

CHUMASH TECHNOLOGY: NEW DISCOVERIES OF USES OF IMPORTED REDWOOD AND ASPHALTUM ON THE CHANNEL ISLANDS

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ABSTRACT

During the Late and early Historic periods, the northern Channel Islanders made extensive use of 2 imported materials: redwood from coastal northern California and high grade asphaltum from mainland coastal seeps. These materials were essential to many tasks, but were perhaps most important for plank canoe construction and caulking, water-proofing of vessels, and repair of many kinds of objects. Recent discoveries on Santa Cruz Island provide new information on an expanded range of uses of these materials, including residential construction and possibly ceremonial activities. A partially-excavated redwood-pole structure and a large asphaltum basin are highlighted for discussion.

INTRODUCTION

Archaeological investigations in recent years on California's northern Channel Islands have resulted in the discovery of numerous imported objects of redwood and high-grade asphaltum in sites of Middle and Late period age. These may be considered among the most valuable non-local materials to appear in these sites, although neither is traditionally perceived as such in contrast to materials such as Sierran obsidian, Franciscan chert, or Catalina Island steatite, acquired from sources 50 to 200 km distant. While exotic lithic artifacts represent obvious expenditures of labor on procurement, manufacturing, and transportation by the time they reach Channel Islands sites, and always are treated as foci for discussions of exchange and related economic processes, redwood and quality asphaltum are rarely singled out for analysis. This may be due to the facts that: (1) redwood has been recognized rarely in site deposits until recently; (2) redwood reached these islands through natural rather than cultural mechanisms; (3) asphaltum appears to be relatively com-

mon in site deposits; thus, it may seem unremarkable to some researchers; and (4) many archaeologists have probably misinterpreted the distribution of sources of high-grade asphaltum, assuming that it was ubiquitous along the coasts in the region. For these reasons, the prehistoric economic importance of these materials for examining exchange, manipulation of resources, and possibly elite development in the Santa Barbara Channel region has gone largely unrecognized by archaeologists.

This paper reviews a variety of forms of these 2 materials from Channel Islands sites within Chumash territory and focuses on previously unidentified uses of asphaltum and redwood recorded during 2 1991 field seasons on Santa Cruz Island. I explore in turn the contexts in which these items were acquired, produced, and used.

ACQUISITION OF REDWOOD AND ASPHALTUM

Redwood

The California redwood (*Sequoia sem-*

pervirens) does not grow in California's coastal region south of mid-Monterey County (Munz 1959:15, 57), and this was the case through the last several thousand years of prehistory. This species had a more southerly distribution during the terminal Pleistocene (Munz 1959:9), but that era is of no concern to the present analysis, which focuses on human use of redwood in southern California since about A.D. 400 (mid-Middle period). Redwood arrives as driftwood in the channel region from at least 300 km to the north, perhaps as far as 600 km, carried by the California current. Logs from redwood-rich areas of the north-central California coast most often beach today at San Miguel or Santa Rosa Island. Shifts in current flow can conceivably carry redwood to almost any beach in the region; overall, data on driftwood landings are limited and largely anecdotal. What seems clear is that the material has always been rare in this area and it could not be counted on by Chumash coastal residents to reliably appear on their beaches. Its rarity and unreliability contributed to its very high value among the Chumash, but most certainly the specific material properties of redwood lent it its greatest value.

Redwood withstands rotting and disintegration more effectively than other woods available in California, and this has many important applications (Munz 1959:57-58), particularly for human uses in marine contexts. Furthermore, it is an extremely large tree with excellent splitting qualities, and large planks are relatively easy to produce. Chumash woodworking technology consisted of rather simple hafted chert and pismo clam tools; hence, workability of wood was an important consideration for prehistoric craftspersons. Locally available woods such as oak, willow, cottonwood, and toyon, to mention a few, were used for many purposes by the Chumash, including fuel, arrow shafts, bows, structures, basketry, and bowls, but redwood was reserved mostly for the manufacture of the Chumash plank canoe. This and other uses will be discussed further below.

High-Grade Asphaltum

Turning to the means by which asphaltum was acquired, we see that this import-

ant material had a considerably more limited distribution than is generally assumed. Land-based seeps of hard, high-grade asphaltum are not known to occur on Santa Cruz Island or the other northern islands. Channel Islands beaches, like those throughout much of the Santa Barbara Channel area, frequently exhibit small blobs of soft tar derived from oil-rich channel-bottom sediments brought in by the surf, but this was emphatically not the material used prehistorically for repairing, gluing, and waterproofing tasks by the Chumash, according to multiple ethnohistorical sources (Hudson and Blackburn 1987:163; Hudson et al. 1978:51-52). Instead, they used high-grade hard asphaltum from seeps which occur along the Santa Barbara coast, especially in deposits in the vicinity of Carpinteria and Goleta Beach, located just east and west of Santa Barbara, respectively (Hudson et al. 1978; Priestaf 1979; Rogers 1929:46-48). This material was mined extensively during prehistory (as it has been historically). There is a reported asphaltum source locality on a small islet north of San Miguel Island (Westcott shoal), although a cursory description indicates that it probably consists of the much lower-grade, soft material (Heye 1921:20).

The mainland hard asphaltum source areas almost certainly produced the high-grade material used by the Chumash in caulking plank canoes, water-proofing baskets and water-bottles, attaching basket-hoppers to mortars, repairing broken stone vessels, hafting tools, and inlaying shell decorations. Hudson et al. (1978) and Hudson and Blackburn (1983, 1986, 1987) illustrate these several uses in some detail.

Preliminary investigation indicates that chemical signatures of asphaltum deposits may be quite similar throughout a restricted geographic province such as the Santa Barbara Channel coastline, especially after the material is subjected to exposure and oxidation through mining and use. There is a small possibility that specific sources can be distinguished; methods include chemical characterization and soil grain inclusion analyses (Gutman 1979; Henry Wright, personal communication, 1992). It is important to note, however, that the high-grade asphaltum used by the Chumash, called

wogo when mined from hard land-based seeps, was often mixed with pine resin to create a special adhesive mixture called yop. Consequently, we expect the chemical composition of the artifactual asphaltum to not always match natural sources. Meanwhile, we can state with some assurance that such materials were introduced to Santa Cruz Island from at least the distance of Westcott shoal, or, most likely, from the high-grade mainland seeps. The patchy distribution of this material and the apparent need to import it from mainland sources made this a valued commodity that communities adjacent to sources might have controlled to some degree. Elsewhere, I discuss at some length (Arnold 1990a) the issue of localized control over other lithic sources in the Santa Barbara Channel region. Substantial labor might have been expended in extracting, heating, and mixing high-grade asphaltum with pine pitch and then transporting it in quantity across the channel, thus making it relatively expensive to obtain. Consequently, this material would have had notable value in the island economy.

USES OF REDWOOD IN MIDDLE AND LATE PERIOD ISLAND COMMUNITIES

Redwood was employed in a very limited number of ways by Channel Islands residents. Historic observations and archaeological data both provide information on the use of redwood in plank canoe (tomol) manufacture, which was without question the most important and frequent use of the material in the Channel Islands region. Hudson et al. (1978) note that redwood canoes were observed in a number of historic-era coastal communities on both the islands and the mainland. Construction of tomols apparently occurred in both areas. Large driftwood pieces were harvested from beaches, perhaps exchanged throughout the region, stored and aged, and the processes of plank-making and construction were undertaken when sufficient redwood was on hand and trained craftspersons were available. The manufacture of a plank canoe was expensive beyond the valuable redwood itself, however. The skills required for planning and executing construction were held by

specialized craft guild members (Hudson et al. 1978), who managed experienced teams of manufacturers during a several-month construction period (Arnold 1992). Canoe ownership was reportedly only within the means of the wealthy and the elite. The most difficult to obtain of all the component materials--the redwood--was probably among the most valued of goods in the entire Chumash economy.

In archaeological contexts, redwood was previously recorded most often in the form of decomposing planks or plank fragments within burials (Rogers 1929). More recently, pieces of redwood from middens predominate. During field seasons supported by the National Science Foundation and UCLA (1989-1991), excavations on western Santa Cruz Island resulted in the recovery of several dozen sizable fragments of redwood. Occasionally these were isolated from other pieces within dense deposits of craft and subsistence debris; sometimes they occurred in associations of several large pieces within a 10 to 15 cm vertical span. Redwood concentrations occurred at 1 site in conjunction with substantial numbers of tarring pebbles, asphaltum plugs, macrodrills, and cakes of asphaltum. Such assemblages almost certainly indicate plank canoe manufacturing activity, for these are precisely the tools and materials needed for production and assembly of tomols. None of the redwood pieces is a plank or has drilled holes, however, suggesting that the wood represents production waste, or, in other words, is the discarded bulk redwood left behind after planks were hewn. These pieces of redwood are rough and rather thick, as if from trunk rather than limb areas.

Very few examples of other redwood uses are recorded for the Chumash area, although a redwood ladle was found last century on Santa Cruz Island (Hudson and Blackburn 1983:311-312). Some feather poles and grave poles have been identified as redwood, although the material should be botanically verified because a few of the pieces were painted red, possibly affecting the accuracy of the original identification (Hudson and Blackburn 1986:78-79, 96). Finally, a cache of 3 bullroarers of redwood was found at a mainland Chumash site

(Hudson and Blackburn 1986:319). This largely exhausts the inventory of redwood uses in the region. In Gabrielino territory to the south, several knife handles and a box of redwood have been found on San Nicolas Island (Hudson and Blackburn 1983:311-312, 434; 1987:79-80), but little else.

Recent excavations on Santa Cruz Island produced an exciting and potentially quite significant use of redwood in prehistoric southern California. During 1991 excavations at the Prisoners Harbor site along the island's north shore, we exposed--in strata of late protohistoric age--2 and possibly 3 curvilinear rows of redwood structural posts, with roughly 20-40 cm spacing between posts in the same rows (Figure 1). The redwood pieces were each 3-5 cm diameter small limbs, some clearly truncated by rough sawing on 1 end. These were uniformly oriented upright, tilted to the N/NW. They may have been supports for a double rowed structure--or possibly 2--at least 8 m in diameter, based on curvature of the rows. It is presently unclear whether the posts were part of 1 or more residential structures, were associated with a windbreak for an activity such as a dance floor, or constituted 1 edge of a house and an associated construction such as a granary. Lynn Gamble (1991) describes Chumash houses and other structures in some detail, and the size of these redwood limbs is consistent with her figures for house post size. The presence of hearths, substantial food debris, large quantities of microblade cores and related debitage, and other artifacts in direct association with these posts suggests a residential deposit, but further work must be completed before we can identify the structure type reliably.

All records I could locate (Gamble 1991; Hudson and Blackburn 1983:327-328; and others) describe Chumash house posts, sweatlodge posts, and other structural supports as willow, sycamore, cottonwood, or other local species, if wood material is mentioned. The structure at Prisoners Harbor appears to be the first occurrence of redwood in an architectural context within the region. Because of the very high value of this material, as discussed previously, I suggest that this may prove to be a residence or

special structure associated with elite or wealthy individuals. Prisoners Harbor was among the villages on the island directly associated with chiefly families during the earliest historic era (Arnold 1990b); thus, this is not an unreasonable inference. Hudson and Blackburn (1986:79) cite an informant who, in referring to grave poles made of redwood, states that redwood poles "were very expensive and were afforded only by certain people." We therefore do not expect sets of redwood posts to occur in ordinary structural contexts. Continued excavations at the Prisoners Harbor site will further illuminate the nature of this structure. The unrotted posts are in excellent condition, and lateral expansion of the excavation area should reveal considerably more about the size of the structure, associated features and materials, and possible elite affiliation.

USES OF ASPHALTUM IN MIDDLE AND LATE PERIOD ISLAND COMMUNITIES

Asphaltum was a versatile material put to many uses by the Chumash. The simplest gluing of light materials and crude inlay work could probably have been accomplished with little skill and with average-grade raw materials. However, soft tar available periodically on beaches throughout the area (called *malak* by the Chumash) was probably very infrequently (or never) used even in these limited tasks because of its greatly inferior properties (Hudson and Blackburn 1987:163). Gluing of large, broken steatite or sandstone vessels clearly required high-grade asphaltum with powerful bonding properties. Also, durable lining of water bottles and attractive shell-bead inlay on vessel rims called for relatively pure asphaltum (Hudson and Blackburn 1987:163).

Without question, plank canoe manufacture required the highest quality asphaltum materials. The historic record is unambiguous on this point. Hudson et al. (1978) provide detailed discussions of the procedures followed to mix heated asphaltum and pine pitch in order to create caulking material for joining planks and sealing drilled holes by which planks were sewn together. Safe and swift operation of canoes depended perhaps

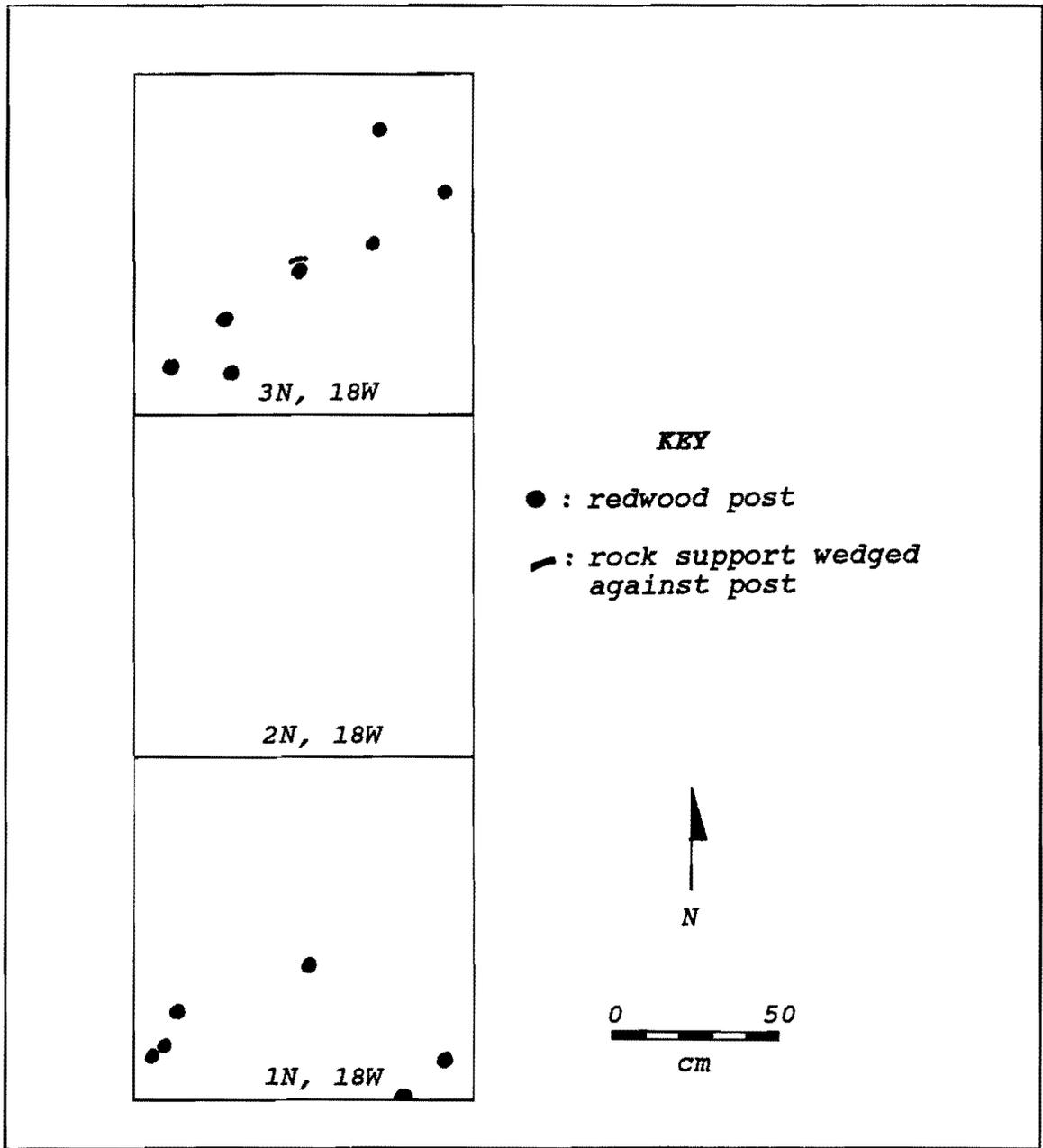


Figure 1. Redwood posts exposed at 60 cm depth, SCRI-240, Prisoners Harbor. Note what appear to be 2 double rows of posts, each extending roughly northeast to southwest across the trench. All posts are oriented upright.

more upon proper asphaltum chemistry than any other component of the craft. A failure of the planks to hold together during cross-channel navigation meant possible disintegration of the canoe and loss of life.

Asphaltum in many forms appears in Chumash midden deposits. Large cakes of the material, in particular, are known from numerous channel area sites (Harrington 1928; Rogers 1929), and it appears that the semi-prepared raw material was stored in this form. At Santa Cruz Island sites, especially sites at Christy Beach on the island's west end, these cakes are abundant and measure up to 30 cm in length and 3 to 5 cm in thickness. Also frequently encountered in local middens are rocks coated with asphaltum, such as tarring pebbles used in lining baskets and water-bottles with bitumen, and longer stone or bone tar applicators. Also, small asphaltum plugs (for canoe planks or abalone dishes) may occur by the hundreds. Other classes of artifacts associated with asphaltum are repaired ground-stone vessels, artifacts with inlaid shell decorations, various tools with asphaltum hafts, hopper mortars, and abalone shell dishes or scoops. Each of these artifact types has been identified by archaeologists in the region since at least the early part of the 20th century (Hudson and Blackburn 1985).

Recently, an extraordinary artifact of asphaltum was discovered which so far has remained unclassified. Excavated from the margin of a western Santa Cruz Island site, below a thin shell lens, in hard-packed sterile clay, and in a feature with several rocks (Figure 2), this large basin-like piece made entirely of very high-grade asphaltum has 4 opposing supports, or legs. It stands 24 cm high and measures 35 cm across, almost perfectly circular along its outer edge, with a more oval interior basin 25 x 20 cm. Based on a limited investigation of the literature so far, it could prove to be the largest asphaltum cultural object found in the New World. The asphaltum is so pure and black that when small fragments flake off, the fresh surfaces resemble obsidian. This object was located within the margin of SCRI-191, near Christy Beach. This site consists of a dense midden and several house depressions, with shell, bone, and substantial shell-

bead and fishhook-making materials. The Christy Beach area was a principal locus of human activity for thousands of years. Sites in the immediate vicinity have substantial Middle, Transitional, Late, and Historic deposits, including a total of 18 house depressions. Dating of the basin itself is unknown, although SCRI-191 has been recently radiocarbon-dated to ca. A.D. 700-1700 (Arnold 1992).

The asphaltum basin was transported to UCLA in November 1991. Flotation of surrounding soils has indicated an absence of botanical remains. Samples from 2 interior areas of the basin have been tested for animal residues without positive result (Newman 1992). There are no impressions of basketry or foreign materials other than clay and sand grains adhering to the surface, and there is not a structure (such as a basket) within the object. A number of archaeologists, including several Africanists, archaeometry specialists, and Chumash experts, have inspected the piece, but none has been able to identify it. Henry Wright (personal communication, 1992), who has extensive experience examining cultural asphaltum, inspected photographs of the piece and indicated that it has no parallels with which he is familiar.

The piece clearly was introduced to this location. There are no high-grade seeps within many kilometers, and even sources of soft tar on the beaches--of which it clearly is not made--are at least 150 m distant. It appears to be prehistoric because of its position below an undisturbed lens of shell midden which contained a diagnostic Late period artifact.

Two principal explanations are emerging to account for its unusual size and form. One suggestion is that the object may have been a cache of prized high-grade asphaltum brought to the site in a container such as a seal bladder, animal skin, or fine-mesh basket, and it was stored and never used. After the container decomposed, the asphaltum gradually seeped into cracks in the surrounding clayey soil, forming the 4 supports, or legs.

Another suggestion is that the object was shaped into this form to serve a specific

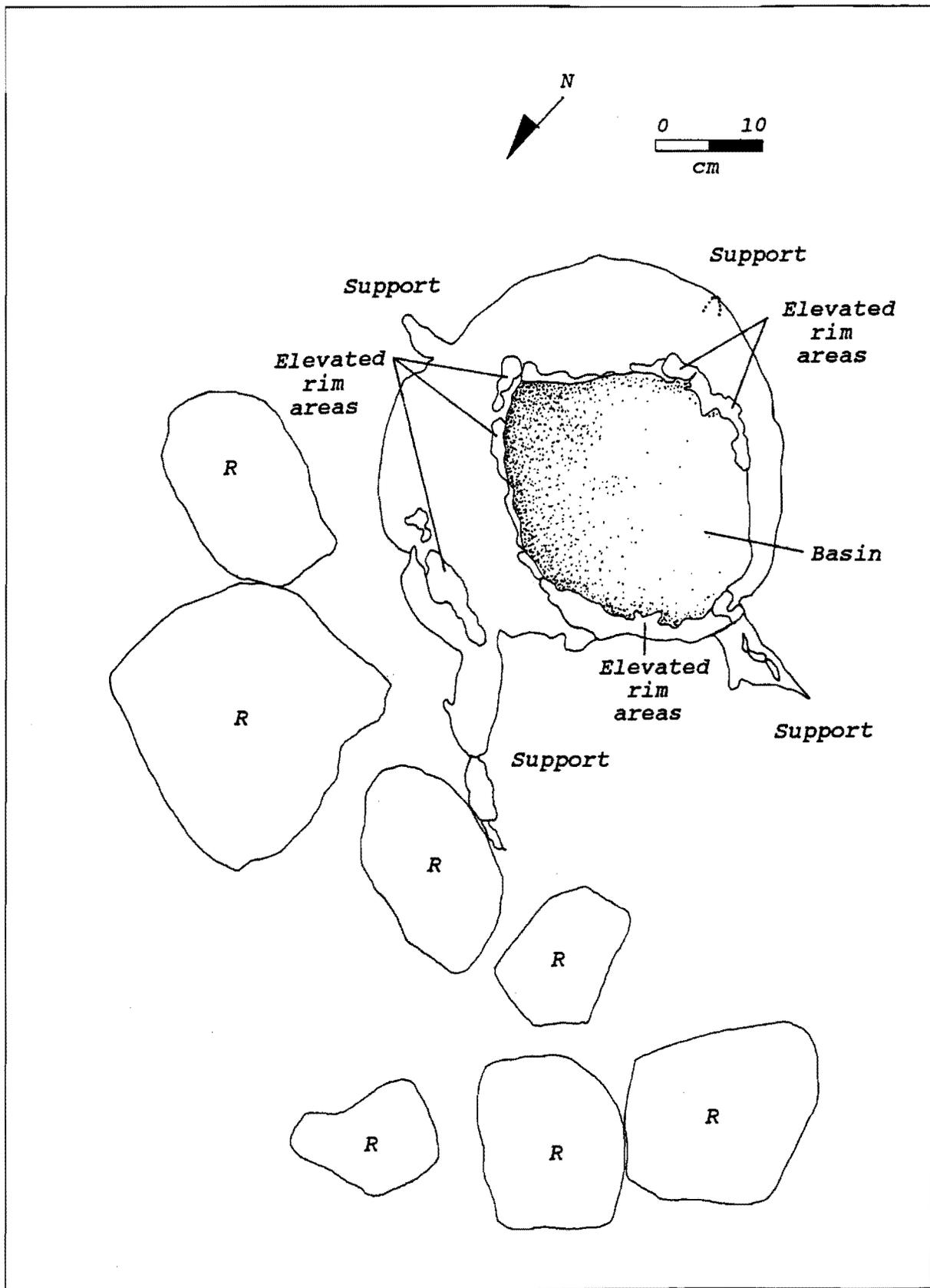


Figure 2. Asphaltum basin and associated igneous rock feature, plan view. Central part of basin (stippled) is surrounded by a high rim. North and west supports extend roughly 20 cm deep; south and east supports are shorter (south support is hidden from view; indicated by a dashed line). Rocks are indicated by "R".

function. Because the piece has a well-defined basin which was completely watertight, explanations naturally center on functions involving storage or display of liquid or fine-grained material. It seems appropriate to eliminate any purely utilitarian function because the Chumash manufactured and used many other more effective, durable, and less costly kinds of containers, including baskets, bottles, wooden bowls, stone bowls, and the like. Moreover, it could hardly have served as a support or work surface due to its brittleness and fragility. The upper rim has projections that would have easily broken around any large utilitarian tools such as grinding implements, for example, and the interior of the basin shows no wear. On the other hand, water, other liquid, pigment, seeds, or other light materials might have been set or displayed there.

While it is prudent to avoid an approach to interpreting this piece which focuses only on possible ritual, esoteric, or ideological functions, which may be very difficult to corroborate, the explanation that it may simply be an abandoned cache of asphaltum fails to account satisfactorily for the crude but clearly opposed position of the 4 supports, and does not account at all for the well-defined basin at the top of the piece. My close inspection suggests that if the basin shape was not deliberately created, some large object would have had to rest within the cached asphaltum mass to create and hold this basin cavity. However, no such object was present upon excavation, and the superb preservation in the site indicates that only wood or soft tissue would have disappeared had it once been in this position. All things considered, deliberate shaping of the basin form seems much more likely. The semicircular arrangement of 7 unfired igneous rocks adjacent to the piece (Figure 2) also suggests deliberate attention to the asphaltum basin that would be inconsistent with an explanation that it was an unworked, stored, and abandoned mass.

Interested colleagues have suggested that the piece might have been used to display liquids or foods during special events, to store such materials, to cup the base of a feather pole, or perhaps to support some other object such as a wooden bowl or large

abalone shell dish. The completed protein residue analysis suggests we can reject the possibility that human blood, or proteins of deer, dog, rabbit, shark, salmonids, or duck, were placed directly in the basin, but antisera for several other likely animal proteins or plant residues must still be developed (Newman 1992). Any of these general possible functions might have some parallel in Chumash ethnohistorical reports, but there is little else in the basin itself that will allow us to select between them.

CONCLUSIONS

Objects introduced from some distance, such as rare redwood brought southward along the California coast by currents, and objects which required both importation and notable expenditures of labor in processing, such as high-grade asphaltum, appear in substantial quantities in northern Channel Islands sites. Indeed, the frequencies of these items appear to be markedly higher in Late and Historic period deposits than they are in Middle period sites. The high value of these items stems from their rarity, distance from sources, and labor invested in production.

Until now, there has been little recognition of the value of redwood and high-grade asphaltum, but I would argue that they ought to be assessed in Channel Islands sites as exotics and valuable materials along with exotic stone such as obsidian and steatite. Thus, changing distributions of these materials may contribute to inferences about wealth and differential status through prehistory. It is possible, although by no means demonstrated at this point, that the unparalleled presence of redwood post structure(s) at Prisoners Harbor and the large, high-grade asphaltum basin at Christy Beach may be related to elite activities at these important communities. Continuing field research will focus on horizontal exposure of the redwood structure, loci of plank canoe manufacture, and associations of high-grade asphaltum with other indicators of status in order to address these interesting issues.

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REFERENCES CITED

- Arnold, Jeanne E.
1990a Lithic Resource Control and Economic Change in the Santa Barbara Channel Region. Journal of California and Great Basin Anthropology 12(2):158-172.
- 1990b An Archaeological Perspective on the Historic Settlement Pattern on Santa Cruz Island. Journal of California and Great Basin Anthropology 12(1):112-127.
- 1992 Complex Hunter-Gatherer-Fishers of Prehistoric California: Chiefs, Specialists, and Maritime Adaptations of the Channel Islands. American Antiquity 57:60-84.
- Gamble, Lynn
1991 Organization of Activities at the Historic Settlement of Helo': A Chumash Political, Economic, and Religious Center. Unpublished Ph.D. dissertation, Department of Anthropology, University of California, Santa Barbara.
- Gutman, Theodore E.
1979 The Use of Asphaltum Sourcing in Archaeology. Journal of New World Archaeology 3(2):32-43.
- Harrington, John P.
1928 Exploration of the Burton Mound at Santa Barbara, California. Bureau of American Ethnology Annual Report 1926-27:23-168. Washington, D.C.
- Heye, George G.
1921 Certain Artifacts from San Miguel Island. Indian Notes and Monographs, Vol. 7, No. 4. Museum of the American Indian, Heye Foundation, New York.
- Hudson, Travis, and Thomas C. Blackburn
1983 The Material Culture of the Chumash Interaction Sphere. Vol. II: Food Preparation and Shelter. Anthropological Papers No. 27. Ballena Press, Santa Barbara.
- 1985 The Material Culture of the Chumash Interaction Sphere. Vol. III: Clothing, Ornamentation, and Grooming. Anthropological Papers No. 28. Ballena Press, Santa Barbara.
- 1986 The Material Culture of the Chumash Interaction Sphere. Vol. IV: Ceremonial Paraphernalia, Games, and Amusements. Anthropological Papers No. 30. Ballena Press, Santa Barbara.
- 1987 The Material Culture of the Chumash Interaction Sphere. Vol. V: Manufacturing Processes, Metrology, and Trade. Anthropological Papers No. 31. Ballena Press, Santa Barbara.
- Hudson, Travis, Jan Timbrook, and Melissa Rempe (editors)
1978 Tomol: Chumash Watercraft as Described in the Ethnographic Notes of John P. Harrington. Anthropological Papers No. 9. Ballena Press, Socorro.
- Munz, Philip A.
1959 A California Flora. University of California Press, Berkeley.
- Newman, Margaret
1992 Immunological Analysis of Samples from an Asphaltum Basin, California. Ms. on file, Institute of Archaeology, University of California, Los Angeles.
- Priestaf, Iris
1979 Natural Tar Seeps and Asphalt Deposits of Santa Barbara County. California Geology 1979:163-169.
- Rogers, David B.
1929 Prehistoric Man on the Santa Barbara Coast. Santa Barbara Museum of Natural History, Santa Barbara.