Prehistoric Dolomite and Obsidian Disc Beads: New California Artifact Types from Orange County

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Abstract

This study describes four unique finds from CA-ORA-83; these are an obsidian disc bead, two dolomite disc beads, and a dolomite ornament blank. The beads allow the proposal of two new California artifact types—the obsidian disc bead and the dolomite disc bead. Geologic source information also is offered.

Introduction

This report documents two ornament types previously unpublished for California—the obsidian disc bead and the dolomite disc bead. A single obsidian disc bead was surface collected from the Cogged Stone site (Fig. 1), or CA-ORA-83, by the late Herrold Plante in the 1960s. More recently, three dolomite artifacts (two disc beads and a bead/ornament blank) were recovered at ORA-83 during investigations of the Bolsa Chica Archaeological Project (BCAP).

The BCAP is an ongoing research effort by Scientific Resource Surveys, Inc., Costa Mesa, focusing on five major prehistoric sites (CA-ORA-82, -83, -85, -88, and -365) ringing part of the Bolsa Chica wetlands in Huntington Beach. Components of the sites taken together span a virtually continuous utilization of the greater area beginning at least in the sixth millennium B.C. and ending at the early contact period. The major activities at CA-ORA-83 occurred during the Milling Stone Period, and the site is particularly unusual for the variety and numbers of specimens that indicate heightened levels of magico-religious activity. These include both fashioned artifacts (e.g., cogged stones, discoidals, and plummet-like charmstones) and natural manuports (e.g., deer astragali and a little deer cowry; see, respectively, Koerper and Whitney-Desautels 1999a and 1999b).

Dolomite Specimens

Two disc beads and a bead/ornament blank were shaped from translucent crystals of dolomite [$CaMg(CO_3)_2$], a mineral characterized as "hexagonal, commonly rhombohedral, with curved faces" (Chesterman 1987:442). The color range is white, colorless, pink, grey, green, brown and black, with luster described as vitreous or pearly. The mineral will streak white (Chesterman 1987:442).

Both faces of the relatively colorless larger bead (Cat. #70,114) are slightly concave (Fig. 2b), the saddle-shapes being a signature for dolomite. The bead measures between 3.5 and 4.0 on the Mohs

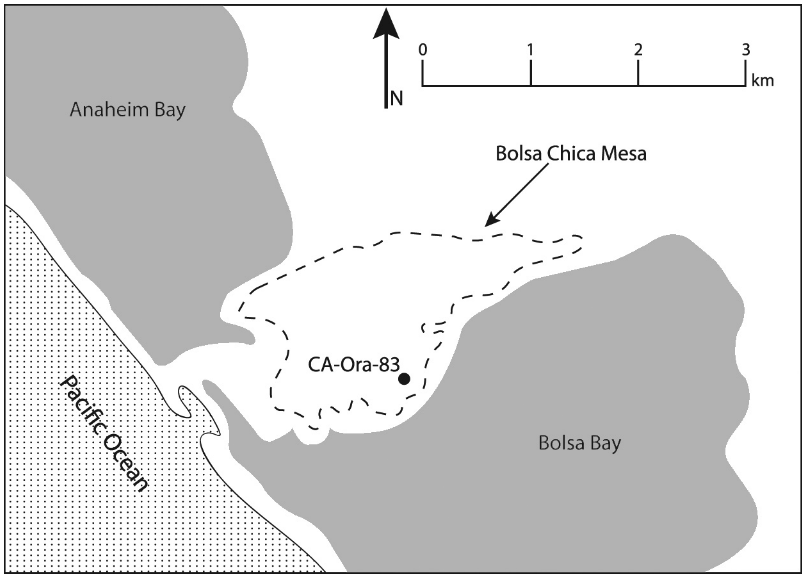

Fig. 1. Location of CA-ORA-83 (Cogged Stone site). Based on 1896 USGS topographic quadrangles.

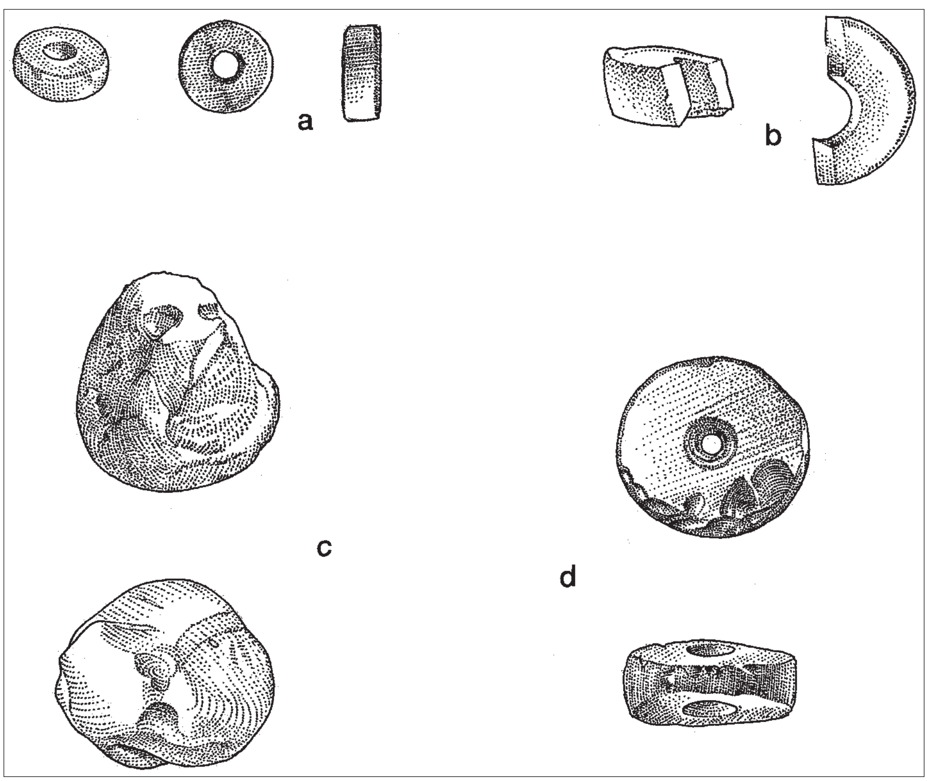

Fig. 2. CA-ORA-83 Beads: a) Dolomite bead (Cat. #55,807) (3x actual size); b) Dolomite bead (Cat. #70,114) (2x actual size); c) Dolomite bead/ornament blank (Cat. #55,625) (2x actual size); d) Obsidian bead (2x actual size).

scale for hardness and exhibits a pearly luster, further corroboration of material identification (see Chesterman 1987:442). After a small scratch was drawn on one surface to powderize a tiny amount of the mineral and 10% HCL subsequently applied, sluggish effervescence was observed. The more common calcite ($CaCO_3$) will always effervesce vigorously since it lacks the impediment of magnesium ions. To maintain artifact integrity, a streak test was not performed. This 0.56 gram specimen is broken and only half complete. Maximum diameter is 10.4 mm for one face and 9.9 mm for the opposite face. Obviously, then, there is a slight tapering of the sides from one face to the other. The maximum thickness is 4.6 mm, and the minimum is 4.1 mm.

The hole is uniconically drilled with a maximum estimated diameter of 3.9 mm, tapering to a minimum estimated diameter between 3.6 mm and 3.5 mm. There are no rotary drill marks in the perforation, rather the striations run perpendicular to the faces. No effort had been expended to flatten the surfaces. An almost imperceptible amount of asphaltum staining is seen on the rim of the perforation at one face.

This bead was found at the 110-120 cm level of unit D51. The nearest radiocarbon samples (Table 1) coupled with the great depth of the find indicate a cultural placement within the early Milling Stone Period.

The second dolomite disc bead (Cat. #55,807) is complete (Fig. 2a). It exhibits a faint light greenish color and also shows a pearly luster. The faces are ground flat, effacing any hint of natural saddle facets. This specimen similarly passed the effervescence test. Because of its small size, we neither tested for hardness nor applied a streak test. The 4.1 mm diameter disc exhibits fairly precise symmetry. Thickness is 1.7 mm, and it weighs about 0.05 grams. The biconically drilled hole, with its rotary drilling marks, is about 1.7 mm in maximum diameter. The specimen is well polished on all outer surfaces. It was found at a depth of 39-41 cm in Trench 2. This artifact is assigned to the Milling Stone Period

The CA-ORA-83 bead/ornament blank (Cat. #55,625) (Fig. 2c) gives clear indication that the crystal had been water worn, either stream rolled or beach rolled. It exhibits two incipient cone cortexes that resulted from natural tumbling. It has saddle-shaped sides. A streak test yielded white, an observation consistent with a dolomite identification (see Chesterman 1987:442). Its hardness, predictably, tested at 4 (Mohs) (see Chesterman 1987:442). It displayed a weak bubbling with application of the same acid test described above.

There was clearly an attempt to biconically drill the stone, but in so doing it split along a line of cleavage. This blank weighs 3.26 grams, and its maximum dimension is 14.9 mm. It was recovered from Trench 3A (38MS) at 0-15 cm. This artifact probably dates to the Milling Stone Period.

A 1.76 gram unmodified dolomite crystal (Cat. #55,791) was also recovered at ORA-83 (Koerper, Desautels, and Couch 2002:69). Possibly it arrived at the site intended as raw material for shaping into an ornament, or perhaps it was intended to have been kept in its natural state.

On Source Location

Large, showy dolomite crystals can be found in abundance at the Livingston Quarry and in the sea cliffs on the Palos Verdes Peninsula, Los Angeles County (Sharp 1959:3-4; Carnahan

Table 1. Radiocarbon dates from units nearby Unit D51 at CA-ORA-83.

CA-ORA-83						Age in Thousands of Years B. P.													
Unit	Level Top	Level Bottom	Uncorrected Date	+/-	Material	1.5 - 2	2 - 2.5	2.5 - 3	3 - 3.5	3.5 - 4	4 - 4.5	4.5 - 5	5 - 5.5	5.5 - 6	6 - 6.5	6.5 - 7	7 - 7.5	7.5 - 8	8 - 8.5
Z1/D52	Feature 11		7360	50	*Pecten*												■		
BB1(N)	40	50	8020	70	Tivela Bead														■
Z(S)	40	50	6770	140	*Laevicardium*											■			
Z1(SE)	80	90	6910	100	*Chione*											■			
D36(SE)	120	130	7400	100	*Pecten*												■		
D36(NE)	120	130	7780	60	*Laevicardium*													■	

1967:29; Pemberton 1983:219). One of us (JHC) collected dolomite crystals from the Livingston Quarry source and observed a prominent basalt sill transecting two sedimentary layers of the Monterey Formation. This feature comprises the environment in which the dolomite crystals form (Department of Geological Sciences, California State University Long Beach 2003a, b, c). These volcanic beds that extrude into the Monterey Formation are those of the El Modena Formation (Yerkes 1957).

A Palos Verdes provenance is cautiously favored for the ORA-83 dolomite material, partly because that area contains cherts once exploited extensively by prehistoric peoples (Cooley 1982), and these Monterey Formation cherts are well represented in the lithic tool and debitage assemblages from the Cogged Stone site. In addition, the predominant material for the numerous Bolsa Chica cogged stones is vesicular basalt, probably of the El Modena Formation, and it was perhaps obtained from the peninsula. Some of the quartz crystals excavated from the Cogged Stone site possibly had a Palos Verdes origin (Koerper, Desautels, and Couch 2002:73).

Obsidian Specimen

The complete, biconically drilled, greyish black translucent volcanic glass disc bead (Table 2) of Figure 2d weighs 0.87 grams. Its maximum diameter is 12.0 mm, and its minimum diameter is 11.3 mm. The thickest edge is 5.5 mm, while the thinnest edge is 2.6 mm. The maximum diameter of the hole on one surface is 4.2 mm, and at the other surface, 4.1 mm. The minimum diameter of the perforation, which occurs at about the midpoint along its length, is approximately 2.7 mm.

One face of the specimen is slightly concave, while the face opposite is slightly convex. The blank for this bead was probably harvested from the termination of the body of a relatively large edge preparation flake. On both faces, one witnesses remnants of concentric rings of the original flake as well as hackles, or cracks along the surface of the flake scars that radiate from a platform. With the arcs of the concentric rings being wide in relation to the diameter of the bead and with the hackles running close to parallel, there is support for the hypothesis that the bead blank began as mass at some distance from the bulb of percussion and flake platform.

In the next stage of manufacture, a rough disc shape was fashioned by peripheral trimming, employing percussion. Ergo, in plan view, the bead is faceted. After this circumferential chipping, the blank was biconically drilled. Drilling at this point is indicated since the subsequently ground surfaces directly engage the perforation holes. The two drill holes display concentric grooves that result from the twisting motion of a drill.

Finally, the blank was ground to finish starting at the edges with top and bottom surfaces to follow. Along the edges one sees slight evidence of circumferential chipping that preceded rotary grinding to finish the edges. It was common practice for artisans to string the rough discs, hold the string taut, and move the grouping in circular/elliptical sweeps over a flat abrasive stone (Gibson 1976:88-89). Drag of the discs across the stationary abrasive disengaged the tiny edge chips. The chip scars' vitreous luster contrasts with the matte finish enveloping the majority of the surface area. Binocular microscopic observation (45x) further reveals edge striations, a phenomenon of rotary grinding, when as so often happened, friction of beads' surfaces against contiguous bead surfaces inhibited continuous and uniform rotation of the beads.

The biconical hole exhibits internal wear of the sort expected from stringing the bead. Some unknown amount of this wear relates to the edge shaping process and some amount to employment of the bead as ornamentation. The ground matte finish found on top and bottom surfaces laps over onto the arises (ridges) of the flake scars at the edges of the lateral surface, a sure indication that the edges were finished prior to the top and bottom faces of the bead being finished.

Further Analysis

The specimen was subjected to X-ray fluorescence (XRF) analysis (Table 2), but the assay could not be matched to a western United States obsidian source (Hughes 2003). Randy Millikin offered the suggestion of a Mesoamerican origin or even a Russian origin (personal communication to Richard Hughes 2003) since Russian sea-otter hunters employed Haida, Aleut, and Eskimo workers in their exploitations along the California coast (Heizer 1947). We are understandably cautious about the lineage of this specimen (see Meighan 1981:29).

Obsidian hydration analysis was not attempted since the sort of manufacture grinding herein described cracks surfaces, a circumstance that would allow water to penetrate more deeply into the surface than would be the case on any uncracked smooth surface of, for instance, a projectile point.

Table 2. XRF Data for the CA-ORA-83 Obsidian Bead (supplied by Richard Hughes).

	Trace Element Concentrations											Ratio	
Cat. Number	Zn	Ga	Rb	Sr	Y	Zr	Nb	Ba	Ti	Mn	$Fe_2O_3^T$	Fe/Mn	Obsidian Source (Chemical Type)
70097	40 ±7	12 ±3	195 ±4	74 ±3	23 ±4	140 ±4	13 ±3	826 ±15	896 ±25	337 ±11	1.13 ±.10	40	Unknown

Values in parts per million (ppm) except total iron [in weight %] and Fe/Mn intensity ratios; ± = expression of x-ray counting uncertainty and regression fitting error at 300 seconds livetime.

Further, we were loath to subject a unique artifact to destructive analysis.

Speculations

It is reasonable to consider whether the ORA-83 beads herein described may have connected directly and/or indirectly with sacred thought and behavior. The speculation is inspired by several observations. First, ethnographic and ethnohistoric data demonstrate that several translucent, glassy-lustrous minerals were imbued with magical, miraculous, and/or medicinal potency in the ideational landscape of Native coastal southern California. Such is documented for quartz crystals, lithia-tourmaline, and "schorl," or black tourmaline, in coastal southern California and Baja California (e.g., DuBois 1908:97; Alliot 1916:129-131; Voegelin 1938:64; Hohenthal 1950:10; Levi 1978; Hudson and Blackburn 1985:261-262; Walker and Hudson 1993:53; Koerper, Desautels, and Couch 2002). Less strongly documented are amethyst, kunzite (spodumene), and garnet (e.g., Bolton 1926:125; Harrington 1978:133-135; also Koerper, Langenwalter, and Schroth 1988:252-253; Hinton 1994:213; Koerper and Mason 2000:15-7; Koerper, Desautels, and Couch 2002); however, none of these materials, with the possible exception of amethyst (Rogers 1929:414; Hudson and Blackburn 1985:263), seems to have been locally employed for bead manufacture. Parenthetically, blue fluorite beads have been excavated from sites in Santa Barbara and San Luis Obispo counties (Haldeman 1879:264; see also Woodward 1937:2; Hudson and Blackburn 1985:263-264). Further, certain translucent and/or glassy lustrous minerals, specifically quartz crystals and tourmaline, were incorporated into local sacred ceremonial venues such as mortuary ritual and puberty rites of passage (e.g., Schumacher 1875:349; Abbott 1879:214; Ford 1887:13; Yates 1957:38[1891:376]; DuBois 1908:92-94; Anonymous 1938; Jones 1956:227-230; Winterbourne 1967:155; L. King 1969; Bates 1972:44; Harrington 1978:134; Koerper and Drover 1983:23; Hudson and Blackburn 1986:155; Hale 1995:25, 70, 119, 193; Koerper 2001).

Obsidian, we believe, carried special meaning beyond mere employment for tool manufacture. Witness the report from the San Pedro Harbor site (Butler 1974:72) of an apache tear, or "small globular piece of obsidian," a long-distance exchange item likely to have been a talisman. Also, regional ethnographic, ethnohistoric, and archaeological data indicate a wide range of bead types associated with magico-religious practices (e.g., Kroeber 1908:13; Olson 1930:19; Boscana 1933 [1978:73]; Outland 1956:5-6; Grant 1964:6; Landberg 1965:57; Gibson 1976:119; Geiger and Meighan 1976:48-49, 58; Hudson and Blackburn 1986:passim). Beads also were attached to many items known or presumed to be in the magico-religious/mythical category or a fiesta/dance category, such as funeral effigies and banners, ceremonial regalia, mourning dance belts, *supey* hair nets, ceremonial baskets, Eagle Dance headdresses, dance sticks, ceremonial wands, turtle shell rattles, shell rattles, bone whistles, ceremonial necklaces, certain steatite smoking pipes and other steatite objects, sucking tubes, star charts, sun staffs, and so on (Wiedman n.d.:35; Kroeber 1908:131; Merriam 1955:81, 82-84; Elsasser and Heizer 1963:24-28; Gibson 1976:94; Hudson et al. 1977:47; Hudson and Underhay 1978; Hudson and Blackburn 1985:passim).

It may also have been that aesthetic considerations weighed into the selection of dolomite and obsidian materials to fashion discs. Consider that while clear quartz crystals were regarded first and foremost as magico-religious in Native California, they might, as with the Chumash, be "admired for their beauty" (Yates 1957:38), and there is testimony for some amount of decorative employment (e.g., Gifford 1940:214; Orr 1947:118, 119, 128, 131).

Summary and Concluding Remarks

Two new bead types have been proposed - the dolomite disc bead and the obsidian disc bead. The two dolomite specimens possibly represent two sub-types, one small and the other large. The ornament blank of dolomite and the natural dolomite crystal found at ORA-83 support the hypothesis of local manufacture for the two complete dolomite beads. Dolomite crystals possibly were received from the Palos Verdes area, and if so, this would add yet another item to the inventory of exotic goods traded into prehistoric Orange County (see Koerper and Whitney-Desautels 1999b:87).

It is likely that the dolomite beads date from the Milling Stone Period. We note parenthetically that the Cogged Stone site was a shell disc bead manufacturing center beginning around 7500 years ago. XRF technology failed to identify the origin of the material for the obsidian bead. The artifact was not subjected to obsidian hydration analysis. The bead may or may not have arrived in finished form to Orange County.

Speculatively, the disc beads possibly held meaning beyond mere ornamentation. As noted, translucent, glassy-lustrous minerals are documented in connection with spiritual/ritual needs, and beads were often associated with the sacred realm.

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