Prehistoric Employments of Pearls in Coastal Southern California with Special Attention to Specimens Recovered at Bolsa Chica Mesa, Orange County

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Abstract

Pearls are counted among a broad range of unmodified to minimally modified animal parts associated with regional Native magico-religious practice and/or other nonutilitarian behavior. Pearls are the focus of this study, those kinds that develop within the mantle and visceral mass of certain pelecypods and gastropods ("free pearls") as well as those that erupt from within the inner shell of abalones ("blister pearls"). Ten bivalve free pearls found by the Bolsa Chica Archaeological Project (BCAP) are described and discussed; it is unclear whether these specimens had borne any cultural significance. This article also provides ethnographic/ethnohistoric and archaeological data relating to employments of both free pearls and blister pearls in coastal southern California.

Introduction

A wide range of unmodified and minimally modified animal parts served nonutilitarian purposes in the Native cultures of coastal southern California.[1] Many were adornments, frequently with perforations to facilitate suspension or fastening. Other animal parts had meanings/functions beyond the comparatively prosaic purposes of beautifying persons or things and/or identifying/celebrating status. Some such items had folded into ritual/belief systems, in relatively private venues as well as in communal settings. Among the former were personal luck charms and power objects for shamanic magic; among the latter there were talismans or talisman-like artifacts attendant to mortuary/mourning rites. Certain other items in sacred venues, while perhaps lacking the imagery/symbology sufficient to channel supernatural forces, functioned as accouterments for ceremonial paraphernalia or regalia. Yet other nonecofactual vertebrate and invertebrate parts had perhaps been collected as curiosities and/or souvenirs.

Pearls, the focus of this essay, are usually counted among the category of unmodified/minimally modified invertebrate parts, an exception being a certain kind of abalone pearl crafted by Native artisans to effect various shapes. Our interest in the subject developed especially with archaeological discoveries of bivalve pearls on the upper terrace of Bolsa Chica Mesa, Huntington Beach (Figure 1). In all, nine pearls were recovered from the Cogged Stone site (CA-ORA-83) and one from the Eberhart site (CA-ORA-85) during excavations for the Bolsa Chica Archaeological Project (BCAP) undertaken by Scientific Resource Surveys, Inc.

In the section immediately following, a useful distinction is drawn between two kinds of things referred

to as pearls in the regional literature. These are "free pearls" (after Cox 1962:64) and "blister pearls" (also called "abalone blister pearls"). After that, we describe the BCAP free pearls and offer discussion relevant to their dating and associations. Along the way, there is counsel on how to tell apart bivalve pearls from certain historic look-alikes. Another section presents ethnographic/ethnohistoric and archaeological notes on free and blister pearls in Native lifeways. Following a discussion section, which touches on pearl imagery/symbology and on possible long distance trade in pearls, this essay closes with a summary.

Free Pearls Versus Blister Pearls

There are limited references to pearls being used by regional Native Americans, and those references cover two somewhat different things. For sake of clarity, we choose to present the distinction using the following two terms: (1) "free pearl," and (2) "blister pearl.." Free pearls form in some kinds of bivalves (see Figures 2-4) but also in some kinds of gastropods (see Figure 5). The first step in the development of a free pearl is occasioned when a grain of sand, less often a parasite or some other foreign thing, enters into the mantle of the animal, thereby signaling a threat to the well-being of the shellfish. In response to this violation, cells of the pearly nacreous layer of the shell begin to surround the foreign substance with thin concentric layers of nacre. The building blocks of these successive layers are crystals of aragonite (orthorhombic calcium carbonate) that are bound together by conchiolin, a fibrous protein. In species whose aragonite crystals are large, pearls will not show iridescence, but they might still exhibit attractive color.

Free pearls do occur in abalones (Figure 5), most formed when a small foreign body is caught between the animal's mantle and its shell. Then, the defensive action is nacre deposition around the intrusive object, thus producing what Cox (1962:64) referred to as a free pearl (to distinguish it from a blister pearl). The shapes of these pearls are usually irregular, but there are infrequent finds of small spherical pearls within

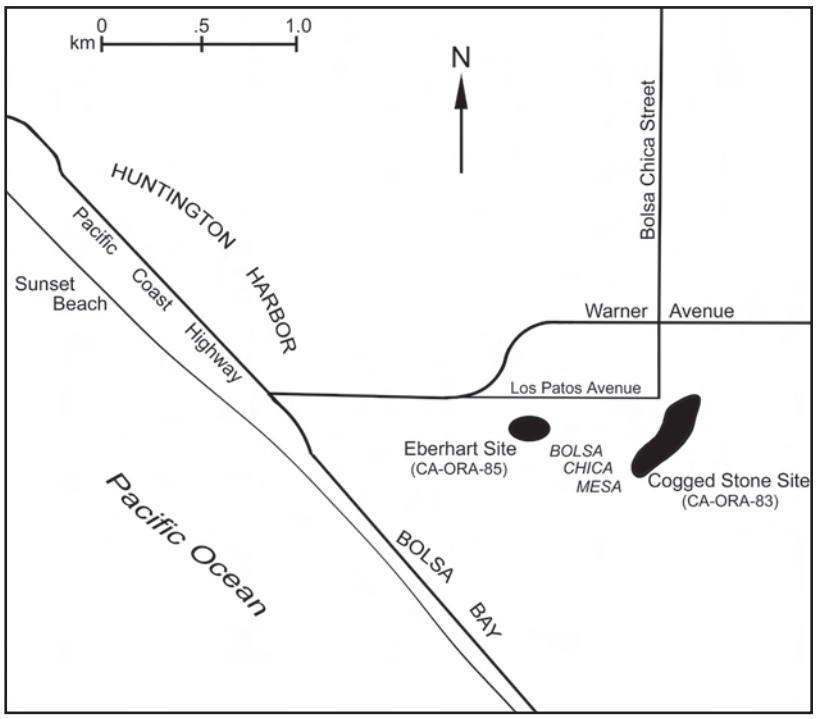

Figure 1. Location map showing the Cogged Stone site (CA-ORA-83) and the Eberhart site (CA-ORA-85) on the upper terrace of Bolsa Chica Mesa.

mantle tissue (Leighton 2000:193-194). Variable shapes and colors of mantle-developed abalone free pearls reflect different locations where growth occurred (see Oliver 1916:185).

Leighton (2000:194) mentioned extremely irregular and bizarre, or "baroque," free pearls that develop within the abalone digestive gland and assume the general shape of the conical gonadal-hepatic appendage. Some might be called "horn-shaped" baroques (Leighton 2000:193) (see Figure 5b). There has long been a question of how such pearls came to be at gonadal and digestive tract locations (e.g., Cox 1962:64). Nucleation of these relatively massive baroque free pearls in the digestive gland-gonadal horn remains an enigma. David Leighton (personal communication 2009) knows of no documentation identifying either a grain of sand, remnant of an intruding worm, or parasite in baroques. Whatever the inducing element, it appears to originate at the base of the gonad, to extend forward through the gonad, and to subsequently surround the digestive gland.

George Heye in noting Native use of blister pearls, or "abalone blister pearls," for jewelry (see Figure 6) referred to these phenomena as the "so-called 'pearls' of the haliotis" which are "protuberant growths on the inside of the shell [not within the mantle] having all the beauty of color and incandescence of the shell itself" (Heye 1921:120). Their material too is nacre, or mother-of-pearl. The progressive addition of layers of nacre generally produces very irregular shapes that might remind one of a blister.

These quasi-hemispherical blisters develop in contact with the nacreous interior of the shell because of small boring predators that penetrate downward, breaking into the shell's inner layer and contacting the abalone's mantle. The defensive response begins with a protective layer of nacre secreted by the mantle in order to cover the borer. As the parasitic mollusc continues its depredation, more mother-of-pearl is deposited, this in order that the intruder be walled off from the body of the abalone's musculature (see Bonnot 1948:166; Cox 1962:63; Leighton 2000:194). The common culprit here is the piddock clam, *Penitelle conradi* (formerly *Pholadidea parva*) (e.g., Ricketts et al. 1985:100). Parenthetically, these largely pholus caused blisters were once very popular for inexpensive jewelry in the United States from the 1870s and into the early twentieth century (Oliver 1916; Bonnot 1948:166).

Bolsa Chica Mesa Pearls

Inventory

It is clear that the nine ORA-83 pearl specimens and one ORA-85 specimen listed in Table 1 (see also Figures 2-4) are not small waterworn rocks or pieces of water-rolled shell. All are free pearls. All have weathered exteriors, a circumstance allowing positive identification since small exfoliated areas on surfaces

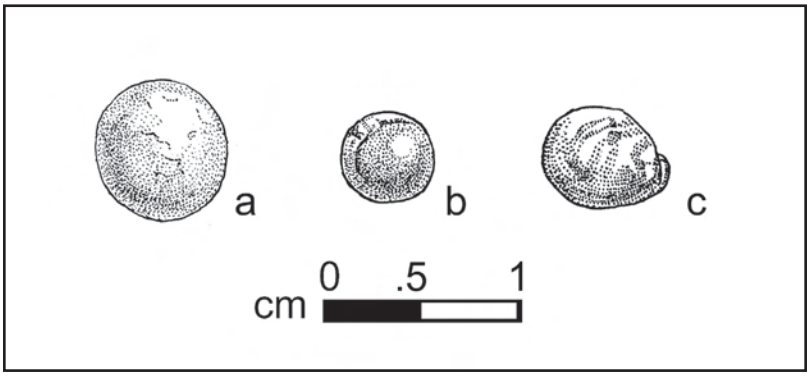

Figure 2. Bolsa Chica Mesa true pearls: (a-b) CA-ORA-83, Cat. No. 56105 and Cat. No. 57120, respectively; (c) ORA-85, Cat. No. 52749.

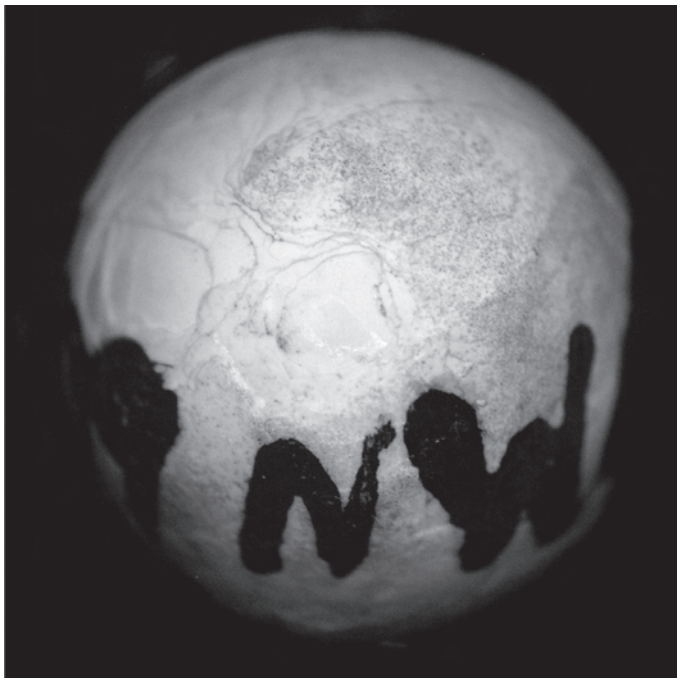

Figure 3. Bivalve pearl (Cat. No. 55804) from CA-ORA-83. Note exfoliated area that exposes concentric layers. Image by Sarah Galaz.

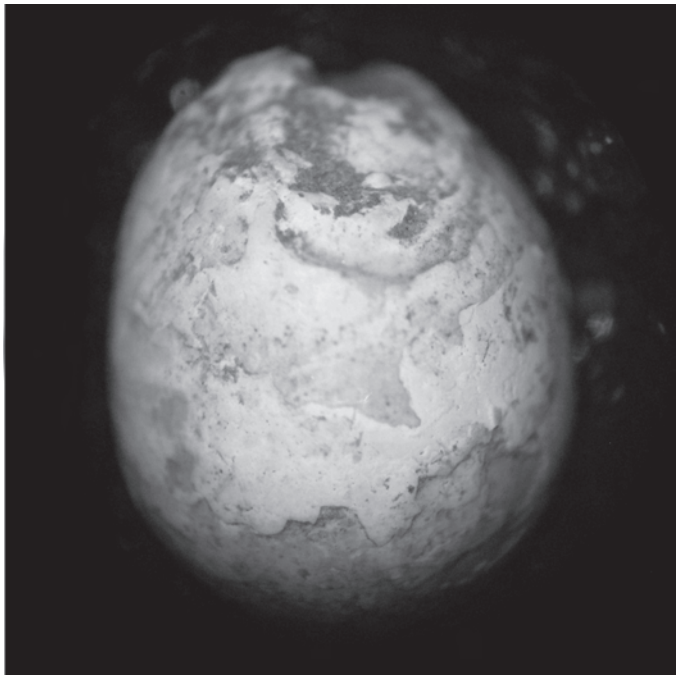

Figure 4. Bivalve pearl (Cat. No. 52749) from CA-ORA-85. Exfoliated area reveals concentric layers. Image by Sarah Galaz.

Table 1. Pearls from the Bolsa Chica Archaeological Project

Cat. No.	Site	Unit	Level	Max. Dia. (mm)	Wt. (g)	Comments
70462	83	DD9(NW) 50-60	50-60	6.6	0.38	concentric layers easily seen
55804	83	Uke22(W)	20-30	5.1	0.12	see Figure 3
55805	83	UD5(NW)	120-130	3.8	0.06	somewhat discoid, not a perfect sphere
55806	83	Uke8(W)	10-20	3.5	0.08	two concentric layers visible
56105	83	Tango26(SW)	50-60	6.9	0.40	see Figure 2a
57120	83	Victor11	layer 3	4.7	0.11	see Figure 2b
106540	83	Zulu55	windrow	7.5	0.35	egg shaped, width=5.9 mm
117547	83	Old Bolsa Chica Road	windrow	3.8	0.08	two concentric layers visible
117548	83	Old Bolsa Chica Road	windrow	5.2	0.12	two concentric layers visible
52749	85	near Feature B.C. 13, Unit 77	windrow	6.8	0.19	single best specimen showing concentric layers, Figures 2c, 4; asymmetric sphere, width=4.9 mm

reveal concentric spherical layers forming the protective coatings (Figures 3 and 4). We are not able to assign genus designations to any specimen, but we presume most, if not all, are from oysters.

The color of these pearls is light greyish white, save for one (Figure 2b) which exhibits some residual vibrancy of an original outer surface that alternates between very dark silver and gun metal grey. None of the eight specimens exhibit remnants of a mastic or applied colorant. Speculatively, perhaps ancient peoples at Bolsa Chica were drawn to pearls for their shimmering qualities, a kind of attraction that had almost certainly occurred with regard to other materials (e.g., quartz crystals, calcite crystals, dolomite crystals, muscovite, and obsidian) (see Koerper et al. 2002) that were sparkly or otherwise provided interesting visual play in the presence of sunlight or perhaps the light of a campfire.

The shapes of the ORA-83 pearls are generally symmetrically round to reasonable approximations of such, but there are two exceptions. Specimen 106540 is symmetrically egg shaped. The ORA-85 pearl seen in Figures 2c and 4 is somewhat asymmetric. None of the Bolsa Chica Mesa pearls could be confused for an abalone pearl, free or blister (Figures 5 and 6).

Caution in identification is recommended as14 artifacts from ORA-83, CA-ORA-82, and CA-ORA-365 were initially mistaken for pearls. Twelve of these objects were near perfect whitish spheres. Their surfaces showed no appreciable weathering. When brought together to generate a table that included metrics, there was the realization that 12 had diameters measuring between 5.1 and 6.0 mm, an indication of machined calibration. Eleven of the objects shared nearly identical weights, averaging around .20 g. With the exception of the ORA-365 spheroid which was coated with a dark substance, the artifacts' surfaces exhibited tiny pits when viewed under magnification. As it turns out, these artifacts are so-called "air-puffs," or airsoft pellets, ammunition for toy rifles. Larger than BB shot, they are manufactured of lightweight plastic, and thus they are easily identified using the "red-hot needle test." That is, a sewing needle heated to incandescence and then touched to an airsoft pellet causes a quick melt (see Figure 7) with an accompanying pungent smell of burning plastic. A pearl remains unaffected using the same test.

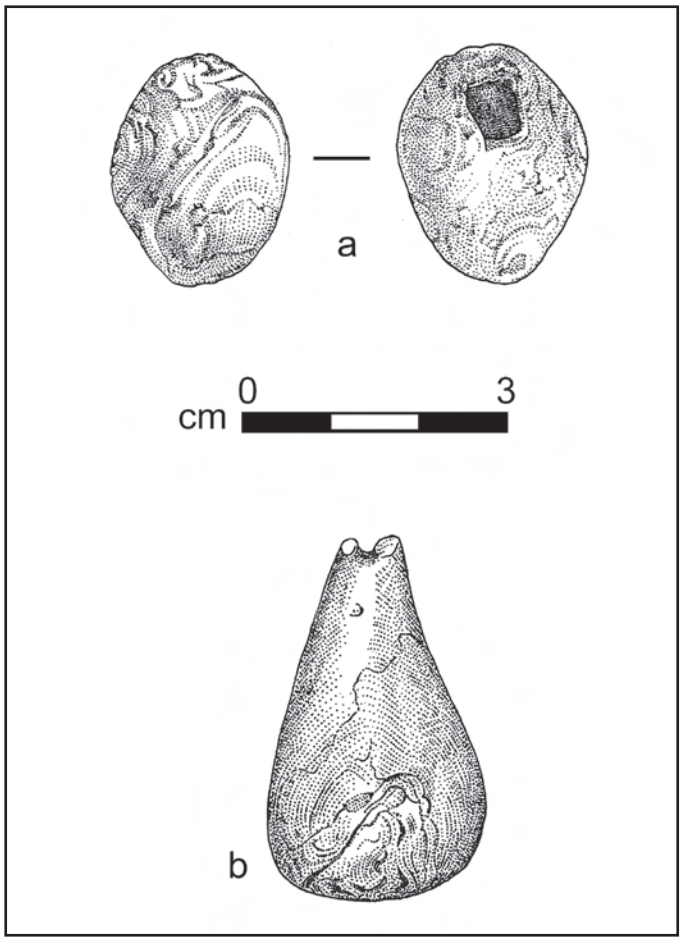

Figure 5. Abalone free pearl ornaments curated at the Bowers Museum of Cultural Art: (a) possible charm/curiosity from the Newland site (CA-ORA-183); (b) biconically drilled pendant, coastal southern California.

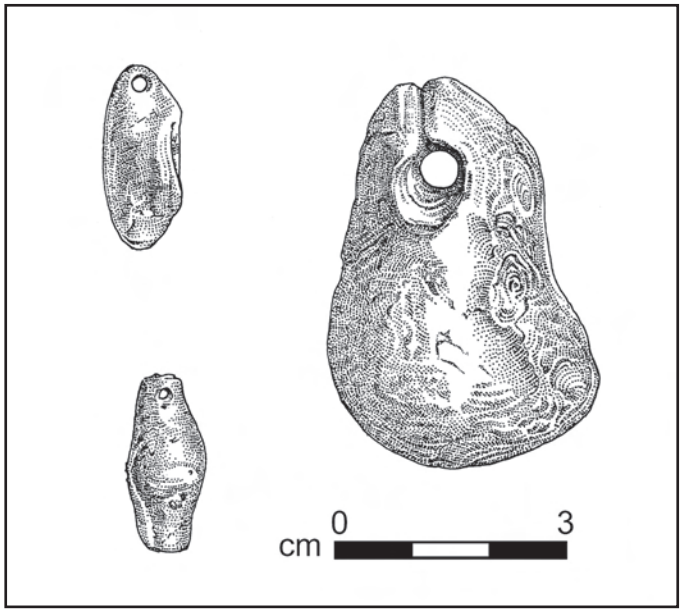

Figure 6. Abalone blister pearl ornaments from San Miguel Island. The largest specimen weighs over two ounces. After Heye (1921:Plate 76).

Temporal Associations of the Bolsa Chica Pearls

ORA-83 is a multi-component site with long periods of occupation. The vast majority of radiocarbon dates are from the late Early Holocene through the end of the Middle Holocene. Provenience information for the pearls compared to the locations of ^{14}C samples suggests significant antiquity for the specimens. We attribute them with some confidence to before the Late Holocene. Considering the small sizes of pearls and factors such as bioturbation, it would be hazardous to posit a narrow temporal placement for any specimen. Had a pearl shown evidence of cultural alteration such as a groove, drill hole, mastic, or colorant, we would not have hesitated to submit the specimen for AMS dating.

As for the ORA-85 pearl (Figures 2c and 4), it was found near human remains, but it is uncertain whether there was a burial association. All but one of the 22 radiocarbon assays from ORA-85, whether uncorrected or adjusted, fall between the latter half of the Middle Holocene and the first third of the Late Holocene (Whitney-Desautels 1995; Vellanoweth 2001:Table 2).

If the Bolsa Chica Mesa pearls had carried cultural significance, this might not represent the earliest manifestations of such. A round pearl was recovered at the Allan O. Kelly site (CA-SDI-9649) at Agua Hedionda Lagoon, San Diego County. The SDI-9649 artifact inventory indicated a "San Dieguito-La Jolla Transition Phase" midden (Koerper et al. 1991), and the seven adjusted radiocarbon assays fell to the eighth millennium B.P. First described as a spherical piece of clam shell and as a possible "ornament blank or inset piece" (Koerper et al. 1991:58), the SDI-9649 pearl was correctly identified only post-publication. Bearing no telltale sign suggesting an inset function (e.g., presence of mastic) or ornamental function (i.e., incising, perforation), it is indistinguishable from pearls that may have arrived incidentally to sites, that is, with molluscs collected for their meat. If simply an incidental manuport, a pearl might subsequently have been recognized and kept for some purpose, perhaps as a curiosity or a luck charm.

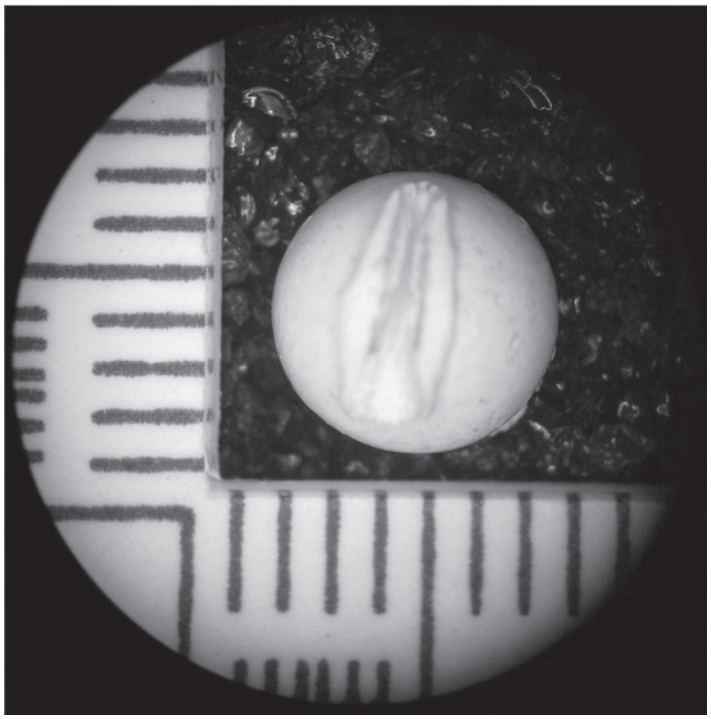

Figure 7. Toy gun airsoft pellet, or "airpuff." Note the area that has been melted with an incandescent sewing needle, one test to detect plastic. Image by Sarah Galaz.

Pearls: Ethnographic and Archaeological Notes

Bivalve Pearls

Ethnographic notes on the uses of free bivalve pearls in greater California are limited; they bespeak decorative functions. We are aware of but a single possible Alta California ethnographic account. DuBois (1905:622, 625-626) described a mourning ceremony, the "great fiesta of the Images of the Dead" in Luiseño and Diegueño religion. It required preparations spread over a year's time, one element of which was the Eagle Fiesta involving ritual killing of a large raptor, some of whose feathers were used to decorate effigies representing specific deceased individuals. Eventually, these images would be consumed in a ceremonial fire along with offerings such as clothing and baskets.

An effigy doll took form beginning with woven matting to fashion legs, a torso, and a head (DuBois 1905:625-626). Sticks added strength to the emerging form. The intent was to mimic as closely as possible the facial characteristics of the deceased person.

The face area had traditionally been covered with buckskin, but this material gave way to cloth in later times. The eyes were shaped from abalone shell with a dot of black wax standing for the pupil. The mouth was painted red and black (outside and inside, respectively). Pearls from the coast or something similar were carefully shaped and inserted into the mouth to represent teeth (DuBois 1905:625). It was not explained how the "teeth" were adhered to the mouth, if a mastic was even used at all. The vagueness inherent in pearls "obtained from the coast, or something resembling them" makes one wonder whether the effigy "teeth" might possibly have been represented using abalone pearls of one kind or another or even by some sort of small gastropod shell.

Edward Davis (1921:101-102) also provided descriptive information regarding manufacture of Luiseño images of the dead, generally similar to that reported by DuBois (1905:625-626), but unfortunately Davis' 1921 study supplied no information regarding either pearls or how teeth were represented. However, in another study, one focused on the Diegueño, Davis (1919:17-19, 26-27) did relate detailed information on shells used to represent teeth on images of the dead. The shells were secured from middlemen traders, Yuma and Cocopah, and their ultimate origin was the Gulf of California. Said to be "Oliva-like," illustrated by line drawings, and shown in photographs and renderings of the death images (our means to gauge shell size) (Davis 1919:Figures 4, 10-12, Plates 2-5), there is much to recommend their species identification, almost certainly *Oliva spicata*, the most common olive shell in the Gulf of California (Morris 1966:Plate 60, 191). Again, Davis never mentioned pearls.

From Baja California there is interesting information regarding Native peoples and their oyster pearls. For instance, citing Fr. Torquimada's writings, Miguel Venegas passed along the information that traditionally the Indians threw the molluscs into the cooking fire without any thought to the consequences for pearls, which were thus destroyed. Only after the indigenous people observed how much foreigners valued pearls (i.e., pearls of *Pinctada mazatlanica*, the Pearl oyster), or so we are told, did they become involved in a quest for pearls (Venegas 1966:49-50). Elsewhere in Venegas' work, there are references to groups living towards Cape San Lucas who "decorated their heads with strings of pearls braided with their hair" (1966:70) and who also had necklaces and bracelets that incorporated pearls (1966:73), and it seems highly probable that these practices had occurred in pre-contact times. Others are reported as "wearing pearls from their nostrils to their ears" (Venegas 1966:101).

There is documentation that small pebbles served as percussors in rattles (e.g., Harrington 1934:38, 1935:82, 1942:28, 1978:159; Boscana 1978:42, 58, 60; Wallace 1980:106; Hudson and Blackburn 1985,

1986), and some such stones presumably would have been of sizes more or less comparable to the archaeologically recovered pearls familiar to us. Given that pearls are relatively fragile and have a lower specific gravity than stone, and given their comparative rarity, it seems unlikely that they had actively been selected for containment in a rattle chamber. Had any actually been sealed inside of rattles, they perhaps had been objects of opportunity reflecting no particular heed to an organic versus a geologic origin.

Inspiration for the percussor hypothesis derives partly from the documentation of a 3.3 mm diameter, greyish white pearl recovered from a burial feature in the mortuary/mourning component of CA-LAN-62 along Ballona Creek in the Playa Vista area near Santa Monica Bay. Positive identification followed from an observation of an exfoliated area that revealed concentric spherical layers. The pearl did not occur in indisputable association with the primary inhumation, a seventeenth to eighteenth century 40+ year old female, or any other human bone. The percussor hypothesis also drew inspiration from the fact that rattles, particularly those crafted of turtle shell, were ritual objects employed in many sacred venues, including death rites. Then again, perhaps this pearl had been a diminutive talisman sequestered, say, in a medicine bag, perhaps an offering for a funeral. Another suggestion is that this particular pearl had once been set into a mourning ceremony image representing some deceased person.

Abalone Pearls

In his discussion of blister pearls from San Miguel Island, George Heye stated:

> The so-called "pearls" of the haliotis...were used both as beads and as pendants. These pearls were carefully removed, then ground on the edges where necessary, and the surface of the back flattened and smoothed. Depending on form more than size, they were finally drilled as a means of suspension [Heye 1921:120-121].

The amount of crafting noted by Heye clearly places such objects outside our category of "minimally modified" animal parts. Heye (1921:Plate 76) illustrated several abalone blister pearl ornaments from San Miguel Island (Figure 6). Gifford (1947:42, 105, 106) noted and illustrated what he referred to as "blisters" from the northern Channel Islands; actually, some are free pearls.

Most references to abalone pearls are oblivious to any distinction between the two kinds - free and blister. Rust (1907) illustrated several examples of abalone pearls from San Miguel Island graves. It appears that Rust (1907:Plate 32) may have pictured both free and blister pearls, but he made no note that any are even pearls.

Bryan (1931:182) noted a small, two-holed abalone pearl bead from a grave at Mishopsnow in Carpenteria. Bryan had previously mentioned abalone pearls worked into beads and pendants that were discovered by Arthur Sanger on San Nicolas Island. Whether those pearl ornaments from a mainland site and an island were free pearls or blister pearls and whether Bryan was aware of the differences are matters that may never be known.

King (1981:276-277, 365, Figures 8 and 9) attributed abalone pearls, free and blister, to his Late Period (see also Lauter 1982:65). Free pearls might be centrally perforated to manufacture beads, and both kinds of pearls might be holed to be used as pendants. King further noted that abalone pearl ornaments turned up in burial areas at Chumash sites on the mainland and on the islands.

The subject of abalone pearls occurred in 1894 correspondence from Juan Pico to Henry Henshaw (Heizer 1971:66). Writing from San Buenaventura, the

Ventureño Chumash Indian was describing abalone pearl insets for decorating what were alleged to have been very fancy digging sticks. He mentioned that the beautiful pearl of the *Ahulon* (abalone) had great value depending on size, and so it seems that Pico was referring to a free pearl rather than a blister pearl.

There are at least two published pin-like or wand-like objects each having a *Haliotis* pearl of one kind or the other. A pearl is prominently displayed at one end of each artifact , both of which are perhaps apocryphal pieces. One specimen is purportedly either a ceremonial bone wand or an ornamental hair pin (see Hudson and Blackburn 1986:257, 260, Figure 334-4). The pearl was glued on with asphaltum. Its unique overall composition alone raises a red flag. Said to be from San Clemente Island, the artifact had passed through the hands of Arthur Sanger before entering into the collections of the Heye Foundation, Museum of the American Indian. Sanger's association is enough to cast serious doubt on the authenticity of the object (see Koerper and Chace 1995; Gamble 2002). Consider that the vast majority of specimens featured in Burnett's (1944) *Inlaid Stone and Bone Artifacts from Southern California* are forgeries or otherwise involve some fakery (see Gamble 2002) and that the great majority of that material was sold to the Heye Foundation by Sanger in league with alleged co-conspirator O. T. Littleton.

Another abalone pearl (either true or blister) can be seen at one end of a "hairpin" attributed to Santa Rosa Island (Hudson and Blackburn 1985:79, Figure 212-8). The stylistic attributes are somewhat out of character with hairpins known to be genuine Native creations. It is unclear if this particular artifact was ever associated with Sanger or Littleton.

There are two previously unpublished abalone free pearls curated with the Bowers Museum of Cultural Art, Santa Ana. The object illustrated in Figure 5a came from the Newland site (CA-ORA-183). Its length is 26.1 mm, and its maximum width measures 20.5 mm. The measurement taken transversely to the maximum width is 16.9 mm. Because of its generally roundish shape, we postulate it is a free pearl, developed within the mantle or visceral mass rather than as an eruption from within the hard shell. The layers of nacre appear concentric, the recognition of such allowed by some differential erosion to surface areas; perhaps this pearl had rolled in the surf. There is no drilled perforation to indicate ornament status. This oddity had possibly been kept as a charm, perhaps part of the contents of a medicine bag.

It is uncertain how the Newland site pearl came to have the hole at one side and corresponding hollow space. This feature is natural, not man-made, and so the object qualifies as a manuport rather than an artifact. Of the several malacologists consulted, only one could offer thoughts regarding the hole and hollow space. John McMullan (personal communication 2009) hypothesized that "perhaps this area [became] infected with decaying conchiolin causing a hole to form." He also suggested that perhaps the nucleus or original irritant of this roundish abalone free pearl had possessed a hole or depression in it and that a thin layer of nacre that formed over it had broken away with handling.

Interestingly, Gifford (1947:42, 105-AN4) documented what is also probably a free pearl, also having a hollow space. This "hollow cone" is "filled with asphaltum which appears through 2 openings on flat face." The Santa Rosa Island artifact was drilled for suspension, and around its base there is a "ring of faint punctations" (Gifford 1947:42).

The teardrop-shaped pendant illustrated in Figure 5b with its concentric layers is clearly a free pearl. Its length is 40.8 mm, and its maximum width is 23.4 mm. It retains the natural shape, there being no evidence of any surface having been worked by human agent save for the remnant of a small drilled hole that

sits at its apex. This free pearl probably developed in the digestive gland-gonadal horn. Provenience for this piece is unknown, but it appeared among a concentration of coastal southern California artifacts within the Bowers Museum collections. There is the possibility that it had been part of the Aldrich collection (see Chace 1965; Koerper 2009; Koerper and Cramer 2009).

Discussion

Had some imagery/symbology attached to these pearls because of their glimmer? For instance, in some cultures the shininess of pearls associates them with sparkling water such as rain (see Claassen 1998:208), and rain easily connects to fertility and related themes. There are cultures in which pearls become symbolically linked to the moon with its luminous surface (e.g., Kunz 1913:242-243). Could there have been some sort of sex-based imagery connecting with a fertility/fecundity referent? After all, pearls are "born" of molluscs, and, as Claassen (1998:203-204) noted, "General categories for shell symbolism are the births of important religious personages or whole groups.... Even when no specific individual is implicated, shell often carries a metaphorical role in fertility..." Claassen also observed that "[shell] genital imagery has been brought into the twentieth century and spread world-wide in the species names of hundreds of molluscs such as *fornicata*, *semen*, *seminalis*, *virginea*, *vagina*, and even more graphically in common names." Parenthetically, it seems that this subject matter can be discomfiting even, surprisingly, for some anthropologists; Moss (1993:643) attributed the less than thorough ethnographic information on molluscs in the Northwest Coast culture area to the association of molluscs with sexuality.

Regionally the hard parts of invertebrates had worldview and ritual associations. Nonfossiliferous invertebrate parts having had special meanings mostly connected with molluscs, an exception being sand dollars which are from sea urchins (see Blackburn 1975:96; Hudson and Underhay 1978:51, 52, 63; Hudson and Blackburn 1986:233-239; see also Anonymous 1937b; Cerrito and Foertsch 1985:75). Among the molluscs, there are references to unspecified shells such as the "shell charm" in Henshaw's 1884 Ventureño vocabulary (Hudson and Blackburn 1986:149) and "curious shells" reported for a Chumash shaman's fetish bundle (Olson 1930:19). Among the more frequently identified shellfish species with imagery/symbolism relating to ritual/ceremonial venues are abalones (*Haliotis*), cockles (*Laevicardium substriatum* and *Trachycardium elatum*), and cowries (e.g., Ford 1887:14; Anonymous 1937a, 1937b; Strandt 1965:31; Koerper and Whitney-Desautels 1999b; Koerper 2001).

Further study might address an alternate origins hypothesis, that the Bolsa Chica pearls, some or all, had been exchanged into coastal southern California from the Gulf of California, where pearls were a sought-after animal part, probably well before European contact. This hypothesis rises to the standard of "prior reasonableness" since Gulf of California shells have turned up in local middens. For example, *Olivella dama* beads are occasional finds in Orange County, and the species is especially prevalent in the northern part of the Gulf of California (Mitchell 1992; see also Mitchell 1991:70; Gibson and Koerper 2000:350). A Little Deer cowry (*Cypraea cervinetta*), another Gulf species, was collected from ORA-83 (Koerper and Whitney-Desautels 1999). A single Annette's cowry (*Cypraea annettae*) was collected from an Orange County midden (Koerper 2001:28), and this too would most probably have originated in the Gulf of California or, less likely, on the Pacific side of lower Baja California (Burgess 1985:102). Rare Hohokam *Glycymeris* shell bracelets were traded by Mohaves into coastal southern California (Koerper and Hedges 1996; Koerper and Desautels 2002). Hohokam peoples would have obtained this species from the Gulf of California. Further, the origin of *Oliva* shells used to represent teeth on some

Diegueño images of the dead was somewhere along the Gulf of California.

We are aware of several chemical techniques (i.e., oxygen isometry, instrumental neutron activation analysis, and atomic absorption spectroscopy) that have had some application to sourcing mollusc shell (see Claassen 1998:212-219), and so a question that might be further pursued is whether pearls might similarly be analyzed to establish origins. Depending on the sourcing outcomes, one might seek AMS radiocarbon assays.

Summary

Unmodified to minimally modified nonutilitarian animal parts, vertebrate and invertebrate, had varied functions and held varied meanings for the Native peoples of coastal southern California. The invertebrate category included pearls, a term that herein covers both abalone blister pearls, or simply blister pearls, which erupt from the inner shell, and free pearls which develop otherwise, growing within the mantle or visceral mass of certain shelled molluscs.

With regard to the abalone, we have illustrated three blister pearls (Figure 6) as well as two free pearls; one abalone free pearl was likely either an adornment, charm/amulet, or curiosity/souvenir (Figure 5a) and the other at least a pendant (Figure 5b). Both free abalone pearls are housed within the collections of the Bowers Museum of Cultural Art, Santa Ana.

Ten free pearls (Figures 2-4), probably from local bivalves (oyster or mussel) or perhaps imported, that were recovered and cataloged in BCAP operations at ORA-83 and ORA-85 (Table 1; Figures 2-4) were described. Most, if not all, probably dated to before the Late Holocene. Again, it is unknown whether these specimens had been exchanged from a distant place or whether they were acquired locally.

Long valued as beautiful gems by state-level cultures, ancient and modern, pearls have also been coveted for their remedial and spiritual virtues (e.g., Kunz 1913) as well as for their service in ostentatious proclamations of wealth and social status. Pearls and other nacre items are established adornment objects for coastal southern California Native Americans. They may have had additional value as ceremonial or religious artifacts.

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Note

1. These animal parts are mostly nonfossiliferous, but some examples of fossils have been identified. For instance, certain fossil vertebrate parts (fish and mammal) are counted as objects with special meanings (e.g., Yarrow 1879:37-38; Putnam 1879:254; Anonymous 1937a; 1937c:9, 15; Treganza and Bierman

1958:68; Greenwood 1969:51). Rare fossil invertebrates make the list. They include gastropods (e.g., Jones 1956:233, Plate 114f; Koerper 2008), pelecypods (e.g., Anonymous 1937c:13), a pseudomorphous belemnite from the Topanga culture (Treganza and Bierman 1968:68), and beach pebbles perforated by piddock clams (e.g., Anonymous 1939:18; Koerper et al. 1988:138).

There are many examples of nonfossil mammals, birds, reptiles, and fish (e.g., Putnam 1879:254; Hoffman 1885:31; Strong 1929; Harrington 1934:35, 1942:16, 1978:130-131; Drucker 1937:18; Voegelin 1938:65 [Tubatulabal example]; Gifford 1940:184, 185, 234; Orr 1947:118, 129; Merriam 1955:80; Jones 1956:264; Meighan 1959:398; Heizer 1968:123; L. King 1969:44; Hudson et al. 1977; Hudson and Underhay 1978:66, 92; Boscana 1933:37-38; Lee 1981:92; Hudson and Blackburn 1986:140, 143-145, 153, 167; Koerper et al. 1988:251, 262; Koerper and Whitney-Desautels 1999a). There is a smaller range of nonfossil invertebrates to consider, both nonmolluscan (Hudson and Underhay 1978:51, 52, 63; see also Blackburn 1975:96; Hudson and Blackburn 1986:233-239) and molluscan (e.g., Ford 1887:14; Olson 1930:19; Anonymous 1937a, 1937b; Strandt 1965:31; Hudson and Blackburn 1986:139; Koerper and Whitney-Desautels 1999b: Koerper 2001).

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