiarus*) were eaten by the Chumash (Harrington 1942:6; Landberg 1965:55). Coyote are commonly seen in these brush and rock areas. Although they eat almost anything of animal or vegetable content, their diet consists mostly of small rodents and rabbits. Two small vertebrae and a small femur, found at the same level, compare favorably with a female coyote specimen.

GRAY FOX (*Urocyon cinereoargenteus*). The numbers of gray fox can average about four per square mile; they are nocturnal and primarily solitary, can climb trees, and the young are born in March or April. A mandible was found from a *Urocyon cinereoargenteus californicus*, a population along the Pacific coast considered a distinct species.[4] There were two pieces of fox bone from the same unit, unit 8, but from different levels, 1 and 5, which may be due to rodent intrusion.

Lagomorpha

JACKRABBIT (*Lepus* sp.). One piece of bone was identified as *Lepus californicus*, blacktail jackrabbit, the only jackrabbit species in this area. It is the common jackrabbit, a hare which is larger than *Sylvilagus*, a true rabbit. Although only three specimens could be identified as jackrabbit, some of the medium-sized unidentifiable bone could also be of this genus. So few jackrabbit bones are represented that it is unlikely that they were taken in communal rabbit drives (Landberg 1965:54). All rabbits and hares were used for food and their fur for blankets.

BRUSH RABBIT (*Sylvilagus bachmani*); DESERT COTTONTAIL (*Sylvilagus audoboni*). Both species are found in the Three Springs Valley today. The brush rabbit is smaller than the desert cottontail and is very prolific. It may have as many as five litters a year; hence, seasonal dating for this species could not be done.

The desert cottontail lives primarily in the Upper Sonoran life zone, has longer hind legs than the brush rabbit and produces only two litters per year. Two *Sylvilagus auduboni* and one *Sylvilagus bachmani* were recognized. Much of the bone could only be noted to the genus *Sylvilagus* and could not be identified to the species of rabbit. A burned tibia, ulna, and radius suggest that rabbits were roasted whole on, or in, prepared fires, and this method (well known ethnographically throughout California) allowed the ends of extremities to become burned.

Medium-size Mammal Bone, Unidentifiable

These bone fragments are of rabbit size, probably from either *Lepus* or *Sylvilagus* sp. but, because of the degree of fragmentation, they may also incorporate pieces of some small-sized bones of bobcat, coyote, dog, or fox, or large-sized bones of gopher. A total of 836 pieces of bone (74.6 g), or 32% of the total bone from the site, was from the medium-size mammal category. Three hundred nineteen pieces (38%) of this was burned, but only two examples exhibited cut marks.

Rodentia

WESTERN GRAY SQUIRREL (*Sciurus griseus*). Five bones of this mammal could be identified: one right distal humerus, the head of a femur, a metatarsal, and two left mandible fragments. It is possible that they are from one animal because the three units in which they were found are adjacent and in levels 6, 7, and 9, and the bones could have been moved by rodent intrusion. According to Harrington (1942:6), tree squirrels were eaten by the Chumash, although at the time of Landberg's writing (1965:54) these animals had not been identified archaeologically. Rodents were often pounded in a mortar and roasted in their skins (Read, n.d.:181).

VALLEY POCKET GOPHER, BOTTA'S POCKET GOPHER (*Thomomys bottae*).
The pocket gopher is one of the mammals responsible for the burrowing holes throughout the site, and some may have died in their burrows since they spend most of their lives in the underground systems, becoming intrusive into the archaeological material. They, along with woodrats and ground squirrels, were a staple in the Chumash diet (Landberg 1965:54; Read n.d.:181).

With the exception of a frontal zygomatic, a femur, a tibia, a sacrum, and an ilium, the fragments identified were mandibles and teeth, the most diagnostic features these rodents retain archaeologically. One juvenile (femoral epiphysis missing) was present. The gopher does not contribute to seasonal dating because it may bear three litters a year.

WOODRAT, PACK RAT, TRADE RAT (*Neotoma* sp.). Two species occur in this area: *Neotoma lepida* (desert woodrat) and *Neotoma fuscipes* (dusky-footed woodrat), the latter being the most common. The woodrat is also called a pack or trade rat because of his habit of collecting and hoarding objects, e.g., putting down a twig he is carrying and "trading" it for another object, particularly a shiny one. They may have several litters per year so it is impossible to tell the season by the presence of young. The woodrat bones found and identified were mandibles, a maxilla and teeth, and the distal ends of a tibia and a radius.

KANGAROO RAT (*Dipodomys* sp.). The kangaroo rat is a nocturnal, burrowing animal which has one to several litters per year, born late spring through early fall. Two tibias were identified, one a juvenile *Dipodomys merriami*, Merriam's kangaroo rat.

GROUND SQUIRREL (*Spermophilus* sp. or *Citellus* sp.). The burrowing *Spermophilus beecheyi*, the California ground squirrel, inhabits this area now. Most hibernate from October or November to February and have their young in the spring. This mammal was recognized by teeth and mandibles, a juvenile tibia and humerus, a calcaneus and three pelvis bones.

Small-size Mammal Bone, Unidentifiable

This bone is from mammals of gopher or rat size. They could be squirrel, ground squirrel, woodrat, or gopher and consist of bone pieces too broken for identification. Thirty bones were recognizable, but no genus designation could be applied. Three hundred fifty-four bones were considered: 98 "long bone fragments" and 256 unidentifiable "bone fragments;" 86 (24%) were burned. About the same number of long bone fragments (42) as unidentifiable bone fragments (44) were burned.

MOUSE (*Peromyscus* sp.). Both *Peromyscus californicus* (California mouse) and *Pero-*

myscus maniculatus (deer mouse) live in chaparral and burrow. One animal was identified as *Peromyscus californicus* by a femur and mandible. There was a juvenile femur, but it could not be seasonally categorized because these mice have several litters a year.

Mouse-sized Mammal Bone, Unidentifiable.

Unidentified were a tibia and six bone fragments, smaller than those classified as small size. This lack of very small sized bones may result from several factors: they may not have been collected, may have fallen through the screen, could have been pulverized and eaten completely, or may simply not have been preserved archaeologically.

Non-mammals

BIRD. Bird bones were all unidentifiable long bone fragments, except for one which was identified as a quail-size tarsometatarsus. Only two pieces of bird bone were burned.

TURTLE. Probably *Clemmys marmorata* (pond turtle). Three pieces of carapace were found. Turtles were used for food and their carapaces were made into dance rattles (Heizer 1978:512). This turtle would be indigenous to the area so the recovered fragments may be natural remains.

SNAKE. Only one snake vertebra was found; it was recognized by the ball-and-socket pattern of the articulation.

Cut or Butchered Bone

Less than 1% of the total bone, 25 pieces, had the cut marks of a sharp tool perpendicular to the bone shaft (table 10.7). Ten had also been burned. Most of the cut bones, 23 pieces, were of deer size and consisted of 10 long bone fragments (5 burned) and 13 undetermined bone fragments (5 burned), some of which may be additional long bone pieces but are too small to identify. Only one bone was recognizable, a deer tibia. Butchering would have been done at the joints of long bones.

The small number of large-size mammal pieces—skull, ribs (6 pieces), scapula (4), pelvis (3)—and the absence of vertebrae indicate that most deer were butchered elsewhere. The axial skeleton would most likely be left at the kill site. (Daly 1969:147; Schwartz 1968:121).

Only two medium-sized mammal bones were cut; none were burned. The medium-sized and small-sized animals would not have needed to be cut apart; they could have been cooked whole and then would easily have pulled apart.

Deer would supply about 100 lbs of meat (50% of the animal's average weight); a rabbit, about 3 lbs (50%); and a gopher, about 0.7 lbs (70%).

Gnawed bones had rounded grooves; some showed definite incisor-tooth sets of grooves, but no teeth from specimens could definitely be said to fit the grooves. Rodent intrusion and burrowing were noted in most if not all excavated levels.

Burned Bone

The presence of burned bones in the Three Springs sites may be due to the intense chaparral fires in the area; many of the bones on the surface would have been burned to ash and lost. Charring may also be due to the cooking procedure of roasting over a fire or tossing bones into the fire after eating. The larger percentage of burned deer bone may indicate roasting. Smaller animals such as rodents were smashed and cooked whole without skinning. Cooking with hot stones and liquid in a basket would not necessarily burn these bones.

Thirty-three percent (863 pieces) of the total bone was burned. Of this, 444 (51%) were of large mammal size, 323 (37%) of medium mammal size, and 92 (10%) were of small mammal size.

One bone fragment (#330) seemed to be a section of fossilized rib. It measured 6.8 cm long by 1.7 cm wide with a thickness of 0.6 cm and had a ridge for muscle attachment.

Minimum Number of Individuals

The MNI (minimum number of individuals) represented in a species sample is simply the number of individuals necessary to account for all the identified bones. It is usually calculated by counting the most

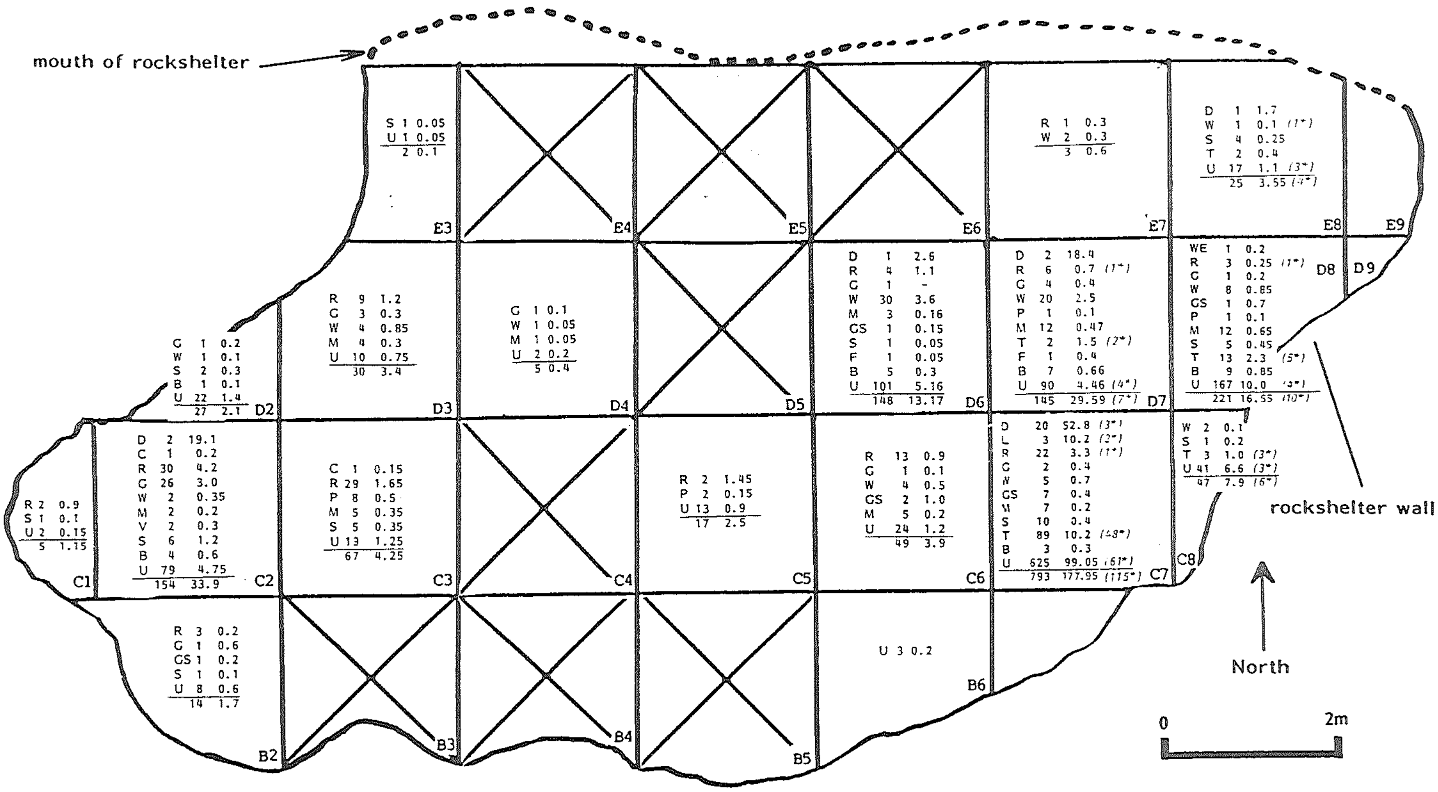


Figure 10.1. Distribution of Faunal Remains, LAn-1031. D = Deer (Odocoileus hemionus); *L = Lynx (Bobcat); C = Coyote-Dog* (Canis); *WE = Weasel* (Mustela); *R = Rabbit* (Sylvilagus); *G = Gopher* (Thomomys); *W = Woodrat* (Neotoma); *GS = Ground Squirrel* (Citellus); *P = Pocket Mouse* (Perognathus); *M= Mouse* (Peromyscus); *V = Vole* (Microtus); *S = Snake; T = Turtle; F= Fish; B =Bird; U= Unidentified. Expressed by quantity and by weight (in grams); * = quantity of burned bone.*

Table 10.8. Bone Recovered from LAn-808

Catalog No.	Unit	Level	Mammal	Element	No. Pieces	Wt. in g.	MNI	Burned	Comments
629-12	4	10-20	Large mammal	Long bone fragments	3	2.9	1	x	Probably distal humerus, deer
629-147	3	20-30	Large mammal	Long bone fragments	1	0.3	-	x	-
629-168	3	30-40	Large mammal	Epiphysis of vertebra centrum	1	0.2	-		Probably immature *odocoileus*
629-169	3	30-40	Large mammal	Long bone fragments	10	1.0	-	x	
629-336	E-5	Surface	Large mammal	Long bone fragments	5	0.7	-	x	
629-359	G-5	Surface	Large mammal	Long bone fragments & sesamoid	4	0.9	-	-	
629-390	F-6	Surface	Large mammal	Long bone fragments	1	0.2	-	-	
629-196	F-1	Surface	*Felis domesticus*	Astragalus	1	0.9	1		Probably recent
629-280	E-4	Surface	*Felis domesticus*	Left distal scapula	1	0.5	-		
629-351	F-5	Surface	*Felis domesticus*	Left distal humerus fragment	1	0.3	-		
629-499	E-9	Surface	*Felis domesticus*	Right calcaneus	1	1.4	-		All parts of 1 cat
629-274	E-4	Surface	*Sylvilagus* sp.	Cheek tooth	1	0.1			
629-12	4	10-20	Rabbit size	Long bone fragments	3	0.6		x*	*1 pc burned: 0.3 g
629-103	2	0-10	Rabbit size	Long bone fragments	2	0.3			
629-398	G-6	Surface	Rabbit size	Skull fragment	1	0.2			
629-11	F-4	Surface	*Thomomys bottae*	Left mandible-cheek tooth	2	0.2	1		
629-351	F-5	Surface	*Thomomys bottae*	Lower right incisor	1	0.2			
629-439	I-7	Surface	*Thomomys bottae*	Lower incisor	1	0.2			
629-298	F-4	Surface	*Neotoma* sp.	Right calcaneum	1	0.05	1		
629-280	E-4	Surface	Rat/goopher size	Long bone fragment	1	0.05		x	
629-268	H-3	Surface	Rat/gopher size	Long bone fragment	1	0.05		x	
				Totals	43	11.25	5	22	

Table 10.9. Total Amount of Bone, Amount and Percentage Burned, Amount Cut (Butchered), and Minimum Number of Individuals at LAn-1031

	No. of pieces	Wt. in grams	No. burned	No. cut	% of species burned	MNI	% of total bone	% of wt.
ARTIODACTYLA								
Mule Deer (*Odocoileus hemionus*)	26	94.60	3	16	0.17	3 (2A,1J)	1.48	31.2
Deer size mammal	404	97.50	46	4	2.60		23.0	32.2
CARNIVORA								
Bobcat (*Lynx rufus*)	7	11.80	2	1	0.10	1	0.4	
Coyote/Dog (*Canis* sp.)	3	0.55				1(J)		
Weasel (*Mustela* sp.)	1	0.20			1.00			
LAGOMORPHIA								
Rabbit (*Sylvilagus* sp.)	123	15.55	3		0.17	4 (3A,1J)	7.0	5.0
Rabbit size mammal	260	19.95	17		0.96		14.8	6.5
RODENTIA								
Gopher (*Thomomys* sp.)	41	5.30				5 (3A,2J)	2.3	11.7
Woodrat (*Neotoma* sp.)	80	10.2	1			6 (4A,2J)	4.5	3.3
Rat/Gopher size	334	12.10	10		0.56		19.0	4.0
Ground squirrel (*Spermophilus* sp.)	12	2.45				2	0.7	0.8
Ground squirrel size	1	0.05						
Pocket mouse (*Perognathus* sp.)	12	0.85				2	0.7	
Mouse (*Peromyscus* sp.)	51	2.58				10 (9A,1J)	2.9	0.8
Vole (*Microtus* sp.)	2	0.30				1	0.1	
Mouse-size mammal	223	6.16	2		0.10	4	12.7	2.0
Snake	33	4.07				1	1.9	1.3
Turtle	109	15.40	58		3.30	1	6.2	5.0
Fish	4	0.52				1		
Bird	29	2.61				4	1.6	0.8
Totals	1,755	302.75	142	21	8.0	47		

Note: A= Adult, J = Juvenile

frequently occuring bone element and including others when it is clear that the animals were not represented in the first count, e.g., juveniles. It must be remembered that the MNI represents the minimum number of individuals, not the number of individuals. The MNI at LAn-807 would be 28 individuals (table 10.1).

FAUNAL ANALYSIS: LAn-808

Forty-three pieces of bone were collected at the Salsipuedes site, located on the ridge above LAn-807 (table 10.8). If downslope alluvial transport was not entirely responsible for the dearth of faunal remains at LAn-808, then its users butchered and/or ate little meat on-site.

Twenty-three of the specimens were from the surface collection and probably are recent, especially in light of the fact that four of these are the bones of a domestic cat (*Felis domesticus*). Other species identified were rabbit (*Sylvilagus* sp.), one bone; woodrat (*Neotoma* sp.), one; and gopher (*Thomomys bottae*), four. In addition, there were deer-size mammal bones (25), rabbit-size bones (6), and rat-size bones (2). All of the recovered bones represent mammals indigenous to the area and may be natural rather than cultural remains.

Three units yielded collectible bone:

unit 2, 0-10 cm; unit 3, 20-30 cm and 30-40 cm; unit 4, 10-20 cm. Twenty-two pieces (51%) of the total number were burned.

FAUNAL ANALYSIS: LAn-1031

A total of 1,755 pieces of bone were examined from LAn-1031, most of which were small fragments (table 10.9). Twenty percent or 358 pieces were identified to the level of genus. The animals represented by the bone were the mule deer *(Odocoileus hemionus)*, bobcat *(Lynx rufus)*, coyote or dog *(Canis* sp.), weasel *(Mustela* sp.), rabbit *(Sylvilagus* sp.), probably the desert cottontail *(S. audoboni)* or the brush rabbit *(S. bachmani)*, the valley or Botta's pocket gopher *(Thomomys bottae)*, desert woodrat *(Neotoma lepida)* or the dusky-footed woodrat *(Neotoma fuscipes)*, ground squirrel *(Spermophilus* sp.), pocket mouse *(Perognathus* sp.) or deer mouse *(Peromyscus* sp.), vole *(Microtus* sp.), and various species of snake, turtle, fish, and bird.

Fragments of bone which were unidentifiable were classified into groups of deer/coyote-sized, rabbit size, ground squirrel size, rat/gopher size, and mouse-sized bone. All animals represented by the bone remains at LAn-1031 are indigenous to the vicinity.

Because of the slope of the rockshelter, there was almost no bone on the cliff edge. The areas to the right and left at the back of the shelter had the largest amount of bone (fig. 10.1). Fragmentation may be due to the aboriginal custom of pulverizing small animals and extracting marrow from the long bones of larger animals.

There were 28 pieces of modified bone (table 10.10). These do not include bone artifacts which were removed before the faunal analysis was done. Of these, all but four were of *Odocoileus* sp. or deer-size bones. Five were also burned, and five or more may be simply exhibiting butchering marks. Because they contain polish and scratch marks, most are probably fragments which had been used as tools. The 21 pieces of bone which exhibited cut marks or butchering marks were all from large-sized mammals.

A total of 142 bones (8% of the recovered bone) were burned (table 10.11). Forty-nine pieces (34%) were deer or of deer size. It is interesting that 58 pieces (53%) of the turtle carapace were burned. All of the burned bone was from units C7, C8, D7, D8, and E8, all in the easternmost section of the rockshelter. No hearth was found. Unit C7 contained the largest amount of bone both by number of pieces and by weight. There was a minimum number of 48 individuals at LAn-1031 (table 10.12).

The MNI (minimum number of individuals) was calculated by counting only the most frequently represented bones and including others when it is clear that the animals were not represented in the first count (i.e. juvenile). It must be remembered that the MNI represents the minimum number of individuals, not the number of individuals.

SPECIES PRESENT AT LAn-1031

Artiodactyla

MULE DEER *(Odocoileus hemionus)*. One juvenile distal metapodial of a mule deer was recovered at LAn-1031. Other deer bone fragments were from the scapula, the metapodials, and tibiae; no vertebrae were identified. Most bone is from the appendicular skeleton which suggests that the primary butchering of deer was not done at the site although some bones exhibit cutting or butchering marks.

Carnivora

BOBCAT *(Lynx rufus)*. The bobcat may have dens in rock crevices. Pieces of a right distal femur were found, one polished, one fragment with cut marks, and two burned fragments all of which suggests butchering, eating, and possible tool making.

COYOTE OR DOG *(Canis* sp.). Only three pieces of bone represent the dog family: a metapodial epiphysis, a small-sized claw, and a tooth, suggesting an immature coyote, dog, or possibly fox. Coyotes use this type of shelter, and coyote coprolites were found there. Coyotes are born in April or May.

WEASEL *(Mustella* sp.). The presence of a weasel in LAn-1031 is indicated by a mandible fragment. Weasels live in land areas near water, feeding on small mammals and birds. *Mustela frenata*, the longtail weasel, inhabits southern California.

Table 10.10. Modified Bone at LAn-1031

Specimen No.	Provenience	Bone		No. Pcs.	Wt., g.	Comments
629-724	C-7 30-40 cm	Deer size	Pelvis or scapula frag.	1	1.8	Modified scratched, burned, cut
629-726	C-7 40-50 cm	*Odocoileus* sp.	2 right scapula 1 right metacarpal 2 right scapula frags.	5	36.4	Cut marks, 4 pc. (2 individuals) 3 burned
629-726	C-7 40-50	*Lynx rufus*	Rt. distal femur	3	10.2	Polished, 1 cut, 2 burned
629-726	C-7 40-50	Deer size	Long bone frags.	3	4.0	Tool frags., 2 cut
629-739	C-7 50-60	Deer size	Long bone frags.	9	0.1	Modified tool frags.
629-739	C-7 50-60	Rabbit size	Long bone frag.	1	0.5	Polished tool frags.
629-831	D-7 30-40	*Odocoileus hemionus*	Long bone frag. Rt. tibia frag.	2	18.4	Polished, no cuts, possible tool frag.
629-895	D-7 60-70	(Deer size) Large mammal	Long bone frags.	2	0.8	Scraped, polished
629-910	D-8 90-100	(Deer size) Large mammal	Long bone frag.	1	0.5	Burned, polished, scratched, possible tool frag.
629-915	E-8 0-10	(Deer size) Large mammal	Unidentifiable fragment	1	0.2	Burned, polished, scratched, poss. tool frag.

Table 10.11. Burned Bone By Species at LAn-1031

	No.	Wt., g
Odocoileus sp.	3	+
Lynx sp.	2	+
Silvilagus sp.	3	0.05+
Neotoma sp.	1	0.15
Turtle	58	7.7+
Deer size	46	35.4
Rabbit size	17	1.4+
Rat/Gopher size	10	0.3+
Mouse size	2	0.5+
Totals	142	45.5+

Table 10.12. Minimum Number of Individuals and Number of Identified Bones per Species at Three Springs Valley

	MNI Minimum Number of Individuals			NISP Number of Identified Specimens (bones) per species		
	LAn-807	LAn-808	LAn-1031	LAn-807	LAn-808	LAn-1031
ARTIODACTYLA						
Mule deer (*Odocoileus hemionus*)	2 (1A,1J)		3 (2A,1J)	24		26
Large mammal		1J				
CARNIVORA						
Bobcat (*Lynx rufus*)	1		1	3		7
Coyote/Dog (*Canis* sp.)	1		1J	3		3
Fox (*Urocyon* sp.)	1			2		
Weasel (*Mustela* sp.)			1			1
Cat (*Felis domesticus*)		1			4	
LAGOMORPHA						
Jackrabbit (*Lepus* sp.)	1			3		
Rabbit (*Sylvilagus* sp.)	3	1	4 (3A,1J)	71	1	123
Medium mammal	3					
RODENTIA						
Squirrel (*Sciurus* sp.)	1			5		
Gopher (*Thomomys* sp.)	3 (2A,1J)	1	5 (3A,2J)	22	4	41
Woodrat (*Neotoma* sp.)	2	1	6 (4A,2J)	12	1	80
Kangaroo rat (*Dipodomys* sp.)	2 (1A,1J)			3		
Ground squirrel (*Spermophilus* sp.)	2 (1A,1J)		2	11		12
Pocket mouse (*Perognathus* sp.)			2			12
Mouse (*Peromyscus* sp.)	1		10 (9A,1J)	6		51
Vole (*Microtus* sp.)			1			2
Small mammal			4			
Totals	23	5	48	165	10	358

Note: A = Adult, J = Juvenile

Lagomorpha

RABBIT (*Sylvilagus* sp.). Both the desert cottontail (*Sylvilagus auduboni*) and the brush rabbit (*Sylvilagus bachmani*) are found in this area. The species identified were all *S. bachmani*, which is smaller than the cottontail. One juvenile was identified. The bones most frequently found were calcanei and astragali, maxillae, mandibles, and teeth. There were also femurs, tibias, humeri, pelves, ulnae, and radii. Because most elements were seen, it indicates that the whole animal was brought to the site. Because they are fairly small, rabbits could easily be carried to the rockshelter.

Rodentia

VALLEY POCKET GOPHER (*Thomomys bottae*). Gophers were not naturally present at LAn-1031 as they are root-eating burrowers and

Table 10.13. List of Taxa from Twelve Southern California Archaeological Sites (after Langenwalter 1978:195)

Taxa	LAn-1031	LAn-807	Ven-125	Ven-294	Ven-39	LAn-167	LAn-243v	LAn-246	LAn-227	LAn-229	SLO-372	LAn-717
Fish	x	x	x	x	x	x	x	x	x	x	x	x
Frogs			x	x				x				
Toads			x	x								
Amphibians								x				
Pond turtle	x	x		x		x			?	x		x
Gopher snake	?	?		x				x		x		
Rattlesnake	?	?		x				x		x		x
Reptiles					*	*	*	*	x			
Canvasback duck											x	
Ducks				x							x	
Valley quail	x		x	x							x	
Hawks			?	x							x	
Golden eagle				x								
Other birds	x	x			x	x	x	x				
Audubon's cottontail	x	x	x	x	x	x	x	x	x	x	x	x
Brush rabbit	x	x		x				x	x	x	x	x
Jackrabbit	x	x	x	x	x	x	x	x			x	x
Ground squirrel	x	x	x	x	x	x	x	x	x	x	x	x
Tree squirrel		x						x				x
Chipmunk				x				x				
Pocket gopher	x	x	x	x	x	x	x	x	x	x	x	x
Meadow mouse				x	x	x	x	x			x	x
Deer mice	x	x	x	x								
Wood rats	x	x	x	x	x	x	x	x	x	x	x	x
Dogs or coyotes	x	x	x	x	x	x	x	x			x	x
Grey fox		x				x		x		x		x
Striped skunk				x	x			x				x
Long-tailed weasel	x							x		x		
Badger			x	x		x	x	x				
Mountain lion							x	x			x	
Porpoises								x				
Bobcat	x	x		x			x	x	x		x	x
Sea otter											x	
California sea lion		?			?	x	x	x		x		x
Harbor seal		?			?	?	x	x	x			
Black-tailed deer	x	x	x	x	x	x	x	x	x	x	x	x
Antelope				x								
Vole												
Pocket mouse					x	x	x	x				

Note: Taxa other than mammals are not complete for all sites. * Species not detailed.

no root foods occur in the rock shelter. At least two juvenile and three adult gophers were represented by mandible, teeth, femur, humerus, radius, ulna, and pelvis fragments. The presence of juvenile gopher bone does not seasonally date the site as two litters of young may be born each year.

WOODRAT (*Neotoma* sp.). Two species of woodrat occur in this area, the desert woodrat (*Neotoma lepida*), and the dusky-footed woodrat (*Neotoma fuscipes*). *N. lepida* occupies rocky slopes and *Neotoma fuscipes*, the heavy chaparral. There was an abundance of woodrat coprolites in the rock-shelter. Four adults and two juvenile woodrats were represented by maxillae, mandibles, and teeth as well as by humerus, tibia, ulna, femur, and pelvis bones.

CALIFORNIA GROUND SQUIRREL (*Spermophilus beecheyi*). The ground squirrel's natural habitat is the surrounding area and rocky ridges. No long bones were identified; only mandibles, maxillae, atlases, and axes were present.

POCKET MOUSE (*Perognathus* sp.). The common pocket mouse in this area is *Perognathus californicus* which lives in areas of chaparral and is a burrower. Its presence was identified by fragments of femur, mandible, and tibia.

MOUSE (*Peromyscus* sp.). The genus *Peromyscus* could not be identified to species, but *P. californicus*, the California mouse, is common in this area. Nine adults and one juvenile were identified by mandible, maxilla, femur, humerus, tibia, and pelvis bones. A femur and a humerus were juvenile. California mice breed throughout the year.

VOLE (*Microtus* sp.). Voles are burrowers and are found in areas of good grass cover or among rocks. They are food for hawks, owls, coyotes, and most likely for the human inhabitants of this site. Only the right mandible and an incisor were identified.

Non-Mammalian

SNAKE. Snakes are common in this area and are identified by the distinctive ball and socket vertebra.

TURTLE. Probably *Clemmys marmorata*, pond turtle. A large percentage, 53%, of the turtle carapace was burned indicating that these were used for food.

FISH. Unidentifiable. Two fragments of fish bone (0.45g) were present in LAn-1031.

BIRD. LAn-1031 contained bones from one *Lophortyx californica*, the valley quail, which lives in chaparral where there is brush and water. Quail are common in the area today and were used by the Chumash as food and decoration (Harrington 1942:19). Birds of sparrow, dove, and robin size were also present.

BURNED AND CUT BONE

One hundred forty-two pieces (8%) of the total bone at LAn-1031 were burned. Fifty-one of these were of deer or large-mammal size, 20 of medium-sized mammals, 11 of small-sized mammals, and 2 were mouse-size fragments. Fifty-eight of the burned bone fragments (40%) were fragments of turtle carapace. Twenty-one specimens had cut marks; 20 of these were of deer or deer-size, one of them was a bobcat bone.

COMPARISON OF LAn-807 AND LAn-1031

LAn-807 contained fox (*Urocyon* sp.), jackrabbit (*Lepus* sp.), squirrel (*Sciurus* sp.), and kangaroo rat (*Dipodomys* sp.), species not found at LAn-1031. The rockshelter contained weasel (*Mustela* sp.), vole (*Microtus* sp.), and pocket mouse (*Perognathus* sp.), which were not represented at LAn-807.

There was about the same amount of deer (*Odocoileus* sp.) by count and weight at both sites. Coyote or dog (*Canis* sp.) and bobcat (*Lynx rufus*) were also approximately the same. There was almost three times as much large-size and medium-size mammal bone at LAn-807 as at LAn-1031 and about the same amount of small-size mammal bone at both sites. Both LAn-807 and LAn-1031 exhibit similar amounts by weight of faunal material per level (figs. 10.2, 10.3).

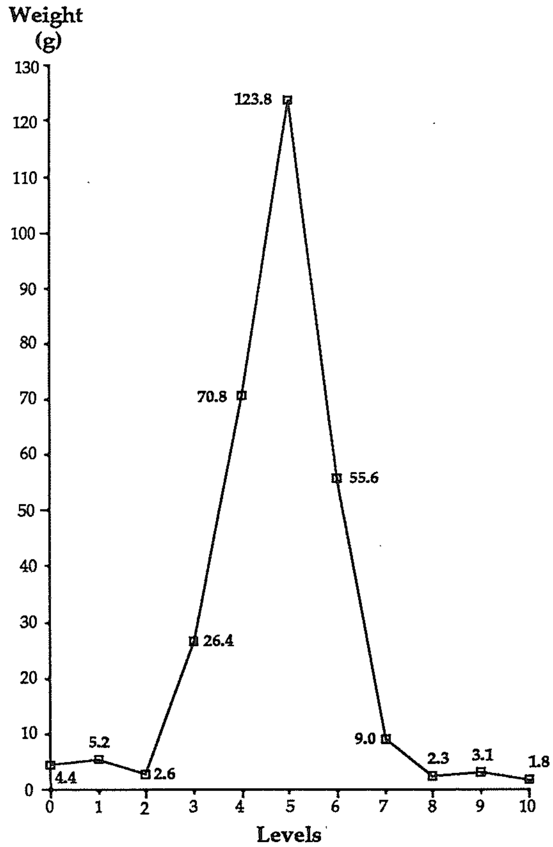
The rockshelter contained much more woodrat (*Neotoma* sp.) and mouse (*Peromyscus* sp.) than LAn-807. There was also more mouse-sized bone, probably due to better preservation in the rockshelter , and more bird and snake but less fish, at LAn-1031. Some of the bone could have been brought there by predators or by raptor birds such as hawks, eagles, or owls which regurgitate pellets containing the undigested bones of their prey.

There was a significant amount of turtle remains in the rockshelter, 53% of it burned. There are important cultural differences seen in the use of the site due to the presence of charred turtle. The burned bone indicates that it was roasted rather than boiled. Thirty-three percent of the bone was burned at LAn-807, only 8% in the rock shelter, LAn-1031.

CONCLUSION

Kroeber (1925:523) states that the California Indians were perhaps the most omnivorous people of the North American continent, and the faunal evidence from the Three Springs Valley excavations does not contradict this opinion.

All the faunal material (excluding fish, and of course, shellfish) is indigenous to



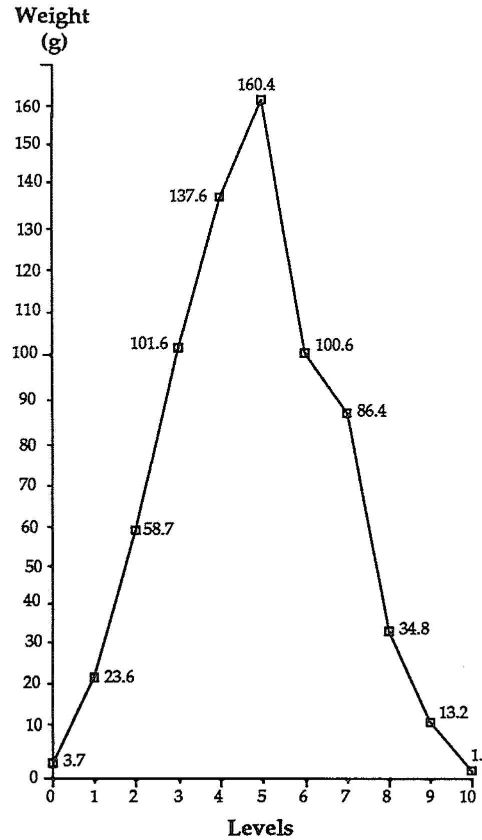


Figure 10.2 (left). Weight of faunal bone per level, LAn-807.

Figure 10.3. (right) Weight of faunal bone per level, LAn-1031.

the Three Springs Valley, and some bone, particularly that of the rodent burrowers, may not be due to cultural activity. The large amount of faunal material present in the LAn-807 midden indicates a campsite casually frequented over an extended period of time, either continually or seasonally.

That LAn-807 was not primarily a kill and butchering site is, however, evidenced by the lack of deer skull, vertebra, pelvis, and rib bones. The absence of these heavier bones indicates that large-size animals such as deer were killed and butchered elsewhere, and meat and some skeletal material (e.g., long bones) were subsequently transported to the site. There are few butchering marks for the number of bones present. Fewer cuts were seen in the smaller animals, no doubt due to the fact that they could be easily carried and cooked whole.

Daly (1969:147) states that the largest number of animals used for food at a site will be of only a few species. This analysis indicates that deer, rabbits, and rodents were the principal game animals taken and eaten in the Three Springs Valley. As Landberg (1965:54) suggests, the most frequently occurring food remains of the Chumash include ground squirrel, pocket gopher, and woodrat. It is reasonable to believe that all animals found here archaeologically were part of the diet of the Late Prehistoric and Early Historic inhabitants of the Three Springs Valley. Though common in coastal sites, the presence of fish bone at an interior site such as LAn-807 may indicate food transported there at the time of seasonal occupations of the site, or trade.

The fragmented condition of the bone indicates what has been recorded ethnographically and found archaeologically in many other southern California sites: bones were completely broken. This was intentional, resulting from food preparation of small animals by pounding and from the marrow extraction of large animal bones.

The presence of coyote or dog, jackrabbit, and mouse is consistent with other southern California sites (table 10.13). Deer, cottontail, gopher, woodrat, and ground squirrel are common to all the archaeological sites listed here. While some of these animals may not have been eaten, it appears that the Three Springs Valley residents utilized all food sources available. The burned and broken pond turtle carapace in the rockshelter points out an additional food that is not usually defined in southern California sites.

Site seasonality could not be determined on the basis of faunal remains alone as some of the small mammals represented may have had two or three litters a year. Deer were hunted all year; the presence of juvenile deer may indicate site occupation around August to October (Langenwalter 1978:196).

ACKNOWLEDGMENTS

I wish to express my thanks and appreciation to those whose help and patience made possible the completion of the three papers I contributed to this volume: to Elsie Sandefur, who did the faunal identifications for LAn-808 and LAn-1031 and, along with Susan Colby, introduced me to faunal bone analysis; to Gail Kennedy for teaching me human skeletal analysis; to Clement Meighan for guidance; to Matthew Boxt for fortitude and composure; and finally, to Brian D. Dillon, who not only gave editorial comments, improving the contents of my papers, but was also a constant source of sarcastic comments about coprolites and bludgeoned me into putting what I thought would remain simply course assignments into the literary maelstrom of modern archaeological prose.

NOTES

1. Unit 5, level 1 was dug from 0 to 20 cm, so that the levels are all at a different depth in this unit than in other units. Level 2 of unit 5 would be from 20 to 30 cm deep instead of the usual 10 to 20 cm of the other units. Allowance is made for this throughout this report

2. Audubon refers to *Lynx rufus* as *Felis rufus* (Whitaker 1980).

3. Audubon and his contemporaries called ground squirrels *Spermophilus* because they are "spermophiles" or "seed-lovers," feeding mainly on seeds. Later mammalogists regrouped them with their Old World relatives of the genus *Citellus*, a classification still seen in some books; but the use of *Spermophilus* is now generally accepted (Whitaker 1980:371).
out this paper, adjusting unit 5 accordingly.

4. The insular gray fox *(U. littoralis)* is smaller, consisting of two subspecies on six islands of southern California.

11. ANALYSIS OF SHELL REMAINS FROM THE THREE SPRINGS VALLEY

Mimi Horner

The presence of marine shell in an inland midden indicates contact with the coast. If a species of shell is present which is known to exist only in a particular microenvironment, the point of contact with the ocean may be considerably narrowed. Any further deductions based purely on molluscan evidence must be considered speculative, but at LAn-807 and LAn-1031 there are other artifacts and archaeological indicators which provide clues to individual site functions.

Basic questions to be answered about any site include: (1) Who was present and in what numbers? (2) What period of time is represented? (3) Was the site a permanent or a temporary settlement, and if temporary, what was the seasonality of its occupation? (4) How was the site used? (5) What was the relationship between this site and others in prehistoric times?

Molluscan remains from Three Springs Valley sites provide partial answers to some of these questions. The shell sample should be considered in context with the artifactual, geological, and environmental evidence as it is usually only one minor aspect of the total activity represented.

RESEARCH METHODS

Shell remains collected from LAn-807 came from eight 2 x 2 m units and one 1 x 2 m unit. A total of nine units were excavated, but no shell was found in unit 4. Additonal traces of shell were found in auger holes drilled to estimate the boundaries of the site, but this shell was excluded from this analysis. Shell from LAn-1031 came from 16 of 21 excavated units. Shell from both sites, which was retained in 1/8" screens, was removed to the laboratory at UCLA where it was separated from other midden components and bagged by unit, quadrant within unit where indicated, and 10 cm levels. The mollusks were identified, when possible by genera and species, and the remains of each species weighed on a scale accurate to 0.1 g. Identifications were made on the basis of comparison with the Holocene collection in the Department of Earth and Space Sciences at UCLA under the curatorship of Louella Saul, who was of great help when an identification was in doubt. Environmental information was derived from Johnson and Snook (1967), Morris (1966), and Ricketts and Calvin (1968). Because archaeological shell found in midden contexts often deteriorates to a point where it may no longer resemble recent shell, further comparisons were made with identified midden material provided by Dr. Clement Meighan. To verify the environmental sources of the shell species and to ascertain their relative accessibility to the ancient population of the Three Springs Valley, collections were taken from different coastal environments with particular attention being given to those points along the coast where large prehistoric Indian communities had once existed. Where possible, these collections were augmented by data from coastal midden collections and through comparison with a list of recent shell species from Point Mugu in Ventura County.

DESCRIPTION OF SHELL SAMPLES

LAn-807

The shell sample from LAn-807 contained 24 types identifiable as to genera, with species names included where possible (see table 11.1). The identified shell and 22.43 g of unidentified shell weighed a total of 475.3 g; only 9 of these mollusks contributed more than 1% of the total sample. In evaluating the significance of the ratio of shell weights, it was necessary to temper facts with common sense. Fifteen species which added less than 1% to the total sample were eliminated because their contribution, aside from their presence, was not considered significant. Further, *Balanus* sp. (barnacle) was discarded because it is so closely associated with *Mytilus californianus* (California sea mussel) that it was probably not purposely collected but inadvertently brought to the site attached to the mussels. The result of these reductions may be seen in figures 11.1 and 11.2. Figure 11.1 shows *M. californianus* to be the most common shell at 52.88%, followed by *Haliotis cracherodii* (black abalone) at 14.80% and *Polinices lewisi* (moon snail) at 6.87%. The percentages of *H. cracherodii* and *P. lewisi* are probably not representative of the sample as a whole. The *H. cracherodii* was, for the most part, concentrated in the remains of two complete shells, one found in the same unit and 10 cm above a human burial; the *P. lewisi* was a single large gastropod specimen. Both of these shells may have had artifactual significance not connected to the general sample. In figure 11.2, the *P. lewisi* and *H. cracherodii* have been subtracted, and the influence on the total by a few heavy pieces of *Tresus nuttallii* (gaper clam) has been shown. If figures 11.1 and 11.2 are compared, it can be seen to what degree a small sample may be distorted by a few large and heavy shells. With the deletions, a more reasonable picture of species exploitation through time emerges. While *M. californianus* is the most heavily represented species overall, in the higher and presumably more recent levels a greater variety, particularly of clams, is represented. This variation may be of use in approximating the time period of shells collected. Hector (1978:156), in her analysis of the shell remains from Ven-294, wrote "The domination of shell remains by *Mytilus* sp. appears to have been a feature of sites occupied circa A.D. 1000 with sites dating from A.D. 1500 exhibiting a higher percentage of a wider range of shellfish resources exploited." Hector illustrates this with a table which includes 10 sites, their dates, and the nature of the shell remains found.

In figure 11.3 the percentages of the total shell sample are entered in each unit. Consecutive unit numbering indicates the order in which the pits were dug rather than their physical proximity. When the percentages of shell are placed on the excavation plan by unit, a greater concentration is shown in the center of LAn-807, with a sharp decline at the extremities. In an effort to ascertain if a temporal difference might be shown between the units, figures 11.4 and 11.5 were compiled to represent the percentage of *M. californianus* in each unit. Figure 11.4 compares *M. californianus* with all other shellfish, and figure 11.5 removes *H. cracherodii*, *P. lewisi* and *T. nuttallii* from the sample. With the deletion of the heavy concentrated shell, the data are less skewed. *M. californianus* becomes 64.83% of the remaining sample and its distribution among the eight units more reasonable. A pattern emerges which is similar to that of the general distribution of shell, with the highest percentage of *M. californianus* at the center of the excavated "T," decreasing at the peripheries of the excavation. Because the sample in general is smaller at the outer limits of LAn-807, the smaller percentage of *M. californianus* does not necessarily indicate that a wider range of species was exploited here; thus different periods of occupation for these units cannot be assumed on this evidence.

LAn-1031

At the rockshelter, LAn-1031, 10 species of mollusks comprised the unmodified shell sample. *Olivella biplicata* (purple olive shell) was represented in the form of shell beads; other culturally modified shells were *H. cracherodii* sealed with asphaltum, and a

Table 11.1. The Three Springs Valley Shell Species List (LAn-807, LAn-1031)

	SHELL TYPE	% OF LAN-807 SAMPLE	ENVIRONMENT	REMARKS
1.*	*Mytilus californianus*, Conrad (California sea mussel) MB, MG, LS Figure 11.7a	52.88%	Open coast, rocky shore	Forms beds on surf-beaten rocks all along the coast. Easily gathered. Most preferred seafood. May be poisonous May-October.
2.*	*Haliotis cracherodii*, Leach (Black abalone) MB, MG, LS Figure 11.8a	14.80%	Open coast, rocky shore	Requires a pry to harvest. Used for food, bowls, fish hooks, and jewelry.
3.	*Diadora aspera*, Eschscholtz (Rough keyhole limpet) Figure 11.9e	< 1%	Open coast, rocky shore	Found on sides and bottoms of rocks.
4.	*Acanthina spirata*, Blainville (Thorn shell) MB, LS Figure11.9a	< 1%	Open coast, rocky shore	Found on sheltered rocks of open coast. Preys on barnacles and mussels.
5.	*Septifer bifurcatus*, Conrad (Branch ribbed mussel) HB Figure 11.9h	< 1%	Protected outer coast	Found under rocks and stones with *Tegula*. Usually less than 1.5 inches. Not to be eaten May-October.
6.	*Tegula funebralis*, Adams (Black turban) Figure 11.9c	2.48%	Protected outer coast	Good food. Found in the middle intertidal on rock in tide pools.
7.	*Norrisia norrisii*, Sowerby (Smooth turban) HB, LS Figure 11.9b	< 1%	Protected outer coast	Considered good food. Found in low intertidal under rocks in tide pools.
8.	*Mopalia muscosa*, Gould (Mossy chiton) HB, LS Figure 11.8h	< 1%	Protected outer coast	Found in low intertidal, under rocks in tide pools.
9.	*Acmaea* sp. (Limpet) MB, MG	< 1%	Protected outer coast	Middle intertidal on rocks intide pools.
10.	*Fissurella volcano*, Reeve MB, LS Figure 11.9f	< 1%	Protected outer coast	On bare rocks on the upper shore; moves lower when found further north.
11.	*Semele* sp. (Flat clam) MG Figure 11.8d	< 1%	Protected outer coast	Edible but not abundant. Buried in sand. Not to be eaten May-October.
12.*	*Tivela stultorum*, Mawe (Pismo clam) LS, MG Figure 11.7c	4.12%	Open coast, sandy beach	Found on exposed sandy beaches only in heavy surf. Very good food but not easy to harvest except at low tide. Found on open coast adjacent to MB and MG.

Table 11.1, continued

SHELL TYPE	% OF LAN-807 SAMPLE	ENVIRONMENT	REMARKS
13. *Chione undatella,* Sowerby (Hard shelled cockle) LS, MG Figure 11.9g	< 1%	Bay or estuary	Edible, common in sand flats almost on the surface.
14.* *Tresus nuttalli,* Conrad (Washington, horse, or gaper clam) HG, MB Figure 11.7d	3.30%	Bay or estuary	Good for food but buried up to 3 feet below surface. Indians used to dry its huge syphons for winter use. Host to tapeworm larvae.
15. *Macoma natusa,* Conrad MG Figure 11.8g	< 1%	Bay or estuary	A common clam of mud flats. Can stand very stale water. Buried 6-8" deep. California Indians made extensive use of *Macoma* for food.
16.* *Protothaca staminea,* Conrad (Little neck clam) MB, MG Figure 11.8f	2.41%	Bay or estuary	Found packed in mud or gravel mixed with sand. Subject to mussel poisoning May-October unless found in bay or estuary.
17.* *Saxidomus nuttallii,* Conrad (Money shell) HB, MG, LS Figure 11.8e	2.71%	Bay or estuary	Found in mud flats. May be poisonous May-October if gathered (rarely) on open coast. California Indians used it to make money beads.
18.* *Balanus* sp. (Barnacle) MB Figure 11.9k	2.25%	Bay or estuary Protected outer coast	Found on rocks, shells, & pilings. Often attached to mussels and are likely part of the sample inadvertently collected with *Mytilus californianus*.
19.* *Olivella biplicata,* Sowerby (Purple olive shell) MB, MG, LS Figure 11.9d	< 1%	Bay or estuary	Burrows just under the sand, leaving a clear trail. Used for shell beads.
20.* *Pecten circularis,* Sowerby (Thick scallop) MG Figure 11.8b	< 1%	Bay or estuary	Edible. Found buried in sand flats.
21.* *Polinices lewisi,* Gould (Moon snail) Figure 11.7b	6.87%	Bay or estuary	6.87%=1 whole shell. Common in sand flats and tolerates sandy mud. Edible but tough. Body much larger than shell.
22. *Venericardia ventricosa,* Gould (Hard shelled clam) Figure 11.9j	< 1%	Bay or estuary	Buried in sandy mud.
23. *Ostrea lurida,* Carpenter (Olympia oyster) MB, MG Figure 11.9i	< 1%	Bay or estuary	Good food. Masses on rocks.
24.* *Hinnites giganteus,* Gray (Rock oyster) Figure 11.8c	< 1%	Adolescents: shallow coastal area. Adult: intertidal rocky areas.	Edible. Resembles scallop when young.

* Found at LAn-1031 as well as at LAn-807.
Possible locations: MB= Malibu Lagoon; MG=Mugu; LS=Little Sycamore

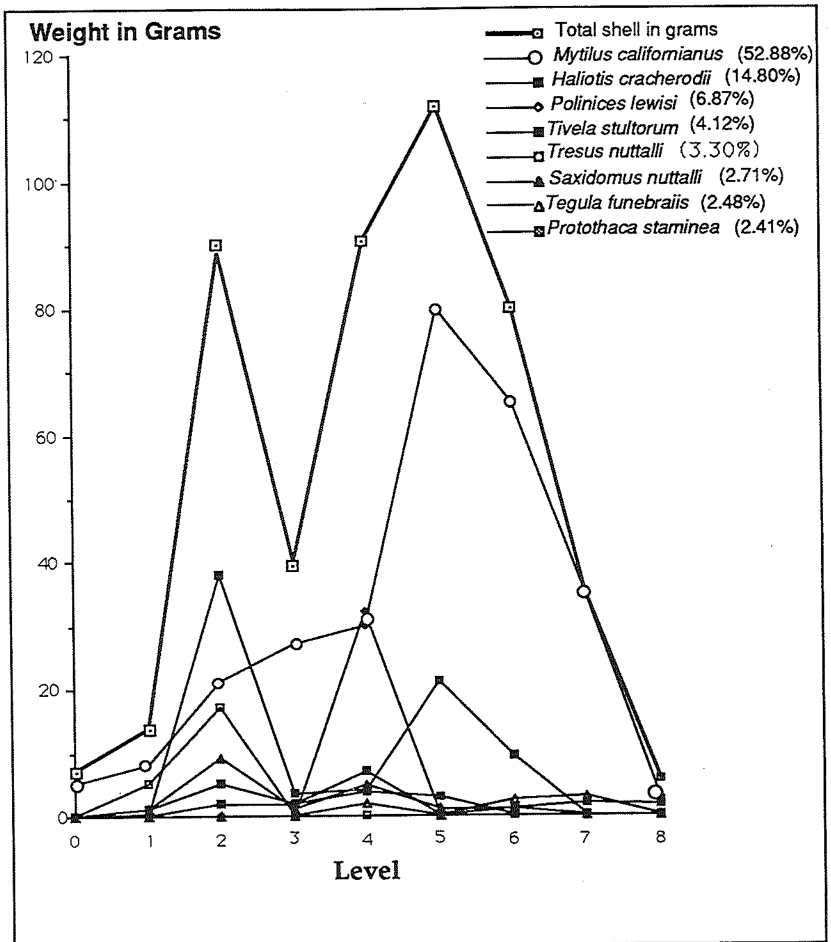


Figure 11.1. Weight of edible marine mollusks found at LAn-807, per level. Excluded are unidentified samples and those species comprising <1% of total sample.

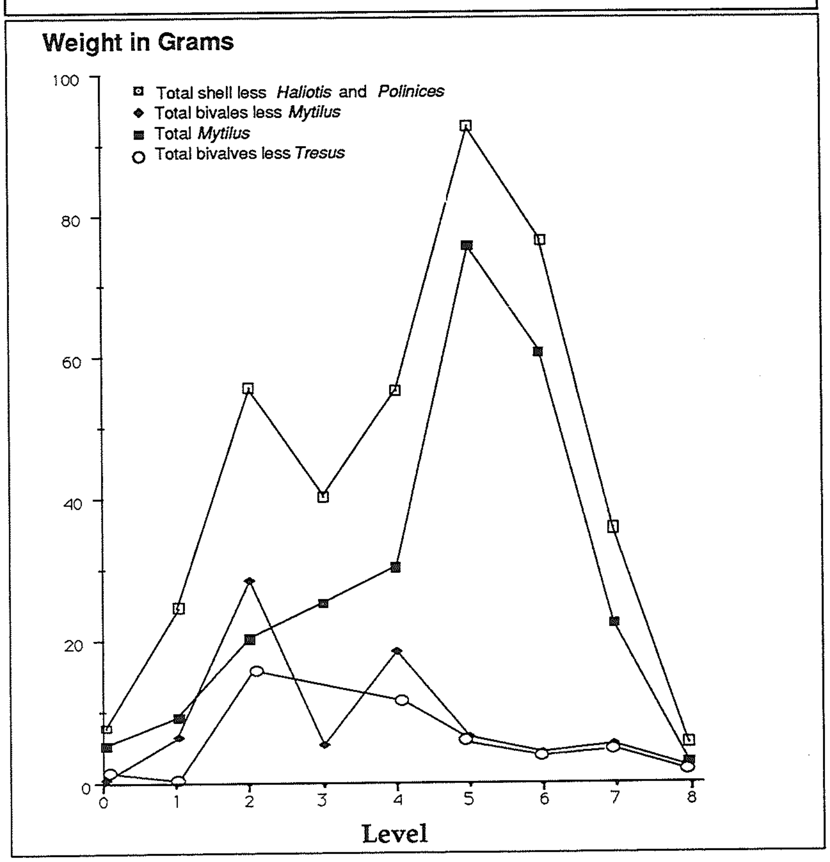


Figure 11.2. Weight of edible marine mollusks found at LAn-807, per level, excluding certain species.

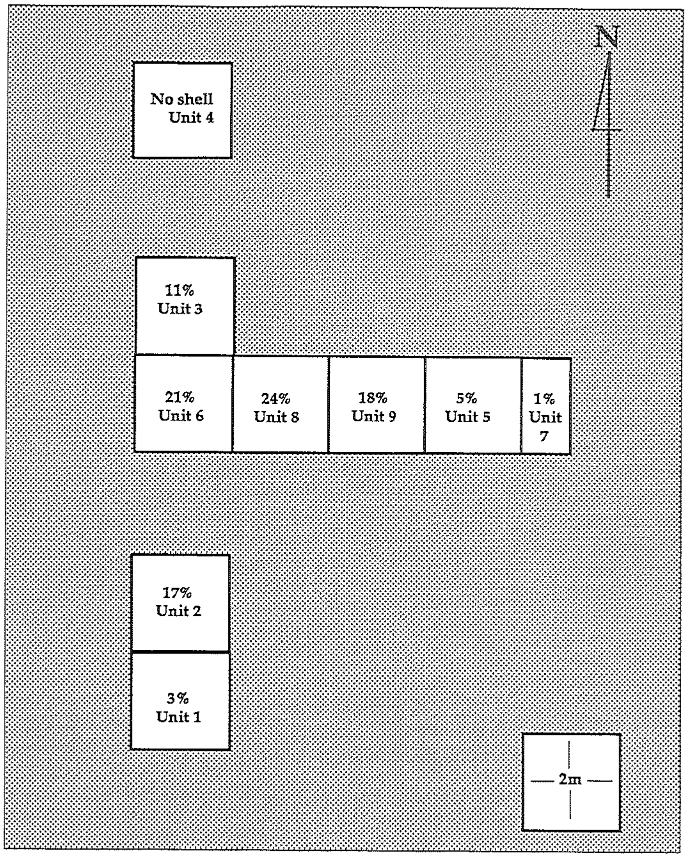


Figure 11.3. Distribution of total shell sample of LAn-807, per unit, by percent.

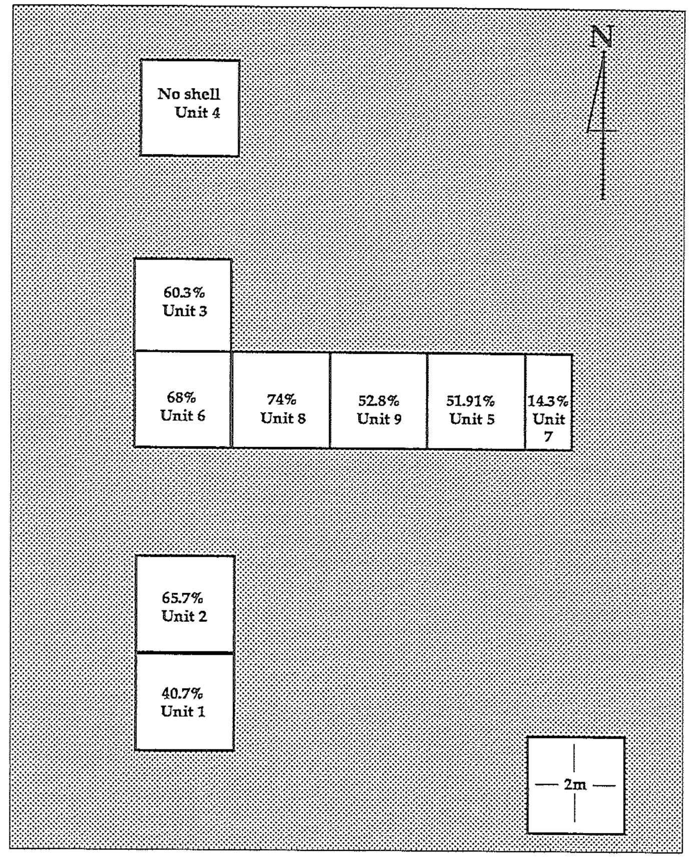


Figure 11.4 . Percent of Mytilus californianus *in the total shell sample of LAn-807, by excavated units.*

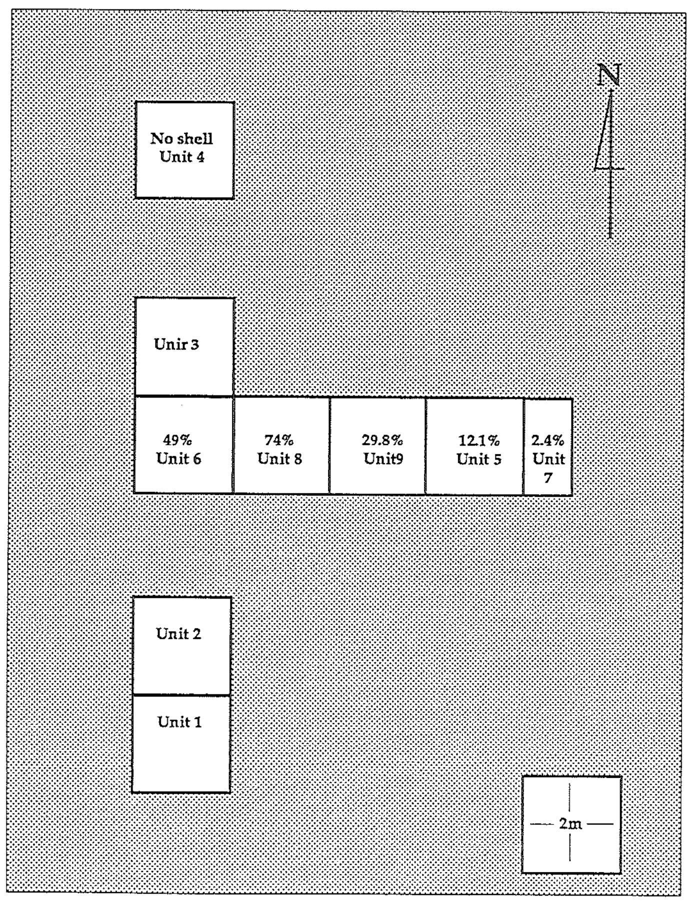


Figure 11.5 . Percent of Mytilus californianius *in the shell sample of LAn-807, excluding* Haliotis cracherodii, Polinices lewisi, *and* Tresus nuttalli, *by excavated units.*

Table 11.2. LAn-1031, Distribution of Species of Unmodified Shell, by Unit

Unit	*Mytilus* Wt N	*Haliotis* Wt N	*Polinices* Wt N	*Tivela* Wt N	*Pecten* Wt N	*Saxidomus* Wt N	*Physa* Wt N	*Hinnites* Wt N	*Protothaca* Wt N	*Balanus* Wt N	Land Snail Wt N	Unident Wt N	Total Wt N
B5	2.4 (2)												2.4 (2)
B6	0.6 (3)												0.6 (3)
C2	0.4 (1)	[122.0 (1)]		0.9 (2)			1.0 (1)					1.0 (2)	3.3 (6)
C3	0.8 (13)											0.1 (1)	0.9 (14)
C5	12.4 (12)												12.4 (12)
C6	27.5 (31)			5.1 (3)			0.1 (2)						32.7 (36)
C7	24.6 (116)	22.8 (5)		0.7 (1)	4.9 (1)	0.4 (1)			0.4 (1)				53.8 (125)
C8	4.8 (18)	52.4 (1)											57.2 (19)
D2	1.1 (1)											1.2 (5)	2.3 (6)
D3	4.9 (7)		10.8 (1)							0.1 (3)			15.8 (11)
D4	1.4 (2)											0.1 (1)	1.5 (3)
D6	6.2 (13)	0.6 (3)				1.1 (1)	0.1 (1)	0.4 (1)		0.1 (1)		0.1 (2)	8.6 (22)
D7	3.4 (36)	0.5 (2)									0.1 (1)	0.5 (8)	4.5 (47)
D8	6.4 (29)											0.1 (2)	6.5 (31)
E3	0.1 (1)												0.1 (1)
E8	0.1 (2)												0.1 (2)
Totals	97.1 (287)	76.3 (11)	10.8 (1)	6.7 (6)	4.9 (1)	1.5 (2)	1.2 (4)	0.4 (1)	0.4 (1)	0.2 (4)	0.1 (1)	2.1 (21)	202.7 (340)
% Wt	47.9	37.64	5.33	3.31	2.42	0.74	0.59	0.20	0.20	0.10	0.05	1.04	
% N	84.1	3.23 [39.12%]	0.29	1.76	0.29	0.59	1.18	0.29	0.29	1.18	0.29	6.17	

Note: Weight measured in grams; N = number of fragments. Numbers in brackets represent a single piece excluded from the overall statistics.

Table 11. 3. LAn-1031, Gram Weight Distribution of Unmodified Shell, by Unit and Level

Unit	Level 0-10 cm Wt N	10-20 cm Wt N	20-30 cm Wt N	30-40 cm Wt N	40-50 cm Wt N	50-60 cm Wt N	60-70 cm Wt N	70-80 cm Wt N	80-90 cm Wt N	90-100 cm Wt N	Total Wt N	% of Total Wt
B5										2.4 (2)	2.4 (2)	1.18
B6					0.5 (2)	0.1 (1)					0.6 (3)	0.30
C2				2.4 (4)	0.9 (2)						3.3 (6)	1.63 +
				[122. (1)]							[122.0 (1)]	
C3		0.1 (1)	0.1 (1)		0.7 (12)						0.9 (14)	0.44
C5			2.2 (3)	9.5 (5)	0.7 (4)						12.4 (12)	6.12
C6	7.1 (6)	10.9 (9)	1.5 (4)	3.5 (6)	9.6 (9)			0.1 (2)			32.7 (36)	16.13
C7			28.1 (5)	1.3 (12)	18.7 (78)	5.7 (30)					58.8 (125)	26.54
C8		55.2 (9)		0.1 (2)	1.9 (8)						57.2 (19)	28.22
D2				1.2 (5)	1.1 (1)						2.3 (6)	1.13
D3				10.9 (4)	1.0 (2)	3.7 (2)	0.1 (2)	0.1 (1)			15.8 (11)	7.80
D4		1.1 (1)				0.4 (2)					1.5 (3)	0.74
D6	1.3 (1)	0.1 (3)	0.1 (1)	4.4 (7)	0.7 (2)	0.8 (6)		1.1 (1)		0.1 (1)	88.6 (22)	4.24
D7		0.1 (3)	0.3 (6)	0.7 (7)	2.0 (19)	0.4 (4)	0.9 (7)	0.1 (1)			4.5 (47)	2.22
D8	3.5 (3)		0.1 (2)	0.1 (3)	0.1 (4)	2.2 (9)	0.3 (8)	0.1 (1)	0.1 (1)		6.5 (31)	3.21
E3			0.1 (1)								0.1 (1)	0.50
E8			0.1 (2)								0.1 (2)	0.50
Totals:												
Wt	11.9	67.5	32.6	34.1	37.9	13.3	1.3	1.5	0.1	2.5	202.7	100.90
N	(10)	(26)	(25)	(55)	(143)	(54)	(17)	(6)	(1)	(3)	(340)	

Note: Weight measured in grams; N= Number of fragments. Numbers in brackets represent a single piece excluded from the overall statistics.

freshwater gastropod, *Physa virginea*, with asphaltum and a tiny shred of plant fiber in its aperture. The range and environment of these species are indicated in table 11.1; the data on the 202.7 g of unmodified shell are covered by tables 11.2 and 11.3. An areal distribution of the shell, along with the artifactual remains is shown in figure 11.6.

INTERPRETATION OF THE MOLLUSCAN REMAINS

In addition to the accepted generalizations that nonfossil molluscan remains in an interior site can prove the presence of man and also contact with the coast, I would add a more basic consideration. Why was

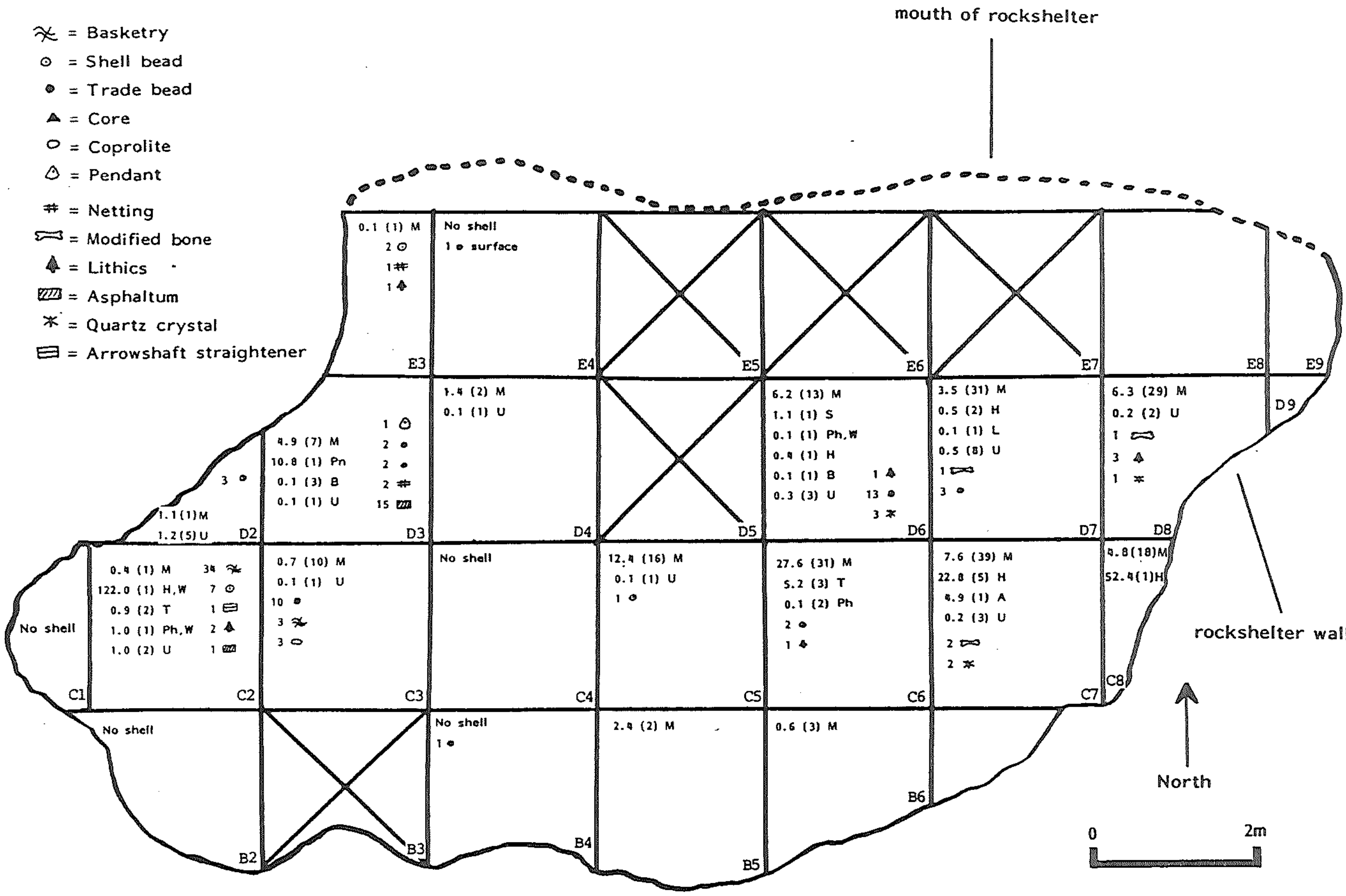


Figure 11.6. LAn-1031, areal distribution of shell remains and artifacts. Data are presented in the following order: weight (in g), number of specimens, species, number of artifacts, and artifact type. M = Mytilus californianus, *H=* Haliotis cracherodii, *T=* Tivela stultorum, *S=* Saxidomus nuttalli, *Ph=* Physa virginea, *Pn=* Polinices lewisi, *H=* Hinnites, *A=* Argopecten, *B=*Protothaca staminea, *B=* Balanus *sp., U= Unidentified, L= Land snail, W= Whole.*

the shell brought to the site? Shellmeat can be a food resource, but the shell itself may be considered artifactual if it has been used as a tool or an ornament. Modern peoples collect shells today for their aesthetic appeal, and there is no reason to believe that the ancient Indians were less sensitive to their beauty. The importance of considering what the shell represented to the aboriginal collectors is crucial to this report because while the same species are represented at LAn-807 and LAn-1031, and these sites are comparatively close to each other, the exploitation of the shell was different at each site and provides clues to dissimilar site function.

LAn-807

LAn-807 gives no indication of having been a permanent habitation site: no evidence of permanent structures or of a cemetery was found; presumably the population was small. Many sites in this region can be identified as "camps" or special activity sites, occupied for short periods on a seasonal basis. At LAn-807 shellfish seems to have been utilized as a food resource, although seafood contributed very little to the aboriginal diet and possibly was relied upon only when other foods were in short supply. In considering shell as representing food consumed, there are chances for sampling error which must be taken into account. Shell is lost, for example, in the screening process, and Tartaglia (n.d.a:62) estimated that only 86% of *Mytilus* sp. will be retained in an 1/8-inch screen. More shell is lost through leaching, and the sample may be further skewed by the presence of a large whole shell or the differential preservation of thick, durable shells, especially in a small sample. Assuming the possibility of error in the data, by using Tartaglia's (ibid.:170) and Hector's (1978:146) meat weight to shell weight ratios together with those I have worked out for species not discussed, the 86.27% of the total shell recovered at LAn-807 which could be identified as food species would yield only approximately one-fifth of a pound of edible meat. If all the shell is considered, one-fourth of a pound at most might have been represented. We may expand this to the total area of the site as defined by auger holes and note that if it were to contain the same concentration of shell as in the excavated portion, which is unlikely, the expected meat yield would be under two pounds for the entire archaeological site. The conclusion is that the shell does not represent enough meat to indicate the number of persons who may have been present at LAn-807, although many assessments of population size have been based on shell midden remains at prehistoric coastal communities where seafood was a primary resource.

Artifactual remains at LAn-807 suggest that it is a Late Prehistoric site. The shell sample bears this out because the high percentage of *M. californianus* is consistent with the late Canaliño and Chumash sites (Landberg 1965:75) and because the higher levels show a diversificaton which appears most commonly in the younger middens. The presence of shell at all levels down to 90 cm supports the hypothesis that LAn-807 was occupied at a number of different times and was probably used as a seasonal hunting and gathering base camp. Furthermore, the inclusion of shell in the midden implies that the occupation was seasonal, occurring during that time of year when more preferred food was least available. Shellfish could be harvested all year, but it seems unlikely that a band would travel any distance for a supplementary resource during those periods when men could more easily hunt and fish or gather plant food. Landberg (1965:76) notes that "observations of Chumash collecting shellfish were made during the rainy season between the months of November and March . . . Winter and early spring months were relatively lean months during which the Indians relied on stored staples of dried fish and acorns. Inasmuch as shellfish can be gathered the year around it does not seem improbable that they were kept in reserve while advantage was taken of seasonal subsistence activities such as fishing for the summer runs of bonito and collecting seeds and acorns." Landberg's statement that winter and early spring were generally not times of plenty is also borne out by the description of a village of 60 inhabitants, slightly inland in the Thousand Oaks area, visited by the Portolá expedition in January 1769. They found the Indians "very poor and thin" (ibid.:87).

For the purposes of comparing coastal microenvironments, I made shell collecting trips during the winter months and found that a representative sample was easily gathered. However, when collecting was attempted during the summer, the results were poor. It was my observation that shellfish gathering was most economic during the extreme low tides of January, February, and March. Galdikas-Brindamour (1970:139) in describing LAn-246 at Mulholland considered shell remains to be indicative of a winter occupation and added that the presence of many projectile points suggested that the site was used in the winter for hunting and that this function was particularly important at that time of the year. An analogy may be drawn if the substantial LAn-807 projectile point collection is taken into consideration.

In further support of a winter occupation I observed that available drinking water diminished during the warm dry months and became brackish and full of algae. Perhaps there was fresh water all year round at Three Springs Valley in prehistoric times, but most of the streams in this are and even the major rivers of the large coastal valley dry up during the summer.

Finally, there is the fact that while shellfish are a year-round resource, some species, and in particular the favored *M. californianus*, can become poisonous enough to cause paralysis and death when the warmer ocean temperatures of summer give rise to the dynoflagellate *Gonyaulax polyeora* which appears as a "red tide." At the present time the collection of mussels and some clams is forbidden in California from May 1 to October 1, and there is disagreement in the literature about the Indians' reaction to this seasonal poisoning. There have been cases of multiple deaths of Indians on the Mendocino coast and in Washington State (Tartaglia n.d.a:72), but if the viscera are removed mollusks can be safely eaten all year. The evidence is too inconclusive to base seasonal occupation merely on the presence or absence of those species capable of poisoning, but it provides one more argument for a winter occupation at this site.

The species list of the shell sample excavated at LAn-807 has been compared with archaeological and recent collections from the sites of large prehistoric coastal communities at Malibu Lagoon (LAn-264), Little Sycamore (Ven-1), and Mugu Lagoon (Ven-11) in an attempt to define what political and economic relationships, if any, existed between this site and the coastal villages. Some species, such as *M. californianus* and *H. cracherodii*, may be found all along the rocky coast and for this reason are of no value in pinpointing a gathering location. Other shells, such as the gaper clam (*T. nuttalli)*, require an inordinate amount of effort to harvest and may be eliminated from consideration because their absence from a faunal list may be simply because it was not economical to exploit them. If, however, one faunal list contains essentially the same species as another or contains very few similarities, some conclusions may be drawn. A valuable clue to at least part of a midden sample is the presence of a species which is indigenous to a particular microenvironment, especially if that environment is also the site of one of the large coastal Indian villages. Glassow (n.d.:4-5) made an analysis of the faunal remains from Malibu Lagoon (LAn-264) but unfortunately listed only the species present in the midden and did not indicate the amount of shell representing each species, except to mention that *M. californianus* and *P. staminea* were the most abundant. Meighan also excavated at Malibu, but the results of his work have not yet been published. Love made a tabulation of recent shell species at Mugu Lagoon, and she too has omitted shell frequency and weight ratios. Wallace et al. (1956:3-4) described the shell remains at the Little Sycamore Shellmound (Ven-1) and noted five of the most common species. The faunal list from LAn-807 was dissimilar to that of Little Sycamore but could easily have been collected at Malibu or Mugu, if the ratio of abundance of particular shellfish is not taken into account. Based on my collections and observations at both Malibu and Mugu Lagoons, I must conclude that at least part of the shell from LAn-807 came from Malibu. By far the most common shellfish at Malibu, both on the beach and in what remains of the middden, is *Protothaca staminea* (little neck clam). *P. staminea* is also found at Mugu but more rarely than another clam, *Macoma natusa* (bent nose clam), the most representative bivalve in that specific environment. In the collection from LAn-807 are 53 fragments of *P. staminea,* and these are found in all units that contain shell—except unit 7 which had little shell of any species—whereas only two fragments of *M. natusa* were found, and these in the same unit. Leonard (1971:111), Galdikas-Brindamour (1970:144), Glassow (1965:63), and Wells (1978:175) agree that *P. staminea* was most likely to have come from Malibu. Glassow, in reporting on the Conejo Rockshelter (1965:63), noted "*Protothaca* may also be local but its nearest maximum abundance along the Chumash coast is considerably south—at Malibu."

If theIndians of southern California had collected shellfish randomly and at will, then none of these data would be relevant to the problem of interaction between coastal and interior sites. There existed, however, natural and cultural barriers to random harvesting which restricted collecting to those coastal locales with which the inland Indians had political or economic ties as well as geographical access. Landberg (1965:29-30) notes that among the postcontact Chumash, because of the varying subsistence potentials in different rancheria territories and populations, a strong sense of "territorial ownership and hostility toward encroachment on rancheria hunting and collecting grounds developed. . . . The most frequent mentioned cause of feuding was unauthorized use of hunting and collecting grounds." In view of this it seems probable that the population of LAn-

807 was connected in some manner to the rancheria whose capital was Malibu. This connection may have been economic or could have reflected a seasonal occupation of LAn-807 by a coastal population.

There is one puzzling aspect of the shell remains for which I have no provable answer. Most *M. californianus* specimens from LAn-807 are quite small (about 2 to 3 cm). In other collections which I have studied there was a mixture of large and small shells with an average size of about 6 to 7 cm; the two pieces of mussel from LAn-1031 represented a whole shell which would have been 20 cm long, although this is admittedly outsized. I do not believe this represents the Indians' preference for small, tender mussels, because such a preference would have been reflected in other middens; and if these small shells had been brought in attached to kelp, it would be too coincidental to find them at every level in every unit. Perhaps the collecting grounds had been overexploited and the ancient inhabitants had to settle for immature specimens. In conclusion, I believe that the analysis of shell remains at LAn-807 implies that a band or bands of Indians occupied the camp at several discontinuous periods of time, perhaps in the winter, and that at least part of the midden can be traced to the Malibu Lagoon.

LAn-1031

The shell at the LAn-1031 rockshelter does not seem to represent an important part of the aboriginal diet. The simple presence of shell, particularly unmodified shell, does not usually suggest the purpose or function of an archaeological site. Especially in an interior site, midden shell represents only a small fraction of the food consumed and does not often reflect the most important economic activities of the population. At LAn-1031, however, the sample seems to be unique, and even without comparative consideration of other artifactual remains we can suggest the aboriginal function of the shelter.

Two deductions can be made immediately from the marine shell remains. First, their presence establishes the presence of man with connections between LAn-1031 and the coast. Second, there is too little shell present to constitute a midden; it does not even represent enough meat to feed one person for one day. The *P. lewisi* might have provided a meal, but it is a durable shell and, given the good preservation provided by the shelter, should have been represented by more than one fragment if it had been brought in whole. One of the whole *H. cracherodii* shells may have been a food resource but the other was purely artifactual. With the exception of *M. californianus*, all other marine species are represented by one, or at most two, fragments, indicating that each mollusk occurred only once or twice in spite of the fact that 11 different species are represented. The freshwater snail *Physa virginea* occurred as individual shells, much too small to have been eaten. There is little evidence for the shell as a food source or even as a food supplement.

If the shells were not brought to the rockshelter for food, they must have served another purpose; it is highly unlikely that anyone would hike 8 miles inland and climb to a nearly inaccessible cave to rid himself of refuse. If the shell was not food, it follows that it was artifactual, and the analysis of the sample supports this theory. Two forms of shell are obviously artifacts: the *H. cracherodii* coated with asphaltum and the 46 shell beads. The beads were time-consuming to manufacture and would not have been casually discarded. An unaltered *P. virginea* might have been excreted by a mammal, but the application of asphaltum makes it cultural. The fragment of *Polinices lewisi* had been part of an unusually large representative of its species (figure 11.7b), and two matching *M. californianus* pieces were also part of an outsized specimen (figure 11.7a). The rest of the species were represented by only one or two shells and may have been present as a symbol of their value as food or as a material used to manufacture beads. A study of the areal distribution (figure 11.6) of the shell and artifacts shows that they were almost always found in association with each other and generally concentrated in two separate sections with very little cultural material or shell connecting them.

In order to use molluscan evidence to interpret a rockshelter site it is necessary to explain not only what can be learned from the shell but also what activities might be carried out there. If a rockshelter is large

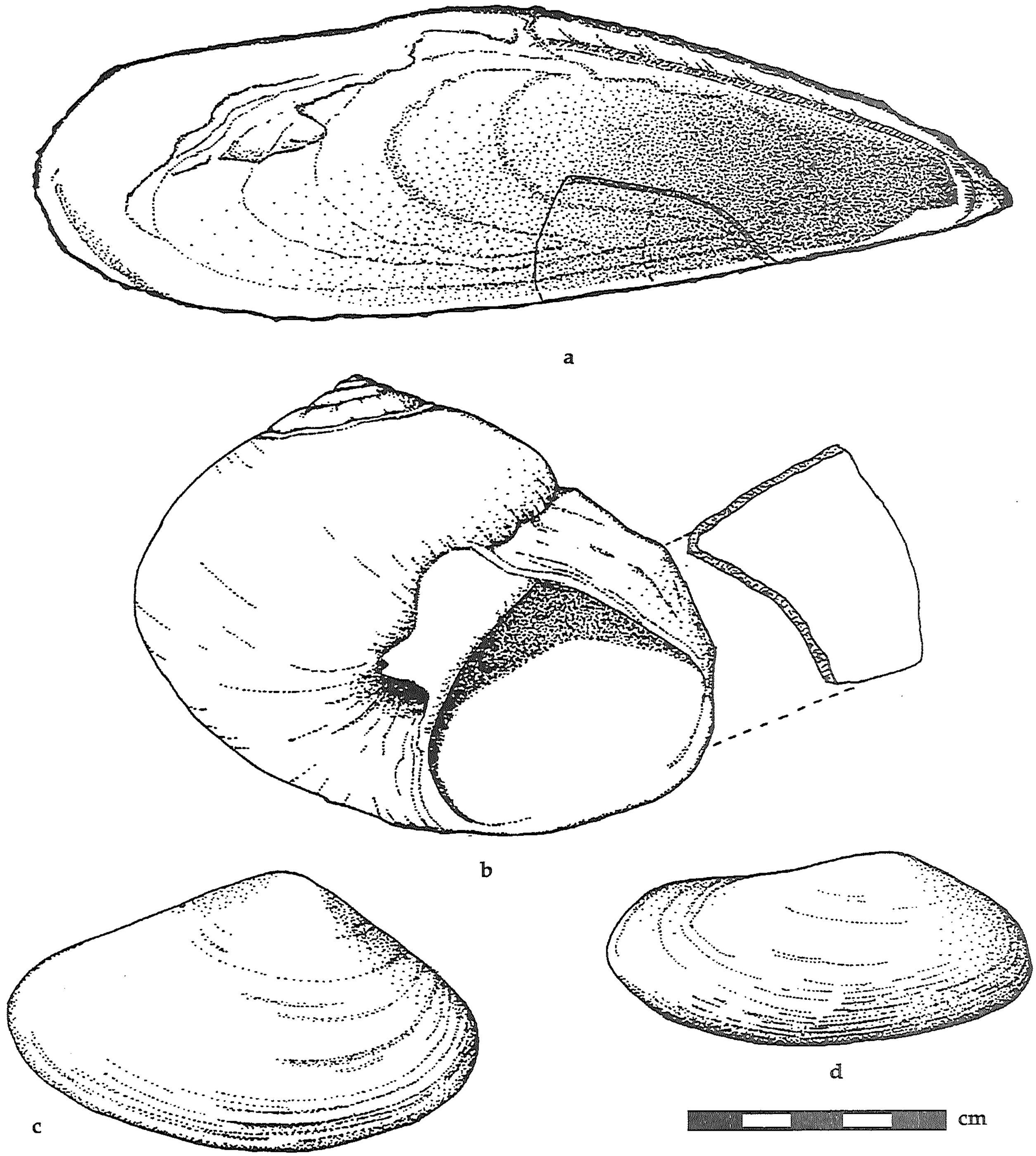


Figure 11.7. Shells found at Three Springs : (a) Mytilus californianus *(California sea mussel), (b)* Polinices lewisi *(moon snail), (c)* Tivela stultorum *(Pismo clam), (d)* Tresus nuttalli *(Washington, horse, or gopher clam.*

enough and is conveniently near fresh water and a preferred food source, it could serve as a permanent or temporary habitation site. Galdikas-Brindamour (1970:157) offered some criteria for permanent occupation as follows: grave sites with both sexes and all ages represented; evidence for the occurrence of some differential social status in the cemetery; indications of houses and other structures; indications of various subsistence and extra-subsistence activities performed at different seasons of the year by both sexes; a diversity of maintenance and manufacturing activities—artifacts reflecting these activities should predominate. LAn-1031, interestingly, shows no evidence of permanent habitation by any of these criteria.

A temporary habitation would probably not normally feature grave sites (although at LAn-807 there was one burial) or house structures, but a midden might rea-

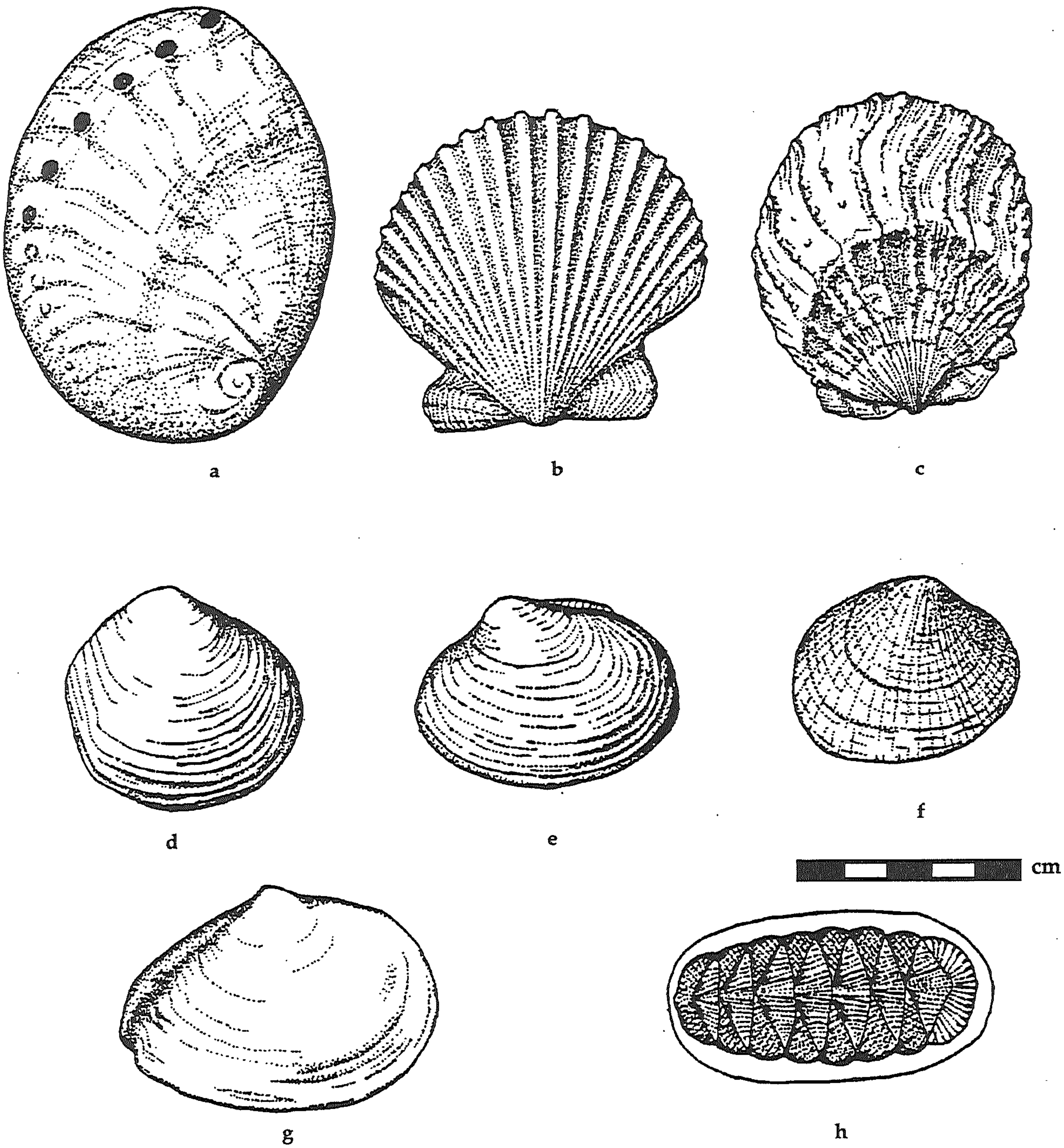
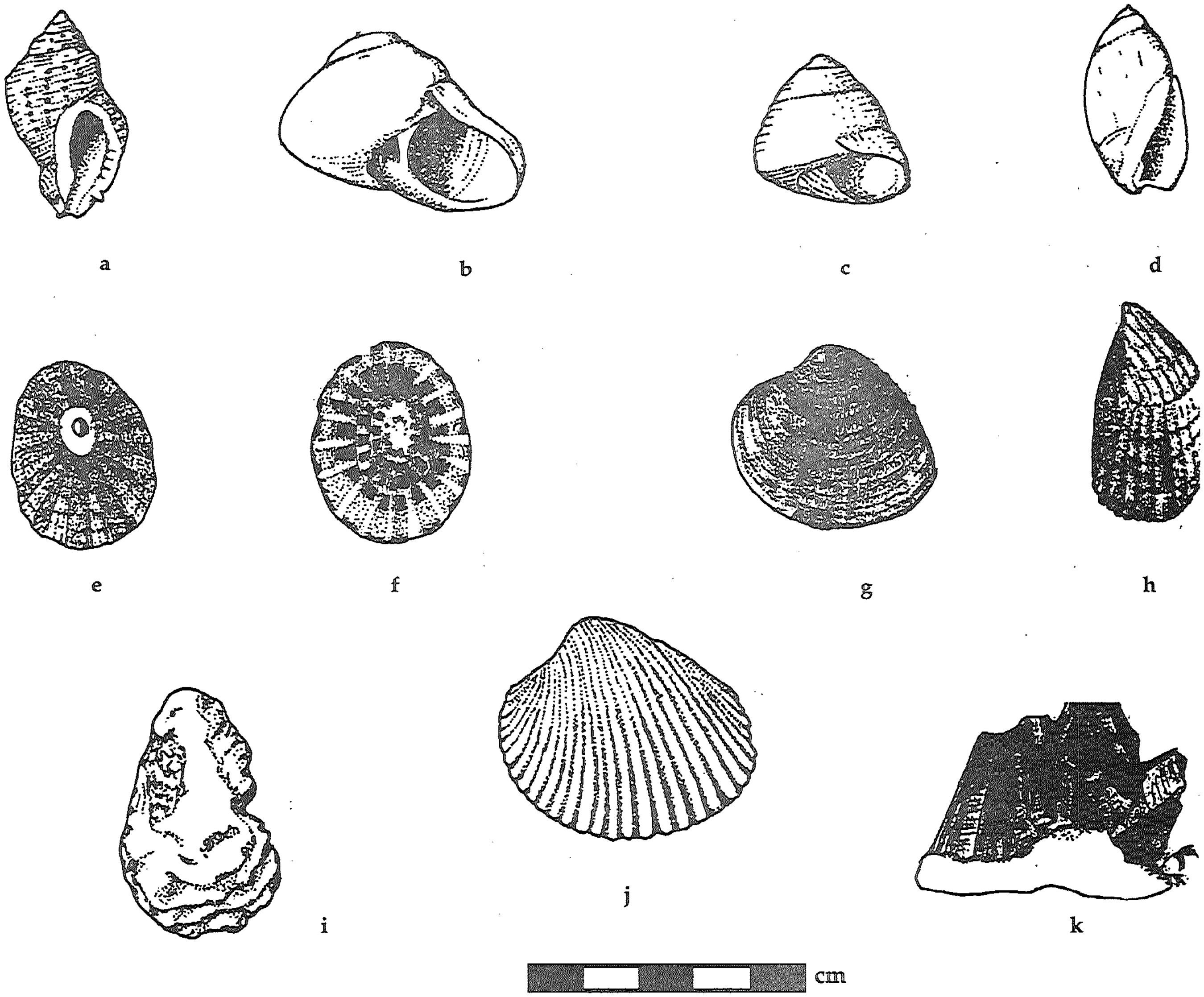


Figure 11.8. Shells found at Three Springs: (a) Haliotis cracherodii *(black abalone), (b)* Pecten circularis *(thick scallop), (c)* Hinnites giganteus *(rock scallop), (d)* Semele *sp. (flat clam), (e)* Saxidomus nuttallii *(money shell), (f)* Protothaca staminea *(little neck clam), (g)* Macoma natusa, *(h)* Mopalia muscosa *(mossy chiton).*

sonably be expected. Temporary shelters, however, might have been used for specific activities and should yield evidence from which such activities might be reconstructed. A hunting camp should contain hunting paraphernalia and some remains of animals taken; a vegetable gathering and processing site would be expected to include grinding tools. LAn-1031 produced no grinding tools and very little lithic material. It appears, then, that the rockshelter was neither a permanent nor a temporary habitation site.

A cache site may contain all or none of the artifacts found at a habitation site. A cache is a hiding place for objects important for a variety of reasons to the person or persons who concealed them. Often, because of the highly personal choice involved, a cache may make very little sense to the excavator trying to find a cultural pattern. LAn-1031, showing no evidence



of habitation, was in all likelihood such a locale.

If LAn-1031 had contained nothing but its unique assortment of unmodified shells and shell artifacts, I would have to conclude that it must have been a cache site because no other use seems logical. The selection of what was basically one shell to represent a whole species seems important symbolically, especially the outsized *Polinices lewisi* and *Mytilus californianus*, and shell beads were often ceremonially hidden. If the other artifacts and archaeological indicators are included in the analysis, the symbolic pattern that emerges is even more striking. There is an arrowshaft straightener, an unusual inclusion in a small site, and little further evidence of hunting. A painted, clam-bored beach stone was found, and painted stones have ritual connotation. A modified bone was buried in an upright position, which could not have been accidental. Thirty-four basketry fragments were excavated from the same unit and may have been the remains of one basket; seven quartz crystals were found. These were considered power objects with a life of their own and were often hidden when not in use to prevent their doing harm. Again, as with the shell sample, a single artifact seems to represent a different aspect of the Indians' relationship to his physical and spiritual world. The painted stone and the quartz crystals were ritual objects and might indicate that the site was a *sawil* or shrine, particularly as these shrines were

Figure 11.9. Shells found at Three Springs: (a) Acanthina spirata *(thorn shell), (b)* Norrisa norrisii *(smooth turban), (c)* Tegula funebralis *(black turban), (d)* Olivella biplicata *(purple olive shell), (e)* Diadora aspera *(rough keyhole limpet), (f)* Fissurella volcano *(MB), (g)* Chione undatella *(hard-shelled cockle), (h)* Septifer bifurcatus *(branch-ribbed mussel), (i)* Ostrea lurida *(Olympia oyster), (j)* Venericardia ventricosa *(hard-shelled clam), (k)* Balanus *sp. (barnacle).*

often on high round in rock shelters. The evidence points to the conclusion that LAn-1031 was used as a cache for objects symbolically, if not ritually, significant.

COMPARISONS AND CONCLUSIONS

By analyzing shell remains from the Three Springs Valley, UCLA archaeologists have sought answers to the following questions: (1) Which marine mollusks constituted the ancient menu? (2) Were marine resources procured on a year-round or a seasonal basis? (3) Which littoral zones were tapped? Responses to these, in turn, generated additional queries, such as when and how interior hunter-gatherer sites, such as LAn-807, 808, and 1031, were utilized.

There was nothing about the makeup of the archaeological shell samples which could prove the interworking of the Three Springs Valley sites.[1] Nevertheless, their geographical proximity to one another strongly implies their interdependence: whoever used the Canasta Rockshelter observed game from the Salsipuedes site, using LAn-807 as a base camp for hunting activities.

While the molluscan-faunal list was smaller at LAn-1031, it included the same species, with one exception, as found at LAn-807. These data suggest to me that mollusks identified at both locales could have been harvested at the same source and at the same time—and possibly by the same people.[2] Nevertheless, several questions, perhaps unanswerable, were raised in the course of this study: (1) Did coastal peoples transport these foodstuffs to the Three Springs Valley for their own consumption while foraging in the interior for game animals, plant foods, fiber and basketry plants, medicinal plants, soap and fish poison plants, or dye, gum, and tobacco plants (Balls 1962)? (2) Did coastal peoples consume shellfish meat while exploiting interior mineral deposits for asphaltum or pigments or while mining scattered lithic sources for raw materials such as chert, chalcedony, or fused shale? (3) Do maritime remains at LAn-807 and LAn-1031 constitute evidence of formal exchange between coastal and interior peoples? (4) Did interior peoples cross the Santa Monicas, exploiting rich coastal microenvironments? (5) Where were the Three Springs Valley shell artifacts manufactured, and by whom? Solutions to these problems remain beyond the scope of this study; however, analysis of the Three Springs Valley shell collection has produced sufficient evidence to answer the less polemical questions.

Comparison of the LAn-1031 shell constituents with those of nearby rock shelters was hampered by a scant data base. (Limited shell data, however, are available from Ven-15, Ven-69, Ven-629, LAn-341, Ven-68, and Ven-373.) With some measure of caution I conclude that the Canasta Rockshelter has a unique shell component, as I have found no counterpart for it in southern California. On the other hand, the LAn-807 shell collection is consistent with what might be found at any Late Prehistoric period hunting camp. Evidence here suggests that shell meat was a minor dietary constituent, complementing the myriad of easily obtainable or preferable food staples native to interior southern California.

Judging from the seasonal availability of identified Cazador mollusks, site utilization during the winter months is hypothesized. Based on the analysis of marine (chap. 6) and terrestrial fauna (chap. 10), I tentatively propose that the Cazador site was casually or intermittently visited during the summer, fall, and winter months—from July until February—for several generations. With some reserve I speculate that the Cazador hunting camp could have been casually, albeit perennially utilized. Still, this is a great deal of postulation for a small amount of cultural debris.

The importance and value of analyzing molluscan refuse from archaeological middens was recognized more than 30 years ago by Meighan, Pendergast, Swartz, and Wissler (1958:1-23). Despite the plethora of research/problem-oriented and contract archaeological excavations conducted in southern California during the 1970s and 1980s, many scholars, seemingly "shell-shocked," have not addressed this topic in their inquiries. Consequently, precious few published data exist on the subject of marine shell analysis (Meighan 1972:3-11; Wlodarski 1985:27). Happily, the renewed scholarly emphasis placed on human ecology and man's resilient adaptive capabilities has reversed this trend; archaeologists continue to pay more attention to this underemphasized research.

Finally, the inherent value of molluscan research cannot be overstated; its utility has long been appreciated by archaeologists working in coastal regions throughout the Americas and beyond. Even a relatively small collection can provide insight, permitting the archaeologist to sample portions of the ancient diet. Substantial quantities of data allow us to reconstruct patterns of resource procurement or to assess the amounts and relative percentages of foodstuffs consumed (e.g., marine vs. terrestrial fauna; terrestrial fauna vs. plant food) by prehistoric peoples. It is my hope that this modest study of ancient subsistence will complement the ever-expanding data base for southern California prehistory, shedding well-needed light on problems of aboriginal settlement and site function.

NOTES

1. The infecund LAn-808 shell collection suggests that shellfish meat was a relatively unimportant source of protein to the site's occupants. Shell artifacts apparently were not manufactured, cached, or carried on-site. As such, they are excluded from the discussion above.

2. That is, marine shells were gathered and brought to the Three Springs Valley throughout the Late Prehistoric period. These marine resources could have been transported to the study area by those individuals responsible for their collection.

ACKNOWLEDGMENTS

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12.
COMPARISONS AND CONCLUSIONS

Brian D. Dillon and Matthew A. Boxt

The Three Springs Valley project began and ended as a field class effort, and as a field class it succeeded in satisfying the basic training needs of beginning archaeology students. As lecture and field courses continue to grow in popularity year after year, surely Grahame Clark (1967:252) has hit upon at least one reason for archaeology's appeal: "Archaeology—and more particularly prehistoric archaeology, which makes no demands upon literary scholarship—has established itself as one of the few forms of entertainment at once harmless and equally acceptable to all grades of society . . . since archaeology appeals directly to interests and concerns basic to human beings, it can entertain almost anyone at whatever level they may be capable of responding."

Our goals in studying the archaeology of the Three Springs Valley, however, incorporated more than basic education and entertainment. As do all culture historians we hoped to reconstruct and interpret the past lifeways of the human beings whose traces we had excavated. Put simply, we hoped to find out what happened in the Three Springs Valley, where it happened, and when it happened. We felt that if we could come up with answers to these three most basic questions, then the fourth and more difficult question of why things happened might also be answered. We hoped to learn about how the ancient people of our study area related to their environment, how and when they exploited sources of food, how they located themselves on the natural landscape, and whether they moved around or stayed put. We also hoped to learn about the size of the sites investigated and to estimate their human populations.

We also hoped to learn about how the Three Springs Valley sites and their occupants related to their cultural environment: how the sites we studied fit into the known or presumed patterns suggested for Santa Monica Mountains archaeology. Were these important sites, or were they cultural backwaters? Were these interior sites, with some artifacts and molluscan remains of obviously coastal derivation, connected directly with coastal settlements? Did they place early or late in the local sequence of cultural development? Could patterns of cultural change be detected within or between the sites? Could linkages beyond the Three Springs Valley be found, and if so, how were these effected? Finally, we hoped to be able to characterize each of the three sites excavated in light of what was already known about the kinds of local prehistoric sites and the activities which went on within them.

INLAND CHUMASH: THE WISHING WELL GOES DRY

Those familiar with earlier archaeological writing about the Santa Monica Mountains area may wonder about the lack of identification in this report with what has come to be termed "inland Chumash" research. Our omission of the descriptive term "inland Chumash" is intentional, because we believe that the concept as a research focus is not very useful. Never really proven as a scientifically valid subdivision of southern California archaeological culture, the idea of the "inland Chumash" passed from theory to dogma without much benefit of proof and may now be inhibiting even such basic kinds of research as chronological ordering and functional identification.

Nearly thirty-five years ago Heizer and Baumhoff (1956:41) stated that "There was some contact between better-off interior groups and the coast peoples, but the environments were so different that probably there were two types of culture with relative separation of coastal and interior groups." Following this line of reasoning, over the past 20 years Santa Monica Mountains archaeology has, rightly or wrongly, become almost synonymous with "Chumash" archaeology, with that of the southern slope "coastal," and that of the northern "inland." Some archaeological thinking about the latter area has become so dogmatic that sites almost automatically are labeled "inland Chumash" without their cultural or chronological affiliations having been established.

"Chumash" aboriginal culture was defined on the basis of ethnographic data, not archaeological research, and there is no consensus of how far back Chumash "prehistory" can be extended in time. Nor is there any consensus about how to identify a "Chumash" site through strictly archaeological means or differentiate it from a prehistoric site occupied by a non-Chumash group. It is also important to note that ethnographic information on the Chumash was recovered only after many years of European infiltration of native cultural patterns and acculturation. Much of the arcana about Chumash intellectual culture can be traced to a single surviving informant, Fernando Librado, interviewed by J.R. Harrington when supposedly 107 years old (C. King 1978:65-66). Librado may have been a paragon of truthfulness and his memory at age 107 may have been sharper than it was at age 17, but his information still is one individual's perception of a past reality that had essentially vanished the generation before he was interviewed.

This being the case, ethnographic reconstructions of Chumash culture must be accepted with great reservations for the period of initial European contact and with suspicion for even the very latest pre-contact period. Researchers such as Tainter (1977:44), who assume that a continuum of Chumash prehistoric culture can be extrapolated from the 1770s back to 5500 B.C. make their case without the benefit of any objective evidence whatsoever.

The notion of the "inland Chumash" has been pervasive in recent archaeological research in the northwestern Santa Monica Mountains and adjacent interior valleys. Archaeological attention was perhaps first drawn to the "inland Chumash" by Glassow (1965:23) in order to evaluate whether or not these people were a cultural subset of the more familiar "coastal Chumash," (i.e., moving between the two zones) or actually separate populations. In Late Prehistoric times the Santa Monica Mountains away from the larger interior valleys seems to have hosted no large villages, and one archaeologist (Van Horn 1987:60) suggests that the area could be "regarded as a sort of 'no man's land'" used mainly for hunting and gathering by Indians living elsewhere. Nevertheless, one of the most ambitious and extensively published regional archaeological investigations in the state was initiated in exactly that "no man's land."

Beginning in the middle 1970s, development in the San Fernando Valley, Conejo Valley, and Thousand Oaks area, coupled with enforcement of the California Environmental Quality Act, led to the investigation of dozens of archaeological sites along the northern flanks of the Santa Monica Mountains and in the "Conejo Corridor." Most of this work was done by UCLA archaeologists, although some projects were also completed by students from Cal State Northridge and by private contract archaeology firms.

Originally called the "Oak Park Project," the major UCLA research effort was gradually transformed into the "Inland Chumash Research Project" (Clewlow, Wells, and Pastron 1978; Clewlow and Whitley 1979; Prichett and McIntyre 1979; Whitley et al. 1980). The result of many surface surveys and site excavations from approximately 1975 to 1985 was to give the Ventura County community of Thousand Oaks and its suburbs, lying just to the northwest of the Three Springs Valley, one of the highest densities of excavated and published archaeological sites in the state of California, if not the country, and elevate the "inland Chumash," at least in southern California archaeological circles, to near legendary status as a "newly discovered" prehistoric people.

The growth of "inland Chumash research" paralleled in many ways the development of what has come to be called the "new" or "scientific" or "problem-oriented" archaeology, even though the greatest popularizers of the rubric (Whitley, Wells, and Clewlow 1980:3-6) attempted in one instance to retroactively co-opt most if not all archaeological work within their sphere of interest as early as the 1870s as "inland Chumash" research.

In the late 1970s and early 1980s "inland Chumash" research came very close to what is described as "social archaeology" in other prehistoric contexts, with more-or-less wholescale reconstruction of past social, political, economic, and even kinship systems based upon fragmentary ethnographic analogies (cf. Whitley and Clewlow 1979:149-174). Yet, after more than a decade of "inland Chumash" excavation and publication, it is hard to find an area of California where so many sites have been dug but so few chronometric dates are available, so many sites studied, yet so few identified as to specific function, so many sites published, yet so few comparisons made between them likely to result in a cumulative advance of interpretation. Viewed in its harshest light, "inland Chumash" archaeology in the Santa Monica Mountains has come to have an ever-expanding body of theory growing ever more distant from basic questions about chronology and function which are left unexplained.

From the outset, "inland Chumash" research tended to be inward-looking rather than comparative—even on a pan-Californian scale. One archaeologist (Van Horn 1987:68) with experience in what others call the "inland Chumash" area suggests that "efforts at organizing regional studies which were explicitly problem-oriented from the outset have been particularly unproductive, considerably more emphasis having been placed upon the problems rather than resolving them." It seems that as archaeologists grew more preoccupied with theoretical constructs and less concerned with hard evidence, the discipline became less anthropological and more sociological. To Van Horn's comment we might add that, as this trend continues, we learn more about the psychology of the researcher than about the people he purports to study. Van Horn's alternative interpretation is that the "inland Chumash" are the same people as the "coastal Chumash," simply living for a season, a year, or possibly a generation away from the coastal population nexus to which they would inevitably return.

If Van Horn distrusts the "inland" part of the "inland Chumash" construct, we dislike the somewhat free and easy use of the ethnic term "Chumash." The culturally identifying label itself can be misleading, for "inland Chumash" archaeology may not be "Chumash" at all depending upon variables of time and space. Early Millingstone sites in the area (Dillon 1978) are obviously too old to be considered "Chumash" and in fact cannot be related to any identifiable ethnographic people. Nevertheless, in some cases (cf. Rosen 1978), despite a known or presumed age for a study site which would obviously make it pre-Chumash or pre- Gabrieliño, it is nevertheless identified by the name given the much later ethnographic group. Incautious extrapolation of ethnohistoric tribal names back into prehistoric time is always to be discouraged, especially so in an archaeological borderland such as we know the Santa Monica Mountains to have been, at least during their final period of prehistoric occupation.

Even for the Late Prehistoric period the ethnic boundary between the coastal Chumash and Gabrieliño is poorly defined: it was, by most accounts (Kroeber 1925), somewhere between Malibu Creek and Topanga Canyon, yet information on the ethnic boundary in the interior (i.e., the northern foothills of the Santa Monica Mountains) is almost completely lacking. Because of the misapplication of a convenient ethnohistoric name such as "Chumash," potentially valuable data from new excavation projects are forced to fit preconceived models or perceptions of cultural development that may be valid only for the very latest part of the prehistoric period. Obviously, when this occurs, each "new" investigation of an "inland Chumash" site becomes a self-fulfilling prophesy.

FUNCTIONAL CULTURE HISTORY

Both of us tacitly accepted the "inland Chumash" notion at first but, after working in the Santa Monica Mountains and Malibu coastal areas for some years, have come to feel that the period of its usefulness has passed. We believe that a different, or perhaps more traditional, approach to reconciling Santa Monica Mountains archaeological data with what it means is now required as opposed to the old "inland Chumash" approach, and the first step in this direction is to eschew the old culture-geographical label. For lack of a better term, we label our approach "functional culture history."

By "function" we mean how things worked within the cultural context that produced and used them (Deetz 1967:77-80), and our methods are those of the old-fashioned field archaeologist, in collecting, describing, and comparing as much evidence from as many sources as possible, and only then interpreting basic evidence instead of letting a preconceived theory force the selective retention of some kinds of evidence and the intentional rejection of other kinds. The most valuable analytical tool for interpretation in this approach is perhaps the oldest anthropological technique: the comparative method. Consequently, much of the present section is devoted to evaluating what we discovered in the Three Springs Valley in light of what other data from other places and time periods can tell us about ancient cultural permutations in southern California. Table 12.1 facilitates artifactual comparisons between the Three Springs Valley sites. Our first impression was that the artifactual constitutents of LAn-807 and LAn-808 were typical and comparable to most collections made at sites in the Santa Monica Mountains. When we combined the artifact categories of the Three Springs Valley sites, however, and considered them as one study collection, we observed the full range of artifacts that one would hope and/or expect to find at a "village." We feel confident that our focus on the Three Springs Valley as a "basic valley residence system," and not on the individual site or on a parent settlement, is a productive avenue of inquiry. Many of the tables presented attempt to inventory specific kinds of artifacts or chronometric evidence present at archaeological sites in the Santa Monica Mountains, on the Malibu coast, and in immediately adjacent areas such as Santa Monica Bay and the Ballona Bluff on the east and the Oxnard Plain in the west.

Table 12.1. Artifact Comparisons of Three Springs Valley Sites

	LAn-807	LAn-808	LAn-1031
Terr. Mam.			
Bone	+	+	+
Artifacts	+	0	+
Leather	0	0	+
Shell			
Unmodified	+	+	+
Artifacts	0	0	+
Fish bone	+	0	0
Bird bone	+	0	+
Feathers	0	0	+
Human burials	+	0	0
Coprolites	0	0	+
Asphaltum	0	+	+
Basketry			
Twined	0	0	0
Coiled	0	0	+
Netting	0	0	+
Leather	0	0	+
Projectile points	+	+	+
Knives	+	0	+
Choppers	+	+	0
Scrapers	+	+	+
Cores	+	+	+
Prismatic blades	+	0	+
Debitage	+	+	+
Quartz crystals	+	+	+
Charm/Painted stones	0	0	+
Incised slabs	0	+	0
Tarring pebbles	0	+	+
Manos	+	+	0
Metates	+	+	0
Mortars	0	0	0
Pestles	0	+	0
Shaft straightener	+	0	+
Steatite vessel fragments	+	0	0
Beads			
Stone	+	0	0
Shell	+	0	+
Glass	0	0	+

CULTURAL CHRONOLOGY

The surest way of avoiding archaeological dogmatism, and the only way in which to determine whether or not the "inland

Chumash" concept has any evolutionary validity, is to achieve control over the cultural chronology of the Santa Monica Mountains through review and integration of chronometric data. Three sources of data exist: radiocarbon age determinations (table 12.2), obsidian hydration measurements (table 12.3), and historical artifacts. All three kinds of evidence were recovered from the Three Springs Valley, although in different quantities at the three separate sites. A thumbnail sketch of chronological development and cultural succession for the valley has already been presented in chapter 1 of this volume. Now it it time to set the chronological interpretation into regional perspective by evaluating the nature of chronometric evidence available for the Santa Monica Mountains proper and for immediately adjacent areas.

Looking at table 12.2, we see the increasing use and utility of C-14 determinations in southern California archaeology. Prior to 1980, a majority of radiocarbon dates either ranged relatively early (post-Pleistocene through the Millingstone period) or well into the Canaliño phase. Recent archaeological efforts among contract archaeologists working in Ventura County, however, have produced a series of important dates, falling within the Intermediate period. These data round out the chronological sequence for southern California.

Obsidian hydration analysis neatly complements radiocarbon and traditional relative dating methods. As one would expect, the majority of obsidian hydration readings fall within the Late Prehistoric period, supporting the assertion that obsidian is a reliable time marker in southern California.

ENVIRONMENT AND SEASONALITY

After many repeated visits over more than a year we began to see the Three Springs Valley not as a natural location containing three separate archaeological sites, but more as its Late Prehistoric and Early Historic Indian inhabitants must have viewed it: as a single residence and resource exploitation entity incorporating at least three different locations at which different specific activities were carried out, surrounded by a great natural larder. The Three Springs Valley in ancient times was probably a good place to live and a good place to get certain kinds of food, a good place to obtain privacy, or to engage in small-scale social or family activities.

Over the many days and nights we eventually spent in the valley, over all the seasons, a wide range of vegetal and faunal resources were seen, from miner's lettuce to mule deer, and very infrequently we were treated to sightings of now-rare species such as pumas or coastal rattlesnakes. Because of its abundant water resources, the Three Springs Valley may have had an absolute advantage over the larger, flatter interior areas such as the Russell Valley immediately to the north; local stockmen attest that in very dry years over the past century when the water gave out down on the flats, it could still be found in the narrower canyon of the Three Springs Valley. Any aboriginal group living in, or making use of, either locality would have been aware of the requirements for subsistence and settlement, and the much smaller valley with its small sites such as LAn-807, 808, and 1031 may have loomed much larger in importance than the large valley with its fewer but possibly larger sites such as Hipuc.

In the context of one of the first sweeping evaluations of California settlement patterns ever offered, Heizer and Baumhoff (1956:33) suggested that

> California was sufficiently endowed with an abundant variety of food resources to enable permanent occupation. By this statement it is not meant that each village was occupied each month of every year of its life, since seasonal population, shifting due to weather . . . drainage problems . . . seasonal endemic disease peaks, and the like obtained widely. However, it is clear that movement was confined to restricted areas which were felt as owned by tribelet groups and defended from trespass. Such conditions of territorial stability were generally true throughout California by the opening of the historic period, and the archaeological data can be interpreted, without straining them, to read that a similar situ-

Table 12.2. Selected C-14 Determinations from Los Angeles and Ventura Counties, California*

	Site No.	Site Name	Sample No.	Date	Description and References
1.	LAn-2	Topanga Canyon	A94	2450 ± 150 B.P.	13"-34." Comment (K. Johnson): Sample (charcoal) is composite from Feature 1, Fire Pits K3 and L3; Feature 5, Fire Pit K5; and Feature 3, Pit K4. A solid carbon date. Damon and Long 1962:245-246.
2.	LAn-2	Topanga Canyon	A197	2700 ± 150 B.P.	Charcoal sample from Feature 3, fire pit K4, 15-24" depth. Ibid.
3.	LAn-43	Encino Village Site	UCR-1992	< 150 (modern)	Charcoal sample, Unit 8, 50-60 cm. Taylor et al. 1986.
4.	LAn-43	Encino Village Site	UCR-1993	210 ± 60 B.P.	Charcoal sample from Unit 8, 60-70 cm. Ibid.)
5.	LAn-43	Encino Village Site	UCR-1994	485 ± 90 B.P.	Charcoal sample from Unit 8, 80-90 cm. Ibid.
6.	LAn-43	Encino Village Site	UCR-1995	550 ± 80 B.P.	Charcoal sample from Unit 8, 90-100 cm. Ibid.
7.	LAn-43	Encino Village Site	UCR-1996	810 ± 90. B.P.	Charcoal sample from Unit 8, 100-110 cm. Ibid.
8.	LAn-43	Encino Village Site	UCR-1997	1050 ± 90 B.P.	Charcoal sample from Unit 8, 110-120 cm. Ibid.
9.	LAn-43	Encino Village Site	UCR-1998	720 ± 50 B.P.	Charcoal sample from Unit 8, 120-130 cm. Ibid.
10.	LAn-43	Encino Village Site	UCR-1999	1000 ± 90 B.P.	Charcoal sample from Unit 8, 130-140 cm. Ibid.
11.	LAn-43	Encino Village Site	UCR-2000	1250 ± 100 B.P.	Charcoal sample from Unit 8, 140-150 cm. Ibid.
12.	LAn-43	Encino Village Site	UCR-2001	1130 ± 70 B.P.	Charcoal sample from Unit 8, 150-160 cm. Ibid.
13.	LAn-43	Encino Village Site	UCR-2002	980 ± 90 B.P.	Charcoal sample from Unit 8, 160-170 cm. Ibid.
14.	LAn-43	Encino Village Site	UCR-2003	530 ± 60 B.P.	Charcoal sample from Unit 8, 170-180 cm. Ibid.
15.	LAn-43	Encino Village Site	UCR-2004	1250 ± 70 B.P.	Charcoal sample from Unit 8, 180-190 cm. Ibid.
16.	LAn-43	Encino Village Site	UCR-2005	1360 ± 100 B.P.	Charcoal sample from Unit 8, 200-210 cm. Ibid.
17.	LAn-43	Encino Village Site	UCR-2006	<150 (modern)	Charcoal sample from Unit 8, 200 cm. Ibid.
18.	LAn-43	Encino Village Site	UCR-2007	1220 ± 80 B.P.	Charcoal sample from Unit 20, 90-100 cm. Ibid.
19.	LAn-43	Encino Village Site	UCR-2008	1120 ± 80 B.P.	Charcoal sample from Unit 20, 100-110 cm. Ibid.
20.	LAn-43	Encino Village Site	UCR-2009	460 ± 90 B.P.	Charcoal sample from Unit 20, 110-120 cm. Ibid.
21.	LAn-43	Encino Village Site	UCR-2010	1100 ± 90 B.P.	Charcoal sample from Unit 20, 120-130 cm. Ibid.
22.	LAn-43	Encino Village Site	UCR-2011	1140 ±100 B.P.	Charcoal sample from Unit 20, 130-140 cm. Ibid.
23.	LAn-43	Encino Village Site	UCR-2012	1030 ± 100 B.P.	Charcoal sample from Unit 20, 140-150 cm. Ibid.
24.	LAn-43	Encino Village Site	UCR-2013	1780 ± 70 B.P.	Charcoal sample from Unit 20, 150-160 cm. Ibid.
25.	LAn-43	Encino Village Site	UCR-2014	1950 ± 85 B.P.	Charcoal sample from Unit 20, 160-170 cm. Ibid.
26.	LAn-43	Encino Village Site	UCR-2015	1790 ± 100 B.P.	Charcoal sample from Unit 20, 170-180 cm. Ibid.
27.	LAn-43	Encino Village Site	UCR-2016	1520 ± 100 B.P.	Charcoal sample from Unit 20, 180-190 cm. Ibid.
28.	LAn-43	Encino Village Site	UCR-2017	1240 ± 80 B.P.	Charcoal sample from Unit 20, 190-200 cm. Ibid.
29.	LAn-43	Encino Village Site	UCR-2018	625 ± 100 B.P.	Charcoal sample from Unit 20, 200-210 cm. Ibid.
30.	LAn-43	Encino Village Site	UCR-2019	1515 ± 80 B.P.	Charcoal sample from Unit 20, 210-220 cm. Ibid.
31.	LAn-43	Encino Village Site	UCR-2020	< 150 (modern)	Charcoal sample from Unit 20, 220-230 cm. Ibid.
32.	LAn-43	Encino Village Site	UCR-1974	980 ± 60 B.P.	Human bone from Feature 15. Ibid.
33.	LAn-43	Encino Village Site	UCR-1975	1030 ± 100 B.P.	Human bone from Feature 51. Ibid.
34.	LAn-43	Encino Village Site	UCR-1976	950 ± 70 B.P.	Human bone from Feature 54. Ibid.
35.	LAn-43	Encino Village Site	UCR-1977	<150 (modern)	Human bone from Feature 74. Ibid.
36.	LAn-43	Encino Village Site	UCR-1978	1070 ± 60 B.P.	Human bone from Feature 75. Ibid.
37.	LAn-43	Encino Village Site	UCR-1979	220 ± 95 B.P.	Human bone from Feature 90. Ibid.
38.	LAn-43	Encino Village Site	UCR-1980	1160 ± 70 B.P.	Human bone from Feature 126. Ibid.
39.	LAn-43	Encino Village Site	UCR-1981	1720 ± 100 B.P.	Human bone from Feature 127. Ibid.
40.	LAn-43	Encino Village Site	UCR-1982	1170 ± 100 B.P.	Human bone from Feature 151. Ibid.
41.	LAn-43	Encino Village Site	UCR-1990	520 ± 80 B.P.	Human bone from Feature 122. Ibid.
42.	LAn-43	Encino Village Site	UCR-1991	1260 ± 60 B.P.	Human bone from Feature 123. Ibid.
43.	LAn-43	Encino Village Site	UCR-2026	790 ± 100 B.P.	Canid bone from Feature 37. Ibid.; Langenwalter 1986:63-97.
44.	LAn-43	Encino Village Site	UCR-2027	860 ± 100 B.P.	Canid bone from Feature 46. Ibid.
45.	LAn-43	Encino Village Site	UCR-2028	510 ±100 B.P.	Canid bone from Feature 59. Ibid.
46.	LAn-43	Encino Village Site	UCR-2029	660 ± 100 B.P.	Canid bone from Feature 117. Ibid.
47.	LAn-43	Encino Village Site	UCR-2030	885 ± 90 B.P.	Canid bone from Feature 135. Ibid.
48.	LAn-43	Encino Village Site	UCR-2021	880 ± 210 B.P.	(reservoir corrected). (A.D. 1580 ± 60, conventional 14C value). Marine shell carbonate sample from Feature 37. Ibid.
49.	LAn-43	Encino Village Site	UCR-2022	760 ± 225 B.P.	(reservoir corrected). (A.D. 1460 ± 100, conventional ^{14}C value). Marine shell carbonate sample from Feature G-52). Ibid.

Table 12.2, *Continued*

	Site No.	Site Name	Sample No.	Date	Description and References
50.	LAn-43	Encino Village Site	UCR-2023	570 ± 225 B.P.	(reservoir corrected). (A.D. 1270 ± 100, conventional ^{14}C value). Marine shell carbonate sample from Feature 83. Ibid.
51.	LAn-43	Encino Village Site	UCR-2024	3870 ± 220 B.P.	(reservoir corrected). (A.D. 4570 ± 80, (conventional ^{14}C value). Marine shell carbonate sample from Feature 92. Ibid.
52.	LAn-43	Encino Village Site	UCR-2025	660 ± 225 B.P.	(reservoir corrected). (A.D. 1360 ± 100, conventional ^{14}C value). Marine shell carbonate sample from Feature 122. Ibid.
53.	LAn-61	Marymount Site	Beta 12381	1420 ± 60 B.P.	Locus A, Trench K, Unit 1, 30-40 cm. Murray, n.d.a.:234-236.
54.	LAn-61	Marymount Site	Beta 13018	2260 ± 65 B.P.	Locus A, Trench H, Units 2, 3, 6. Ibid.
55.	LAn-61	Marymount Site	Beta 12380	2390 ± 65 B.P.	Locus A, Unit 43, 50-60 cm. Ibid.
56.	LAn-61	Marymount Site	Beta 13023	3120 ± 95 B.P.	Locus A, Trench G, Unit 13-14, 40-50 cm. Ibid.
57.	LAn-61	Marymount Site	Beta 12379	4710 ± 80 B.P.	Locus A, Unit 34, 10-20 cm. Ibid.
58.	LAn-61	Marymount Site	Beta 13020	580 ± 80 B.P.	Locus C, Unit 2, 40-50 cm. Ibid.
59.	LAn-61	Loyola Site	Beta 13022	1510 ± 90 B.P.	Locus B,Trench C, Unit 2, 3, 4. Ibid.
60.	LAn-61	Loyola Site	Beta 11903	1970 ± 60 B.P.	Locus B, Trench B, Unit 6, 30-40 cm. Ibid.
61.	LAn-61	Loyola Site	Beta 13019	2390 ± 65 B.P.	Locus B, Unit 32, 40-50 cm. Ibid.
62.	LAn-61	Loyola Site	Beta 13021	3340 ± 75 (700 B.C.)	Locus B, Trench E, Unit 1, 40-50. cm Ibid.
63.	LAn-63	Del Rey Site	Beta 18303**	2020 ± 70 B.P.	Shell. Unit 31, 190-200 cm. Di Gregorio and Linscheid, n.d.:232-233, Table 54.
64.	LAn-63	Del Rey Site	Beta 18301	2070 ± 60 B.P.	Shell. Unit 26: 20-30 cm. Ibid.
65.	LAn-63	Del Rey Site	Beta 19092	2070 ± 90 B.P.	Shell. Trench D8, 80-90 cm. Ibid.
66.	LAn-63	Del Rey Site	Beta 18302	2100 ± 70 B.P.	Shell. Unit 26, 110-120 cm. Ibid.
67.	LAn-63	Del Rey Site	Beta 19091	2530 ± 90 B.P.	Shell. Trench D8, 40-50 cm. Ibid.
68.	LAn-64	Bluff Site	Beta 19093	2300 ± 90 B.P.	Abalone shell. Trench E, Unit 19, 30 cm. Ibid.
69.	LAn-138	UCLA-1008A Malaga Cove	Untreated collagen	215 ± 80 B.P. (A.D. 1735)	Berger and Libby 1966:471.
70.	LAn-138	UCLA-1008B Malaga Cove	NaOH-treated collagen	1790 ± 160 B.P. (A.D. 160)	Ibid.
71.	LAn-138	Malaga Cove II	UCLA-680	1170 ± 100 B.P. (A.D. 780)	Marine shells from Pit I, 12" to 24" depth. See Walker 1951; Berger, Fergusson, and Libby 1965:342.
72.	LAn-138	Malaga Cove II	UCLA-681	1800 ± 100 B.P. (A.D. 150)	Marine shells from Pit I, 36" to 48" depth. Ibid.
73.	LAn-138	Malaga Cove	LJ-3	6510 ± 200 B.P.	Clam shells *(Chione californiensis)*. Hubbs, Bien, and Suess 1960:201.
74.	LAn-159	La Brea Tar Pits 4	LJ-121	4450 ± 200 B.P.	Fragment of wooden atlatl foreshaft (one of the few artifacts from Rancho La Brea tar pits). Ibid.:218-219; Payen 1970:164,
75.	LAn-159	La Brea Tar Pits	UCLA-1292BB	9000 ± 80 B.P.	Collagen extracted from human bone sample. Berger et al. 1971:46.
76.	LAn-159	La Brea Tar Pits	UCLA-1292B	12650 ± 160 B.P.	Ibid.
77.	LAn-159	La Brea Tar Pits	Y-0355A	15400 ± 300 B.P.	Ibid.
78.	LAn-159	La Brea Tar Pits	LJ-344	34000 B.P.	Ibid.
79.	LAn-167	Big Tujunga Site	UCLA-926	1515 ± 80 B.P. (A.D. 435)	Charcoal from lowest cultural stratum. Ruby 1966:117; Berger and Libby 1966:471.
80.	LAn-174	Zuma Creek Site	LJ-77	4950 ± 200 B.P.	*Haliotis cracherodii* shell from Pit 6, 30-60 cm. Hubbs, Bien, and Suess 1960:211.
81.	LAn-190		LJ-78	3460 ± 200 B.P.	*Mytilus californianus* (near Malibu Beach). Ibid. Buried 4.8 m beneath roadcut.
82.	LAn-197	Trancas Canyon	UCLA-1370	2320 ± 60 B.P. (370 B.C.)	*Haliotis rufescens*, Pit 1. Associated with Burial 20, 20-40 cm. Thomas and Beaton 1968:167; Berger and Libby 1969: 196.
83.	LAn-200		Beta-25968	5010 ± 80 B.P.	*Tivela stultorum.* Locus 1, Unit A, 10-20 cm. Hampson and Greenwood n.d.
84.	LAn-210	Mouth of Solstice Canyon		3000 B.P.	Shell. Leonard 1971:123; Dillon et al., n.d.

Table 12.2, *Continued*

	Site No.	Site Name	Sample No.	Date	Description and References
85.	LAn-215	Parker Mesa	UCLA-275	3000 ± 100 B.P. 1050 B. C.	Shell *(Mytilus californianus)* from bottom level of midden-analysis pit, 18"-24." C. King 1962. Comment (C. W. Meighan): the artifact assemblage and terrace location of the site show this site to be part of the Early Milling Stone horizon of southern California, which has yielded numerous $^{C}14$ dates in the 5000 to 7000 yr range from Santa Barbara south to San Diego. The date given is possible but appears to be too young for the cultural context. Berger and Libby 1964:330; Leonard 1971:115.
86.	LAn-222	Paradise Cove	UCLA-920	4300 ± 80 B.P. (2350 B.C.)	*Haliotis cracherodii* shell from Pits 1 and 2, Trenches A and Z, 27 in. below surface. Berger and Libby 1966: 471.
87.	LAn-229	Century Ranch	UCLA-1296	260 ± 80 B.P. (A.D. 1690)	*Haliotis cracherodii* (abalone) from cemetery of village site near junction of Virgenes and Malibu canyons. Pit S-10, W-22, 30-39' below datum. Date corrected by ± 160 yr according to Berger, Taylor, and Libby (Berger and Libby 1968:404). King, Blackburn, and Chandonet 1968: 93-94.
88.	LAn-243	Medea Creek	UCLA-1411A	A.D. 1605 ± 50	Human femur associated with Burial 73. Breschini et al. 1984:6; L. King, n.d.:43.
89.	LAn-243	Medea Creek	UCLA-1411B	ca. A.D. 1650	Charcoal associated with Burial 73 (300 years old). Ibid.
90.	LAn-243.	Medea Creek		A.D. 1420	Human bone associated with Burial 212. See reference above.
91.	LAn-246	Mulholland Site	UCLA 1489A	565 ± 50 B.P.	Charcoal. Pit M5, 12"-24." Galdikas-Brindamour 1972:135, table 2.
92.	LAn-246	Mulholland Site	UCLA 1489B	680 ± 50 B.P. (A.D. 1240)	Charcoal. Pit TR-8, 0-12". Ibid.
93.	LAn-246	Mulholland Site	UCLA 1489C	630 ± 50 B.P. (A.D. 1240)	Charcoal. H-67, 24"-30". Ibid.
94.	LAn-246	Mulholland Site	UCLA 1489D	385 ± 55 B.P. (A.D. 1440)	Human femur, Burial 12, 39. Ibid.
95.	LAn-246	Mulholland Site	UCLA 1489F	Recent	Charcoal from screen. Y2-0, 24"-40." Ibid.
96.	LAn-264	Malibu	UCLA-918A	970 ± 80 B.P. (A.D. 980)	*Mytilus californianus* shells from 42" depth of Area II. Berger and Libby 1966:470; also Glassow, n.d., chart 1.
97.	LAn-264	Malibu	UCLA-918B	2120 ± 80 B.P. (170 B.C.)	*Mytilus californianus* shells from about 65" depth of Area II. See references above.
98.	LAn-264	Malibu	UCLA-918C	2150 ± 80 B.P. (560 B.C.)	*Mytilus californianus* shells from about 120" depth of Area II. See references above.
99.	LAn-264	Malibu	UCLA-918E	2715 ± 80 B.P. (765 B.C.)	*Mytilus californianus* shells from 180" depth in Area II. See references above.
100.	LAn-264	Malibu	UCLA-1886	1246 ± 60 B.P. (A.D. 704)	Bone collagen. C. King, n.d. :47. Breschini et al. 1984:6.
101.	LAn-267	Sweetwater Mesa	UCLA-918F	6310 ± 100 B.P. (4360 B.C.)	*Mytilus californianus* shells from 0 to 6" depth in Area III, Pit II. C. King 1967; Leonard 1971:115.
102.	LAn-267	Sweetwater Mesa	UCLA-918G	6870 ± 100 B.P. (4920 B.C.)	*Hinnites giganteum* shells from 18 in. in depth of Area III, Pit 6. General comment: UCLA-918 A-E fall into estimated age range according to analysis of artifacts. UCLA-918F and G are from approx. 1300-2000 yrs. earlier than anticipated. Ibid.
103.	LAn-269		UCLA-188	600 ± 50 B.P. (A.D. 1350)	Bone collagen. C. King, n.d.:47.
104.	LAn-472		UCLA-2343a	1950 ± 80 B.P.	Charcoal. Unit 1, 30-40 cm. Raab, Singer, Tartaglia, J. Romani, G. Romani, and Larson, n.d.
105.	LAn-472		UCLA-2343b	690 ± 235 B.P.	Shell. Unit 0-10 cm. Ibid.
	LAn-472		UCLA-2343c	300 B.P.	Shellfish. Unit 1, 50-60 cm. Ibid.
106.	LAn-542		UCLA 962:	435 A.D.	Meighan, Findlow, and DeAtley 1974:24.
107.	LAn-629	near Van Norman Reservoir	UCLA-1885	600 ± 80 B.P. (A.D. 1300-1400)	Human bone sample. Foster and Wlodarski 1983:110.
108.	LAn-717	Saddle Rock Ranch	UCLA 2380	1125 ± 300 B.P.	Unit 8, charcoal, Dillon, personal communication.
109.	LAn-807	Cazador Site	UCLA-2522	3780 ± 275 B.P. (1720-2940 B.C.)	Human femur. McJunkin and Berger, this volume.

Table 12.2, *Continued*

	Site No.	Site Name	Sample No.	Date	Description and References
110.	LAn-1060		Beta-9642	720 ± 60 B.P.	Marine shell. Unit 15, 40-50 cm. Brown, Murray, and Van Horn 1986.
111.	LAn-1060		Beta-9643	565 ± 70 B.P.	Marine shell. Unit 15, 50-60 cm. See reference above. B.P. = 1950.
112.	Ven-1	Little Sycamore Cnyn	UCLA-922A	2610 ± 80 B.P. (660 B.C.)	*Tivela stultorum* shell from Pit B-3, 6 to 12 in. Berger and Libby 1966:471; Leonard 1971:115.
113.	Ven-1	Little Sycamore Cnyn	UCLA-922B	6960 ± 100 (5010 B. C.)	*Haliotis cracherodii*. Comment: greatly different ages of samples UCLA-922A and B suggest occupation of site at different times. Ibid.
114.	Ven-7	Deer Canyon Site	UCLA-919A	1770 ± 80 (A.D. 180)	*Mytilus californianus* shells from Pit F-28, 48-54 in., N wall, 5 in. from E wall. Wissler 1958:73-87.
115.	Ven-11	Mugu		290 ± 60 B.P.	Resnick, n.d.
116.	Ven-11	Mugu		500 ± 130 B.P.	Ibid.
117.	Ven-11	Mugu		400 ± 140 B.P.	Ibid.
118.	Ven-26	Simomo Site	UCR-212	3160 ± 150 B.P. (1210 B.C.)	Marine shell *(Chione undatella simillima* [Sowerby], *Argopecten circularis aequisulcatus* [Carpenter], and *Euspira lewisi* [Gould] from 350 to 365 cm. Taylor 1975:398.
119.	Ven-87	Ventura Mission Plaza west of Mission San Buenaventura Historic village of Mitz-khlan-a-kan)	UGa-916	3355 ± 70 B.P. 1405 B.C.	Shell *(Tivela stultorum)*. Noakes and Brandau 1976:363.
120.	Ven-87		UGa-917	3550 ± 90 B.P. (1600 B.C.)	Shell *(Tivela stultorum)*. 2 m depth. Ibid.
121.	Ven-87		UGa-1024	3070 ± 70 B.P. (1120 B.C.)	Shell *(Tivela stultorum)*. Ibid.
122.	Ven-87		UGa-1025	3015 ± 70 B.P. (1065 B.C.)	Shell *(Protothaca castaminea)*. Two samples at a depth of 2.5 m. Ibid.
123.	Ven-87		UGa-1117	2305 ± 140 B.P. (355 B.C.)	Pinniped bone. Bone of sea mammal at 2.05 m below surface. Ibid.
124.	Ven-110		Beta-13627	1020 ± 60 B.P.	Shell. Unit 2, 10-20 cm. Greenwood, Foster, and Romani, n.d.c.
125.	Ven-110		Beta-13628	1020 ± 70 B.P.	Charcoal. Unit 2, 50-60 cm.
126.	Ven-110		Beta-13629	1230 ± 60 B.P.	Shell. Unit 2, 90-110 cm.
127.	Ven-110		Beta-13630	960 ± 60 B.P.	Shell. Unit 4, Level 4.
128.	Ven-110		Beta-13631	1200 ± 70 B.P.	Shell. Unit 4, Level 10.
129.	Ven-118		Beta-16233	660 ± 70 B.P.	Shell. Sugar tests. Greenwood, Foster, and Romani, n.d.a.:38-39.
130.	Ven-168		Beta-17214	1230 ± 70 B.P. (A.D. 720)	Unit 3, 120-140 cm. Romani, Foster, and Greenwood, n.d.b.:26-27.
131.	Ven-168		Beta-19743	1110 ± 60 B.P. (A.D. 840)	Unit 4, 20-30 cm. Ibid.
132.	Ven-168		Beta-19744	1150 ± 60 B.P. (A.D. 630)	Unit 4, 70-80 cm. Ibid.
133.	Ven-168		Beta-19745	1320 ± 60 B.P. (A.D. 630)	Unit 4, 120-130 cm. Ibid.
134.	Ven-168		Beta-19746	1000 ± 50 B.P. (A.D. 950)	10-20 cm. Samples were excavated in 1987 and curated at the Ventura County Museum. Ibid.
135.	Ven-168		Beta-19747	830 ± 80 B.P. (A.D. 1120)	Unit 4. See note above.
136.	Ven-243		Beta-16232	3290 ± 80 B.P.	Shell. Unit 1, 0-10 cm. Greenwood, Foster, and Romani, n.d.a.:38-39.
137.	Ven-243		Beta-16291	2230 ± 60 B.P.	Shell. 40-50 cm. Ibid.
138.	Ven-243		Beta-16292	2080 ± 80 B.P.	Shell. 59/W15. 60-90 cm. Ibid.
139.	Ven-294		UCLA-2131A	3740 ± 160 B.P.	Abalone shell. Unit 249, 40-50 cm deep. Rosen (1978: 115; Table 2), notes a discrepancy between the relative and absolute dating of this site.
140.	Ven-294		UCLA-2131B	7200 ± 160 B.P.	Abalone shell. Unit 200, 40-50 cm. Ibid.
141.	Ven-294		UCLA-2131C	8250 ± 160 B.P.	Abalone shell. Unit 315, 70-80 cm. Ibid.

Table 12.2, *Continued*

	Site No.	Site Name	Sample No.	Date	Description and References
142.	Ven-294		UCLA-2131D	2350 ± 80 B.P.	Hearth charcoal. Unit 127, 108 cm. Ibid.
143.	Ven-594		Beta-25945	5260 ± 100 B.P.	Large mammal bone. Greenwood and Foster, n.d.
144.	Ven-721		Beta-15687	4090 ± 70 B.P.	Shell. Unit 1, 70-80 cm. Greenwood, Foster, and Romani, n.d.a.:38-39.
145.	Ven-721		Beta-15688	3190 ± 90 B.P.	Charcoal. Unit 2, 50-60 cm. Ibid.
146.	Ven-721		Beta-15689	4420 ± 100 B.P.	Charcoal. Unit 2, 80-90 cm. Ibid.
147.	Ven-747		Beta- 28761	5840 ± 90 B.P. (3890 B.C.)	Marine shell. 10 g collected from all units, 10-20 cm. Wlodarski, n.d.a.:47.
148.	Ven-786		Beta-16234	100 ± 80 B.P.	Charcoal. Modern. Greenwood, Foster, and Romani, n.d.b.:21.
149.	Ven-853		Beta-20794	6690 ± 130 B.P.	Shell. Unit 1-W1/530. Greenwood, Romani, and Foster, n.d.:23.
150.	Ven-853		Beta-20795	7610 ± 110 B.P.	Shell. STP9-NO/EO. Ibid.

*Data taken from Breschini et al. 1984.
**Beta = Beta Analytic

Table 12.3. Los Angeles/Ventura County Obsidian Hydration: Selected Sites

Site	OHL No.	Micron Value	Age B.P.	Corrected
LAn-1	11441	4.5	990	A.D. 995
	11439	4.6	1012	968
	11440	5.6	1232	753
LAn-21	6074	4.3	946	A.D. 1039
	6073	4.4	968	1012
	6075, 77	6.6	1452	528
	6076	7.4	1628	360
LAn-26	10737	4.7	1034	A.D. 946
LAn-59	11311	1.0	220	A.D. 1765
	11308	1.5	330	1655
	11303	1.6	352	1633
	11305	3.1/5.7	682	1303
	11300	3.2	704	1281
	11310	3.3	726	1259
	11312, 16	3.6	792	1193
	11313	4.0	880	1105
	11309, 10271	4.3	946	1039
	11317, 18	4.5	990	995
	11319, 15	4.6	1012	973
	11299	4.7	1034	951
	11302	4.8/3.1	1056	929
	11304	4.9	1078	907
	11306	5.2	1144	841
	11307	6.2	1364	621
	11297	6.8	1496	489
	11296, 11301 nhv*			
LAn-61	9033	2.8	616	A.D. 1364
	10163	3.2	704	1276
	9264	3.6	792	1193
LAn-61	9034	3.7	814	1166
	10218, 23	4.2	924	1056
	9619	4.6	1012	968
	9265	4.7/4.3	1034	946
	9256, 51	4.8	1056	924
	9262	4.9	1078	902
	10230	5.2	1144	836
	9252	5.3	1166	814
	10217	5.4	1188	792
	9261	5.4/6.0	"	"
	10226	5.6	1232	756
	9266, 10164, 10219	5.8	1276	704
	9259	5.8/6.2	"	"
	9258	6.0	1320	660
	10221	6.0	"	"
	10224	6.0	"	"
	10165	6.0	"	A.D. 660
	10234	6.0	"	"
	10225	6.1	1342	643
	9254	6.1	"	"
	9255	6.2	1364	621
	7658	6.2	"	"
	9257	6.3	1386	599
	9618	6.3	"	"
	10216	6.3	"	"
	10235	6.4	1408	577
	10238	6.4	"	"
	10232	6.5/7.3	1430	555
	10215	6.7	1474	515
	9032	6.9	1518	471
	9253	7.2	1584	405
	7929	7.3	1606	383
	7928	7.4	1628	360

Site	OHL No.	Micron Value	Age B.P.	Corrected
LAn-61	10223	7.7	1694	295
	10236	8.0/8.9	1760	229
	9617	8.1	1782	207
	9035	8.4	1848	137
	9263	8.7	1914	71
	9260	9.0	1980	5
	10231	9.0/8.3	"	"
	10222	9.5	2090	105 B.C.
	10220	9.6	2112	127 B.C.
LAn-63	9002	2.0	440	A.D. 1540
	10101	3.9	850	1130
	10102	4.1	902	1078
	7659	5.1	1122	858
	9001	5.5	1210	770
	7699	7.0	1540	449
	7698	7.5	1650	339
	10103	8.0	1760	229
LAn-64	7699	7.0	1540	449
	7698	7.5	1650	339
LAn-75	12277	1.3	286	1703
	12280	1.6	352	1633
	12279	1.8	396	1593
	12256	1.8	"	"
	12252	2.0	440	1540
	12278	2.2/3.0	484/726	1505/1263
	12249	2.6		
	12268	3.6	782	1193
	12254	4.2/5.0	924/1100	1056/880
	12251	4.5	990	995
	12262	4.8	1056	924
	12257	6.4	1408	577
	12258	6.4/7.4		
	12273	7.5	1650	A.D. 339
	12250	nhv*		
	12261	nhv*		
	12265	nhv*		
	12269	nhv*		
	12276	nhv*		
LAn-138	10735	4.2	924	1065
	10733	5.5	1210	779
	10734	6.5	1430	559
LAn-153	7341	3.7	814	1175
	7346	3.7	"	"
	5645	5.2	1144	845
	7345	6.3	1380	594
	5811	7.7	1694	295
	7342	8.4	1848	141
	7343	nhv*		
	7344	nhv*		
LAn-243	8589	2.5	550	1435
	8588	2.7	594	1390
	8587	2.8	616	1364
LAn-243	8579	3.0	660	1325
	8578	8.6	1900	85
	8580	nhv*		
	8581	nhv*		
	8582	nhv*		
	8583	nhv*		
	8584	nhv*		
	8585	nhv*		
	8586	nhv*		
	8591	nhv*		
	8592	nhv*		
LAn-243V	1536	3.1	682	A.D. 1303
LAn-264	3898	2.2	484	A.D. 1496
	3957	2.2	"	
	3890	2.8	616	1364
	3913	2.8	"	"
	3916	3.2	704	1276
	3881	3.4	748	1232
	3871	3.7	814	1166
	3876	3.8	836	1144
	3851	3.9	850	1130
	3955	3.9	"	"
	3980	3.9/4.9	850/1078	1130/902
	3870	4.1	902	1078
	3914	4.1	"	"
	3859	4.2	924	1056
	3874	4.3	946	1034
	3884	4.3	"	"
	3855	4.3	"	"
	3862	4.3	"	"
	3956	4.3	"	"
	3947	4.4	968	1012
	3872	4.4	"	"
	3906	4.4	"	"
	3873	4.6	1012	968
	3879	4.6	"	"
	3882	4.6	"	"
	3894	4.6	"	"
	3897	4.6	"	"
	3850	4.6	"	"
	3865	4.6	"	"
	3912	4.6	"	"
	3901	4.7	1034	946
	3907	4.7	"	"
	3875	4.8	1056	924
	3949	4.8	"	"
	3891	4.9	1078	902
	3893	4.9	"	"
	3840	4.9	"	"
	3877	4.9	"	"
	3885	4.9	"	"
	3847	4.9	"	"
	3849	4.9	"	"
	3854	4.9	"	"
	3863	4.9	"	"
	3905	4.9	"	"

Site	OHL No.	Micron Value	Age B.P.	Corrected
LAn-264	3869	5.0	1100	A.D. 880
	3852	5.0	"	"
	3902	5.0	"	"
	3909	5.0	"	"
	3911	5.0	"	"
	3981	5.0	"	"
	3878	5.1	1122	858
	3853	5.1	"	"
	3860	5.1	"	"
	3861	5.2	1144	836
	3867	5.2	"	"
	3954	5.2	"	"
	3895	5.2/6.3	1144/1386	836/594
	3848	5.3	1166	814
	3892	5.4	1188	792
	3883	5.4	"	"
	3843	5.4	"	"
	3845	5.4	"	"
	3857	5.4	"	"
	3858	5.4	"	"
	3899	5.4	"	"
	3904	5.4	"	"
	4111	5.4	"	"
	3951	5.4	"	"
	3889	5.5	1210	770
	3839	5.5	"	"
	3866	5.5	"	"
	3880	5.7	1254	726
	3887	5.7	"	"
	3844	5.7	"	"
	3900	5.7	"	"
	3896	5.8	1276	704
	3903	5.8	"	"
	3842	5.9	1298	682
	3948	5.9	"	"
	3886	6.0	1320	660
	3868	6.0	"	"
	3910	6.0	"	"
	3908	6.2	1364	616
	3846	6.3	1386	594
	3950	6.3	"	"
	3952	10.7	2354	365 B.C.
	3888	nhv*		
	3856	nhv*		
	3864	nhv*		
LAn-339	10720	6.7	1474	515
	120	7.7	1694	295
	119	7.8	1716	273
	10721	8.0	1760	229
LAn-454	10407	nhv*		
	10408	1.6	352	A.D. 1633
LAn-474A	5839	4.4	968	A.D. 1012
	5740	4.4	"	"
	5836	4.7	1034	946
	5837	4.7	"	"

Site	OHL No.	Micron Value	Age B.P.	Corrected
LAn-474A	5838	6.3	1386	594
LAn-474B	5716	2.1	462	A.D. 1527
	5718	3.0	660	1329
	5719	4.3	946	1043
	5720	5.4	1188	801
	5721	6.0	1320	669
LAn-516	10720	6.7	154	1835
	10721	8.0	1760	229
LAn-518	10729	7.3	1606	383
	10731	7.4	1628	361
	10726	8.0	1760	229
	10727	8.1	1782	207
	10728	8.2	1804	185
	10725	8.7	1914	75
	10732	9.4	2068	79 B.C.
	10724	9.8	2156	167 B.C.
	10730	14.0	3080	1091 B.C.
LAn-542	866	4.6	1012	977
	861	5.0	1100	889
	869	5.0	"	"
	871	5.0	"	"
	872	5.0	"	"
	864	5.2	1144	845
	865	5.2/6.2	1144/1364	845/625
	868	5.2	1144	845
	870	5.4	1188	801
	863	7.1	1562	427
	862	7.3	1606	383
	875	7.3	"	"
	874	7.4	1628	361
	867	n.a.		
LAn-582	3958	6.9	1518	A.D. 471
	3959	12.6	2772	783 B.C.
LAn-671	9860	4.8	1056	A.D. 933
LAn-711	7472	4.7	1033	A.D. 947
	7473	5.9	1298	683
	7474	5.9	"	"
LAn-712	7983	4.9	1078	A.D. 902
	7984	4.9	"	"
	7979	5.8	1276	704
	7980	5.8	"	"
	7982	6.6	1452	528
	7981	7.0	1540	440
LAn-717	9027	1.7	374	A.D. 1611
	9017	2.2	484	1505
	9028	2.3	506	1483
	9007	2.4	528	1461
	9020	2.5	550	1439
	9019	2.7	594	1395

Site	OHL No.	Micron Value	Age B.P.	Corrected
LAn-717	9018	2.8	616	1373
	9004	3.0	660	1329
	9022	3.0	"	"
	9024	3.1	682	1307
	9026	3.1	"	"
	9009	3.1	"	"
	9003	3.3	726	1263
	9012	3.3	"	"
	9013	3.6	792	1197
	9008	3.6	"	"
	9015	3.7	814	1175
	9006	3.7	"	"
	9029	3.7	"	"
	9023	3.7	"	"
	9025	3.7	"	"
	9014	3.9	858	1131
	9010	4.2	924	1065
	9011	4.6	1012	977
	9016	4.6	"	"
	9005	5.5	1210	779
	9021	8.9	1958	31
LAn-807	7477	2.8	616	A.D. 1369
	7475	4.5	990	995
	7476	4.8	1056	929
	7478	6.0	1320	665
	7660	6.4	1408	577
	7661	6.5	1430	555
	7662	6.6	1452	533
LAn-808	10334	4.6	1072	A.D. 913
	10335	5.3	1166	819
LAn-844	8644	5.8	1276	713
	8642	5.8	"	"
	8640	5.9	1298	691
	8641	5.9	"	"
	8643	7.3	1606	383
LAn-848	10739	5.1	1122	867
LAn-999	6098	5.8	1276	713
LAn-1060	11340	3.2	704	1276
	11338	3.6	792	1193
	11324	3.8	836	1144
	11323	3.8/5.0	"	"
	11339	4.1	902	1078
	11337	4.2	924	1056
	11325	4.5/5.2	990/1144	995/841
	11331	4.6	1012	968
	11328	4.8	1056	929
	11329	5.0	1100	880
	11330	5.2	1144	845
	11334	5.2	"	"
	11335	5.2	"	"
	11336	5.3	1166	814
LAn-1060	11326	5.3	"	"
	11327	8.5	1870	119
LAn-1098	12281	1.4	308	1681
	12272	2.2	484	1505
	12248	3.0/4.0	726/880	1263/ 1109
	12266	4.8	1056	933
	12274	5.0	1100	586
	12263	6.1	1342	647
	12259	nhv*		
	12260	nhv*		
	12267	nhv*		
	12271	nhv*		
	12275	nhv*		
LAn-1263	12893	8.5	1807	A.D. 119
	12894	10.2	2244	255 B.C.
	12890	10.5	2310	321 B.C.
	12891	nhv*		
LAn-1264	12895	5.7	1254	A.D. 735
	12892	10.0	2200	211 B.C.
VENTURA COUNTY				
Ven-71	8596	3.4	748	A.D. 1237
	8594	3.5	770	1215
	8595	nhv*		
Ven-87	4941	1.6	352	1633
	4940	1.7	374	1611
	4938	1.9	418	1571
	4943	2.2	484	1496
	4939	2.4	528	1461
	4937	2.6	572	1417
	4935	5.1	1122	867
	4934	6.0	1320	665
	4942	6.3	1380	594
	4936	nhv*		
	4944	nhv*		
	4945	nhv*		
	4946	nhv*		
Ven-168	1735	nbs**		
	1742	nbs**		
	1743	nbs**		
	1736	3.0	726	1263
	1738	3.1	682	1303
	1737	3.9	850	1130
	1739	4.7	1034	946
	1740	5.4	1188	792
	1741	6.2	1364	616
Ven-226	11039	5.5	1210	770
	11042	6.0	1320	660

Site	OHL No.	Micron Value	Age B.P.	Corrected
Ven-226	11043	6.8	1496	493
	11038	6.9	1518	471
	11040	6.9	"	"
	11041	6.9	"	"
Ven-260	11034	3.5	770	
	11035	4.2	924	1056
	11033	5.4	1188	792
	11032	6.1/6.7	1342/1474	643/515
	11036	nhv*		
	11037	nhv*		
Ven-294	5466	3.7	833	A.D. 1144
	5483	4.1	923	1054
	5475	4.3	968	1009
	5482	4.7	1058	919
	5465	4.9	1103	874
	5463	5.2	1170	807
	5462	5.5	1238	739
	5478	6.0	1350	627
	5477	6.2	1395	582
	5479	6.3	1418	559
	5473	6.8	1530	447
	5484	7.5		
	5469	8.0	1800	177
	5471	8.0	"	"
	5467	8.4	1890	87
	5470	8.6	1935	42
	5468	9.0	2025	48 B.C.
	5474	nhv*		
	5481	nhv*		
Ven-315	10716	2.4	528	1461
	10717	2.7	594	1395
	10718	4.0/4.9	880/1078	1109/911
	10719	4.6	1012	977
Ven-457	9039	4.2	924	1065
Ven-477B	13117	5.6	1232	756
	13118	5.7	1254	726
Ven-536	6099	3.8	836	1144
	6101	3.9	850	1130
	6102	4.1	902	1078
	6100	6.8	1496	493
Ven-594	7505	2.2	484	1505
	7532	2.5	550	1439
	7542	2.6	572	1417
	7533	3.4	748	1237
	7525	3.4	"	"
	7534	3.8	836	1144
	7524	4.0	880	1105

Site	OHL No.	Micron Value	Age B.P.	Corrected
Ven-594	7546	4.3	946	1039
	7510	4.3	"	"
	7511	4.3	"	"
	7514	4.3	946	1039
	7503	4.6	1012	977
	7516	4.7	1034	951
	7544	4.7	"	"
	7512	4.8	1056	924
	7513	4.9	1078	902
	7522	4.9	"	"
	7536	5.0	1100	880
	7545	5.0	"	"
	7519	5.1	1122	858
	7520	5.2	1144	836
	7521	5.2	"	"
	7506	5.2	"	"
	7547	5.2	"	"
	7504	5.3	1166	814
	7526	5.3	"	"
	7531	5.3	"	"
	7509	5.4	1188	792
	7518	5.4	"	"
	7517	5.5	1210	770
	7537	5.5	"	"
	7540	5.5	"	"
	7541	5.5	"	"
	7538	5.7	1254	735
	7543	5.8	1276	713
	7523	5.9	1298	691
	7515	6.4	1408	577
	7527	6.4	"	"
	7528	6.4	"	"
	7529	6.4	"	"
	7530	6.8	1496	493
	7508	6.9	1518	471
	7539	6.0	1320	660
	7535	7.3	1606	383
	7502	7.5	1650	339
	7507	43.6		
Ven-733	6068	2.8/3.3	616/726	1364/ 1259
	6069	3.0	726	1263
	6072	3.9	850	1130
	6067	4.3	968	1009
Ven-747	***	5.0	A.D.330-880	
		2.6	A.D. 1122-1408	

* No hydration visible (see Meighan and Vanderhoeven 1978:vii)
** No band seen (see note in Meighan et al. 1974:3)
***Sonoma State University

ation had existed for some centuries, if not millennia, earlier.

With this general pattern in mind, it is likely that aboriginal areas such as the Three Springs Valley probably experienced cyclical periods of peak utilization interspersed with abandonment. Throughout much of California, especially in its more arid regions, the Indian population dispersed during times of scarce water and congregated during times of relative abundance of water. The seasonal regime in many areas encouraged a "winter village"-"summer camp" situation that persisted in some parts of southern California and the Central Valley long past European contact. The northern slope of the Santa Monica Mountains may very well have facilitated this kind of shifting settlement pattern, with a congregation of population during the winter months—when water was plentiful—in large settlements which could perhaps be identified as "villages"; then as water became scarce during the late spring and summer, the concentrated population would drift away, probably in small family groups, to smaller settlements that would not overtax the locally available sources of water.

There are no Spanish colonial references to the Three Springs Valley dating to the last quarter of the eighteenth century, and, in fact, no indications of an archaeological presence there were discovered until two centuries later. Nevertheless, a place name was recorded in the immediate vicinity, within a mile or so to the north of the Valley's mouth, by the first terrestrial European explorers in Los Angeles County; references to this location indicate the kinds of extremes of seasonality that would have led to shifting settlement patterns. Edberg (n.d.: 4-11, 4-14) equates Hipuc "village" with a settlement of 10 grass houses which the members of the Portolá party named "El Triunfo del Dulcissimo Nombre de Jesus." The locality eventually gave its name to Triunfo Canyon.

Regardless of whether we accept Hipuc as a "village" in the conventional sense, it probably was the closest named settlement of any size to the Three Springs Valley at the time of initial European contact. In January 1770, during the rainy season, Portolá estimated Hipic's population at 30 people, and Crespi enthused about the abundant wood and especially the water at "El Triunfo." A quarter-century later, Fray Vicente de Santa María in August 1795 (the dry season) found virtually no water there at all. What would have happened to the population of Hipuc as summer advanced and the water dried up? It probably dispersed to places such as the Three Springs Valley where dependable water, albeit in small quantities, was available year-round.

Faunal, fish, molluscan, and to a lesser extent, coprolite remains from the Three Springs Valley sites suggest human exploitation during the summer, fall, and winter, and if our identification of the Canasta Rockshelter's function as that of a cache location is correct, this also supports an intermittent interpretation of aboriginal use for the Three Springs Valley (i.e., the small sites are abandoned for part of the year, but the people have possessions "locked away" in the cave until the next visit). In all likelihood the Three Springs Valley was utilized by its residents intermittently throughout the year, not strictly as a "summer encampment" area as a ready acceptance of the model earlier discussed might suggest. In fact, seasonality in southern California archaeological contexts is probably a much more complicated matter than the "either-or," "winter-summer" dichotomy sometimes assumed. In our study area different functions may have been carried out by possibly different people (even by different sexes) at different times of the year.

SETTLEMENT AND SUBSISTENCE PATTERNS

A standard expression of hunter-gatherer settlement patterns in arid or semi-arid regions incorporates the notion of the "satellite" system, in which a large settlement (sometimes called a "parent" village) is at the center of a scattering of smaller residence units, sometimes villages themselves, sometimes something less prestigious and smaller in population than the nebulously-defined "village." According to this quasi-colonial model, each lesser unit is dependent upon the greater one for certain things like political or economic power, prestige, or religious or kinship authority. Injecting the presumption of seasonal population shifts, we can infer that this model would equate the winter "village" with the prestige center, and the "summer camps" as the boondocks locations where the more mundane activities took place. The notion of the "shifting village" is a well established one in California ethnology, yet one which has not been applied to archaeological contexts perhaps as frequently as it might have.

For areas with very low population density, such as we tend to presume was the case in the Santa Monica Mountains interior, the relations between such residence units are normally supposed to be based upon kinship. Frequently, social interpretations of such "satellite systems" have lineage heads residing in the winter village—sometimes, as prestige would dictate, for much more than just the winter months—while less-prestigious relatives or lower-ranked family members lived in the satellite sites. Thus, the classic satellite model takes the form of a wagon wheel, with the hub being the parent or winter village and the individual spokes leading outward to the subsidiary settlements, be they also "villages," "camps," or "special activity sites" (cf. Butzer 1982: fig. 13-1).

Archaeologists used to looking at settlement patterns or "settlement systems" sometimes tend to see small sites relating to larger ones as a function of relative prestige: the implicit assumption is that small sites have lesser prestige simply because they are smaller than the larger sites, which must be where the "important" people live. Following this line of reasoning, one frequently assumes that the greater the distance from the local prestige "capitol," the lesser the prestige of the small site. But, if the focus of prestige is control over a specific resource area, i.e., a spring, a stand of oak trees, or as in this case, perhaps an entire valley, with self-contained water, faunal, floral, and residential resources, then the absolute size of the sites and absolute distance from the "big village" may have nothing to do with the relative level of prestige. The independent variable now becomes the valley itself and its advantages or disadvantages. Does it have a year-round supply of water? Can it offer plant and animal foods in some abundance? Is it a pleasant place to live? Can it be defended against encroachment?

When we first began work in the Three Springs Valley, we were ready to assume that Hipuc, destroyed a decade before, was a "hub" village, and the three sites we were investigating were consequently best identified as Hipuc satellites. As such, we identified them much as Butzer's (1982:231) "multiple-activity long-term camps." But, as we came to know our small sites better, we found it hard to establish any proof of direct connection with larger, "village level" sites, and the "satellite" label became less attractive. In fact, we began to question the somewhat free and easy use of the term "village" itself, realizing that the rubric meant very different things to different people.

The term "village" as used in the Santa Monica Mountains (cf. C. King 1975, 1978) is a meaningless term which most users don't qualify or define. Even for the period of initial European contact, an aboriginal "village" connotes neither a specific settlement form nor a specific level of population. Only Galdikas-Brindamour (1970) has made a serious effort to outline archaeological criteria by which one can recognize prehistoric "villages" through excavated evidence alone. Her criteria (ibid.: 130-131) for village sites are: (1) they are occupation sites which are never completely abandoned; (2) they are occupied for lengths of time spanning more than one generation; (3) permanence of occupation is signalled by the presence of a cemetery with inhumations of both sexes and all ages; (4) differential social status should be detectable within cemetery populations; (5) architectural evidence should be recoverable; (6) different subsistence and extra-subsistence activities performed at different seasons of the year by both sexes should be discoverable; and (7) a diversity of manufacturing and maintenance activities should be discernable.

By these criteria, no site in the Three Springs Valley qualifies as a "village," and in fact few other supposedly "inland Chumash" sites touted as "villages" pass the test either. LAn-229, identified as "Talepop" by King (n.d.), LAn-413 identified as "Huwam" by Romani (n.d.), and Ven-271 (M. Johnson 1980), for example, are all claimed as "villages" by their excavators yet lack many or most of the criteria outlined by Galdikas-Brindamour. One inland site which seems to possess all the proper qualifications for "village" status is LAn-43, commonly known as the "lost village of Encino," which in at least its later period of occupation was a Gabrieliño settlement.

Perhaps a neutral term such as "settlement" is more appropriate than the uncritical use of the term "village." We can identify simple and complex kinds of settlements, as well as large and small ones, but making the distinction between "large hamlet" and "small village" is still problematic, especially when one considers that most archaeological villages wherever they are found began small and grew over time.

"Satellite" settlements such as LAn-807 or LAn-808 are frequently seen as being less prestigious than the presumed "parent" villages, less complex, with fewer people and fewer activities being carried out. Yet, with contact-period "village" populations in the interior numbering only 30 to 60 people at most, it is likely that the so-called "satellite" villages or camps are more characteristic of the Santa Monica Mountains than the very few larger villages such as Medea Creek. Certainly, with one of the most telling differences between the Malibu coast and the Santa Monica Mountains interior being the small size of sites in the latter area, it is likely that the overall population of the interior was quite small and probably dispersed.

The Three Springs Valley settlement pattern incorporates three basically different archaeological sites, not "communities" but each forming part of what might be termed a "basic valley residence system." In terms of subsistence, in modern archaeological parlance, the Three Springs area makes up a convenient "resource procurement zone" or "catchment area" that was doubtless exploited by the Indians who occupied or at least used archaeological sites LAn-807, 808, and 1031. That subsistence activities within the valley seem to have been quite diversified is suggested by the physical evidence discussed earlier in this volume by Roeder, Duque, and Horner. Certainly the human residents of the valley did not confine their subsistence activities entirely within it, as the reasonably abundant marine resources imported from the coast on the other side of the mountains attest.

If what we know as "land ownership" was an alien concept to most California Indian groups, "use rights" were not. Heizer and Treganza (1972) note the generalized concept of specific exploitation rights to lithic resource areas in aboriginal California and similarities with floral and faunal resources as well. If, within the Three Springs Valley

> exclusive gathering-hunting rights were vested in individuals (or families). . . it would invalidate interpretations that resources were available to all who might want to make use of them. This in turn would affect an interpretation of the carrying capacity of the land. [Hole and Heizer 1977:307]

Examining the ecological context or setting of aboriginal settlements as a means of interpreting site function or human behavior is not a new concept: it was clearly postulated 50 years ago (Gifford and Kroeber 1939), and its continued validity is supported by recent writings such as those of McLendon and Oswalt (1978) for the northern California Pomo. According to Gifford and Kroeber (1939:117): "Several Pomoan groups were divided into a number of small groups, which at one time or another have been called tribes, villages, or tribelets. Each of these was completely autonomous and owned a tract of land which might or might not be exactly defined but was substantially recognized by all neighboring communities."

McLendon and Oswalt (1978:275-276) add that

> the extent and nature of the tract of land claimed by each village-community seems to have been determined largely by the nature of the terrain, its ecology, and the nature of the group's adaptation to that ecology. The absolute square footage controlled was not particularly important. Rather, the size of the tract of land claimed seems to have been determined by the need to assure access to a sufficient supply

> of food (which is why the absolute limits of a group's territory are sometimes not clear). Differences in the carrying capacity of the environment resulted in several village-communities sometimes being in close proximity.[1]

There very well may have been a similar environmental constraint on the settlement pattern of the Three Springs Valley, but the environment did not determine the nature and number of sites we found and excavated within; rather, it may have been a cultural rule that the valley itself was "owned" by a specific family or lineage or that only an exclusive group of people could take advantage of its resources. Conceivably, all three sites in the Three Springs Valley could have been the exclusive preserve of a single extended family over the entire period of their use, forming as such not a "satellite" system related to any other "parent" village such as Hipuc, but something more like a closed cycle or what Butzer (1982: fig.13-2A) terms a "circular, annual macroscale mobility model for hunter-gatherers."

WHEN IS A VILLAGE NOT A VILLAGE?

Many protohistoric Chumash and Gabrieliño settlements in the Los Angeles and Ventura counties' coastal zone satisfy all of Galdikas-Brindamour's (1970) criteria for village status, and in fact, the Canaliño "village" level of development is sometimes represented as "incipient urbanism." Inland, however, village status is frequently ambiguous: certainly, no aboriginal cities ever existed in the adjacent Santa Monica Mountains, yet population concentrations were encountered nonetheless, and these are normally identified as "villages." Heizer (1962) provides ample ethnographic documentation for the abandonment and reestablishment of native Californian village sites, so even if we accept the proposition that "villages" existed in the Santa Monica Mountains in any numbers, it is likely that they changed locations from time to time.

Unfortunately, research in the interior has tended to focus more on "where" such villages are rather than "what" they are: Applegate (1975), C. King (1975), Whitley and Clewlow (1979), and Edberg (n.d.) have all grappled with the problem of village identifications and affiliations in the Santa Monica Mountains region. The intriguing task of correlating archaeological sites with ethnohistoric place names faces the same obstacle wherever attempted in California: too many archaeological sites exist as candidates for too few historic locations, and the Spanish colonial-era descriptions are usually too brief to allow for differentiation between the possible archaeological candidates.

Edberg (n.d.: 4-5), for example, in one of the more stimulating discussions of aboriginal villages in the Santa Monica Mountains region, draws heavily upon the writings and speculations of C. King (1975) and believes that the LAn-229 archaeological site equates with the protohistoric Chumash village of Talepop. Edberg ridicules an earlier assertion that this village instead is LAn-243 at Medea Creek: "This incorrect attribution is symptomatic of a general level of ignorance on the part of some researchers regarding historic Chumash villages in the Santa Monica Mountains," but, according to Galdikas-Brindamour's 1970 criteria, the identification of LAn-243 as a village is much more accurate than ascribing village status to LAn-229.

If we rely upon archaeological evidence as a means of distinguishing or defining "village" sites (table 12.4) and not upon the impressions of early Spanish visitors or the subsequent interpretations of ethnohistorians, then it seems obvious that fewer "village" settlements were extant during the contact period than indicated by some students (King et al., n.d.).

Why, then, have so many villages been identified in the "inland Chumash" region, yet so few been excavated? Have the bona fide villages been destroyed by development before they could be archaeologically studied or are historical accounts being misinterpreted and non-villages being misidentified as such by overzealous archaeologists?

We suggest that many, if not most, of the archaeological or early historic villages claimed for the Santa Monica Mountains are not villages at all. Having expressed this caveat, we must then ask what are they? The colonial Spanish term *ranchería* provides the most important clue, one fre-

Table 12.4. Comparisons of Material Remains Among Village Sites

	LAn-43	LAn-229	LAn-243v	LAn 246	Lan-413	Ven-61	Ven-70	Ven-261	Ven-271	Ven-294	Ven-449
Terr. mammal bone:*											
Unmodified	+	+	+	+	+	+	+	+	+	+	+
Artifacts	+	+	+	+	+	+	+	+	0	+	0
Shell:											
Unmodified	+	+	+	+	+	+	+	+	+	+	+
Artifacts	+	+	+	+	+	+	0	+	0	+	0
Fish bone	?	+	+	+	+	0	0	+	+	+	0
Bird bone	+	+	+	+	+	0	0	0	0	+	0
Feathers	0	0	0	0	0	0	0	0	0	0	0
Human burials	+	0	+	+	+	+	0	+	0	+	0
Coprolites	0	0	0	0	0	0	0	0	0	0	0
Asphaltum	?	+	+	+	+	+	+	+	0	+	+
Basketry:											
Twined	0	0	0	0	0	0	0	0	0	0	0
Coiled	0	0	0	0	0	0	0	0	0	0	0
Netting	0	0	0	0	0	0	0	0	0	0	0
Leather	?	0	+	0	0	0	0	0	0	0	0
Projectile points	+	+	+	+	+	+	+	+	+	+	+
Knives	+	+	+	+	+	+	+	+	+	+	+
Choppers	+	+	+	+	+	+	+	+	+	+	0
Scrapers	+	+	+	+	+	+	+	+	+	+	+
Cores	+	+	0	+	+	+	+	+	+	+	0
Prismatic blades (unifacial)	?	0	0	+	+	+	0	+	0	0	+
Debitage	+	+	+	+	+	+	+	+	+	+	+
Quartz crystals	?	+	0	+	+	+	+	+	+	+	+
Charm/Painted stones	?	+	0	0	0	0	0	0	0	0	0
Incised slabs	?	+	0	0	0	+	+	0	0	+	0
Tarring pebbles	?	+	0	+	+	+	+	0	0	+	0
Manos	+	+	+	+	+	+	+	+	+	+	+
Metates	+		+	+	+	+	+	+	+	+	+
Mortars	?	+	+	+	+	+	+	+	0	+	0
Pestles	?	+	+	+	+	+	+	+	0	+	0
Shaft straightener	?	0	0	0	0	0	0	+	0	0	0
Steatite vessel frags.	?	+	+	+	+	+	+	+	0	0	0
Beads:											
Stone	?	+	0	+	0	+	0	+	+	+	0
Shell	+	+	+	+	+	+	+	+	0	+	+
Glass	?	+	0	0	0	0	0	0	0	0	0
Bone	?	+	0	0	0	+	0	0	0	+	0
Hammerstones	?	+	+	+	+	+	+	+	+	+	0
Drills, gravers	?	+	+	0	0	+	+	+	+	+	+
Obsidian	?	+	0	+	+	+	+	+	+	+	+

*Nonhuman

quently overlooked by non-Spanish speaking archaeologists working in the Santa Monica Mountains. We suggest that the Spanish word ranchería, which in its eighteenth-century frontier usage probably best translates to "rural encampment" has recently come to be routinely misused as a direct equivalent of the English term "village." This incorrect usage has resulted in a skewed understanding of aboriginal settlement patterns.

In its original sense, *ranchería* referred to a small cluster of dwellings and by no means indicated a pueblo, or village. This etymological point has obvious archaeological repercussions: by distorting the observations made by early Spanish travelers, we run the risk of fabricating settlement types and settlement patterns that might not have existed anciently in this region. Moreover, if "ranchería" and "village" are applied interchangeably, the population of aboriginal southern California skyrockets, being significantly greater than previously assumed (Cook 1964) and interior southern California would have proliferated with villages. Temporary campsites or small rancherías such as LAn-807 and LAn-808 clearly were not villages, and other sites such as LAn-229 are probably best described as large rancherías.

POPULATION SIZE

One of the most pressing questions we can ask about the three sites in the Three Springs Valley is how many people they could have supported at any given time. Some attempts in southern California to understand ancient population (Tainter 1972) have been advanced without recourse to archaeological evidence of any kind whatsoever. Such "simulation models" attempt to account for "population dynamics, to predict population levels, growth rates, and periods of demographic instability" (Tainter 1977:34-35) by pulling population estimates out of thin air rather than by studying the places the people lived (i.e., the archaeological sites themselves), and consequently they confuse interpretation with evidence.

Reconstructions of ancient populations are highly speculative in all cases, but are more likely to be accurate when the total site inventory of an area is known, and some kind of comparative yardstick can be applied to the sites within the sample. Information on the population size of aboriginal settlements or regions comes from four basic sources: two from ethnohistory and two from archaeology. All four approaches deal with quantifiable evidence, unlike "simulation models." With archaeological facts available, fiction need not be resorted to.

The most accurate of the ethnohistoric sources is the in-the-field "head count," when the earliest European to visit a locality actually counts or estimates the number of Indians at a specific location and sometimes makes a count of the houses or structures present as well. The second, and less accurate method, is reviewing the baptismal records at the missions to which the local Indians were resettled. This is inaccurate precisely because it is a count of Indians at the mission, not at their places of aboriginal habitation. Such a count includes persons born at the mission who may never have lived at a pre-contact site as well as persons who may have left one location to marry into another family and consequently became identified with a different one or may have claimed allegiance to two.

Of the two archaeological sources for population reconstruction, the most accurate is again the "head count," but in this case it is the number of skeletons which can be associated with a specific locality, either in a cemetery associated with an occupation site or in some less formal burial context. The less accurate archaeological method is identification of architectural units within the site area, the establishment of a household index (so many persons per family), and then extrapolation outwards. This final method is inaccurate because in archaeological situations such as the Three Springs Valley architecture is elusive and frequently invisible, very little data exists on the size of individual "families" or household units, and even if these two variables can be controlled, there is no easy way to determine how many residences were occupied simultaneously.

Table 12.5 incorporates data obtained from the late eighteenth-century Spanish chroniclers and summarized by Edberg (n.d.) for the northern slope of the Santa Monica Mountains area. Most assuredly, it does not represent anything like a com-

Table 12.5. Santa Monica Mountains Population Counts

Location	Baptisms Ventura	Baptisms S. Fernando	Total	Houses	Head Counts
Cayegues	120	4	124	-	40/60
Huwam	1	75	76	-	-
Sapue	64	0	64	-	-
Momongna	0	43	43	-	-
Hipuc	24	14	38	10	30
Lalimanue	28	6	28	-	-
Talepop	0	27	27	-	-
Tusip	0	5	5	-	-
Topanga	0	5	5	-	-
Calabasas	0	1	1	-	-
Agua Amarga	0	0	0	12	-
Saptuhuj	0	0	0	8/12	50

plete count of settlements occupied at the time of initial European contact, nor can all such locations be considered "villages," as claimed by C. King (1975). Of the 12 named locations in table 12.5, the final two may simply be different names for locations known by a different name. Even so, half of the 10 "villages" (according to the baptismal records) produced less than 30 people, and three of these five or less. To our knowledge nowhere else in the world have "villages" been claimed with populations of only one or five residents. Tiny population aggregations such as these conveniently fit our "ranchería" designation, however, and in fact the only location on the list that probably qualifies as a "village" on the basis of population would be Cayegues. Interestingly enough, the baptismal data for Malibu coastal settlements (table 12.6) indicates larger populations than those of the interior settlements, but only two locations, Muwu and Humaliwu, seem immediately identifiable as "villages" by such reasoning.

There is perhaps more information available from ethnohistoric sources on Gabrieliño village populations than for Chumash, and it may prove instructive to review this material. The population sizes of Gabrieliño settlements are difficult to determine, with both high and low figures offered. Bean and Smith (1978:540) estimate 50 to 100 inhabitants per "village" at the time of Spanish contact. This seems somewhat low, in light of the contact-period head-counts made at Tujunga (90 persons) Yangna (over 200) and Encino (60 to 200) by the earliest Europeans to come into contact with the coastal Shoshoneans (Crespi 1927; Forbes 1966). Hugo Reid, an eyewitness and early describer of Gabrieliño culture in Mexican California says of Gabrieliño settlements:

> Their huts were made of sticks, covered in around with flag [tule] mats worked or plaited, and each village generally contained from 500 to 1500 huts. Suanga [near present-day Long Beach] was the largest and most populous village, being of great extent. [Dakin 1939:222]

If Bean and Smith's population estimates seem quite low, Reid's seem excessively high, but it must be remembered that not all structures were residential, and not all residential structures need have been occupied simultaneously. Within each village was, for example,

> a church, called Yobagnar, which was circular and formed of short stakes, with twigs of willow entwined basket fashion, to the height of three feet. This church was sacred, but was consecrated nevertheless every time it was used. This took an entire day, being done by the seers in a succession of different ceremonies. There was also an unconsecrated one used for the purpose of rehearsing in and teaching children, dedicated to this end, to dance and gesticulate... The only ones admitted into the church were the seers and captains, the

Table 12.6. Malibu Coast Population Counts

Location	Baptisms Ventura	Baptisms S. Fernando	Total
Muwu	179	0	179
Humaliwu	26	86	112
Sumuahuahua	55	0	55
Lisicsi	49	1	50
Sumo	19	28	47
Lojostogni	31	2	32

> adult male dancers, the boys training for that purpose, and the female singers. But on funeral occasions the near relatives of the deceased were allowed to enter. [ibid.:229]

If female menstrual houses, men's sweathouses, and ceremonial constructions, all of which recruited users from the other permanent or semi-permanent structures, were being counted, as is likely (Harrington 1942:9, 10-11, 44), we might revise Reid's estimate downward by at least 50%. This revised count would have most Gabrieliño villages containing 100 to 400 "households," regardless of the number of structures.

The number of people resident in each household is unknown and surely must have been quite variable. Ascención (1929:237) noted that some houses were so large they could hold 50 people, but that he thought that a single family lived in each one. Costansó (1911), on the other hand, noted multiple families living in Gabrieliño houses on Santa Catalina Island, and it is well known that chiefs had multiple wives and, presumably, large families. An acceptable low average might be four persons per household while a high average of 10 might be reasonable, putting the largest village populations in the 400 to 5000 persons range.

What does all of this comparative data indicate for our population estimate for the Three Springs Valley? How many people inhabited the Three Springs Valley during peak season, and where did they locate? We think that the best comparative information indicates that the entire valley probably hosted no more than one or two extended families or "households," and that never more than at most ten or a dozen individuals resided in the Three Springs Valley. This population, when not resident at or utilizing sites LAn-807, 808 and 1031, would have made up 1/3 to 1/2 the population of larger rancherías such as Hipuc, or, possibly, 10% or less of the population of even larger rancherías or perhaps villages on the coast such as Humaliwu.

CEMETERIES AND BURIAL PRACTICES

If the presence or absence of "cemeteries" is accorded crucial for the archaeological recognition of villages in the Santa Monica Mountains area, and one of the best sources of data for population reconstruction remains head counts from cemeteries, then perhaps a brief review of local burial patterns is in order. Differences between Gabrieliño and Chumash burial patterns have been summarized by Eggers et al. (n.d.), and their comparison is reproduced as table 12.7.

The Gabrieliño both cremated and buried their dead (Kroeber 1925:633). This authority states that on the mainland cremations were common until the Mission Period, when the European ecclesiastics changed the practice to burial. The Channel Islands under Gabrieliño control, however, seemed to favor burial throughout their history of occupation, but this may in fact be a very old, pre-Gabrieliño trait. Hugo Reid (Dakin 1939:235), who married a Gabrieliño woman and was familiar with their customs from the 1830s to the 1850s, noted that Gabrieliño burials in the Los Angeles area featured letting the corpse partially decompose while a mourning dance was held; the body was then wrapped up, tied with rope, and buried in "their burial place," which sounds very much like a cemetery, but this could of course be the result of Spanish influence.

Table 12.7. Gabrieliño and Chumash Burial Patterns Compared

Trait	Gabrieliño	Chumash
Cremation	Common	Absent
Interment	Present	Typical
"Cemeteries"	Rare	Typical
Grave Markers	Etched stone, baskets	Baskets, poles
Grave Offerings	Few	Common
"Killed" Objects	Present	Common
Annual Mourning Ceremony	Present	Typical

Criminals and war captives were executed by shooting with arrows; bodies of the former were burned, presumably by their surviving relatives (Harrington 1934:18, 33), whereas those of the latter were decapitated, the heads were scalped, and the scalps kept as war trophies (Boscana 1947:50). It is not recorded how the headless bodies and severed heads of war captives were disposed of, but presumably their disposition was accomplished with little ceremony.

In the Ballona Bluff site of LAn-61, divided into two separate "loci" or subsites called Loyola and Marymount, both inhumations and probable cremations were discovered (White, n.d.: 229-233). At the Loyola site a single burial was discovered with so many bones missing that it was impossible to determine whether a primary or secondary interment was represented. Sixty-five other fragments of human bone were recovered from the Loyola site, probably relating to two additional individuals, none of which were burned. The Marymount site, on the other hand, contributed 191 human bone fragments, possibly from at least four individuals, many of which were burned. What may be present at LAn-61 is a pattern of primary or secondary inhumation at Loyola as opposed to a pattern of cremation at Marymount. According to the radiocarbon evidence (Van Horn, n.d.: table 63) the Marymount site was occupied earlier than the Loyola site, and one is tempted to infer that at least on the Ballona Bluffs, an earlier Gabrieliño or "proto-Gabrieliño" tradition of cremation gradually gave way to inhumation, possibly as a result of contact with and acculturation from other coastal groups such as the Chumash.

Cremations are reported for Level 4 of the Malaga Cove site (Walker 1951:68), but no formal "cemetery" precincts similar to the Chumash practice are known. At the Chatsworth Cairn site and in the immediate vicinity (Walker 1951:81-100) both burials and cremations were discovered, but chronological control over the archaeological evidence was poor and it seems obvious that an Intermediate Period (i.e., pre-Gabrieliño) as well as a Late Prehistoric, Fernandeño occupation is represented. At the LAn-43 site identified as "Encino Village," Cerreto (1986) describes over twenty primary interments, although the dating of each burial cannot be in every case related to the Late Prehistoric (i.e., Gabrieliño/Fernandeño) period.

At LAn-98, possibly the ethnohistorically known village of "Suangna" in present-day Carson, Eggers et al. (n.d.) note a diversity of burial types and patterns. One of these suggests "a burial context prior to the presence of the village . . . since burials were never known to take place within the village confines," and presumably might be pre-Gabrieliño. Earlier discoveries by Racer (n.d.) were of two burials with stone pipes, ear ornaments, grinding stones, and crystals, and a single burial containing multiple deer-bone whistles, suggestive of a shaman's kit (Coffin 1955). Interestingly, the burials seem to have been located on the northeast and southwestern peripheries of the archaeological site, supporting the ethnohistorically reported separation between burial and occupation contexts.

Also supporting the notion of circumscribed burial precincts is the Sheldon Reservoir site in Pasadena (Walker 1951:70-80), which produced 53 burials in a probable cemetery context associated with Late period artifacts probably of Gabrieliño manufacture. The Big Tujunga site (Walker 1951: 102-116) probably incorporates a pre-Gabrieliño component as well as a Late Prehistoric one. Here, human remains were found in obviously reburied (or secondary) contexts. Finally, individual burials are known from the Fernandeño or Gabrieliño area which obviously indicate primary interments made with great care: Foster and Wlodarski (1983:107-112) report on a single burial with over 3,600 shell and stone beads associated that was excavated near the Van Norman reservoir. This burial seems to refute the common perception that Gabrieliño burials are "impoverished," at least in comparison with Chumash ones.

The Chumash by most ethnohistoric accounts buried their dead in formal cemeteries (i.e., precincts which were set aside for this specific purpose) and this pattern has been corroborated archaeologically in western Los Angeles County both on the coast and in the interior. The Trancas Canyon Cemetery site (LAn-197) on the coast west of Point Dume (Thomas and Beaton 1968; K.P. Johnson, n.d.) produced over 100 burials and a radiocarbon date of 2320 ± 58 B.P. (Thomas and Beaton 1968:167), making it very early Chumash or possibly even pre-Chumash. Even earlier dates have been recovered from the Malibu site to the east, where a southerly prehistoric cemetery was succeeded by a northerly post-historic cemetery, both producing numerous burials.

Inland from Point Dume, the Medea Creek site (LAn-243), arbitrarily divided into village (243v) and cemetery sections (243c), was reported upon by Singer and Gibson (1970) and L. King (n.d.). The first report, a "Functional Lithic Analysis," is remarkable for almost as many type categories as artifacts in the collection and for its lack of usable illustrations by which one might adjudge morphological differences between "types," while the latter is a model of completeness in California cemetery description and interpretation. For a good many years some archaeologists believed that the Medea Creek site had to have been a very large village because of the very numerous burials in its cemetery. The curious thing about the Medea Creek site is that the archaeological "village" (243v) seems too small to have accounted for the very large number of burials (nearly 400) recovered from the associated cemetery (243c). L. King suggests (n.d.:140) that the best explanation for this situation is that the Medea Creek cemetery was something of a necropolis and may have recruited from many settlements, both in the interior as well as on the coast, and that absolute village size need not have anything to do with absolute cemetery size. If this is correct, it is plausible to suggest that the residents of the Three Springs Valley buried their dead some distance away, either in coastal or interior cemeteries, near villages that may have had more prestige than the small ranchería sites discussed in this volume.

FUNCTIONAL COMPARISONS

The research advantages of excavating all the sites within a single valley are partially explained through J. D. Clark's (1968:277) suggestion that all parts of any prehistoric whole should be studied:

> The first requirement is the excavation of complete units of settlement, both those where there are no natural features limiting the spread of occupation debris . . . and those where the area of occupation is naturally confined. . . . Once a sufficient number of distribution plots of complete occupation units are available, it will be possible to see the extent to which the association patterns of the components of a site [or sites] vary or are consistent.

We believe that this comparative method is the best way to establish tentative functional identifications.

LAn-808 is virtually indistinguishable in size, location, and in its artifactual constituency from numerous "special-purpose" Late period sites in Los Angeles and Ventura counties. Salsipuedes and comparable sites (table 12.8) are characterized by a limited surface artifactual component and rarely display a rich midden deposit. These sites contain relatively small amounts of ground stone and chipped stone tools, chipping waste, animal bone, and shell or fish remains, reflecting limited site utilization. Importantly, LAn-808 and comparable sites are generally related to nearby habitation sites (e.g., LAn-807), probably reflecting a casual utilization by members of an adjacent base camp. While the archaeological record at the Salsipuedes site does reflect a poorly developed subsurface midden component, the variety of artifacts associated with plant-food processing and chipped stone tool manufacturing suggests, to us, that it was not a "special purpose" site. It differs from the chipping stations and plant-food processing or winnowing stations identified elsewhere in this region: the presence of expended cores, lithic debitage, and ground stone artifacts suggest a wide range of activities were informally carried out on-site.

This point is further supported by the pipe fragments and an incised siltstone tablet, artifactually distinguishing the Salsipuedes site from other sites of this category. In order to ascertain LAn-808's function we will draw comparisons to six neighboring sites reported and surface collected in the Oak Park North (Ven-40 and Ven-374) and South (Ven-542, Ven-328, Ven-329, and Ven-376) complexes (Whitley, Schneider, and Drews 1979). Knolltop sites

Table 12.8. Comparison of Cultural Remains Among Selected Unusual Sites

	LAn-808	Ven-40	Ven-328	Ven-329	Ven-374	Ven-376	Ven-542
Terr. mammal bone:*							
Unmodified	+	0	+	+	0	0	+
Artifacts	0	0	0	0	0	0	0
Shell:							
Unmodified	+	0	0	0	+	0	+
Artifacts	0	0	0	0	0	0	0
Fish bone	0	0	0	0	0	0	0
Bird bone	0	0	0	0	0	0	0
Feathers	0	0	0	0	0	0	0
Human burials	0	0	0	0	0	0	0
Coprolites	0	0	0	0	0	0	0
Asphaltum (on hand stone)	+	0	0	0	0	0	0
Basketry:							
Twined	0	0	0	0	0	0	0
Coiled	0	0	0	0	0	0	0
Netting;	0	0	0	0	0	0	0
Leather	0	0	0	0	0	0	0
Projectile points	+	0	0	0	0	0	0
Knives	0	0	0	0	0	0	+
Choppers	+	0	0	+	0	+	+
Scrapers	+	0	0	+	0	+	+
Cores	+	+	0	+	0	+	+
Prismatic blades	0	0	0	+	0	+	0
Debitage	+	+	+	+	+	+	+
Quartz crystals	+	0	0	0	0	0	0
Charm/painted stones	0	0	0	0	0	0	0
Incised slabs	+	0	0	0	0	0	0
Tarring pebbles	+	0	0	0	0	0	0
Manos	+	+	0	+	0	+	+
Metates	+	0	0	0	0	0	0
Mortars	0	0	0	0	0	0	0
Pestles	+	0	0	0	0	0	0
Groundstone bowl	0	0	0	+	0	+	0
Shaft straightener	0	0	0	0	0	0	0
Steatite vessel frags.	0	0	0	0	0	0	0
Beads:							
Stone	0	0	0	0	0	0	0
Shell	0	0	0	0	0	0	0
Glass	0	0	0	0	0	0	0
Hammerstone	0	0	0	+	0	+	+
Obsidian	+	0	0	0	0	0	0

*Nonhuman

that contain chipped stone tools or chipping waste but lack ground stone artifacts (e.g., Ven-328, Ven-329, Ven-374) are defined as sporadically utilized, incidental lithic production areas, or simple use chipping stations (Whitley, Schneider, and Drews 1979:38, 39); in contrast, knolltop sites that contain artifacts associated with plant-food preparation (e.g., ground stone implements, pulping and/or cutting tools) are functionally categorized as plant processing or winnowing stations (e.g., Ven-376, Ven-40; Whitley, Schneider, and Drews 1979:44). A wide variety of artifactual materials at LAn-808 prevents it from fitting into either of these narrowly defined specialized site types. In addition, so little work has been undertaken at many of these "special-purpose" or "single-activity" sites that their functional and artifactual differences are questionable. Apparent differences in site function may be caused by limited site testing. If a greater percentage of each site were tested, one wonders if special-activity sites would seem less unique and more homogeneous.

We are certain, however, that the Salsipuedes site was functionally related to other sites in the Three Springs Valley. The lack of a well-developed midden, its chronological parameters (based on obsidian hydration analysis), and its proximity to LAn-807 suggest that LAn-808 was informally utilized by Cazador hunters as a lookout some time after the initial occupation of LAn-807. In this, Shepard offers an additional category to the typology of interior Chumash sites: hunting lookout.

The Cazador site is comparable to numerous sites in the immediate region. It is almost identical in its artifactual assemblage to Ven-125 (Wells 1978), Ven-261, LAn-1060, LAn-669, and other interior campsites. The artifact assemblage recovered at LAn-807 is almost identical to those reported at other interior campsites (table 12.9). Minor differences in artifactual constituents, however, probably reflect a sampling bias rather than any real difference in site function (e.g., the absence of shell discs at LAn-807, obsidian at LAn-669, or quartz crystals at LAn-1060 might be amended if a greater percentage of each site were investigated); that is, the full range of artifacts and cultural indicators as listed in table 12.9 probably existed at each hunting camp, and differences in excavated artifactual assemblages among hunting camps (table 12.9) could be eliminated if the comparable percentages of each site were tested. UCLA archaeologists tested 11% of the Cazador site, providing ample data to assess site chronology and function and making it one of the more thoroughly tested hunting camps in the southern California region.

TRADE AND EXCHANGE

As with the definition of "village" sites, Galdikas-Brindamour (1970:131) offers valuable distinctions for the understanding of archaeological "trade," including the proposition that imported items should not simply relate to subsistence (fish and shellfish) but to other pursuits as well: these might include stone tool manufacturing, basketmaking, and prestige concerns manifested by shell beads and steatite objects.

According to Heizer (1978:690), trade is "the purchase or exchange of objects between individuals of one tribal group and individuals of another tribal group, that is, trade on an intertribal basis." Although we have no evidence for professional traders or markets in prehistoric southern California (ibid.: 690), we have sundry ethnographic accounts with supportive archaeological data, suggesting that inter- and intratribal trade and/or bartering did exist among these peoples as well as between these people and their neighbors.

Kroeber (1925) suggests that the Chumash knew their Salinan, Yokuts, Allikilik, Fernandeño, and Gabrieliño neighbors, stating that the Chumash supplied the southern part of aboriginal California with clam shell disk beads—fashionable as money currency (ibid.:564). Other coastal Chumash trade items included the long, tubular beads, manufactured from the columella of large univalves or from the hinge of a large rock clam, which were prized like jewels among the Yokuts and Diegueño (ibid.:566). Curiously, the Chumash did not acquire in trade any pottery manufactured by their southeastern Juaneño, Cahuilla, Diegueño, Serrano, Mohave, or Yuma neighbors (ibid.: 562), reflecting their reluctance to supplant the traditional woven basket and steatite vessel with a less durable substitute (e.g., ceramic). Likewise, few small ornamental pieces of steatite are

Table 12.9. Comparisons of Cultural Remains Among Selected Hunting Camps

	LAn-807	LAn-1060	LAn-669	Ven-125	Ven-261	Ven-70	Ven-122
Terr. mammal bone: *							
Unmodified	+	+	+	+	+	+	+
Artifacts	+	+	+	+	+	+	+
Leather	0	0	0	0	0	0	0
Shell:							
Unmodified	+	+	+	+	+	+	+
Artifacts	0	+	+	0	0	+	0
Fish bone	+	+	+	+	+	+	+
Bird bone	+	0	+	+	+	0	n/a
Feathers	0	0	0	0	0	0	0
Human burials	+	0	+	0	+	0	0
Coprolites	0	0	0	0	0	0	0
Asphaltum	0	+	0	+	+	+	0
Basketry:							
Twined	0	0	0	0	0	0	0
Coiled	0	0	0	0	0	0	0
Netting	0	0	0	0	0	0	0
Leather	0	0	0	0	0	0	0
Projectile. points	+	+	+	+	+	+	+
Knives	+	+	+	+	+	+	+
Choppers	+	+	+	+	+	+	+
Scrapers	+	+	+	+	+	+	+
Cores	+	+	+	+	+	+	+
Prismatic blades (unifacial)	+	+	+	+	+	0	0
Debitage	+	+	+	+	+	+	+
Quartz crystals	+	0	0	+	+	0	+
Charm/painted stones	0	0	0	0	0	0	0
Incised slabs	0	0	0	0	0	0	0
Tarring pebbles	0	0	0	+	+	+	0
Manos	+	+	+	0	+	+	+
Metates	+	+	+	+	+	+	+
Mortars	0	+	+	+	+	+	0
Pestles	0	+	+	+	+	+	0
Shaft straightener	+	0	0	0	+	+	0
Steatite vessel frags.	+	+	0	0	+	+	0
Beads:							
Stone	+	+	+	0	+	+	0
Shell	+	+	+	+	+	+	+
Glass	0	0	0	0	0	0	0
Bone	0	0	0	0	0	0	0
Hammerstones	+	+	+	0	+	+	+
Drills, Gravers	+	+	0	+	+	+	+
Obsidian	+	+	0	+	0	0	+

*Nonhuman

known from these settlements (ibid.:629).

Bean and Smith (1978) state that the protohistoric Chumash acted as middlemen in the exchange of Gabrieliño steatite to the distant Tubatulabal of the southern Sierra Nevada foothill region. Davis (1961:29) indicates that mainland Chumash supplied their Salinan neighbors with steatite, wooden vessels, and beads. Grant (1978c:517) suggests that the Chumash traded white pigment, shell beads, Pismo clam, abalone, *Olivella*, limpet, and cowrie shells, dried sea urchin, and starfish to the Yokuts in exchange for black pigment, antelope and elk skins, obsidian, salt, steatite, beads, seeds, and herbs. He adds that the Chumash supplied the Tubatulabal with asphaltum, shell ornaments, steatite, and fish in exchange for piñon nuts, and that the Kitanemuk obtained wooden and shell-inlaid vessels from the Chumash. On the whole, evidence produced from the Three Springs Valley excavations provides few data supporting sophisticated mechanisms of intertribal exchange. Our research reveals that the ancient Three Springs Valley residents manufactured most of the artifacts they used on-site.

It is safe to assume that residents of the Three Springs Valley ventured outside of their "home range," but their movements are impossible to trace. Three Springs Valley residents apparently relished ocean foods, yet we cannot state with any certainty whether they harvested these delicacies or procured them through intratribal trade or bartering.

Three Springs Valley residents did not have to travel too far to satisfy their material concerns. Most artifacts and materials, with the exception of those made from obsidian and steatite, originated within the boundaries of the Three Springs Valley and adjacent territories. The Cazador and Canasta site steatite arrowshaft straighteners, comal and olla fragments, and obsidian arrow points, may have been exchanged with neighboring peoples for utilitarian items, such as lithics, minerals, locally killed meat, animal skins, or vegetal foods.

SAMPLE SIZE

One frequently hears about the excavation of "very poor sites" almost as frequently as one hears statements that "we dug it all" or "we got every bit out of it." Naturally, excavation is the best means of assessing site function; as the percentage of the site tested increases, so does the credibility of one's interpretations.

Estimating site volume and indicating the percentage of a site dug is a straightforward procedure, particularly at small and relatively shallow southern California hunter-gatherer sites. It is surprising that so few archaeologists use this method inasmuch as the results (when combined with material remains) are the basis for quantifying interpretative conclusions (tables 12.10 and 12.12 facilitate comparisons among all sites mentioned in this chapter).

At what percentage of site testing do one's chronological and functional ascriptions become credible (or incredible)? Five percent, 10%, 15%? A 100% sample is optimal, yet financial and time restrictions normally prohibit such complete recovery. For obvious reasons, rockshelters are usually more fully excavated than are open-air sites (table 12.11). These data become extremely useful, especially when compared with those from sites nearby, emphasizing the value of studying the full range of prehistoric settlements in a study zone, e.g., the Three Springs Valley.

In the absence of information about this variable (percentage of site tested), one questions the reliability of the investigator's interpretations; that is, how accurate can his interpretations be if they are based on bare-bones evidence. In the absence of corroborative historic, ethnographic, and archaeological sources, can we identify a protohistoric Chumash "village," for example, on the basis of the 1% to 5% of the site tested, complementing a collection of surface artifacts? In response to our question, When is a village not a village? we respond: when a significant portion of the site remains unexcavated, and one's interpretations are based on impressions rather than substantive evidence.

SCIENCE FACT VS. SCIENCE FICTION

An initial assignment in the teaching of introductory archaeology courses that one of us (Dillon) has been making for years is the reading and review of any recent publication on archaeology. The class is told that

Table 12.10. Selected Archaeological Excavations in Los Angeles and Ventura Counties (after Meighan (n.d.).

Site Number	Cubic meters or yards dug	% of site	Artifact total	Yield ratio	Age B.P. years
LAn-1	300	25	9000	30	8000-3000
LAn-2	100	75	375	3.75	3000
LAn-40	32	1	500	15.62	5000
LAn-52	185	3	6339	34.26	200-1000
LAn-61	1000	10	—	—	900-3000
LAn-111	30	1	200	6.6	5000
LAn-138	100	1	400	4	200-4000
LAn-162	5.4	0.33	1562	19.44	3000-8000
LAn-174	100	5	500	5	5000
LAn-210	3	1	51	17	500-1500
LAn-215	20	1	100	5	8000
LAn-225	24.5	—	1005	41	—
LAn-227	88	—	783	8.9	—
LAn-229	108	—	1103	10.2	150-400
LAn-243	50	1	600	12	200-500
LAn-246	360*	25	1800	5	200-500
LAn-267	15	1	100	6.6	6500
LAn-283	300	3	400	1.3	4000
LAn-311	8.4	0.6	—	—	400-1100
LAn-341	8.3	100	6	—	2500
LAn-711/712	63	3	244	3.8	400-900
LAn-807	30	11	141	4.7	200-1300
LAn-808	8	4.7	19	2.3	200-1300
LAn-1031	22	80	140	6.36	150-1300
LAn-1218	.8	2.5	8	2.5	200-1000
LAn-1248	3	2.79	53	11	5500-8000
LAn-1298	2.8	0.1	—	—	—
Ven-1	837	—	640	.76	2000-5000
Ven-11	70	1	450	6*	300-500
Ven-12	900	10	200	—	150-600
Ven-15	18	50	77	4	2000-8000
Ven-61	29.4	?	613	—	400-2000
Ven-68	.6	100	0	0	200-600
Ven-69	20	50	569	28.5	150-900
Ven-70**	100	—	252*	2.5	150-900
Ven-123	25.5	75	50	1.96	2000-8000
Ven-125	—	50	604	—	200-1200
Ven-171	3.3	1	3	1.1	200-2000
Ven-195	11.5	61.5	190	16.52	200-450
Ven-294	—	—	—	—	500-8000
Ven-373	3.9(?)	80	6	.65	200-600

*Shell beads not counted in this total.
** See Singer, n.d.b:23-26 for additional calculations.

Table 12.11. Comparison of Cultural Remains Among Selected Rockshelters

	Lan-1031	LAn-341	Ven-12	Ven-15	Ven-68	Ven-69	Ven 195	Ven-373	Ven-472	Ven-629
Terr. mammal bone:*										
Unmodified	+	+	+	+	0	+	+	0	+	+
Artifacts	+	+	+	+	0	+	+	0	+	+
Leather	+	0	+	0	0	0	0	0		0
Shell:										
Unmodified	+	0	+	+	+	+	+	0	+	+
Artifacts	+	0	+	0	0	+	0	0	+	+
Fish bone	0	0	+	+	0	+	+	0	+	0
Bird bone	+	0	+	0	0	+	+	0	0	0
Feathers	+	0	+	0	0	0	0	0	0	0
Human burials	0	0	0	0	0	0	+	0	0	+
Coprolites	+	0	0	0	0	0	0	0	0	0
Asphaltum	+	+	+	0	0	+	+	+	0	0
Basketry:										
Twined	0	0	+	+	0	0	0	+	0	0
Coiled	+	0	+	+	0	0	0	0	0	0
Netting	+	0	+	+	0	0	0	0	0	0
Leather	+	0	+	0	0	0	0	0	0	0
Projectile points	+	0	+	0	0	+	+	+	+	+
Knives	+	0	+	0	0	+	+	+	0	+
Crescents	0	+	0	0	0	0	+	0	0	0
Choppers	0	0	+	+	0	+	+	0	0	+
Scrapers	+	0	+	+	0	+	+	+	0	+
Cores	+	0	+	+	0	+	0	0	0	+
Prismatic blades	+	0	0	0	0	0	0	0	+	0
Debitage	+	0	+	0	0	+	+	+	+	+
Quartz crystals	+	0	0	0	0	+	0	0	0	+
Charm/Painted stones	+	+	0	+	0	+	0	0	0	0
Incised slabs	0	0	0	0	0	0	0	0	0	0
Tarring pebbles	+	0	+	+	0	+	0	0	0	+
Manos	0	0	+	+	0	+	0	0	+	+
Metates	0	0	+	+	0	+	0	0	0	+
Mortars	0	0	+	0	0	+	0	0	0	+
Pestles	0	0	+	0	0	+	0	0	0	0
Shaft straightener	+	0	+	0	0	+	0	0	0	0
Steatite vessel frags	+	0	+	0	0	+	+	0	0	+
Beads:										
Stone	0	0	+	0	0	+	+	0	0	0
Shell	+	0	+	0	0	+	+	0	+	+
Glass	+	0	+	0	0	+	0	0	0	0
Drills	+	0	+	0	0	0	+	0	0	+
Hammerstones	0	0	+	+	0	+	+	0	0	0

*Nonhuman

Table 12.12. Selected References for Tables in Chapter 12

Site	Site Name and References
LAn-1	Tank Site. Treganza and Bierman 1950; Treganza and Malamud 1958.
LAn-2	Topanga Site 2. K. L. Johnson 1966.
LAn-21	Chatsworth cairn site. Walker 1951
LAn-26	Sheldon Reservoir. Meighan and Scalise 1988.
LAn-40	Zuma Mesa. Ruby 1961
LAn-43	Encino Village Site. Taylor et al. 1986; Langenwalter 1986.
LAn-52	Arroyo Sequit. Curtis 1959, 1963.
LAn-59	Meighan and Scalise 1988.
LAn-61.	Van Horn and Murray, n.d.; Meighan and Scalise 1988.
LAn-63	Van Horn, n.d.; DiGregorio and Linscheid, n.d.; Meighan and Scalise 1988.
LAn-64	Van Horn, n.d.; Meighan and Scalise 1988.
LAn-75	Meighan and Scalise 1988.
LAn-111	Encino. Rozaire 1960.
LAn-138	Malaga Cove. Walker 1951; Hubbs, Bien, and Suess 1960; Berger, Fergusson, and Libby 1965.
LAn-153	Meighan and Russell 1981; Meighan and Scalise 1988.
LAn-159	Hobbs, Bien, and Suess 1960; Payen 1970; Berger et al. 1971.
LAn-162	Santa Maria site. Dillon and Hyland, n.d.
LAn-167	Big Tujunga. Ruby 1966; Meighan and Scalise 1988; Berger and Libby 1966.
LAn-174	Zuma Creek. Peck 1955. Hubbs, Bien, and Suess 1960.
LAn-190	Hubbs, Bien, and Suess 1960.
LAn-197	Trancas Canyon. Thomas and Beaton 1968; Berger and Libby 1969.
LAn-200	Hampson and Greenwood, n.d.
LAn-210	Leonard 1971; Dillon et al., n.d.
LAn-215	Parker Mesa. C. King 1962; Berger and Libby 1964; Leonard 1971.
LAn-218	Corbin Tank Site. Dillon, n.d.
LAn-222	Paradise Cove. Berger and Libby 1966.
LAn-225, 227, 229	Century Ranch. King, Blackgurn, and Chandonet 1968; Berger and Libby 1968; King et al., n.d.
LAn-243, 243v	Medea Creek. Singer and Gibson 1970; Meighan, Findlow, and DeAtley 1974; L. King, n.d.; G. Read, n.d.
LAN-246	Mulholland. Galdikas-Brindamour 1970.
LAn-264	Meighan and Vanderhoeven 1978; Meighan and Scalise 1988; Meighan 1976; Glassow, n.d.
LAn-267	Sweetwater Mesa. C. King 1967; Leonard 1971.
LAn-269	C. King, n.d.
LAn-311	Dillon et al., n.d.
LAn-339	Meighan, Findlow, and DeAtley 1974.
LAn-341	Topanga Canyon. Meighan 1969.
LAn-361-362	Vasquez Rocks. Meighan and Vanderhoeven 1978.
LAn-364-365	Vasquez Rocks. Meighan and Vanderhoeven 1978.
LAn-369, 371	Vasquez Rocks. Meighan and Vanderhoeven 1978.
LAn-413	Romani, n.d.
LAn-454	Meighan and Scalise 1988.
LAn-472	Raab et al., n.d.
LAn-474A,B	Horse Flats. Meighan and Russell 1981.
LAn-516	Romani, n.d.
LAn-518	Wlodarski 1985.
LAn-542	Meighan, Findlow, and DeAtley 1974.
LAn-582	Wlodarski 1985.
LAn-618	Meighan and Scalise 1988.
LAn-629	Foster and Wlodarski 1983.
LAn-669	Daon Site. Murray 1982.
LAn-671	Meighan and Scalise 1988.
LAn-711-712	Dry Canyon. Boxt and Rechtman 1981; Villanueva 1981.
LAn-717	Dillon and Boxt, this vol.; Meighan and Scalise 1988.
LAn-807, 808	Dillon and Boxt, this vol.

Site	Site Name and References
LAn-844	Meighan and Scalise 1988.
LAn-848	Meighan and Scalise 1988.
LAn-999	Meighan and Russell 1981.
LAn-1060	Meighan and Scalise 1988; Brown, Murray, and Van Horn 1986.
LAn-1098	Meighan and Scalise 1988.
LAn-1218	Dillon, n.d.c.
LAn-1248	Montevideo site. Dillon, n.d.b.
LAn-1263	Meighan and Scalise 1988.
LAn-1264	Meighan and Scalise 1988.
LAn-1298	Dillon et al., n.d.
Ven-1	Little Sycamore shell midden. Wallace et al. 1965.
Ven-2	Wissler 1958.
Ven-7	Sterud, n.d
Ven-11	Muwu. Rogers 1929; Woodward 1930a, 1930b; Resnick, n.d.
Ven-12	Canterbury Cave Site. Rigby, n.d.b.
Ven-15	Triunfo Rockshelter. Kowta and Hurst 1960.
Ven-26	Leonard 1966; Taylor 1975.
Ven-40	Oak Park. Whitley, Schneider, and Drews 1979.
Ven-43	Encino Site. Mason 1986; Taylor et al. 1986; Langenwalter 1986.
Ven-61	Soule Park Site. Susia 1962.
Ven-65	Running Springs Ranch. Prichett and McIntyre 1979.
Ven-68	Oak Park. Clewlow, Whitley, Drews, and Simon 1979.
Ven-69	Conejo Rockshelter. Glassow 1965.
Ven-70	Leonard 1966; Singer, n.d.b.
Ven-71	Meighan and Scalise 1988.
Ven-87	Mission San Buenaventura. Meighan and Scalise 1988; Noakes and Brandau 1976.
Ven-89	C. King, n.d.
Ven-110	Greenwood, Foster, and Romani, n.d.c.
Ven-118	Greenwood, Foster, and Romani, n.d.a.
Ven-122	Whitley, Schneider, Simon, and Drews 1979.
Ven-123, 125	Oak Park. Dillon 1978.
Ven-168	Meighan, Findlow, and DeAtley 1974; Romani, Foster, and Greenwood, n.d.b.
Ven-171	Dillon, n.d.e.
Ven-195	Gibson and Singer 1970.
Ven-226	Meighan and Scalise 1988.
Ven-243	Greenwood, Foster, and Romani, n.d.a.
Ven-260	Meighan and Scalise 1988.
Ven-261	Running Springs Ranch. Prichett and McIntyre 1979.
Ven-271	M. Johnson 1980.
Ven-294	Oak Park. Rosen 1978; Meighan and Scalise 1988.
Ven-315	Meighan and Scalise 1988.
Ven-328, 329	Oak Park. Whitley, Schneider, and Drews 1979.
Ven-373	Oak Park. Clewlow, Whitley, Drews, and Simon 1979.
Ven-374, 376	Oak Park. Whitley, Schneider, and Drews 1979.
Ven-449	Clewlow, n.d.
Ven-457	Meighan and Scalise 1988.
Ven-472	Singer, n.d.c.
Ven-477B	Meighan and Scalise 1988.
Ven-530	Meighan and Russell 1981.
Ven-535-537	Ring Brothers. Clewlow, Whitley, and McCann 1979; Meighan and Russell 1981.
Ven-542	Oak Park. Whitley, Schneider, and Drews 1979.
Ven-594	Meighan and Scalise 1988; Greenwood and Foster, n.d.
Ven-629	Wlodarski 1985.
Vem-721	Greenwood, Foster, and Romani, n.d.a.
Ven-733	Meighan and Scalise 1988.
Ven-747	Wlordarski, n.d.a.
Ven-786	Greenwood, Foster, and Romani, n.d.b.
Ven-847	Wlodarski, n.d.b.
Ven-853	Greenwood, Romani, and Foster, n.d.

all archaeological writing must be either evidence or interpretation. If it isn't the former, then it must be the latter; if it is neither, archaeology isn't being written about. A lively discussion usually ensues about the nature of archaeological evidence, with the result being that the class accepts the definition we believe to be correct, the one taught at Berkeley by John Rowe and earlier by A. L. Kroeber: archaeological evidence consists of artifacts and physical associations and nothing else.

The class is then asked to subject the writing to the "student believability test" and rigidly separate statements of archaeological evidence from those of archaeological interpretation, assessing how successful the author has been at distinguishing between the objective and the subjective. Believable writings normally have 90% evidence to 10% interpretation; as the ratio shifts in the opposite direction, the author's statements become less credible. Most students are surprised to find that in many archaeological writings, especially in comparative contexts, the interpretations of earlier scholars are accepted as if they were basic evidence. The brightest students then can be counted upon to express the opinion that the farther one goes from the evidence, the less "scientific" archaeology is and the more it becomes like alchemy.

Throughout the Three Springs Valley project, and within the pages of this report, we have tried to keep evidence and interpretation separate, and have tried to offer subjective conclusions only when supported by objective data. We think that this volume can pass the student believability test, and we offer it in the belief that archaeology is not so much about numbers or theories or even about individual artifacts, but, as stated so simply by Sir Mortimer Wheeler (1961:13), it is about people.

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Note

1. Ethnographic data for the interior Chumash of southern California, particularly those inhabiting the eastern zone, are scant (Grant 1978c:530); therefore, we must look elsewhere for comparative analogy. The Pomo are among the best studied of all California Indian groups (Kroeber 1925; McLendon and Oswalt 1978) and provide interesting comparative information about land use rights and "ownership" of specific collecting areas by families or individuals.

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