Donut Stones as Fishing Sinkers in Coastal Southern California?

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Abstract

This article explores the origin and initial function as well as subsequent history for the so-called donut stone, a category of southern California large perforated artifact, torus-like to quasi-toroidal in general morphology. Drawing on both direct and circumstantial evidence, it is proposed that the genesis of the donut stone artifact occurred with cultural modifications to beach pebbles into which piddock clams had excavated tubular channels, head starts, as it were, in a stone worker's manufacture of sinkers, those objects that add weight to fishing nets and fishing lines. Abetting the dialogue are descriptions of a number of piddock-impacted specimens, all probable sinkers, the most revealing of which is an artifact from the Palos Verdes Peninsula, one of its faces showing what is unequivocally a piddock's entrance hole but whose opposite side shows a pecked and/or drilled, asymmetric conical opening.

In time, donut-like morphology would come to characterize another functional category—the digging stick weight. Stick weights and donut-like sinkers might be repurposed to secondary applications (possibly hammers, club heads, manufacturing dies, hoop and pole targets, etc.) Donut stones have frequently appeared in non-utilitarian contexts (i.e., ritual caches and mortuary features).

Introduction

Several types of coastal southern California carved stone artifacts have historically evoked spirited discussions turning on assignments of function and/or meaning. Prominent among these give and takes is a long-running conversation enveloping a tangle of hypotheses to account for what was initially called the "stone ring" (a.k.a. "ring stone"), but subsequently renamed the "donut stone" (also "doughnut stone," "fossil doughnut," or simply, "donut").

Continuous morphological variation extending from those artifacts that appear more or less to mimic the common bakery good to certain other kinds of large crafted stones, similarly possessing a central, through and through perforation coursing from one face to its opposite, poses a taxonomic challenge. What are the limits of inclusivity for specimens that might be labeled "donut stones"? A convenience employed for this essay begins with restricting the range of shapes to those objects palpably projecting torus-like to quasi-toroidal imagery.

The "donut stone" type is subsumed among a spectrum of artifacts answering to the generic rubric, "large perforated stones," an umbrella category that includes, for instance, objects that are pear-shaped (pyriform), globular, depressed globular, globular-conoid, cylindrical, barrel-shaped, etc. (e.g., Putnam 1879b; Henshaw 1887 Figures 1–4, 9, 10, 16; Hudson and Blackburn 1982:247–251;see also Rogers 1929, Plate 44; Landberg 1965:109; Grant 1978:525, Figure 3; Koerper and Hunter 2017:85–86[1]).

Further considerations regarding donut stone status involve location and history. Kroeber (1925:563; see also Campbell 1999:7) incautiously reported that "stone rings" were "nearly unique" to the Chumash, when in actuality they were at least as abundant within northern mainland Tongva (Gabrielino) and southern Channel Island Tongva territories.[2] But what of specimens further afield? Outlier donut stones include, for instance, specimens documented in Yokuts territory, southern San Joaquin Valley (e.g., Latta 1999:456). The author supposes these donuts reached the valley through direct or indirect exchange but does not com-

pletely rule out the possibility of stimulus diffusion. In any case, the very strong likelihood of some historical connection recommends such outliers to the donut stone type. However, very similar looking artifacts observed well away from Chumash and Tongva territories, specifically in that part of the Northwest Coast culture area which extends into far northwestern California (see below), are barred from inclusion within the donut stone category apropos of the present study's southern California taxonomy; this follows the supposition that the Northwest Coast specimens are products of independent invention, that is, absent historical connection to southern California donuts.

The priority task of this article is to revisit the issue of whether some donut-like artifacts served in a sinker capacity for fish lines or fishnets. The one formal definition for coastal southern California sinker does not recognize perforated artifacts. Rather, the sinker is said to be "a grooved or notched stone weight that was attached to a fishnet or fish line to make it sink" (Hudson and Blackburn 1982:159).

This revisit was sparked by the author's chance encounter with a certain quasi-toroidal specimen (Figures 1 and 2; see also cover illustration) while perusing shelves in a storage room within the Point Vicente Interpretive Center (PVIC), Rancho Palos Verdes. The somewhat donut-shaped object drew particular interest for the character of its perforation, a channel, most of which had been drilled by a clam. Initial curiosity invited questions regarding manufacture and function, consequently precipitating a literature search for perspectives on employments of donut stones and also for relevant comparative archaeological data. This reengaged the author with two long held interests—fishing sinkers (e.g., Koerper et al. 1988:138; Koerper and Mason 2000:8–23, 8–24, Figure 8–16; Koerper and Cramer 2015; Koerper and Hunter 2017:86–87) and non-ornamental perforated stone artifacts (especially donuts) (e.g., Koerper 2006, 2012:73–78, 2017; Koerper and Gust 2009; Koerper et al. 2010).

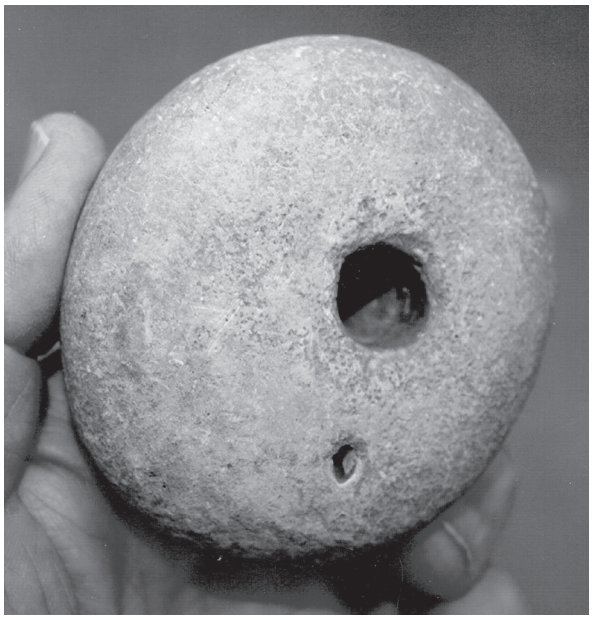

Figure 1. Probable fishnet weight from Palos Verdes Peninsula. Maximum diameter, 7.2 cm. Note centrally located, piddock-drilled hole.

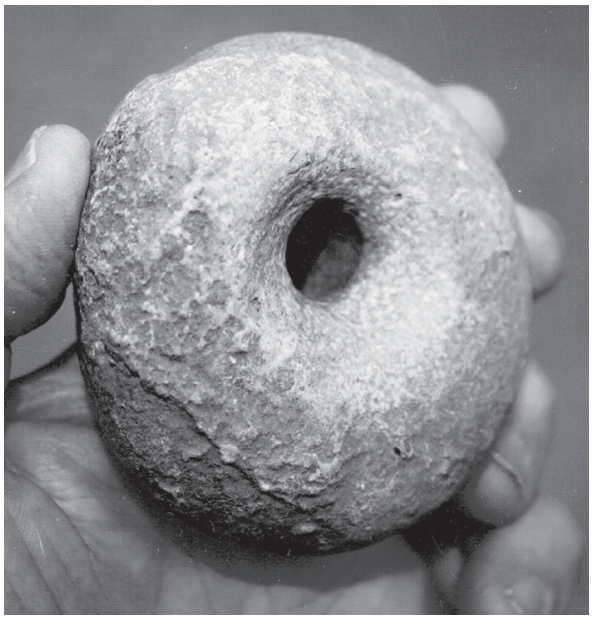

Figure 2. Opposite side of artifact seen in Figure 1. Note the asymmetric, conical, pecked hole that penetrates into the piddock-drilled channel.

One outcome of these efforts is a modest but not inconsequential adjustment to the above cited definition of "sinker." Another outcome is an updated alert to the regional archaeological community that naturally holed beach stones were easily procured for the manufacture of fishing equipment. Such awareness should force greater attention to the physical characteristics of donut-like stones and even other kinds of perforated stones. Yet another outcome is a quick-and-easy introduction to ideas proposed regarding the practical applications of, particularly, donuts. Considerations of specific magico-religious thought and behavior possibly attaching to at least some donut-shaped objects and certain other large perforated stones fall outside the purview of this essay, but the reader interested in such is directed to Koerper (2006). Additional contributions of this article include food for thought concerning donut stone aetiology and secondary employments of the artifact type.

The section beginning just below looks at information regarding functionality. Artifact descriptions, starting with the Palos Verdes specimen, then follow to further address the question that is the title of this article. This exercise ends with a "Summary and Conclusions" section.

Functionality

Thought devoted to donut-like artifacts in regional ethnology and prehistory has focused largely on utilitarian purposes. Virtually all hypotheses dealing with function were submitted before the turn of the twentieth century. For about fourteen decades and up to the present, the most frequently submitted functional identification for those southern California stone rings, or donut stones, having a comparatively large perforation, is that of digging stick weight, its purpose being to add mass and consequently force to the stroke of the tool. The digging stick is associated mainly with unearthing roots, bulbs, and corms (e.g., see Schumacher 1877:41, Pl. 22b, 1880:265–268; Putnam 1879b:161, 166; Henshaw 1887:7–11; Harrington 1942:9; Heizer 1955:153–154; Landberg 1965:40, 109; Hudson and Blackburn 1982:247–251) but is also associated with excavating, for instance, postholes, ovens, and graves (see Jones 1956:220; Campbell 1991:71; Hollimon 2000:192–193). Certain small donut-like artifacts are often supposed as toy digging stick weights (e.g., Putnam 1879b:161; Schumacher 1880:268; Henshaw 1887:8–9; Heizer 1955:153; Koerper and Gust 2009; Koerper 2017).

Phillip Mills Jones, ca. 1901–1902, regarded the stick weight hypothesis as "problematic." He perceived the "stone rings" to be far more common on the islands than on the southern California coastal mainland. The artifact, he believed, must have been generated:

> … through causes and influences which acted [in island settings] in marked degree but were not appreciable on the mainland. What can they have been? There is but little to dig for [on Santa Rosa Island] save for graves. Cultivation of the soil was unknown, roots are few and, so far as I know, not edible; the wild onion is common, but does not require a specially weighted digging stick to obtain it [Jones 1956:220].

Another frequent thought about the applications of donuts is that of fishing sinker, both as a line weight and as a net weight. This weight hypothesis occupies regional literature starting with late 1800s scholarship (Putnam 1879b:161–162; Schumacher 1880:265–268; Henshaw 1887:19) and continues to recent times (e.g., Hoover 1973:7, Plate 4b, 4c). Some sources challenge directly (e.g., Rogers 1929:406) or indirectly (e.g., Hudson and Blackburn 1982:159–161, 247–251) the proposition that donut stones were sinkers.

Schumacher (1880:265–268) broke out perforated stone artifacts presumed to be weights into the digging-related versus fishing-related categories.

This breakout observed artifacts' levels of finish. Fishing equipment donuts were said to be comparatively coarse, their holes "smaller and narrower in the middle." The perforation was "hardly ever drilled, or finished by drilling, but simply pecked." The digging stick weight exhibited better symmetry, its perforation, he believed, accomplished by pecking from both sides. When the two pecked excavations met, drilling occurred to complete the job.[3]

Frederick Putnam (1879b:138, 155, 102) supposed that "easily perforated," irregularly shaped pebbles may have been employed as sinkers. However, he did question why a Native fisherman would trouble himself to drill a hole, when with much less labor, notching produced a sinker just as effective. Putnam seems halfway to answering his own question since he recognized some pebbles were "easily" holed, yet he, like Schumacher, apparently did not consider the many beach pebbles that possessed natural cavities.

The author submits that any labor differential would be an insignificant factor for people who were no strangers to leisure time. Also, is it possible that perforated sinkers were seen to offer more secure attachment to a line or net than either a grooved or notched sinker?[4]

From among the donut-like to quasi-donut-like specimens, Putnam recognized ones that appeared comparatively "rude." Indeed, in Putnam's Plate X (1879b), showing 17 southern California donut stones, five were singled out for being "flattened and more or less oval pebbles of basalt, and other hard rocks, that have been perforated by pecking the hole through from both sides" (1879b:182). These more coarse-looking objects, he believed, were good candidates for the sinker category. Shown in plan view, several of the Plate X artifacts are palpably asymmetrical, thus quickly evoking the appearance of beach stones.

Beach stones collected for sinkers is a subject that turns up in the ethnographic record. From Henry Henshaw (1885:112, 1887:19; Heizer 1955:152) and others (e.g., J. P. Harrington [JPH/Candalaria Valenzuela] cited in Hudson and Blackburn 1982:160), we are informed that beaches provided sources of stones for sinkers. A Chumash informant related to Henshaw that ordinary beach-gathered stones were never subsequently shaped (Heizer 1955:152); this statement is somewhat ambiguous. Was Henshaw's informant's use of "shaped" a reference to carving/sculpting to effect general morphology, but with no consideration given to notching, grooving, or perforating? After all, it is well known that some sinkers were purposefully notched and others grooved to facilitate attachment. Or perchance, did the informant have in mind selection for beach stones whose natural features offered the functional equivalents of man-made notches or holes?

Putnam (1879b:185–188) gave attention to culturally holed stones of both hard and soft minerals which in their raw states were beach pebbles. At this point, one might wonder whether any had received a head start on perforation courtesy of a piddock clam. Piddock clams (family, Pholodidae) possess a mechanical means to drill tubular holes into relatively hard substrates, compacted mud, and soft rock (McLean 1978:90–92; see also Morris 1966:43–44). The mollusks' capacity to do such is quickly explained:

> The foot of growing, active clams projects through an anterior gape. Contraction and rotation of the foot brings the roughened ridges on the anterior slope of the valves into contact with the substrate and the burrow is enlarged by a filing action … In some [species] the boring ceases as the shell reaches maturity and the anterior opening where the foot projects is sealed over with a smooth shelly extension of the valve known as the callum [McLean 1978:90].

Consider what a Chumash informant provided J. P. Harrington:

> On surf-fishing line, a weight was tied on the line. Now it is a lead weight, but formerly it was a stone with a hole in it—many stones with a hole on the coast [JPH/Anon.; Wiedmann ca. 1975:3].

There is no overreach in supposing that almost certainly the referent in the citation just above was piddock-drilled pebbles.

Interestingly, in correspondence to Putnam (see Putnam 1879b:162), Yarrow shared his thoughts regarding labor costs. He saw "nothing improbable in the statement that these [large perforated] stones may have been used as net-sinkers," submitting that labor investment to fashion them might be set against the labor input in producing a large net: "It seems to me that the same care might have been devoted to the necessary stone sinkers that was given to construction of the net."

Other suggested functions for which the mass of the artifact is more crucial to its efficacy than the perforation include club (combat and/or hunting weaponry), hammer, slung shot, sling shot, bolas, and other missiles. Spindle whorl and counter weight as functional possibilities occurred to early writers, but donut-like stones of the sorts featured herein are mostly too large and too heavy to be seriously considered as those kinds of artifacts (see Henshaw 1887:19–20).

Among others, Putnam (1879b:166–167, 171) and Henshaw (1887:32–34) considered that certain large perforated stones may have served as club heads. Henshaw reasonably supposed multiple functions for the range of such holed artifacts with which he had become familiar, and he further contemplated a single origin for them. He also wondered about evolutionary trajectories following an origin. Despite admitting an "imperfect state of knowledge respecting the perforated stones," and despite stating it would be "idle to speculate" concerning origin and evolutionary issues, he did in fact speculate, albeit cautiously:

> Could it be proved that they have served generally, or even extensively, as the heads of war clubs, this might, perhaps, be regarded as one at least of their primary uses, if not the most important one, while their other functions would naturally be regarded as of secondary character [Henshaw 1887:32].

Closely related to the war club function is that of hammer, which is offered by Philip Mills Jones (1956:220–221), who, referring specifically to "stone rings," weighed into the club versus hammer issue with characteristic aplomb, offering an unorthodox view that would have given pause to his turn of the century contemporaries had they only known:

There is no evidence from the skulls and bones found by me or others … showing the people to have been a quarrelsome or warlike people … all recorded information … goes to show that they were peaceable and friendly … Such being the case it is not conceivable that those who settled on these islands would develop war implements when they had no use for them—"stone maces," stone war clubs," as so often called by the "crossroads [mainstream?] archaeologists." Were the parent stocks—those found on the mainland—at all savage or warlike, they would have developed war implements and we would still find them both on the mainland and here on the islands [Jones 1956:220].

Rejecting the digging stick and club hypotheses, Philip Jones gave measured support to a hammer hypothesis:

> There is unmistakable evidence that some [stone rings] may have been used as hammers, but that all have been so used may be a matter of doubt … The reason why so many of them have the hole double tapering is … obvious; it was the natural shape when the hole was bored in the easiest manner, as illustrated in many specimens thus far collected

> by me. To make a straight uniform hole, or one tapering clear through, would require an unusual amount of skill … and a considerably longer time. It would be easy enough to mount a ring with a double tapering hole on a handle for use as a hammer, with the aid of asphalt and cord, and both of these articles were at hand and largely used [Jones 1956:220–221].

Kroeber was unimpressed with the observation that some donut-like stones show wear that might suggest hammering. If so used, he believed, the employment would only represent a secondary purpose:

> A hasty woman may occasionally have laid hold of the first implement that came to hand, or young or thoughtless members of the family may have aroused her resentment by putting a carefully preserved treasure to rough and ruinous use in her absence. We do not conclude from coffee stains on a chair that the owner regarded it indiscriminately as a seat and a table, nor from its violently fractured condition that it was intended as a weapon of offense. The remains of primitive people must be judged in the same spirit [Kroeber 1925:563–564].

Slung shots and bolas appear occasionally in discussions of regional perforated stones (e.g., Putnam 1879b:159, 173). A slung shot is a weight fastened onto a strap and hurled to produce blunt force trauma. A bolas consists of two or more weights attached to the ends of one or more cords; its first purpose is to entangle an animal's legs. An extensive literature review failed to turn up either weapon for the Chumash and Tongva areas. Donut stones would seem poor choices for these weapons since they would be vulnerable to breakage given hard landings. Sling shot refers to pebbles hurled using a sling, that is, a short strap having long strings at either end. To operate such a weapon, a missile is set in the strap, the ends of the strings are held in one hand, the weapon is whirled in a circle, and one string is released, discharging the missile. Again, there is a hard-landing problem. Also, donut stones are too big and much too unwieldy to the purpose. Parenthetically, slings, are well documented for the central California coast (Harrington 1942:15).

Suggested functions for which the perforation is more crucial to employment than the artifact's mass include dies for fashioning tubes, pipes, and similar cylindrical objects. Of the published specimens that might conceivably answer to a die purpose (see e.g., Henshaw 1887:18–19; Koerper and Desautels-Wiley 2009; Koerper and Hunter 2017:84–85), many are not at all donut like. One might reasonably imagine that certain donuts shaped out of coarse material could serve a grinding function, as when a steatite object intended to be, say, a smoking pipe or sucking tube, is rotated about the entrance to a donut's perforation. However, a simple abrading stone should be about as effective. If a donut stone had ever served such a die purpose, it would likely have been a case of secondary usage.

Other suggested functions that involve the hole as crucial to a donut's purpose include rope smoother, gauge for working and polishing arrow shafts, harpoon shafts, and spear shafts (e.g., Olson 1930:18), and targets for certain kinds of games/amusements.

An amusement example is a competition recorded from Mission San Buenaventura in which a wooden lance was tossed at a perforated flattish stone disk that was rolled along the ground (Henshaw 1887:16–17, Figure 9; Heizer 1955:154). The target was centrally perforated. The one example illustrated by Henshaw was a flat disk that does not rise to the standard for being labeled "toroidal."

Earlier, Steven Bowers (1878:319) was convinced that donut stones of various sizes were used in a game requiring three or four persons. He wrote that two individuals would roll the perforated stones back and forth between one another over a playing space while another person or perhaps two players would attempt to engage each whirled target through its hole using a sharpened pole (see also Taylor 1863; Olson 1930:18). Other "hoop" targets might be constructed of softer materials, not stone (Hoffman 1885:18; Davis 1887:168; Palou 1926:156; Bolton 1931:253). Irwin (1975:22) observed that donut stones generally lack the symmetry conducive to rolling as hoop and pole targets. If there were donut-shaped targets, one might reasonably suspect that their employment was a secondary one.

Descriptions

An Unusual, Quasi-Toroidal Artifact Curated at the Point Vicente Interpretive Center (PVIC)

As previously noted, the author recently made a serendipitous find, a quasi-toroidal, stone artifact (Figures 1 and 2, also see *Quarterly* cover illustration), most of its through and through channel excavated by a piddock clam. The specimen turned up in searches among a varied accumulation of cultural and natural objects stored with the PVIC, Rancho Palos Verdes. It had been donated by a relic collector who occasionally searched the coastal edge of the Palos Verdes Peninsula. Exact provenance is unremembered.

The sedimentary stone artifact measures 72 mm in maximum diameter and has a maximum thickness of 33 mm. It weighs 246 g. Its hardness scores ≈ 3.4 on the Mohs scale.

Both openings to the piddock-drilled channel are positioned off-center. The outer surfaces surrounding the smaller entrance are unmodified, but at the side opposite there is a somewhat conical depression, probably formed by pecking actions rather than by rotating a stone drill since the opening is relatively asymmetric. The depression was perhaps intended to widen the piddock-drilled opening. On the other hand, perhaps the piddock channel had not been bored completely through to the other side, and the pecking stone was then used to complete the tunnel.

The certain signature for clam drilling occurs at the channel opening not modified by human agent; there, the opening diameter is a bit smaller than the diameter of the channel just inside. The inner channel walls are slightly undulating, and they are smoothly rather than roughly textured. Native artisans' drilling to effect relatively narrow routes through certain large perforated stones typically produced straight-walled tunnels.

The side of the artifact showing a somewhat conical entrance has a comparatively rugged surface (Figure 2), while the other side shows a surface smoothed by the actions of tidal waters (Figure 1). Whether examined in plan view or in side view, asymmetry is immediately apparent. Use wear is absent from any surface.

Clearly, this Palos Verdes specimen answers more to Schumacher's (1880:265–268) expectation for a fishing weight rather than for a digging stick weight. Its channel is too narrow to accommodate the shaft of a digging stick. Neither will it accommodate a club handle or a hammer handle. The hole is far too small to be used in competitions such as hoop and pole; circumferential surfaces would impede steady rolling along the ground.

There is no feature that would contradict candidacy for sinker status. It was perhaps attached to a fishing line, but given its size, it more likely attached at the lower end of a net. Also, with respect to its weight, it was less likely to have been that kind of net attachment sometimes referred to as a net anchor, which is heavier in order to hold the net in one place (see Stewart 1973:78–79).

A Santa Rosa Island, Piddock-Drilled Artifact

The only other southern California, donut-like artifact previously recognized as having a piddock-drilled chamber and formally documented in the published literature is shown in Figure 3 (right). It was unearthed on Santa Rosa Island in 1901 by Phillip Mills Jones (1956:212, 232, 267, Plate 118a).

If the scale in Jones's Plate 118a is in increments of one-eighth inch, maximum diameter of this irregularly toroidal object is an estimated 65 mm. Its perforation is an estimated 19 mm. Observed in plan view, it exhibits such compromised symmetry as to suggest minimal if any crafting. Parenthetically, Horatio Rust referred to donut-like objects as "stone rings" (1898:75) as had Paul Schumacher (1880:265) and as did Dr. Jones (1956:220).

Excavated at CA-SRI-156 (Camp 34), it emerged from a burial cache together with a flint scraper, four pieces of red ochre, and a donut stone carved from "hard volcanic rock, beautifully polished on both sides" (Jones 1956:232) (Figure 3, left). The cache items lay near the left innominate bone of a male skeleton. Obviously, the final function of the smaller donut was that of mortuary offering. Supposing that it had served a prior, non-ritual purpose, it is reasonable to propose it had been a sinker for a line rather than a net, this owing to its small size.

A Probable Piddock-Drilled Fish Line Sinker from CA-ORA-855

A relatively thin, ovoid (maximum diameter ≈ 61 mm), piddock-drilled specimen (Figure 4) from CA-ORA-855, the historically documented Juaneño village of Putuidem in San Juan Capistrano, was labeled a possible net weight sinker in Koerper et al. (1988:134, Figure 37c, 137, Figure 39, 138). Because a small amount of wear was detected at the top of the hole's outer surface, it was supposed that a cord or string was once attached. Given that the Putuidem artifact has far less mass than objects positively known to be net weight sinkers (see e.g., Koerper and Cramer 2015), the author now favors "probable fish line sinker" over "possible net weight." The author suspects similar objects have escaped close scrutiny, perhaps regarded as mere manuports or otherwise objects of little or no significance.

Donut-like Net Weights from Extreme Northwestern California

The southernmost extension of the Northwest Coast culture area descends into the extreme northwestern

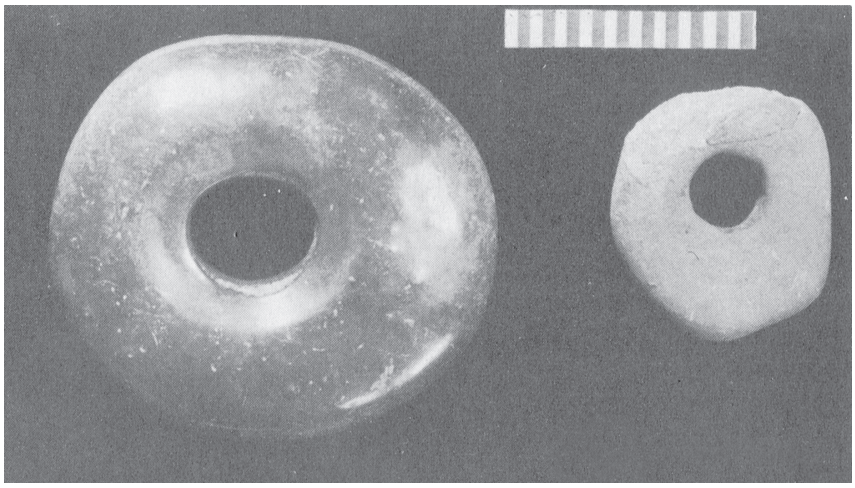

Figure 3. Two donut-shaped objects from a Santa Rosa Island burial. Hole into possible fishing line sinker shown at right is piddock-drilled. Length of scale is uncertain, but possibly measures 2.5 in. Image reproduced from Jones (1956:Plate 118a). Courtesy, University of California Press, Berkeley.

Figure 4. Probable fish line sinker from CA-ORA-855. Length, 6.1 cm.

corner of the Golden State (Kroeber 1920:127, Figure 1, 155–164, 1925:903–912, 1939:30). Several of that area's tribes possessed perforated net sinkers, the majority bearing more than a modicum of resemblance to the donut-shaped pastry. One-time dean of North American Indian studies, Harold Driver (1939:312), listed the Yurok, Tolowa, Karok, and Hupa as possessors of perforated sinkers, but he provided no illustrations. However, Driver (1939:378) did refer readers to Kroeber's Figure 7 in *Handbook of California Indians* (1925:86) where one can observe three Yurok perforated sinkers, each more or less donut-like. The specimens of Kroeber's Figure 7 are curated at the UC Museum of Anthropology (UCMA).

Shapes of two of these three artifacts appear to reflect water wear far more than human sculpting. One of those specimens (UCMA 1-1933) (Figure 5, lower left) was illustrated in somewhat oblique view, revealing that it was not particularly thick, resembling a large, water-flattened pebble. The other object illustrated in plan view and reproduced here (UCMA 1-1688g) (Figure 5, lower right) exhibits compromised symmetry, indubitably the outcome of natural rather than cultural forces. Kroeber (1925:86) recognized that sinkers' piercings could be laid to either cultural design or natural agency, but he addressed neither case with respect to the objects just noted. Clearly, on the faces shown for each, a drilling tool had been employed. Recalling the Palos Verdes artifact (Figures 1 and 2), there is the lesson that both molluscan and human action can account for a perforation seen on a single specimen.

It is not known if Kroeber equated at least some natural perforations with piddock drilling. With colleague S. A. Barrett, the Berkeley professor photographed a 370 g example of a completely natural, holed net sinker (1960:182, Plate 6) (Figure 6, lower right), but it would be hazardous to definitively attribute a cause to its perforation.

Kroeber and Barrett (1960:55) reported that northwest California sinkers were "attached at frequent intervals along the lower edges of flat nets." A large proportion of the finer sinkers were carved of soft stone, either serpentine or talc schist.

Of particular interest is Plate 5a published by Kroeber and Barrett (1960:170, 181) and reproduced here (Figure 7), for it shows four sinkers lashed onto a Yurok gill net; the photograph was taken in 1901 or 1902 by Phillip Mills Jones. It is likely that the two UC Berkeley scholars relied on Jones' image, never physically handling the net with its weights. This could explain their uncritical descriptions of all four sinkers as "carefully made." The artifact at the far left in Figure 7 is irregular in outline, and the entrance to the hole is barely open. The specimen seen second from the right appears minimally worked, if worked at all; perhaps its perforation is completely natural. Complicating matters is the possibility that one source for water-worn stones could have been the Klamath River, as opposed to the coast where the piddock clams live. No

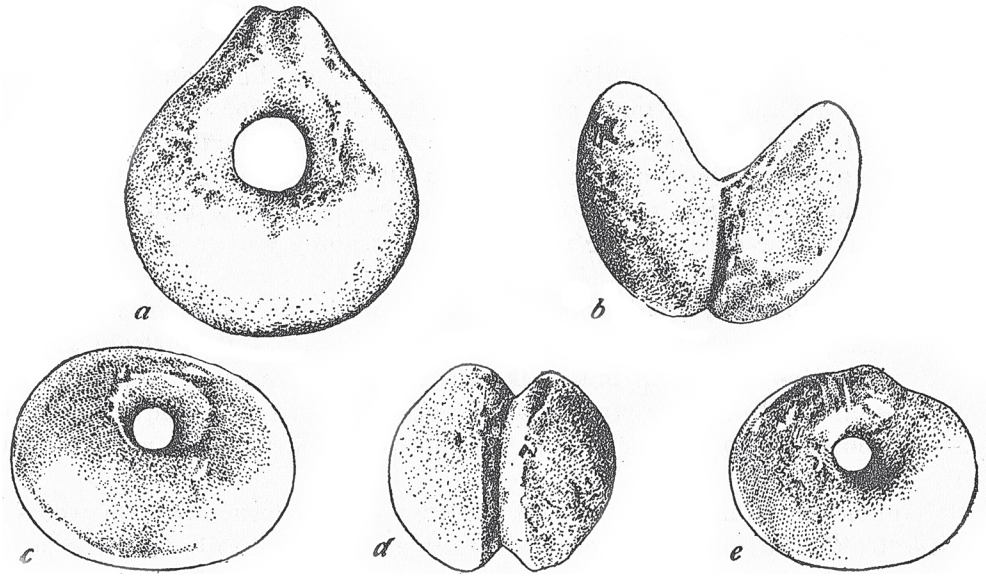

Figure 5. Yurok fishing sinkers. Illustration reproduced from Kroeber (1925:86, Figure 7). Specimens c (maximum dimension, 8.6 cm) and e (maximum dimension, 7.3 cm) appear to be waterworn pebbles.

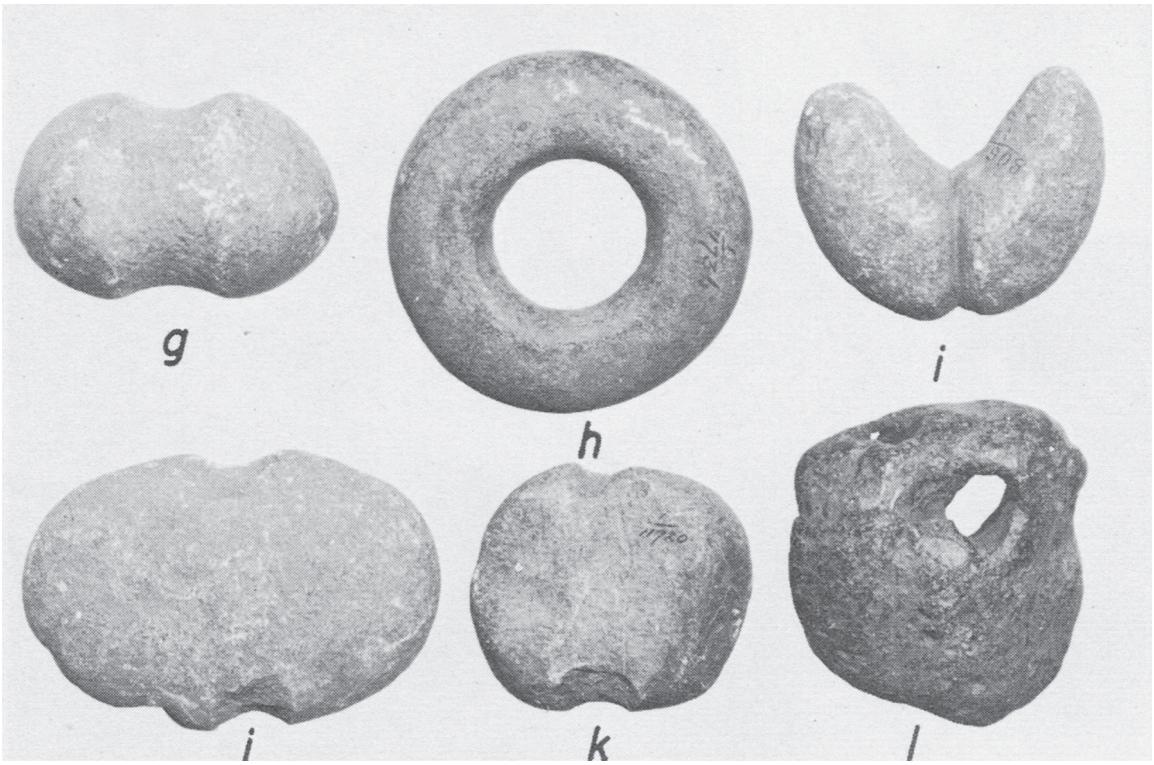

Figure 6. Northwestern California fishing sinkers. Image (neg. 17069) reproduced from Plate 6 in Kroeber and Barrett (1960:182). Completely natural sinker (lower right) (UCMA 1-11741), possible piddock-holed. Maximum dimension, 87 mm. Courtesy, University of California Press, Berkeley.

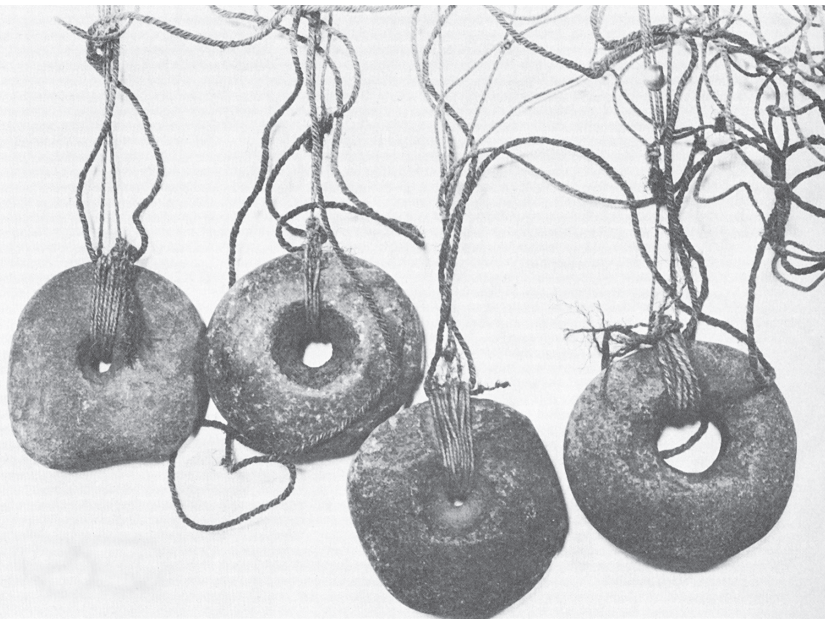

Figure 7. Yurok gill net with attached sinkers (UCMA 1-1083). Image (neg. 756) reproduced from Plate 5a in Kroeber and Barrett (1960:181). Scale unavailable. Courtesy, University of California Press, Berkeley.

scale accompanies the photograph, and any estimate of a sinker's diameter would be a bit hazardous.[5]

It is reasonably inferred that Jones' photographic image (Figure 7) postdates his February 18, 1901–June 7, 1901 stay on Santa Rosa Island, for had he examined this net and its donut-like sinkers prior to taking up the matter of the purposes of the island's "stone rings" in his April 1, 1901 notebook entry, one might expect some reference to the Yurok artifacts. He considered and then dismissed the hypothesis that the "stone rings" were fishing net sinkers, explaining that he thought he remembered Major Horatio Rust purchasing about a dozen such objects from an Indian who at the time explained he used the donut-like artifacts as net sinkers (Jones 1956:220–221). He wrote that if his remembrance was correct, it "proves nothing" because:

> … we have no evidence that the Indians used or knew of nets, and these, originally made for some other purpose, may have been found and made use of by the Indian from whom Rust purchased them. Furthermore, were they intended for such a minor purpose they would not be so well finished and would not show evident wearing and polishing … [Jones 1956:220].

An interesting note is that other scholars were skeptical about Native people even possessing nets prior to European influence (e.g., C. C. Abbott cited in Yates 1889:297, 1890:15–16).

Jones (1956:220–221) also cast doubt on other hypothesized purposes of "stone rings" before settling on his take that "a very large percentage" were manufactured for hammering. His several ruminations reflect that he was thoroughly conversant with the functional conundrum that had become entrenched in regional Indianology prior to the turn of the century (e.g. Powers 1877:52, 53, Figure 1; Bowers 1878:319; Putnam 1879a:23, 28, 1879b:159, 161, 163; Henshaw 1887:7–22; Davis 1887:168).

California's first ethnologist, Stephen Powers, thought Yurok donut-shaped stones might only be "net sinkers," but he supposed it more probable they

were weapons, specifically slung-shot 1877:52, 53, Figure 1).

Revisiting a Playa Vista Donut Stone

As previously noted, naturally holed beach stones were easily available for application to fishing technology. Knowing this, researchers would be wise to examine carefully perforated artifacts for evidence of piddock drilling. The author, heeding his own advice, revisited a published donut stone whose piddock footprint had previously gone unrecognized.

To explain, Koerper et al. (2010) featured an unusual donut-shaped, granite artifact from CA-LAN-62, Playa Vista, whose perforation exhibits polished concave walls (Figure 8). The walls were misdiagnosed as reflecting an artisan's patient handiwork, which in turn helped precipitate an inference that the artifact's first purpose had likely been of a magico-religious nature. The specimen's generally mundane configuration, however, hints at a different first purpose, one aligned with some profane employment. Now, after acquiring greater familiarity with piddock-drilled items, it seems prudent to accept that the artifact's crafting occurred subsequent to its raw material first entering human hands as an already perforated beach pebble.

An estimated diameter for the artifact prior to breakage is about 68 mm (2.7 in), too small for a digging stick weight but a reasonable size for a net weight. When this author realized his probable error in Koerper et al. (2010), he then understood the item had probably been a sinker.

Summary and Conclusions

A recent chance encounter with a quasi-toroidal artifact helped rekindle the author's curiosity regarding whether the purposes of some coastal southern California donut stones included attachment as weights to fishing nets and/or fishing lines. Seen in Figures 1 and 2 (also cover illustration), the Palos Verdes Peninsula specimen might draw immediate attention for the physical contrast between its two faces, one side exhibiting a stoneworker's pecked entrance into the object's through and through perforation, the opposite side without evidence of human crafting, but rather displaying a natural, piddock-drilled penetration into the beach pebble.

Figure 8. Donut stone fragment recovered at CA-LAN-62, Playa Vista. Note concave, polished surfaces of the piddock-drilled perforation. Maximum dimension, 6.2 mm.

Following this article's introduction wherein the taxon "donut stone" was restricted to those regional "large perforated stones" that projected torus-like to quasi-toroidal imagery, a section on functionality offered a historical overview of thought on the purposes of the donut type. Of the various hypotheses considered, the two receiving the greater attentions are: (1) fishing sinker and (2) digging stick weight. The PVIC artifact's perforation is much too small to accommodate a digging stick, or for that matter, a hammer/club handle, and it is too small to serve as a target for hoop and pole competitions.

There is ethnographic witness to beach stones collected for fishing weights. Indeed, J. P. Harrington in conversation with an informant, now anonymous, was apprised that holed stones were easily available at the coast for use on surf-fishing lines (Wiedmann ca. 1975:3).

The clam-drilled Santa Rosa Island specimen (Figure 3, right) is probably a pristine example of such, that is, not at all shaped by an artisan. Its discovery in the company of a well-worked, apparently polished donut (Figure 3, left) in a mortuary context is intriguing.

Yet another donut stone (Figure 8), an ocean pebble with a clam-drilled hole, strongly suggests a fishing sinker. Its perforation diameter rules out a stick weight function. Excavated at LAN-62, both faces were minimally crafted to effect circumferential depressions encircling the off-center openings.

A clam-drilled sinker (Figure 4), almost certainly for a line rather than a net, flattish and ovoid rather than donut-shaped (thus, not a donut stone), was recovered from a historically recorded Juaneño village, Putuidem (ORA-855), in San Juan Capistrano. Minor use wear indicated that a suspension cord was once attached. The specimen and the three piddock-holed donut stones just noted offer robust advocacy for an adjustment to the formal definition of "sinker" proffered by Hudson and Blackburn (1982:159). "Sinker" should now be defined as a grooved, or notched, or *perforated* weight attaching to a fishnet or fish line to make it sink.

Net sinkers attach to the lower margin of an outstretched net to hold it down and vertical, while floats attach along the upper edge. An anchor stone might prevent the net from drifting (see Stewart 1973:78). Perhaps certain comparatively heavy donuts saw duty as net anchors.

There is reasonable justification for bringing into the conversation certain equipment from faraway Yurok territory—the gill net with attached toroidal-shaped to quasi-toroidal-shaped sinkers shown in Figure 7 (see also Goddard 1903:24, Plate 14, No. 1). Independently of one another, peoples resident in Chumash/Tongva territories and persons of northwestern California (lower Northwest Coast culture area) arrived at employing objects that similarly evoke resemblances to the donut bakery good. In coastal southern California some donut stones were employed as digging stick weights, but others seem to have served as fishing sinkers. While there were digging sticks in far northwestern California (Driver 1939:314), no stick weights are documented. It is reasonable to hypothesize that in northwestern California the donut-shaped sinker first came into existence with selections of beach stones possessing, at the least, incipient holes. The configuration of a piddock-initiated depression/channel would influence a level of crafted enhancement to the hole to effect adequate means to secure a tie to the artifact. Pecking or drilling a natural perforation might help bring forth a torus-like morphology. Aesthetic sensibilities could then have directed some stone workers to confer even near geometric perfection to the medium (see Figure 6, top row, middle). At times the natural hole alone might suffice. In Figure 7 two net sinkers seem to exhibit little or no modification from the time they were beach collected, but clearly the two with the largest perforations received some amount of purposeful shaping.

The major thought presented here is that in coastal southern California the aetiology of the donut stone phenomenon began with the selection of beach pebbles possessing a piddock channel, and then, either left natural (proto-donut) or further drilled, they were put to sinker purpose. At some point in time, donuts were opportunistically appended to digging sticks to multiply force in the downward thrust of the implement.

This technological advance was perhaps occasioned either with the recognition that a large-holed donut is easily positioned onto a digging stick or with the recognition that further widening a sinker's perforation would facilitate its mounting onto the tool's shaft. The technological experimentation may have drawn inspiration from prior use of ordinary stones to lash onto a digging stick (see Wiedmann ca. 1975:25; Hudson and Blackburn 1982:242). The "better mousetrap," however, more effectively secured the additional mass.

In time, presumably certain donut stones would come to be manufactured specifically as accoutrements to the digging tool. Any use as hammer, club, or hoop and pole target was likely a secondary purpose.

As a final thought, it is possible that the extra effort invested to impart pleasing symmetry, unusual design features, and/or quality finishing (e.g., polishing) that is witnessed for some donut stones or somewhat similar large perforated stones may signal that an artifact was intended to communicate special imagery or symbology. Such quality crafting likely commits an object more to nonmaterial/ideational purposes rather than to utilitarian purposes. Even mundane donut stones' final dispositions occurred frequently among burial offerings and other ritual caches in which there might be additional sacred objects projecting life-force content. Elsewhere it has been argued that the imagery of a shaft penetrating an opening and the kinetics of the digging implement in work had recommended the donut stone to fertility-fecundity thematics (see Koerper 2006).

Endnotes

1. The author at one time had separated out quasi-toroidal to torus-like objects from certain other kinds of artifacts also falling within a range of disk-shaped to globular-shaped, explaining that among the varied grouping of large perforated stones there was "a type distinguishable by morphologies that are almost always intermediate between globular and disk-like, resembling the … bakery good that inspires its taxonomic label, 'donut stone'" (Koerper 2006:87). Grappling with the long running regional archaeology issue of distinguishing between ceremonial/ritual torus-like artifacts and torus-like digging stick weights, the author reluctantly but cautiously reserved "donut stone" for the former category and defaulted to "digging stick weight" for the latter Koerper 2006:89). Infusing function into the typological mix rather than restricting type to morphology was, in retrospect, a misstep. This article serves as a corrective.

Also, a decade later, the author, while emphasizing that the term "donut stone" (also "doughnut stone," "donut," "fossil doughnut") be restricted to torus-like objects, stated that a particular barrel-shaped object then under consideration (Koerper and Hunter 2017:85–86) not be assigned the "donut" label. Instead, "barrel-shaped perforated stone" was preferable. However, an inadvertent "donut" was not expunged from the draft, showing up on page 86 in the article.

2. Kroeber (1925:563) noted that some of the "large stone rings or perforated disks" that "were slipped over the women's digging sticks to give the stroke momentum" were "beautifully polished in hard, compact material," indicating, he believed, "fondness of the Chumash for perfection in manual matters." It is uncertain whether the Berkeley professor had considered that the aesthetic appeal of certain large perforated stones might have reflected ritual or some other purpose within Native mentalistic landscapes.

3. Schumacher's interest in the weight issue, that is, sinker versus digging stick weight, was piqued only after he showed a circular perforated stone that he believed to be a club head to an "old vaquero, with some Indian blood," who convinced the German scientist that the object was instead a digging stick weight. Additional thinking on the matter follows:

> The sinker is of a different material … the [digging stick] hole shows a polish and fine striae running lengthwise, and wear on one end of the ring imparted by the hand while in use and in carrying the digging-stick where it naturally would rest, with its projecting stone weight, against the hand [Schumacher 1880:265–266].

4. Lorenzo Yates (1889:302, 1890:22) argued that "stones which answer the purpose [as sinkers] can be picked up when wanted for use, and that it is not probable that they would have burdened themselves with extra weight while traveling from place to place." The second half of his statement is weak; the amount of weight that might have been transported on nets for a fishing excursion would not have been particularly burdensome.

Also, as a point of interest, searching among stones at the shoreline for suitable sinker material might be rewarded with a serendipitous find, a kind of stone coveted by shamans for its supernatural power—the *Tu-cait*. It is a flattish round, beach-worn, quartzite pebble, stained black with iron and unmodified by any person (Yates 1889:299, 300, 1890:19).

5. The author guesstimated diameters between 7 cm and 10 cm. Just before this article was formatted for publication, the author reacquainted himself with a photographic image of a Hupa seine-like net possessed of a dozen "sinkers of stone, discs three and a half inches in diameter with holes chipped in the centers" (Goddard 1903:24, Plate 14, no. 1). Most are more or less donut-like; some, however, are palpably irregular in outline. Incidentally, Hupa journeyed to the coast by boat down the Klamath or walked overland to the ocean (Goddard 1903:31).

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