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Digging Stick Weights and Doughnut Stones: An Analysis of Perforated Stones from the Santa Barbara Channel Region

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Archaeologists have long made assumptions about the use and meaning of the variety of perforated stones found in the Santa Barbara Channel region. Those assumptions have focused on where the stones are most likely to be found, who used the stones, and the purpose for which the stones were employed. A systematic study of 525 perforated stones in museum collections was undertaken to evaluate the validity of these assumptions. During the course of the study, thirteen perforated stone types were identified on the basis of stylistic attributes, and use wear and metric data were analyzed in an attempt to discern the function of each type of perforated stone. Burial records from 454 Chumash internments on Santa Cruz Island were then consulted to determine which segments of the population may have used the stones and whether that demographic may have changed over time.

For over a century, researchers working in southern California have pondered the function and meaning of perforated stones. Otherwise known as doughnut (donut) stones, stone rings, digging stick weights, and mace heads, such perforated stones are found in most regions of the world (Putnam 1879). However, the stones are quite variable in size, shape, and design, and also appear in greater numbers in certain regions. These inconsistencies suggest, perhaps not too surprisingly, that the objects were used for a diverse array of tasks (Henshaw 1887; Molitor 2000; Putnam 1879; Wood 2000). Ethnographic records from southern California also support this conclusion, providing descriptions of perforated stones being employed in numerous activities of both a utilitarian and ritualistic nature (Henshaw 1887; Hudson and Blackburn 1982; Latta 1977; Wood 2000).

Ethnographic evidence collected in the late nineteenth and early twentieth centuries suggests that perforated stones were commonly used as digging stick weights (Hudson and Blackburn 1982:247). It is likely, due to this, that archaeologists currently working in the Santa Barbara Channel region usually identify perforated stones as digging stick weights. Some perforated stones undoubtedly were used in this way, but currently our knowledge of these stones is too limited to make this assumption for every example found in the region. Additional unproven assumptions regarding perforated stones are (1) that many more stones are found on the northern Channel Islands than on the Santa Barbara mainland (Putnam 1879:135; Walker and Erlandson 1986:380); (2) that they were used primarily by women as digging stick weights to collect roots, corms, and bulbs (Hollimon 1990:109); and (3) that the small ones were used by children as toys (Henshaw 1887; Hudson and Blackburn 1982; Koerper and Gust 2009). It is the proliferation of these unproven assumptions that prompted the present study of perforated stones from the Santa Barbara Channel region. Through a systematic study, valuable information about perforated stones—such as their distribution, antiquity, stylistic types and corresponding use-wear patterns, and which segments of society used them—may be obtained. This information can then be used to evaluate the validity of the various assumptions.

METHODS

For this study, perforated stones from collections housed at the Santa Barbara Museum of Natural History, the U.C. Santa Barbara Repository for Archaeological

and Ethnographic Collections, and the Phoebe Hearst Museum at U.C. Berkeley were analyzed. The focus of the study was on stones found in the Santa Barbara Channel region, including the northern Channel Islands, the mainland coast of present-day San Luis Obispo, Santa Barbara, and Ventura counties, and the interior Santa Ynez Valley (Fig. 1). However, because the museum collections also contained specimens from the southern Channel Islands, I decided that these stones would also be included in the study for comparison.

It should be noted that perforated stones measuring less than five centimeters in diameter and obviously functioning as beads or possibly net weights were not recorded. However, a few of these very small stones with interesting or significant anthropogenic modifications were recorded. Most of these fell within the Type 5 Cobble Stones category (see classification below). Net weights were expediently made by drilling a central perforation into a small flat stone or pecking a hole into the stone and then smoothing the perforation. Except for the perforation, the stone remained unaltered. Another exception involved a set of four miniature perforated stones from the Santa Barbara Museum of Natural History that were originally catalogued as beads (Figs. 22a and 22b). These unique artifacts are discussed below. To date, 525 perforated stones from the following museums have been analyzed: 342 from the Santa Barbara Museum of Natural History, 31 from the U.C.S.B. Repository, and 152 from the Phoebe Hearst Museum.

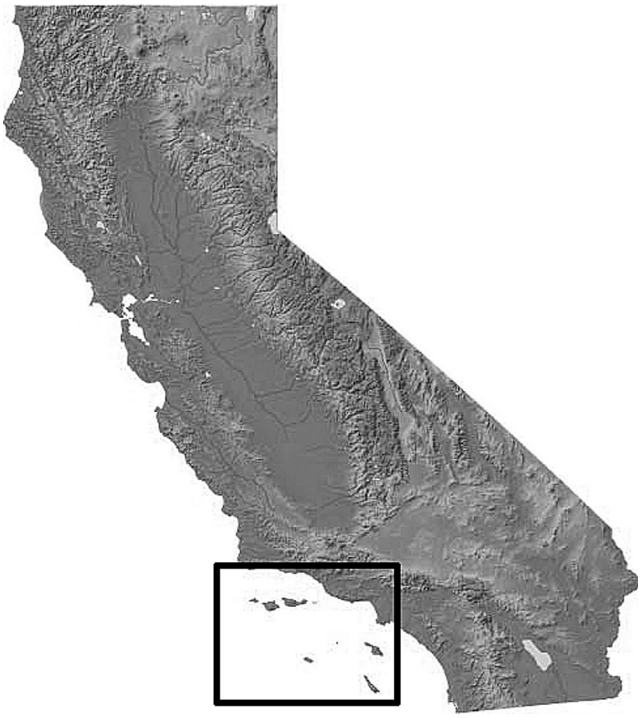


Figure 1. Map of California with study area defined.

DISTRIBUTION AND ANTIQUITY

In the Santa Barbara region, perforated stones have been recovered from all of the northern Channel Islands, as well as from many areas along the mainland coast. For quite some time, we have assumed that these stones occur in much higher frequency on the islands than on the mainland. In the 1920s and 1930s, Ronald Olson (1930) excavated hundreds of Chumash burials from cemeteries on both Santa Cruz Island and on the mainland coast near Santa Barbara. Approximately 29% of the burials excavated on Santa Cruz Island were associated with at least one perforated stone, whereas the mainland burials yielded not a single perforated stone (Walker and Erlandson 1986:380). The present systematic study of museum collections provides a better understanding as to just how skewed the distribution of perforated stones may be. Although a sample of perforated stones from the southern Channel Islands was analyzed as part of my study, no attempt has as yet been made to systematically record other perforated stones from the Los Angeles mainland area occupied by the Tongva/Gabrielino. Therefore, the following discussion of island versus mainland frequencies of perforated stones pertains only to the Chumash-occupied areas of the California coast and the northern Channel Islands. I did, however, include the data from the stones from the southern Channel Islands in the database from which I developed the typology of perforated stones presented here, and some stones from the southern Channel Islands are illustrated in the section on typology and use wear.

If perforated stones from the Chumash region are isolated, 364 stones were associated with specific archaeological sites. Of these, 333 (91%) are from the northern Channel Islands, with only 31 (9%) stones coming from mainland sites. However, if we look at the 440 perforated stones from the Chumash region that have either definite or probable provenience, 373 (85%) are attributed to the northern Channel Islands, with 67 (15%) ascribed to the mainland.

I do not believe that the higher density of stones found on the islands versus the mainland is a result of sampling bias. Although many archaeological sites on the mainland have been destroyed or capped, numerous archaeological projects have been (and continue to be) conducted on the mainland. The distribution of stones on the mainland itself is quite interesting. All of the mainland stones analyzed during the course of this project came from coastal areas. No stones were found from interior Chumash areas such as the Santa Ynez Valley, and no stones came from the northern Chumash coastal areas around present-day San Luis Obispo. This is not to say that perforated stones have never been found in these areas, but they are found very infrequently. Two notable perforated stones, hafted on sticks, were discovered in Bowers Cave, located in the interior in an area known to have been occupied by the Tataviam, just east of Chumash territory, between the present-day cities of Piru and Santa Clarita (Elsasser and Heizer 1963). However, these stones were decorated with painted designs and are believed to have been ceremonial in nature; they apparently represented the sun, and were therefore not used as digging stick weights.

In addition to being employed as digging stick weights, perforated stones are also thought to have been used in a variety of activities, serving as gaming pieces, dies, net weights, club heads, bolo or other projectile stones, ceremonial implements, and children's toys (Heizer 1955; Henshaw 1887; Molitor 2000). Undoubtedly perforated stones may have been used for some of these purposes; however, none of these suggested uses alone accounts for why so many more perforated stones are found on the islands. Although Chumash groups may have varied to a certain degree in subsistence and ceremonial practices, they also shared a significant amount of their material culture. An explanation must be found to account for the significant proportional differences.

One explanation for this difference may lie in the nature of the plant communities on the northern Channel Islands. Although the islands are home to a large number of edible plants, the species of plants found on the islands are much less diverse than those found on the mainland. For example, yucca is not found on the northern Channel Islands. *Yucca whipplei* was an important plant food resource for many Native Americans in southern and south-central California (Anderson 2005:268). Yucca ovens have been archaeologically identified in areas where the plant occurs in abundance, such as the territory occupied by the southern Chumash and the Tataviam (Allen and Hanks 1970; Ericson 1972; Johnson 1966; King 2000). The base of the yucca, known as the crown, cabbage, or bulb of the plant, was the main portion that was eaten after being roasted (Anderson 2005:268; Timbrook 2007:227). The leaves of the plant were either singed off completely or roasted, which required a bit more labor to trim and remove the spines (Anderson 2005; Timbrook 2007). Harrington (1944:32) even noted that these roasted yucca cabbages were "a sort of corn or staff of life to the people." It is very clear that yucca was an important resource to the mainland Chumash, and although digging sticks were sometimes used to harvest yucca, a digging stick would not have required a digging stick weight, since the stick itself was thick and strong, serving both as a digging stick and as a pry bar to dislodge the large, spiny plants for roasting.

Because yucca and other plant species found on the mainland did not grow on the islands, the Chumash living on the islands would have needed to intensify their harvesting of the specific plant resources that were found there. Blue dicks or brodiaea, *Dichelostemma capitatum*, may have filled this niche for the islanders. *Dichelostemma*, a member of the lily family, has a blue flower, a stalk, and edible corms. After the flower stalks died back in the late spring, the corms were dug either by hand or with a digging stick equipped with a weight, and then collected in woven sacks (Timbrook 2007:75). There are very few extant examples of weighted digging sticks (Hudson and Blackburn 1982:244; Irwin 1975:22), and those examples cannot be linked with any certainty to specific locales, although one is believed to have been collected from a cave on Santa Rosa Island (Hudson and Blackburn 1982:244), and the other was possibly found in Ventura County (Hudson and Blackburn 1982:244; Irwin 1975:22). Additionally, it is not certain if these specific weighted digging sticks were employed in harvesting corms. Extensive information collected by Henshaw (1887) on perforated stones and digging sticks would suggest that the stones were hafted around the middle of the stick, and employed in a manner similar to that illustrated here (Fig. 2).

While blue dicks were also found on the California mainland, there is some reason to believe that the corms

Figure 2. Example of possible use as digging stick weight. Illustration by Kevin Price.

may have been a more significant terrestrial resource among the island Chumash. Harrington's Chumash consultants described communal blue dicks roasting pits on Santa Cruz Island as being as large as six feet square (Timbrook 2007; Wagner 1929:162). Other important plant resources such as islay, chia, and acorns could be found on the islands as well as on the mainland; however, there is some question as to the extent to which the island Chumash were exploiting these resources. Harrington's mainland Chumash consultants believed that the island Chumash spent all of their time manufacturing shell bead money and were too lazy to gather islay and chia; instead, they simply traded shell bead money to the mainland in return for these supplies (Timbrook 1982:172). While the consultants' descriptions may be exaggerated to some extent, it is also possible that the islanders may have preferred blue dicks and concentrated on harvesting this resource more than others.

On the mainland, an abundance of milling stones appear around 9,000 B.P. and attest to the importance of plant resources (Erlandson and Colten 1991). This pattern on the mainland is followed in later times by an intensification on marine resources. However, on the northern Channel Islands, milling stones are very rare (Glassow et al. 2007:195; Walker and Erlandson 1986:379). Lacking paleoethnobotanical data, archaeologists have relied on faunal and artifactual evidence to conclude that the early island residents concentrated on protein-rich marine resources and expended little effort on harvesting plant foods (Erlandson 1991, 2001; Hoover 1971; Wallace 1978:30). However, in a study of frequencies of carious lesions in one Early Period (~6,200–500 B.C.) cemetery and one Middle Period (500 B.C.–A.D. 1150) cemetery on Santa Rosa Island, Walker and Erlandson (1986) found that dental caries were much more frequent in the Early Period population—nearly 80% of the population had carious lesions. This suggests that carbohydrates made up a significant proportion of the early diet. In addition, although milling stones are found infrequently in island sites, perforated stones are very common. On Santa Cruz Island, 18% of the 102 excavated burials at the Early Period cemetery near Frazer Point (CA-SCRI-333) contained at least one perforated stone, and 26% of the 23 excavated burials in the Early Period cemetery at Site 126 (Berkeley/Olson's site designation) in the Orizaba area of the island were interred with at least one perforated stone. This evidence suggests that Early Period Chumash populations on the islands likely relied on terrestrial plant foods for a significant proportion of their diet. However, while mainlanders were focusing on seeds and acorns, islanders were likely focusing on roots and corms. In looking again at the Early and Middle Period populations from Santa Rosa Island, Walker (1978) also found that the Early Period population at Cañada Verde had a much higher rate of dental wear than the Middle Period population at Skull Gulch. The consumption of pit-roasted bulbs and corms (such as blue dicks) laden with grit would be consistent with these dental wear findings. Although corms and bulbs would have been processed and cooked, it is likely that not all of the dirt and grit could be removed, given that they grow underground and are cooked in earthen roasting pits layered with ash and then completely covered with earth to keep the air out during roasting.

Multiple lines of evidence suggest that corms played a much more significant role in the diet of the island Chumash as compared to the diet of the mainland Chumash. Skeletal data and the presence of large numbers of perforated stones likely used as digging stick weights attest to this dietary choice. However, it should

be remembered that the island Chumash likely exploited additional plant resources and that the perforated stones were likely used for purposes other than as digging stick weights. The wear exhibited by these perforated stones attests to their multi-purpose use. For example, if the islanders were focusing on roots and corms and needed a perforated stone, the stone could also have doubled as a grinding and/or pounding stone for processing other plants. In some instances, it may have been easier to use the perforated stone for plant processing than to make a new implement. Indeed, some perforated stones do show evidence of grinding and pounding.

Some people have suggested that the "doughnut stones" from the Santa Barbara region were net sinkers rather than weights for digging sticks (Huddleston and Barker 1978; Salls 1998:166). Salls (1998:166) contends that perforated stones were used as sinkers, and that they are common in coastal sites, very abundant on the Channel Islands, but become much less common as one travels inland. While it is conceivable that some perforated stones were used as net sinkers, it has not been established that the stones are commonly found in coastal sites. The present study demonstrates that the vast majority of the stones have been found on the Channel Islands, with only a few from the Santa Barbara mainland coast. If the stones were used almost exclusively as net sinkers, one would expect a much more even distribution of the stones across island and coastal sites. Additionally, net weights do not require holes to be drilled in their center, nor do they need to be smoothed and polished (as the majority of the stones studied here have been).

Net weights would likely differ most significantly from digging stick weights in hole diameter. Digging stick weights would need a hole large enough to fit onto the shaft of a sturdy digging stick, whereas a net weight would only require a hole large enough for cordage. The following section presents a typology and a description of the attributes of each type of perforated stone in an effort to suggest possible uses for them.

ARTIFACT TYPOLOGY AND USE WEAR

During the course of this study, thirteen general types of stones were identified. Stones do not always fall neatly into these categories, and it is not uncommon for stones to exhibit characteristics of multiple types. A general shape was assigned to each stone depending on which shape it most closely resembled. If artifacts were too fragmented or weathered to determine shape, they were excluded. The shape types are listed below in order of frequency. The sample of stones I recorded from the southern Channel Islands was included.

In order to provide a baseline for measurements and attributes, data on 307 whole perforated stones in this study from both the northern and southern Channel Islands were compiled. The analysis focused on the attributes of length, width, thickness, weight, and hole diameter, as those are the most illuminating in attempting to determine how the stones were used. The average perforated stone has a length of 8.4 cm., a width of 7.8 cm., and a thickness of 4.6 cm. The average weight of 488.4 grams is heavy enough to be useful for digging, and the average hole diameter of 2.2 cm. is wide enough to allow for a sturdy digging stick. The diameter of digging sticks throughout California is known to range from 2.5 to 6.4 cm. (Campbell 1999). As the average hole diameter for the sample is less than that, it is evident that the digging sticks used on the Channel Islands were at the small end of the spectrum. Digging sticks used for digging corms and bulbs are known to be smaller than those used for other purposes. For example, known digging sticks employed by the Nez Perce of the inland Northwest for harvesting camas (*Camassia*), which are in the same family of flowering plants as blue dicks and are gathered and prepared in much the same manner, are significantly smaller than those digging sticks employed in southern California for the processing of yucca. However, it should be noted that stones may have been used for other purposes than digging, and some of the stones and sticks were used by children, who required smaller-scaled tools. Additionally, if the stones were used for digging, the stones and the hole diameters may have varied depending on the type of digging for which they were intended; e.g., digging roasting pits or ovens, digging post holes, digging graves, and digging up roots and corms.

Perhaps the most telling sign that a stone was used as a weight on a stick is the band of polish left inside the center of the hole where the diameter is smallest. A band of polish would be created as the stone wore against the stick during use, and also when the stone

Figure 3. Example of a doughnut-shaped perforated stone. Santa Barbara Museum of Natural History (NA-CA-28-3A-115).

was wedged onto and off of a stick. Interior polish was observed on many of the stones, but the majority of them did not show evidence of such use. Only 43 of the 307 whole stones that were analyzed had interior polishing (however, many of the fragmented stones also showed evidence of interior polishing). Of the forty-three that exhibited interior polishing use wear, all but four weighed less than 800 grams. Therefore, almost all of the large stones weighing over 800 grams lacked evidence of interior polishing, suggesting that they were not hafted or were not subject to much movement if they were hafted. Use wear observations were the result of naked-eye and low-power magnification identification. Further investigation using high-power magnification might reveal additional use-wear patterns.

For each stone, measurements of length, width, thickness, weight, and hole diameter were recorded. K-means cluster analysis was conducted, but no meaningful patterns were observed beyond those noted below.

Type 1: The Doughnut Stone

By far the most common shape of the perforated stones is the "doughnut" shape. Two-thirds of the total sample compared generally in both shape (and often size) to modern doughnuts (Fig. 3). Clearly, this is why the stones are often referred to as doughnut stones. They are roughly circular in shape with a hole drilled through the center.

Figure 4. Symmetrical Doughnuts, Santa Barbara Museum of Natural History. (Left to right: I.87/2939, O.683, I.543).

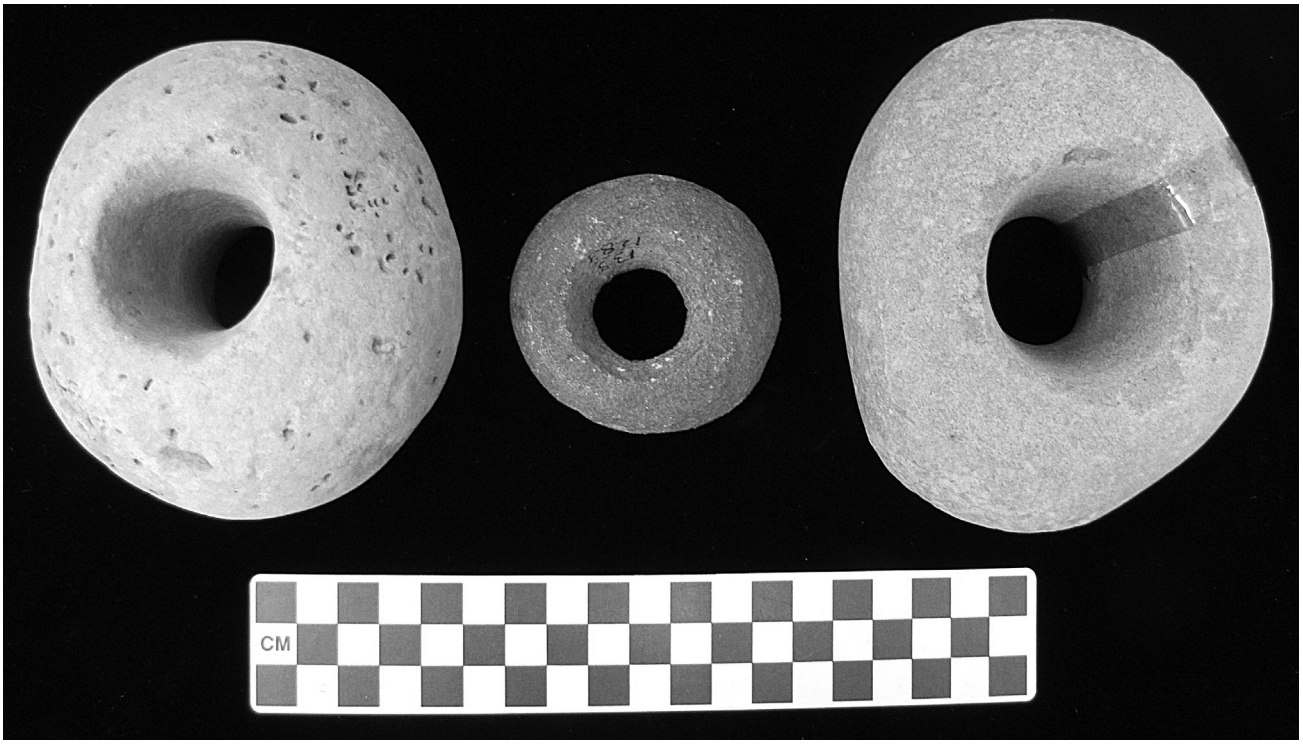


Figure 5. Asymmetrical Doughnuts, Santa Barbara Museum of Natural History. (Left to right: NA-CA-SBA-XX-5022, 1283, 3791).

The Type 1 category can further be divided into two subcategories: symmetrical doughnuts (Fig. 4) and asymmetrical doughnuts (Fig. 5). Median and average measurements for symmetrical and asymmetrical stones are remarkably similar. Symmetrical doughnuts are completely or mostly balanced in proportion, with each side almost a mirror image of the other. The surface of these stones has been smoothed or polished. It is clear that a great deal of time and care went into manufacturing them. Asymmetrical doughnuts were more expediently made, and little attention was paid to finer finishing details. Asymmetrical donuts are lop-sided, often have off-center holes, and exhibit surface blemishes.

Although they are made from a variety of rock, both symmetrical and asymmetrical doughnut-shaped stones are most commonly made from sandstone or serpentine. Different types of wear are evident on these stones, including grinding, pecking, polishing around and inside the hole, and chipping. The most common signs of wear are chipping around the rim of the hole, polishing in the center of the hole, and polishing on only one side of the stone. The hole of most perforated stones was drilled biconically (Fig. 6), and the diameter of the hole

Figure 6. Cross section of a broken, biconcially drilled, cylinder-shaped perforated stone, Santa Barbara Museum of Natural History (3495/ I.718).

is therefore smallest in the center of the stone. The area where the hole is narrowest is often polished, most likely from a stick that would have been inserted into the hole and consistently rubbed against that section of the stone. With regard to those perforated stones that are polished on only one side, it is uncertain whether the polished side is the result of an initially dull stone that was polished on one side during use, or whether the stone was initially polished (as some stones were) and then roughened on one side through use. The doughnut stones compare quite closely to the average for all stones in terms of interior use wear, exterior use wear, and the presence of ochre and incising.

Interestingly, both of the burials from Santa Cruz Island that Sandra Hollimon (personal communication 2011) has tentatively identified as being *aqí* (Chumash grave diggers) had associated symmetrical doughnut-shaped perforated stones. The stone found in the possible *aqí* burial from the Early Period site at Frazer's Point weighs approximately 270 grams, is made of sandstone, has evidence of ochre, and shows wear on both perforation ridges. The other stone found in a possible *aqí* burial comes from the cemetery at the Middle-Late Transition Period site at the mouth of Poso Canyon on the southwest side of Santa Cruz Island. It is made of basalt, weighs approximately 195 grams, shows wear on both perforation ridges, and also exhibits a band of grinding wear around the exterior of the stone.

The doughnut-shaped perforated stones appear to have been present throughout most of prehistory in the Santa Barbara Channel region. Perforated stones of this type were found in Early Period cemeteries on both Santa Cruz and Santa Rosa islands. Several perforated stones were found in association with burials at the Early Holocene site at Tecolote Point (SRI-3) on Santa Rosa Island. Shell from the Tecolote Point site has been dated to between 8,000 and 7,500 B.P., and some of the burials in the cemetery are believed to date to this same time (Erlandson 1994; Kennett 2005; Orr 1968). Type 1 perforated stones have also been found at archaeological sites dating later in time, as late as the Historic Period.

Most doughnut-shaped stones are undecorated, but a few are incised, usually with one continuous line. The incised line is usually horizontal around the center of the stone, or is sometimes located at the top or bottom around the hole. A few intricately incised, rather large, sandstone stones were observed. One of these intricately incised stones was interred with the lone burial in Cemetery X at Cañade Verde (SRI-41X) on Santa Rosa Island, and dates to 4,840–4,400 B.P. (Kennett 2005:137). John P. Harrington was told by a Chumash consultant that the incised stones were those of a "capitana" (Hudson and Blackburn 1982:248).

Type 2: The Squashed Stone

Twenty-four "squashed" stones were identified in the collections. Two opposite sides around the perimeter of these stones have been abraded to create a flat surface, whereas the remainder of the perimeter remains curved. The stones originally appear to have been uniformly rounded, like the doughnut stones, and then were ground down on the two opposite sides either by use wear or for aesthetic reasons. The abraded sides give the stone a "squashed" appearance (Figs. 7a and 7b). In addition to scraping marks on the flattened sides, these stones often have evidence of pecking on remaining portions of the perimeter, as if the stone was used for hammering. Interestingly, none of the squashed stones shows evidence of ochre or incising. Additionally, only 17% of squashed stones exhibit evidence of polishing, as compared to 30% for all stones. These stones are relatively thick. Several of them, including the one pictured here, have indentations on at least two sides of the perimeter. These indentations are identical to the indentations on the Type 13 Indented Stones discussed below. A K-means cluster analysis was conducted with measurements from these stones and a bimodal distribution was observed. This indicates that there are smaller and larger groups of stones of this type, possibly suggesting two uses for these stones. However, there is no significant difference in use wear between the larger and smaller squashed stones.

Type 3: The Oval

Twenty-four oval-shaped perforated stones were examined (Fig. 8). These stones exhibit general wear, including pecking and polishing. Unlike the squashed stones that often have pecking wear on the curved portions of the perimeter, the oval stones do not consistently show signs of pecking on this area. Compared to all perforated stones, a higher percentage of oval stones show evidence of ochre, incising, and polishing.

Figures 7a and 7b. Top view (a) and side view (b) of an unusual, squashed perforated stone with the two rounded edges worn down and circular indentations on the opposite sides. Santa Barbara Museum of Natural History (SBA-XX-565).

Type 4: The Teardrop

Twenty teardrop-shaped perforated stones (Fig. 9) were identified in the collections. Many of these stones (36% compared to the 6% for all stones) are incised with at least one line. All of the incised stones have one line encircling the stone, very close to the top. One stone has a second incised line encircling the center of the stone. Most of the teardrop-shaped stones are made of durable volcanic rock, although a few are made of sandstone. One had broken in half vertically and had been repaired using asphaltum, and one stone also showed evidence of asphaltum as a fixing agent, probably to aid in adhering the stone to a stick (Fig. 10). The teardrop stones in general show much evidence of use; 82% have exterior chipping and 64% have significant scratching inside the hole.

Figure 8. Two oval-shaped stones from SBMNH; the one on the left shows evidence of pecking wear on one end. Santa Barbara Museum of Natural History. (Left to right: 4013; Santa Cruz Island Foundation, no catalog number.)

Figure 9. Two teardrop-shaped stones, Santa Barbara Museum of Natural History. (Left to right: 3910, 3208.)

Figure 10. Stone with traces of asphaltum, Santa Barbara Museum of Natural History (NA-CA-125-3A-6).

The teardrop stones have an average hole diameter of 2.90 cm., which is well above the 2.22 cm. average for all the stones, and they have an average weight of 804.55 g., which is significantly greater than the 488.41 g. average for all stones. Thirty percent (six) of the teardrop-shaped stones were found with burials. This is a significant percentage, especially considering that many of these stones come from an unknown context. Three additional stones were found near burials. Since these stones are heavier than average, have a larger than average hole diameter, and many are associated with burials, it seems likely that these were not digging stick weights involved in digging up small plants like blue dick corms. However, much of the use wear exhibited by these stones, such as chipping, exterior wear, and marks inside the perforation, does suggest the stones may have been used for digging. Perhaps these stones were used for heavier digging, such as might be involved in digging graves or post holes.

Type 5: The Cobble

Eighteen of the perforated stones appear to be water-worn cobbles with a hole in the center. In some instances the holes were drilled, but in other instances the holes appear to be natural. Some of the cobbles with natural holes may have been found on the beach and expediently turned into tools with little effort if the hole was large enough for a good-sized stick. Some of the cobbles show evidence of use wear and hafting similar to the other perforated stones; however, many of these stones show no evidence of being used as digging stick weights. Significantly, fewer than average of these stones exhibit evidence of common use wear. They are included because they are perforated and exhibit other anthropogenic

Figure 11a. Disk-shaped perforated stone, Santa Barbara Museum of Natural History (NA-CA-132-3A-47.)

Figure 11b. Disk-shaped perforated stone, Santa Barbara Museum of Natural History (NA-CA-SBA-XX-5016).

alterations, but their holes are significantly smaller than in most other perforated stones, with an average hole size of 1.45 cm., in comparison to the 2.22 cm. average for all stones. Most of the holes in the cobble type appear to be too small to have accommodated a stick that would have been useful for digging. The length, width, thickness, and weight measurements suggest that there may be two groups within the cobble type, with perhaps the smaller being used as net weights and the larger being used for some other purpose.

Type 6: The Disk

Seventeen disk-shaped perforated stones were found in the collections. These stones (Figs. 11a and 11b) are characteristically flat, with hole sizes ranging from small to average: 0.77 cm. to 2.68 cm. With an average hole size of 1.88 cm., many are unlikely to have been used as digging stick weights. A few are carefully shaped, taking on the semblance of a "flying saucer." A larger number of disk stones than average have chipping wear.

Type 7: The Sphere

Although the doughnut-shaped stones are somewhat round and globular in shape, sixteen other stones are shaped into perfect spheres, with almost equal width and height measurements (Figs. 12 and 13). A few have been flattened slightly around the hole and can rest on this area, but most will roll around like a ball when placed on a flat surface. Often at least one side of the hole has been drilled at an angle. In these cases, it would have been difficult to attach these stones to straight sticks because the hole was biconically drilled straight from one side and at an angle from the other side.

In general, the measurements of the spherical stones are fairly widely and evenly distributed. However, the spherical stones are generally one of the smaller types, with all measurements except for thickness falling below the average for all stones. With an average hole diameter size of 1.83 cm., many of these stones may not have been used as digging stick weights. Seventy-seven percent of spherical stones have chipping wear.

Type 8: The Cylinder

Fourteen cylindrical or barrel-shaped perforated stones were recorded. These are generally tall, with a flattened top and bottom around the hole (Fig. 14). It was reported that the Santa Barbara Chumash used barrel-shaped stone rings to play a game in which players attempted

Figure 12. Spherical perforated stones, Santa Barbara Museum of Natural History. (Left to right: 2978, 2978, I.82/ 2884.) Note that the two on the left were cataloged as a lot and therefore have the same catalog number.

Figure 13. An exceptionally large and heavy perforated stone of spherical shape, Santa Barbara Museum of Natural History (NA-CA-SCRI-XX-207).

Figure 14. Cylindrical perforated stone, Santa Barbara Museum of Natural History (4417).

Figure 15. Modified cylindrical stone, Santa Barbara Museum of Natural History (NA-CA-158-3A-8).

Figure 16. Lipped perforated stone from the Southern Channel Islands, Santa Barbara Museum of Natural History (NA-CA-SNI-XX-3A-9).

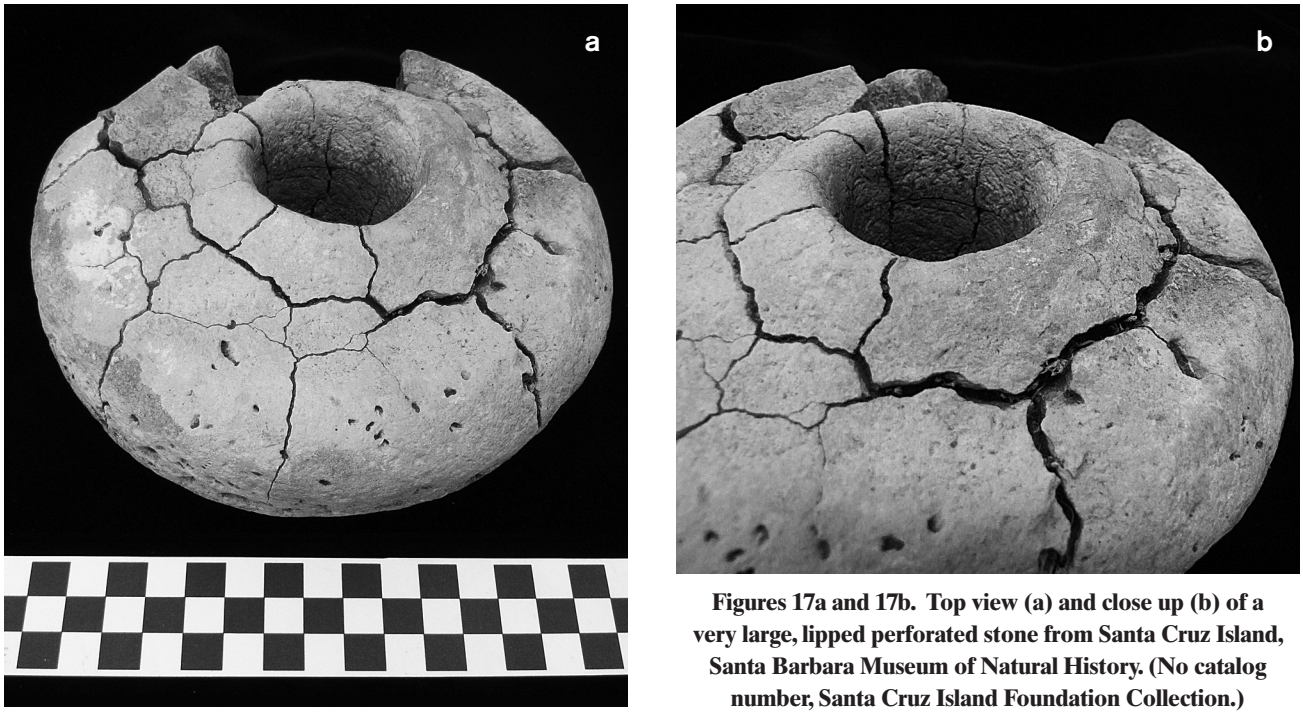
to shoot arrows through the hole of the stone while it was in motion (Heizer 1955:154). However, these stones show evidence of being hafted onto a stick. A band of polish inside the hole, as well as striations inside the hole, attest to this use. Several interesting examples of modified cylindrical perforated stones were found, including a stone from the U.C.S.B. Repository that is stepped near the middle of the stone's thickness for some undetermined purpose, and an example from the Santa Barbara Museum of Natural History that is cylindrical, with the addition of a conical top (Fig. 15). The average weight of a cylindrical stone is 726.46 g., which is significantly greater than the 488.41 g. average of all perforated stones. Seventy-three percent of cylindrical stones show signs of grinding wear, and 18% of the stones have at least one incised line, compared to the 6% average for all stones.

Type 9: Lipped

Only a handful of definitely lipped stones (Fig. 16) were found; two are from the southern Channel Islands, five from the northern Channel Islands, and two from the Santa Barbara mainland. Lipped stones are flattened and smoothed on one side, just around the hole. On the same face, a protruding lip surrounds the hole. Sometimes this lip is slight, while in other instances it is fairly prominent. One lipped stone from Santa Cruz Island (Figs. 17a and 17b) is very large and shows little evidence of use wear, although it is in poor condition. This particular stone is very much an outlier, as the measurements for all of the other lipped stones fall within the average range. With a hole diameter of 3.45 cm. and a weight of 2,249.60 g., this stone was likely too large and unwieldy to have been used effectively as a digging stick weight for digging corms. Perhaps it was used for digging to greater depths, as in digging large pits or graves. The stone was found on the northern coast of Santa Cruz Island at China Harbor. Most of the lipped stones exhibit the average amount and types of use wear.

Type 10: The Angular Stone

Eleven angular stones were found in the collections. Most (8 of 11, or 73%) are made of steatite or serpentine and are highly polished. They have anywhere from



Figures 17a and 17b. Top view (a) and close up (b) of a very large, lipped perforated stone from Santa Cruz Island, Santa Barbara Museum of Natural History. (No catalog number, Santa Cruz Island Foundation Collection.)

Figure 18. Angular perforated stones made of serpentine, Santa Barbara Museum of Natural History. (Left to right: 2818/ I.455, 2834, NA-CA-27-3A-1.)

three to eight sides and the edges are rounded (Fig. 18). In general, the angular stones are slightly smaller than average. The average weight of the angular stones is of particular interest. At 324.33 g., the average weight of an angular stone is 1/3 less than the 488.41 g. average weight of all stones.

Type 11: The Ring

Eight ring-shaped stones (Fig. 19) were recorded. The hole diameter of these is a relatively large 2.55 cm. Henshaw (1887) noted that flatter stone rings with rather large perforations were used as gaming pieces. The Chumash at San Buenaventura played a game called

Figure 19. Ring-shaped perforated stones, Santa Barbara Museum of Natural History. (Left to right: NA-CA-SMI-XX-11, NA-CA-136-3A-6, NA-CA-129-3A-218.)

itúrursh in which a wooden lance was thrown in an attempt to penetrate the hole of the stone ring when it was in motion (Henshaw 1887).

The distribution of measurements of ring-shaped stones suggests that there may be two groups of them, one consisting of smaller stones and the other of larger stones. The average weight of a ring-shaped stone is 139.48 g., which is a significant 71% less than the average of 488.41 g. for all stones. That lower weight is partially due to the larger hole diameter of the stones, resulting in their having less mass than other perforated stones with smaller hole diameters. In addition, ring-shaped stones are often made of lighter-weight sandstones.

Type 12: The Egg/Ovoid

Seven egg or ovoid-shaped stones were identified. About half of these are known to have come from San Nicolas Island and are made of polished chlorite schist. Three of these stones have an incised line around the center of each stone (Fig. 20). The central incised line suggests a possible use as a net sinker, although many of these stones are highly polished. Commonly, chipping is found around the central perforation.

Type 13: The Indented Stone

Two indented stones were recorded; both are made of sandstone (Fig. 21). Some additional stones, particularly the squashed-type stones, also had one or two indentations per stone. In Figure 21, one stone pictured has four circular indentations, and the other has two. From time to time, other stones with one or two slight indentations were encountered, but these two stones have purposeful, deep indentations. Henshaw (1887:18–19) suggested that these were possibly used as dies for shaping artifacts such as stone pipes. Sandstone may have been useful for shaping pipes made of soft steatite, and the indentations useful for gripping the object firmly with the fingers. However, wear inside the holes of these stones is not consistent with the hypothesis that these two examples were used as dies.

These indented stones are nearly identical to the fish-vertebrae type of cogged stones described by Eberhart (1961). The distribution of all types of cogged stones is currently believed to extend from extreme southern Ventura County down to San Diego County (Eberhart 1961; Koerper and Mason 1998). Herman Strandt (1965:23) reported one cogged stone

Figure 20. Incised ovoid-shaped perforated stones, Santa Barbara Museum of Natural History. (Left to right: 3715/ A 658, A 471, NA-CA-SCRI-XX-3A-9.)

Figure 21. Indented "fish vertebrae" style stones, Santa Barbara Museum of Natural History. (Left to right: NA-CA-132-3A-38, NA-CA-SBA-XX-3A-349.)

excavated by O. T. Littleton at Goleta in Santa Barbara County. However, there is some reason to question that provenience (Koerper and Chance 1995; Lee 1993). In light of the discovery of the two indented stones included in this study, one definitively coming from San Miguel Island and the other attributed generally to the Santa Barbara region, and of Henshaw's (1887) description of these types of stones from the Santa Barbara region, I suggest the distribution of cogged stones, or at least the fish-vertebrae type of cogged stones, should be extended further north to include Santa Barbara County.

USE BY GENDER AND AGE

Perforated stones are commonly thought to have been used primarily by women (Hollimon 1990:109). This is due to the assumption that perforated stones were used as digging stick weights and that gathering blue dick bulbs would have been an activity predominately performed by women. In the late nineteenth century, researchers questioned Chumash consultants regarding the use of perforated stones. Although the Chumash had abandoned these tools by that time and they were largely forgotten, a few individuals remembered that the stones were used as digging stick weights by women (Heizer 1955:153–154; Henshaw 1887:8), and that the women were sometimes assisted by boys and old men (Heizer 1955:153). But even if most perforated stones were used as digging stick weights, it is doubtful that this tool would have been associated primarily with women throughout prehistory.

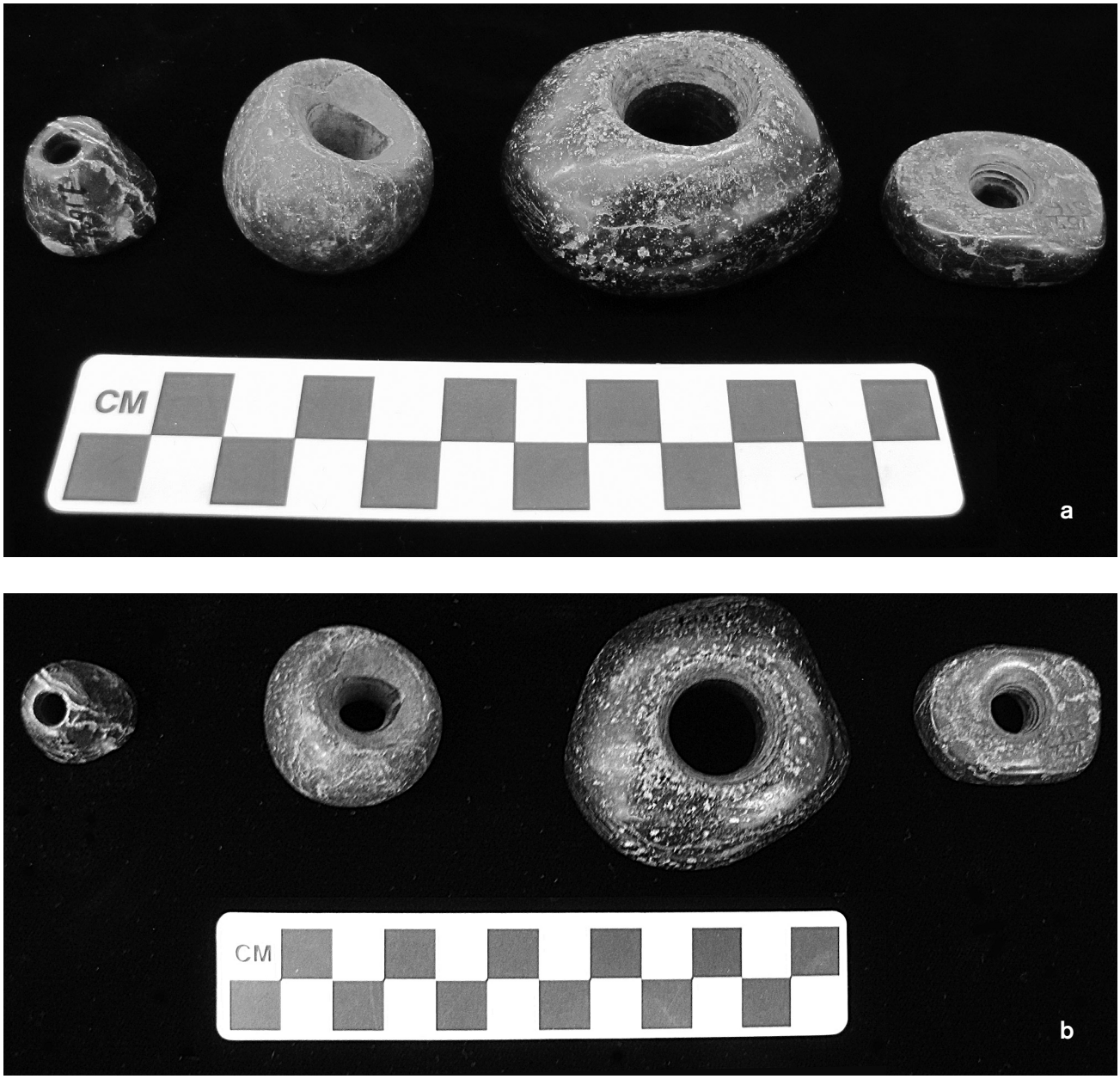
When questioned about the use of small perforated stones, the Chumash consultants stated that they were used by children (Heizer 1955:153–154; Henshaw 1887:8; Hudson and Blackburn 1982:247; Putnum 1879:161). The implication drawn from these accounts is that they were used as toys, since some stones were thought to be too small to have any economic function (see also Koerper and Gust 2009). Some of the stones are indeed very small, but there is much variation in the size of perforated stones. Children likely did employ perforated stones as tools, and whether the stones were large or small, they cannot be thought of as having no economic function because they were employed by children.

Archaeologists have long ignored the role of children in society, depicting them as having only peripheral social, economic, religious, and political roles (Baxter 2005; Baxter [ed.] 2005; Lillehammer 1989:90). While recent scholars have begun to develop approaches to investigating the archaeology of childhood (e.g. Baxter 2000; Baxter [ed.] 2005; Dommasnes and Wrigglesworth 2008; Kamp 2002; Moore and Scott 1997; Park 1998; Sofaer Derevenski 1996, 2000), much more work needs to be done to regularly include children in our interpretations of the past. Several important points need to be considered in assuming that small perforated stones were used as children's toys. First, compared to modern times, the human life span in prehistory was significantly shorter. People got married, had children, and died at a younger age. This compressed life span could very well have led to a shorter childhood—not physically (of course) but socially, in the adoption of economic, social, and political responsibilities at a young age (Dommasnes and Wrigglesworth 2008:xiii). Childhood may be seen as a social construction, as the range of ages within this stage of life varies between cultures, socioeconomic classes, and time periods (Bugarin 2005:15; Haag 1988). Second, tools are most efficient when proportionately sized to the individual using the tool. Although it is a difficult task, a distinction needs to be made between artifacts that are very small and likely only used for play, and those that were functional and scaled down in size in order to be used efficiently by children (Park 2005:60). For example, in his Arctic research, Park notes that

> ...the bows and arrows described in one of the Jenness quotes were toys used by children to shoot at "imaginary deer" (Jenness 1922:219), but clearly those toys "functioned" enough for the arrows to be launched. And finally, as also described by Jenness (1922:170), children's "fathers make bows and arrows for them suited to their strength." Those bows and arrows, while smaller than the ones used by adults, clearly cannot be described as toys although they were associated with children [Park 2005:60].

Childhood involves a learning process, and the tools used during childhood help an individual acquire skills and knowledge. Children may not always be as physically strong as adults, and their tools may not be made with the same degree of craftsmanship and knowledge, but this does not mean that these smaller objects are toys.

Some perforated stones found in the Santa Barbara Channel region are indeed too small to have likely been used as tools. One set of tiny perforated stones found



Figures 22a and 22b. Side view (a) and top view (b) of a set of miniature perforated stones from Santa Cruz Island, Santa Barbara Museum of Natural History. (Left to right: 3164/ I.1036d, 3164/ I.1036b, 3164/ I.1036a, 3164/ I.1036c.)

with an adult burial on Santa Cruz Island, and identified in the collection catalog as "beads," are clearly a set of miniature perforated stones (Figs. 22a and 22b). These four stones range in length from two to four centimeters. From left to right (in Figs. 22a and 22b), there is a miniature teardrop-shaped stone without incised lines, a sphere with the top half of the hole being drilled in at an angle, an angular stone, and a squashed stone. All are made of highly polished serpentine and show limited or no signs of wear. These perforated stones clearly functioned as toys, beads, or in some other non-utilitarian manner. However, many of the other small perforated stones are, in fact, large enough to have been used as tools, and indeed show use wear to indicate this.

Although archaeologists have recently started to pay greater attention to populations notoriously underrepresented in their research, the study of these populations is extremely difficult given their lack of

visibility in the archaeological record (Bugarin 2005:13; Lightfoot 1995:201). Although there are many problems associated with using mortuary remains to interpret social relations in the past, the data presented here offer an opportunity to get a brief glimpse into the lives of individuals, something rarely achieved by archaeology. In previous analyses of Chumash cemeteries (Hollimon 1990; King 1982; Martz 1984), it has been assumed that associations between artifacts are meaningful, as they are not random and they reflect the organization of the culture (Hollimon 1990:11). Therefore, burial records were consulted in order to determine who was being buried with perforated stones and thus achieve some understanding as to who may have employed the stones and whether that pattern changed over time. This approach has notable flaws; for example, the perforated stones may have belonged to mourners who placed the stones in graves, and stones belonging to some individuals may have been destroyed during mourning ceremonies and never made their way into the graves of those who used them (Arnold and Green 2002; Gamble et al. 2001). Artifacts interred with the deceased represent a significant interpretive challenge, as the items found with burials may represent items that belonged to the deceased, items placed in the grave by a loved one, or items with some symbolic and/or ritual significance. The data are nevertheless presented here as they may provide a baseline understanding of general changes in the use of perforated stones over time.

The Mortuary Sample

During 1927 and 1928, Ronald Olson from the Department of Anthropology at the University of California, Berkeley, carried out a series of archaeological excavations on Santa Cruz Island and on the Santa Barbara mainland (Hoover 1971; Olson 1930). Olson, occasionally assisted by David Banks Rogers of the Santa Barbara Museum of Natural History, concentrated on excavating the cemetery components of many Chumash archaeological sites. All in all, Olson excavated some 725 burials (Olson 1930:4), collecting the grave goods and keeping only the best preserved bones. Unfortunately, these collections, like many early collections, are in a state of some disarray. Olson and Rogers ultimately disagreed on various issues and ended up splitting much of the collection between their two museums, with some of the material going to the Santa Barbara Museum of Natural History and the rest going to what is now the Phoebe Hearst Museum at U.C. Berkeley. Artifacts are missing, others lack provenience, and much of the human skeletal material was never collected due to poor preservation.

Olson, however, did keep fairly detailed excavation notes, notes that include data on body position, a list of and the location of associated grave goods, and information on the relative age (infant, child, youth, adult) of the deceased for almost every burial. It was these burial records that were consulted for information on the sex and age of individuals buried with perforated stones. Although both mainland and Santa Cruz Island burial records were investigated, the mainland burials excavated by Olson contained virtually no perforated stones. Therefore, it is only the Santa Cruz Island burials that are considered below. Additionally, the perforated stones mentioned in Olson's notes were sometimes described as being "small" or "large." In these instances, the size descriptions were noted in order to determine if any correlation could be made between small stones and the burials of children. However, because these collections are in some disarray, and the collections were haphazardly divided between the Santa Barbara Museum of Natural History and the Phoebe Hearst Museum, it is often impossible to match specific artifacts with the burials with which they were associated. Therefore, a determination as to what Olson considered "large" or "small" cannot be made. In most instances a size descriptor was not given to the perforated stones mentioned in his notes.

Gender Correlation with Perforated Stones

Unfortunately, no correlation could be made between perforated stones and their presence in the graves of males or females because the sex of most burials could not be determined. Many of the bones excavated in the 1920s were not kept due to their poor preservation, and therefore only a few of the burials have been analyzed using modern methods to determine gender. However, the gender of most of those few burials has been evaluated using modern techniques (Hollimon 1990). Twenty-three of the burials for which gender was determined were interred with at least one perforated stone; fourteen were males and nine were females (Hollimon 1990:123). An additional fifteen well-preserved

Figure 23. Location of cemeteries on Santa Cruz Island discussed in text.

burials are present in the collection, but a definitive estimation of the sex of these individuals could not be made. Additionally, the burials were not separated by time period. In the end, although more male burials than female burials were interred with a perforated stone, the large number of unsexed burials prevents a determination of whether this pattern is meaningful.

Age Correlation with Perforated Stones

Fortunately, Olson noted the relative age category of each burial that was excavated. Almost all burials were assigned to one of four general categories: infant, child, youth, and adult. When reading through Olson's (1927–8) field notes, it becomes clear that Olson's category of "youth" was most commonly assigned to younger adults and older teenagers. Because it is believed that teenagers in prehistoric Chumash society were often married and likely shared many of the same responsibilities as older adults, they were grouped into the "adult" category for the purposes of this study. Olson's infant and child categories were also grouped together in one general "child" category. Unfortunately, we do not know how Olson and his excavators defined these categories, and in some instances a burial is noted as being that of an "infant/child." Because the precise age of the burials is ambiguous, the decision was made to group these two categories.

Early Period Distribution

The Early Period (~6,200–500 B.C.) burial sample consists of a total of 125 burials: 102 burials from SCRI-3, Frazer's Point, on the western end of Santa Cruz Island, and 23 burials from Olson's site 126 in the Orizaba region of northern Santa Cruz Island (Fig. 23). At these two cemeteries, 20% of the total excavated burial population was laid to rest with at least one perforated stone. Some 23% of the 88 adult burials were buried with at least one perforated stone, while 13.5% of the 37 child burials included at least one perforated stone (Fig. 24). In the field notes, ten of the stones found were described as being "small" or "tiny." Seven of these small stones were found with adult burials, while the other three were recovered from child burials. In context, this translates as 35% of the stones buried with adults being described as small by Olson, and 60% of the stones found with children being described as small (Fig. 25).

Middle Period Distribution

Olson and his crew excavated 120 burials from the Middle Period (~500 B.C.–A.D. 1150) cemetery at Christy Beach (Olson's site 83) on the western coast of the island (Fig. 23). In this cemetery, 15% of the excavated burials contained at least one perforated stone. Both 15% of the 94 adult burials and 15% of the 27 child burials were interred with perforated stones. Six of the perforated stones from this cemetery were described as small, with three found with adults and three with children. However, this translates as 21% of the stones found with adults being described as small, while 75% of the children's stones were noted as being small.

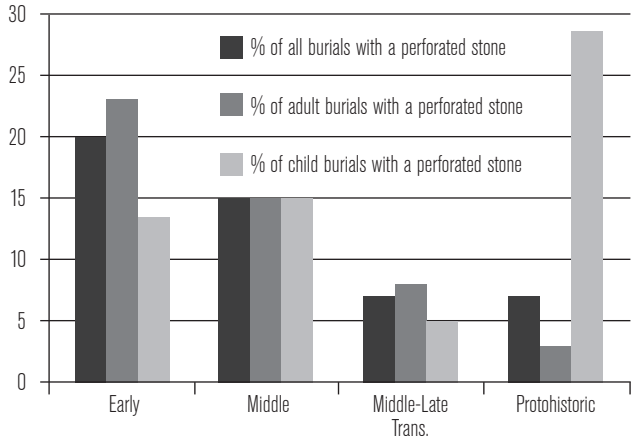


Figure 24. Percentage of burials interred with at least one perforated stone, tracked for the entire population, adults only, and children only throughout history by time period.

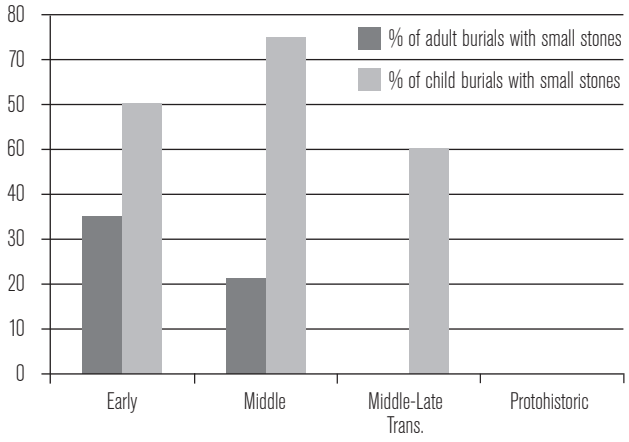


Figure 25. Percentage of adult and child burials associated with small perforated stones by time period.

Middle-Late Period Transition Distribution

It is believed that the excavation of 167 burials by Olson and his team accounted for almost all of the cemetery at the mouth of Poso Canyon (Olson's site 100) on the southwestern coast of the island (Fig. 23). This cemetery dates to the Middle-Late Period Transition (A.D. 1200–1300), which is thought to be a time of significant social change and great climatic variability (Arnold 1992; Johnson 2000). In this cemetery, a mere 7% of the burials were interred with a perforated stone. Among adult burials, only 8% were interred with a stone, and only 5% of child burials contained a perforated stone. Additionally, only one of the recovered perforated stones was noted as being small, and it was found in a child's grave. However, since only two stones were found with children's burials, 50% of the stones buried with children were small.

Protohistoric Period Distribution

Very few burials dating to the Late Period (A.D. 1300–1542) or later were excavated by Olson's team. A total of 42 burials from the Protohistoric Period (A.D. 1542–1782) were excavated: 32 from a cemetery at Smuggler's Cove (Olson's site 138) on the eastern coast of the island, and 10 burials from another cemetery (Olson's site 82) at Christy Beach on the western coast of the island (Fig. 23). Among these burials, again only 7% were found accompanied by a perforated stone. Only one burial (or 3%) of the 35 adult burials was associated with a stone. However, 28.5% of the 7 child burials were interred with a perforated stone. None of the perforated stones found in these two cemeteries was noted as being small.

DISCUSSION

For all time periods, 54% of the perforated stones interred with children were described in Olson's field notes as being small. However, only 23% of the stones interred with adults were noted as being small. This suggests that although the small perforated stones may not have been used exclusively by children, they appear to have been more strongly associated with children. Children may have actively used these perforated stones as tools, hafting them on digging sticks for weight and leverage in digging up blue dick corms. The smaller-sized stones would be more proportional to their body size, allowing the tools to be more effective. While use of the perforated stones as toys cannot be excluded from consideration, it should not be assumed that this was their primary function. During the Early, Middle, and Middle-Late Transition periods, small stones are more frequently found with child burials (Fig. 25).

When the presence of perforated stones with burials is tracked throughout time periods for the total population, and also separately for adult and child populations, an interesting pattern emerges (Fig. 24). First, on Santa Cruz Island, the presence of the stones with burials tapers off over time. If many of the

stones were used as digging stick weights to aid in the harvesting of blue dicks corms, it may be assumed that the importance of this plant resource also decreased throughout time. This would be consistent with the findings of Walker and Erlandson (1986), who concluded that plant food resources may have been more important to the islanders during the Early Period. The lack of milling stones and implements in early island burials and sites suggests that the islanders were consuming different forms of carbohydrates than the mainlanders, who concentrated on seeds and acorns. Corms do not require much processing; therefore, the absence of ground stone artifacts supports the hypothesis that islanders were relying on corms as a source of food during this time. Gill (2013) has recently suggested that corms and other island geophytes may have been an optimal resource, as they were larger in overall size than those found on the mainland and would have provided a significant source of carbohydrates for much of the year. As fishing and boat technology developed, the diet shifted to include more fish and sea mammals. Although plant foods would have continued to have been consumed, they may have comprised significantly less of the diet. It would not be surprising, then, that the presence of perforated stones with adult burials also tapered off over time.

Although the presence of perforated stones with children's burials also decreases from the Early Period to the Middle-Late Period Transition, the number spikes in the Protohistoric Period. This suggests that children may have become responsible for gathering blue dicks corms and perhaps other plant resources later in time. Hollimon (1990:153) noted that in the Late Period, burial accompaniments suggesting craft specialization are common. As more adults began focusing on craft production, children in the Late and Protohistoric periods may have become increasingly more responsible for procuring plant foods and supplemental resources.

The role of children as collectors of bulbs is illustrated in the Chumash oral narrative, *Coyote and the Children* (Blackburn 1975:220–221). In this story, a very hungry Coyote comes across a group of children digging for *cacomites* (blue dicks). The good children are willing to share their bulbs with Coyote, while the stingy children proclaim, "Coyote, what I've dug is for my relatives only!" Coyote and the children then take the bulbs to a different location to roast them. The bulbs of the generous children are roasted perfectly, while the bulbs of the stingy children burn, and they go hungry. Coyote and the good children enjoy their meal. This narrative illustrates how common it may have been for groups of children to collect bulbs together, and also that they were clearly gathering them for their family, not just themselves.

Usually, several families came together to roast the bulbs in pits after they were harvested (Wagner 1929:162). If children decided who they would accompany to gather the bulbs, they would have also been choosing children in families to which their own family would have social ties. In this way, children were economically important for providing sustenance for their families, but were also socially reinforcing bonds between families through a shared responsibility for roasting, and later eating, the cooked bulbs.

CONCLUSIONS

The goal of this study was to evaluate four major assumptions about perforated stones in the Santa Barbara Channel region: (1) perforated stones were primarily used as digging stick weights; (2) more of the stones occur on the Channel Islands than on the mainland coast; (3) women were most associated with the stones as they would have been responsible for digging bulbs and therefore would have required the stones for digging stick weights; and (4) small stones which appear to have had no economic value were used as toys by children. In evaluating these assumptions, some results are clearer than others. While many of the perforated stones may have been used as digging stick weights, an investigation of the use wear patterns on the stones shows definitively that a substantial number were also used for other tasks. It is possible that the stones were multi-purpose tools, performing a variety of hammering, grinding, and weighting functions as needed. The results of this study also quite conclusively demonstrate that perforated stones were much more frequently used on the Channel Islands, and had a more limited use on the mainland. This may be linked to the limited diversity of plant species on the Channel Islands, with islanders focusing on the harvesting of blue dicks corms, while mainlanders had a much larger selection of plant resources to exploit.

Evaluating the connections between both women and perforated stones and between children and perforated stones is more complicated. Unfortunately, few of the burials excavated by Olson on Santa Cruz Island in the 1920s could be analyzed to determine gender. Judging by the few burials for which gender could be determined using modern methods, it is apparent that perforated stones were buried with both males and females. Some 54% of the perforated stones found with child burials were described in the field notes as "small," while only 23% of the stones found with adult burials were noted as small. The small perforated stones were therefore not exclusively associated with children, although they were strongly associated with them. It could be suggested that the small sizes of the stones were proportional to children's bodies, making them more effective when used by children. As many of the small stones show the same signs of use as larger stones, it cannot be said that the stones had no economic function. While some of the very small stones may have been used as toys or for other purposes, it is clear that others were used as tools.

Further research on the perforated stones from this region should include experimental studies to look at use wear patterns and the tasks that might correspond to certain patterns. Small perforated stones must not be discounted from analysis, as they may very well have served a variety of economic functions. In general, more attention needs to be paid to identifying children in the archaeological record and attempting to understand their economic, social, and political contributions. While great strides have recently been made in looking at traditionally understudied groups such as women, children, and the disenfranchised, we have a long way to go. While locating these groups in the archaeological record is undoubtedly difficult, making an effort to include them in our analyses will dramatically increase our understanding of the prehistory of the region.

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