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Beads and Ornaments from San Diego: Evidence for Exchange Networks in Southern California and the American Southwest

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The study of shell artifacts provides important information concerning economic and political ties between Native American groups over time. California Indian groups participated in wide-ranging exchange networks for thousands of years that involved the trading of shell beads and ornaments. Shell beads and ornaments from the San Diego region provide chronological information concerning numerous sites; more importantly, they also contribute to our knowledge of economic and political networks that included the greater Southwest and the Pacific Coast. Our examination of over 23 assemblages from San Diego County documents the frequent use of beads made in both the Santa Barbara Channel region and in the Southwest, as well as the use of locally-produced shell beads.

Shell beads have been used in California for over 10,000 years, and they are found throughout western North America—in the Great Basin, in northern and southern California, and in the Southwest (Bennyhoff and Hughes 1987; Erlandson et al. 2005; Fitzgerald et al. 2005; Gamble 2011; King 1990a). Many disc beads, such as *Olivella biplicata* disc beads, *Olivella biplicata* rough disc beads, *Haliotis rufescens* epidermis disc beads, *Olivella biplicata* lipped beads, *Olivella biplicata* cupped beads, and *Mytilus californianus* disc beads were produced in the Santa Barbara Channel region (Eerkens 2005 et al.; Farmer and La Rose 2009; Gamble and Zepeda 2002; King 1990a; King and Gamble 2008; Vellanoweth 2001). Other beads were made from shells (such as *Olivella dama*) that are found in the Gulf of California.

In this paper, we focus on the bead types found in San Diego County that we have analyzed over the past ten years. Relatively few publications on beads from this region have appeared in peer-reviewed venues (Gamble and Zepeda 2002; King 1990a); a greater number of reports have appeared in the gray literature, conference proceedings, or in dissertations (Carrico and Day 1981; Carrico and Taylor 1983; Gamble 2008; Gamble and King 2004; Gibson 2000a, 2000b; King 2004; King and Gamble 2008; McDonald 1992; Rosen 1994; Zepeda 1999). Such reports are not readily available to a wide audience of scholars, and discussions are often limited to a consideration of beads from one or only a few sites. A primary goal of this paper is to highlight the significance of the trade and conveyance of beads in the San Diego region. The people that lived in the area participated in exchange and political networks that used beads made from shells obtained from the Gulf of California, from the Santa Barbara Channel region, and from other coastal locales in southern California. These networks extended throughout the Southwest, California, and the Great Basin.

ETHNOGRAPHIC BACKGROUND— THE KUMEYAAY AND THE CAHUILLA

The Kumeyaay, the Cahuilla, and the Luiseño lived in the San Diego region at the time of European contact,

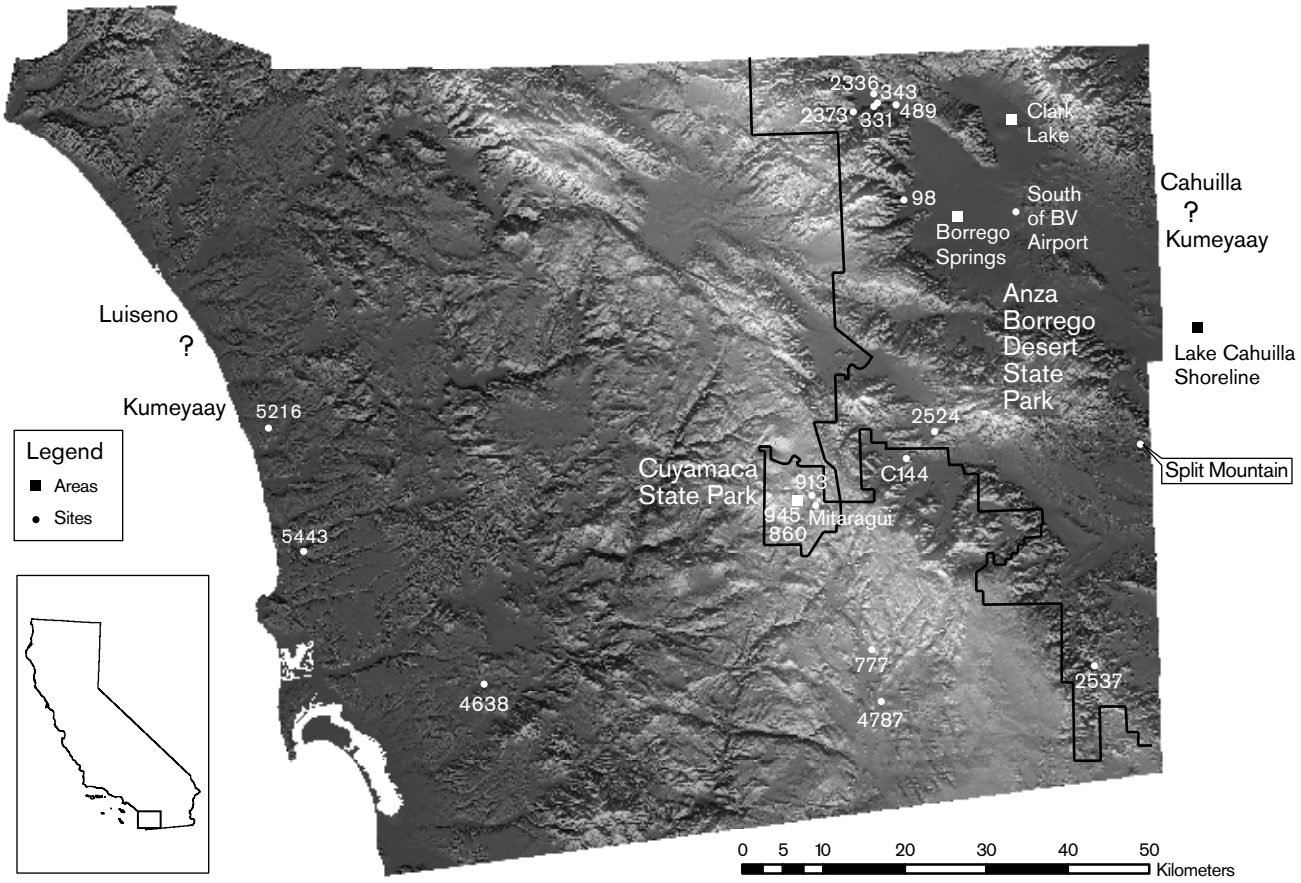

Figure1. Locations of San Diego County sites discussed.

and still do today. Most of the collections that were analyzed for this project are from within the region ethnographically occupied by the Kumeyaay (Fig. 1); therefore, this background discussion focuses on the Kumeyaay and (to a lesser extent) on the Cahuilla. None of the collections we examined are from the Luiseño area. Both the Kumeyaay and the Cahuilla relied primarily on hunting and gathering, although Lawton and Bean (1968) suggest that marginal agriculture existed among the Cahuilla. The Imperial Valley Kumeyaay historically planted maize, beans, teparies, gourds, pumpkins, and melons in the floodplains of the Colorado River.

The Kumeyaay recognized territorial bands, each of which had a central primary village with outlier homesteads (Shipek 1982:297). It is believed that these bands moved seasonally to access food resources (Shipek 1982:297, 1987:7). The leaders or chiefs of the bands, the *kwaapaay*, generally inherited their positions through the male line (Luomala 1978; Shipek 1982:297–298); they advised the band on economic matters, resolved disputes, and oversaw ceremonies. In payment for their services, the *kwaapaay* received food and valuables (Shipek 1987:7–8). The *kwaapaay* and other Kumeyaay officials, including shamans and other religious specialists, had more decision-making powers, more land resources, and more personal valuables (such as shell beads) than other band members (Shipek 1982:299–300).

The Cahuilla were organized into clans composed of three to ten lineages (Bean 1978) that participated in ritual performances, large communal subsistence events, and defensive activities. The *néts*, or the lineage leaders, usually inherited their positions through the male line and were similar to the Kumeyaay *kwaapaay* in their duties. Other important officials included the *páxa'*, the ceremonial leader, and shamans, all of whom were elites in Cahuilla society. The *páxa'* oversaw the ceremonial performers and also insured that people attending ritual events followed the proper protocol in their contributions of food and gifts.

Both the Kumeyaay and Cahuilla cremated the dead during the Late Period (May 1974; True 1970). Beads were frequently associated with the cremated remains, which often were placed in pottery urns (Gamble and Zepeda 2002; King 1995). One of the most important ceremonies among the Cahuilla was the *núkil*, the annual mourning ceremony. Both the Cahuilla and the Kumeyaay practiced a clothes-burning ceremony after the death of an individual. Among the Kumeyaay, all of the belongings of the dead were burned to insure that the spirit did not return for them (Davis 1921:95–97; Heye 1919:14–16; Luomala 1978:603).

Shell beads and ornaments in the San Diego region served as ornamentation that undoubtedly signaled one's rank in society. They also were a form of currency, at least among the Cahuilla (Bean 1978:582), and figured prominently in ceremonies, especially mortuary rituals (Gamble and Zepeda 2002; King 1995). Eastern Kumeyaay or Kamia women reportedly wore clamshell beads or "blue beads" made from Gulf of California species, and men wore strings of small, white clamshell discs or shells in their nasal septums (Gifford 1931:37). Gifford (1931:37) also noted that clamshell beads were traded to the Kamia by the Cocopa.

Among the Cahuilla, the clan chief of each ceremonial group kept several strands of shell beads, usually in association with the clan's sacred bundle (Strong 1929:94–96). One class of shell money was called *witcu* by the Palm Springs Cahuilla. A string of *witcu* was measured from a person's forehead to the ground, then multiplied by four, and was worth 50 cents. One of these was given by the clan chief to each invited clan leader at the end of an image-burning ceremony. This ceremony usually occurred about a year after death. A similar string was returned by each clan head when their clan had a ceremony; as a result, *witcu* were involved in a perpetual series of exchanges. There was also another type of shell money that was called *napanaa* by the Palm Springs Cahuilla. These strings of beads were measured by wrapping the string around the wrist and fingers, and they were sent by all leaders to a clan chief after a death in the clan (Strong 1929: 95); they were worth 20 cents. Alejo Potencio told William Duncan Strong that the beads were traded to the Cahuilla by the Serrano, who received them from the Gabrieleño (Tongva) of San Fernando Mission. In his accounts, the use and distribution of shell beads took place in the context of ceremonies (Strong 1929:94–96).

THE SAN DIEGO COLLECTIONS: THE SAMPLE

Many of the beads described in this paper are from collections curated by California State Parks, while others come from collections in the Collections Management Program at San Diego State University. Some of the collections were donated to State Parks by avocationals and have limited provenience information. Site descriptions vary, because more information is known about some sites and collections than others. In this section, we provide a brief description of each site or accession involving the bead assemblages, organized according to their general regional provenience. The collections that have known provenience information are mapped in Figure 1. The authors, with the help of Scott Justus, Kara Johnson, and other students from San Diego State University (SDSU), analyzed over 2,000 shell beads, shell ornaments, and glass beads.

San Diego Sites West of Cuyamaca Rancho State Park and Anza Borrego

CA-SDI-5216, Woodward. The Woodward site is situated near the coast just east of Escondido and the San Elijo Lagoon (Fig. 1), near a seasonal drainage, and at an elevation of about 100 feet above sea level (Gamble 2008). The site rests on land oriented between two Mexican land grants of the early 1840s; this includes Rancho Las Encinitas and Rancho San Dieguito (now Rancho Santa Fe). The site was first investigated in 1966 and then later in the 1970s. No human remains were identified at the site during the excavations; however, after the faunal remains were examined in 2003, nine calcined bones were discovered, eight of which were human and one probably human. Twenty-four worked shell artifacts were recovered from the Woodward site. An unworked *Olivella biplicata* shell was also found. In addition to the shell beads in Table 1, one *Olivella* sp. oblique spire-removed bead is in this collection, as well as two *Laevicardium elatum* shells, an *Aequipecten circularis* shell, and a cowry shell (*Cypraea spadica*), all of which were possibly worked.

CA-SDI-4638, Bancroft Ranch. The Bancroft Ranch site is situated near Spring Valley, California at an

Table 1

DISTRIBUTION OF COMMON BEAD TYPES BY SITE IN SAN DIEGO COUNTY

	SDI-5216	SDI-4638	SDI-777	SDI-4787	SDI-913	SDI-860	RC 618-X-311	RC 618-X-310	RC 618-X-189	A 622-20-42	Borrego Spr	S of Airport	Clark Lake	625-61-3	622-10-1F & G	Mason V	625-62-2	Harry Ross	Split Mountain	SDI-343	SDI-489	SDI-98	Lake Cahuilla	TOTAL
O. biplicata Rough Disc		1				12	299	116		10	1			1		13			10	3	1	106		**573**
O. biplicata Cupped		4				5		1		66	11	9				1		7			1			**105**
O. biplicata Full Lipped		10		1	69	2					2							12						**96**
O. biplicata Thin Lipped		2				2							22	16		3								**45**
O. biplicata Wall Discs, small										1	4													**5**
O. biplicata Wall Discs, large		13									16					2	2	67						**100**
O. biplicata spire rem	20	57	1	5	26	14			7		27	2				13		10				1	3	**18**
O. biplicata Barrel		1	1																					**2**
O. sp. Barrel				7																				**7**
O. biplicata Cyl.		5																						**5**
Tivela stultorum Disc Beads	2																							**2**
Haliotis rufescens Disc Beads						1	5															1		**7**
Mytilus californicus Disc Beads											1		1			1	2	1						**6**
Haliotis sp. Nacre Disc Beads																		2						**2**
Haliotis sp. Orns.		4	1			1																	2	**8**
Laevicardium sp. Pendant/Shaped				1							1					2								**4**
O. dama Spire Rem	1	26		24	20	6			59		31				196	74		27	6	5			4	**479**
O. dama Barrel		9			16	6		1	183	1	6				33	1	2	10	2	1				**271**
Oliva undatella Spire Removed											2							14						**16**
Glycemeris sp. Arm Bands			2																					**2**
Conus sp. Spire Removed Beads											9													**9**
Conus sp. Cap									4		1				1									**6**
Glass Beads		10			5	5	2				2					1			6	11			12	**54**
TOTAL	**23**	**142**	**5**	**38**	**136**	**54**	**306**	**118**	**253**	**78**	**114**	**11**	**23**	**17**	**230**	**111**	**6**	**150**	**24**	**20**	**2**	**108**	**21**	**1990**

(*O.* = *Olivella*)

elevation of 420 feet above sea level (Fig. 1). The site has been identified as that of a Kumeyaay village called *Meti* (*Neti*) (Carrico and Ainsworth 1974:4). By the 1830s, the village had been abandoned and the valley was used for grazing (San Diego Historical Society 2004). The historian Hubert Bancroft purchased the site in 1885. The village was occupied during the Late and historic periods, and has a significant permanent spring (Gamble 2008). Between 1775 and 1809, 29 people were baptized from the village (Carrico and Ainsworth 1974:5). Less than

one month after the first baptisms occurred in 1775, the inhabitants of this and other historic villages burned the San Diego mission and killed Father Luis Jayme and two other Spaniards. We are not sure if any Kumeyaay lived at the site after 1809. Excavations under the auspices of Dr. Paul Ezell of S.D.S.U. began at Bancroft Ranch in 1969 and continued until 1974. Diane Barbolla from Mesa College conducted excavations in 1975, followed by Alana Cordy-Collins with the University of San Diego (U.S.D.) and the University of California at San Diego (U.C.S.D.) in the early 1980s (Gamble 2008).

During the 2000/2001 academic year, 41 human remains from nine units at Bancroft Ranch were repatriated to the Kumeyaay. Other repatriated objects included a cremation platform and associated funerary objects consisting of miscellaneous animal bones. Since that repatriation, 717 human remains or possible human remains were found as a result of examining the faunal remains. Associated funerary objects included a broken olla and 14 burned shell beads. In addition to the 141 beads and ornaments reported in Table 1, a possibly drilled *Argopecten* sp. shell and 32 *Olivella biplicata* whole shells were found at the site (King 2004). The entire chipped stone collection, which was massive, was searched for evidence of any types of small drills that would be suitable for the drilling of holes in disc beads. No bead drills or any type of small drills were found.

CA-SDI-777, Cottonwood. The Cottonwood site is situated east of the Bancroft Ranch site and just southeast of Pine Valley on Interstate 8 (Fig. 1) within traditional Kumeyaay territory. The site was excavated in 1967 and 1968 by U.C.L.A., and then again in 1971 by S.D.S.U. under the direction of Paul Ezell and Ron May, who excavated 51 test units and nine trenches as part of a salvage project (Gamble 2008). A house floor and two cremation hearths were found at the site. Approximately 1,750 fragments of cremated human or possible human remains were found in the faunal remains between 2002 and 2004. Seven worked shell artifacts were found at Cottonwood, five of which are reported in Table 1. The additional shell artifacts were a *Conus californicus* spire bead and an eroded *Olivella* sp. barrel bead. The *Haliotis* sp. ornament had two holes drilled near its center like a button; however, no historic era artifacts were found at the site.

CA-SDI-4787, Buckman Springs. The Buckman Springs site is also known as the historic Kumeyaay village site of *Wikalokal* (which means 'singing rocks' in Tipai). It is situated just south of the Cottonwood site on Interstate 8. It is believed that the site was occupied between about 400 B.C. and A.D. 1890 (Hildebrand and Hagstrum 1995:109). S.D.S.U. excavated over 200 2 m. x 2 m. units (approximately 138.4 cubic meters) at the site in 1971 as part of a Caltrans project (Gamble 2008). Approximately 124 human and possible human remains were found among the faunal remains at the site, in addition to one individual that was identified in the field with 264 associated funerary objects. Forty beads and ornaments were found at the site. The only ones not reported in Table 1 are an *Olivella biplicata* cap bead and an *Olivella* sp. spire-removed bead. Seven of the beads were burned, including three *Olivella dama* spire-removed beads, one *Olivella biplicata* spire-removed bead, and three *Olivella* sp. barrel beads.

Collections from Cuyamaca Rancho State Park

Except for two collections from CA-SDI-860, the Dripping Springs site, and one from CA-SDI-945, the authors have only limited information on the sites or collections from Cuyamaca Rancho State Park that were examined as part of a State Park contract (Gamble and King 2004; King 2004). The beads from the other collections at the Park are from several State Parks accession numbers (see Table 1). Two accessions are from Arrowmakers Ridge (CA-SDI-913), Accessions 618-1-220 and 618-1-221. Three additional accessions curated at the Dyar House at Cuyamaca Rancho State Park were examined for State Parks, Accessions 618-X-311, 618-X-310, and 618-X-189. It is believed that the beads from these collections are from the vicinity of Cuyamaca Rancho State Park. All of the sites at Cuyamaca Rancho State Park are in Kumeyaay territory. The Cedar fire in the fall of 2003 burned the Dyar House, but the beads were preserved because they were still under analysis.

CA-SDI-913, Arrowmaker Ridge. The Arrowmaker Ridge site is on West Mesa at Cuyamaca Rancho State Park at an elevation of approximately 4,560 feet above sea level. According to Breck Parkman's (1983) article on the site, over 5,000 projectile points and 50 steatite arrowshaft straighteners were found at the site, hence its name of Arrowmaker. It is believed that this site was possibly the Kumeyaay historic village of *Pilcha*. The site was excavated by the San Diego Museum of

Man (S.D.M.O.M.) under the direction of Malcolm Rogers between 1934 and 1939; Rogers encountered a number of cremations at the site. In 1949 the site was excavated again by the S.D.M.O.M., but this time under the direction of M. F. Farmer. The site was excavated the following year by the S.D.M.O.M. and the San Diego Anthropological Society under the auspices of M. V. Harding. The beads analyzed in this study are from State Parks Accessions W-220, 221 and 618-701-614. The latter accession is associated with the collector Patrick Shea and consists of five glass beads. Other than the 131 shell and five glass beads reported in Table 1 from Arrowmakers Ridge, there were one *Glycymeris* sp. disc bead, one *Fisurella volcano* limpet callus ring ornament, and five shaped *Laevicardium* sp. shells from the site.

CA-SDI-945, Hual-cui-cuish. CA-SDI-945 is situated at the eastern base of Middle Peak in Cuyamaca Rancho State Park, at the edge of a meadow and pine-oak woodland, and at an elevation of about 4,800 feet. The site is a Late Period site associated with the historic village of *Hual-cui-cuish*. Lynn Gamble excavated at the site in 1999, 2000, and 2001 with a field class from S.D.S.U. Two shell beads, an *Olivella biplicata* full-lipped bead and an *Olivella biplicata* cupped bead, and two shell bead fragments were recovered. The two partial beads are too fragmentary to be identified by type, but are made from *Olivella* sp. shells. This site was not included in Table 1 because there were so few beads in the collection.

CA-SDI-860, Dripping Springs. The Dripping Springs site is situated on an open grassy area with a southeastern exposure; it is surrounded by oak woodland (True 1970:11) and lies at an elevation of about 4,880 feet in Cuyamaca Rancho State Park. Bedrock milling features are common on the granitic outcroppings at the site. True conducted test excavations at the site in the 1970s and identified it as the type-site for the Cuyamaca region. It is one of the largest, if not the largest, sites in Cuyamaca Rancho State Park. True recovered a wide range of artifacts and faunal remains from the site, including historic artifacts, ceramics, chipped stone tools and points, groundstone, shell, and bone. He excavated in both the cemetery and the living areas; most of the remains and associated funerary objects from the cemetery were reburied many years ago before NAGPRA had been enacted. Gamble completed a detailed survey of the site in 1999 and conducted limited excavations (less then two cubic meters) in 2008. The beads reported here are from the excavations undertaken by True and Gamble. Other than the 54 beads in Table 1, a pendant made from *Pecten* sp. shell and a *Saxidomus* sp. bead blank were found at the site.

South Mituragui. Four glass beads collected by Patrick Shea are associated with this site, which is in Green Valley.

Accession 618-X-311. Although there is no clear provenience information about this accession, it is believed that the collection is from Cuyamaca Rancho State Park. All the 306 beads from this accession are reported in Table 1.

Accession 618-X-310. This collection also lacks specific provenience information, but it is probably from Cuyamaca Rancho State Park. The 118 shell beads from this collection are included in Table 1.

Accession 618-X-189. As was true regarding the two previous accessions, this collection lacks provenience information, but it is probably from the Park. All of the 253 beads from this collection are reported in Table 1.

Accession 618-701-611. This accession also lacks detailed provenience information, but it is from Cuyamaca Rancho State Park. There is only one bead from this collection, a *Mytilus californianus* disc bead.

San Diego Sites in Anza Borrego Desert State Park

The beads in this section are from numerous locations in Anza Borrego Desert State Park, and they were analyzed by us to help California State Parks determine what items might be subject to NAGPRA. They include beads collected by Bill Seidel during excavation at SDI-98 and during surveys of other sites in the northwestern portion of Anza Borrego, beads collected by Paul Ezell at Santa Catarina Springs, and beads collected by avocationals who donated them to the Park. Many beads were collected from cremation burials or in the vicinity of cremation burials.

Accession 622-20-42. This collection lacks specific provenience information, but it is probably from Anza Borrego Desert State Park. Seventy-eight beads from this accession are included in Table 1. One additional bead, a possible cupped bead, is also from this accession.

Borrego Springs. The collections from Borrego Springs that we examined include Accessions 625-60-302, 625-60-303 a and b, and 625-60-304. All we know about them is that the artifacts were collected in the vicinity of Borrego Springs/Borrego Sink by Duvall. In addition to the 115 beads reported in Table 1, three *Olivella biplicata* spire-removed fragments were found at the site along with over 20 *Olivella* sp. fragments.

South of Airport. Eleven beads were collected south of the airport in Borrego Springs (Table 1).

Clark Lake. Clark Lake is an old, dry lakebed northeast of Borrego Springs and to the east of Coyote Mountain, in an area traditionally occupied by the Cahuilla. Twenty-three beads collected by Ben McCown are associated with this collection (Table 1).

Accession 625-61-3. This collection is from the D.C. Barbee accession from Anza Borrego. Sixteen thin-lipped beads (Table 1), some of which are fragmentary, are from this accession, as is one *Olivella biplicata* rough disc bead.

Accessions 622-10-1F and 1G. This collection consists of two or three strings of burned beads collected by Jane Thorness in a dune site in Anza Borrego that contained a metate, a mano, and a small olla that had been repaired. All 230 beads are reported in Table 1.

Mason Valley. The beads from Mason Valley in Accession 622-4-23 were collected by Lloyd Findley. In addition to the 111 beads reported in Table 1, there was one pendant made from *Trachycardium quadragenarium* in the collection. Mason Valley is near the Great Southern Overland Stage Route of 1849. The historic site of *Matenoc* (C-144) is situated in Mason Valley (*Matenoc* is the most common spelling of the site in the mission records; it is also know as *Amat Inuk*, *Net Nook*, and *Matnook*) (Gamble and Zepeda 2002; Zepeda 1999); the beads and pendant in Accession 622-4-23 may be from the same site.

Accession 625-62-2. There are six beads associated with this accession (Table 1), none of which has any provenience information, other than the fact that all are probably from the Anza Borrego area and were collected by Ben McCown.

Accessions 622-7-85, 625-66-2, and 625-66-3. These accessions are attributable to Harry D. Ross, who collected them in the Anza Borrego area. Otherwise, little is known about their provenience. All 150 beads are reported in Table 1.

Accession 622-1-69a. Two burned beads were collected by Frizzel from the Anza Borrego area. One was a full-lipped bead and the other was an *Oliva undatella* spire-removed bead. These are not included in Table 1.

Hendrickson House. This consists of a collection of one bead, a *Haliotis rufescens* epidermis disc bead. It is not reported in Table 1.

Split Mountain. The beads from Accessions 622-21-1a and 1b were collected by Wright and Carlsberg in an area near Split Mountain that is traditional Kumeyaay territory. All the beads from this collection are included in Table 1.

CA-SDI-343. The beads from this site, which is in the Coyote Canyon area, were collected by William Seidel in the 1970s. Twenty-two of the 24 beads from this collection are reported in Table 1. The two additional ones are an *Olivella biplicata* medium-wall disc bead and a possible button fragment made of glass.

CA-SDI-489. William Seidel also worked at this site, which is near Coyote Canyon. Only two beads are in this collection (Table 1).

CA-SDI-98. This is the largest collection of beads (n=108, Table 1) from Seidel's investigations. The site is situated in the Borrego Palm Canyon region.

CA-SDI-2600. This site is situated northwest of the Borrego Sink and had one ornament, a *Lottia limatula* limpet ring ornament.

Lake Cahuilla. The beads from an old shoreline of Lake Cahuilla in Imperial County were collected by Ada Jackson. In addition to the 21 beads reported in Table 1, there are two pendants, one made from *Rangia mendica* shell, and the other made from *Trachycardium quadragenarium* shell.

BEAD AND ORNAMENT TYPES

Research involving the archaeology of central and southern California has resulted in the recognition of a sequence of at least fifteen periods preceding Cabrillo's 1542 voyage and two time periods succeeding it, all prior to the establishment of the missions. These chronological periods are delineated on the basis of changes in ornaments, beads, and other artifacts (King 1990a). Figure 2 indicates the approximate duration of each recognized time period. Shell ornaments are usually larger than shell beads and often lack a small central hole.

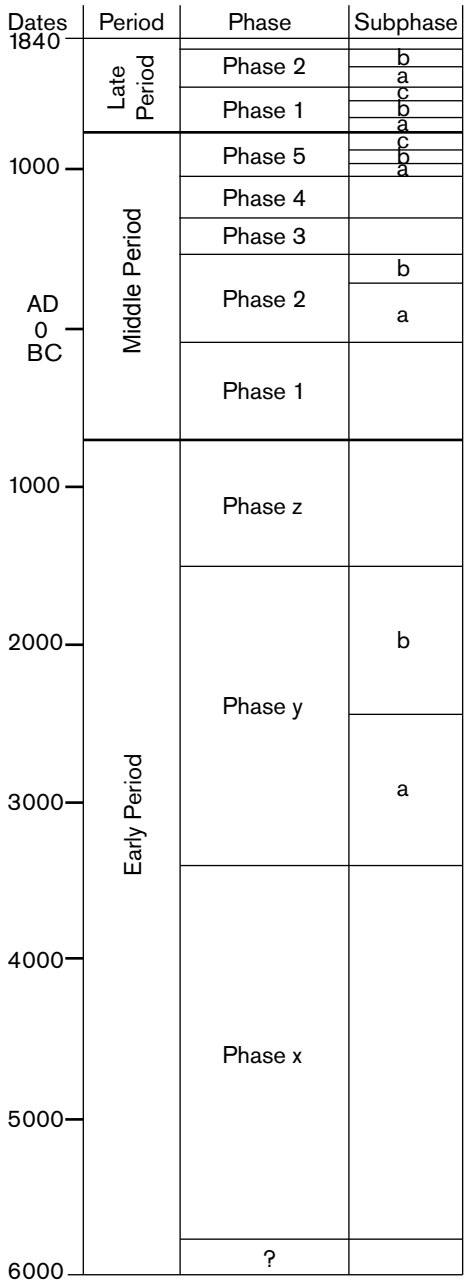

Figure 2. Sequence of time periods recognized in Southern California prehistory. Time periods are based on the sequence of changes in beads and ornaments (King 1990b). Correlations with calendar dates are based on interpretation of Carbon 14 dates and cross-dating with Southwestern and Great Basin sequences. The dates of the beginning and end of many phases and subphases have not been determined. Seriation indicates that the discovered sequence is complete after Phase z of the Early Period. Prior to Phase z, it is probable that beads and ornaments that have been studied do not represent a complete sequence. The bead and ornament sequence discovered for southern California is similar to the sequence discovered in central California (Bennyhoff and Hughes 1987).

We do not provide a complete discussion here on every bead type found in the San Diego area or in the rest of California, nor do we provide their measurements; however, there are some excellent sources of information on the subject. The monograph by James A. Bennyhoff and Richard E. Hughes entitled *Shell Bead and Ornament Exchange Networks Between California and the Western Great Basin* (1987) contains a typology of the kinds of *Olivella* shell beads found in California and the Great Basin, and includes both metric descriptions and temporal information. However, this significant work does not include descriptions of beads other than *Olivella* beads, nor is it focused on some *Olivella* bead types that are more common in southern California. Chester King, in a monograph entitled *The Evolution of Chumash Society* (1990a), systematically records artifacts from burial lots in the Santa Barbara Channel region and documents thousands of shell beads, stone, and bone beads. In this publication, King provides detailed descriptions of bead types, and includes information on how to identify them, their dimensions, and their temporal contexts. His discussion covers the many types of *Olivella* shell beads found in the Santa Barbara Channel region, as well as over 21 other types of shell beads. A third source, Bob Gibson's "An Introduction to the Study of Aboriginal Beads from California" (1992), provides even more detailed information on how to distinguish the many types of shell beads found in California. This is a one of the best sources of information available on how to distinguish one bead type from another, with detailed discussions on the often subtle differences between bead types.

Pacific Coast Shell Beads and Ornaments

Pacific Coast shell beads include *Olivella biplicata* disc beads, *Olivella biplicata* rough disc beads, *Haliotis rufescens* epidermis disc beads, *Olivella biplicata* lipped beads, *Olivella biplicata* cupped beads, and *Mytilus californianus* disc beads. Most of these types were manufactured in the Santa Barbara Channel region and were traded over a large area of the western United States. It is well documented that the Chumash manufactured large quantities of shell beads and traded them over long distances, both within and outside of California (Arnold and Munns 1994; Bennyhoff and Hughes 1987; King 1990a). Similarities in the diameters, perforation sizes,

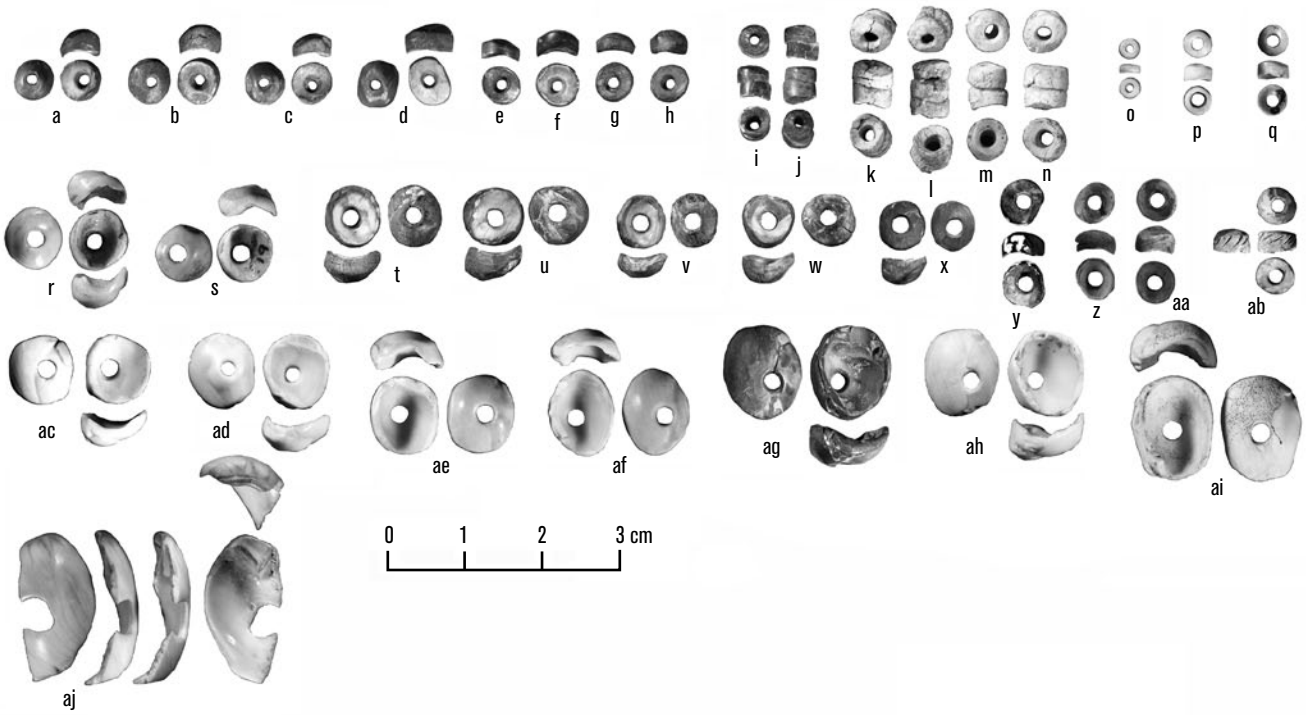

Figure 3. ***Olivella biplicata*** **Cupped (a–q), Thin-lipped (r–x), Cylinder (y–ab), Full-lipped (ac-ai), Split-punched (aj) beads to scale.**

and thicknesses of the disc beads found in the San Diego region and those of beads manufactured by the Chumash support the conclusion that the Chumash made most of the disc beads and traded them to the Kumeyaay and to other North American Indians in California, the Great Basin, and elsewhere.

During the Late Period, the callus of the *Olivella biplicata* shell—which had previously been discarded during bead manufacture—was used to make several types of shell beads. Beads in the collections analyzed here include the more common types traded from the Santa Barbara Channel during the Late Period. The first type of bead used in the Late Period was made entirely from the upper portion of the shell callus. These beads are round in shape, have a relatively consistent thickness along their edges, and have relatively small perforations, usually ranging between 1.2 and 1.5 mm. in diameter. These beads are called cupped beads. At the end of Late Period Phase 1, cupped beads differentiated into small cupped beads with perforations similar to earlier cupped beads, and larger beads with perforations around 2.0 mm. in diameter. These larger beads are called lipped beads. Their thickness varies around the edge of the bead. Over time, lipped beads increased in diameter, the range in thickness of their edges increased, and adjacent portions of the shell wall were included. The perforation moved from being entirely in the callus to the junction of the callus and the wall; eventually it was placed mostly in the wall portion of the bead. Earlier lipped beads with their perforations in the callus are called thin-lipped beads. The later beads, usually with perforations at the juncture of the wall and the callus, are called full-lipped beads. In addition to the three basic types of callus beads, there are some with incised edges that have either parallel oblique or cross-hatched designs.

Olivella biplicata *Cupped Beads (n=106) [K1 (Bennyhoff and Hughes 1987)].* Cupped beads (Fig. 3a–q) were first made at the beginning of the Late Period Phase 1 and were preceded by split-punched beads. They were made up to the time of Spanish colonization, when they were apparently replaced by glass beads. During Late Period Phase 2, the range of diameters decreased to between 2.1 and 3.8 mm. (by Phase L2b). During Phase L2 (possibly earlier), some cupped beads exhibit grinding on their convex (dorsal) surface; occasionally concave surfaces were also incised on their edges. Three cupped beads from SDI-860 and one cupped bead from SDI-4638 have dorsal grinding. All four of these beads have diameters between 2.1 and 3.8 mm. and may have been made during Phase L2. Most cupped beads in the

collections, however, appear to be from Phase 1 contexts. The smaller, unburned cupped beads illustrated in Figure 3o-q may have been used during Phase 2 or early Phase 1. Figure 3i-n includes different views of cremated beads that were stuck together and can therefore indicate the way in which they were originally strung.

Table 2 presents information on the diameters of cupped beads from collections at Anza Borrego containing more than one cupped bead. The large cupped beads from Borrego Springs were possibly found associated with the large *Olivella* wall disc beads from the same area and were used during Late Period Phase 1c. Accession 622-20-42 also contained an incised cylinder bead that indicates a Phase L2a context (Fig. 3ab). The cupped beads from this collection also may be Phase L2a types; however, they could be from Phase L1. The nine cupped beads from a site south of the airport are probably Phase L1 beads. One cupped bead was recovered from SDI-945 and is not included in Table 1.

Olivella biplicata *Thin-Lipped Beads (n=46) [E1 (Bennyhoff and Hughes 1987)*]. Late Period Phase 2 is marked by the development of a number of new types of callus beads. Lipped and cylinder beads were first used during Phase 2. Lipped beads frequently include portions of the wall as well as the callus of the *Olivella* shell. The thin-lipped beads used during Phase L2a have roundish outlines and are called round thin-lipped beads. Round thin-lipped beads are illustrated in Figure 3r-aa. The beads labeled 3y-ab can be classed as cylinder beads. Larger cylinder beads were used at the same time as thin-lipped beads. All the thin-lipped beads from Accession 625-61-3 and the Clark Lake collections from Anza Borrego were burned, indicating that they were associated with cremations.

Olivella biplicata *Full-Lipped Beads (n=98) [E2a (Bennyhoff and Hughes 1987)]*. Full-lipped beads are usually perforated at the juncture of the wall and the callus, in contrast to earlier thin-lipped beads, which are usually perforated through the callus. Full-lipped beads were made during Late Period Phase 2b. True's Type 3 beads from Cuyamaca are lipped beads (1970:39–40). Sixty-nine burned full-lipped beads were recovered from SDI-913. In addition to the beads from the Cuyamaca collections in Table 1, one more from Cuyamaca at SDI-945 was recovered, as well as one from the Frizzel collection. They were probably made between A.D. 1700–1770. Only one full-lipped bead from the Anza Borrego collection was burned. All of the full-lipped beads from SDI-913 were burned. A selection of full-lipped beads is illustrated in Figure 3ac–ai.

Table 2

DIAMETERS OF ANZA BORREGO CUPPED BEADS. *= NOT BURNED

Diameter mm.	622-20-42 no loc.	BV-S. of Airport	Harry D. Ross	Borrego Springs
3.6	1*			
3.7				
3.8	1			
3.9	1			
4.0		1*		1
4.1	1	1		
4.2	2	1	1	
4.3	2			
4.4	10			
4.5	8	1		
4.6	8			
4.7	5	1		
4.8	9	2		
4.9	1	1	1	
5.0			1	
5.1			3	
5.2	2	1		
5.3	2			1
5.4				1
5.5	1			1
5.6	1		1	1
5.7				1
5.8				3
5.9				1
6.0				
6.1	1			
6.2				
6.3				
6.4				1

Olivella biplicata *Oblique Incised Cylinder or Cupped Beads (n=1) [K3 (Bennyhoff and Hughes 1987)]*. One obliquely-incised *Olivella* cylinder bead was from Accession 622-2-42. It had been burned and was probably associated with a Phase L2a cremation. The incised bead is illustrated in Figure 3ab.

Olivella biplicata *Split-Punched Beads (n=1) [D1a (Bennyhoff and Hughes 1987)]*. *Olivella* split-punched beads were used at the end of the Middle Period during

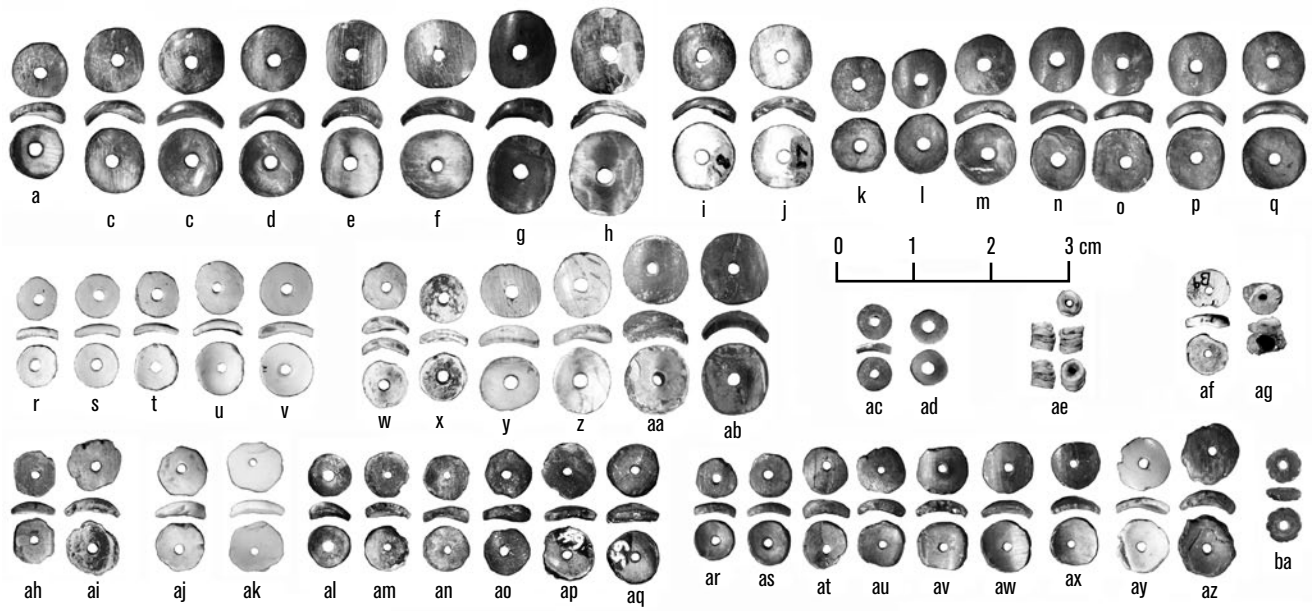

Figure 4. ***Olivella biplicata*** **wall disc beads.**

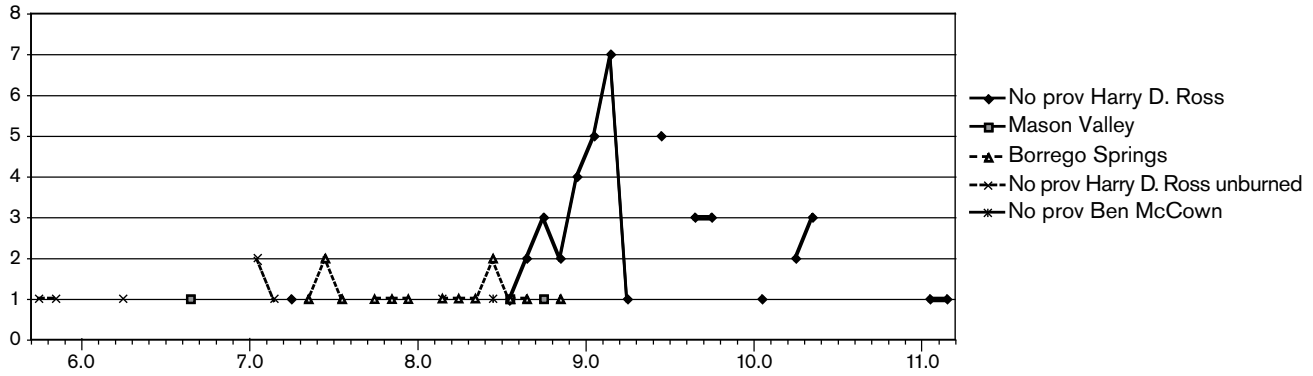

Figure 5. Diameters of large ***Olivella*** **wall disc beads from the Anza Borrego Desert**

Phase M5c in southern California. Phase M5c dates to approximately A.D. 1100–1200 (possibly plus 50 years). Phase M5c began immediately after many farming communities in Nevada were abandoned. Middle Period Phase 5c split-punched beads include a portion of the shell callus. It appears that cupped beads were first made at the same time that split-punched beads ceased to be manufactured. A large fragment of a split-punched bead was collected from a Lake Cahuilla shoreline in Imperial County; it is illustrated in Figure 3aj.

Olivella biplicata *Large Wall Disc Beads (n=100) [G2 (Bennyhoff and Hughes 1987)]*. Thirteen large *Olivella* wall disc beads were recovered from probable late Phase L1 contexts at the Bancroft Ranch Site (SDI-4638) in San Diego. In addition, the collection from Anza Borrego Desert includes 61 large, burned *Olivella* wall beads collected by Harry Ross, 16 from Borrego Springs, and two from Mason Valley (Fig. 4a–ab). Figure 5 illustrates the ranges and frequencies of different diameters of large wall disc beads. Six unburned *Olivella* large wall disc beads from the Harry Ross collection tend to be the smallest ones in the collections we examined (Fig. 4r–v). The largest are the burned beads from the H. Ross collection (Fig. 4a–h). Burned beads from Borrego Springs are intermediate in size (Fig. 4k–q). Twelve wall disc beads from SDI-4638 were between 6.0 and 9.3 mm. in diameter, and one was 4.7 mm. in diameter. It appears that there was a shift to larger-sized wall disc beads during Phase 1 of the Late Period. This trend ended at the beginning of Phase 2, when lipped beads became

clearly differentiated from cupped beads, and large wall disc beads ceased to be manufactured.

During late Phase 1 of the Late Period, before the use of cylinder and thin-lipped beads, relatively large wall disc beads were traded by the Chumash to northern and eastern neighbors. They have been recovered from the Lake Cahuilla shoreline village at La Quinta (Riv-1179) (King 1986a; Sutton and Wilke 1986:145), Van Norman Reservoir (LAN-629) (Foster and Wlodarski 1983; Gates 1977), and the Late Period Santa Monica Mountain Chumash village of *Talepop* (King 1982).

Olivella biplicata *Medium Disc Beads (n=2)*. One medium-sized disc bead was found at *Meti* (SDI-4638) (Figure 4ac) and another at Santa Catarina Springs (SDI-343) by Paul Ezell (Figure 4ad). It is probably a Late Period type.

Olivella biplicata *Small Disc Beads (n=5) [G1 (Bennyhoff and Hughes 1987)]*. Small disc beads were used during all of the Middle and Late Periods in the Santa Barbara Channel; they are too small to be recovered in eight-mesh screens. Four small disc beads that were calcined and stuck together were recovered with the Borrego Springs collection (Fig. 4ae). The relatively long *Olivella dama* 'barrel' beads associated with these may indicate a late Middle Period date for the beads, although similarly calcined cupped beads and an incised cylinder bead, also from Borrego Springs, may indicate that the small disc beads are from a Late Period Phase 2 context. Another small disc bead is from Accession 622-20-42 from Anza Borrego. Bead lots associated with occupations around Lake Cahuilla during Phase 1 indicate small wall disc beads were used there during Late Period Phase 1a. Lots from FW-1 (FW=Douglas Fain and Phil Wilke collection), FW-11, FW-24, and FW-26 have small-diameter cupped and wall disc beads consistent with the sizes of beads found in Phase L1a contexts in Chumash sites.

Olivella biplicata *Rough Disc Beads (n=573) [H (Bennyhoff and Hughes 1987)]*. *Olivella biplicata* rough disc beads were the most common type of bead made in Southern California during the Spanish and Mexican mission periods. Including fragments, over 427 rough disc beads are present in the Rancho Cuyamaca State Park collections. Most are from two lots of beads obtained by artifact collectors in or near Rancho Cuyamaca State Park (Table 1). All of these beads were burned and were apparently found with cremations. True's Type 1 beads from Cuyamaca are rough disc beads (1970:39–40). Some 145 beads are from the collections in or near Anza Borrego Desert State Park. Most of these were burned and were probably associated with cremations. A selection of *Olivella biplicata* rough disc beads are illustrated in Figure 4af–az.

Rough disc beads made from the walls of *Olivella biplicata* shells are usually over 4.0 mm. in diameter, and the earliest have relatively parallel-sided holes that are close to 1.0 mm. in diameter. These perforations were apparently made with drills tipped with iron needles. Rough disc beads were probably first made around 1780, and they continued to be made throughout the Spanish and Mexican mission periods. Between 1780 and 1840, rough discs beads generally increased in size; in addition, the degree to which the bead margins were ground smooth decreased, the diameters of perforations became more variable, and perforations became more biconical when compared to early historic beads that usually had straight-sided perforations. The relatively rapid changes in *Olivella biplicata* rough disc beads enables a discrimination of time periods of short duration (Gibson 1976; King 1974, 1985, 1990b, 1990c).

The contexts used to determine the ranges of diameters delineating short time periods include burial lots at *Humaliwu* (LAn-264), areas at the Ventura Mission site (Ven-87), the Santa Barbara Presidio, Santa Inez and La Purisima missions, Mescalitan Island (*Helo'*) (SBa-46), Arroyo Sequit, Smugglers Cove on Santa Cruz Island, the Isthmus at Catalina Island, and many other sites throughout southern and south-central California. Many of these sites were founded or abandoned at known dates; it has therefore been possible to establish a refined chronology of changes in beads used between A.D. 1770 and 1844, utilizing changes in bead diameters and the degree of finish by grinding of the margins of beads (see King and Gamble 2008: Figs. 11 and 12).

The manufacture of shell beads continued at the missions after the abandonment of native villages. The presence of a sequence of beads at the Ventura Mission site (Gibson 1976; King 1990b), the beads from the post-1813 La Purisma Mission site (King 1990c), and ethnographic accounts all indicate the manufacture of beads continued during the later mission period. Luisa Ignacio told Harrington that Father Antonio Ripoll,

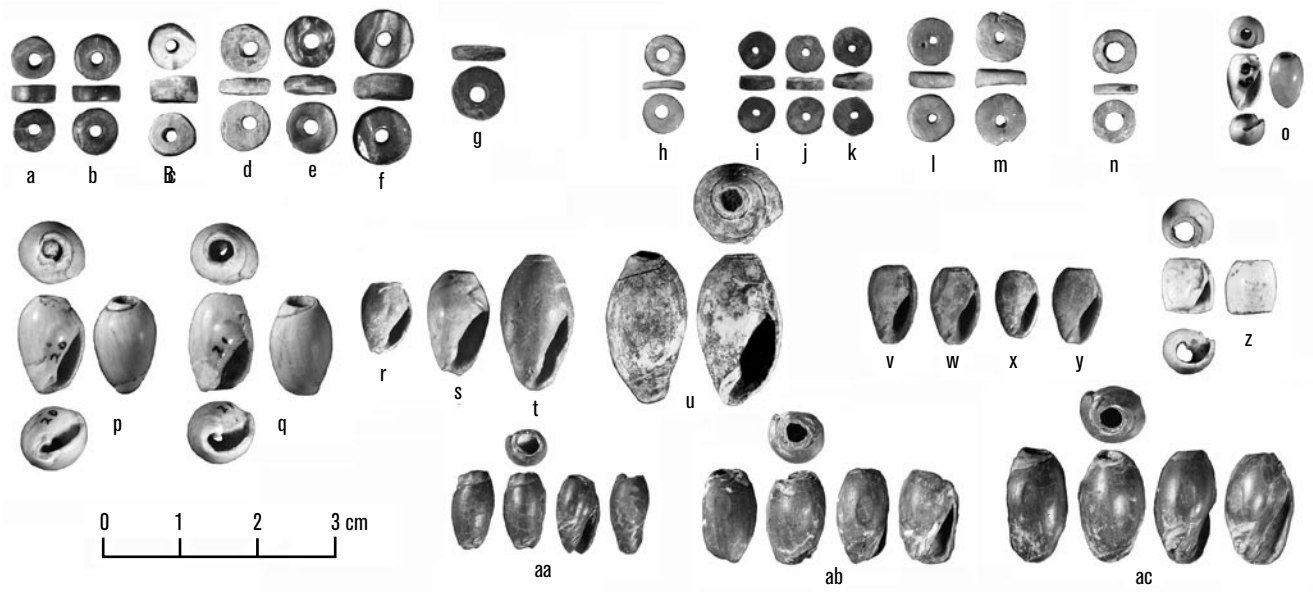

Figure 6. ***Mytilus californianus*** **disc (a–g),** ***Haliotis rufescens*** **epidermis disc (h–m),** ***Haliotis nacre*** **disc (n), and** ***Olivella biplicata*** **Spire-removed beads (o–ac).**

who was at Santa Barbara Mission between 1815 and 1828 (before Luisa was born), ordered the Indians to make shell beads to help pay for fiestas (Hudson et al. 1981:104). Apparently, after the Channel Island villages were abandoned, beads were still being made at the missions. Archaeological evidence demonstrates the manufacturing of beads at Ventura Mission (Gibson 1976). Harrington's ethnographic notes describe the manufacture of beads in the 1840s at the mouth of the Ventura River (Johnson 1991:13–14). The beads recovered from historic sites throughout Southern California are within the ranges of sizes and degrees of finish of beads found at Ventura Mission. Evidence of disc bead manufacturing has not been reported from non-Chumash Late Period sites.

Most of the rough disc beads from Anza Borrego and Cuyamaca are from the Spanish mission period (1769–1821). The beads from the site near Split Mountain appear to be the latest beads in the collections from Anza Borrego, and some of these beads probably date from the Mexican mission period (1821–1834).

Olivella biplicata *Rough Disc Beads with incised edges (n=1).* One incised rough disc bead was found at Cuyamaca State Park (Fig. 4ba). Incised rough disc beads were made during the early Spanish mission period.

*Mussel (*Mytilus californianus*) Shell Disc Beads (n=7). Mytilus californianus* shell disc beads were used from Middle Period Phase 5 until the Spanish invasion, and were made in the Santa Barbara Channel region. Mussel shell disc beads in the size ranges found in the Anza Borrego collection were used in southern California during Middle Period Phase 5a and 5b and Late Period Phase 1b and 1c. One bead from Cuyamaca State Park that is not in Table 1 (Accession 618-701-611) is 7.2 mm. in diameter, 2.0 mm. thick, and has a perforation 1.9 mm. in diameter. The Anza Borrego collection includes six mussel disc beads (Table 1 and Fig. 6a–g). They range between 5.7 and 7.7 mm. in diameter.

*Abalone (*Haliotis rufescens*) Epidermis Disc Beads (n=8).* Abalone epidermis beads were used from the middle of Phase 1 of the Late Period into the historic Spanish mission period. One *Haliotis rufescens* epidermis disc with a biconically-drilled perforation 1.8 mm. in diameter was found at the Hendrickson House site (Fig. 6h). The larger perforation of this bead indicates that it was made before 1780. Five *Haliotis rufescens* disc beads were found with over 299 *Olivella biplicata* rough disc beads and two glass beads in the lot labeled 618-X-311 on West Mesa at Rancho Cuyamaca State Park. They have small perforations and generally have the same diameter (range from 4.9–5.9 mm.) as the *Olivella* rough disc beads in the same collection. All beads with this accession number were burned, apparently in a cremation fire. True's Type 2 beads from Cuyamaca are

Haliotis rufescens disc beads (1970:39–40). Two historic *Haliotis rufescens* epidermis disc beads were found at SDI-98 in the Cuyamacas. They were associated with Olivella rough disc beads of similar age. Abalone epidermis beads made during the historic period have small parallel-sided perforations similar to the perforations of Olivella rough disc beads, with which they are often strung (Fig. 6i–m). Beads ranging in size from 5.5 to 6.2 mm. in diameter were found in the same area at *Talepop* as a concentration of rough disc beads ranging between 5.0 and 6.8 mm. in diameter. It appears that this type was infrequently used during the later Mexican mission period. *Olivella biplicata* rough disc beads and *Haliotis rufescens* disc beads are the types of shell beads most commonly used in southern California during the historic period.

*Abalone [*Haliotis *sp.] Nacre Disc Bead (n=1)*. One unburned *Haliotis* sp. nacre disc bead was in the Harry Ross collection (Fig. 6n). This type of bead was most frequently used during Phases 1 and 2 of the Middle Period. The bead may also be a small Late Period ring or disc ornament. It is one of few artifacts in the collection that possibly came from a context earlier than the end of the Middle Period.

Olivella biplicata *Spire-Removed Beads (n=186) [A1 (Bennyhoff and Hughes 1987)]*. Eighty-three *Olivella biplicata* spire-removed beads are present in collections from San Diego sites west of Cuyamaca Rancho State Park and Anza Borrego; 47 are from Cuyamaca, and 56 are from the area in and around Anza Borrego Desert State Park (Table 1 and Fig. 6o–ac). Many beads made by removing the spires of *Olivella biplicata* shells were probably manufactured in San Diego County. Most of the spire-removed *Olivella biplicata* beads have little contextual information, and many may have come from Early Period contexts. The relative frequency of beads made by removing the spires of *Olivella biplicata* shells is greatest in early contexts throughout southern California, where they were the dominant type of bead during the Early Period and the first phase of the Middle Period (Gibson 2000b; King 1990a). Compared to many types of beads, there is a high frequency of unburned spire-removed beads. According to May (1974), the practice of cremation in the San Diego region did not occur until about A.D. 900 to 1150. Because many beads from early contexts are not burned, it is probable that some are from early contexts. Six medium-sized burned beads from the Harry Ross collection have abraded areas on opposite sides that indicate they were strung side-by-side in the manner that some *Olivella dama* beads were strung, which also have similar abraded areas on their sides. Three are illustrated in Figure 6aa-ac. The other burned beads in the H. Ross collection are beads used during Late Period Phase 1, and it is therefore probable that these spire-removed beads were used during Late Period Phase 1. *Olivella biplicata* spire-removed beads with abraded areas on opposing sides have also been identified at the historic settlement of *Meti* (SDI-4638). Several sites in Orange County, including ORA-287, ORA-676, ORA-1208 (Gibson and King 1991a), ORA-19, ORA-582, and ORA-855 (Gibson 2000a) had *Olivella biplicata* side-ground beads (King and Gamble 2008). It appears that during the Late Period, people obtained small- to medium-sized *Olivella biplicata* shells along the coasts of Orange and San Diego counties, and used them to manufacture woven beadwork in which shells were strung side by side. This beadwork was similar to beadwork done with *Olivella dama* shells in the Southwestern United States. This type of Californian bead should be looked for in Southwestern archaeological and ethnographic collections.

Haliotis *sp. Ornament Fragments (n=6+)*. Abalone shells were used to manufacture ornaments along the California coast; the shells were also traded to interior groups, who also manufactured ornaments. Figure 7a–h illustrates abalone ornaments from San Diego County. Four abalone ornaments were found in the collection from *Meti* (SDI-4638). One is a pendant fragment made from a *Haliotis cracheroderi* that still retains its epidermis (Fig. 7a); another involves fragments from a single central-perforated rectangular nacre ornament (Fig. 7b–c); a third involves fragments of a burned ring-shaped nacre ornament (Fig. 7d–e); and a fourth is a fragment of a shaped piece of nacre (Fig. 7f).

There are also two abalone ornament fragments from a site near the Lake Cahuilla beach line in Imperial County; both lack their outer covering and are all nacre (Fig. 7g–h). The nacre of the ornament illustrated in Figure 7g appears to be from a *Haliotis cracheroderi* shell. Our present knowledge of ornaments from the area is limited, and reconstruction of the ornament shapes and their temporal placement requires further research.

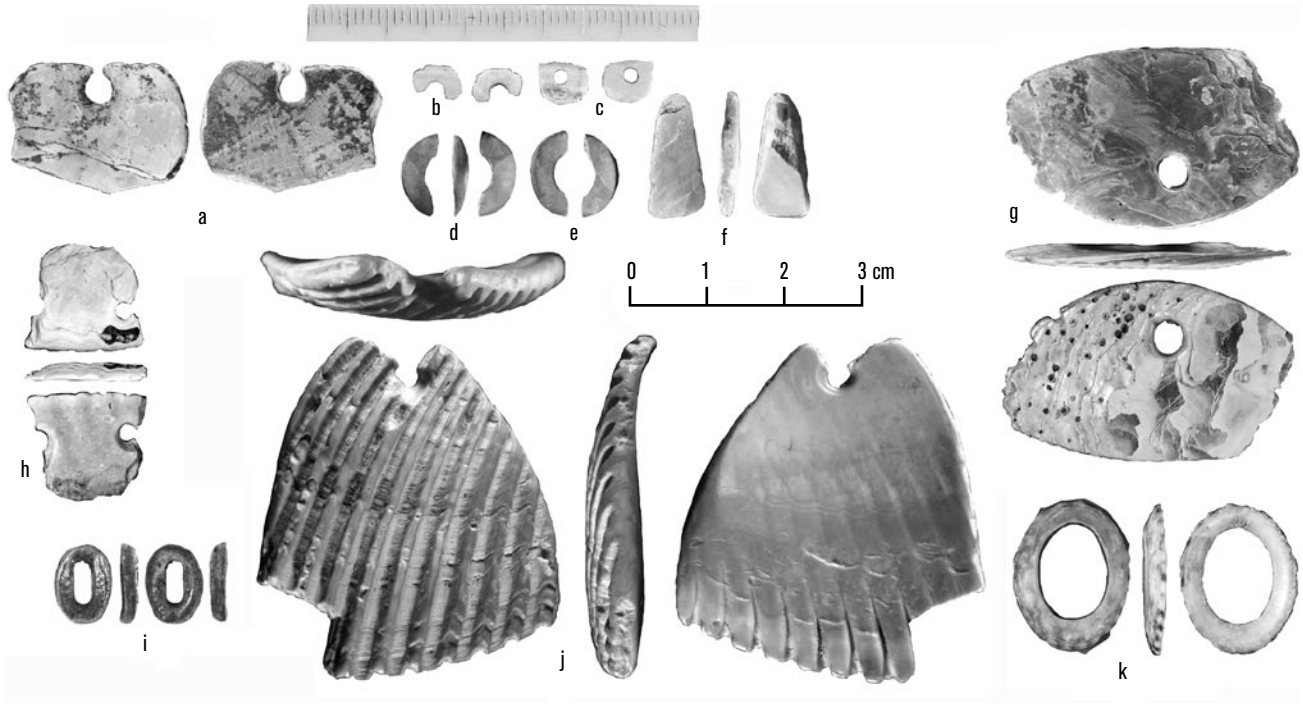

Figure 7. Ornaments from Pacific coast shells.

Trachycardium quadragenarium *Pendant and Fragment (n=2)*. One almost whole unburned pendant of *Trachycardium quadragenarium* shell was found at a site on a Lake Cahuilla beach line in Imperial County (Figure 7j). A burned shell fragment of the same material was also found in Mason Valley.

Fisurella volcano *Limpet Callus Ring Ornament (n=1)*. One unburned shaped ring from the callus of a volcano limpet is in the Cuyamaca collections at SDI-913 (Figure 7i). Volcano limpet rings were used during the Middle Period in the Santa Barbara Channel, indicating the presence of a Middle Period occupation at SDI-913.

Lottia limatula *Limpet Ring Ornament (n=1)*. One unburned ring made from the outer part of a File limpet (*Lottia limatula*) was found at SDI-2600. It probably indicates the presence of a Middle Period occupation. The ring is illustrated in Figure 7k. Its inner edge appears ground.

Beads and Ornaments Made From Gulf of California Shells

Seven hundred and eighty-nine of the beads and ornaments studied were made from shells native to the Gulf of California. Most are types found in Classic Period Hohokam sites and southern California Late Period sites extending to the Los Angeles County coast. The most common beads are made from *Olivella dama* shells. It appears that they were used during the same periods as the beads made from Pacific Coast shells found in the collection.

The best evidence for the manufacture of shell beads at a Kumeyaay site is from IMP-5427, the Elmore site in Imperial County (Rosen 1994). Marty Rosen identified 229 pieces of *Olivella* shell from this protohistoric village site, including 169 fragments of *Olivella* shell bead-making detritus. Seven of these pieces were identified as *Olivella dama*; the others were not identified by species because they lacked diagnostic features. Rosen (1994:4–6 and 15–18) proposed that the type of detritus indicated that spire-removed and barrel beads were being manufactured. Sixty beads or bead fragments were identified in the collection, most of which were not identified by species. The majority of those that were identified to the species level (n=16) were made from *Olivella dama*. Only three beads were made from *Olivella biplicata*; they were all spire-removed beads. Additional evidence for bead making comes from the

Spindrift site (CA-SDI-39); some clam disc blanks were found here, indicating a manufacturing of clam shell disc beads during the Early Period (Farmer and La Rose 2009). In addition, the authors suggest that Olivella spire-removed beads were probably made at the site as well.

Several *Olivella dama* types were identified in our study. One includes shells that have had their spires removed. Another common Late Period type includes shells that have had their spires removed to a greater degree, and their bases ground to form a barrel- or cylinder-shaped bead. The collection also includes a bead made only from the top part of a shell, as well as a less modified spire- and base-removed bead. In southern California, most *Olivella dama* beads similar to the beads from the Anza Borrego Desert and Cuyamaca are from Late Period contexts. They were frequently used during pre-Spanish periods, and became rarer during the Spanish mission period. Seven hundred and fifty-two *Olivella dama* beads were present in the collections studied.

Olivella dama *Spire-Removed Beads (n=479)*. *Olivella dama* spire-removed beads include shells with spires that were removed by being ground, chipped away, and eroded; the latter could not be identified as spire-ground or spire-chipped. There were very few eroded beads. Fifty-one of the *Olivella dama* spire-removed beads were from sites west of Cuyamaca Rancho State Park and Anza Borrego; 85 were from the Cuyamacas; and 343 were from the Anza Borrego area. Details about the sizes of most of these types can be found in several reports (Gamble 2008; Gamble and King 2004; King 2004).

Olivella dama spire-removed beads were strung in several different ways. Many beads have no facets on their sides or grooves on the edge where the spire was removed, and these were probably strung end-to-end on strings. Some of these are illustrated in Figure 8a–e. These beads may have been strung in line on single strands or may have been used in woven networks, but they were not worn long enough to develop the signs of wear found on some of the other beads. The beads illustrated in Figure 8a-d from the Harry Ross collection and in Figure 8e from Mason Valley were probably strung end-to-end. All the *Olivella dama* beads in these two collections were burned.

Spire-removed beads with abrasion-ground facets on their sides and/or grooves on the edge of the hole where the spire was removed were apparently strung side-by-side (Figure 8g–m). The facets on their sides resulted from abrasion against adjacent beads. The grooves were caused by wear from strings that passed over the edges of the perforated end and rubbed against the edges of the perforations. Figure 8k shows three *Olivella dama* spire-removed beads calcined together from a cremation in a collection from Cuyamaca (Accession 618-X-189) that had a total of 59 burned *Olivella dama* spire-removed beads. The three calcined beads indicate the spire-removed *Olivella dama* beads were strung side-by-side as part of a woven network of beads, as illustrated in Orchard (1975:26–27). It is probable that some of the less well-preserved spire-removed beads were also strung side-by-side, but the evidence for this has been destroyed by erosion and breakage. In the collection from Anza Borrego, fewer *Olivella dama* beads that have signs of being strung side-by-side were burned than those without signs of wear.

Olivella dama *Spire-Ground Base-Chipped Beads (n=1)*. One unburned *Olivella dama* spire-removed and base-chipped bead was collected from SDI-331. This bead is less altered than the *Olivella dama* 'barrel' beads. It is illustrated in Figure 8n.

Olivella dama *'Cap' Beads (n=1)*. One unburned bead made from the top portion of an *Olivella dama* shell was in the collection from Borrego Springs (Fig. 8o).

Olivella dama *'Barrel' Beads (n=271)*. *Olivella dama* spire-removed and base-ground 'barrel'-shaped beads were identified in the collections studied. These beads were probably strung in strands. The range of sizes and degree of grinding are similar to other *Olivella dama* barrel beads found in Late Period contexts in southern California. Generally more of the shell spire was removed than on the earlier spire- and base-ground *Olivella dama* beads that were used during the Santa Cruz and Sacaton Phases of the Hohokam. They were used during the Late Period and continued to be used during Spanish colonization. Figure 8p–ah indicates the range of variation in the type. The beads of this type from Anza Borrego indicate that there may have been a trend toward thinner beads and the removal of a larger portion of the shell.

Oliva undatella *Spire-Removed Beads (n=17)*. Seventeen beads in the collections were made by grinding off the spires of *Oliva undatella* shells (Fig. 8ai–an). All of the beads are burned and are from the Anza Borrego area. The only one not noted in Table 1 is from the Frizzel collection. Gifford (1947:11) reported the presence of

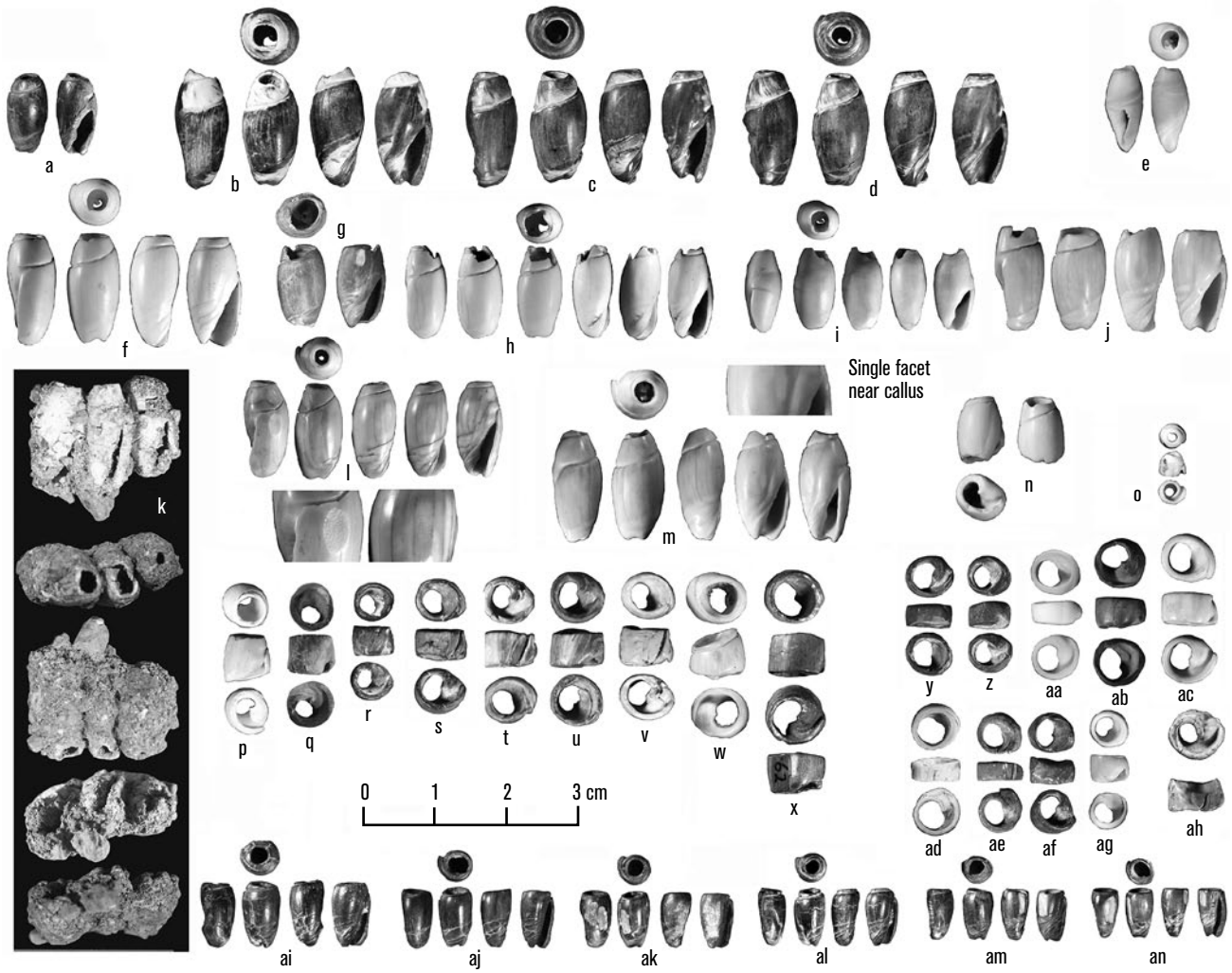

Figure 8. ***Olivella dama*** **spire-removed beads (a–ah).** ***Oliva undatella*** **spire-removed beads (ai–an).**

Olivella undatella as a Gulf species used to make 24 calcined beads with spires and bases removed that were found in sand dunes near Indio. Whether he was actually referring to *Olivella dama* or *Oliva undatella* can only be determined by looking at the collection. He listed no *Olivella dama* beads in his study of the beads at Berkeley. The associations of *Oliva undatella* spire-removed beads with other beads in the Anza Borrego collections indicate they were used during the later part of Late Period Phase 1.

Conus *Beads and Ornaments (n=13)*. The species of *Conus* used for these beads and ornaments has not been identified. They probably are not made from *Conus californicus*, but rather from various other species from the Gulf of California. Jernigan observed that most *Conus* shell artifacts from the Gulf of California were used during the Classic Hohokam Period (ca. A.D. 1100–1450). Although isolated occurrences of *Conus* shells have been found even in Pioneer Period contexts, *Conus* may be considered essentially a Classic Period shell (Jernigan 1978:42, 73). The Classic Period in southern Arizona was contemporary with Middle Period Phase 5c and Late Period Phase 1 in California. Nine *Conus* sp. artifacts were found at Borrego Springs, where large, burned *Olivella* wall disc beads and Olivella cupped beads indicate the presence of a mortuary area used during Late Period Phase 1b or 1c (ca. A.D. 1300–1500). It appears that the *Conus* sp. beads in the collections are made from Gulf of California species. Figure 9a–e illustrates five of these beads. One medium *Conus* shell (#159) with its spire removed was found at SDI-2524. It is illustrated in Figure 9f. A large *Conus* cap bead from Accession 622-10-1f collected by Jane

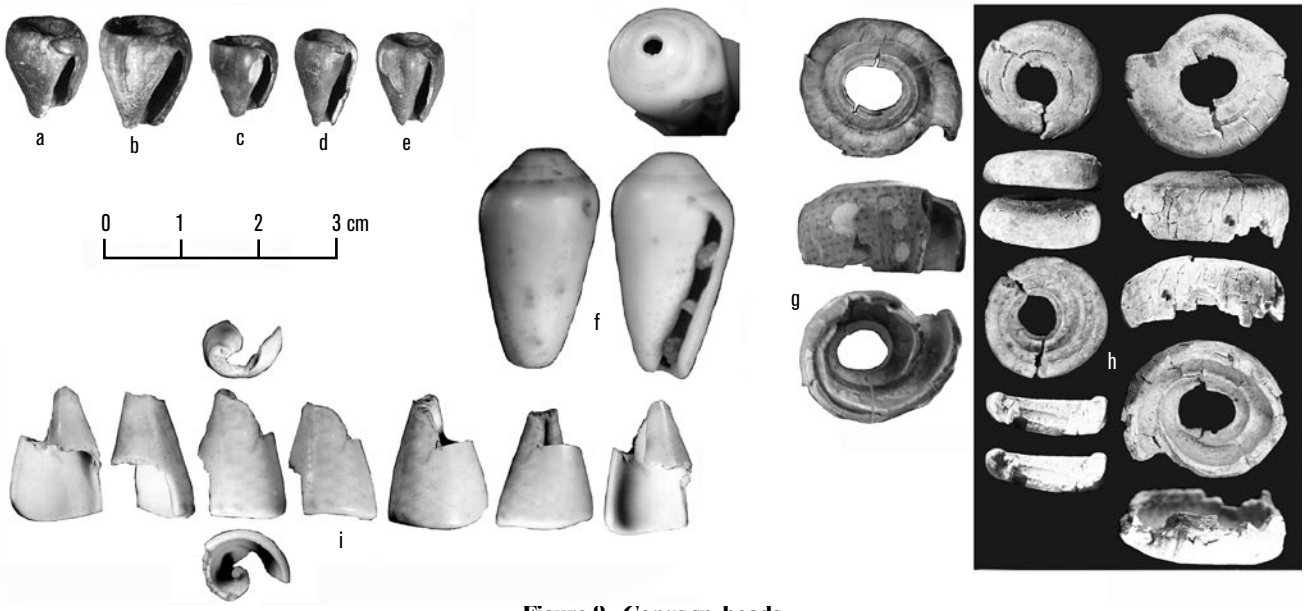

Figure 9. *Conus* sp. beads.

Thorness from the desert is similar to four *Conus* beads associated with a cremation at Cuyamaca State Park (Fig. 9g–h) (Gamble and King 2004; King 2004). The bead has spots and is probably from an Interrupted Cone (*Conus ximenes*). A fragment of a burned bead from Borrego Springs is similar to the whole bead.

There is also one fragment of a *Conus* shell (Fig. 9i) that appears to be a large portion of a pendant or tinkler similar to the tinklers in a necklace collected ethnographically at Isleta Pueblo and illustrated by Orchard (1975:42–43). *Conus* tinklers are present in small numbers throughout the Anasazi sequence, except in Pueblo III, when they are common (Jernigan 1978:162).

*Freshwater Snail (*Physella *sp.) Beads (n=1).* One freshwater snail shell with its spire ground off was found in the collection made by Harry Ross. The shell may have been obtained locally. It is illustrated in Figure 10a.

Rangia mendica *Ornaments (n=3). Rangia mendica* is not mentioned as a shell species commonly used in the Southwest; perhaps it was most frequently used along the Colorado River. It lives in brackish water. *Rangia mendica* fossils can be seen on shorelines in the Salton Basin. Their modification by perforation near the hinge and large central perforation is similar to the treatment of other whole shells in the Southwest. There is one *Rangia mendica* shell in the collections with a large perforation in its center (Fig. 10b); it is from an old beach line of Lake Cahuilla in Imperial County (Table 1). Two *Rangia mendica* pendants with small perforations near the shell hinge were collected by Harry Ross from the Anza Borrego region (Fig. 10c–d). It appears that the two pendants may be valves of the same bivalve shell. They are both drilled near the shell hinge.

Glycymeris maculata *with Central Part of Shell Removed (n=1).* A burned (apparently cremated) fragment of a *Glycymeris maculata* ornament was in the collection from Mason Valley. *Glycymeris* shells from the Gulf of California were sometimes modified by perforating a large hole in their center. Both Pecten and (more frequently) *Glycymeris* shells were sometimes perforated with a hole that was from a quarter to a third the diameter of the shell. The hole was placed centrally on the vertical axis and either centrally or more toward the top on the horizontal axis of the shell (Jernigan 1978). The fragment in the collection has been ground and polished along its interior edge, and it appears to be part of a whole shell with a large perforation similar to those described by Jernigan. Figure 10e includes a reconstruction that assumed that the ornament was symmetrical along the axis of the shell and employing a mirror image. The shape of the ground areas indicates that the perforated area had a more complex shape than a circle.

Glycymeris *sp. Shell Arm-Bands (n=2).* Two *Glycymeris* shell arm-band fragments were recovered at the Cottonwood site, SDI-777, west of the Cuyamacas (Fig. 1). This type of arm band was common in the

Figure 10. Freshwater snail bead (a) and Gulf of California shell ornaments (b–e).

Southwest in the Hohokam sequence; McGuire and Howard (1987) suggest that these low-value items may have served to link commoners with elites in the Southwest. Their meaning for the occupants of the Cottonwood site may have been very different, because they are relatively unique in the San Diego region.

Glass Beads (n=54)

Fifty-four glass beads were present in the collections reported here (Table 1). Because we did not consistently examine all of these beads in the same way, and they are not the focus of this paper, we only report them to provide an indication of which sites have evidence of historic era artifacts. More details on some of these are provided elsewhere (Gamble 2008; King 2004; King and Gamble 2008).

CONCLUSIONS CONCERNING PERIODS OF OCCUPATION AND EXCHANGE NETWORKS

The shell beads and ornaments from the San Diego region are significant in that they indicate that the inhabitants of the area participated in exchange and political networks that included both the greater Southwest and the Pacific Coast. They also provide chronological information about numerous sites, some of which have little or no other associated temporal data. Although many collections lack specific provenience and contextual information, insight into the use and distribution of beads and ornaments over time helps us understand ancient sociopolitical and economic interactions in the region.

Most of the beads and ornaments from these collections were probably found with cremations. When detailed provenience is lacking, it is assumed that beads that are in lots and are burned were probably associated with cremated individuals. Zepeda's (1999) study of beads from the historic village site of *Amat Inuk* provides evidence that burned beads were in association with cremated individuals, as is the case with many cremated bead lots in Cahuilla territory (King 1995). The collections from the Anza Borrego desert area and sites west of Rancho Cuyamaca are primarily types made after A.D. 1100 and before 1851. In contrast, collections from Rancho Cuyamaca, except for beads from the Drippings Springs site (SDI-860) and *Hual-cui-cuish* (SDI-945), contain types made after A.D. 1700 and before 1805. There are no types of beads that indicate contexts later than 1851.

Other collections from Anza Borrego State Park also have Late Period shell beads and ornaments, as well as some from earlier contexts. A study of the Indian Hill Rockshelter at Anza Borrego Desert State Park

indicates that Early and Middle Period beads similar to types used in the Santa Barbara Channel were used in the Anza Borrego Desert (McDonald 1992; Wilke et al. 1986:102–105). Shell beads collected by State Parks archaeologists in 1977 from the Barrel Springs site in the Lower Borrego Valley, approximately three miles north of Ocotillo Wells, were identified as Late Period types by Robert Gibson (personal communication, 1977). The collection included nine *Olivella* rough disc beads, an *Olivella* thin-lipped round bead, three *Mytilus californianus* disc beads, spire-removed *Olivella biplicata* and *Olivella dama* shells, and spire- and base-removed shells.

Studies of collections from Orange and Riverside counties have documented that most beads in the region are types made on the Santa Barbara Channel Islands (Gibson 1993, 1994, 1995, 1996a, 1996b, 1996c, 1996d, 1998, 1999a, 1999b, 1999c, 2000a, 2000b, 2004; Gibson and King 1991a, 1991b; Gibson and Koerper 2000; King 1986a, 1986b, 1987, 1989, 1995). Our research on beads from the San Diego area demonstrates that the networks in which these beads were involved extended as far south as the Mexican border. It is not yet known if shell beads from the Santa Barbara Channel were used south of the Mexican border, or even how far south and east they occurred, if in fact they were used at all in those areas. We do know that they were traded north to the northern Sacramento Valley and east at least as far as Pecos, New Mexico. It is probable that they were also used in parts of what is now Mexico. Studies of beads from the vicinity of old Lake Cahuilla and Tahquitz Canyon (King 1986a, 1995) indicate that during the Late Period, the same types of beads found in Cahuilla sites in the northern part of Cahuilla territory were used by both the Cahuilla and the Kumeyaay who lived in the Anza Borrego Desert.

Most of the shell beads that were studied that were made from Gulf of California shells are types found in Classic Period Hohokam and protohistoric Pima sites in Arizona. These types were also used in the northern part of the Southwest during Pueblo III and IV. Disc beads made from Gulf of California shells found in Hohokam sites (Haury 1938; Jernigan 1978) are also found in San Diego and other southern California sites; however, they are infrequently found.

The inhabitants of the San Diego region probably produced many of the *Olivella biplicata* spire-removed and barrel beads. Once made, they were used locally, traded, or conveyed to other areas of San Diego County and beyond. Disc beads made from Pacific Coast shells include types made from *Olivella biplicata*, *Haliotis rufescens*, and *Mytilus californianus*. The types of beads made from these shells include *Haliotis rufescens* epidermis disc beads, *Mytilus californianus* disc beads, *Olivella biplicata* disc beads, *Olivella biplicata* rough disc beads, *Olivella biplicata* cupped beads, and *Olivella biplicata* lipped beads. Massive amounts of shell bead-making detritus have been documented in the Santa Barbara Channel region. The similarities in the diameters, perforation sizes, and thicknesses of the disc beads found in the San Diego region and the beads manufactured by the Chumash support the conclusion that the Chumash made most of the disc beads and traded them to the Kumeyaay in the San Diego region and to other North American Indian groups in California, the Great Basin, the Southwest, and elsewhere (Arnold and Munns 1994; Bennyhoff and Hughes 1987; King 1990a). Jelmer Eerkens and his colleagues (2005) examined isotopic signatures of ten *Olivella* beads found in sites in central California and the Owens Valley, and suggested that all ten appeared to have been harvested from the warmer waters south of Point Conception. This is further evidence of the widespread exchange of shell beads made in the Santa Barbara Channel region. The context of their distribution is not entirely understood, but ethnographic and ethnohistoric sources indicate that the Cahuilla used shell beads in the context of ceremonies (Gifford 1931; Strong 1929). Clan leaders exchanged shell beads with other clan leaders during such rituals as the image-burning ceremony. Worked shell beads and ornaments made from Gulf of California shells are also common in the San Diego region. Many of the beads from the studied San Diego collections were burned and were probably originally associated with cremations. Their frequent presence with cremations documents their use in a ritual context.

In summary, the beads and ornaments found in the San Diego region are evidence of exchange networks that integrated groups living in the Southwest, the interior areas of southern California, the southern coast of California, and the Santa Barbara Channel region. Late Period Kumeyaay sites are found along the Pacific Coast, in the interior valleys and mountains, and in

the Colorado Desert. The San Diego area is located between the Gulf of California and the Pacific coast, two distinct sources of shell that were used to make beads. Beads made from Gulf of California shells were most frequently used in the American Southwest. They were also used by southern California groups south of the Chumash, and are evidence of participation by southern Californians in networks that were centered in the Southwest. The frequent use of beads made in the Santa Barbara Channel documents the participation of people in San Diego County in larger Californian economic networks, networks that also extended into the Southwest and the Great Basin. People in San Diego County participated in at least two overlapping but separate international economic networks.

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