TRADE IN MOLLUSKAN RELIGIOFAUNA BETWEEN THE SOUTHWESTERN UNITED STATES AND SOUTHERN CALIFORNIA

by

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An Abstract of the Dissertation of

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Title: TRADE IN MOLLUSKAN RELIGIOFAUNA BETWEEN THE SOUTHWESTERN UNITED STATES AND SOUTHERN CALIFORNIA

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Dr. C. Melvin Aikens

This dissertation describes prehistoric trade between Native American groups of the North American Southwest and southern California. Archaeologic and ethnographic sources have been used to create a major new quantitative database on the Southwest-southern California trade. I draw on this data base to characterize the routes and intensity of exchange, as well as the specific objects involved in native trade networks.

Artifacts made of *Olivella* and *Haliotis* shells were traded eastward from the southern California Channel Islands into the Anasazi, Mogollon, and Hohokam regions of the Southwest in south Nevada, Arizona, and New Mexico. This trade spanned nearly a thousand years, with a major temporal watershed at about AD 900. This research documents

trends in the intensity of the trade along with changes in the importance of various trading centers over time. The research stresses the particular importance of an west-east route into the Southwest from southern California, and of a south-north route between Hohokam and Anasazi areas of the Southwest.

In exploring motivational factors I address the importance of trade to the maintenance of social elites in the two regions, the importance of cosmological ideas in motivating trade, and the role of marine faunal species and ritualization in the process of defining what was valued and traded.

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CHAPTER I

INTRODUCTION

The archaeological study of trade and exchange is of particular importance for exploring human relationships and values within and among past societies. The objects or materials involved reflect the social, economic, and ideological motivations of individuals and groups. Social connections and distance greatly affect what is traded. Differential abundance of trade objects or substances within communities, and among communities of different kinds, reflects structures and variables of wealth and social control within broad regions. In my study, matters of ideological significance and social relationship are also of concern.

Interest in the degree and character of cultural connections between California and the Southwest is of long standing. Early anthropologists including Kroeber, Wissler, and others were fascinated by the apparent great differences between these two cultural areas, on the one hand, and by the comparative cultural richness of both on the other. Already by the late 19th century it was hinted from ethnohistorical and archaeological evidence that the two areas, as distinct as they were, had long been connected through trading relationships.

This study explores the sociocultural implications of trade between southern California and the Southwest over a period of about a thousand years, centered on 900 AD. Though not a point of focal interest in the present study, it is important to note that coastal-interior trade is of ancient standing in western North America. *Olivella* shell beads have been traded from the Pacific Coast to interior regions of the Southwest and even beyond, to the western Great Plains, since early Holocene times (Erlandson et al. 2002; Brand 1938; Tower 1945; Jernigan 1978; Cox 1962). At Leonard Rock Shelter in Nevada, a string of 50 *Olivella biplicata* shell beads were dated to 8000 years ago (Bennyhoff and Hughes 1987; Jennings 1983:162). Santa Rosa and San Miguel Islands have provided Early to Mid-Holocene evidence of *Haliotis rufescens* shell in funerary and ritual contexts (Erlandson and Colten 1991), and *Haliotis* artifacts found in the Southwest have been dated at least as early as the Mid-Holocene (Haury 1976; Jernigan 1978).

My current study, focused on the California-Southwest trade, builds on the early work of Brand (1938), Tower (1945), Gifford (1947), Ruby (1970), and many others, with a particular focus on molluskan data. Unlike the important work done by Ruby (1970), which focused primarily on ethnographic sources and archaeological pottery, my study focuses on archaeological evidence of shell ornaments made from key molluskan species. It is supported and warranted by an extensive new compilation of recently obtained archaeological data (Appendix A) that brings the Southwest corpus under examination to 26,317 molluskan artifacts gathered from 139 sites in the Southwest (Tables 14, 16, 18, 22). Additionally, Appendix A includes 29,817 molluskan artifacts gathered from 71 sites in southern California.

The main elements of my study include:

- An explanation of the rationale for focusing analysis on molluskan religiofauna.
- A brief and generalized orienting sketch of Southwest and southern California history.
- A brief history of previous research into the shell trade between southern California and the Southwest.

- Presentation of newly compiled quantitative data on what was traded, where it came from, and where it came to rest in the archaeologic record. This study charts temporal changes and identifies primary, secondary, and tertiary contexts of shell trade use.
- An account, based on both archaeologic and ethnohistorical data, of the routes of this long distance trade and the intermediaries involved.
- An interpretation of the cultural uses and ritualization of *Haliotis, Olivella*, and *Spondylus* in the Southwest and southern California, and my argument that the trade between these areas was motivated by cosmologically grounded ritual that functioned to integrate increasingly complex societies and solidify the roles and powers of sociopolitical elites.

The remainder of this chapter is devoted to defining the concept of molluskan religiofauna, and presenting the culture-historical background and brief history of research into the shell trade. The remaining topics will be treated in the following chapters.

The Rationale for a Focus on Molluskan Religiofauna

Religious artifacts made from marine shells are modified or whole un-worked shells which have little or no apparent utilitarian use as tools. Their typical primary uses are abstract, including use in healing and ritual, as symbols, and as objects of beauty. Such objects were frequently used as gifts and funerary offerings among elites and, to some extent, the general populace.

Prehistoric molluskan artifacts are relatively durable, surviving many degenerative processes, including flood, fire, and bacteria. Although shells are very durable under certain conditions, acidic conditions often cause marine shells to deteriorate or lose distinguishing characteristics such as color. Marine shell may provide lasting evidence of both short and long distance trade which can be traced to general source locations or habitats, and can be dated by Carbon 14 analysis of associated materials or the objects themselves (Vellanoweth 2001).

Molluskan artifacts are often found far inland from their original marine sources. Pacific Coast abalone and *Olivella biplicata* artifacts have been found throughout the Southwest in many prehistoric sites. When the identity of a molluskan specimen is determined, its source or general place of origin can be identified. This identification is important in an analysis of long distance trade, in that it indicates the beginning of the trade pathway for important molluskan religiofauna.

Marine shells are seen to be socially important by their pervasive presence in archaeological deposits throughout the Southwest and southern California. The distinctive shapes, colors, and textures of certain molluskan shells provided markers of social or gender distinction, supporting social stratification. Religiofaunal objects may also reinforce common cultural perceptions and values, and may transmit symbolic or cosmologic knowledge by their codes of shape, color, texture, or place of origin. By exchanging religiofaunal items, such as shell products, members of social elite groups established ties beyond the individual kin group, reinforcing trade, technology exchange, and social alliances. In funerary contexts, Southwestern elites are generally associated with marine shells, polychrome ceramics, turquoise, and feathers.

Various religiofaunal body parts such as shells, skin, claws, beaks, teeth, fur, and feathers are often seen in traditional societies as possessing the literal or symbolic power or attributes of the animals themselves (Eliade 1972). The source of marine molluskan religiofaunal species (the world's marine environments) may also be an important factor in their perceived power and uses.

Native shamans of western North America often employed religiofaunal body parts such as shells or shell products in divining and curing processes (Eliade 1958, 1972; S.L. Rogers 1982). In the Southwest, exotic marine religiofaunal objects were involved in a shamanic complex oriented towards the production and control of rain and fertility. Many western North American religiofaunal species have iridescent qualities including shells, feathers, and insects. In shamanic cosmology, iridescence seems to be associated with water, rain, growth, birth, and renewal (Eliade 1972; Jernigan 1978), giving molluskan artifacts which possessed this quality a high degree of relevance to fundamental human concerns.

A Brief Cultural History of the Southwest

The first peoples to leave evidence of their lives in the American Southwest were late Pleistocene Big Game Hunters of the Clovis culture, who were followed by various peoples belonging to the Desert Archaic Culture.

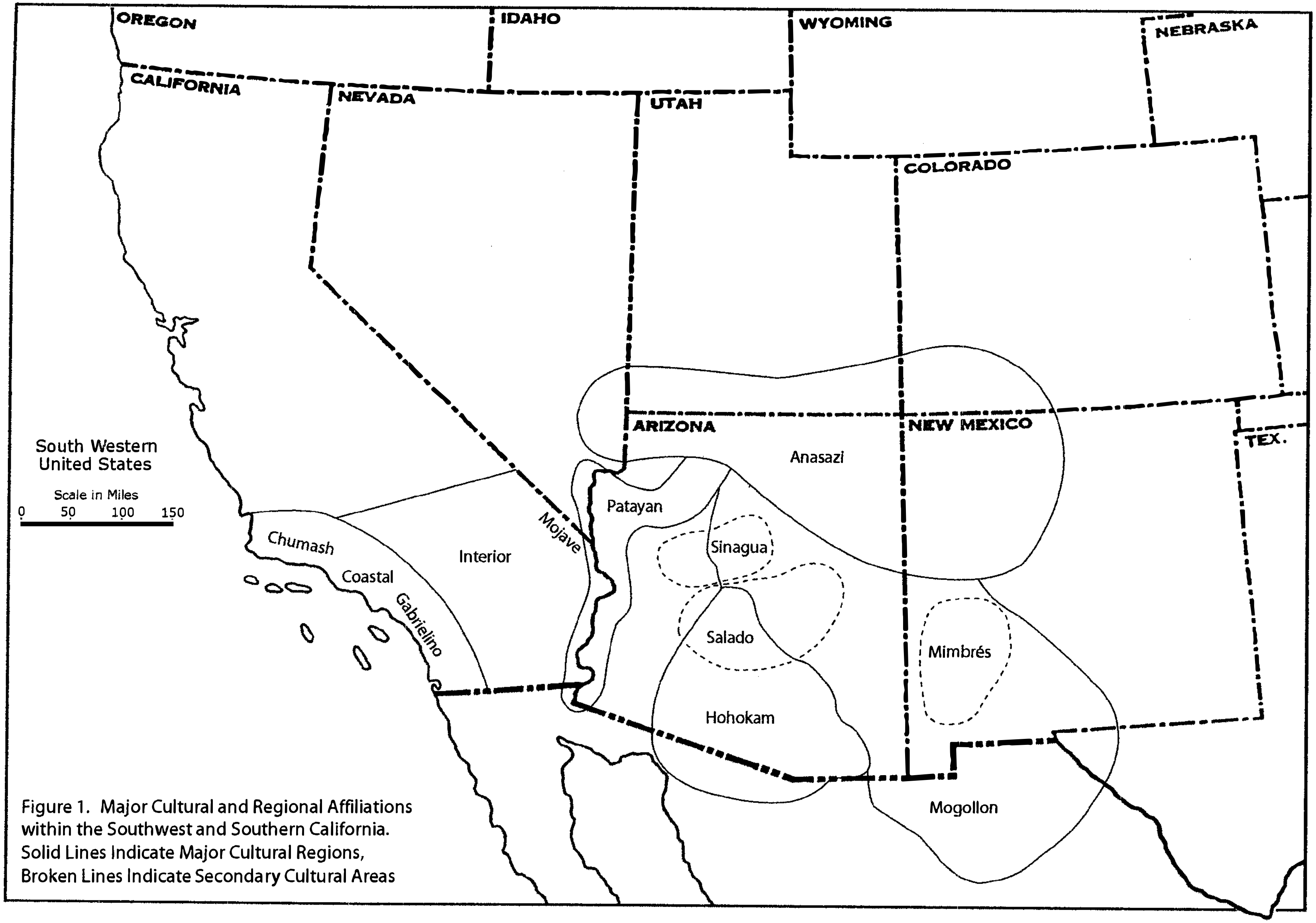


Figure 1. Major Cultural and Regional Affiliations within the Southwest and Southern California. Solid Lines Indicate Major Cultural Regions, Broken Lines Indicate Secondary Cultural Areas

Table 1.

Chronologies of Principal Southwest and Southern California Cultural Traditions, ca. 400 BC to AD 1500

Casas Grandes (DiPeso 1974)	Mogollon (Wheat 1955)	Hohokam (Haury 1976)	Anasazi (Kidder 1927)	Southern California: Coast (King 1990)	Southern California: Deserts Patayan (Schroeder 1952)	Dates AD/BC
		Civano		L2		
TARDIO						1400
Robles			Pueblo IV			
		Soho				1300
		CLASSIC				
Diablo			Pueblo III	L1		1200
MEDIO					Yuman	
Paquime		Sacaton				
Buena Fe						1100
	Mogollon V		Pueblo II			
Perros				M5	Rose	1000
Bravos	Mogollon IV	SEDENTARY			Spring	
						900
		Santa Cruz	Pueblo I	M4		
		Phase				
Pilon					Amargosa	
VIEJO	Mogollon					800
	III					
						700
Convento						
		COLONIAL	Basketmaker		Saratoga	600
	Mogollon II	Snaketown	III		Springs	
					Gypsum	500
			Basketmaker	M3		400
	Mogollon I		II			
						300
		Sweetwater				200
				M2		
						100
		Estrella				
		PIONEER			Late	0
					Archaic	
			Desert			100
		Vahki	Culture			
						200
				M1		
						300

During the Archaic Period, the Southwest was settled by highly mobile people who made their living by hunting small and larger game, and collecting a wide variety of native seeds and root bearing plants. During the final stages of the Archaic, the principal Southwestern horticultural traditions, including Hohokam in the low Sonoran Desert, Anasazi in the high desert of the Colorado Plateau, and Mogollon in the mountains between these two zones, began to be differentiated (Cordell 1984). Population growth, climatic change, and external cultural influences engendered a subsequent florescence in settled village life and the growth of large communities based upon cultivated plants (Cordell and Gumerman 1989). Between about AD 100 and 900, long-lasting regional patterns emerged. Pithouses, undecorated pottery, and new varieties of corn, beans, and squash were employed in the Southwest. Mogollon, Hokokam, and Anasazi cultural patterns clearly emerged during this time (Cordell and Gummerman 1989; Reid and Whittlesey 1997, 1999; Whittlesey 1995).

The Hohokam generally occupied the low deserts of southern Arizona and northern Mexico. They farmed by irrigation along the Gila, Salt, and other rivers, and over time built increasingly large villages and towns. The historic Pima and Papago are southern Arizona groups descended from the prehistoric Hohokam (J.T. Jones 1998; Reid and Whittlesey 1997; Wallace, Heidke, and Doelle 1995).

The Anasazi generally inhabited regions of the Colorado Plateau above 5000 feet in elevation. During its most expansive period, beginning after AD 900, Anasazi occupation extended from southeast Colorado to southern Nevada, and north into Utah. Mesa Verde, Chaco Canyon, Canyon de Chelly, Tsegi Canyon, southeastern Utah, and the Virgin and Muddy River drainages were centers of Anasazi activity. The Fremont cultures of central Utah, though not defined as Anasazi, clearly maintained Anasazi connections. The Sinagua and Salado are other Southwest groups often grouped under the Anasazi designation. The Hopi, Zuni, and other modern Puebloan groups are descended from the Anasazi (Geib and Davidson 1994; Vivian 1990).

The Mogollon generally inhabited the mountainous regions situated between the Colorado Plateau on the north, and the low deserts of the south. Though agriculturists like the others, the Mogollon tended to rely more on hunter-gatherer subsistence strategies than the other primary Southwest groups. The Casas Grandes complex represents a distinctive subgroup at the far southern edge of Mogollon territory

(Cordell and Gumerman 1989; DiPeso 1974; Whalen and Minnis 2001).

A Brief Cultural History of the Southern California Coast and Desert Regions

Early postglacial Clovis hunters of large mammals are known from the interior southern California deserts by about 9000 or 10,000 BC. Soon thereafter, in both the interior and along the coast, different kinds of stone tools and site localities indicate the presence of broad spectrum Archaic foragers who harvested plant foods in the interior deserts, and plant foods and shellfish along the coasts (Glassow 1996).

Many different regional and local chronologies have been proposed for the southern California Coast (Chartkoff and Chartkoff 1984; C.D.King 1990; Moriarty 1966; Orr 1968; M.J. Rogers 1929). In the Santa Barbara Channel area all these chronologies probably reflect the evolution of a single relatively uninterrupted culture (Erlandson 1994:43). In contrast, the coastal regions of Los Angeles, Orange, and northern San Diego counties indicate a late prehistoric diffusion of desert elements and Shoshonean linguistic groups into the coastal region possibly after about 1500 years ago

(Erlandson 1994:43; Koerper 1996; Koerper, Earle, Mason, and Apodaca 1996; Moratto 1984).

On the south coast of California, the Encinitas Tradition (Warren 1968) emerged about 5500 BC with a well developed collecting economy indicated by abundant remains of shellfish, and by characteristic millingstones in the Santa Barbara Channel region. Also known as the Millingstone Horizon (7000-3000 BC) this was a period dominated economically by seed milling and shellfish collecting (Erlandson 1994; Raab 1996).

Between 5500 and 2500 BC the Campbell Tradition (W.J. Wallace 1955), evidenced an increasing importance of acorns in the diet, as indicated by an increased use of mortars and pestles rather than millingstones. Shellfish use declined along much of the mainland coast (Erlandson 1994) and sea mammal hunting began to appear as a major emphasis. Along the coast this cultural tradition was most pronounced in the Santa Barbara Channel region, where the environment was most favorable to marine development.

The period between about 1500 BC-AD 1782 marks a time of increased population among the Chumash, large coastal and island towns, material culture elaboration, extensive trade networks, and finally the impact of new diseases (Arnold

1987; Erlandson and Bartoy 1995). Significant trade was based upon the manufacture and use of *Olivella* bead shell currency (Colten 1995; Erlandson 1994:48; Hartgill 1991; King 1990; Raab 1996; Salls, Raab, and Bradford 1993).

In the southern California desert the early Archaic San Dieguito Complex gave way to the Pinto Basin Complex by about 5000 BC. In the Mojave Desert the Pinto and Gypsum Complexes are succeeded by the Amargosa Phase at about AD 200 (Moratto 1984:353). This phase is marked by triangular stemmed and notched dart points, manos, and metates.

By about AD 900, if not earlier, Paiute ancestors occupied the deserts of eastern California and southern Nevada, their presence indicated by heavy Brown Ware pottery. Sites in the southern California deserts at this time are commonly found on dunes, near springs, and in rock shelters. An economy centered around plant food collecting and small game hunting is indicated (Laylander 1997).

By about AD 900 Patayan or Hakataya peoples, ancestors of modern speakers of the Yuman languages, were well established along the Colorado River. They grew maize, beans, and squash, made Brown Ware pottery, and served as middlemen traders between coastal California and the Puebloan Southwest (Aikens 1966; Moratto 1984; Ruby 1970; Schroeder 1961; W.J.

Wallace 1958). A flourishing lacustrine economy was established at Lake Cahuilla in the Salton Basin (Laylander 1997; Moratto 1984; Wilke 1978). The historical descendants of this tradition include the Cahuilla, Maricopa, Mojave, Walapai, Yavapai, and Yuma (Schroeder 1952, 1957).

AD 900: An Important Watershed Date

The selection of AD 900 as an important watershed date in this paper was based upon its importance as a point of transition in the development of Southwestern cultures (DiPeso 1974; Haury 1976; Jennings 1983; Jernigan 1978; Kidder 1927; Vivian 1990). Because the relationship between southern California and the Southwest is a primary concern of this paper, I have applied this important date of Southwest change and transition also to the southern California area. According to the chronologic sequence established by King (1990), AD 900 in southern California corresponds to the beginning of Phase M4 of the Middle Period. This is followed by M5 and the onset of the Late Prehistoric Period (L1, L2, L3).

In the Southwest, AD 900 marks in a general way the time of transition from a mixed regime of horticulture and hunter-gathering to a narrower and more intensive focus on horticulture. Among the Anasazi, AD 900 marks the important change from Pueblo I to Pueblo II, and the coming to full fruition of sedentary horticultural practices which had been developing among the Anasazi during Basketmaker III and Pueblo I (Cordell 1984; Jennings 1983; Vivian 1990).

Paleoclimatic evidence indicates that the period between AD 900 and 1150 provided an optimum climate for Southwest agriculturists, permitting food surpluses, exchange, and specialized craft activities (Jennings 1983; Jernigan 1978; Reid and Whittlessey 1997).

In the Southwest, the period from 900 to 1150 was generally stable with few profound droughts and several relatively wet periods (Jennings 1983:465). During Pueblo II (900-1150) the Anasazi reached their maximum geographic distribution and population peak (Berry 1982; Vivian 1990).

By AD 900 there was beginning to appear greater social complexity, including increased population, craft specialization, trade, and the first establishment of publicly constructed central places with ritual uses, such as Pueblo Bonito and Casa Rinconada in Chaco Canyon (Vivian 1990; Whittlessey 1995). The increased use and development of ceremonial kiva structures in larger Anasazi sites after AD 900 suggests community integrative functions that facilitated economic redistribution, increased trade, and commodity storage (Cordell and Gumerman 1989; Vivian 1990).

The tree-ring date of AD 915 marks the beginning of construction on Pueblo Bonito, which was the largest greathouse ever constructed in the Anasazi system. Additionally, in the Chacoan region AD 900 marks the beginning of road construction, with some roads ultimately reaching as much as 190 kilometers in length (Bernardini 1999; Vivian 1990).

Among the Hohokam, AD 900 marks the transition from the Colonial Period to the Sedentary Period. The Hohokam cultural tradition, marked by its Red on Buff pottery, reached its greatest spatial extent just after AD 900. The major Hohokam site of Snaketown reached its maximum spatial size of over 1 square km in about AD 900, when it displayed strong evidence of centralized organization, including irrigation systems, platform mounds, ballcourts, and a flourishing trade (Haury 1976; Nelson 1991).

Among the Mogollon AD 900 marks the transition from Mogollon III to Mogollon IV. This is a time of generally greater population levels and increased site size. The site of Casas Grandes, on the far southern edge of the Mogollon country, reached its maximum spatial and demographic size after AD 900 (DiPeso 1974; Whalen and Minnis 2001; Woosley and McIntyre 1999).

Overall, the period after AD 900 marks the greatest time of trade in the Southwest, as indicated by great amounts of exotic objects from the California coast and much lesser yet very significant amounts of Mesoamerican goods in Southwest sites (DiPeso 1974; Haury 1976; Judd 1954; Vivian 1990).

Previous Research on the Shell Trade Between Southern California and the Southwest

Contact and trade between the peoples of southern California and the Southwest has been investigated by a number of early and later American archaeologists, ethnographers, and linguists (e.g., Barber 1876; Bolton 1931; Brand 1938; Colton 1941; Davis 1961; Fewkes 1896; Gifford 1947; Heizer 1946; Ives 1961; Jernigan 1978; Koerper 1996; Kroeber 1925; Ruby 1970; Ruby and Blackburn 1964;; M. Rogers 1929; Schroeder 1952; Shutler 1961; Tower 1945; Walker 1945; Wallace 1958) Most of these studies however, consist principally of listings of intrusive items and brief attempts at explaining the contact. Motivations for such trade have rarely been addressed and never satisfactorily described or explained.

Kroeber (1925) noted similarities in social and ceremonial organization between the Southwest and southern California and suggested they were the result of contact diffusion. Steward (1937) countered Kroeber's ideas with a theory of coincidentally similar ecologic adaptations. Jennings (1983:57) summed up these early studies with "Southwest relationships to areas lying north, south, east, and west either early or late in time have, for many years, been ignored, blandly dismissed, or categorically denied. When they have been recognized their relationship has not been explained or studied". J.T. Davis (1961:20) concurred that "inter- and intra-tribal trade and routes employed in aboriginal California have largely been neglected by ethnographers."

Granting the essential justice of these assessments, it is nevertheless important to review the basic contentions that have been offered. As early as 1876 Barber pointed out that *Olivella* beads found both archaeologically and ethnographically in the Southwest were a Pacific Coast species and were therefore obtained through trade with

Pacific Coast tribes. In 1896 Fewkes published an article entitled "Pacific Coast Shells From Tusayan Pueblos" which reiterated and further documented the point made by Barber in 1876.

Farmer (1935) identified a Mojave-Pacific Trail, named the Mojave as middlemen traders, and indicated which groups were contacted by Mojave traders. This was the first published indication of the role of desert middlemen in trade between the Pacific Coast and Southwest. Farmer concluded, largely from ethnographic accounts, that the Mojave were the principal desert or Colorado River people who traded directly with Pacific Coast groups.

Several authors (Heizer 1941; Koerper 1996; Ruby 1970; Schroeder 1952, 1961), based primarily on archaeologic evidence, generally concurred with the notion of the Mojave as principal mobile traders between the two regions. Farmer (1935) first suggested that Southwest Puebloan trade with the Mojave may explain why and how objects of Southwest origin (such as grooved axes and ceramics) came to be found in aboriginal sites of southern California.

Donald Brand (1938) generally outlined prehistoric trade routes involving the Southwest and its peripheries, based upon the identification and distribution of marine shell artifacts. Brand's main contribution was his careful attention to species identification and original provenience in determining the types and amounts of shell species traded. Brand determined that *Haliotis rufescens, H. fulgens, and Olivella biplicata* were the principally traded shells from the Pacific Coast to the Southwest.

Malcolm Rogers (1941) presented historical and ethnic background on trade relationships within and between the Southwest and southern California. He concluded that Pueblo influence and presence extended west into California at least to the Cronise Basin, which he referred to as having "widespread Pueblo occupation." Rogers proposed that the Mojave sink was the seat of a cultural climax that was the result, in part, of trade between the Colorado River (along with the Southwest) and southern California Coast.

R.F. Heizer (1941) used ethnographic and ethnohistoric documents to characterize the nature of trade between the Southwest and southern California. Heizer and Treganza (1944) discussed turquoise mines in the southern California area which they believed were worked by Southwest Puebloans, and not California groups. Heizer (1946) also wrote an important paper on the various types of Southwestern style grooved axes found in prehistoric California sites.

John Tower (1945) attempted to define probable trade routes into and within the Southwest based primarily on the source locations and archaeological find sites of traded shell species. Tower emphasized and followed similar work done by Brand in 1938, but added to it with considerably more work on species identification, the identification of main redistribution centers, and trade routes.

Gifford (1947:61-62) determined that no less than 14 types of artifacts from Southwest sites were made from four Pacific Coast genera (*Haliotis, Olivella, Megathura, and Saxidomus*). These artifacts (identifiable with Californian types) ranged in time from Basketmaker II (AD 450) to Pueblo IV (AD 1350). Some of the provenienced Southwest specimens cited by Gifford were from the extreme westerly Virgin River Anasazi of Lost City in southern Nevada, while others were from the most easterly Anasazi sites (i.e., Pecos, New Mexico). Gifford thus offered a valuable temporal and trans-regional approach to Southwest artifacts and trade.

R. L. Ives (1961) used early mission accounts to indicate the source and importance of what are most probably *H. fulgens* (green abalone) shells during the late 17th and early 18th centuries in the southern Southwest. Ive's discussion is useful because it offers insight into a

"Southern Route" of Pacific shell trade to the Southwest. He used ethnohistoric and ethnographic records and investigations by Father Eusebio Francisco Kino, known as "the apostle to the Pimas," to compile trade data. Father Kino learned from numerous native informants that there was extensive trade and travel between the Pacific Coast and the desert land of the Papagueria in southern Arizona.

Albert Schroeder's (1961) "The Archaeological Excavations at Willow Beach, Arizona, 1950" researched a major trade rendezvous point midway between the Southwest and the southern California Coast. Schroeder showed that Willow Beach was a principal meeting place of Mojave middlemen traders with Virgin branch Anasazi of the northwestern periphery of the Southwest. Schroeder cited ceramics and shell jewelry as indicators that Willow Beach was used by both Mojave and Puebloan groups over a long period from about AD 500 to about AD 1200.

Jay Ruby (1970) demonstrated that shell from southern California, and probably turquoise from interior southern California, were present in the Southwest from about AD 1 to AD 1300. Ruby suggested that southern California shell was acquired by Southwesterners through peaceful, indirect means, often assisted by specialist middlemen. He identified as a main problem in tracking the prehistoric trade between the Southwest and southern California, the lack in southern California of apparent prehistoric goods from the Southwest. Ruby assumed that traded goods from the Southwest were of perishable materials which have not survived in the archaeological record.

Wesley Jernigan (1978) related the development, manufacture, and trade of prehistoric Southwest jewelry. Jernigan discussed the Pacific Coast often because Pacific shells and artifacts are found in numerous sites in each of the three major Southwest cultural areas. Jernigan concluded that the Hohokam obtained shell from the Gulf of California via two established routes, and that they supplied much of the marine shell used in the Southwest for at least 15 centuries.

In the publication "A *Glycemeris* Shell Bracelet from Orange County, California", Koerper (1996) discussed trade mechanisms and relationships between western Colorado River tribes and tribes far to the west and east. According to Koerper only indirect contact seems to have characterized connections between the Southwest and coastal territory. In spite of this, however, Koerper maintained there was marked stylistic diffusion from the Pueblos to the lower Colorado River area. Koerper and Mason concluded that during all known periods middlemen were necessary for significant trade between the two regions. These may have occasionally included traders of other groups, in addition to the Mojave.

The research briefly sketched here as an introduction to the subject is returned to throughout the remainder of this work as needed to supply relevant specifics and viewpoints.

Prospect

To further the discussion of the southern California - Southwest trade by improving the data base on which it rests, I present in the next chapter (and in Appendices A and B) a new compilation of evidence on the distribution of artifacts made from three key molluskan species - *Haliotis, Olivella,* and *Spondylus*.

The accumulated data now available make it possible to study quantitatively the growth of the shell trade over centuries, and to identify growth and change in centers of the trade over the same period. That is the task of the following chapter.

CHAPTER II

A QUANTITATIVE PERSPECTIVE ON THE SHELL TRADE BETWEEN SOUTHERN CALIFORNIA AND THE SOUTHWEST

In this chapter, I present a quantitatively based review of trade in *Haliotis, Olivella, and Spondylus* artifacts between southern California and the Southwest, based on a newly developed and updated data set), (Figs. 2, 3; Table 22, Appendix A). I chart temporal trends in the regional abundances of traded *Haliotis, Olivella, and Spondylus* before and after AD 900. This temporal divide emerges from the quantitative information on specimens dated either directly or by their association with sites and pottery types of known age.

The chapter identifies major and lesser locations of shell use in the Hohokam, Anasazi, and Mogollon culture areas. A quantitative account is presented of the relative intensity and most important locations of shell use pre- and post AD 900. Additionally, the western beginning of the trade pathway at points on the southern California Coast is briefly

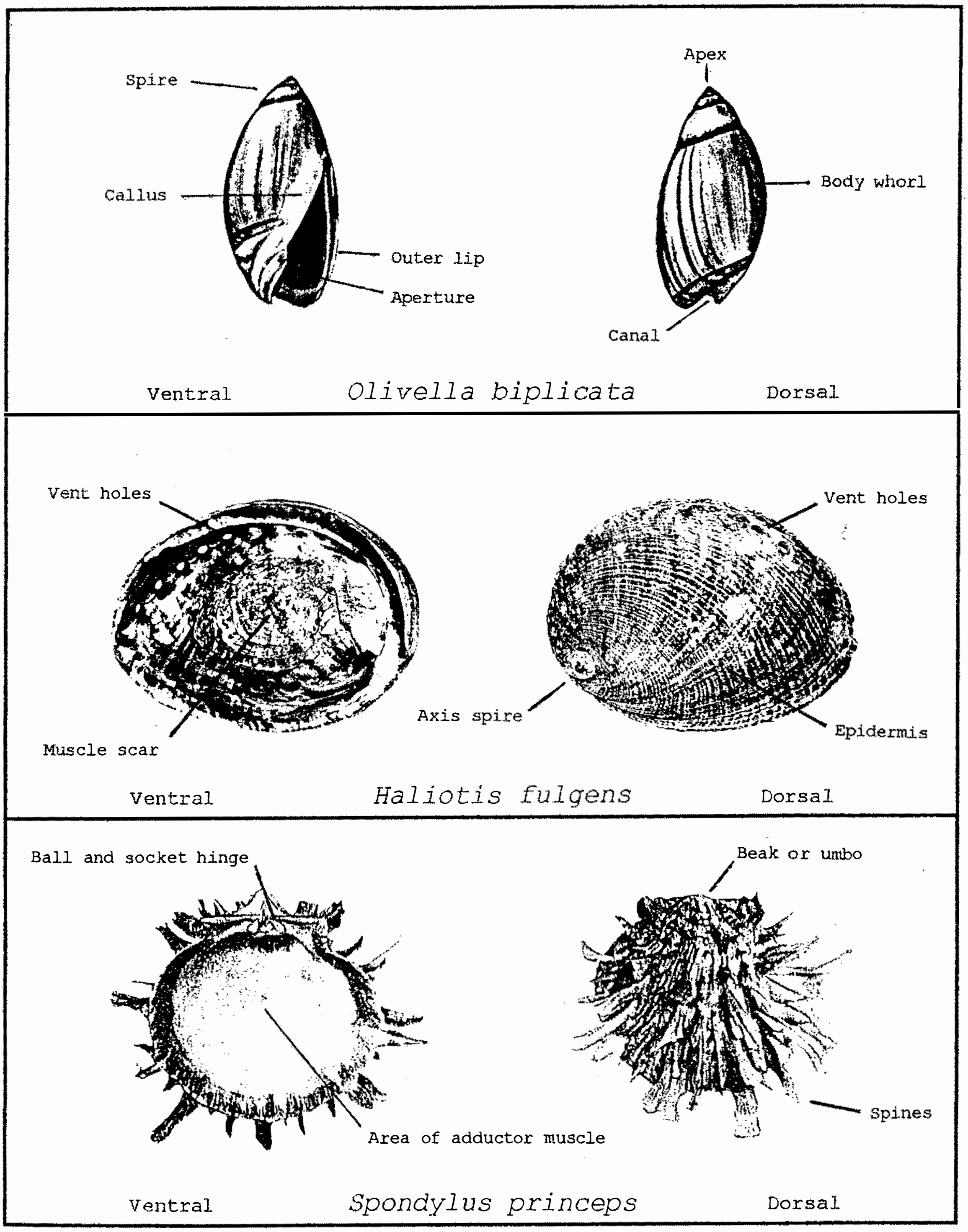


Figure 2. General Shell Morphology of *Olivella*, *Haliotis*, and *Spondylus*.

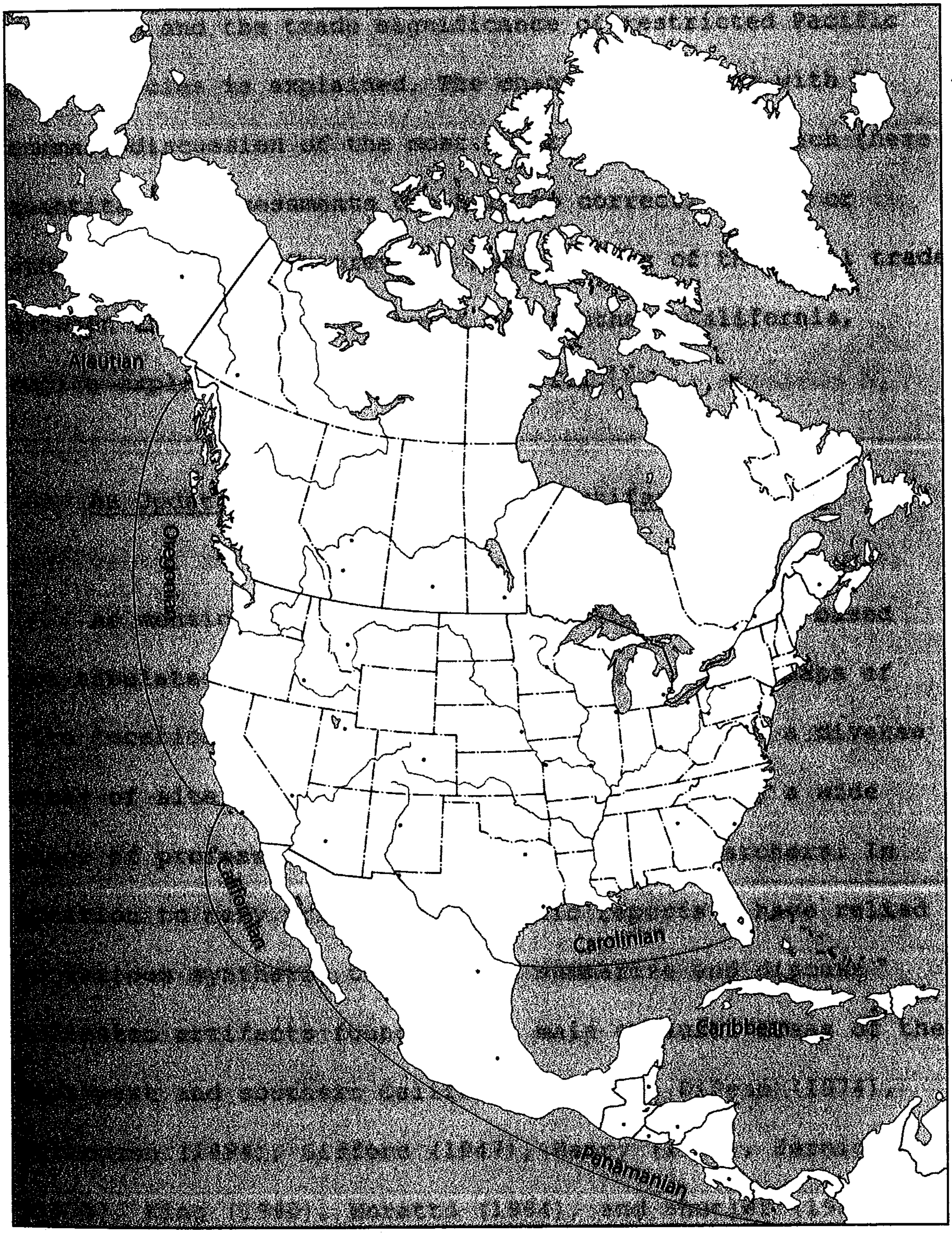


Figure 3. Principal Molluskan Faunal Provinces of Western North America.

discussed and the trade significance of restricted Pacific Coast species is explained. The chapter concludes with a summary discussion of the most important ways in which these quantitative assessments can help to correct, expand or otherwise improve on previous descriptions of the shell trade between the American Southwest and southern California, topics explored further in Chapter III.

An Updated and Expanded Shell Artifact Data Set

As mentioned, the data on which this study is based are tabulated in Appendix A, which also provides maps of site locations. The data have been gathered from a diverse array of site survey reports and descriptions by a wide range of professional archaeologists and researchers. In addition to many primary monographic reports I have relied on various synthetic texts which summarize and discuss molluskan artifacts found in the main cultural areas of the Southwest and southern California such as DiPeso (1974), Erlandson (1994), Gifford (1947), Haury (1976), Jernigan (1978), King (1990), Moratto (1984), and Shutler (1961).

In support of my extensive library research, I received artifact information, site survey reports, and advice concerning locating pertinent site survey reports and artifact descriptions from Dr. Mel Aikens, Dr. Jon Erlandson, Dr. Helen Fairley, Dr. Bob Gibson, Dr. Henry Koerper, Dr. Stan Olsen, Torben Rick, Dr. Stead Upham, Dr. Rene Vellanoweth, and Art Vokes.

I have done none of the excavation or original cataloging of any of the artifacts listed in Appendix A, but have relied on information published by others. In compiling the Appendix A database, I relied on the conclusions of the various authors about the provenience, age, and identification of the specimens, but did not undertake an independent re-examination of their conclusions. In many cases, authors provided substantial discussions of excavation considerations such as site history, stratigraphic profiles, vertical provenience, and screening, but in other sources—especially those written long ago—such discussions were sparse or lacking entirely. To re-evaluate in detail all the many sources relied on in this paper would have been a monumental task, and because of that, I relied on what I took to be the best efforts of the reporters involved and accepted their reportage as presented. During my search of the literature, where I encountered crucial ambiguities about basic facts of age, provenience, and identification, I simply did not enter the data into my compilation.

I have examined collections at several museums in connection with this work, and in some cases I added data from museum visits to my database. My history of examining museum collections goes back in time beyond the work done specifically for this dissertation, however, and much of this experience has functioned more to background my research than to contribute specifically to the data compilation used in the present analysis.

At the Lost City archaeologic Museum in Overton, Nevada, during June, 2000 I examined and photographed virtually every *Haliotis, Spondylus,* or *Olivella* artifact in the collections (some appropriately controlled specimens of which are included in Appendix A), as well as artifacts made from other molluskan species and samples of decorated Puebloan cotton cloth, archaeologic salt, and turquoise.

I have examined many molluskan artifacts (some of which are also included in Appendix A} at the Arizona State Museum on numerous occasions, when I had access to collections as a zooarchaeology student at the University of Arizona. I have studied southern California artifacts in various museums and private collections and in the Anthropology Department of the University of Oregon.

The information compiled in Appendix A is a chronologic listing by cultural affiliation and genus or species from a range of selected Southwest sites and some key southern California sites. Map locations of the sites are also shown. In my search of the archaeological literature, I sought out information from sites with evidence of shell trade over time, both before and after AD 900. I selected a variety of small to large sites from which to sample, with the greatest geographic spread possible.

The archaeological literature has grown enormously since the time of the last major efforts at data compilation of this sort, (Jernigan 1978), and I was rewarded with much new evidence. I did not, of course, examine every archaeological monograph published in the last 25 years, but I did examine a large number of major reports, as the bibliography will show. The sample is of course not comprehensive, but I believe that it is quite representative for the Southwest in terms of both spatial and temporal parameters. Certainly it is the most representative and largest sample yet compiled.

Trends in Regional Abundances of Traded *Haliotis, Olivella,* *and Spondylus* Before and After AD 900

The Hohokam Cultural Area

Trade in *Haliotis*

Based on my analysis the Hohokam appear to have been the principal Southwest users of *Haliotis* before AD 900. This is evidenced by 120 artifacts from 9 sites (Fig. 2; Appendix A: Table 25). Throughout the Hohokam area, the number of *Haliotis artifacts* and the number of differing artifact types are more numerous before AD 900 than afterwards (Table 2). Further, the artifacts were concentrated into a few major sites suggesting elite or restricted use at these locations (Appendix A: Table 25). The principal *Haliotis* artifact type was the Pendant (Table 2). *Haliotis* pendants were generally intended for elite display, whereas disc beads, made of the same material, may have served primarily as wealth or measures of dividable value (Jernigan 1978; Taxay 1970).

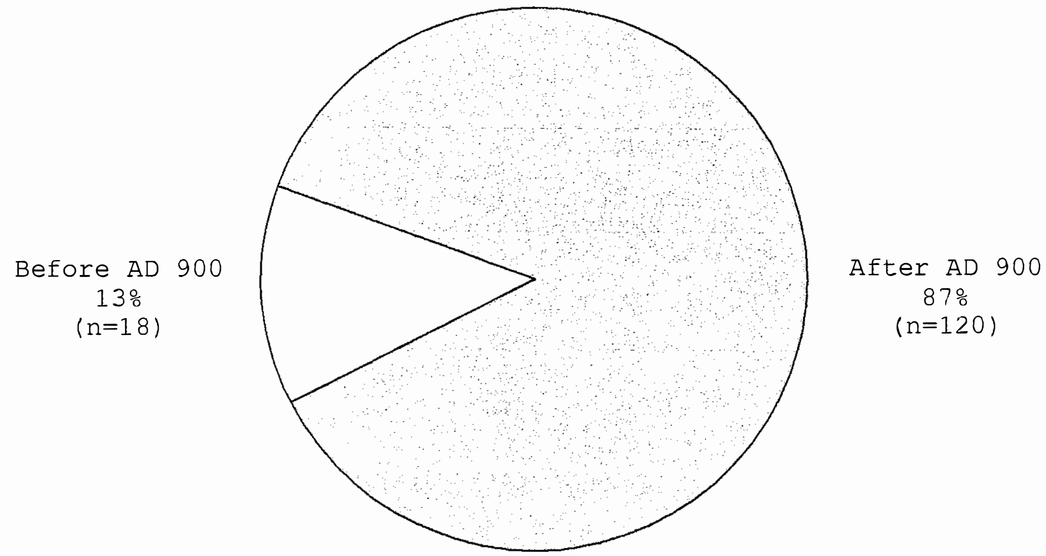


Figure 4. Hohokam: Temporal Distribution of *Haliotis* Artifacts Before and After AD 900

Pacific shell evidence from before AD 900 (primarily *Haliotis*) suggests that the Hohokam had an active trade relationship with coastal groups of southern California or intermediate tribes.

Ethnographic information (Koerper 1996; Ruby 1970), the presence of some species of restricted origin (Tables 2, 21), and trade routes linking the two regions, indicate that the Hohokam traded for certain species of *Haliotis*, and perhaps finished *Haliotis* artifacts as well, with California coastal and island groups located below Point Conception, such as the Chumash and Gabrielino (Fig.1).

Table 2. Counts of Primary Artifact Types of Known Species of *Haliotis* from the Hohokam Cultural Area.

	< AD 900	> AD 900	Totals
Pendants			
H. rufescens	2		2
H. fulgens	4		4
H. cracherodii	2	2	4
H. corrugata	1		1
Disc Beads			
H. rufescens	4		4
H. cracherodii	3	3	6
Square Beads			
H. rufescens	2		2
H. fulgens	4		4
H. cracherodii	1		1
H. corrugata	1		1
Worked Fragments			
H. rufescens	2		2
H. fulgens	1		1
H. cracherodii	1		1
Zoomorphs			
H. rufescens	1	1	2
H. cracherodii		2	2
Whole Shell			
H. californiensis imperforata	1		1
Total	30	8	38

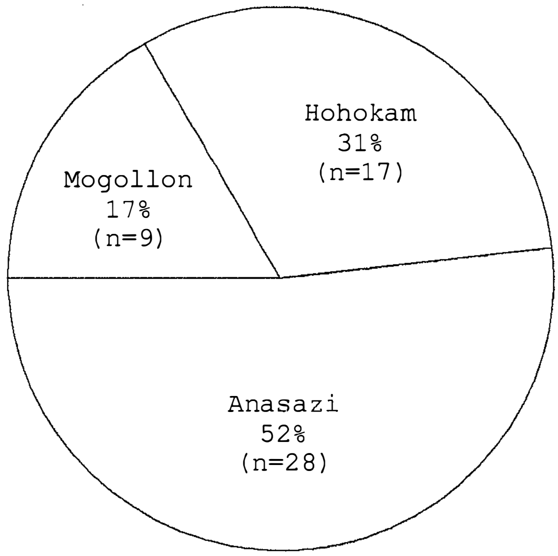


Figure 5. Hohokam, Anasazi, and Mogollon: Total Sites in Sample with *Haliotis*. Samples Dating both Before and After AD 900 Combined.

Trade in *Olivella*

The Hohokam also show widespread use of *Olivella* before AD 900, with 359 artifacts from 17 sites. After AD 900 there was markedly increased use and somewhat broader distribution of *Olivella,* with 2141 artifacts from 24 sites (Fig. 6, Appendix A: Table 26). Comprehensively over time, in my sample more Hohokam sites contained *Olivella* artifacts than did the sites from southern California or other Southwest areas (Fig. 7), although the greatest number of *Olivella* artifacts by far occurred in the large coastal and island sites of southern California. Before AD 900, a cluster of sites in the Tucson Basin dominated the *Olivella* trade. After AD 900, Snaketown (about 80 miles northwest of the Tucson Basin) greatly dominated the *Olivella* trade. The reasons for a shift in shell trade domination from the Tucson Basin before AD 900, northwest to Snaketown after AD 900 may involve negative impacts from flooding, warfare, and disease in the Tucson Basin after AD 900 (Bayman 2001).

Disc beads made of *Olivella* species from the Pacific appear never to have been as popular among the Hohokam as they were among the Anasazi and groups of coastal southern California. This is probably due to the close proximity of the Hohokam cultural area to the upper Gulf of California, and its plentiful supply of tropical *Olivella dama* (Gifford 1946; Table 3).

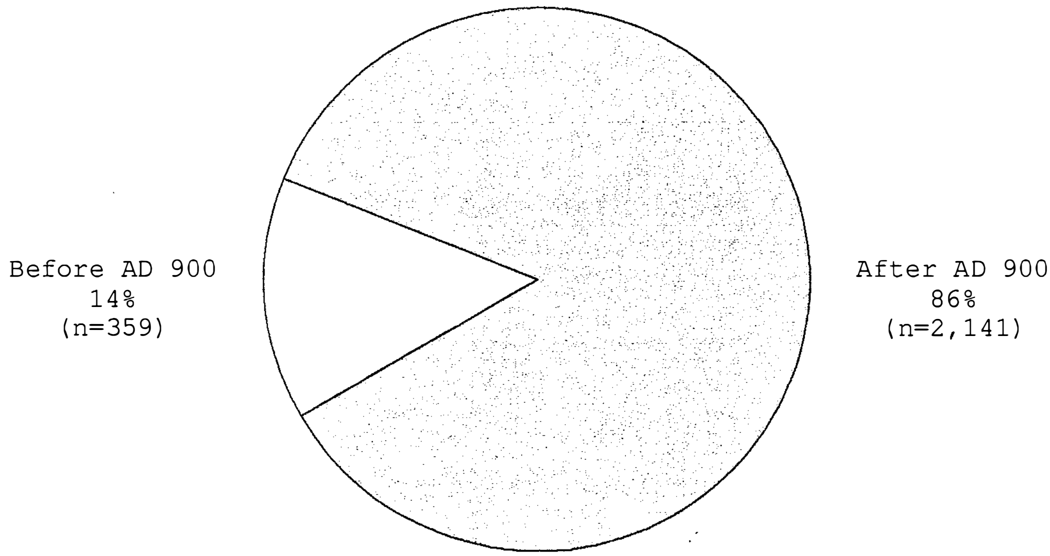


Figure 6. Hohokam: Temporal Distribution of *Olivella* Artifacts Before and After AD 900

Table 3. Counts of Primary Artifact Types of *Olivella* from the Hohokam Cultural Area. (N.A. indicates that artifacts were present but counts not available.)

	< AD 900	> AD 900	Totals
Spire Removed Beads			
O. dama	262	127	389
O. biplicata	3	N.A.	3
Complete Shell			
O. dama	3		3
Disc Beads			
O. dama	2		2
O. biplicata	N.A.		N.A.
Barrel Beads			
O. dama	N.A.	N.A.	N.A.
O. biplicata	N.A.	N.A.	N.A.
Total	270	127	397

Both before and after AD 900, Hohokam *Olivella* use was greatly dominated by the tropical non-Pacific species *O. dama* (Fig. 6; Table 3). By comparison, relatively few specimens of Pacific *O. biplicata* have been identified from Hohokam sites. This may be explained by the relative proximity of the Hohokam to the Gulf of California, which was the source of *O. dama* and other tropical species (Appendix B: Fig. 43). The abundance of *O. dama* and the relative scarcity of *Olivella biplicata* among the Hohokam indicates greater travel by the Hohokam, and greater trade with areas and groups to the south, than with those to the west on the Pacific shore (Haury 1976).

Archaeological investigations by Gifford (1946) confirmed that Hohokam expeditions frequented the area around Puerto Penasco, Mexico, in the northern Gulf of California, to collect *O. dama* and other tropical shells (Gifford 1946; Haury 1976). Interestingly, the relatively large number of *O. dama* artifacts found in Anasazi sites both before and after AD 900 (Fig. 10; Table 6), and the dominance of *O. dama* artifacts in Hohokam sites (Table 3), suggests that the Hohokam acted as middlemen traders to the Anasazi, furnishing the tropical species *O. dama, Glycemeris,* and *Spondylus* (Figs. 29, 30).

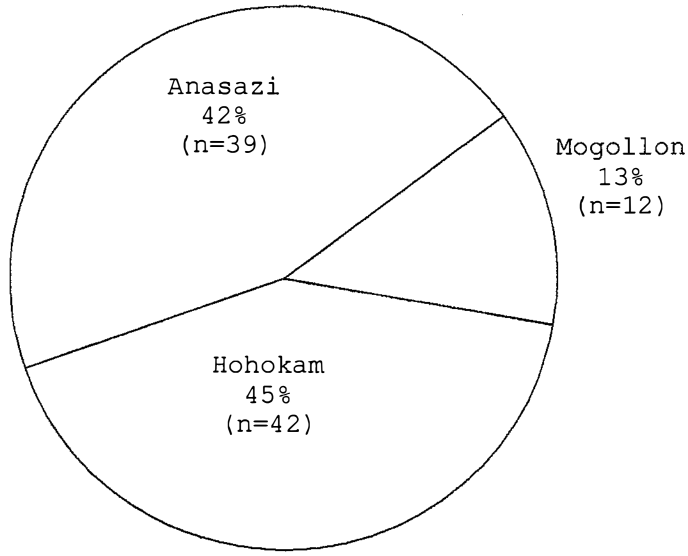


Figure 7. Hohokam, Anasazi, and Mogollon: Total Sites in Sample with *Olivella*. Samples Dating both Before and After AD 900 Combined.

Trade in *Spondylus*

Among the Hohokam there was restricted use of *Spondylus* before AD 900, with 27 artifacts from just 2 sites. After AD 900 there was a substantial increase in *Spondylus* use, when it was represented by 267 artifacts from 16 sites (Fig. 8; Appendix A: Table 28).

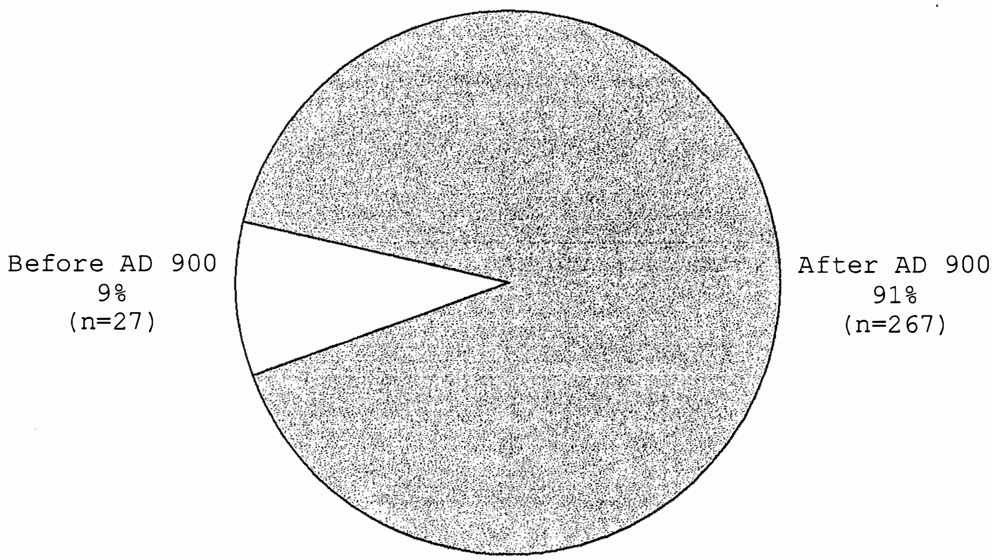


Figure 8. Hohokam: Temporal Distribution of *Spondylus* Artifacts Before and After AD 900

The numbers show that *Spondylus* became pre-eminent over *Haliotis*. Most of these artifacts were prominent display items, which when found in significant quantity, suggest elite status among the Hohokam after AD 900 (Figs. 4, 8). The Pendant was the dominant *Spondylus* artifact type before AD 900, changing to a dominance of Disc beads after AD 900 (Table 4). It is believed that *Spondylus* pendants were generally used for elite display, whereas *Spondylus* disc beads tended to serve as wealth and ornamentation (Jernigan 1978; Kolb 1987; Taxay 1970).

Throughout time the Hohokam show the greatest number of sites with *Spondylus*, compared with southern California or other Southwest groups (Fig. 9). The greater use of *Spondylus* by the Hohokam compared to other groups is surely related to the relative closeness of the Gulf of California, where the *Spondylus* genus is native. In contrast, the temperate Pacific Coast is totally without *Spondylus* (Appendix B: Fig. 43).

Table 4. Counts of Primary Artifact Types of *Spondylus* from the Hohokam Cultural Area. (N.A. indicates that artifacts were present but counts not available.)

	< AD 900	> AD 900	Totals
Disc Beads			
S. princeps	N.A.	250+	250+
S. calcifer	N.A.	6	6
Pendants			
S. princeps or S. calcifer	25		25
Globular Pendants			
Genus Unknown		6	6
Zoomorphs (used in mosaic)			
Genus Unknown		3	3
Lump Beads			
S. princeps or S. calcifer	1		1
Whole Shell			
S. princeps		1	1
Dentate or Claw Bead			
S. princeps or S. calcifer	N.A.		N.A.
Irregular Beads and Pendants			
S. princeps	N.A.		N.A.
Total	26	266+	292

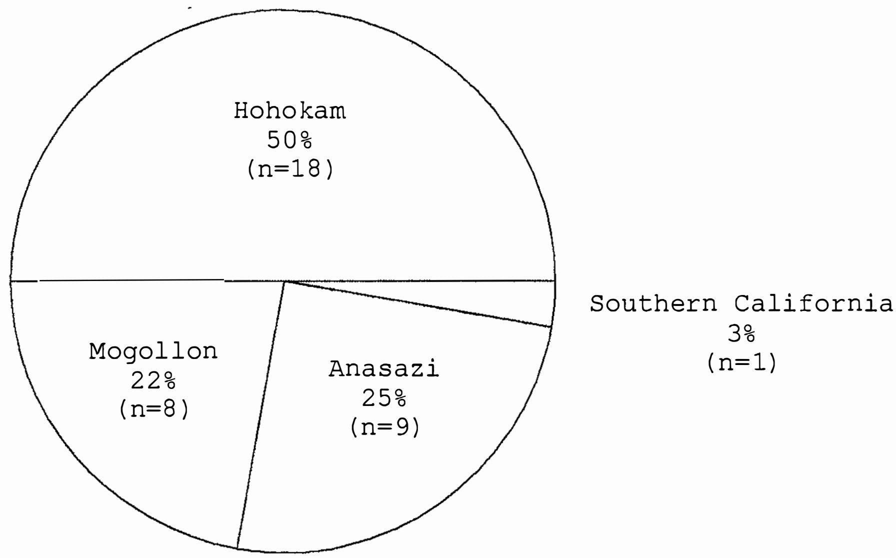


Figure 9. Hohokam, Anasazi, Mogollon, and Southern California: Total Sites in Sample with *Spondylus* Compared to all other Cultural Groups. Samples Dating both Before and After AD 900 Combined.

Hohokam Summary

Haliotis

The Hohokam manifest the greatest use of *Haliotis* in the Southwest over time. Its greatest use appears before AD 900. After AD 900 *Haliotis* was still distributed widely (8 sites), but is not as numerous as before AD 900. Five species were recorded before AD 900, but only two species after AD 900 (Table 2). The dominant species represented was *H. cracherodii*, with 10 artifacts, followed by *rufescens* with 5 determined artifacts (some of the undetermined *Haliotis* artifacts within this data set may be *rufescens*). *H. cracherodii* and *H. rufescens* have broad ranges up and down the Pacific Coast (Appendix B: Fig. 43). *H. fulgens* is represented by 4 artifacts and *H. californiensis imperforata* by a single whole shell. *H. fulgens and H. californiensis are* restricted to Pacific ranges south of Point Conception (Appendix B: Figs. 43), which indicates their sources were in the coastal and island areas below Point Conception. The most abundant *Haliotis* artifact type was the Pendant (Table 2), an apparent elite marker of display (Haury 1976; Jernigan 1978). Pendants were followed closely by disc beads and square beads.

Olivella

The Hohokam manifest the greatest number of sites in the Southwest containing *Olivella dama,* obtained from the Gulf of California. The greatest use of *Olivella* by the Hohokam was before AD 900. Throughout time, the dominant *Olivella* species was *O. dama* represented by 389 artifacts. *Olivella biplicata,* with only 3 artifacts, was clearly insignificant in the overall trade picture. The dominant artifact type was the Spire Removed Bead.

Spondylus

There was a great increase in the use of *Spondylus* among the Hohokam after AD 900. Ten times the number of *Spondylus* artifacts, and eight times the number of sites containing *Spondylus* were found after AD 900, compared to the period before AD 900 (Appendix A: Table 28). Haury (1976), Kolb (1987), and Schroeder (1966) argued that this demonstrates increased trade from Mesoamerica via the Gulf of California, though it is not a point I have pursued in this research. The dominant *Spondylus* species was *princeps, with calcifer* a very distant second. The dominant artifact type was the Disc Bead, an easily dividable, durable marker of wealth (Table 4).

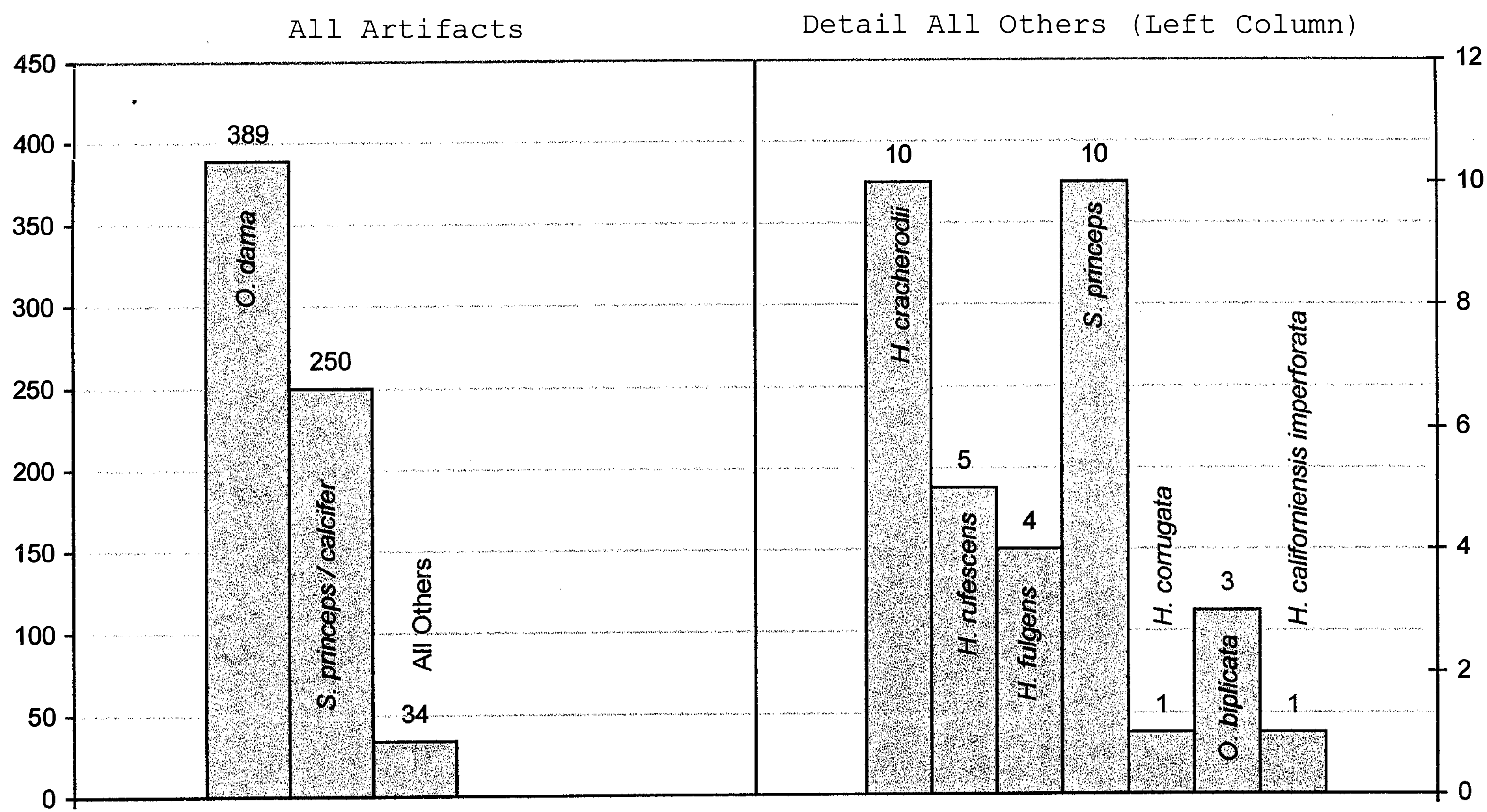


Figure 10. Comparative Graph of Total *Haliotis*, *Olivella*, and *Spondylus* Artifacts by Genus and Species from the Hohokam Cultural Area (Pre- and Post- AD 900 Artifacts Combined.)

The Anasazi Cultural Area

Trade in *Haliotis*

The Anasazi show considerable use of *Haliotis* before AD 900, with 65 artifacts from 13 sites. After AD 900 there was minor increase in *Haliotis* use, with 74 artifacts from 15 sites (Fig. 11; Appendix A: Table 29). The Anasazi show the greatest number of sites with *Haliotis* of all Southwest groups (Fig. 5).

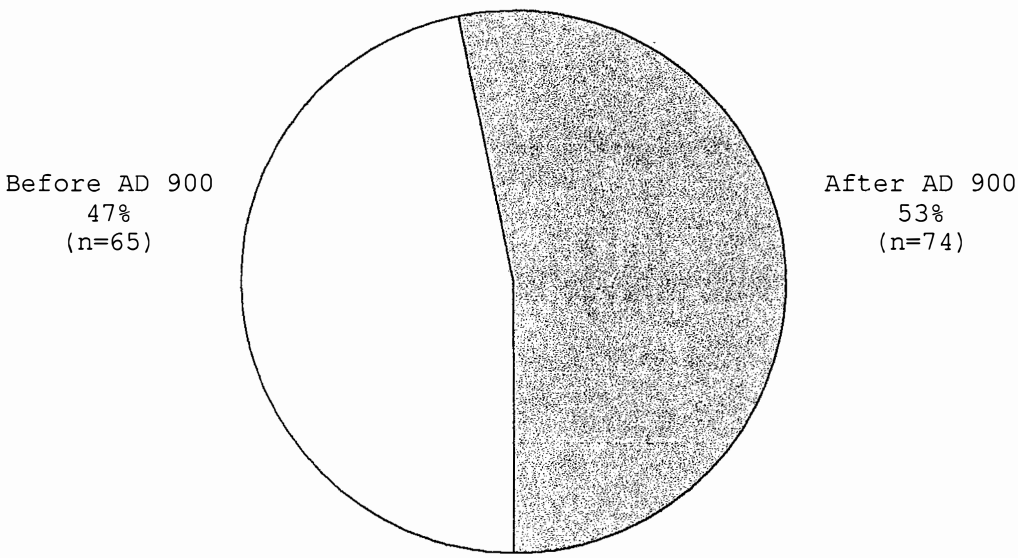


Figure 11. Anasazi: Temporal Distribution of *Haliotis* Artifacts Before and After AD 900.

Evidence of Pacific shells both before and after AD 900 (primarily restricted *Haliotis species and Olivella pedroana*) show that the Anasazi long had an active trade relationship with coastal groups of southern California (Figs. 7, 8, 30; Table 21). The virtually equal amounts of *Haliotis* distributed in a similar number of sites both before and after AD 900, points to a stable relationship between the Anasazi and coastal southern California over an extended period of time (Table 30).

Haliotis fulgens and H. assimilis, which both originate exclusively in the Pacific south of Point Conception, have been found in Anasazi sites (Table 21). They show that the Anasazi were receiving molluskan material from southern California groups, most probably the mainland and island Chumash and Gabrielino, who are known to have used and traded these species (King 1990) (Table 5).

Before AD 900 the principal *Haliotis* artifact type was the Shell Ring. After AD 900 the Pendant became the dominant artifact type (Table 5). Both artifact types are intended for display and may have been used by elites (Jernigan 1978). Throughout time the dominant *Haliotis* species was *cracherodii* represented by 69 artifacts, followed by *rufescens* with 26 artifacts, *fulgens* with 3 artifacts, and *assimilis* with 1 artifact (Table 5; Fig 15).

Table 5. Counts of Primary Artifact Types of *Haliotis* from the Anasazi Area. (N.A. indicates that artifacts were present but counts not available.)

	< AD 900	> AD 900	Total
Shell Ring			
H. rufescens		2	2
H. cracherodii	45		45
Pendants			
H. rufescens	5	16	21
H. fulgens		2	2
H. cracherodii	N.A.	9	9
H. californiensis imperforata	1		1
H. assimilis		1	1
Discs + Discoidal Beads			
H. rufescens	3		3
H. fulgens		1	1
H. cracherodii	1	10	11
Whole Shell			
H. cracherodii		3	3
Mosaic Backing			
H. cracherodii		1	1
Ornaments			
H. fulgens		N.A.	
H. cracherodii	N.A.	N.A.	
Total	55	45	100

Trade in *Olivella*

The Anasazi show widespread use of *Olivella* before AD 900 which is evidenced by 5,153 artifacts from 12 sites. After AD 900 there was a decrease in the number of *Olivella* artifacts in the Anasazi cultural area (n = 3306), but a great increase in the number of sites (n = 13 before AD 900, 26 after) (Fig. 13; Appendix A: Table 30). The increase in sites with *Olivella* after AD 900 suggests population growth and perhaps less elite domination of *Olivella* use.

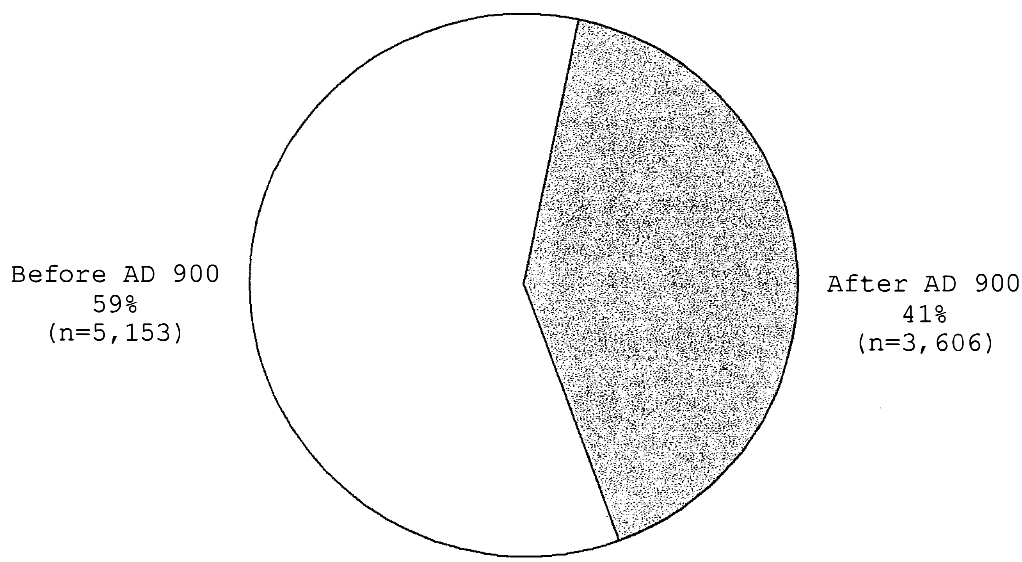


Figure 12. Anasazi: Temporal Distribution of *Olivella* Artifacts Before and After AD 900.

The Spire Removed bead was the major *Olivella* artifact type before and after AD 900 (Table 6). Throughout time the dominant *Olivella* species was *O. dama* with 2732 artifacts, followed by *O. biplicata* with 2021 artifacts, and *pedroana* and *volutella* with one artifact each (Table 6; Fig. 15). The large number of *O. dama* artifacts from the tropical Gulf of California found in Anasazi sites, coupled with evidence of known Hohokam shell collecting expeditions to the Puerto Penasco region of the northern Gulf of California (Gifford 1946; Haury 1976), show that the Hohokam long acted as middlemen traders to the Anasazi, furnishing *O. dama* and other tropical molluskan species.

Also notable is the fact that the sample contains more than three times the number of *O. biplicata* Spire Removed beads dated after AD 900 than before. This evidence, along with the *O. biplicata* Disc and Cap beads found in Anasazi sites dated to after AD 900, shows increased trade between the Anasazi and coastal southern California in the period after AD 900 (Table 6).

Of the principal Southwest groups the Anasazi manifest the second greatest number of *Olivella* artifacts over time (Table 20). The great amount of *O. dama* artifacts found in Anasazi sites shows the importance of the shell trade between the Anasazi and more southerly Hohokam. Before AD 900 *O. dama* was the dominant *Olivella* species traded among the Anasazi.

After AD 900, Pacific *O. biplicata* dominated the Anasazi *Olivella* trade. This shows that Anasazi trade relations with southern California in *Olivella* increased after AD 900.

Table 6. Counts of Primary Artifact Types of *Olivella* from the Anasazi Cultural Area. (N.A. indicates that artifacts were present but counts not available.)

	< AD 900	> AD 900	Total
Spire Removed Beads			
O. dama	321	460	781
O. biplicata	7	25	32
O. volutella		1	1
O. pedroana		1	1
Thin Lipped Cupped Beads			
O. biplicata		133	133
Thin Lipped Disc Beads			
O. biplicata		133	133
Cup Beads			
O. biplicata		56	56
Barrel Beads			
O. dama	4	1	5
O. biplicata		38	38
Saucer Disc Beads			
O. biplicata		133	133
Split Punched			
O. biplicata	1		1
Cap Beads			
O. biplicata	N.A.	N.A.	N.A.
Disc Beads			
O. biplicata		N.A.	N.A.
Total	333	981	1314

The quantity of Pacific *O. biplicata* and *O. pedroana* artifacts found in Anasazi sites shows that the Anasazi had the most substantial trade relationship with coastal southern California of any Southwest cultural group, especially after AD 900 (Table 6).

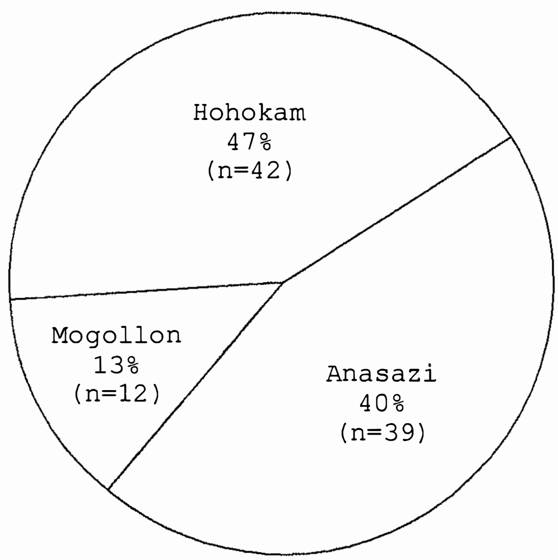


Figure 13. Hohokam, Anasazi, and Mogollon: Total Sites in Sample with *Olivella*. Samples Dating both Before and After AD 900 Combined.

<u>Trade in *Spondylus*</u>

The Anasazi show very limited use of *Spondylus* before AD 900, with only two artifacts from two sites. After AD 900 there was a significant increase in *Spondylus* use, with 18 artifacts from 9 sites (Fig 14; Appendix A: Table 31).

Throughout time the dominant *Spondylus* species were *princeps and calcifer* (Table 7; Fig. 15).

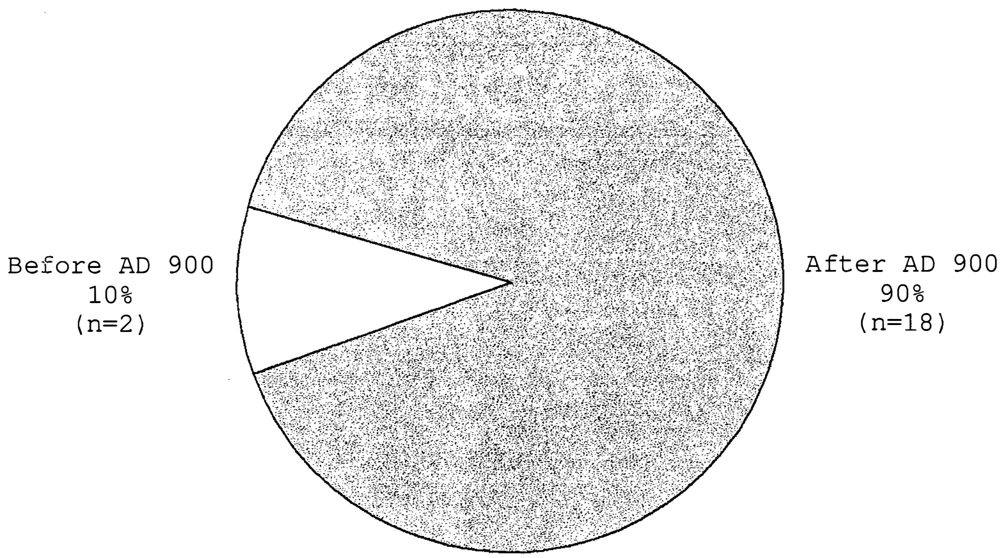


Figure 14. Anasazi: Temporal Distribution of *Spondylus* Artifacts Before and After AD 900.

The increase in the number of *Spondylus* artifacts and the number of sites with *Spondylus* after AD 900 indicates greater trade with the Hohokam and possibly increased influence from northern Mesoamerica, as mentioned in Chapter IV.

The principal *Spondylus* artifact type was the Pendant, suggesting elite use for the purpose of noticeable display. The Anasazi rank second behind the Hohokam in the number of sites with *Spondylus* (Fig. 9), again reinforcing the Hohokam-Anasazi relationship noted above.

Table 7. Counts of Primary Artifact Types of *Spondylus* from the Anasazi Cultural Area. (N.A. indicates that artifacts are present but counts not available.)

	< AD 900	> AD 900	Total
Pendants			
S. princes or S. calcifer	2	8	10
S. calcifer		1	1
Lump Beads			
S. princes or S. calcifer		5	5
Disc Beads			
S. calcifer		2	2
Zoomorphs			
S. princes or S. calcifer		2	2
Bilobed Beads			
S. princes	N.A.	N.A.	
S. calcifer	N.A.	N.A.	
Dentate / Claw Beads			
S. princes or S. calcifer		N.A.	
Total	2	18	20

Anasazi Summary

Haliotis

Through time the dominant *Haliotis* species was *cracherodii* represented by 69 artifacts, *rufescens* with 26 artifacts, *fulgens* with 3 artifacts, and *assimilis* with 1 artifact (Fig. 15). Among the major Southwest groups, the

Anasazi manifest the greatest number of sites with *Haliotis*. This shows extensive trade in exotic Pacific molluskan objects among a great many Anasazi sites. The greatest amount of *H. rufescens* in the Anasazi area appears after AD 900, and *H. fulgens first* appears in the Anasazi cultural area after AD 900. Also, the Anasazi manifest the only *H. assimilis* artifact reported in the Southwest (Fig. 15). Since *H. fulgens* and *H. assimilis* are restricted Pacific species native only south of Point Conception, they document trade with southern California coastal groups from that region (Appendix B: Fig. 43; Table 20).

Olivella

There were twice the number of Anasazi sites with *Olivella* before AD 900 compared to after AD 900, although the actual number of artifacts remained about the same (Appendix A: Table 30). This probably reflects the tendency over much of the Southwest after AD 900 for the establishment and growth of larger more nucleated centers with less of the dispersed occupation that occurr earlier (Haury 1976; Upham 1990; Vivian 1990).

Throughout time the dominant *Olivella* species was *dama* with 2732 artifacts, followed by *biplicata* with 2021 artifacts, and *pedroana* and *volutella* with 1 artifact each. Of the three principal Southwest cultural groups, the Anasazi manifest the greatest number of Pacific *Olivella* artifacts both before and after AD 900.

The dominant *Olivella* artifact type was the Spire Removed Bead. The Anasazi show the only evidence of *O. pedroana* (a restricted Pacific species indigenous south of Point Conception) in the Southwest, again suggesting trade with coastal groups south of Point Conception (Fig. 15; Table 21). The Hohokam probably acted as middlemen traders to the Anasazi supplying the tropical species *O. dama*.

Spondylus

After AD 900 there were four times the number of Anasazi sites with *Spondylus* and nine times the number of *Spondylus* artifacts documented before AD 900 (Appendix A: Table 29). Although the numbers were never large, the rate of increase clearly points to increased circulation via Hohokam middlemen. Through time the dominant *Spondylus* species was *princeps* with 8 artifacts, followed by *calcifer* with a single artifact. The dominant artifact type was the Pendant.

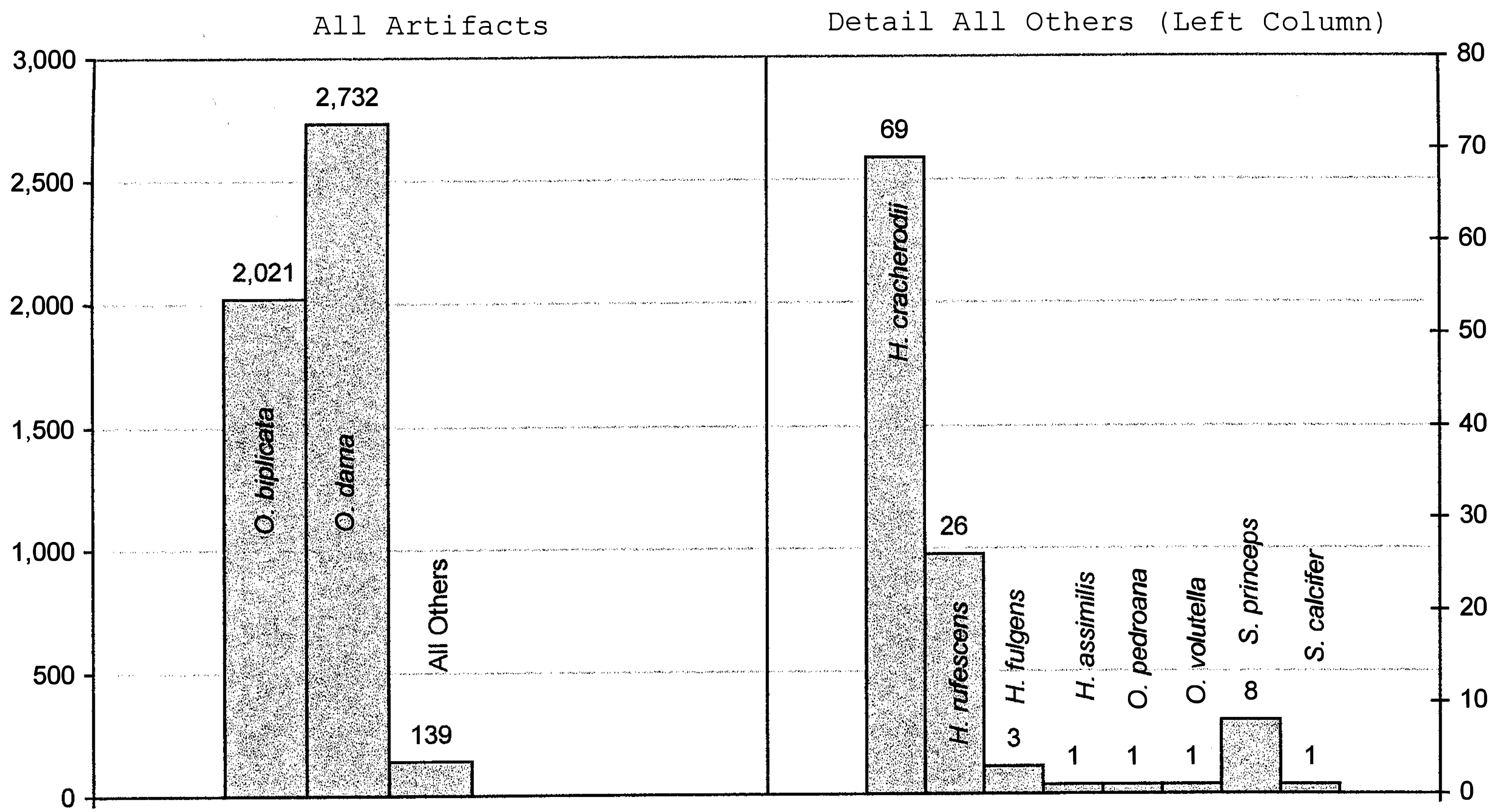


Figure 15. Comparative Graph of Total *Haliotis*, *Olivella*, and *Spondylus* Artifacts by Genus and Species from the Anasazi Cultural Area (Pre- and Post- AD 900 Artifacts Combined).

The Mogollon Cultural Area

Quantitative information from the large Casas Grandes site in northern Chihuahua, which has often been linked to the Mogollon area (DiPeso 1974; Haury 1976; Jernigan 1978), has been included within this section. This inclusion is made because Casas Grandes was an important trading center at the southern edge of the Mogollon country (Figs. 29, 30), because of the clearly Puebloan nature of its domestic architecture (DiPeso 1974; Whalen and Minnis 2001), and because of its association with Mogollon groups to the north such as the Mimbres (Whalen and Minnis 2001).

Due in part to recent research (Whalen and Minnis 2001), Casas Grandes is now seen by some to have been a separate cultural entity apart from the major cultural groups of the American Southwest, manifesting some important Mesoamerican cultural elements, and with less of a tendency toward state level regional organization and hegemony than originally proposed by DiPeso (1974). New information indicates that the interaction sphere of Casas Grandes was about the same size as those of the Hohokam and Chacoan areas (Whalen and Minnis 2001).

<u>Trade in *Haliotis*</u>

The Mogollon show the least use of *Haliotis*, and the fewest sites containing it of all cultural groups represented in all time periods. 12 artifacts are known from five sites before AD 900. After AD 900, however, there was a marked increase in *Haliotis* use, with 34 artifacts from 4 sites (Fig. 16; Appendix A: Table 32). The dominant *Haliotis* species was *cracherodii,* represented by 28 artifacts, followed by *rufescens* with 9 artifacts (Table 8).

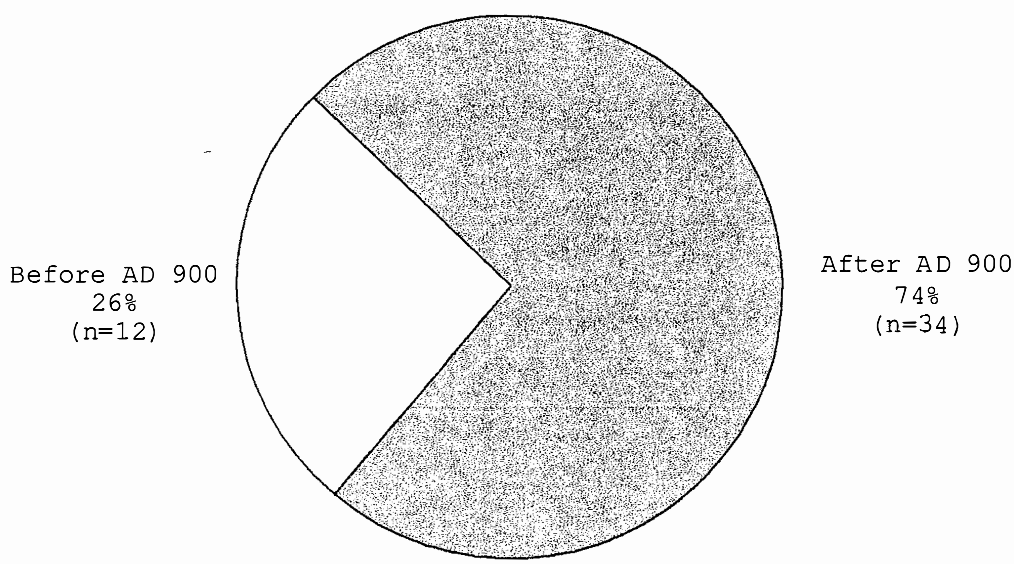


Figure 16. Mogollon: Temporal Distribution of *Haliotis* Artifacts Before and After AD 900.

The Mogollon culture area (particularly the Mimbres, Jornada, and Casas Grandes regions) is the greatest distance from the Pacific Ocean of all Southwest groups (Figs. 28, 30). This may partially explain the rarity of *Haliotis* in Mogollon sites. The principal *Haliotis* artifact type before AD 900 was the Pendant. After AD 900 the principal *Haliotis* artifacts type were Tesserae, small, flat, geometric or round worked pieces of stone or shell that were used primarily for mosaic encrustation of whole shells or wooden objects (Table 8). The emphasis on mosaic tesserae after AD 900 by the Mogollon may indicate cultural influence from the Hohokam or from northern Mesoamerica, where the mosaic art form was popular (Coe 1992; DiPeso 1974; Haury 1976; Jernigan 1978).

Table 8. Counts of Primary Artifact Types of *Haliotis* from the Mogollon Cultural Area.

	< AD 900	> AD 900	Total
Tesserae			
H. cracherodii		19	19
Pendants			
H. rufescens	2	5	7
H. cracherodii		5	5
Spangle			
H. cracherodii		2	2
Zoomorphs			
H. rufescens		2	2
Knife			
H. cracherodii		1	1
Notched Oval			
H. cracherodii		1	1
Total	2	35	37

Trade in Olivella

As was the case with *Haliotis*, the Mogollon show the fewest sites containing *Olivella* artifacts of all cultural groups considered. The Mogollon show comparatively restricted use of *Olivella* before AD 900, with 96 artifacts from 2 sites (including totals from Casas Grandes). After AD 900 there was a substantial increase in the distribution and quantity of *Olivella* artifacts evidenced by 579 artifacts from 10 sites (14,051 including specimens from Casas Grandes) (Fig. 17;

Appendix A: Table 33). The increased number of *Olivella* artifacts and the number of sites with *Olivella* indicate expanded trade, though there is some difference of opinion about whether thede facts indicate an increasing use of *Olivella* as generalized ornamentation or as an elite indicator (DiPeso 1974; Jernigan 1978; Taxay 1970). The dominant *Olivella* artifact type was the Spire Removed Bead both before and after AD 900 (Table 9).

Due to the close proximity of Casas Grandes and other southern Mogollon sites to the tropical Gulf of California Casas Grandes had relatively direct access to a plentiful supply of tropical *Olivella dama* species but not the Pacific species *O. biplicata* (Appendix B: Figs. 28, 30). This may explain the absence of identified *O. biplicata* among the vast numbers of *Olivella* artifacts found in Casas Grandes, which were made from tropical species. Although no *O. biplicata* was identified from Casas Grandes, however, 112 artifacts made of the widespread Pacific *O. baetica* were identified (Table 9; Appendix B: Figs. 28, 30). *Olivella baetica* artifacts found in Casas Grandes perhaps indicate an isolated instance of trade with the Pacific Coast (DiPeso 1974). *O. baetica* is found from Kodiak Island, Alaska to Baja California.

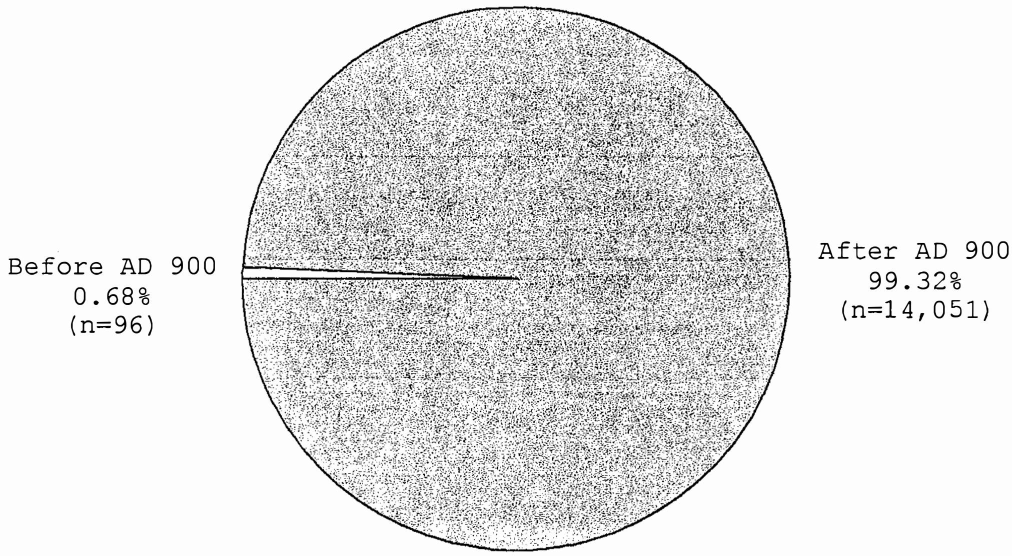


Figure 17. Mogollon: Temporal Distribution of *Olivella* Artifacts Before and After AD 900.

Table 9. Counts of Primary Artifact Types of *Olivella* from the Mogollon Cultural Area, Including Casas Grandes.

	< AD 900	> AD 900	Total
Spire Removed Beads			
O. dama	67	14,432	14,499
O. baetica		112	112
O. gracilis		6	6
O. anazora		1	1
Barrel Beads			
O. dama	29	111	140
Total	96	14,662	14,758

Trade in *Spondylus*

Within the Southwest the Mogollon show the fewest sites containing *Spondylus* artifacts (Fig. 9). Before AD 900 *Spondylus* is evidenced by two artifacts from one site. After AD 900 there is a great increase in its use and distribution, with 272 artifacts from 8 sites (Figs. 18; Appendix A: Table 34). The dramatic increase after AD 900 in *Spondylus* artifacts, and sites containing them, suggests population growth, expanded trade, and possibly cultural influence from northern Mesoamerica, about which more will be said later.

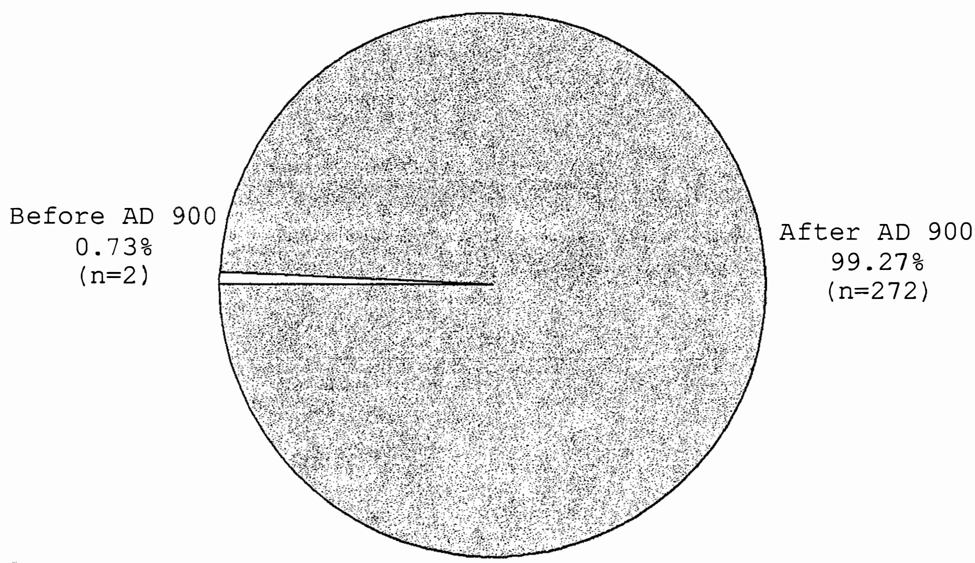


Figure 18. Mogollon: Temporal Distribution of *Spondylus* Artifacts Before and After AD 900.

The *Spondylus* artifact types known before AD 900 included one example each of the Disc Bead, Bilobed Bead, and the Pendant. The primary Mogollon *Spondylus* artifact type after AD 900 was the Disc Bead, with 196 artifacts (Table 10). This suggests Spondylus use as ordinary ornamentation after AD 900 (Jernigan 1978; Kolb 1987). Throughout time the Mogollon and Anasazi showed a similar number of sites with *Spondylus*.

Table 10. Counts of Primary Artifact Types of *Spondylus* from the Mogollon Cultural Area. (N.A. indicates that artifacts are present but counts not available.)

	< AD 900	> AD 900	Total
Disc Beads			
S. princeps	1	126	127
S. calcifer		69	69
Pendants			
S. princeps	1	17	18
Rectangular Tesserae			
S. princeps		14	14
Zoomorph Button Beads			
S. princeps		2	2
S. calcifer		12	12
Barrel Beads			
S. calcifer		11	11
Gorgets			
S. princeps		8	8
Bilobed Beads			
S. calcifer	1	N.A.	1
S. princeps or S. calcifer		6	6
Cylindrical Beads			
S. princeps		2	2
S. calcifer		3	3
Zoomorphs			
S. calcifer		1	1
S. princeps or S. calcifer		3	3
Triangular Tessera			
S. princeps		1	1
Worked Shell			
S. princeps or S. calcifer		1	1
Total	3	276	279

Mogollon Summary

Haliotis

The Mogollon manifest the fewest sites with *Haliotis* of all Southwest cultural groups. The dominant *Haliotis* species was *cracherodii* represented by 29 artifacts, followed by *rufescens* with 9 artifacts (Fig. 19). Within the Mogollon area itself, the greatest use of *Haliotis* came after AD 900. The dominant *Haliotis* artifact type was the mosaic Tessera. *Haliotis* use was dominated by *H. rufescens* before AD 900, and *H. cracherodii* after AD 900. The increase in *Haliotis* use, and the dominance of *H. cracherodii* after AD 900, may be explained by the increased use of mosaic Tesserae after AD 900, made from only *H. cracherodii* (Table 8).

Olivella

There were six times the number of *Olivella* artifacts and five times the number of Mogollon sites with *Olivella* after AD 900 as compared to before AD 900 (Appendix A: Table 33). The dominant *Olivella* species was *dama* with 531 artifacts (13,979 counting specimens from Casas Grandes), followed by *baetica* with 112 artifacts, *gracilis* with 6 artifacts, and *anazora* with 1 artifact (Fig 18). The dominant artifact type was the Spire Removed Bead (Table 10). No *O. biplicata* has been reported from Casas Grandes (DiPeso 1974). The Mogollon show the only evidence of Pacific *O. baetica* in the Southwest (Fig. 19), a fact difficult to account for.

Spondylus

Among the Mogollon, *Spondylus* use was much greater after AD 900 than before. Mogollon *Spondylus* artifact counts are very similar to Hohokam artifact counts after AD 900. This may suggest similar use of *Spondylus* and expanded trade between the Mogollon and Hohokam after AD 900. The dominant *Spondylus* species was *princeps* with 174 artifacts, followed by *calcifer* with 88 artifacts (Fig 19). The dominant artifact type was the Disc bead. Mogollon *Spondylus* use was dominated by *S. princeps* both before and after AD 900. The presence of greater amounts of *Spondylus* after AD 900 may suggest increased trade with, and influence from, northern Mesoamerica (DiPeso 1974).

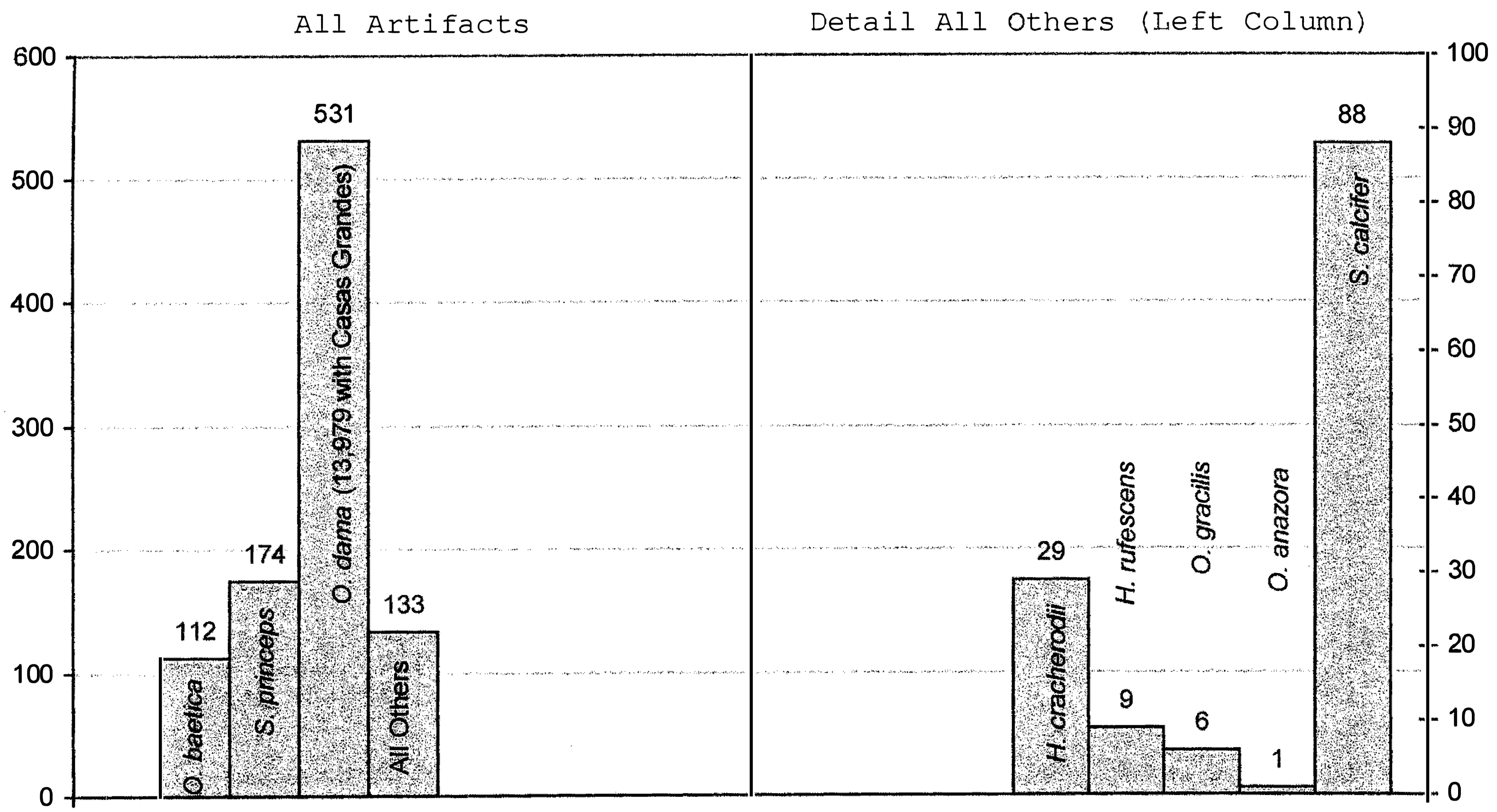


Figure 19. Comparative Graph of Total *Haliotis*, *Olivella*, *and Spondylus* Artifacts by Genus and Species from the Mogollon Cultural Area (Pre- and Post- AD 900 Artifacts Combined).

The Southern California Cultural Area

The Molluskan data from southern California included in this section and in Appendix A are intended to be illustrative rather than comprehensive.

Southern California is important to this research because it represents the beginning of the trade pathway for Pacific shell artifacts traded east to the Southwest. I have relied on recent scholarship detailing relevant artifact collections and documentation in southern California as a basis for showing that the Chumash area was a principal beginning point of Pacific Coast shell trade to the Southwest.

The shell artifact data represented in Appendix A are not intended to be used in a quantitatively representative comparison of sites of the southern California Coast and Islands with sites in the Southwest. A significant portion of my southern California data come from a small number of large cemetery sites and therefore are not appropriate for a comparative and quantitative study such as that done for the Southwest. While sheer numbers of identified shell artifacts from a diverse array of sites in the Southwest are potentially useful for quantitative comparisons within the southwest itself, my shell artifact numbers from a few specialized sites in the Santa Barbara Channel region may not represent adequately comparable data.

I am using southern California data, therefore, primarily for a look at traded key artifact types according to time period. The data also contain restricted Pacific *Haliotis* and *Olivella* species and subspecies such as *H. fulgens, H. corrugata*, *H. cracherodii imperforata,* and *Olivella pedroana,* which provide some insight into the specific sources of certain Pacific shell artifacts found in some Southwest sites. These finds in southern California sites help to provide information about the use of these same restricted species found in Southwest sites.

The shell artifact data (primarily *Haliotis* and *Olivella*) from the limited number of California Coastal and Island sites sampled is also useful because it gives a general indication of which species tended to be exploited by southern California groups over time, and an estimation of the artifact types most prevalent in southern California coastal and island sites before and after AD 900.

The evidence from southern California sites indicate that the northern Channel Islands, especially after AD 900, were the principal entrepreneurs of shell artifacts. The evidence suggesting this consists of high artifact counts, evidence of manufacture, and controlled access to the shell sources and the specialized stone needed to manufacture microdrills and other shell working tools. The special trapezoidal microblade tools produced on east Santa Cruz island were traded to other Chumash island and mainland sites which had plentiful nearby shell resources, but few available micro tools for artifact manufacture (Arnold 1987:188).

In addition to the large numbers of shell artifacts found in sites on Santa Cruz Island, specialized sites in east Santa Cruz Island, such as SCrI-306, were the principal source and manufacturing locations for microblade tools and drills used in making shell artifacts used throughout the Santa Barbara region (Arnold 1987).

The C-14 date AD 935 + - 100 marks the first substantial presence of microblade artifacts in site SCrI-240 (Prisoners Harbor on the northeast coast of Santa Cruz Island), which has a dated history stretching back over 4000 years. These specialized tools indicate increased production of shell items by Santa Cruz Island after AD 900 during M5a (AD 900-1000)(Arnold 1987:194). This growth in production may be associated with the general increase of

Pacific Coast shell artifacts found in the Southwest after AD 900. A conservative estimate of microblade items produced in site SCrI-306, also on east Santa Cruz Island over a period of 500 years is 2.6 million (an average rate of 5400 per year), with core estimations of 500,000 (Arnold 1987:171).

Chert micro and macro blade production was also important to plank boat construction, which was an important part of the coastal and island shell trade process.

Production of chert microblades and drills, and the control of source quarries for this production, was controlled by or in some important way associated with elites in southern California Arnold 1987:129). Evidence from quarries in east Santa Cruz Island such as shrines, caches of immature black abalone shells, and raven bills suggest ritual and elite activity associated with these chert quarries and tool production areas (Arnold 1987:140).

Trade in *Haliotis*

In southern California my sample gives evidence of greater use of *Haliotis* before AD 900, although there appears to have been widespread distribution both before and after AD

900 (Fig. 25; Appendix A: Table 34). In my sample, there were four times the number of *Haliotis* artifacts before AD 900 as in the period after AD 900. This corresponds somewhat to the Hohokam emphasis on *Haliotis* before AD 900 (Fig 4), and may indicate a trade relationship between the Hohokam and southern California, which diminished or changed after AD 900 (Haury 1976).

The dominant *Haliotis* species in the southern California sample was *rufescens,* with 596 artifacts, followed by *cracherodii* with 246 artifacts, and *fulgens* with 18 artifacts (Table 11; Fig. 20). The primary *Haliotis* artifact type before AD 900 was the Disc Bead, primarily made from *H. cracherodii*. The principal *Haliotis* artifact type after AD 900 was the Epidermal Disc bead made from *H. rufescens* (Table 11). The Epidermal Disc beads made from *H. rufescens* in southern California greatly resemble Disc Beads made of red, pink or orange *Spondylus*, which were used by Southwest groups especially after AD 900 (DiPeso 1974; Haury 1976; Jernigan 1978).

Table 11. Counts of Primary Artifact Types of *Haliotis* from some Key Southern California Sites. (N.A. indicates that artifacts are present but counts not available.)

	< AD 900	> AD 900	Total
Epidermal Disc Beads			
H. rufescens		404	404
H. cracherodii		101	101
Tube Beads			
H. rufescens		85	85
H. cracherodii		3	3
Discoidal Beads			
H. rufescens		5	5
H. cracherodii	4	42	46
Discs			
H. rufescens	1	1	2
H. fulgens	4		4
H. cracherodii	28	2	30
Pendants			
H. rufescens		5	5
H. fulgens	4		4
H. cracherodii	23	2	25
Fish Hooks (nobbed)			
H. rufescens		12	12
H. fulgens		7	7
H. cracherodii		4	4
Rim, Tube and Globular Beads			
H. rufescens		19	19
Rectangular Beads			
H. cracherodii	17		17
Rectangular Ornaments			
H. rufescens	1		1
H. fulgens		2	2
H. cracherodii	9		9

Table 11. Continued.

	< AD 900	> AD 900	Total
Whole Shell Discs			
H. rufescens	9	N.A.	9
H. fulgens	N.A.	N.A.	
H. cracherodii	3	N.A.	3
H. corrugata	N.A.	N.A.	
Whole Shell			
H. rufescens	1		1
H. cracherodii	4		4
Pearl Beads			
H. rufescens		3	3
Shell Spoons			
H. cracherodii	3		3
Shell Fragments			
H. rufescens	1		1
H. cracherodii	1		1
Epidermal Cylinders			
H. cracherodii		1	1
Globular Pearl Beads			
H. rufescens		1	1
Lunate Beads			
H. cracherodii		1	1
Square Beads			
H. cracherodii	1		1
Triangular Ornaments			
H. cracherodii	1		1
Worked Shell			
H. rufescens	1		1
Irregular Bead Blanks			
H. rufescens		N.A.	
Nacreous Disc Beads			
H. rufescens	N.A.	N.A.	
Total	116	700	816

In the sample examined, southern California manifested nearly twice the number of sites with *Haliotis* as all Southwest sites combined. This is obviously due to the close proximity of southern California groups to the natural habitats of *Haliotis* (Appendix B: Fig. 43).

Trade in *Olivella*

Understandably, southern California manifested the greatest number of *Olivella* artifacts of all groups considered. There was widespread use of *Olivella* in southern California before AD 900, evidenced by 34,875 artifacts from 15 sites. After AD 900 there was some increase in *Olivella* use and distribution represented by 37,920 artifacts from 19 sites (Appendix A: Table 35).

The dominant *Olivella* species both before and after AD 900 was *biplicata* with 28,954 artifacts followed by a small number of *dama* artifacts (Table 12). It should be remembered in figures and tables such as these, which make a distinction between before and after AD 900, that the period after AD 900 represents only about 800 years of shell use, whereas the other portion represents almost 9000 years of shell use in the case of *Olivella*.

Table 12. Counts of Primary *Olivella* Shell Artifact Types from Some Key Southern California Sites. (N.A. indicates that artifacts are present but counts not available.)

	< AD 900	> AD 900	Total
Spire Removed Beads			
O. biplicata	8,193	13,512	21,705
Disc and Saucer Beads			
O. biplicata		1,710+	1,710+
Disc Beads			
O. biplicata		1,235	1,235
O. dama		N.A.	
Rectangular Beads			
O. biplicata	709		709
Barrel Bead			
O. biplicata	9	361	370
Shells			
O. biplicata	63	15	78
Wall Disc			
O. biplicata	5	15	20
Cup Beads			
O. biplicata	8	3	11
Cap Beads			
O. biplicata	3	N.A.	3

Table 12 Continued.

Split Punched Beads			
O. biplicata		3	3
Full Lipped Beads			
Undetermined		2	2
Thin Lipped Beads			
Undetermined		2	2
Wall Disc Beads (incised)			
Undetermined		2	2
Chipped Wall Disc			
Undetermined		N.A.	
Cylinder Barrel Beads			
O. biplicata		N.A.	
Grooved Rectangle/Oval			
Undetermined		N.A.	
Total	8,990	16,860	25,850

Trade in *Spondylus*

By far southern California manifested the fewest sites containing *Spondylus* of all the areas considered (Fig. 9). The only identified *Spondylus* artifacts discovered in southern California are 3 Disc Beads (made from *S. princeps*) found in a cemetery on San Miguel Island. The age of these beads is uncertain (Heye 1921). These three are the only *Spondylus*, as well as the only possible Southwest artifacts found in the Santa Barbara Channel region

(Erlandson personal comm. 2000; Koerper personal comm. 2001).

One possible reason that *Spondylus* artifacts are so rare in southern California sites is the relatively long distance (approx. 300 miles) to the nearest tropical habitat of most *Spondylus* species (Appendix B: Fig. 43). Additionally, southern Californians may have had little incentive to import *Spondylus* disc beads, since *Haliotis* epidermal disc beads were produced in great numbers in southern California, and, depending on how they are made, may be very similar in appearance to *Spondylus* disc beads.

Southern California Summary

Haliotis

In my sample, and quite expectably, southern California manifested nearly twice the number of sites with *Haliotis* as all Southwest areas combined. In both the Southwest and southern California, although there was a general increase in the amount and variety of shell artifacts traded after AD 900, the Hohokam and southern California peoples used less *Haliotis* after AD 900.

In southern California *Haliotis* use before AD 900 (Fig. 25), was dominated by *H. rufescens.* After AD 900 *Haliotis use was dominated* by *H. cracherodii* (*rufescens* and *cracherodii* are both widespread species). Apparently equal counts of *H. fulgens* were found before and after AD 900 in the southern California area. The dominant *Haliotis* species overall was *rufescens* with 596 artifacts, followed by *cracherodii* with 246 determined artifacts, and *fulgens* with 18 artifacts (Fig. 20).

Olivella

Of all groups considered, southern California manifested the greatest number of *Olivella* artifacts. Southern California shows the greatest use of *Olivella* in the period after AD 900.

Olivella use was greatly dominated by *O. biplicata* both before and after AD 900. Very little *O. dama* has been reported from southern California probably due to the availability and abundance of larger, and possibly more desirable Pacific species such as *O. biplicata* (Appendix B: Fig. 43).

Spondylus

Southern California had the fewest sites with *Spondylus* artifacts of all cultural groups considered (Fig. 9). The three known artifacts made of *S. princeps* from San Miguel Island are of unknown age. These artifacts represent the total amount of *Spondylus* recorded from any ethnic group of southern California. These three artifacts constitute the only possible Southwest or Mesoamerican artifacts found in the Santa Barbara Channel region. In Gabrielino and Chumash sites, other *Spondylus* artifacts could be present, but may be unidentified or mistaken for *Hinnites multirugosus* or *Haliotis* epidermal beads.

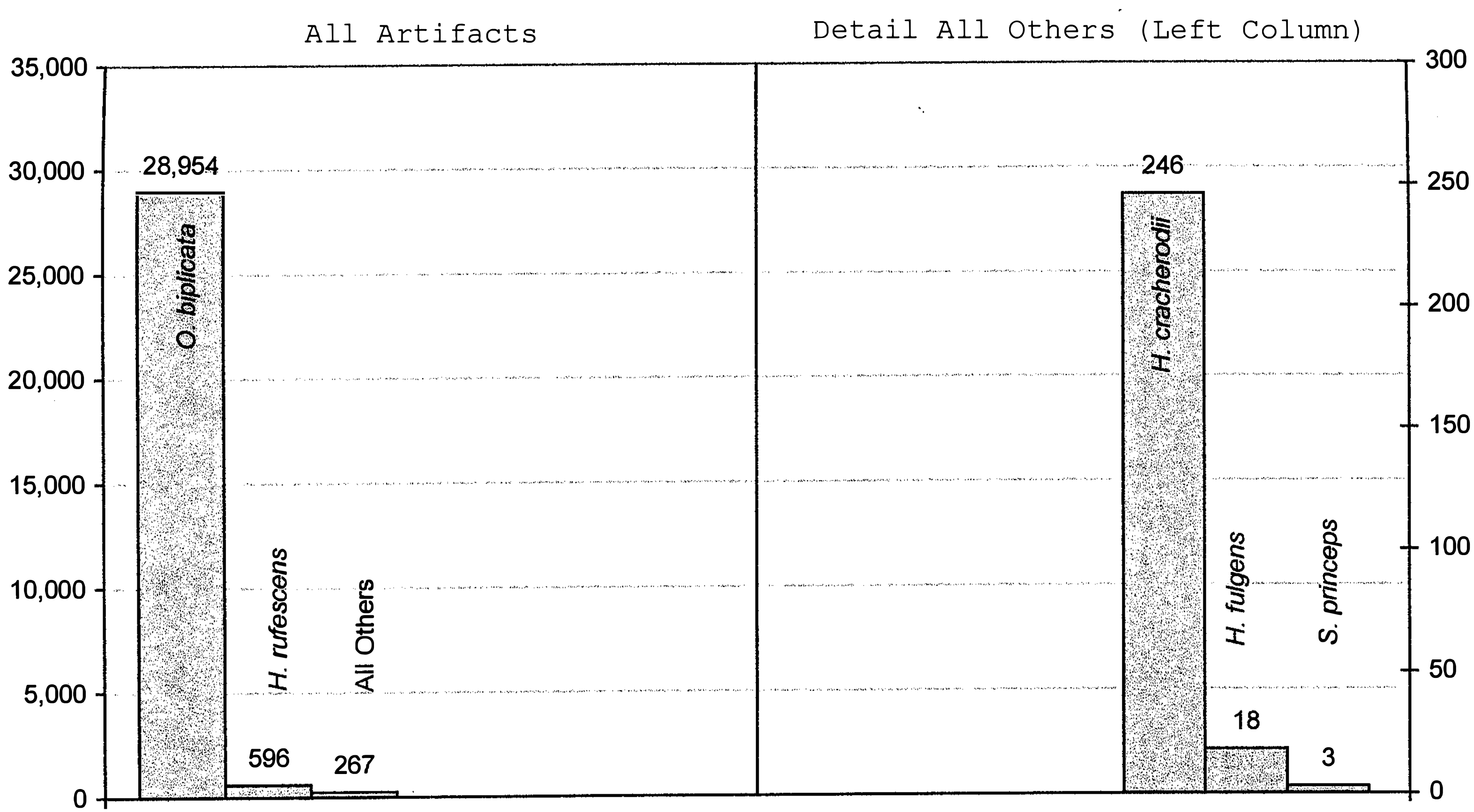


Figure 20. Comparative Graph of Total *Haliotis*, *Olivella*, *and Spondylus* Artifacts by Genus and Species from some Key Sites in the Southern California Cultural Area (Pre- and Post- AD 900 Artifacts Combined).

Summary of Regional Patterns and Change in Intensity of the Shell Trade Over Time

In the Southwest there was a general increase in the amount and variety of *Haliotis, Olivella, and Spondylus* shell artifacts traded after AD 900. The increased use of marine shell artifacts after AD 900 is seen in newly established trade locations, greater cultural diffusion, and more frequent contact between differing regions.

Evidence suggests an early trade relationship between the Hohokam and southern California. It appears there was already a substantial *Haliotis* trade before AD 900 between southern California and the Hohokam area which diminished or changed after AD 900 (cf. Haury 1976).

Although there was a general tendency for an increase in shell use after AD 900, the trend was not the same for all shell species. Most notable in this regard was the greater use of *Haliotis* by Hohokam and southern California people before AD 900, rather than after. In the studied sample, there were four times the number of *Haliotis* artifacts in southern California dated before AD 900 as after AD 900. This corresponds to the Hohokam emphasis on *Haliotis* use before AD 900.

Both southern California and the Southwest showed general increases in *Olivella* use after AD 900. The most intriguing case is that of the Anasazi. There were twice the number of Anasazi sites with *Olivella* before AD 900 as compared to after, but the actual quantity of artifacts remained somewhat similar in the later period. The most obvious accounting for this is, of course, the well known tendency in late Southwest prehistory for the formation of fewer but larger nucleated sites (DiPeso 1974; Vivian 1990).

There was greater *Spondylus* use after AD 900 by all Southwest groups and *Spondylus* trade seems to have been dominated by the Hohokam both before and after AD 900, as shown by Figures 8, 9, and Table 4.

Primary, Secondary and Tertiary Shell Trade Locations Before and After AD 900

In this section, certain Southwest and southern California sites are categorized into Primary, Secondary and Tertiary shell trade Locations based upon their shell artifact counts. Change over time in location and the size of trade locations is traced by dividing the corpus into pre-AD 900 and post AD 900 data sets. Those sites with the greatest number of countable artifacts during a given time period are classed as Primary, those with lesser counts are termed Secondary, and those with the fewest artifacts are classed as Tertiary. As Tables 14, 16, and 18 show, the raw artifact numbers provide obvious divisions between the groups.

Obviously, the intensity, methods, and location of excavations at archaeological sites greatly affect the character and number of specimens recovered. Because shell artifacts tend to be concentrated in burial locations or households more than in middens, different excavation strategies applied to a site can yield quite different representations of such specimens. Screen size (or lack of screening) can also dramatically affect the recovery of small artifacts such as beads and many other ornaments. Sheer extent of sites or excavations is another important variable, especially in the recovery of relatively rare artifacts.

As the notes on individual cells in Appendix A show, the specimens recorded come from burial, household, and unspecified contexts, and from large and small sites or excavated areas. Unmistakably, the largest collections come from a few large sites or clusters of sites where extensive excavations have been carried out, and it is just as obvious that smaller sites and excavations have yielded smaller collections. It cannot be ruled out that further excavations at some of the known sites might yield much more extensive shell collections. This is, however, an ambiguity that must be lived with until further information emerges, as there is no realistic prospect of resolving it by determining the potential for further yields at the many sites included in the current sample. While the information needed to attempt such assessments might be available in a few site reports of comparatively recent vintage, in many cases it surely is not. As in all research, it must be expected that future investigations will result in corrections and additions to the picture that can be presented at any given time.

Given the inevitable ambiguities of working with data collected over almost a century, it is clear that making fine distinctions between shell trade locations based on artifact counts is not warranted, even while quantitative data remain crucial to the picture. Thus, only the most robustly expressed patterns in the data can be given credence. For this reason, only Primary, Secondary, and Tertiary categories of shell trade locations are recognized in the present analysis. As tables 14, 16, and 18 show, the counts for these three categories are of clearly distinct orders of magnitude, and give reasonable warrant for setting them apart

Within both the Southwest and southern California, locations associated with trade tended initially to form near sources of water and exploitable resources (Haury 1976; Moratto 1984; Schroeder 1960; Ruby 1970; Vivian 1990). Primary trade sites tended to be situated near the junctions of two or more trade routes (Figs. 29, 30), where they provided access to the varied resources of differing cultural, climatic and geographic regions. Some sites, located on what were to become major trade routes and junctions of these major trade routes, tended to evolve from Secondary to Primary trade locations (Tables 13, 14, 16, 18). Some Primary locations also sank to Secondary status over time. Tertiary sites appear to represent down-the-line termini of the trading chain, where often very few specimens have been recovered.

Although not actually within the Hohokam culture area, Indian Hill Rock Shelter (Figure 31, Table 25) in extreme southeast California is included here among Hohokam sites because of abundant Hohokam archaeological evidence found there. This site was obviously important over time as a desert meeting and exchange campsite, where goods passed between the Hohokam and southern California groups (Haury 1976; Moratto 1984; Ruby 1970).

I refer to a number of similar sites clustered along the upper Santa Cruz River in south central Arizona as a single entity termed the "Tucson Basin". Tucson Basin sites were especially concentrated into a relatively small area, similar to the string of back to back sites which form the Lost City complex in southern Nevada.

For each cultural area considered, I show the quantitative basis for Primary, Secondary, and Tertiary trade locations, then plot the data on pre- and post AD 900 maps to show how the system changed over time and involved specific geographic areas. As Table 22 shows, there was a general increase in the numbers of Southwest sites containing exotic shells after AD 900, but the order of magnitude did not increase significantly. Artifact numbers overall, however, increased dramatically. Two exceptions are that Pacific *Haliotis* decreased in a major way in Hohokam sites, and *Olivella dama* from the Gulf of California decreased significantly in Anasazi sites. In overview, the numbers of sites and artifacts make it clear that major changes in the majority of the shell trade occurred after AD 900.

Hohokam Trade Locations

Tables 13 and 14 compare Hohokam trade locations as to the total number of artifacts of *Haliotis, Olivella and Spondylus*, represented both before and after AD 900.

Table 13. Comparative Counts of *Haliotis*, *Olivella*, and *Spondylus* Artifacts before and after AD 900 from Primary Molluskan Trade Sites of the Hohokam Cultural Area.

	Haliotis		*Olivella*		*Spondylus*	
	< AD 900	> AD 900	< AD 900	> AD 900	< AD 900	> AD 900
Tucson Basin	58	10	219	58	1	6
Snaketown	44	20	47	1,856	27	250
Total	102	30	266	1,914	28	256

Before AD 900 there was a generally restricted use of shell in both distribution and quantity, followed by a marked florescence after AD 900. Before AD 900 the Tucson Basin was the Primary trade location among the Hohokam.

Snaketown, 80 miles to the northwest on the Salt River was already a Secondary shell trade location, manifesting slightly less than half the artifacts found in the Tucson Basin during the same period (Table 14; Fig. 21).

Table 14. Hohokam: Possible Primary, Secondary, and Tertiary Trade Locations and Total Number of Artifacts from Sites with Known Artifact Counts.

< AD 900		> AD 900	
Primary		Primary	
1. Tucson Basin	277	9. Snaketown	2,126
Secondary		Secondary	
2. Snaketown	118	10. Los Muertos	125
3. Los Pozos	61	11. Tucson Basin	74
4. Los Muertos	41	12. Junkyard Site	36
		13. Frogtown	27
Tertiary			
5. La Lomita	5	Tertiary	
6. Donaldson Site	2	14. Siphon Draw	8
7. Valencia Road Site	1	15. El Polvoron	7
8. Indian Hill R.S.	1	16. San Cayetano	6
		17. Ellsworth	4
		18. Las Fosas	3
		19. Quijotoa Valley	3
		20. Casa Grande	2
		21. Casas Pequenas	1
		22. Gopherette	1
		23. Rancho Sin Vacas	1
		24. Sunset Mesa	1
		25. Painted Rocks	1

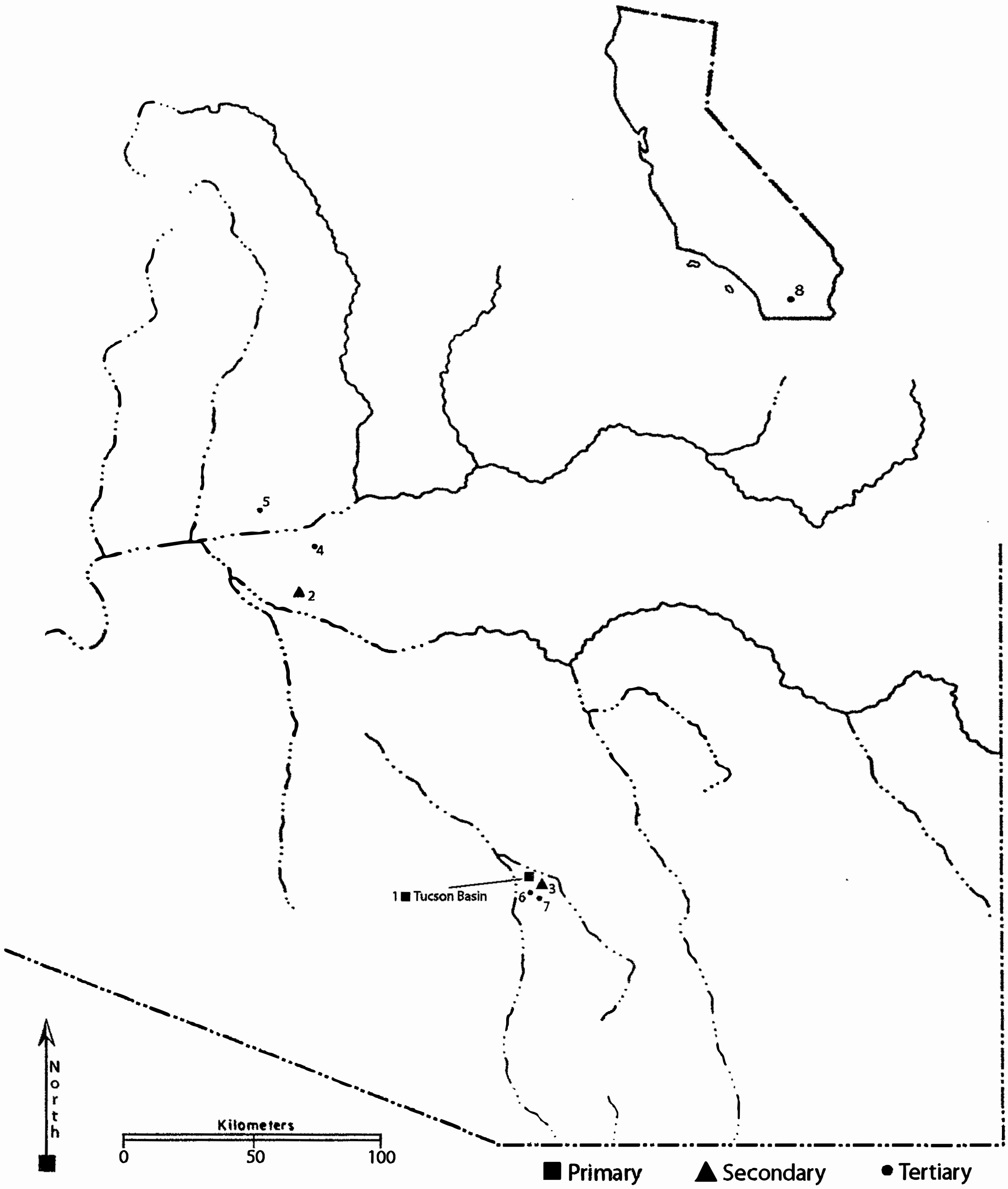


Figure 21. Hohokam: Possible Primary, Secondary, and Tertiary Locations of Shell Use Before AD 900. Data and site names from Table 14.

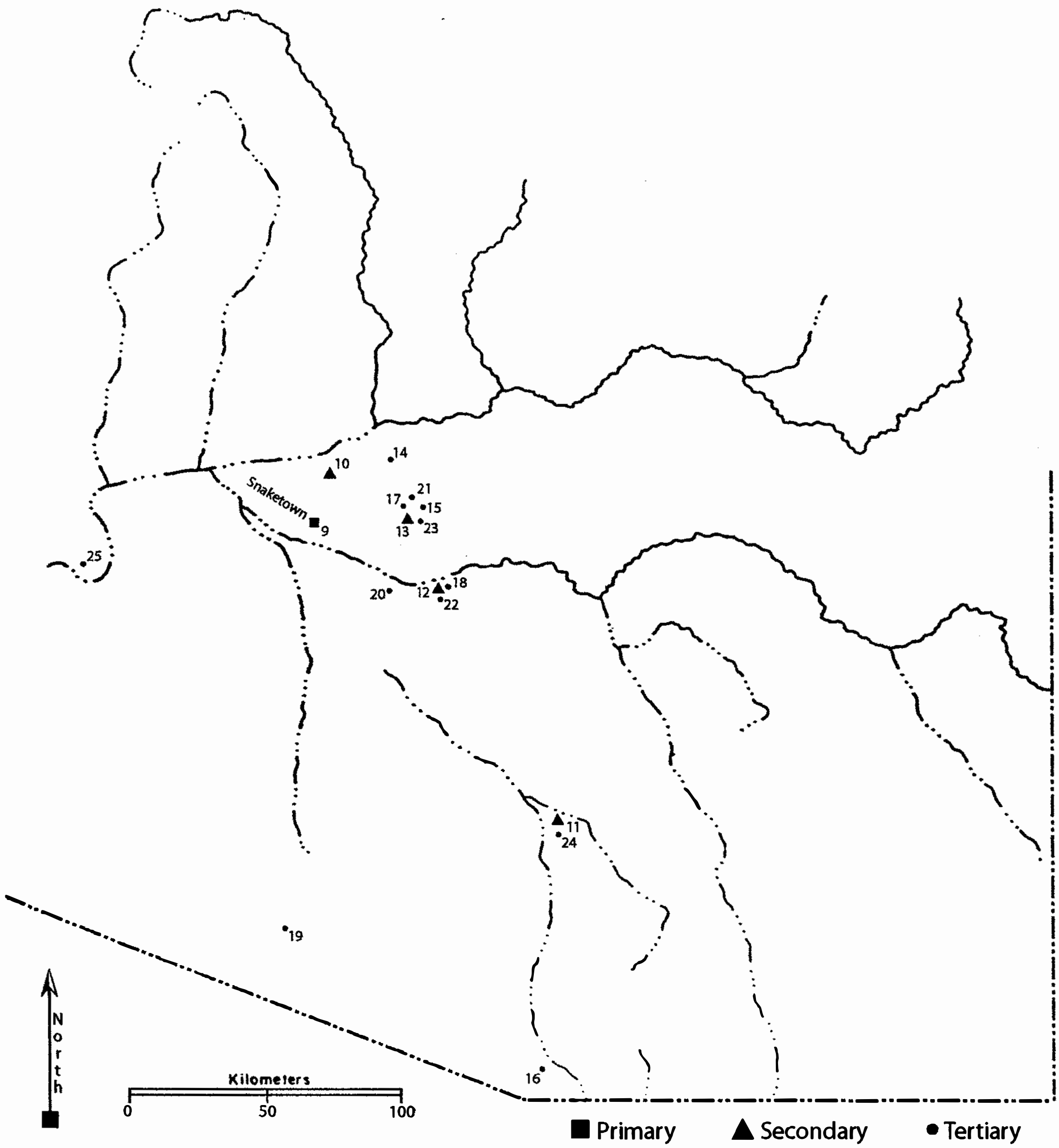


Figure 22. Hohokam: Possible Primary, Secondary, and Tertiary Locations of Shell Use After AD 900. Data and site names from Table 14.

Snaketown developed from a Secondary trade location before AD 900, to a Primary trade location after AD 900. It greatly eclipsed the Tucson Basin to the south, and became a focal point around which a number of Secondary and Tertiary sites clustered (Fig. 22). After AD 900 Snaketown clearly emerged as the dominant molluskan trade location for a large region of the Southwest including the Hohokam area (Haury 1976). During the same time period the Tucson Basin was reduced to a Secondary location, manifesting about 4% of the artifacts it yielded as a Primary trade location in the period before AD 900.

Figures 21 and 22 show how several trade locations classified as Secondary before AD 900 may have changed to Primary locations after AD 900. There was a markedly wider distribution of Secondary sites after AD 900, and more than twice the number of Tertiary sites as before AD 900.

The largest number of artifacts and the most elaborate artifacts, such as turquoise mosaics with *Spondylus* aviform centerpieces, are commonly found in Primary and occasionally Secondary Hohokam trade locations (Haury 1976). This suggests sociopolitical use of exotic objects by elites in the most important sites such as Snaketown. Some suggested explanations for the diminishment of the

Tucson Basin as a major trade location after AD 900 include warfare, flood and disease (Bayman 2001).

Anasazi Trade Locations

Among the Anasazi before AD 900, Chaco Canyon and Canyon del Muerto/Canyon de Chelley were the main locations of shell trade, as determined by sites with the greatest numbers of shell artifacts (Table 16). Among the Anasazi, the greatest number of artifacts from a single site/complex were from Chaco Canyon before AD 900 (Table 15). Among the Anasazi before AD 900 Chaco Canyon is clearly a nexus or center of molluskan trade, followed closely by Canyon De Chelley/Canyon Muerto.

Table 15, Comparative Counts of *Haliotis*, *Olivella*, and *Spondylus* Artifacts both before and after AD 900 from Primary Molluskan Trade Locations of the Anasazi Cultural Area. (N.A. indicates that artifacts were present but counts not available.)

	Haliotis		*Olivella*		*Spondylus*	
	< AD 900	> AD 900	< AD 900	> AD 900	< AD 900	> AD 900
Chaco Canyon	1	4	3,000	10	7	N.A.
Canyon de Chelley/Canyon del Muerto	45	N.A.	2,000	N.A.	N.A.	N.A.
Pecos/Arroyo Hondo	N.A.	8	N.A.	1,176	NA	1
Marsh Pass	1	N.A.	117	1,012	1	N.A.
Main Ridge/Lost City	2	44	6	805	N.A.	9
Totals	49	56	5,123	3,003	8	10

Shell is more widely distributed among the Anasazi after AD 900 as evidenced by more Primary, Secondary, and Tertiary trade locations (Table 16; Figs. 23, 24). The Anasazi show twice the number of Tertiary sites after AD 900 (20) as compared to before AD 900 (10) (Table 16). In all of the main Anasazi trade locations after AD 900 the major shell genus traded was *Olivella*.

Table 16. Anasazi: Possible Primary, Secondary, and Tertiary Trade Locations and Total Number of Artifacts from Sites with Known Artifact Counts.

< AD 900

Primary	
1. Chaco Canyon	3,008
2. Canyon del Muerto/Canyon de Chelley	2,045
Secondary	
3. Marsh Pass	119
Tertiary	
4. Caldwell Village	12
5. Main Ridge/Lost City	8
6. Durango	7
7. Broken Flute Cave	5
8. Sayodneechee	5
9. Willow Beach	5
10. Animas Rock Shelter	3
11. Prayer Rock	1
12. Kiatuthlana	1
13. White Dog Cave	1

> AD 900

Primary	
14. Pecos/Arroyo Hondo	1,185
15. Marsh Pass	1,012
16. Main Ridge/Lost City	858
Secondary	
17. Kiatuthlana	300
18. Zuni/Halonowan	209
19. Wupakti	49
Tertiary	
20. Mesa Verde	20
21. Chaco Canyon	14
22. Willow Beach	10
23. Black Mesa	9
24. Nephi Site	6
25. White Rock Village	5
26. Keet Seel	3
27. Ridge Ruin	3
28. Monument Valley	3
29. Black Mesa	2
30. Poncho House	2
31. Ramp Site	1
32. Etna Cave	1
33. Paragoonah	1
34. Bonanza Dune	1
35. Tsi Taa	1
36. Gilbert Site	1
37. Barrier Canyon	1
38. Aztec	1
39. Chevelon	1

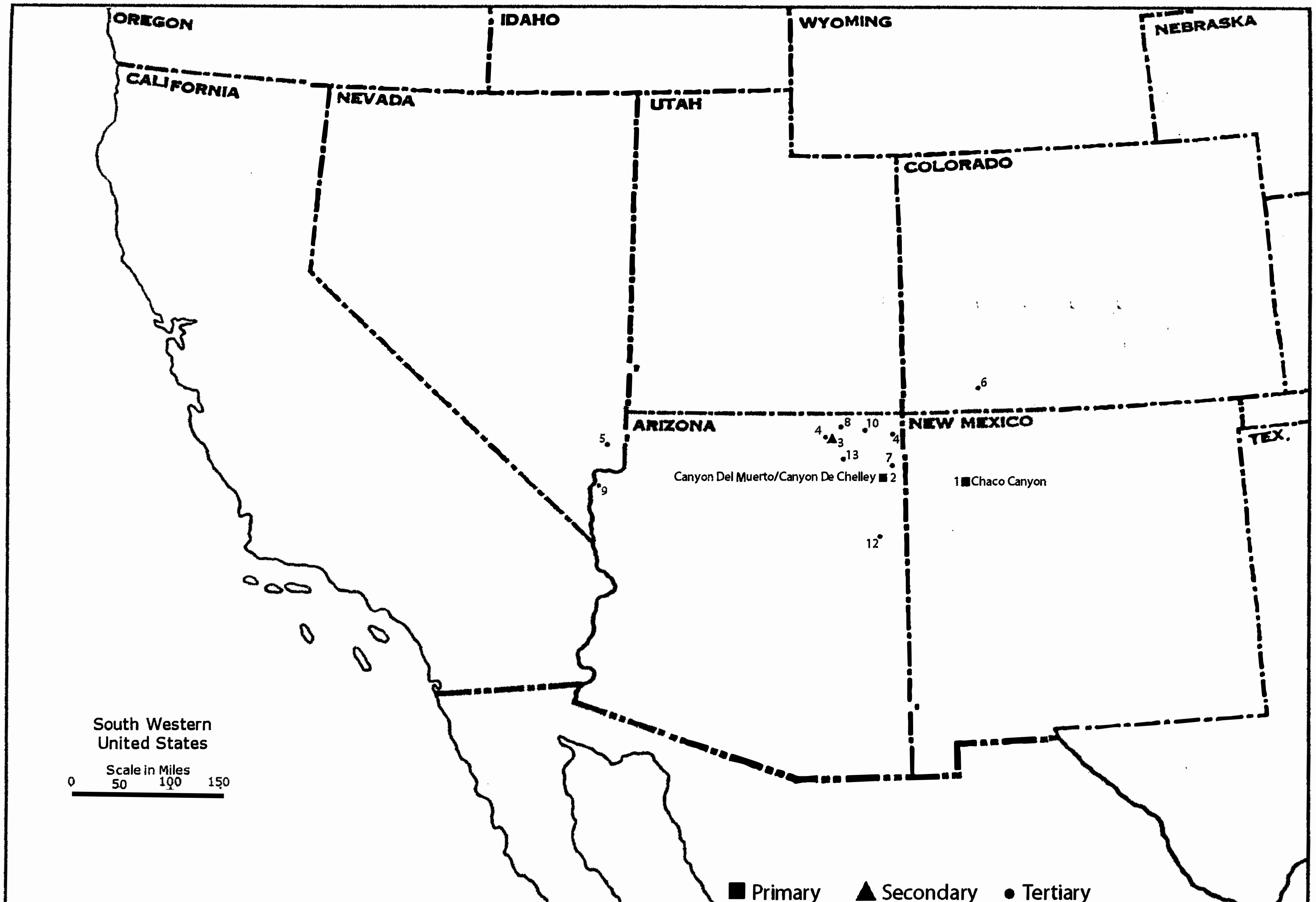


Figure 23. Anasazi: Possible Primary, Secondary, and Tertiary Locations of Shell Use Before AD 900. Data and Site Names from Table 16.

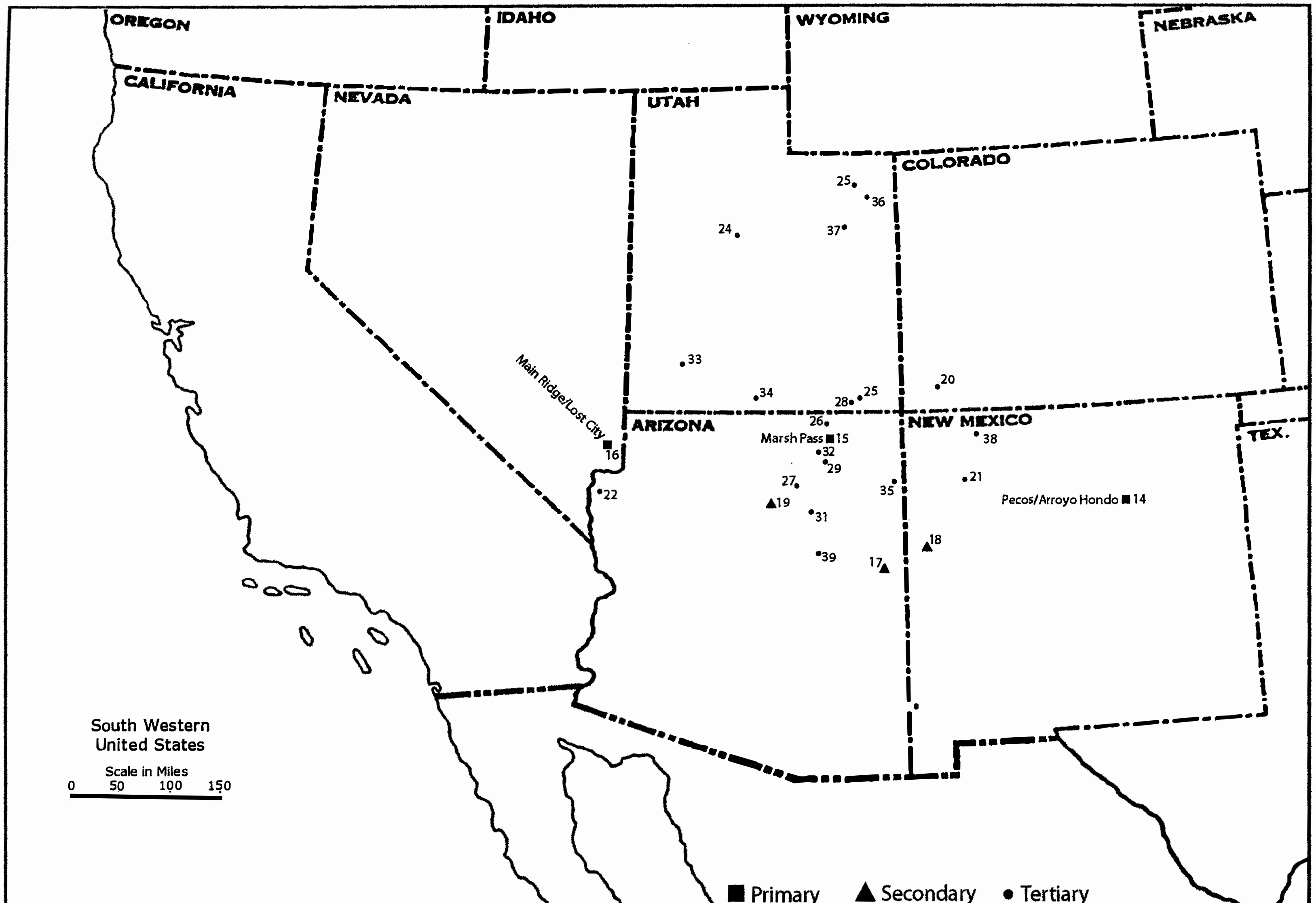


Figure 24. Anasazi: Possible Primary, Secondary, and Tertiary Locations of Shell Use After AD 900. Data and Site Names from Table 16.

After AD 900 Pecos/Arroyo Hondo emerges as the Primary Anasazi shell trade location (Table 16). Chaco Canyon went from a dominant Anasazi Primary shell trade location before AD 900 to a Tertiary location after AD 900 (Table 16; Figs. 23, 24). This reflects pronounced political and demographic changes after AD 900. Due to a combination of factors Chaco Canyon seems to have been all but abandoned by AD 1150 (Vivian 1990).

Marsh Pass and closely associated Tsegi Canyon sites such as Keet Seel in northeast Arizona served major east-west and north-south trade routes. Marsh Pass demonstrated a marked increase in *Olivella* use after AD 900. This increase is partially related to the increased ingress of Pacific *Olivella biplicata* via the Mojave Trail and Main Ridge/Lost City, as well as an increase in *Olivella dama* from the Gulf of California, supplied by the Hohokam.

The Virgin Branch Anasazi site cluster of Lost City, especially the Main Ridge site, rose from a Tertiary location of shell trade before AD 900 to a Primary center after AD 900 (Table 16; Figs. 23, 24). The increase in the amount of Pacific *Olivella biplicata* and *Haliotis* shell at Main Ridge/Lost City after AD 900 (Table 30) documents the increasingly important role of the site in distributing

Pacific shell to the Southwest during this period (cf. Shutler 1961; Lyneis 1992, 1995; Figs. 23, 24).

After AD 900 Pecos/Arroyo Hondo has the largest number of molluskan artifacts (Fig. 29), followed closely by Marsh Pass and Main Ridge/Lost City (Table 16, Fig. 24). These three Anasazi trade centers are geographically arranged with Main Ridge/Lost City in the far west, possibly functioning as a western Anasazi "shell collection center" for Pacific Shells, Pecos/Arroyo Hondo in the extreme east with established trade access to the Mogollon (Figs. 29, 30), and Marsh Pass between the two, with established trade access to both Virgin Anasazi- mediated Pacific shell and Hohokam- mediated Gulf of California shell (Fig. 29). After AD 900 these Primary trade locations were major destinations along principal shell trade pathways.

Mogollon Trade Locations

Before AD 900 there was generally restricted use and distribution of molluskan shell in the Mogollon area. Casas Grandes on the southern edge of the Mogollon country was the Primary shell trade location both before and after AD 900 (Tables 17, 18, 21, Appendix A: Table 22). Both the regional distribution of trade locations and the number of shell artifacts increased significantly after AD 900.

Table 17, Comparative Counts of *Haliotis*, *Olivella*, and *Spondylus* Artifacts both before and after AD 900 from Primary Molluskan Trade Locations of the Mogollon Cultural Area.

	Haliotis		*Olivella*		*Spondylus*	
	< AD 900	> AD 900	< AD 900	> AD 900	< AD 900	> AD 900
Casas Grandes	0	28	91	13,587	259	2

The relatively large Mogollon sites of Swartz Ruin and Gran Quivera emerge as Secondary Mogollon shell trade locations after AD 900. Though they rank far below Casas Grandes, their emergence clearly is related to the general establishment of large habitation sites during late prehistory in the Southwest. Swartz and Gran Quivera may have been instrumental in vending shells north from Casas Grandes.

Table 18. Mogollon: Possible Primary, Secondary, and Tertiary Trade Locations, and Total Number of Artifacts from Sites with Known Artifact Counts.

< AD 900		> AD 900	
Primary		Primary	
1. Casas Grandes	93	8. Casas Grandes	13,875
Secondary		Secondary	
2. El Paso	5	9. Swartz	316
3. Mariana Mesa	5	10. Gran Quivera	117
4. Tuzigoot	4		
		Tertiary	
Tertiary		11. Red Bow Cliff D.	20
5. Mimbres Valley	1	12. Mimbres	10
6. Mogollon	1	13. Wind Mountain	5
7. Point of Pines	1	14. Carter Ranch	4
		15. Alamogordo	1
		16. Exhausted Cave	1
		17. Montezuma's Castle	1
		18. Point of Pines	1
		19. Pine Flat Cave	1
		20. Ridge Ruin	1
		21. Grasshopper	1
		22. Tuzigoot	1
		23. Wupakti	1
		24. Mule Creek	1

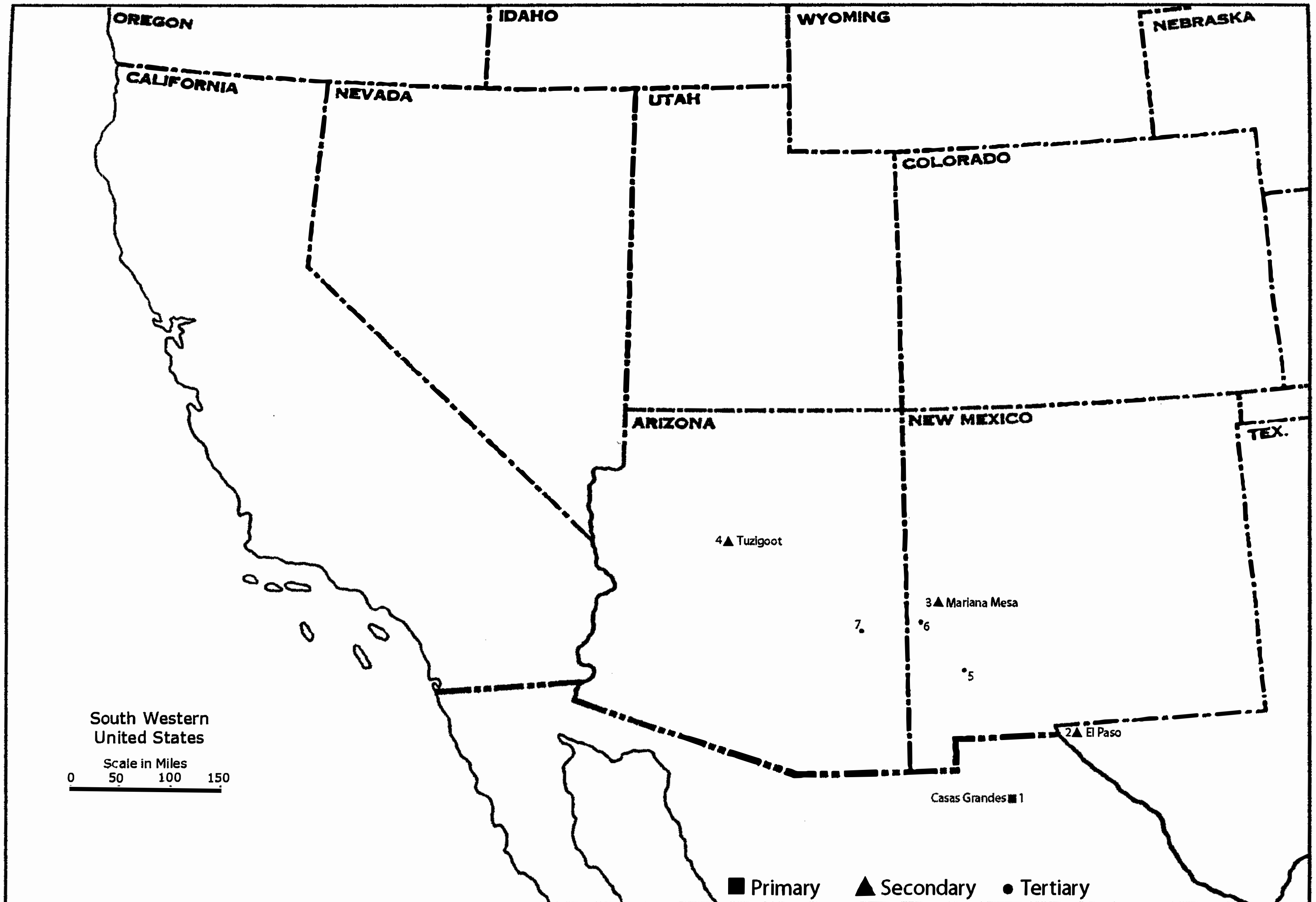


Figure 25. Mogollon: Possible Primary, Secondary, and Tertiary Locations of Shell Use Before AD 900. Data and Site Names from Table 18.

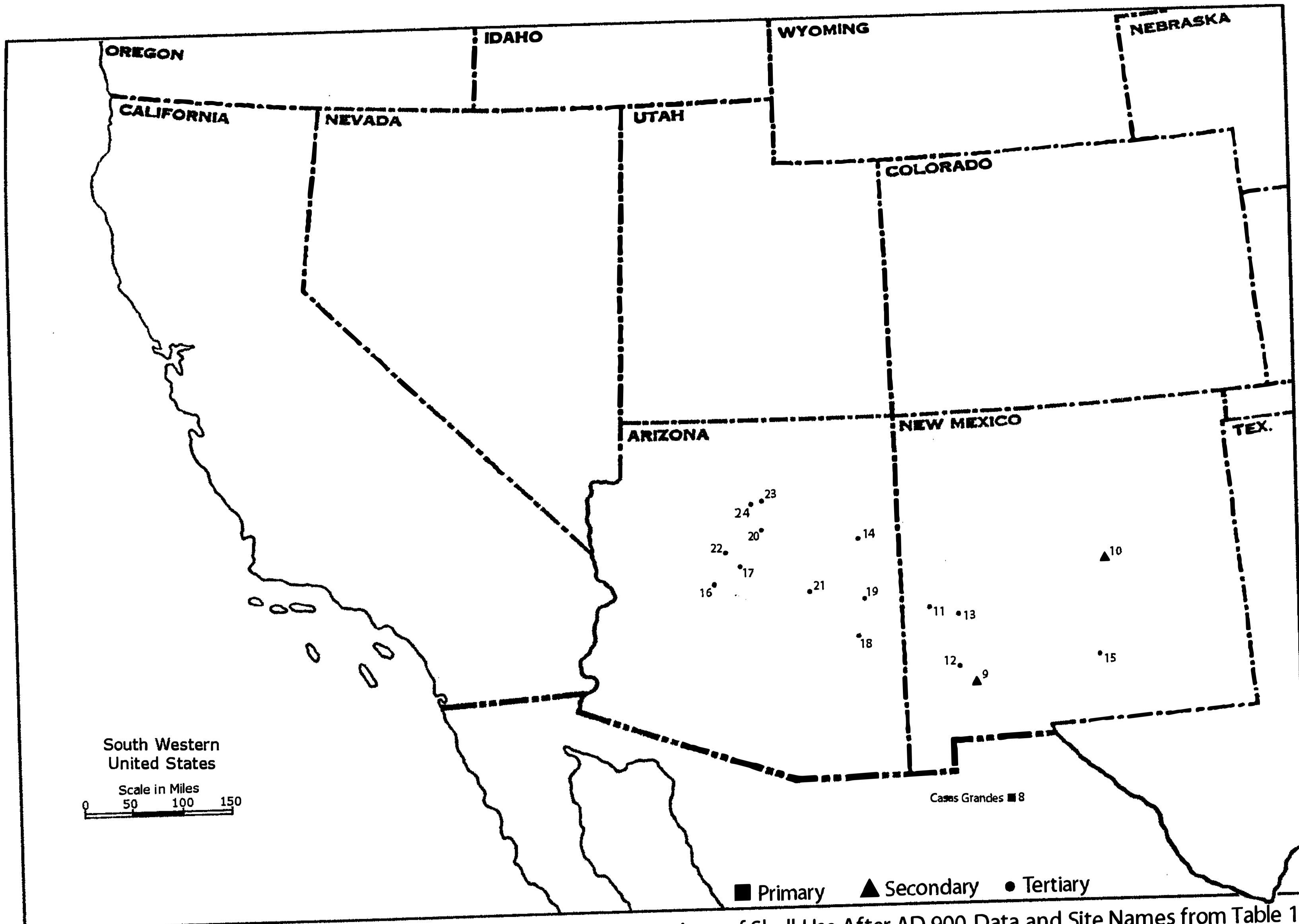


Figure 26. Mogollon: Possible Primary, Secondary, and Tertiary Locations of Shell Use After AD 900. Data and Site Names from Table 18.

There was a great increase in the number of Mogollon area Tertiary shell trade locations after AD 900 (Figs. 25, 26), sites representing the end recipients in a process of down-the-line trade. This is reflected in the relative scarcity of exotic shell objects and the poorer quality of objects from Tertiary sites compared to Primary sites (cf. Haury 1976).

Artifact counts show that after AD 900 Casas Grandes experienced a very great increase in molluskan artifacts which suggests its emerging role as a dominant location of molluskan trade during the late prehistoric and protohistoric periods in the Southwest (DiPeso 1974).

In its role as a Primary trade location Casas Grandes clearly participated in the diffusion of Mesoamerican cultural elements such as ballcourts and macaw and *Spondylus* ritualization into the Southwest after AD 900. According to DiPeso (1974) there was relatively close association between Casas Grandes and northern Mesoamerican cultural factions, especially after AD 900.

Some Major Southern California Shell Trade Locations

Table 19. Southern California: Some Major Sites of Southern California with Large Numbers of Shell Artifacts. Sites and artifact counts are arranged before and after AD 900.

< AD 900			> AD 900		
1.	SCrI-3	11,541	9.	SCrI-100	15,080
2.	SBa-81	9,374	10.	SRI-41	11,181
3.	SCrI-100	2,976	11.	SRI-34	5,417
4.	SRI-41	1,083	12.	SBa-46	5,190
5.	SCrI-162	498	13.	SBa-72	3,117
6.	SRI-83	279	14.	SCrI-83	2,109
7.	SBa-71	187			
8.	SBa-142	68			

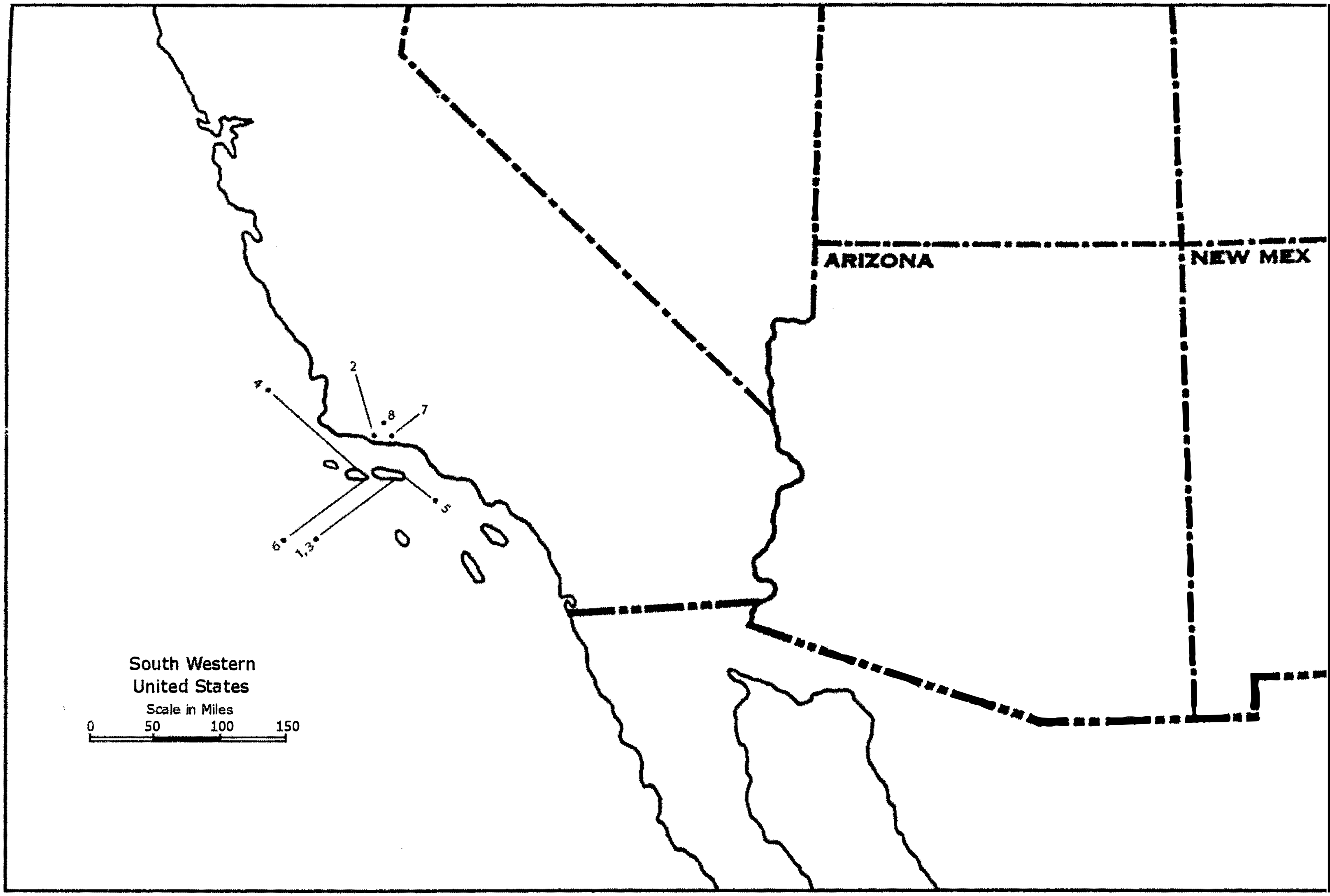


Figure 27. Southern California: Some Major Loations of Shell Use Before AD 900. Data from Table 19.

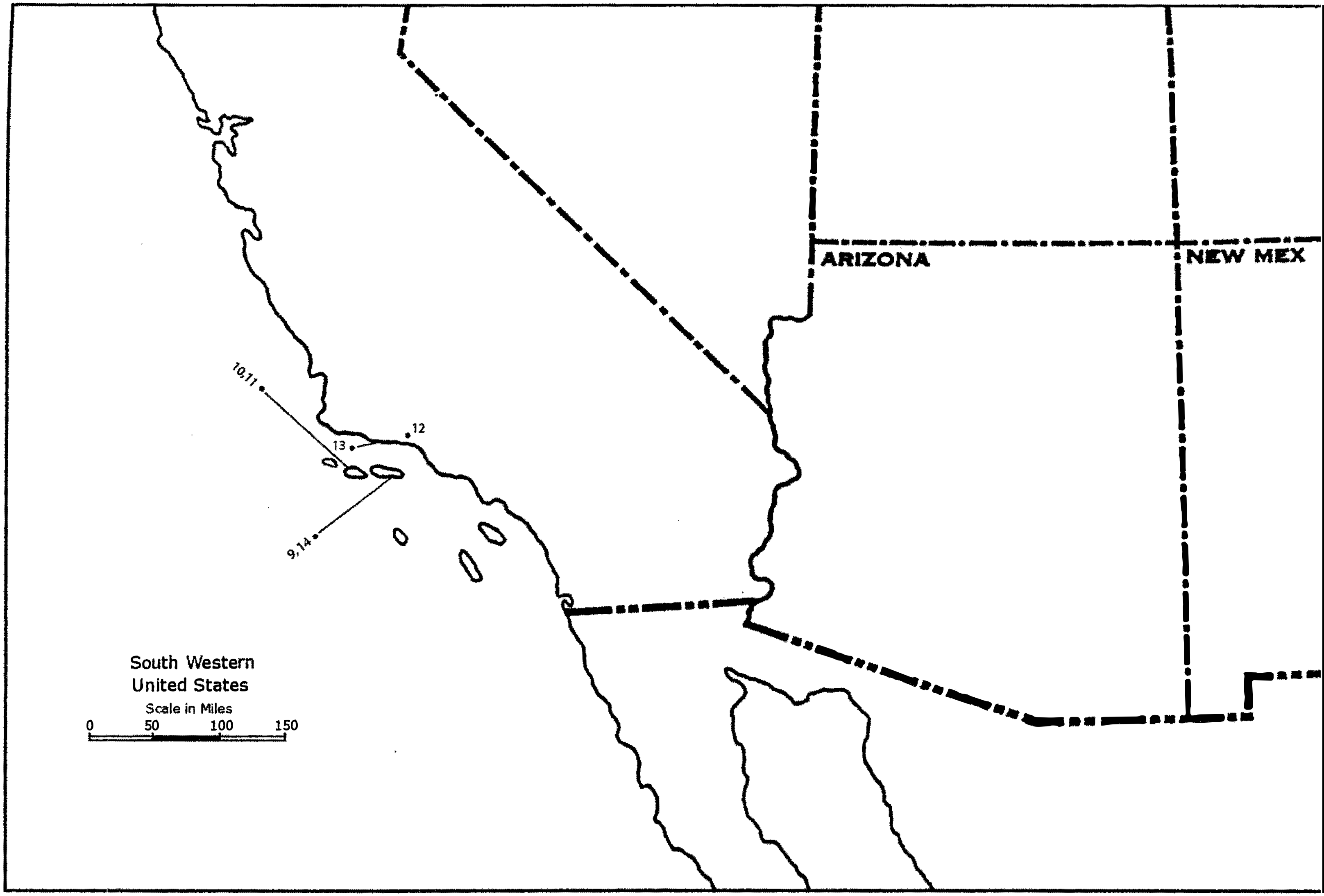


Figure 28. Southern California: Some Major Locations of Shell Use After AD 900. Data from Table 19.

	Haliotis		*Olivella*		*Spondylus*	
	< AD 900	> AD 900	< AD 900	> AD 900	< AD 900	> AD 900
Hohokam						
Tucson Basin	58	10	219	58	1	6
Snaketown	44	20	47	1856	27	250
Anasazi						
Chaco Canyon	1	4	3000+	10	7	N.A.
Canyon de Chelley/de Muerto	45	N.A.	2000	N.A.	N.A.	N.A.
Pecos/Arroyo Hondo	N.A.	8	N.A.	1176	N.A.	1
Marsh Pass	1	N.A.	117	1012	1	N.A.
Main Ridge/Lost City	2	44	6	805	N.A.	9
Mogollon						
Casas Grandes	0	28	91	13,587	259	2

Table 20. Comparative Counts of *Haliotis*, *Olivella*, and *Spondylus* Artifacts both before and after AD 900 from Primary Trade Locations of Major Cultural Areas in the Southwest

Summary of Changes over Time in Regional and Local Shell Trade Locations

The California-Southwest shell trade was well established, but at a relatively low level of intensity, some centuries before AD 900. After AD 900 in both the Southwest and southern California, there was a general increase in the number of sites and trade locations, as well as an increase in the amount and variety of shell artifacts traded. With increased use of marine shell artifacts came the establishment of new trade locations, greater cultural diffusion, and more frequent contact between differing regions.

In the Hohokam area there is only one dominant shell trade location documented both before and after AD 900, but its location shifted over time. The greatest emphasis on shell trade before AD 900 was in the Tucson Basin, but the emphasis shifted northwest some 80 miles to Snaketown after AD 900. Before AD 900 Snaketown was already important, but then manifested only slightly less than half the artifacts found in the contemporaneous Tucson Basin. Both these centers and other locations as well had already fully established the Hohokam pattern of drawing on the Gulf of California as its major source of marine shell. The Hohokam concentrated tropical *Olivella* artifacts (mostly *O. dama)* from the Gulf of California in both Snaketown and the Tucson Basin after AD 900. During the same period there was a corresponding increase in *Olivella dama* artifacts in Anasazi sites. The high prevalence of *O. dama* in Anasazi sites generally makes it clear that the Hohokam vended tropical *Olivella dama* to the Anasazi over a long period of time, and especially after AD 900, during the ascendancy of Snaketown.

Among the Hohokam there was somewhat wider distribution of Secondary sites after AD 900 (Figs. 21, 22). After AD 900 there was more than twice the number of Tertiary sites as before AD 900, suggesting greater artifact distribution, population increases and more non-elite use of shell products.

The greatest number of artifacts before AD 900 from a single Anasazi complex came from the Primary trade location of from Chaco Canyon. Canyon de Muerto/Canyon de Chelly was also a Primary trade location before AD 900, manifesting more molluskan artifacts at this time than any other trade location except Chaco Canyon.

Among the Anasazi there was a greater number of Primary, Secondary, and Tertiary trade locations after AD

900. After AD 900 there was a notable increase in the number of Tertiary sites further to the north and west. There was a tendency for some sites to change in status, with some sites classed as Secondary before AD 900 changing into Primary sites after AD 900. Chaco Canyon, on the other hand, devolved in size after AD 900 through abandonment (Vivian 1990).

In the Anasazi area, shell is more widely distributed after AD 900, as evidenced by a larger aggregate total of Primary, Secondary, and Tertiary locations (Table 17; Figs. 23, 24). The Anasazi show twice the number of Tertiary sites after AD 900 (20) as compared to before AD 900 (10) (Table 16). There was an increase in the number of Anasazi Tertiary sites north and west in southern Utah and Nevada (Appendix A: Table 30; Fig. 34).

Chaco Canyon sank from being the dominant Anasazi Primary shell trade location before AD 900 to being a Tertiary location after AD 900 (Table 16; Figs. 23, 24). After AD 900 Pecos/Arroyo Hondo emerged to replace Chaco Canyon as the Primary Anasazi shell trade location (Fig. 24).

After AD 900 the Primary trade locations of Main Ridge/Lost City, Marsh Pass and Pecos/Arroyo Hondo clearly formed major destinations along a principal west to east pathway for Pacific molluskan objects and other trade. This continued on eastward from the Mojave Trail of southern California (Table 16; Fig. 23).

Among the Mogollon only three sites qualify as Tertiary trade locations before AD 900. Casas Grandes, on the far southern edge of the Mogollon country, is shown to be the only qualifying Primary trade location in that area both before and after AD 900. Casas Grandes shows much less use of *Spondylus* before AD 900 as compared to after. The Swartz and Gran Quivera sites emerged as Secondary, but much smaller shell trade locations after AD 900. They were no doubt links in the Casas Grandes trade network serving the Mogollon country (DiPeso 1974; Vivian 1990; Whalen and Minnis 2001). The number of Tertiary shell trade locations increased dramatically in the Mogollon region after AD 900 (Table 18).

The major southern California shell trade sites were in coastal or island locations of the Chumash cultural area, as discussed further in the following section.

Beginning of the Trade Pathway

Point Conception, California (in the north-west Santa Barbara Channel region), and the northern Channel Islands, mark the northern range limits of several Pacific shellfish species (Appendix B: Fig. 43) that are represented as artifacts in Appendix A. These particular artifacts, and other lines of evidence, show that the marine oriented peoples and island cultures south of Point Conception comprised the beginning point of Southwest trade relationships both before and after AD 900.

Furthermore, because the mainland and island Chumash manifested the greatest amount and variety of shell artifacts of any group in California (King 1990; Kroeber 1925), and because the Pacific molluskan artifacts found in Southwest sites match those from southern California coastal and island sites (Gifford 1947; King 1990), it is evident that the Pacific molluskan artifacts found in the Southwest must have been primarily manufactured in the southern California coastal area. The numbers in Table 21 indicating species indigenous only south of Point Conception are small because they represent only taxa that have been positively identified and which are rare as artifacts. *Haliotis rufescens and H. cracherodii* are the most common taxa found in archaeologic sites, but are less identifiable as to source because they exist on a large area of the Pacific Coast.

Table 21. Restricted Pacific Coast Species.

	Hohokam		Anasazi		Mogollon	
	< AD 900	> AD 900	< AD 900	> AD 900	< AD 900	> AD 900
H. fulgens	9	0		3	0	0
H. imperforata	1		1		0	0
H. corrugata	2	0	0	0	0	0
H. assimilis	0		1		0	0
O. pedroana	1		1			
Totals	13	0	3	3	0	0

Within California there are marked differences in the types of manufactured *Haliotis* objects found in southern, central, and northern California (Gifford 1947). The *Haliotis* and *Olivella* artifacts from the Southwest look like those from the Channel Islands, and not like those from central or northern California. For example, "Banjo" objects made from "widespread" *Haliotis* species (*rufescens)* are found in central California sites but not in Chumash, Gabrielino or Southwest sites. This and other evidence previously discussed confirms that the southern California

Coast and islands south of Point Conception, were the key suppliers of *Haliotis* artifacts to the Southwest. No site within the Southwest has been identified as a place of manufacture of artifacts made from Pacific Coast molluskan species so it would appear that finished artifacts, rather than raw shells, were transported (DiPeso 1974; Gifford 1947:61-62; Haury 1976; Jernigan 1978; Vivian 1990; Volks 2000 personal communication).

Santa Cruz Island was a major manufacturing center for many types of molluskan artifacts which have been found in southern California and Southwest locations. Prime chert toolstone sources for the manufacture of the microblade tools needed to cut and perforate molluskan beads and ornaments, as well as a variety of the microblade tools themselves, have been found in abundance at shell artifact producing sites such as SCrI-100 on Santa Cruz Island (Arnold 1987; King 1990).

A significant quantity of Pacific *Olivella* artifacts have been found in Southwest sites. These are traceable, on the grounds of their place of origin and types of manufacture, to the Channel Islands region. It is important to stress, however, as noted in previous discussions, that a slight preponderance of the *Olivella* shell artifacts found in Anasazi sites were *O. dama* from the Gulf of California, and reached the Anasazi via Hohokam middlemen, rather than from the California Chumash and their neighbors who were purveyors of *O. biplicata*.

	Hohokam			Anasazi			Mogollon ξ		
	<AD 900	>AD 900	Total	<AD 900	>AD 900	Total	<AD 900	>AD 900	Total
Number of *Haliotis* Artifacts									
Number of Sites in Sample	9	8	17	13	15	28	5	4	9
H. cracherodii	5	5	10	46	23	69	0	29	29
H. rufescens	4	1	5	9	17	26	7	2	9
H. fulgens	4	0	4	0	3	3	0	0	0
H. assimilis	0	0	0	1	0	1	0	0	0
H. californiensis imperforata	1	0	1	0	0	0	0	0	0
H. corrugata	1	0	1	0	0	0	0	0	0
H. species	105	12	117	9	31	40	5	3	8
Total *Haliotis* Artifacts	120	18	138	65	74	139	12	34	46
Number of *Olivella* Artifacts									
Number of Sites in Sample	18	24	42	13	26	39	2	10	12
O. dama	262	127	389	2,125	607	2,732	96	13,883	13,979
O. biplicata	3	0	3	8	2,013	2,021	0	0	0
O. baetica	0	0	0	0	0	0	0	112	112
O. gracilis	0	0	0	0	0	0	0	6	6
O. pedroana	0	0	0	0	1	1	0	0	0
O. volutella	0	0	0	0	1	1	0	0	0
O. anazora	0	0	0	0	0	0	0	1	1
O. species	94	2,014	2,108	3,020	984	4,004	0	49	49
Total *Olivella* Artifacts	359	2,141	2,433	5,153	3,606	8,759	96	14,051	14,147
Number of *Spondylus* Artifacts									
Number of Sites in Sample	2	16	18	2	7	9	1	8	8
S. princeps	0	10	10	0	8	8	2	172	174
S. calcifer	0	0	0	0	1	1	0	88	88
S. princeps/calcifer	0	250+	250+	0	0	0	0	0	0
S. species	27	7	34	2	9	11	0	12	12
Total *Spondylus* Artifacts	27	267+	294+	2	18	20	2	272	274
All Shell Artifacts [26,317]	506	2,426+	2,932+	5,220	3,698	8,918	110	14,357	14,467

Table 22. Counts of Shell Artifacts from the Hohokam, Anasazi, and Mogollon Areas.
ξ Including totals from Casas Grandes.

Conclusion: Some Reaffirmations and New Perspectives on The California-Southwest Shell Trade

Previous authors proved that trade in marine shell was important in establishing connections within and between the Southwest and southern California (Koerper 1996; Ruby 1970). Brand, Koerper and Mason, Ruby, and Tower showed the basic distribution of Pacific shell species throughout much of the Southwest. These earlier studies did not, however, document the temporal trends in the shell trade here noted, did not systematically identify trading centers as is done here, and left undeveloped other important aspects of the shell trade within the Southwest and between the Southwest and southern California.

Earlier studies, limited by previously available data, made no thorough tabulations of Pacific molluskan artifacts found in Southwest sites. This chapter is based on counts of *Haliotis*, *Olivella*, and *Spondylus* artifacts from both the Southwest and southern California, differentiated by date as to before and after AD 900. From this data base, some important new conclusions have been drawn.

My investigation overwhelmingly reaffirms the conclusion of Ruby (1970) and his predecessors that *Haliotis* and *O. biplicata* artifacts were the principal

Pacific Coast objects found in Southwest sites. Through quantitative analysis, this study shows that the Chumash and their southern neighbors were principally responsible for supplying these artifacts to the Anasazi.

My research shows that a major northerly route into the Anasazi country was comprised by the Mojave Trail, the trading camp at Willow Beach, Arizona, a major trading outpost at Main Ridge/Lost City in southern Nevada, and another major connecting area at Marsh Pass, in northern Arizona. This pathway led on to an eastern trading terminus at Pecos/Arroyo Hondo in north-central New Mexico. This northern route had its beginnings before AD 900 and reached its peak after AD 900.

A major south to north flow of shell trade is also revealed by my quantitative data, though the precise pathway is less evident. The fact that Anasazi sites as far north as Marsh Pass yielded a preponderance of *Olivella dama* shells from the Gulf of California links the Anasazi shell trade also very importantly with Hohokam suppliers based in the Tucson Basin and Snaketown. This north-south flow also existed before AD 900, though it reached its high tide after that date.

The trade routes map provided in Figure 29 provides a quantitatively based determination of Primary trade locations and shows how the relative importance of given centers rose and fell before and after AD 900. This systematic identification and dating of trade sites represents a new conclusion that could not have been convincingly obtained without the new field research that has taken place in all areas since the time of earlier syntheses.

In Chapter III I address these points in more detail. I discuss what was carried east from southern California to the Southwest, what was carried west to California from the Southwest, and the role of trading outposts and middlemen in the transport of traded objects. I also say more about my new perspectives on trade routes west to east and south to north. Chapter III further provides a substantial compilation of ceramic evidence showing differential contact between specific cultural areas of the Southwest and specific areas of southern California both before and after AD 900. The role of turquoise and other trade objects in stimulating trade between the two regions is also discussed there.

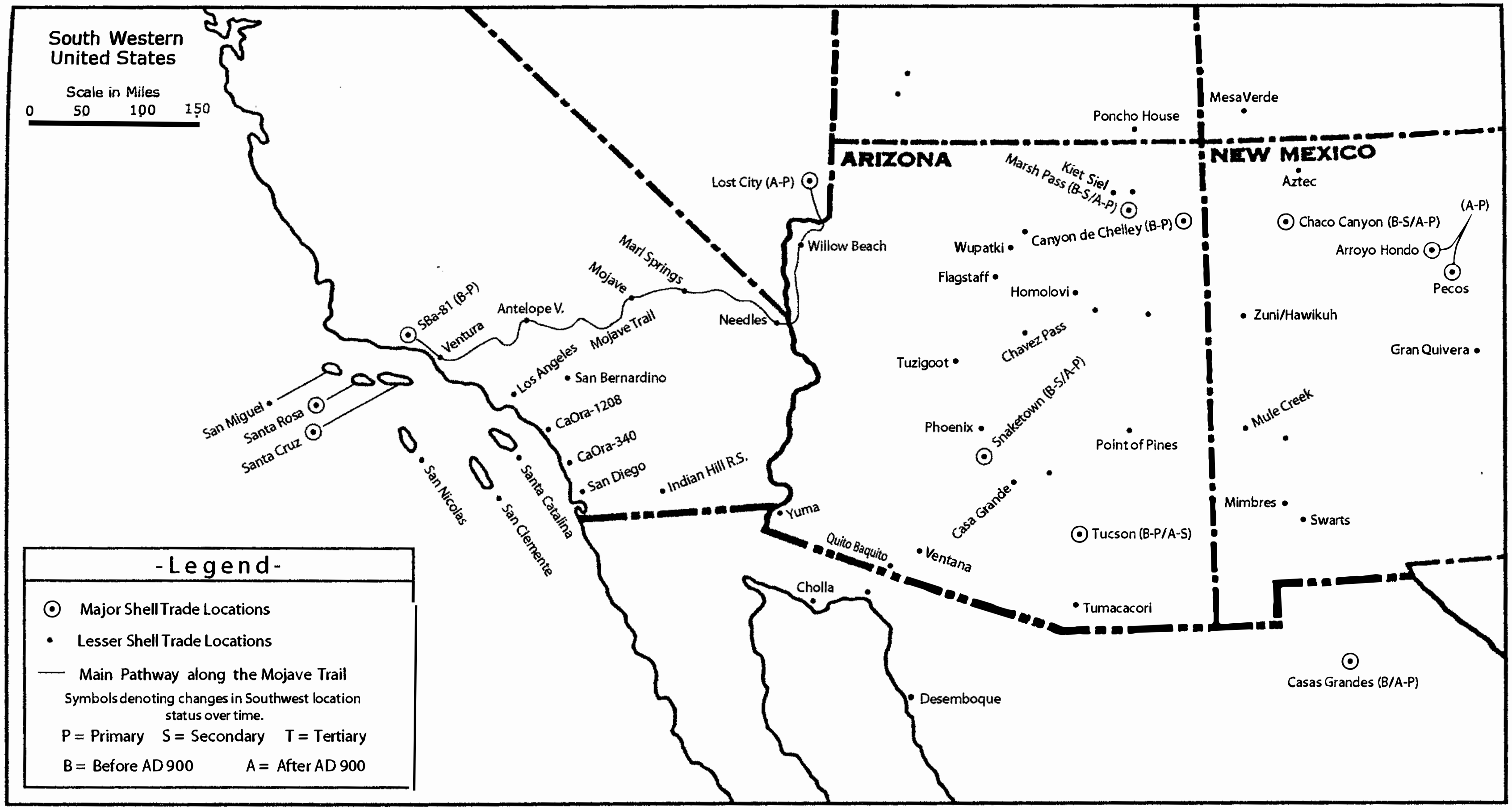


Figure 29. Major Shell Trade Locations Linking the Southwest and Southern California Before and After AD 900.

CHAPTER III

TRADE GOODS, ROUTES, AND MIDDLEMEN

In this chapter I fill out the perspective offered by the quantitative data presented in Chapter II. I take a comprehensive look at previous archaeologic and ethnographic information concerning molluskan use in the Southwest area of the United States, what was traded from west to east and south to north, and at previous postulations about the paths of trade routes and locations of principal molluskan trade locations. The quantitative study of Chapter II shed new light on the importance of some previously known but inadequately appreciated trading centers and routes, which I examine in greater detail here. I conclude with a new construction of the shell trade map that identifies the major trade routes between the southern California Coast, the Gulf of California, and the Southwest.

What was Carried East from California? Imported Objects from the Southern California Coast in Southwest Sites

There are ethnohistoric traditions among the Pueblos of pilgrimages to the "sky blue water" (Pacific Ocean) to acquire shell and ask for rain. According to Bourke (1884:242), the Hopi said that in the past they made pilgrimages every 4 or 5 years to the Pacific Ocean. In 1910 an old resident of San Ildefonso Pueblo told Judd that, as a young man, he had twice ridden horseback from his Rio Grande village to the west coast to obtain shells (Judd 1954:80). Pueblo peoples may have traveled to the Pacific Coast (possibly the vicinity of present day Ventura/Santa Barbara) to acquire shells (Lange 1959:152).

A total of 21 different Pacific coast molluskan species have been identified from Southwest archaeologic sites (Gifford 1947; Haury 1976; Ruby 1970; Smith 2000; Tower 1945). Of the marine mollusks introduced into the Southwest from the temperate California Marine Faunal Province, several species of *Haliotis and Olivella biplicata* are dominant. Within the Southwest, artifacts of *Haliotis and Olivella* first appear in pre-agricultural sites of the Desert Culture (Jernigan 1978:15).

The Hohokam acquired Pacific shells by trading with intermediaries, or possibly by traveling to the Pacific Coast in the vicinity of present day San Diego. Among Hohokam sites at least 14 Californian species have been identified, and

Pacific shell is known from all periods (Brand 1938; Haury 1976; Ruby 1970; Tower 1945).

Haliotis Exports from Southern California to the Southwest

Whole *Haliotis* shells were used in the Southwest as ceremonial containers for corn pollen and powdered turquoise (Brand 1938), and as ritual storage containers for beads or jewelry (Haury 1940). The peoples of the interior Southwest did not use marine mollusks for food except for occasional use of dried abalone (Davis 1961).

Thin disc beads of abalone, both nacreous and epidermal, were used in numerous Southwest sites during Basketmaker II (Jernigan 1978). Abalone tab pendants were also used in the Southwest during Basketmaker times. As shown by Jernigan and others, shell disc beads used by various northern desert peoples were manufactured in California (Gifford 1947; Jernigan 1978; Ruby 1970).

Of the three genera of nacreous shells used by the Hohokam, *Haliotis* was by far the most common and was used from the Vahki phase to the Classic Period (150 BC-AD 1250) (Haury 1976). Zoomorphs such as birds, canines, and cougars were made from *Haliotis* shell by the Pioneer Period Hohokam (Haury 1976; Jernigan 1978)).

At the Anasazi Bear Ruin site in the Forestdale Valley of east Arizona (Haury 1940), loose shell beads were found in a black abalone shell that had been placed in a burial, probably as a ritual offering (Jernigan 1978:162). At Aztec Ruin, in New Mexico, a number of small flat rectangles of bone with longitudinal grooves were used as backings for plates of abalone possibly used as beads (Jernigan 1978). A broken abalone pendant from Pueblo Bonito had been repaired by securing the broken lobe to the body of the pendant with a piece of turquoise. This same piece also has a turquoise plug inlay (Judd 1954:96). Abalone tabular beads were combined with *O. biplicata* shells in a necklace found in Arroyo Hondo, near present day Santa Fe, New Mexico.

The Southwest mountain cultures of the Mogollon region used large fragments of abalone, or even whole abalone shells as pendants. Though unwieldy as pendants, abalone shells were also worn ceremonially at Hopi pueblos in ethnohistoric times (Jernigan 1978:106).

Some of the shell mosaic forms from Casas Grandes, located at the far southern edge of the Mogollon country, resemble those produced on the southern California Coast (Jernigan 1978). DiPeso (1974) reported that 43.2% of the total shell tesserae (geometric tabular pieces of mineral or shell) recovered from Casas Grandes were made of *Haliotis cracherodii*, a Pacific Coast species. A perforated abalone disc with edge ticking, typical of those produced in southern California, was also found at the Point of Pines site in south central Arizona.

Olivella Exports from Southern California to the Southwest

Olivella was used in the Southwest as Whole Shells, or Spire Removed beads. Different parts of the shell were used to manufacture a variety of other beads such as Callus Cup beads, Cap beads, and Disc Beads. Manufactured beads were strung for use as currency. Finely ground *Olivella* shell was used as an abrasive, or ceremonially. Based on ethnographic information, *Olivella* may be symbolically associated with seeds, fertility, wealth, and the ocean (Jernigan 1981).

Four principal species of *Olivella* have been found in archaeological sites in the Southwest and southern California. In their relative order of prominence, these are: *O. biplicata, O. dama, O. pedroana, and O. baetica.* Only *O. dama* is not indigenous to the Pacific Marine Faunal Province, being native to the Gulf of California. The difference between *O. dama* and the other *Olivella* species in terms of source area is very important to the understanding of trade networks within the Southwest, as will be later discussed.

Following are some selected examples of Pacific *O. biplicata* artifacts recovered from Southwest sites. Some sites with vague or undetermined numbers of artifacts have been included in the discussion because of the importance of any Pacific species found in Southwest sites.

In the southeast Anasazi region nine *O. biplicata* Spire Removed Beads (Pueblo IV) were found in the Zuni ruin of Halonawan (Tower 1945:21). In the Kayenta area in north eastern Arizona seven *O. biplicata* beads (Basketmaker II) were recovered from the Marsh Pass site (Tower 1945:19). To the south of Marsh Pass, two *O. biplicata* central perforated saucer disc beads (Pueblo III) were found in Wupatki ruin in north central Arizona (Stanislawski 1963:313). On the Colorado River two *O. biplicata* whole shell beads were found in trench IV of the Willow Beach Site (Schroeder 1961:73). In the far western Anasazi region 449 *O. biplicata* thin lipped beads (Pueblo II) were recovered from the ash dump of house 47, in the Main Ridge site of Lost City in southern Nevada (Shutler 1961).

In the Hohokam area of southern Arizona an undetermined number of *O. biplicata* Spire Removed beads

(Sacaton Phase) were found at San Cayetano (Nelson 1991:8). Between present day Phoenix and Tucson, Arizona, an undetermined number of *O. biplicata* whole shell beads (Classic Period) were found in the Casa Grande ruin (Nelson 1991:19). Southeast of present day Phoenix an undetermined number of *O. biplicata* whole shell beads (Sacaton Phase) were recovered from the site of Los Muertos (Nelson 1991). To the southwest of Los Muertos, an undetermined number of *O. biplicata* whole shell beads (Sedentary Phase) were found in the site of Snaketown (Nelson 1991:18).

In the Mogollon country of southeast New Mexico 112 *O. baetica* whole shell beads (Mogollon V) were recovered from Swartz Ruin (Tower 1945:21). At Red Bow Cliff Dwelling in east Arizona, 19 *O. biplicata* Spire Removed beads (Mogollon V) were recovered from the ceremonial area of room 4 (J. Gifford 1980). An undetermined number of *O. biplicata* barrel beads (with spire and base removed) were found in Grasshopper Ruin (early Mogollon V) (Jernigan 1978:129). One "possible" *O. biplicata* Spire Removed bead (Medio Period) came from the fill of room 5-8, at Casas Grandes (DiPeso 1974:424).

Other Pacific Coast Molluskan Species in Southwest Sites

Gifford (1947) determined that no less than 14 types of artifacts found in Southwest sites were made from four genera (*Haliotis, Olivella, Megathura and Saxidomus*) limited to the Pacific Coast. These jewelry forms (identifiable with Californian types) ranged in time from Basketmaker II (AD 600) to Pueblo IV (AD 1200). The dominant shell species of the 14 ornament types defined by Gifford are *Olivella and Haliotis,* but *Megathura, Saxidomus,* and other species less well represented are also important for defining the broader scope of the shell trade.

A flat ended ring (*Megathura crenulata*) (Gifford I.D.# H2aIII) dated to Pueblo II, was found in the Virgin Anasazi site of Main Ridge at Lost City. These artifacts utilize a natural shell opening as a ring aperture, with two opposing outer sides ground flat. From a site at the mouth of the Virgin River, Nevada a perforated clam (*Saxidomus nuttalli*) disc or oval was found (Gifford I.D.# VlaII), dated to Basketmaker III.

The Pacific molluskan species *Donax gouldii, Polinces lewisii, Hinnites multirugosus, and Tagelus californianus* have been found in Hohokam sites (Nelson 1991). A whole upper valve of *Hinnites multirugosus* was found (but left unidentified) in the Preclassic Hohokam Grewe site in 1930 by an expedition from the Los Angeles County Museum. I first identified this shell in 2000. Associated with virtually every Hohokam phase were deep purple beads and artifacts made of *Spondylus calcifer*, which resemble beads and ornaments made from *Hinnites multirugosus*. Some purple beads found in Southwest sites previously identified as *Spondylus* may have been made from *H. multirugosus* (Gifford 1947).

Salt Mines

Pueblo pottery and tools are both found in salt and turquoise mines in southern Nevada and eastern California. Because of nutritional necessity and its concentrated non-perishable nature, salt was an important trade item in the Southwest and southern California (Davis 1961; DiPeso 1974; Haury 1976; Hudson and Blackburn 1984; Moratto 1984; Vivian 1990). Prominent prehistoric salt mines in the Southwest included those in the Lost City area of southern Nevada, a large open pit salt mine at Camp Verde, Arizona, and Zuni Salt Lake in west central New Mexico.

In the Southwest salt was used as a popular edible condiment and as a ceremonial mineral. According to Haury (1940), a small cotton bag filled with salt (probably from Camp Verde) was found on an altar at an un-named canyon cliff dwelling in eastern Arizona.

Puebloan ceramics such as Virgin Black on White, Moapa Black on Grey, and North Creek Fugitive Red, along with Puebloan tools and other evidence found in the vicinity of salt caves and pit mines in the Lost City area, indicate that Pueblo Anasazi Indians mined salt in the lower Moapa River Valley (Lost City) in Nevada, from Basketmaker though the late Pueblo II time periods (Shutler 1961).

Three principal salt cave mines and one open pit mine were worked for salt by Indian groups of southwest Nevada. In the Lost City area tunnels were dug following veins of salt. Discs or knobs of salt would be separated from the vein by pecking with stone tools. In the salt mines of the Lost City area hundreds of discs and knobs show evidence of removal (Kroeber 1925; Shutler 1961). One salt cave used prehistorically in the Lost City area, visited by Harrington in 1925, was 19 feet high, 21 feet wide at the mouth, and 50 feet deep (Shutler 1961).

Southern California Turquoise and Steatite in Southwest Sites

In 1928 Malcolm Rogers surveyed the Mojave sink region and discovered two large turquoise deposits, later referred to as the Toltec and Himalaya mines, that had been mined prehistorically. Over 200 small mine shafts were found in the same vicinity along with Puebloan pottery sherds. Rogers concluded from studying Lost City pottery types that these people were associated with Lost City, Nevada, and the Virgin Anasazi (see also Harrington 1948, 1955: Lyneis 1995; Shutler 1961).

Gertrude Hill (1938) (a graduate student of Emil Haury), documented turquoise mines in eastern California. According to Hill, these were located "west of the Colorado River and near the Nevada border, about 100 miles northwest of Needles and some 60 miles north of the old town of Manvel in northeast San Bernardino County. Workings consist of saucer like pits, 15 to 30 feet across and 8 to 15 feet in depth. Adzes or axes and hammers of basalt are found in the excavations. The canyon walls contain numerous caves, with evidence of occupation to be seen in their smoke blackened roofs, the implements, scattered sherds, and abundant pictographs all about" (Hill 1938:16).

Another southern California intrusive object is a tubular steatite pipe (provenienced to the southern California Coast) that was found in the Piedra district of the Southwest by Roberts (1930) and dated to Pueblo I. Steatite was also used by the Hohokam during the Estrella and Sweetwater phases for making nasal septum plugs and for rings, virtually replacing shell for this purpose. Steatite may have been imported from the Pacific Coast (Catalina Island) into the Southwest in greater quantities than previously thought (Davis 1961; Moratto 1984).

Summary

Pueblo pottery and tools are both found in salt and turquoise mines in southern Nevada and eastern California. The pottery types indicate that Virgin Anasazi Pueblo people from southern Nevada were probably the principal miners at these sites (Heizer 1944; Ruby 1970). Salt and turquoise were part of a trade complex involving Pacific shell and shell products (Shutler 1961). According to Heizer (1944), the turquoise mines in the Mojave Desert were not worked by California Indians, but by Puebloan peoples coming into California in rather large expeditions to mine turquoise and carry it back with them to the Southwest. Heizer's interpretation is supported by the fact that in spite of the presence of indigenous turquoise in California, turquoise artifacts are almost totally missing from southern California sites (Ruby 1970).

What was Carried West to California? Imported Southwest Objects in Southern California

In Chapter II, I established that southern California Indians traded Pacific molluskan shell to the Southwest in quantity. There is also substantial evidence of what was carried from the Southwest to southern California. Among the objects brought west, Southwest ceramics can be dated and sourced to quite specific areas of manufacture. Other trade items such as cotton textiles were perishable in nature and poorly represented (but not entirely absent) in the archaeological record. They are also clearly documented from early ethnohistoric times as items of customary trade (Ruby 1970).

Evidence of Southwest Textiles in Prehistoric Southern California

According to ethnographic evidence, woven cotton blankets imported from the Southwest were used by the mainland and island Chumash and probably Gabrielino (Bolton 1931: 250, 275).

Archaeological evidence shows that certain areas of the Southwest, such as the Virgin and Muddy River valleys of southern Nevada's Lost City region, produced sufficient cotton cloth and thread for export (Shutler 1961). Several examples of both plain and decorated cotton fragments have come from sites in southern Nevada's Moapa Valley. These fragments, dated to Pueblo II-III, represent the most westerly production and use of cotton among the Puebloans. These valuable but perishable textiles were no doubt used along with other items such as ceramics to trade for Pacific shells. Desert middlemen such as the Mojave were in regular contact with the southern California Coast, and could have been the agents of such trade.

According to Font, who visited the Mission at Santa Barbara, Califoria, in 1774, "I saw some Indians wearing blankets of cotton, and black ones of wool which come from el Moqui (Hopi), which they have been able to acquire through the Cocininomaricopa and Mojave" (Bolton 1933:103). Recording observations made at Xucu (Rincon Point in Santa Barbara County) in 1774, Font stated that:

"Among the Indians who came to the camp, I saw one wearing a cotton blanket like those made by the Gila Pimans. I inferred that he must have acquired it from that great distance by means of the commerce which they have with others" (Bolton 1933:257).

Longinos Martinez comments in 1792 that:

> "all the Indians (Chumash) are fond of trafficking and commerce. They trade frequently with mountain people, bringing fish, shells, and beadwork, and exchanging them for seeds, fox skins, and a kind of blanket made from the fibers of a plant resembling cotton, preferring it to their own blankets made of sea otter' (Simpson 1961 54-55; Ruby 1970).

A cotton blanket attributed to the 18th century Hopi was found in southern California at the south end of the San Joaquin Valley (Gifford and Schenck 1926:104). According to the description by Gifford and Schenck, they found, on the shore of Buena Vista Lake:

> " . . . a rectangular, uncolored, thin, cotton cloth. This blanket is probably of Pueblo origin, so both Drs. Walter Hough and A.V. Kidder affirm. Dr. Kidder writes: 'the textile fragment would have caused me no surprise had I found it in a cliff house. In other words, it is regular Southwest cotton cloth with typical multi-strand rolling side selvage'. There is no precise indication of the age of this blanket, which was found weathering out

of a cut associated with a burial. Kidder further mentions that 'he had found practically identical material in 18Th century rooms at Pecos. Modern Hopi cottons are much coarser than this piece."

Split Twig Figurines

Split twig figurines, made by folding and binding single long thin split willow branches into animal forms such as desert sheep, are known from several ancient sites in the Grand Canyon and further up the Colorado system into southern Utah (Jennings 1957; Moratto 1984). The Grand Canyon area is seen as the place where these figurine were first produced, later spreading west to California and Nevada (Moratto 1984:417).

These figurines, reported from at least 16 sites in Utah, Arizona, Nevada, and California, show that contacts between the Southwest and California long predated the era of the Pueblo and related culture. Early radiocarbon dates for split twig figurines range from 2145 BC at Stanton Cave in the Grand Canyon to 1020 BC at Newberry Cave in California (Davis 1981). These zoomorphic figurines were still being made as late as AD 455 at Cowboy Cave, in southeast Utah (Jennings 1983; Moratto 1984:417). In 1995 five pristine caves, each containing split twig figurines similar to those found in California sites,but of an older date were investigated in the vicinity of Grand Canyon National Park in northwest Arizona (Emslie, Mead, and Coats 1995). Split twig figurines provide impressively early evidence of east to west contact in non-utility items between the Southwest and southern California.

Southwest Ceramics in Southern California Sites

A surprisingly large quantity of pottery sherds from a number of sites document the presence of Southwest artifacts in southern California. Most of these sites are located in the Mojave Desert (Ruby 1970:76), where Anasazi pottery was first introduced about AD 500 (Moratto 1984: 390, 421-422; Ruby 1970; Shutler 1961).

Evidence of trade between the Hohokam and southern California Coast is seen in the occurrence of Sacaton Red on Buff pottery and Hohokam-style *Glycemeris* bracelets in coastal sites just south of the Santa Barbara Channel area (Haury 1976:307; Koerper 1996; Ruby and Blackburn 1964).

Table 23 is a compilation from several sources of specifically identified Southwest pottery types found in sites along the southern California Coast up to 1996. An overwhelming majority of the coastal finds are of types from the Hohokam area of southern Arizona, with Anasazi, Mogollon, and other Southwestern variants scarce.

Virtually all Southwest ceramic evidence found in southern California is comprised of sherds. However, a totally reconstructable Hohokam pot was found at the Big Tujunga site in Los Angeles County (Ruby 1967).

Table 24 shows that there is strikingly more evidence of Southwestern pottery in the southern California interior than on the coast. Only seven coastal sites are documented, compared to 43 different interior sites or locations. Obviously direct Southwest-southern California linkages were most intense through the interior corridor.

Table 23. Southwestern Pottery Found in Southern California Coastal Sites

Type	Date	Where Found	No. of Specimens	Area of Origin	Reference
Arizona Red on Brown or Sacaton Red on Buff (Hohokam)	AD 600 – 800	Big Tujunga, northeast L.A. (LAn-167) L.A. Co.	40 sherds	Snaketown Area	Ruby 1970
Colorado Red on Beige (Anasazi)	AD 600 – 800	Big Tujunga, northeast L.A.(LAn-167) L.A. Co.	1 sherd	Mesa Verde Area	Ruby 1970
Sacaton Red on Buff (Hohokam)	AD 600 – 800	Torrance/Redondo Beach area, L.A. Co.	Several Sherds	Snaketown Area	Ruby and Blackburn 1964
Trincheras Purple on Red (Hohokam, north Mexico)	AD 800 – 1100	CaOra-469, coastal Orange County	86 sherds	Southern Arizona	Demcak and Cottrell 1985; Koerper 1996
Sacaton Red on Buff (Hohokam)	AD 800 – 1100	Bull Pen site of the Wilmington area in L.A. County	Many Sherds	Snaketown	Ruby and Blackburn 1964
Cibola White Ware (Anasazi)	AD 900 – AD 1000	Century Ranch , northwest of L.A. (LAn 227) L..A. Co.	1 sherd	East Central Arizona	Ruby 1970
Verde Black on Grey (Sinagua)	AD 1000 – 1200	Town of Castaic, on the Santa Clara River,, Ventura Co.	3 sherds	West Central Arizona	Ruby 1970

A second key point is that Anasazi pottery and related Patayan pottery from southern Nevada and north-central Arizona dominate the interior inventory, with extremely few Hohokam types identified. Two separate channels of communication are implied by the pottery evidence, with a limited Hohokam coastal linkage indicated on the one hand, and a much more intense Anasazi-interior communication indicated on the other.

Some cultural groups of interior southern California such as the Mojave generally employed more Southwest derived utilitarian innovations such as cultigens, axes, and ceramics than did southern California coastal peoples.

The Anasazi appear to be the only Southwest cultural group to have manifested some sedentary occupation in the eastern desert areas of California. This occupation occurred primarily for purposes of turquoise and salt mining, and possibly shell collection and trade.

Table 24. Southwestern Pottery Sherds Found in Interior Southern California

Type	Date	Where Found	Area of Origin	Reference
Woodruff Smudged (Sinagua)	AD 500 – 800	Camp near Newberry Spring, Mojave Desert, San Bernardino Co.	Petrified Forest, east central Arizona	Ruby 1970
Lino Gray (Kayenta Anasazi)	AD 600 – 900	Himalayan Turquoise Mines, eastern Mojave Desert, San Bernardino Co.	Four Corners	Rogers 1929
Lino Gray (Kayenta Anasazi)	AD 600 – 900	Rustlers Rockshelter, northeastern Mojave Desert , Inyo Co.	Four Corners	Davis 1962
Boulder White (Virgin Anasazi)	AD 600 – 900	Rock Shelter on indian Creek, Mojave Desert, Kern Co.	Las Vegas to the upper Virgin River	Ruby 1970
Deadman's Fugitive Red (Patayan)	Pre AD 700 – 1050	Camp at the head waters of the east fork of Halloran Wash, San Bernardino Co.t	San Francisco Mountains, Coconino County, Arizona	Ruby 1970
Deadman's Fugitive Red (Patayan)	Pre AD 700 – 1050	Camp in the Mesquite Valley near Kingston, San Bernardino Co.	San Francisco Mountains, Coconino County, Arizona	Ruby 1970
Rio de Flag Brown (Sinagua)	AD 700 – 1050	Camp in the Crucero Plains, south of Soda Lake, California, San Bernardino Co.	Coconino County, Arizona	Ruby 1970
Rio de Flag Brown (Sinagua)	AD 700 – 1050	Camp on the northwest side of West Cronise Lake in the Mojave Desert, San Bernardino Co.	Coconino County, Arizona	Ruby 1970
Deadman's Gray (Patayan)	AD 700 – 1150	Camp at the head waters of the east fork of Halloran Wash, San Bernardino Co.	Coconino and Yavapai counties, Arizona	Ruby 1970
Deadman's Gray (Patayan)	AD 700 – 1150	Rock Shelter on Indian Creek, San Bernardino Co.	Coconino and Yavapai counties, Arizona	Ruby 1970

Table 24. Southwestern Pottery Sherds Found in Interior Southern California (Continued)

Type	Date	Where Found	Area of Origin	Reference
Deadman's Gray (Patayan)	AD 700 – 1150	Camp on the Mojave River near Manix, L.A. Co.	Coconino and Yavapai Counties, Arizona	Ruby 1970
Black Mesa Black on White (Kayenta Anasazi)	AD 800 – 1150	South of Blythe, Riverside Co.	North Central Arizona	Moratto 1984
Red on Buff (Hohokam)	AD 800 – 1150	South of Blythe, Riverside Co.	Southern Arizona	Moratto 1984
Red on Buff (Hohokam)	AD 800 – 1150	South of Blythe, Riverside Co.	Southern Arizona	Moratto 1984
St. George B/G (Virgin Anasazi)	Early Pueblo II AD 900 – 1000	Camp near Resting Spring, east Mojave Desert, San Bernardino Co.	upper Virgin Valley, between Zion Canyon and Santa Clara Creek	Ruby 1970; Moratto 1984
St. George B/G (Virgin Anasazi)	Early Pueblo II AD 900 – 1000	Camp near Harper Dry Lake, Mojave Desert, San Bernardino Co.	upper Virgin Valley, between Zion Canyon and Santa Clara Creek	Ruby 1970
St. George B/G (Virgin Anasazi)	Early Pueblo II AD 900 – 1000	Camp near Resting Spring, east Mojave Desert, San Bernardino Co.	upper Virgin Valley, between Zion Canyon and Santa Clara Creek	Ruby 1970; Moratto 1984
Boulder Corrugated (Virgin Anasazi)	AD 900 – 1100	Rock Shelter Near Lench Springs in the northern Mojave Desert, Inyo Co.	Muddy River (Lost City), Nevada	Ruby 1970
St. Thomas White (Virgin Anasazi)	AD 900 – 1100	Willow Beach, Arizona	Muddy River Valley (Lost City) Nevada	Schroeder 1960
Deadman's B/G (Sinagua)	AD 900 – 1100	Camp near Harper Dry Lake, California, San Bernardino Co.	Verde River and Walnut Drainages in Yavapai and Coconino counties	Ruby 1970

Table 24. Southwestern Pottery Sherds Found in Interior Southern California (Continued)

Type	Date	Where Found	Area of Origin	Reference
Deadman's B/R (Sinagua)	900 – 1100	Camp near Resting Spring, east Mojave Desert, San Bernardino Co.	Verde River and Walnut Drainages in Yavapai and Coconino counties	Ruby 1970; Moratto 1984
Moapa Gray (Virgin Anasazi)	Pueblo II AD 900 – 1100	Eastern Mojave Desert, San Bernardino Co.	Virgin and Muddy River Valleys	Ruby 1970
Moapa Gray (Virgin Anasazi)	Pueblo II AD 900 – 1100	Rock Shelter on Indian Creek, Mojave Desert, San Bernardino Co.	Virgin and Muddy River Valleys	Ruby 1970
Overton B/R (Virgin Anasazi)	Pueblo II AD 900 – 1100	Near Saratoga Springs, southern Death Valley, Inyo Co.	Muddy River, Nevada	Ruby 1970
Black Mesa B/W (Kayenta Anasazi)	Pueblo II AD 900 – 1100	Wind Cave in the Providence Mountains, northern Mojave Desert, San Bernardino Co.	Northeast Arizona	Ruby 1970
St. Thomas White (Virgin Anasazi)	Pueblo II AD 900 – 1100	Camp in the Mesquite Valley near Kingston, , Mojave Desert, San Bernardino Co.	Muddy River Valley (Lost City) Nevada	Ruby 1970
Aquarius B/O (Patayan)	AD 1000 – 1100	Camp at the Head waters of the east fork of Halloran Wash, northeast Mojave Desert, San Bernardino Co.	Aquarius Plateau, and Chino and Williamson Valleys, Arizona	Ruby 1970
Aquarius B/O (Patayan)	AD 1000 – 1100	Rock Shelter on Indian Creek, San Bernardino Co.	Coconino and Yavapai Counties, Arizona	Ruby 1970
Aquarius Orange (Patayan)	1000 – 1100	Cave east of the Clark Mountains, Mojave Desert, San Bernardino Co.	Yavapai County, Chino Valley to Big Sandy, Arizona	Ruby 1970

Table 24. Southwestern Pottery Sherds Found in Interior Southern California (Continued)

Type	Date	Where Found	Area of Origin	Reference
Aquarius Orange (Patayan)	1000 – 1100	Camp at the east fork of Halloran Wash,, San Bernardino Co.	Yavapai County, Chino Valley to Big Sandy, Arizona	Ruby 1970
Aquarius Orange (Patayan)	1000 – 1100	Eastern Mojave Desert	Yavapai County, Chino Valley to Big Sandy, Arizona	Ruby 1970
North Creek B/G (Virgin Anasazi)	Middle Pueblo II 1050	Wind Cave in the Providence Mountains, San Bernardino Co.	Virgin River Valley	Ruby 1970
North Creek B/G (Virgin Anasazi)	Middle Pueblo II 1050	Wind Cave in the Providence Mountains, San Bernardino Co.	Virgin River Valley	Ruby 1970
North Creek B/G (Virgin Anasazi)	Middle Pueblo II 1050	Camp near Harper Dry Lake, California, San Bernardino Co.	Virgin River Valley	Ruby 1970
Verde B/G (Sinagua)	AD 1050 – 1200	Camp near East Cronise Lake, San Bernardino Co.	Between the Verde and Big Sandy Rivers in Yavapai County, Arizona	Ruby 1970
Verde B/G (Sinagua)	AD 1050 – 1200	Rustlers Rockshelter, Mojave Desert, San Bernardino Co.	Between the Verde and Big Sandy Rivers in Yavapai County, Arizona	Davis 1962
Verde B/G	AD 1050 – 1200	Camp on the northwest side of West Cronise Lake , San Bernardino Co.	Between the Verde and big Sandy Rivers in Yavapai County, Arizona	Ruby 1970
Moenkopi Corrugated	Pueblo II – III 1050 – 1275	Cave near Tecopa, L.A. Co.	Northeast Arizona and southern Utah	Ruby 1970; Colton 1955

Table 24. Southwestern Pottery Sherds Found in Interior Southern California

Type	Date	Where Found	Area of Origin	Reference
North Creek Fugitive Red (Virgin Anasazi)	Pueblo II – III AD 1050 – 1275	Rustler's Rockshelter, northeastern Mojave Desert, San Bernardino Co..	Virgin River Valley	Davis 1962
Moapa B/G (Virgin Anasazi)	Pueblo II – III AD 1100 – 1150	Camp near Resting Spring, east Mojave Desert, San Bernardino Co.	Lower Virgin Shivwits Plateau and the Toroweap Valley	Ruby 1970; Moratto 1984
Red on Buff (Hohokam Beach Mesa)	AD 1150	South of Willow Beach, Arizona, San Bernardino Co.	Colorado River	Moratto 1984
Jeddito B/Y (Hopi)	Pueblo IV AD 1325 – 1600	Camp & cemetery on the north side of East Cronese Lake in San Bernardino Co.	Hopi Areas	Ruby 1970
Jeddito B/Y (Hopi)	Pueblo IV AD 1325 – 1600	East Cronese Lake in the Mojave Desert, San Bernardino Co.	Hopi Areas	Ruby 1970

A third key point is chronological. Southwest ceramics found in coastal sites range in time from about AD 600-1200, while the earliest interior sherds are dated to about AD 500 (Basket Maker II), and the latest, from the Hopi Buttes in Arizona, are dated to Pueblo IV, after about AD 1300. The Southwest ceramic evidence found in interior southern California was primarily from western Virgin Branch Anasazi and Patayan groups of northwest Arizona.

Southwest *Glycemeris* Shell Artifacts Found in Southern California Locations

Glycemeris gigantea is a tropical shell from the Gulf of California which appears as an artifact in sites of both the Southwest and southern California. Many *Glycemeris* bracelets were made from partially fossilized shells, deposited in the northern Gulf of California area during the Late Pleistocene (Haury 1976; Koerper 1996; Nelson 1991). According to the evidence cited by Haury (1976), the Hohokam were the principal manufacturers of *Glycemeris* artifacts such as bracelets, and the few *Glycemeris* bracelets found in southern California match the styles of Hohokam bracelets (Haury 1976; Koerper 1996). The trade pathway for *Glycemeris* bracelets found in southern

California clearly began in the Hohokam region (Koerper 1996).

During the Hohokam Colonial Period (AD 600-900) the most popular *Glycemeris* artifact style consisted of thin bracelets, in which the umbo or beak was shaped into an angular tab (Haury 1976; Jernigan 1978:61). During the subsequent Hohokam Sedentary Period (AD 900-1250) medium width bracelets were most popular. At this time the umbo was reduced to a rounded, angular, or pointed shape. Throughout the Hohokam area Sedentary Period bracelets are often found with a perforation.

The widest *Glycemeris* shell bracelet style is most characteristic of the Hohokam Classic Period. In the late Classic these bracelets were occasionally engraved with geometric designs (Gladwin, Haury, and Sayles 1937:142). Some Hohokam *Glycemeris* bracelets, from several periods, have the umbo area carved into a stylized frog, bird, or occasional bird-snake motif (Jernigan 1978:237).

A bracelet made of fossil *Glycemeris* shell was recovered from site CA ORA-225 in Orange County, California in 1995. According to style and dimensions, it is probable that this bracelet was introduced into southern California from the Southwest after AD 900 (Koerper 1996). A *Glycemeris* bracelet find is also documented from a prehistoric cremation found in Indio, California (Graffam 1978:26). A whole *Glycemeris* bracelet, in the Southwest Museum in Los Angeles, was purportedly found on Catalina Island (Koerper 1996). Another *Glycemeris* bracelet, associated with a human burial, was recovered from the San Joaquin Valley Gun Club site (CA-ORA57-77) (Kroeper and Mason 1996; Miller 1991:90).

The presence of Southwestern-style *Glycemeris* artifacts in prehistoric California sites suggests the possibility of a "shell for shell" exchange relationship between the Southwest and southern California. That is, Pacific Coast shell items may have been traded for *Glycemeris* bracelets made in the Southwest. Although the sample is very small, the finding of most *Glycemeris* bracelets within the Gabrielino cultural area of southern California also suggests the possibility of a specialized trade relationship between The Hohokam and Gabrielino.

Grooved Stone Axes of Southwestern Type in Southern California

Southwest style grooved stone axes, made from a partially or completely grooved and polished piece of hard stone such as shist or granite are another exotic artifact type found in archaeological and ethnographic contexts in southern California (Heizer 1946; Ruby 1970). The only southern California ethnic group reported to have used grooved axes in ethnohistoric times was the Mojave (Ruby 1970:294), who may have imported them from their Puebloan neighbors (Heizer 1941).

Well formed chipped and side-notched axes found at turquoise quarries in San Bernadino County and the Mojave Desert greatly resemble their polished and grooved counterparts from the Southwest. Rogers (1929) believed that these axes were imported from the Southwest in Basketmaker II and/or early Pueblo Anasazi times. Heizer (1946) recorded two additional axes found near the Mojave Desert turquoise mines described by Rogers (1929). Hohokam style projectile points have also been found in Southern California (Koerper 1996).

Nearer the coast, C.F. Roberts collected a one-half grooved maul reminiscent of Southwestern forms from a construction ditch near the San Gabriel River in Orange County (Ruby 1970:294). Two grooved axes were also recorded from a steatite quarry on Santa Catalina Island by P. Schumacher in 1875 (Ruby 1970).

Summary

Prior to the historic era, the principal documented goods brought from the Southwest into southern California were Anasazi, Hohokam, and Patayan ceramics of numerous types, cotton textiles and manufactured *Glycemeris* shell artifacts. From pottery evidence, and Southwest style stone axes found at the mines, it appears that turquoise mines in interior southern California were worked primarily by Puebloan expeditionary groups who evidently carried southern California turquoise back with them to the Southwest. Hohokam style projectile points have been found in southern California (Koerper 1996). Cotton cloth from the Southwest was observed in southern California by early Spanish travelers, and an evidently more ancient specimen was archaeologically recorded from Buena Vista Lake. Cotton goods from the Southwest may have been more prevalent in California than the meager archaeological record of this perishable commodity documents.

Trade Routes

Three major trade routes are documented in the ethnographic and archaeological literature. These are the east-west Mojave Trail, an east-west San Diego-Casas Grandes route, and a south-north route leading from the northern Gulf of California up through Hohokam, Mogollon, and Anasazi country.

The Mojave Trail

The Mojave Trail east-west trade route is famous in the literature of southern California ethnology and archaeology. It was an important prehistoric and protohistoric trade route, used primarily by Mojave Indians to travel west from their Colorado River homes to desert and mountain destinations, and even to the Pacific Coast (Farmer 1935). This enabled the Mojave to trade with numerous southern California groups including the Gabrielinos, Fernandenos, Serranos, Chumash, and Kitanemuk.

According to ethnohistoric evidence, the "Mojave Trail" (also called the Mojave Pacific Trail) began at a large Mojave village located on the west bank of the Colorado River, just above present day Needles, California. The trail proceeded west via a series of springs before reaching Soda Lake. From Soda Lake the route followed the intermittent surface flow of the Mojave River to the base of the San Gabriel Mountains, then west to Cajon Pass, where the trail divides. The western branch skirts the base of the mountains south of Antelope Valley, then crosses the mountains at Newhall Pass and follows the Santa Clara River to the coast near Oxnard in Ventura County, California. The other branch proceeds west at Cajon Pass and continues south into the San Bernardino Valley, then on to the Long Beach area (Ruby 1970; Koerper 1996).

Part of a southern branch of the Mojave Trail was described by Johnston and Johnston (1957), who followed the beaten and eroded trace of a single trail complex running from the San Bernardino Valley region across the Colorado Desert to the Colorado River. Eroded or tamped about an inch deep in the desert pavement, trail sections ranged from 6 inches to 12 inches wide, and were frequently lined on each side by a ridge of pebbles thrown aside by the foot traffic. Broken pottery sherds and stone shrines are occasionally found along these trails. The trails often follow ridges rather than the floors of canyons, probably because ridges were safer from ambush (Johnston and Johnston 1957).

In Chapter II I compiled evidence which is the main basis for the following description of a northern trade route which extended eastward beyond the end of the Mojave Trail. Northeast of Needles are the sites of Willow Beach, Arizona and Lost City, Nevada. Strong archaeological evidence from these sites indicates that they lay along a major northern pathway that carried Pacific shell beyond the eastern terminus of the Mojave Trail deeper into the Southwest. Further east, beyond Lost City, strong evidence of Pacific shell indicates that Marsh Pass and nearby associated sites in the Tsegi Canyon area, such as Keet Seel, were also important stops along an exchange pathway. Farther east still, Canyon de Chelley and Chaco Canyon lay along this same apparent northern route.

A secondary route may have gone south from Marsh Pass to Wupakti then proceeded southeast along the Little Colorado River to Homolovi, east to the Petrified Forest area, then on east to Zuni (Jernigan 1978; Tower 1945) (Figs. 28, 30). Alternatively, the clear evidence for California shells at Homolovi and Zuni could imply a more southerly route across central Arizona, but no major archaeological evidence of shell trade locations is known in the expanse from Needles to Homolovi. This is a question that will require a search for additional field evidence to resolve.

Ethnographic evidence indicates that in ethnohistoric times southern California desert and mountain groups such as the Mojave, Serrano, and others traded Southwest products including ceramics, cotton cloth, minerals, herbs, and pinyon nuts (which may have had complex status functions), to the coastal and island Chumash. In return they recieved dried marine specialty foods and shell products such as abalone and *Olivella*, which they traded back eastward (Hudson and Blackburn 1984; Koerper 1996; Moratto 1984; Ruby 1970). In Chapter II I showed that this pattern was an ancient one dating back well before AD 900.

The San Diego, Yuma, Hohokam and Casas Grandes/East-West Trade

A southern route from west to east which began from the vicinity of San Diego brought Pacific shells through Hohokam territory, into the Mogollon country, and on to Casas Grandes. From the vicinity of San Diego, this southern route of the shell trade proceeded east to Yuma, then on to Snaketown (Haury 1976; Jernigan 1978:214). From Snaketown, the main route proceeded southeast to Casa Grande then on to the Tucson area. From Tucson the main route apparently drove east to Mimbres and Swarts Ruin, and south to Casas Grandes in northern Chihuahua.

The Hohokam also probably acquired Pacific *Haliotis* and some *Olivella* (*biplicata and pedroana*) via the southern branch of the Mojave trail that intersected the southern route of east-west trade. Though the bulk of Hohokam-traded marine shells came from the Gulf of California (notably *Olivella dama, Glycemeris, and Spondylus)*, some precious *Haliotis* objects reached the Hohokam domain from the Pacific by this separate overland route (Haury 1976:307).

South to North Trade

The pathways used for acquiring tropical shells from the Gulf of California were primarily controlled by the Hohokam, who were closest of all Southwest groups to the Gulf of California. Shells such as *O.dama, Conus, Spondylus, Glycemeris, Laevaecardium and Strombus* were gathered at the head of the Gulf of California in the vicinity of Puerto Penasco (Cholla) Sonora, Mexico (Gifford 1946; Haury 1976).

There is clear evidence that much of the shell collected by the Hohokam was the result of beach combing. This is indicated by evidence of beach rolling and color fading of shells and by fossil shell use in many instances (Haury 1976:306).

Hohokam bracelets made of *Glycemeris* have been found in Anasazi and Mogollon sites north of Hohokam country (DiPeso 1974; Haury 1976; Jernigan 1978; Vivian 1990). These manufactured Hohokam items are usually found with other Gulf of California shells the Hohokam were also known to have collected and vended, including *Olivella dama, Spondylus, and Conus.* The main route to Snaketown and the Phoenix area began at the coastal area of Cholla/Rocky Point in the upper Gulf of California, passed northeast to Quito Baquito Spring, on to the Ventana Cave area, then north to Snaketown and the Phoenix area (Haury 1976).

The Hohokam of the Tucson Basin appear to have used a slightly more southern beginning point than did those of Snaketown. The route for shell acquisition primarily used by the Tucson Basin Hohokam began near the Desemboque area on the northeast Gulf of California Coast. The trail headed northeast to Tumacacori, then north along the Magdalena, Altar, and Santa Cruz river courses to the Tucson Basin. Shell artifacts then moved directly east from the Tucson Basin into the Mogollon area, north from there to the Anasazi areas, and south to Casas Grandes (Brand 1937; Haury 1976; Jernigan 1978).

According to sites with the greatest number of molluskan artifacts, the principal south to north route of shell trade going north from the Hohokam area passed from Snaketown north to Wupakti (near Flagstaff), northeast to Marsh Pass and the

Kayenta area, east to the San Juan River and the Chacoan system, then on east across the Continental Divide to Pecos/Arroyo Hondo. The most notable species of this shell trade was *Olivella dama,* but *Spondylus, Glycemeris*, and other species traveled it as well. Some Hohokam-manufactured shell artifacts also moved east from Snaketown via the Salt and Gila rivers to the Zuni area, then north from there into the Chaco system (Haury 1976; Tower 1945).

The primary river drainages which converged in the Hohokam heartland no doubt functioned as main corridors of regional trade. These included the Verde and Aqua Fria from the north leading into Sinagua country, the Salt River Valley from the east, leading into the Tonto Basin and Mogollon Rim country, and the Gila and San Francisco Rivers, up which valleys penetrate southeast into the Mimbres region (DiPeso 1974).

Summary

The Mojave Trail began on the Colorado River near Needles, California, and extended west to the southern Chumash area of the Pacific Coast. East of Needles was a section of the Mojave Trail which linked Needles and Willow

Beach to the Virgin Branch Anasazi of Lost City, Nevada. The Mojave Trail was a principal northern pathway for Pacific coast objects moving into the Anasazi Southwest, and for Southwest objects moving west into southern California. The southern San Diego, Yuma, Hohokam, and Casas Grandes west-east trade route also furnished Pacific shell to more southerly reaches of the Southwest.

The south to north shell distribution system that began in the northern Gulf of California was used primarily for the passage of tropical Gulf of California shells. These reached southern centers including the Tucson Basin, and continued north and east to major centers at Marsh Pass and Chaco Canyon. The clearest marker of this trade is the widespread presence throughout the interior Southwest of *Olivella dama*, a species limited to the Gulf of California.. Much of the south to north trade was controlled by the Hohokam, whose presence on the Gulf of California Coast is well attested by Hohokam pottery and other artifacts at coastal Puerto Penasco, Cholla, and Desemboque (Gifford 1946; Haury 1976).

Middlemen: The Ethnographic and Prehistoric Mojave

The ethnographically known Mojave desert and river peoples, who resided between the Southwest demographic centers and the Pacific Coast, acted as middlemen traders between the two regions. These middlemen groups traded items such as obsidian, ochre, salt, ceramics, and cotton cloth in exchange for *Haliotis and Olivella* shells and other manufactured shell objects. Pacific marine items were obtained primarily from the coastal Chumash and Gabrielino, then exchanged to the Southwest for items such as cotton cloth, axes, and ceramics (Farmer 1935; Koerper 1996; Ruby 1970).

Known for their ferocity and nomadism, the Mojave were the principal people who habitually traveled, usually for trade purposes, through the territories of other southern California groups (Stewart 1947). Perhaps it was their reputation for ferocity that facilitated their routine passage through the territories of other peoples on their trading missions. According to King (1990) and Ruby (1970) the Mojave primarily came west to visit and trade. The Mojave of the Colorado River were welcome guests among the Serrano (Kitanemuk), and penetrated even further, into the areas of the Yokuts, Alliklik, and Chumash. Other tribes generally did not reciprocate by visiting the Mojave (Kroeber 1925:612).

Several researchers (Farmer 1935; Koerper 1996; Ruby 1970) have argued that Mojave ancestors (archaeologically known as Patayan or Hakataya) were probably responsible for most trafficking of Pacific shells to the Basketmaker and Puebloan Southwest. According to Farmer (1935), the Mojave were the only ethnohistorically known desert/river tribe that traded directly with coastal groups. Farmer suggested that trade with the ancestral Mojave may explain why and how objects of Southwest origin are found in aboriginal sites of southern California. Farmer mentioned that the principal reason the Mojave traveled to the Pacific Coast was to trade for *Olivella* shells and beads. Kroeber (1925) mentioned curiosity (concerning the Pacific Ocean?) as another important motivator for westward travel by the Mojave.

In AD 1776, while with the Anza Expedition in the Colorado Desert, Father Garces separated from the expedition and traveled north to the territory of the Mojaves. There Garces found Mojave guides who were willing to take him west across the desert, via the Mojave Trail, to the Mission of San Gabriel. On that trip Garces and his guides encountered three separate parties of Mojaves that had recently been in the San Gabriel area (Ruby 1970). Garces stated:

> I met four Indians that were coming from the Santa Clara River after trading shells. I was lost in wonder to see that they brought no provisions on a route where there is naught to eat, nor did they carry bows and arrows for hunting. They replied to my amazement " The Jamajab

> (Mojave) endure hunger and thirst for four days", to give me to understand that they indeed are valiant men (Coues 1900:237).

As late as AD 1819, 22 Mojave appeared at one time on the southern California Coast at the San Buenaventura Mission to trade (Bancroft 1885). Based on ethnohistoric sources like these, researchers have seen the Mojave as key middlemen in trade within California and into the westernmost areas of the Southwest (Heizer 1941; King 1990; Koerper 1996; Rogers 1941; Ruby 1970)

Schroeder (1957) inferred that the ethnographic Mojave were descendants of one segment of the archaeological Patayan tradition. The Patayan have been divided into 11 main branches, referred to as Salton, Amacava (Mojave), Cerbat, Cohonina, Prescott, Verde, Aqua Fria, Roosevelt, Gila Bend, La Paz, and Palo Verde. According to Schroeder (1957), because of the vast range and great diversity of the Patayan peoples, there was more variation in material culture among the Patayan than among their closest Southwest neighbors, the Hohokam. Schroeder (1960) placed all branches of the previously defined Patayan culture into the larger unit he called Hakataya. This he saw as a pattern with ancient origins in the Desert Culture, that developed independently of other Southwest societies. Schroeder (1960) saw the lower Colorado Patayan as having developed into the historic Yuma and Mojave.

The commonality of the Yuman language, which was shared among the various branches of Patayans, no doubt facilitated contact and intraregional trade. The Mojave, Yuma, and Chumash languages are all members of the larger Hokan linguistic family, which suggests shared cultural traits, and an earlier commonality of origin (Moratto 1984: 558,568).

The importance of common culture and language affiliation in the manufacture, trade, and use of special social ceremonial objects may be seen in the example of *Olivella* grooved rectangle beads from prehistoric sites (some very early) in southern California (Vellanoweth 2001). These beads were manufactured predominately on the southern Channel Islands (San Nicolas), before the time of Christ, and during the particular time period (AD 900-1750) under consideration. Grooved rectangle beads have been found far to the north in Great Basin sites where Uto- Aztecan speakers such as the Northern Paiute and Shoshone resided (Bennyhoff and Hughes 1987; Jenkins and Erlandson 1996). None of these grooved rectangle beads have been found in northern Channel Island sites, which were occupied by the Chumash (Jenkins and Erlandson 1996: 299-301). One may infer from this example that commonalities of language and culture may have also facilitated and perpetuated trade relations among other peoples of shared language, such as the Chumash and related Patayan groups including the Mojave.

In sum, well established intraregional trade mediated by desert dwelling Patayan groups (ancestral Mojave, at least in part) acting as middlemen traders, facilitated the interregional acquisition of ornamental and ritual objects from the Pacific Coast (such as species of *Haliotis*), by Southwest groups for well over a millenium (Cox 1962; Haury 1976; King 1990).

More on Three Inadequately Recognized Trading Locations

My quantitative research in Chapter II calls new attention to Willow Beach, Arizona, Lost City, Nevada and Marsh Pass, Arizona as much more important locations of the shell trade than previously recognized. In this section, I present additional evidence to support this assertion.

Willow Beach: Oasis, Campsite, and Trade Rendezvous

Archaeological evidence suggests that Willow Beach, Arizona was a primary link or meeting place between Mojave, Anasazi, and perhaps also Pai middlemen. The Willow Beach site lies some distance beyond the eastern end of an established trade route, the Mojave Trail, which began at Needles, California and extended as far west as the Pacific Coast. This case was long ago made by Schroeder (1961), but has never received the attention it deserves.

Willow Beach was a prehistoric campsite located on aColorado River terrace (about 20,000 Sq. ft.) about 15 miles south of modern Hoover Dam. The Willow Beach site was visited by different groups of people over a period of several thousand years. The sequent levels of human occupation were naturally separated by relatively sterile flood deposits, which enhanced the process of archaeological excavation and interpretation (Schroeder 1961). The evidence, largely composed of datable Patayan and Puebloan pottery, indicates that Willow Beach was a primary link or junction point for trade and exchange between the Mojave and southern Nevada/northern Arizona Anasazi of the Virgin Branch (Schroeder 1961).

Pre-pottery Basketmaker II people were the first to occupy the site. Willow Beach is less than a day's travel from the mouth of the Virgin River in southern Nevada, which was a main northern crossing point of the Colorado River. By ceramic times, Willow Beach had become a major stop between the Lost City area of south Nevada and the beginning point of the Mojave-Pacific trail across southern California (Schroeder 1961).

Willow Beach seems to have functioned as a nexus or meeting place because it was always well watered, and the next logical stop beyond the eastern terminus of the much used Mojave Trail. The pottery and other evidence suggests that Willow Beach was most continuously occupied by Mojave and other Patayan peoples, and probably not directly controlled by the Puebloans (Schroeder 1961). Willow Beach was, however, an easy one day foot journey from the nearest large Virgin Branch Anasazi site of Main Ridge, in the Lost City locality of southern Nevada, and pottery gives ample evidence of Anasazi presence there.

Schroeder's (1961) publication of the Willow Beach excavations provides a chronological sequence for the region. The majority of artifacts were surface finds or excavated in former campsite depressions which had probably been covered with brush shelters. Willow Beach was a stratified site that was occupied sporadically over a period of more than 1000 years. The earliest occupation, termed the Price Butte Phase, is radiocarbon dated at 250 BC. It is marked by pithouses with jacal roof supports, slab millingstones, tubular stone pipes, Spire removed *Olivella* beads and stone discs (Schroeder 1961:82). Schroeder noticed distinct similarities between a Price Butte Phase house pit assemblage and that of a house pit found at the confluence of the Muddy and Virgin Rivers further upstream in the Lost City area. The following Nelson Phase (after AD 250) is distinguished by the appearance of the oval basin millingstone and paint pigment. During the subsequent Eldorado Phase (AD 450) architectural similarity of the Willow Beach house pits with those of Lost City was marked by Schroeder. The Roaring Rapids Phase (beginning about AD 750) is dated on the basis of intrusive Basketmaker III pottery, and shell artifacts which Schroeder attributed to contact with the nearby Virgin River Anasazi.

The final Willow Beach Phase, of Pueblo II age, is characterized by intrusive sherds of Moapa Gray, Prescott Gray, and Cerbat Brown wares, which indicate shared use of the site by both Virgin Branch Anasazi and Cerbat Branch Patayans (ancestral Mojave). The Willow Beach Phase saw a general continuation of the assemblages of the preceding phase, with the addition of Pueblo II Anasazi ceramics, Patayan ceramics, and worked turquoise and shell. Tusayan Black on Red pottery, produced after AD 1100, is the last indication of intrusive Puebloan ceramics at Willow Beach (Schroeder 1961).

During the Pueblo II Willow Beach Phase, the archaeological predecessors of the modern Mojave imported objects made of steatite and shells of *Olivella* and *Haliotis*. Schroeder saw Willow Beach as a northern terminus for Mojave trade up the Colorado River, which drew middlemen traders from the Virgin River Anasazi area to the north of the Grand Canyon, and Cerbat peoples (Pai ancestors) to the south of it. This is indicated by the relative wealth of Mojave ceramics and artifacts found at Willow Beach, in contrast to the scarcity of Mojave pottery and artifacts in Lost City (Lyneis 1992, 1995; Schroeder 1961; Shutler 1961). Much of the Pacific marine shell brought to and traded at Willow Beach by the Mojave was eventually traded farther east to the Anasazi of the eastern Colorado Plateau (Schroeder 1961).

Sometime after AD 1100 the trade relationships which had developed at Willow Beach were disrupted. This is probably related to repetitive droughts and the increasing incursions by hostile non- Puebloan peoples into peripheral Anasazi areas after AD 1100. The time of this disruption coincides with the appearance of Paiute pottery in abandoned Virgin Branch Anasazi sites. The Anasazi area contracted eastward, which put the Puebloans out of easy contact with the Mojave, the Mojave Trail, and the supply of exotic Pacific shells (Moratto 1984; Schroeder 1961).

Eventually, the Mojave too all but abandoned Willow Beach, establishing themselves farther down the Colorado River just below present day Davis Dam, about 50 miles below Willow Beach (Schroeder 1952). From there, they vended Pacific shells to the Prescott Branch of the Patayans, who lived up the Bill Williams Fork in the vicinity of modern Prescott, Arizona (Schroeder 1961). Baldwin (1948) reported Pueblo, Paiute, Mojave, and Walapai pottery from sites in this region, with Mojave being the most dominant.

The early Mojave continued as principal middlemen traders of the western deserts after AD 1150, on into historic times.

The historic Mojave continued to bring Pacific Coast products into the Parker/Needles area of the Colorado River into the 19th century. In 1861 Lt. J. Ives reported that the Mojaves crossed the Colorado River on rafts, which were often guided by swimmers. He stated that at that time the Mojave were friendly with the Chemehuevis and Yumas, but were enemies of the Cocopas, Paiutes, Pimas, and Maricopas. While following the Mojave Trail, Ives camped on the west bank of the Colorado (Camp 58) near Willow Beach in 1858 (Schroeder 1961:3).

In exchange for Pacific shells and shell products, Pueblo peoples of southern Nevada bartered with salt, turquoise, and cotton cloth, as discussed below.

Lost City, Nevada: Pacific Shells, Cotton and Salt

As already noted, Lost City, Nevada was an easy one day foot journey from the well watered meeting place at Willow Beach, Arizona. It is likely, from the wealth of Pacific shell evidence which was found in Lost City sites (Lyneis 1992, 1995; Shutler 1961), that the Lost City area functioned as an eastern extension of the Mojave Trail, especially after AD 900.

The name Lost City refers to numerous archaeological sites of the Virgin Branch Anasazi culture that lie in the Moapa Valley of extreme southern Nevada, along both sides of the lower 15 miles of the Muddy River. Lost City is composed of 100 sites, from small pithouses to room blocks comprising as many as 100 above ground structures (Shutler 1961:68). The relatively low elevation (2000 ft.), protection by mountains on all sides, and perpetually flowing spring-fed waters of the Muddy River, are principal features which encouraged the successful production of maize, beans, squash and -- especially important -- cotton, which was made into cloth for both local use and trade purposes.

Main Ridge, with over 60 rooms, is one of more than 100 sites clustered along the lower 16 miles of the Muddy River, the whole of which is popularly referred to as Lost City, or Pueblo Grande de Nevada. The diverse sites of the Lost City area include pit houses, Pueblo style masonry ruins, campsites, caves, rockshelters, and salt mines (Rafferty 1989).

The Main Ridge site was first excavated by Harrington in 1924, before it and other sites in the lower Moapa Valley were inundated by the rising waters of Lake Mead. Parts of Main Ridge Ruin still project above the water level, and have recently been damaged by wave action.

A large quantity of Pacific shell artifacts was found in the Lost City excavations (Lyneis 1992, 1995; Shutler 1961:42; Tower 1945). These include a surprising wealth and variety of *Haliotis* artifacts including rings, round and oval earrings, square, round, oval, trapezoidal, rectangular and triangular pendants, beads, fragments, and whole shells. a variety of *Olivella biplicata* beads, including Spire Removed, wall, disc, cup, and saddle types were also found in quantity. In addition, beads made from Pacific *Saxidomus* and ring ornaments made from Pacific *Megathura* were found in the Lost City excavations (Lyneis 1992, 1995; Shutler 1961).

Fragments of decorated Puebloan cotton cloth have been found in the Lost City area. This evidence, along with the excellent conditions in the Moapa Valley for growing cotton, suggest that cotton cloth and thread were important goods traded from Lost City (Lyneis 1992).

Salt mines in the Lost City area represent evidence of another distinctive and valuable trade commodity. Pueblo tools and pottery found in the vicinity of these mines indicate they were worked for a long period of time by Virgin Branch Anasazi, who may have traded salt east to peoples of the Colorado Plateau (Shutler 1961).

Marsh Pass, Arizona: Shell Collection and Redistribution Center

In the Kayenta region of northeast Arizona, Marsh Pass was a main Anasazi center and trade route junction for both east-west and north-south trade that continued from Basketmaker II times into the ethnohistoric period. Marsh Pass is the name given a low pass in extreme north central Arizona between Black Mesa to the south and the pink Navaho sandstone formation of Skeleton Mesa to the north. In the immediate vicinity are the famed 12^{th} century Tsegi Canyon Cliff Houses of Kiet Siel, Betatakin, and other sites, and there are many smaller habitation sites in the area as well.

Marsh Pass has yielded a variety of shell artifacts dated as early as AD 200-750. Many of these objects were found in White Dog Cave, an early Basketmaker site in the immediate Marsh Pass area (Cordell 1984; Guernsey and Kidder 1921; Gumerman and Euler 1976;).

The closely associated late prehistoric sites of the Tsegi Canyon complex, including Kiet Siel, Betatakin, Scaffold House, Lolomaki, Batwoman House, Saydoneechee, and Twin Caves Pueblo share the same primary river drainage as Marsh Pass, which lies to the southeast of these related sites. This cluster of Tsegi Canyon Kayenta sites participated with Marsh Pass in an extensive molluskan trade (Lindsay 1969).

Shell artifacts have been found in many Kayenta sites (Beals, Brainerd, and Smith 1945:80). Shell beads of *Olivella* and *Conus* are common. Abalone shell occurs as beads and pendants. Bracelets of *Glycemeris* have also been found (Lindsay 1969:346).

Pacific shell in the form of *Olivella and Haliotis* artifacts indicate east-west trade between Marsh Pass and the Pacific Coast. Around Marsh Pass, at least 121 Olivella *dama* artifacts have also been found. This is significant because *Olivella dama* comes only from the Gulf of California and is a marker of Hohokam trade in the Southwest (Haury 1976). The presence of Hohokam *Glycemeris* bracelets and other Hohokam shell artifacts in the Marsh Pass area indicate trade between Marsh Pass and the Hohokam, who had ready access to *Olivella dama and Glycemeris* from the Gulf of California. The Hohokam dominated the trade in these species (Dipeso 1974; Haury 1976).

Additional examples of molluskan artifacts, and other evidence which establishes the role of the Marsh Pass area as an important trade location, are the following. Several perforated shell discs dated to Basketmaker II have been found at White Dog Cave. A disc of perforated horn with edge ticking, similar to that of southern California edge ticked artifacts (Gifford 1947), was found in White Dog Cave and dated to Basketmaker II (Jernigan 1978: Fig. 78). One shell disc dated to Basketmaker III, with cross incising on one surface, was also found at Marsh Pass.

The earliest aviform (bird-like) shell pendants found at Marsh Pass have been dated to Basketmaker III. This artifact type is rare in early Anasazi sites but became popular in Pueblo Bonito during Pueblo II, about 300 years after its earliest appearance at Marsh Pass (Jernigan 1978:174).

A disc bead necklace with 11 *Olivella* Spire Removed beads dated to Basketmaker II was found at the site of Sayodneechee, located just north of Marsh Pass. Additionally, pendants and buttons made of jet dated to Basketmaker II were found in Sayodneechee (Jernigan 1978), as well as a beveled turquoise mosaic disc dated to Basketmaker II (Jernigan 1978: Fig.90).

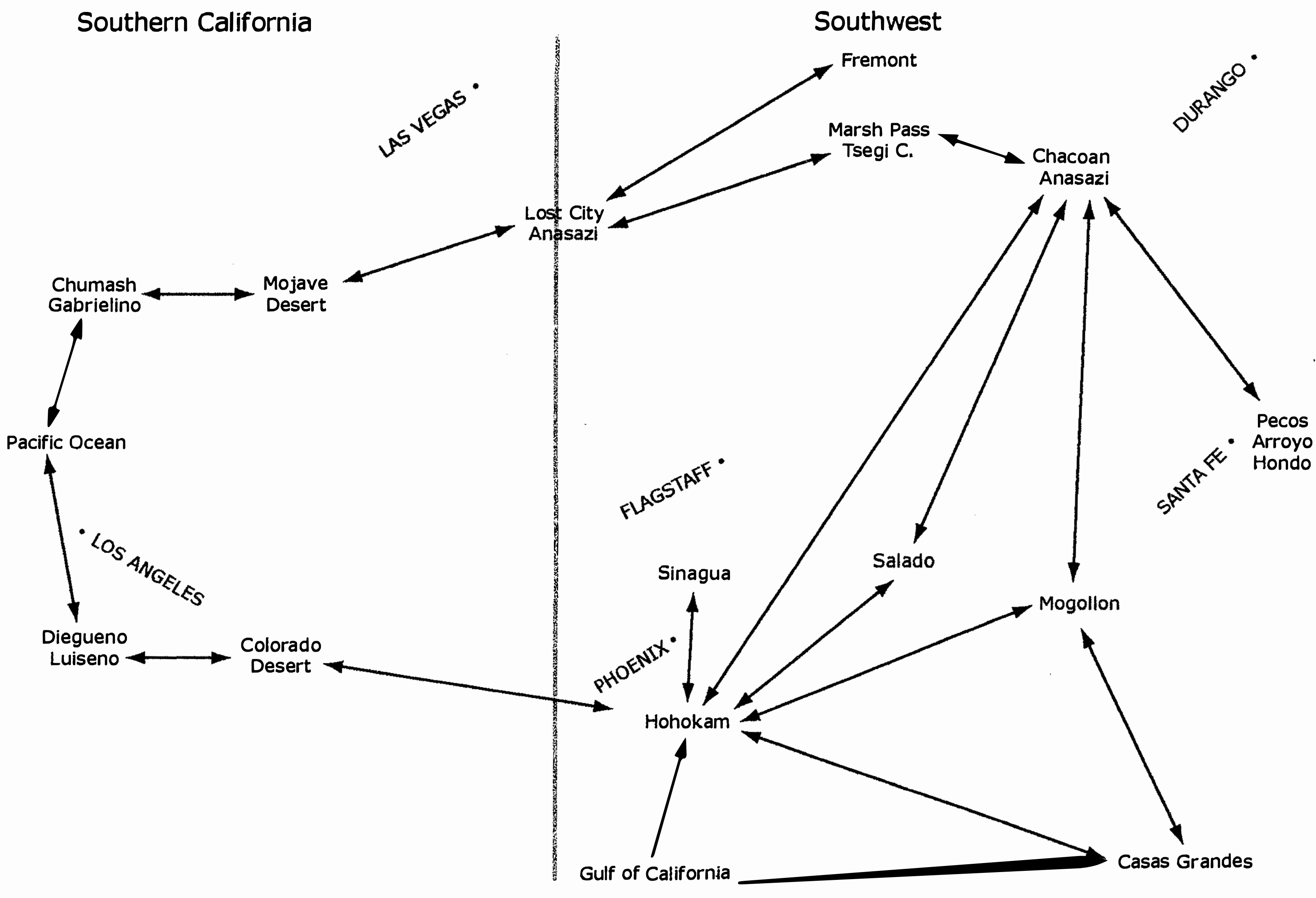
Shell frogs of apparent Hohokam manufacture, dated to Pueblo II, were found at Kayenta, a site just east of Marsh Pass (Jernigan 1978). A turquoise mosaic on a wooden backing, dated to Pueblo III was found in Betatakin, located just to the northwest (Jernigan 1978).

A New Construction of the Shell Trade Map

In Figure 30 I present a new map of the California-Southwest shell trade. It is synthesized both from the quantitative results of Chapter II and the considerations reviewed in the present chapter. It does not attempt to depict every site at which shell artifacts have been found, but rather is intended as a broad-scale interpretation of inter- and intra-regional patterns.

Pacific shell products traveled from coastal areas to the inland Southwest Virgin Branch Anasazi of Lost City,

Figure 30. Probable Pathways of Marine Shell Exchange between Southern California and the Southwest Before and After AD 900.



Nevada, on to the Kayenta-Marsh Pass area, then finally to the major Pueblos of Canyon de Chelley, Chaco, and Zuni, which in turn passed the goods on to the Rio Grande and eastern Pueblos such as Pecos. Woven goods and other Southwest products (as shown by examples in Chapter III) traveled this same pathway westward to the Pacific Coast. Thus, the main route of Pacific shell to the Anasazi of the northern Southwest employed a Chumash-Mojave-Virgin Anasazi/Kayenta-Anasazi exchange relationship.

Coastal southern California groups were visited by Mojave people from the Colorado River area, who brought with them Southwestern goods as well as their own collected products to trade for shell and shell products. These shells were eventually traded to and within the Southwest.

The Anasazi and Mogollon were well supplied by the Hohokam with tropical shells, especially *Olivella dama and Spondylus,* which traveled a south to north route. It is probable that the Salado, Sinagua and the Mogollon did not acquire Pacific shell directly, but from within the Southwest from groups such as the Virgin and Chacoan Anasazi and the Hohokam. Possible motivations for this extensive Southwest—California trade are discussed in Chapter IV.

CHAPTER IV.

COSMOLOGY, RITUAL, AND SOCIAL CONTROL AS MOTIVATORS OF THE CALIFORNIA-SOUTHWEST TRADE

In this chapter, I discuss the larger social and ceremonial context of exotic ornamental items in traditional societies, to identify some of the diverse reasons that probably lay behind the southern California/Southwest shell trade. In both southern California and the Southwest, a strong relationship between social complexity, social ranking, and ritual material culture may be readily observed (Arnold 1987; King 1990; Upham 1990; Upham, Lightfoot, and Jewett 1989; Vivian 1990).

Artifacts used in marking elites and regulating social behavior are parts of dynamic social systems which change in response to changes in social interrelationships and opportunities. In prehistoric societies generally, relationships involving large numbers of people required highly visible personal artifacts to identify the key players (Eliade 1978).

Direct relationships exist between the cost of producing and acquiring elaborate artifacts and their significance in organizing social behavior. Artifacts worn on the body reflect social or gender distinctions and provide messages that are clear to those who observe them. The observer is then able to understand the nuances of social context and status differentiation (Hudson and Blackburn 1985:19). For example, artifacts might denote social, political, or religious affiliation. Their value is usually determined by the rarity of the material from which they are made, the amount of labor expended, and the showiness of the finished artifact. In the category of southern California decorated artifacts, we find iridescent shell, stone and bone with various kinds of incising, and overlay. Many of these decorated artifacts represent the expenditure of great time and labor.

According to A.L. Kroeber (1922) there are probably more different varieties of ornaments and ornamented objects found along the southern California Coast than in all the rest of California. While the ornamentation, whether of form, of inlay, or of decorative marking, is often rich, it is always simple in pattern and usually geometric.

As Earle (1997:205) and many others have pointed out, wealth items represent ideology. Only through representation, public agreement and participation by social groups can culture be produced, and thus controlled and manipulated by central leaders or elites.

The individual use of exotic wealth items was important as a linkage to social power. By exchanging ritual wealth items elites may establish ties beyond their individual kin groups. Control of the acquisition and later exchange of exotic goods and raw materials yields social power (Earle 1997:203). This mechanism usually operates because traded exotic items are often more highly charged with power and prestige than local common goods.

The symbolic may have more social cohesive influence than the literal. This may be seen when groups, such as the moieties of the Hopi, are represented by a symbolic animal totem, like the bear. The cohesive power of the symbolic also rectifies the problem of bringing non-kin mates into a clan or group. New clan members, as mates, become united and part of the group, not through their genetics initially (their offspring will later provide this function), but because of their acceptance, initiation, and allegiance to the commonality of an established and elemental symbolic animal form or token, which is often represented by an ornamental manufactured exotic object.

Shell Currency, Craft Specialization, and Societal Development: *Olivella* as Money

The cultural invention and widespread use of a monetary exchange system is a significant marker of societal specialization and cultural and economic development. According to Herskovits (1952) a true symbolic money form is a type of item that is rare, small, and portable. It is also easily divisible and its supply can only be increased with the expenditure of labor. The value of a money generally derives from its relative scarcity and from the labor that must be invested in its production. The *Olivella* bead type most often used as currency in southern California was the Callus Cup bead. The value of these beads is increased over other beads because only one Callus Cup bead can be made from each shell, unlike several other bead types which allow multiple beads to be made from each shell. *Olivella* shell bead money, such as that minted by the Chumash in southern coastal California, perfectly satisfies the aforementioned criteria.

Several California Indian groups rose to a level of complex social organization and developed craft specializations without significant agriculture or domestication. Sahlins (1965) noted that societies with the greatest material productivity are also those with the greatest degree of social stratification, chiefly powers, and economic specialization. As a society becomes more complex, the need for a symbolic item of exchange often arises (Arnold 1987). The standardization of value becomes necessary when moving from simple household production to greater specialization, and wider, more diverse exchange relationships (King 1990).

Monetary traditions seem to have been highly developed in coastal California. The Chumash and the Pomo (both had continuous access to monetary shell species) were the principal minters or entrepreneurs of monetary shell production. In central coastal California the Pomo specialized in the production of clam shell disc-bead money. In southern California, the Chumash specialized in the production of *Olivella* money beads and abalone beads and ornaments. In the early stages of shell bead production, spire removed, then rectangular shaped beads, were dominant. In the early Holocene, Spire Removed *Olivella* shells were strung end to end. Some whole *Olivella* were centrally perforated and strung side to side. The Chumash *ponco* was a unit of strung 0. *biplicata* Callus Cup beads, measured as two turns from the wrist to the middle finger (Jernigan 1978).

Among the Chumash, most *Olivella* money bead production was dependent upon chert drills (points hafted as palm drills), produced on the northern Channel Islands. The presence of quality chert and abundant shell species on the northern Channel Islands may have permitted monopolization of the production of microblade drills and tools, and shell bead monetary production by the Island Chumash (Arnold 1987).

The *Olivella* money beads produced for thousands of years in coastal and island California were generally uniform, easily dividable, and measurable. Although some of these beads were occasionally incised with designs, it is their uniformity and lack of ornamental variability that lends them to monetary exchange. Although *Haliotis* was also used to some extent as a medium of monetary exchange, its variability in nacre and epidermal characteristics (compared to the uniformity of *Olivella*) caused it to be less of a standard medium of exchange and more of a precious ornament.

Olivella shell beads also became ritualized to a degree, through "profound noticing" (Gadamer 1986) of their beauty. As far back as the Early to Middle Holocene, people surely became sensitive to the very glossy, mauve colored *Olivella biplicata*. At first, whole *Olivella* of the preferred size and color were selected and simply spire abraded, to be strung whole on a necklace. At this early stage in the ritualization of *Olivella* it may have been the particular color or colors of *Olivella,* and the number and size of whole shells that represented a particular value (Bennyhoff and Hughes 1987; Gifford 1947). The time taken away from subsistence and food gathering or other activities to abrade enough *Olivella* for a length of proper necklace surely figured in the idea or calculation of worth. Later on in the widespread use of *Olivella* as a monetary exchange item, the smaller more intricate beads, which are more difficult and time consuming to manufacture, were probably reckoned the most valuable. If we comprehensively examine prehistoric jewelry made with *Olivella* shells and shell beads, we will find numerous cases where the shells have been specifically selected according to color, shape, size, provenience, and other aesthetic qualities. In order to increase the appearance of uniformity, the Chumash would bleach Callus Cup beads white (Hudson and Blackburn 1987).

As I noted earlier, it was the profound noticing of *Olivella* (due in part to the power of the beautiful or significant to bring about revelation or noticing, see Gadamer 1986), and its other attributes that caused *Olivella* beads to become a standard measure of exchange. It also seems likely that focused gatherings (parties, rituals, or celebrations) were also involved in the instilling of worth and cultural power into *Olivella* (among other things). In traditional culture the mythic symbolism or metaphor that may have become an attribute of *Olivella* (and other objects), was socially dependent upon the gathering of people together for the practicing of a collaborative construction of affirmation and acceptance. It should also be pointed out that *Olivella* shell necklaces, bracelets, and other ornaments constituted "wearable wealth" that signaled to a gathering the prosperity and social standing of their bearer.

Elites and Elite Markers in Southern California

Chumash social organization, which was as complex as any known in hunter-gatherer society, featured pronounced status differentiation (King 1982; Moratto 1984:118). Chumash towns had as many as 1,000 residents, and the AD 1770 Chumash population has been estimated at 15,000 to 20,000 (Cook and Heizer 1965).

Elites in southern California were principally involved in the shamanic capacity to manipulate marine herd animals, fish, fertility, world and personal renewal, wealth, and societal cohesion (Bean 1992; Blackburn 1975; Lee 1997).

Various badges of power and sacred objects were used by ruling elites to distinguish themselves and enhance their ability to insure their social groups abundance of food and safety. Shell jewelry made by specialist craftspeople served as a status marker and were used as gifts presented to other elites.

The Chumash social system was organized similar to those of other southern California groups. Each Chumash village had at least one ascribed chief (Wot), who inherited this position. One of the main functions of the Wot was the storing up of foodstuffs for the purpose of ceremonial gatherings.

The Chumash had two types of elite shamans. Older men called *Alcuqlas* administered *toloache* (*Datura*), named children, interpreted dreams, made love magic, used herbs, forecasted rain, averted storms, and used sacred stones and objects. *Alexlaps* were men who wrote sacred songs and dances, had knowledge of astronomy and calendrics, and have been described as poets, singers, and scientists. These two specialty elite positions were generally not inherited, but were attained by demonstrating prowess during apprenticeship (Bean 1992; Eliade 1958; Lee 1997). Like most groups in the Southwest and California, the Chumash believed in the necessity of having a "personal spirit or dream helper", without which all endeavors could end in failure.

The manager of socially important formal Chumash fiestas or feasts was referred to as a *Paxa*. The Paxa was the leader of a group or cult of men called *Antap*. The *Antap* performed at ceremonies, collected food and money for the *Wot*, and maintained esoteric knowledge. The larger Chumash towns were said to have three or four chiefs, one of whom was the recognized head chief or *Wot* (Bean 1992; King 1990).

Among southern California groups such as the Chumash, particular faunal species and body parts were used to delineate and identify elites. The principal *Wot* was zoomorphically identified with the eagle. Assistant chiefs were often identified with the falcon (*xelex*). Ritualized body parts were used from animals such as grizzly bear (teeth, claws, paws, skin); swordfish (bones, sword); sea lion (whiskers, bones, canines); whale (vertebrae); shark (skin, teeth); and sea otter (teeth, fur). Hawk skulls and/or bear paws would be worn by shamans and other elites (Hudson and Blackburn 1986). The tomol (plank canoe) used by elite Chumash had elaborate and distinctive abalone inlay at the bow and stern. The canoe sitting stool used by a Chumash "princess" was ritually made from a whale vertebrae, which was inlaid with abalone half moons, stars, and other symbols (Hudson and Blackburn 1986).

Among mainland and island Chumash groups there was a notable amount of traditional elite exchange and giftgiving. In general, it appears that the more colorful beads (*Haliotis, Hinnites*) were used to cement relationships between the elite nobility. Less colorful and smaller beads were used in more common exchanges between non-elites (King 1990:63). Intraregional giftgiving took advantage of differential regional access to relatively rare or coveted items, such as rabbit or deer skins and blankets from the interior, and otter, sea bird, or seal skins from the coast and islands. The use of gifts such as bracelets, necklaces, earrings, etc., indicated social position and wealth (King 1990:63; Priestly 1972). Objects which were signs of personal supernatural power may be generally categorized by the Chumash word *atiswen*.

Baker (1957:146) argued that the styles and quality of clothing for men and women have been among the most obvious symbols of social class in all societies. This may be apparent in the case of Chumash male elites, who traditionally wore elaborate (sometimes full length) robes, as opposed to the common Chumash men who wore virtually nothing (Hudson and Blackburn 1986).

The trade in an exotic, manufactured, and relatively soft textile such as Southwest cotton cloth, (which could be used as exclusive ritual or status clothing), would have greatly appealed to the need of competing Chumash elites for noticeable ritual display. Competition between the elites of different Chumash groups surely caused material culture and societal change, flowing from the cultural results of using exotic trade objects for aggrandizement (Harrington 1927; Hudson and Blackburn 1982; King 1990;).

Elites and Elite Markers in the Southwest

Southwest social structure was generally based on totemic clan organization, with elites possessing and controlling traditional ritual knowledge, and with it social power, status, and authority. Elites in the Southwest were primarily involved in manipulating weather, rain, frost, wind, cultigens, fertility, social cohesion, and security.

Southwestern societies are marked by pronounced ecological and social adaptive diversity. Social status differentiation is apparent from Basketmaker through later Pueblo periods. In funerary contexts, Southwestern elites are generally associated with marine shells, polychrome ceramics, turquoise, and feathers.

Southwestern societies eventually evolved into complex organizations, as at Chaco Canyon in the San Juan River area of northwest New Mexico. During the later Puebloan periods, many Southwestern villages grew in population to include over 2000 persons (Upham 1989). The most complex and elaborate burials found in the whole expanse of the Southwest are those at Pueblo Bonito, the largest Great House of the entire Chacoan system.

Differential access to ritual knowledge is the foundation from which all bases of political power and economic control derive, as manifested by sociopolitical elites in the Southwest. In the modern Pueblo of Zuni in New Mexico, political power is achieved mainly through esoteric history, knowledge, and ritual. A strong relationship between political authority and traditional ritual ceremonial knowledge may also be seen among the modern Hopi of northern Arizona.

The Hopi speak of themselves as having always been a class society (Brandt 1954:23). Specific Hopi linguistic terms refer to high priests (*Mong-cinum*), non-office holders who are involved with ceremonies (*Panoun-cinum*), and those who neither take part in ceremonies nor belong to ritual societies. *Sukavung-cinum,* the last group mentioned has the least social status, and has been suggested to have been comprised of slaves in Hopi history (Nequatewa 1967:125).

Plog (1984:359-365) demonstrated that in the Southwest, clan organization such as that among the Hopi is integral to the management of domestic affairs, agriculture, political needs, and kiva organization. Clan structure is also seen as basic to the determination of inheritance and land holdings. It may be said that complex clanship is the basic social structure principle around which most Pueblo society is organized. Each clan traditionally has one or more totems. The majority of these clan totems are ritualized faunal species such as the bear, wolf, badger, and eagle. Certain units such as the Hopi Bear Clan may develop political authority over other clans (Brandt 1954:20;).

Social stratification for many of the modern western Pueblos is not based on the acquisition of material wealth, but on the access to, and possession of ritual knowledge (Brandt 1954). Important aspects of ritual activity may require exotic objects only obtainable through long distance trade.

According to Jernigan (1978), ornaments were used in the Southwest to indicate tribal or totemic affiliation, rank, status, office, occupations or achievements. Abalone and shell objects were used by Southwest elites as noticeable status markers, and as necessary parts of ritual activity (DiPeso 1974; Haury 1976; Jernigan 1978;). The use of whole abalone shells by elites as ritual containers for pigments and medicines probably existed from at least Basketmaker I onwards (Brand 1938; Jernigan 1978). The whole abalone shell as a practical or ritual container may have been popular during much of the Southwestern pre-ceramic Basketmaker Period.

Upham (1982:23) concluded that in western Pueblo groups a select group of related individuals has for generations occuppied the vast majority of the highest ceremonial and political offices. These elites have justified their roles by religious position, excluding outsiders through secrecy and the control of ceremonial objects and knowledge, which could also include socially important trade route knowledge and trade contacts.

Based on limited and perhaps erroneously interpreted ethnographic evidence, Benedict's "Composite Pueblo Model" saw the Pueblos as generally egalitarian. In this model, sociopolitical hierarchies and managerial elites do not exist (Upham 1982:79). Contrary to this view, however, according to Fried (1967:32) few if any known human societies manifested equal social status, and all known societies create ranking hierarchies.

Another apparently erroneous claim made by advocates of the Composite Pueblo Model is that, if there *are* apparent sociopolitical leaders, they have authority *without* power. This interpretation is based on limited ethnographic information, and perhaps on a manipulation of the ethnographic present. According to Upham (1989:94), these conclusions have been superimposed on the study of prehistoric sociopolitical systems and elites in the Southwest for over 100 years, and have resulted in considerable confusion and misinformation.

Among the Hopi, access to clan lands depends on participation in the ceremonial system. Such participation is not possible without possession of ritual knowledge and proper objects. The Bear Clan has traditionally maintained the most elite ceremonial and political positions in Hopi villages. In Zuni, the Dogwood Clan has maintained social and political dominance (Upham 1982).

In much of the prehistoric Southwest, greater status positions are indicated by more grave goods and the increased presence of marine shell and turquoise. In the area of Chaco Canyon in New Mexico, elite burials were dramatically furnished, while commoners were usually buried with few grave goods. The two most elaborate burials in Chaco Canyon were found under a plank floor in room 33 of Pueblo Bonito. In the fill of the room above the plank floor were found the remains of 16 young women, apparently sacrificial victims. The first of the (40-50 year old) elite male burials interred below the plank floor contained 5902 pieces of turquoise and three shells. The second burial had 13,000 turquoise objects, five jet inlays, 94 shell bracelets, 3326 shell beads, a shell trumpet, bivalve shells, and stone beads. Apparently, both of these Chacoan elite persons died violent deaths, as indicated by forensic evidence of percussion blows to the heads. These two most elite burials in the entire Chaco system were also interred in the largest and most complex single structure and central place (Pueblo Bonito) in the Chaco Canyon complex (Judd 1954; Vivian 1990).

Only one comparable elite burial has been documented outside the central place of Pueblo Bonito in Chaco Canyon. In room 41 of the Chacoan outlier of Aztec, two adults and three children were excavated by Earl Morris (1928:155-161). One of the adults was covered with *Olivella biplicata* beads, abalone shell, and mosaic pendants. The total number of pieces of turquoise, shell, and stone jewelry recovered from this room exceeded 50,000 (Vivian 1990).

The Chacoan economy was based on intensive agricultural practices, which depended on rainfall/floodwater farming. This may help explain the widespread ritual use of marine shell and turquoise by elites in the arid Southwest, as sources of ritual power for inducing rain and weather control (Jernigan 1981).

In sum, within much of the Southwest, decision making managerial elites gained their authority and power by controlling both the economic bases of power (clan lands) and esoteric ceremonial knowledge and objects. The various positions of social status were indicated by objects such as turquoise, shells and shell jewelry, and specialized articles of clothing and headwear (Jernigan 1978).

Shamanism, Cosmology, Interregional Interaction, and Gain or Loss of Power

Religious persons such as priests or shamans are extremely important socio-political figures in native society. They are the manipulators and mechanics of power, since they possess knowledge that makes it possible for them to travel safely to distant and dangerous places, which may be in any of the three shamanic worlds. Those persons possessing a knowledge of the rules governing shamanic power are capable of receiving, manipulating, and controlling power throughout the imagined universe. (Bean 1992; Blackburn 1975; Eliade 1964; White 1963).

Form, space, aesthetics, and time are changeable under the influence of shamanic power. During rituals, when power is being exercised, past, present, and future may be fused into one integral whole. A shaman may use power to bring sacred time into the present so he (or she) can interact with beings from that time. He or she may transcend space, shortening or lengthening distances through the use of power. He or she may travel rapidly across space transformed into another creature, such as a bird, bear, or feline.

In the Southwest and southern California, animal familiars are among the prehistoric shamanic concepts that can be seen in extant rock art, masks, ornaments, and costumes. Other shamanic symbols relate to the Axis Mundi, which is generally a sacred tree or cosmic mountain which serves as entry into the sky world, enabling the shaman to travel into other dimensions (Eliade 1972; Hedges 1983).

Within the "middle world" of man, power can exist anywhere, and anything occupying space may contain power and be beneficial or dangerous. For this reason, the central place occupied by an Indian group--the village or town--is more sacred and safer than anything beyond its perimeter. Such a central place is viewed as safe because it is controlled by men of authority and knowledge (elites) who can protect the inhabitants from other malevolent power sources (Blackburn 1974; Eliade 1958).

If security, predictability, and sociability are associated with one's home base, everything beyond is associated with the potential for danger. Places not inhabited by man are unsafe because they are defined as uncontrolled, as are the other two shamanic universes (which are above and below this central universe). According to these concepts, travel away from one's home base increases the chances of encountering danger. The potential danger of uncontrolled power is believed to increase in a series of concentric circles the farther one moves away from one's immediate social universe. For this reason, the presence of strangers in a community could represent a source of danger and strangers may be viewed with suspicion (xenophobia). These xenophobic shamanic world views may cause exotic elite objects to be more difficult to obtain, which may greatly increase their value.

In societies dealing with uncertainty or danger, a person who can control, acquire, or manipulate power is absolutely necessary. While the social price required for a shaman’s presence may be inconvenient, society is generally willing to pay it. Generally, throughout California, chiefly families were those that had many priests and shamans. In economic considerations, the elite families controlled the principal means or methods of production and distribution of goods, owned monopolies on many valuable goods (such as shell products) and services, and possessed the power to levy taxes, fines, and fees to support institutions (Bean 1992). Elites were also able to charge interest on loans, thus amassing even more wealth. In legal matters, they were the final judicial arbitrators with the power of consummating decisions involving life and death within the community.

Just as there was a conflict between those with innate power and those seeking to acquire it in the myths and cosmologies of the California Indians, so did such a conflict exist in human society between the elites holding power and newcomers seeking to obtain it. The elites, with their inherited power that brought wealth and differential status, were in perpetual tension with individuals from below their ranks who sought to acquire power. The elites, however, possessed control mechanisms for the licensing of power such as inheritance of rank, secret societies, initiations, knowledge, and control of ceremonial equipment. Some of these mechanisms provided means by which persons of lower rank, possessing skill and ambition, might enter the system. Through elite licensing of power, virtuous young people of lower ranks were able to improve their social standing, yet the power structure was usually kept safe from serious disruption by talented malcontents (Bean 1992; Lee 1997).

Since personal or social power could also be destroyed, shamans or others who misused their abilities or violated the community could be reduced in rank or power through ritual disenfranchisement or, if necessary, assassination.

Indicators of status held by elite families, such as symbols of political office (e.g., ceremonial bundles, elaborate artifacts), were also often synonomous with the most powerful supernatural beings in sacred positions of the upper world, and therefore symbols of power as well. The main social implication of power was that elites lived a life and shared a type of knowledge that clearly separated them from the common people.

The Social Roles of Shamanism

The shaman is an elite person of power in a group, tribe, or chiefdom, who is capable of persuading, controlling, and directing other members of a group or society. The power to be a shaman is derived from apprenticeship, initiation, the confidence of the participating society, and the strong need the society has for his or her roles and skills. The shaman traditionally employs objects such as exotic shells, crystals, feathers, and ritualized faunal body parts such as bones, teeth, claws, and fur (Eliade 1972). The shaman may encourage, manipulate, or actually participate in long distance trade efforts to acquire exotic shamanic objects.

A shaman is that individual in a culture who can make contact with the supernatural worlds. By means of ecstatic trance (the basis of shamanic practice), the shaman acquires supernatural capabilities, transforming into an animal or bird, and traveling across time and space to the spirit world. In both his mind and those of his people, the shaman's transformation is literal (Furst 1990:13; Hedges 1992).

Shamans played a major part in defending of the cosmologic integrity of a community. They fought "demons" and other shamans, cured illnesses, controlled weather, increased game and food resources, directed communal sacrifices, fostered human fertility, conducted rites of passage, and escorted the dead to other worlds. One of the shaman's most significant functions was to oversee world renewal rites. These rites were often conducted at the time of the solstices, for the sun was commonly considered to be the progenitor source of all power and light. The shaman as an elite person of great power based on his spiritual authority, often conspired with political elites (chiefs) in what has been referred to as "unholy alliance," to more effectively manipulate their community's social and economic situation.

Shamanic Cosmology, Trade, and the Pacific Ocean

The Pacific Ocean, in fact and myth, is humanly important to the trade model I present here, because it was the largest and most primordial source of water, rain, and wind for both southern California and the Southwest, and was ritually recognized as such. Thus, certain objects or animals coming from this source may have been considered especially significant or symbolically powerful. In most traditional Southwestern religions, the three prevalent themes are curing, obtaining personal spirit power, and the bringing of rain, the latter being the most emphasized (Campbell 1983; Eliade 1972; Jernigan 1981:41).

The Mexican Huichol who have been considered descendants of a southern branch of the Southwest Mogollon (DiPeso 1974), have sustained strongly the practice of ancient and traditional rituals and activity (Furst and Schaifer 1996). Of special pertinence here, In "The Flesh of the Gods" Furst (1990) makes reference to the Huichol tradition of a belief in the Pacific Ocean as a divine progenitor source of moisture.

The intensive use of shells by the Hohokam may have been ideologically and symbolically involved in bringing rain to the desert. Jernigan (1981) recounts an Arizona Papago custom of conducting a ritual pilgrimage to the Gulf of California to obtain salt and shells, and other ethnographic sources also mention the acquisition of sea water by inland peoples for ceremonial uses. The Papago pilgramage troupe was led by a "rain priest" referred to as *Siirvanyi,* and of the main functions of this ritual pilgrimage was to bring rain clouds back from the sea. Before leaving the sea to return home, the *Siirvanyi* asked the sea to send a sea breeze to blow the group home safely. Upon returning home, the pilgrims would be greeted by the sound of bullroarers, whose sound was intended to imitate rain coming from the ocean.

Reference is also made to rain sent by the guardian of the "Rain house standing in the west" (Jernigan 1981:41). This rain house standing in the west may refer to the Pacific Ocean, which is more westerly in reference to the Papago and their Hohokam ancestors, than is the Gulf of California.

A key conclusion which may be inferred from this information is that the Hohokam, and other prehistoric groups, probably viewed marine shells and objects as having the power to attract rain bearing clouds from the sea or ocean to the Southwest, and that the Pacific Ocean was seen as a primordial source of moisture, wind, and shamanic power.

Religiofauna and Cosmology

An approach that recognizes the importance of religiofauna in the elaboration of cosmology and aggrandizement of political elites may help explain why Pacific species of *Haliotis and Olivella* appear in most of the major sites in the Southwest. Aspects of ritual, symbol, and dependence on rainfall may be seen as probable explanations or motivations for the presence and preference for certain ritualized Pacific molluskan species in the Southwest.

One possible motivation for intense marine shell ritualization in the far west and Southwest may be because many aboriginal peoples of the coast had been marine oriented from earliest times and were highly conversant with impressive, potentially iconic forms, such as spirals and shell shapes. The universal shamanic cosmology may also have influenced the manifestation of marine shell ritualization. Marine shell was important to the shamanic process because of the iconographic importance of spiral morphology, colors, and the symbology of the oceanic non-terrestrial realm, which was the source of shells.

The "beautiful," when recognized, is capable by itself of causing acute noticing, revelation, motivation, change, and to some extent ethnic or societal stability (Gadamer 1986). The social role of beauty in noticing, revelation, bringing about change, and the perpetuation of regional tradition may have been seriously underestimated. After objects have been established as beautiful, and are regionally considered so, they may acquire the profound capacity to unify a social group. This capacity may be similar to the unifying influence of common language and other characteristics of extant cultural heritage.

Turquoise, Obsidian, and Iridescent Objects as Motivators for Interregional Contact and Exchange

A large number of turquoise deposits are located in a geological belt running from the region of Silver Lake, California, eastward across the Nevada State line, and south into Arizona. This geological band of turquoise was first worked by the Puebloans in northwest Arizona, and subsequently was worked west and northward into the deserts of southern California by Puebloans associated with the Virgin Anasazi and the site of Lost City, Nevada (Heizer 1941; Rafferty 1989).

Quality turquoise obtainable from mines in southern Nevada and southeast California encouraged prehistoric contact between the Southwest and southern California. This relationship may have been stimulated at various times by Mesoamerican interests or commerce (DiPeso 1974; Jernigan 1978; Rafferty 1989). The cultural and ritual influence of northern Mesoamerica on the Southwest may well have encouraged or developed the ritual and symbolic association of turquoise, spirals, shells, and iridescence with water, fertility, life, and divination, and the use of certain Pacific marine species by elites and priests for aggrandizement.

M. J. Rogers (1941) proposed that the inhabitants of the Mojave Sink were largely middlemen traders, and that the Anasazi pottery and Rose Spring projectile points from sites in the Mojave Sink were intrusive items that accompanied itinerant turquoise miners. Another interpretation is that Anasazi peoples actually occupied the Mojave Sink during the time that they worked and controlled the desert turquoise mines (Heizer 1941).

The closest source of fine obsidian to the coastal Chumash is in the Coso Range on the northern edge of the Mojave desert, about 450 km away from the nearest coastal Chumash site (Glassow 1996). The location of such a valuable mineral resource in their teritory may have allowed and encouraged groups such as the desert Mojave to acquire shell products received from the Chumash, in exchange for Coso obsidian and other desert and mountain resources from the interior. These Chumash shell goods could be exchanged for products from the Southwest, such as cotton cloth, which might then be passed on to the coast.

Iridescence is one specific aspect of color that caused the "deification" and trade of numerous faunal species in Mesoamerica, the Farwest, and the Southwest (Simon 1971). Among numerous ritualized iridescent species are the quetzal, turkeys, parrots, butterflies, shell, abalone, fish, and numerous insects. In the search for and acquisition of iridescent ritual objects, the northern "frontier" region of Mesoamerica (and in fact more southern regions also) came under the influence of Mesoamerican state level ideologies and economic systems.

The most sought after and probably most valuable item throughout prehistoric Mesoamerica was the iridescent green-blue feathers of the quetzal bird (Trogonidae)(Coe 1992; Miller and Taube 1993; Sejourne 1956). The feathers of the quetzal employ a complex mechanism of organic structural refraction to produce many specific hues. Such hues are also produced by the inner nacreous surface of the shells of red or green abalone (Haliotid mother of pearl). The iridescence of molluskan mother of pearl is formed by thin, translucent, and variably colored sheets of aragonite deposited parallel to the inner surface of a shell. These composite nacreous layers create the refracted light and colors characteristic of diverse molluskan iridescence (Keen 1971). A preference for pearls, ornaments, money, and display wealth made from iridescent shells has encouraged trade and cultural diffusion between the Southwest and Far West, and between diverse groups around the world.

The motivation and driving force in the widespread use and demand for *Haliotis* shell may be based upon an ideological complex that associated iridescence and/or the source of these exotic shells with water, rain, growth, and renewal.

Iridescent objects may owe their major appeal to their prominent characteristic of changing form and color. The principal reason that iridescent objects have been and are so sought after and coveted has to do with the magical, multicolored changeability of these objects. The color and reflected surface structure of an iridescent species such as green abalone *(Haliotis fulgens)* changes when an object of such shell is moved or seen from different angles or in changeable light (Bevelander 1988).

It is this changeability of form and color which may qualify iridescent objects as precious or beautiful. In this *living* way, iridescent objects may be seen to reflect or be symbolic of the changeable, unpredictable, and metamorphic nature of life itself. The various "living" colors found in iridescent objects may be seen as symbolic of a wide range of objects, emotions, or ideas. Certain manifestations of iridescence, such as that of pink, white, or silvery pearls, or mother of pearl, have been seen by several cultures to be representative of virginal fertility and eroticism. Pearlescence has often been connected with a symbology involving female procreation, renewal, and genitalia, and may also show symbolic reference to seminal fluid.

It is the symbolic encapsulation of the movement of play and life, which is part of a play of concealment and revealment (Gadamer 1986) that has caused iridescence to be precious and sought after. These concepts of changeability and beauty have often been associated with shamanic renewal, shape-change, and rebirth.

Summary

Exotic objects have been used for thousands of years to mark elites and regulate social behavior in the Southwest and southern California.

Shamanism is part of a complex social controlling mechanism, often involving exotic objects. The needs and beliefs of Southwest and southern California elites and shamans stimulated trade relationships. Pacific Molluskan objects such as *Haliotis and Olivella* played a significant part in developing and perpetuating the west-east trade relationship.

Olivella was widely used as a form of money as well as prestige ornamentation in southern California. Objects manufactured from *Haliotis and Spondylus* were also used as prestige markers in the Southwest, and iridescent *Haliotis* objects were used as signs of prestige in southern California.

The motivation for trade in exotic objects between southern California and the Southwest involved cosmologic symbolism associated with the Pacific Ocean, shells, rain, fertility, and wind.

In sum, sociopolitical aggrandizement and ritual, along with cosmological considerations, are seen as the key motivators for prolonged interregional trade and contact between peoples of the Southwest and southern California. The acting out of these motivations over a period of centuries has given us the shell trade record that is documented in the present work.

CHAPTER V

CONCLUSIONS

In this study I have shown that a great quantity and variety of Pacific and Gulf of California shell was used in the Southwest over nearly 1,000 years, centered on about AD 900. The quantity and diversity of traded shell artifacts of exotic species shows how strong both the Gulf of California trade and the Pacific trade were in delivering shell artifacts to the interior Southwest (Table 22).

Pacific Coast	
Haliotis	323
Olivella biplicata	2,024
Olivella baetica	112
Olivella pedroana	1
Total	2,459

Gulf of California	
Spondylus	588
Olivella dama	14,107 Ψ
Olivella gracilis	6
Olivella volutella	1
Olivella anazora	1
Total	14,703 Ψ

Table 25. Total Number of Artifacts from Pacific Coast and Gulf of California Species found in Southwest Sites

Ψ With Casas Grandes.

The abundance of shell artifacts and artifact manufacturing sites in their territory indicates that the Chumash were major Pacific Coast purveyors of shell artifacts. The typology as well as the species of Pacific shell artifacts shows that those found among the Anasazi especially, and other Southwest groups as well, were predominately of southern California origin. Thus the circumstances point to the Chumash and perhaps their immediate neighbors to the south, as the primary source.

I have also stressed that the Hohokam were instrumental in supplying the Anasazi with *Olivella dama* and *Spondylus* shells, Gulf of California species to which the Hohokam had direct access. *O. dama* especially was very common in the Anasazi trade, and it is interesting that the Island Chumash and various middlemen traded Pacific *Olivella biplicata* in strong competition with the Hohokam, who were at the same time vending *O. dama* from the Gulf of California in the Anasazi *Olivella* "market". As summed up in Table 25, it is clear that the Hohokam trade was more than highly competitive, a fact perhaps not fully appreciated in earlier discussions.

Both Pacific and Gulf of California shell trade, already important as early as AD 500, expanded significantly after AD

900. An analysis of shell artifact counts from sites at Lost City, Nevada, reveals *Olivella* artifacts in many rooms. *Olivella* was similarly abundant at sites around Marsh Pass and at other eastern Arizona and New Mexico Anasazi sites, showing that for the Anasazi after AD 900, *Olivella* was widely distributed among the general population as well as in elite contexts. Increased trade, abundance, and widespread ornamental and monetary use of *Olivella* shells is indicated. An analysis of Snaketown and Casas Grandes shell artifacts room by room also reveals this tendency (Appendix A) (DiPeso 1974; Haury 1976).

More than three times the number of *O. biplicata* Spire Removed beads were found in Anasazi sites after AD 900 as before that date. This evidence, along with the substantial number of *O. biplicata* Disc and Cap beads dated to after AD 900 from Anasazi sites, demonstrates greatly increased trade between the Anasazi and southern California tribes after AD 900. Within all cultural areas of the Southwest, Pacific *Haliotis* ornamentation competed with Gulf of California *Spondylus* as a marker of elite status.

There were other fluctuations in shell use over time as well. In my limited sample from southern California there were four times the number of *Haliotis* artifacts before AD

900 compared to the period following. This corresponds to the Hohokam emphasis on *Haliotis* before AD 900, and may support other evidence of a close and early trade relationship between the Hohokam and southern California peoples, which diminished or changed after AD 900 (Haury 1976). The finding of Hohokam *Glycemeris* bracelets in the Gabrielino area of southern California, including the coast, is further evidence of a trade relationship between the Hohokam and southern California.

In the societal realm, my study suggests that certain key sites grew from lesser to greater size and importance while others shrank, reflecting demographic, political, and trade changes over time. Certain primary and secondary locations were no doubt instrumental in the rapid spread, in a node-to-node fashion, of trade objects, technical concepts, and stylistic innovations between the Southwest and southern California.

In the Southwest, a cluster of Hohokam sites in the Tucson Basin devolved from Primary trade location status before AD 900 to Secondary status in the period following. At the same time, Snaketown grew from its status as a Secondary shell trade location before AD 900 into the major location of the Hohokam shell trade afterward.

Main Ridge/Lost City of the Virgin Branch Anasazi in southern Nevada grew from Tertiary status before AD 900 to Primary status afterward. Further east, Chaco Canyon declined from being the main Anasazi Primary trade location before AD 900, to much diminished status as a Tertiary location by the time of its final abandonment about AD 1150. The Marsh Pass vicinity, on the other hand, grew from Secondary shell trade location status before AD 900 to Primary status afterward. Kiatuthlanna moved up from Tertiary status before AD 900 to Secondary status after AD 900. Among Mogollon sites, Tuzigoot declined from Secondary trade location status before AD 900 to Tertiary location status after that date. These dynamics are of course reflective of major changes taking place across the Southwest generally, such as climate change, drought, migration and population shifts (Cordell and Gumerman 1989).

I have created a new trade routes map (Fig. 29) based upon artifact counts from my updated and expanded database. My research shows that the Mojave Trail was instrumental both before and after AD 900 as a pathway for moving Pacific shell to the Southwest, and Southwest products to southern California. Pacific products were carried by middlemen from coastal areas to desert meeting places at Willow Beach, Arizona, and the western Anasazi center at Lost City, Nevada.

Lost City was instrumental, especially after AD 900, as a receiving station and redistribution center for Pacific shells coming east on the Mojave Trail. The area of Marsh Pass, Arizona was also of particular significance, serving as an east-west/north-south meeting place in the trade of Gulf of California shells supplied by the Hohokam, and Pacific shells supplied by southern California coastal Chumash and perhaps others.

During traditional times, the principal documented goods brought from the Southwest to southern California were ceramics of Anasazi, Hohokam, and Patayan types. Cotton textiles and manufactured *Glycemeris* shell artifacts have also been found. Many of these finds are in Gabrielino territory, which suggests some trade relationship between the Gabrielino and groups such as the Hohokam. It appears that turquoise mines in interior southern California were worked primarily by Puebloan expeditionary groups who left their used and broken pottery behind and evidently carried southern California turquoise back with them to the Southwest. Judging from their representation in ethnohistoric accounts, cotton goods from the Southwest may have been more prevalent in southern California than the archaeological record documents.

As noted above, the Mojave Trail was a principal northern pathway for Pacific Coast objects moving into the Southwest, and for Southwest objects moving west into southern California. A southern San Diego, Yuma, Hohokam, and Casas Grandes west-east trade route also furnished some Pacific shell to the Southwest.

A south to north shell distribution system that began in the northern Gulf of California was used primarily for the passage of tropical Gulf of California shells to southern locations such as the Tucson Basin and Snaketown, whence they were traded north and east to Marsh Pass, Chaco Canyon, and other locations.

The data indicate that the flow of goods between the Southwest and southern California was largely indirect, using a down-the-line trading process involving the Mojave and others as middlemen. The main route of Pacific shell into the Anasazi area employed a Chumash/Gabrielino-Mojave-Virgin Anasazi-Kayenta Anasazi exchange relationship. There is also strong evidence, however, that makers and users of Anasazi and Patayan pottery came directly to the southern California interior to mine turquoise, apparently returning with it from whence they came. It is not clear that these sojourner miners played any major role in the sustained shell trade.

Finally I believe that, rather than serving utilitarian needs, the shell trade between the Southwest and southern California interaction spheres developed primarily out of elite needs and uses, in conjunction with concepts of cosmology, symbol, and esoteric concepts of beauty. Shell objects obtained in trade functioned as markers of elite social status, wealth, and symbolic ornament. In the Southwest the symbolic or ritual significance of artifacts made from shells native to the Pacific and Gulf of California may have been primarily linked to the cosmological and practical significance of water, rain, and the Pacific Ocean.

Olivella and *Haliotis* were of prime importance in the trade, contact, and diffusion that flourished for nearly a thousand years between these two very different regions. The iridescence of *Haliotis* was symbolic of change, growth, birth, and the ocean. *Olivella* was used as a means of monetary exchange as well as ornament and wealth display, and was further symbolic of fertility, and the ocean.

In sum, sociopolitical aggrandizement and ritual, along with cosmological considerations, are seen as the key motivators for prolonged interregional trade and contact between the Southwest and southern California. Social and aesthetic need for exotic shells provided the motivations that formed the shell trade record documented in the present work.

Future Research Directions

In future research, I hope to identify more Pacific species used in the manufacture of jewelry and artifacts found in interior sites. I intend to enlarge my present molluskan database by further investigations of Southwest and southern California sites and artifact collections. I plan to investigate to what extent artistic styles such as bead forms and mosaic manufacture may have diffused from one region to another over time. My study raises questions about motivations for trade, and market competition involving shell trade and use.

By analysis of chemical or isotopic signatures, and other means, I would like to be involved with efforts to track suspected California-produced, shell, steatite, and turquoise artifacts found in the Southwest. Isotopic studies may identify specific points of origin for shell artifacts found in Southwest sites, differentiating between the Oregon coast, northern California coast, southern California coast or the northern Mexican coast.

My work raises several questions concerning the relationships between native peoples of southern California and the Southwest. At what levels and how did Hohokam *Olivella* shell trade merchants compete with Chumash and Gabrielino shell merchants in the trade that both conducted within the interior Southwest? Did Pacific Coast *Hinnites multirugosus* compete with *Spondylus calcifer* in the Southwest? How much *Spondylus* came to southern California and the Farwest? The indications from this current study are that the competition was perhaps more than previously imagined , particularly within the Anasazi area.

Was cotton cloth and thread produced in sufficient quantity and over an extended period of time by western Puebloans, such as the Virgin Anasazi, to have substantially influenced shell trade between the two regions? How much turquoise was traded east from southern California, and to where?

What was the cosmology of the symbolic role of the Pacific Ocean for peoples of the Southwest and southern California, compared to cosmologies associated with the Gulf of Mexico or Gulf of California? I have identified a few ethnographic leads to this question, but there is potentially much more to be done.

APPENDIX A:

INVENTORY OF RECOVERED *HALIOTIS, OLIVELLA, AND SPONDYLUS* ARTIFACTS FROM SELECTED ARCHAEOLOGIC SITES IN THE AMERICAN SOUTHWEST AND SOUTHERN CALIFORNIA

The following archaeologic data pertain mainly to artifacts made from the shells of *Haliotis, Olivella, and Spondylus.* These data have been compiled for the purpose of examining trade in shell artifacts between the prehistoric Southwest and southern California. They represent the first major updating and synthesis since the work of Brand (1938), Tower (1945), and Ruby (1970).

The data in Appendix A provide the most comprehensive and definitive presentation yet produced on the spatial and temporal parameters of *Olivella biplicata, Haliotis, and* species of *Spondylus.* These objects represent datable evidence of ancient trade routes which trafficked Pacific objects to the Southwest over several millennia. The process of acquiring Pacific shells motivated trade and interaction between the Southwest and southern California.

Many of the data are comprised of *Haliotis and Olivella biplicata,* which are exclusively Pacific species. These specific Pacific artifacts, found in Southwest sites, began their trade pathways at points on the Pacific Ocean.

The listings within Appendix A are chronologically comprehensive and include evidence from the early Holocene to the Protohistoric and early Mission periods. The data represent the Southwestern Hohokam, Anasazi, and Mogollon, and several cultural groups of coastal, island, and desert southern California.

The sites from which these artifacts were taken are diverse, ranging from the largest pre-planned pueblos to caves, rock shelters, and campsites. Although certainly not every site within the Southwest and southern California has been included, a systematic effort was made to intensively sample all relevant areas, time periods, and site types. This is a large and systematic sample covering a major portion of the extant data on the subject, but because research is continuously ongoing, no sample can ever be considered as complete.

In the tabular presentation, objects which are obviously made from *Haliotis, Olivella, and Spondylus,* but whose species or subspecies is unclear, are referred to as undetermined. Numerous unidentified (primarily because of cremation damage or exfoliation) nacreous objects found in the Southwest, many of which were probably made from species of *Haliotis,* have not been included in these profiles.

The ordering of Southwest artifacts moves from Hohokam to Anasazi to Mogollon and proceeds chronologically from the Archaic to the Protohistoric. The ordering of Southern California artifacts proceeds from the early Holocene (Archaic) to the Protohistoric or Mission Period. Most of the data for both regions pertain to the period from AD 900 to 1300.

All *Olivella* artifacts classed as Spire Removed beads have simply had the spire end removed (perpendicular or oblique removal) unless otherwise noted.

Evidence of *Haliotis, Olivella,* and *Spondylus* in Southwest Archaeologic Sites

Throughout the Southwest, the most commonly found shells in archaeologic situations are *Olivella (biplicata and dama), Glycymeris, Haliotis, Oliva, and Conus.*

Artifacts made from several species of *Haliotis* (red, black, and green) and *Olivella biplicata* are the most usable extant archaeologic means to establish contact and long distance trade between southern California and the Southwest. Abalone (*Haliotis spp.*) shells in the form of fetishes, jewelry, and whole or partial shells have been found throughout the Southwest in hundreds of prehistoric sites. All of these abalone artifacts had to originally come from the Pacific coast, mostly from southern California or the western (Pacific) coast of Baja California. Pacific species of *Haliotis* (red, green, and black), which are found as artifacts in Southwest sites, will not tolerate the constant relatively high water temperatures of the Gulf of California or the Gulf of Mexico. This is a principal reason that we may be sure all *Haliotis* artifacts or raw shell found in Southwestern sites originally came from the Pacific coast. South of San Diego, green and black abalone species predominate. North of San Diego, red abalone tends to dominate (along with black), and does so until the northern limit of its range, near Coos Bay, Oregon.

By a process of careful examination using epidermal and nacreous diagnostics, one may generally determine the species and the ecologic source of many *Haliotis* artifacts found in Southwest sites. Red abalone has a wide range (see Appendix B), but is sensitive to overheating, so it is not found in great concentrations south of San Diego. Conversely, green abalone is sensitive to hypothermia, and so is not found in any concentration north of Point Conception.

Though variable, each *Haliotis* species has a distinctive nacre and iridescence. This characteristic alone may be used to generally identify *Haliotis* artifacts as to species, but is complicated by the tendency of *Haliotis* nacreous surfaces to exfoliate when exposed to the elements.

Since early Holocene times *Olivella* has been the most widespread and numerous marine shell genus found throughout the western United States. *Olivella biplicata,* which is exclusive to the Pacific Coast, and *Olivella dama,* which is exclusive to the Gulf of California are the predominate species recovered from archaeologic sites. These two species may be differentiated from each other by various morphologic and chromatic differences. *Olivella* shell beads were relatively easy to manufacture by removing the spire end or abrading both ends to produce several types of barrel beads. Variations of disc, rectangle, cup, saddle, and lipped beads made from *Olivella* were also important during certain time periods as ornament, funerary objects, and as currency (Bennyhoff and Hughes 1987).

Spire removed *Olivella* shells were typically strung end to end. The majority of centrally perforated circular to oval shell wall beads were strung face to face. In southern California *Olivella* disc beads were employed in mosaic constructions, as inlays, or as a standard medium of exchange (Gifford 1947; King 1990).

Artifacts manufactured from species of *Spondylus,* or thorny oyster, have been recovered throughout the Southwest, in southern California (San Miguel Island), and as far north as the Columbia Plateau (Erickson 1990). All species of *Spondylus* are decidedly tropical and exclusive to the Panamic Marine Faunal Province. Throughout prehistory *Spondylus* shell was the principal source of purple, pink, or orange colored raw jewelry material for both Mesoamerica and the Southwest. The ritualization and importance of *Spondylus* in the New World had its origins in Mesoamerica.

Spondylus artifacts typically appear as disc and bilobed beads, pendants, and zoomorphs. Red and pink *Spondylus* disc beads, used in the Southwest, may have competed with and had similar uses to red abalone epidermal beads, which were popular in southern California.

Although only one site in southern California (San Miguel Island) has yielded *Spondylus* artifacts (Heye 1921), it is possible that numerous *Spondylus* artifacts have not been identified in coastal and interior southern California. Several of the key identifying characteristics of *Spondylus,* such as the bright shell colors of red, pink, or purple may be changed or lost due to such causes as fire, or acidic soils. In the past, the majority of archaeologists working in southern California have not been trained to identify artifacts made from *Spondylus*, and have not expected to find such artifacts. Erickson (1990) reported artifacts made from *Spondylus* from the Columbia Plateau in Washington State (Indian Dan site), which were dated well before the time of Christ.

Key to Data Bank Sites, Maps, and Dated Artifacts

Key to the names of sites whose locations are shown in figures 40 to 51. The sites are arranged in chronologic order, based upon their dated artifacts. Sites dated to before AD 900 may also evidence artifacts dated to after AD 900.

Table 26. Hohokam Sites containing *Haliotis*

< AD 900	> AD 900
1. Indian Hill Rock Shelter (not a Hohokam site proper, but important in Hohokam trade.)	10. Rancho Espero
2. Valencia Road Site	11. Siphon Draw
3. Stone Pipe Site	12. Las Fosas
4. Wetlands	13. Ellsworth
5. Los Pozos	14. Frogtown
6. Coffee Camp	15. Gopherette
7. Snaketown	16. Casas Pequenas
8. Santa Cruz Bend	17. Sunset Mesa Ruin
9. Hodges	

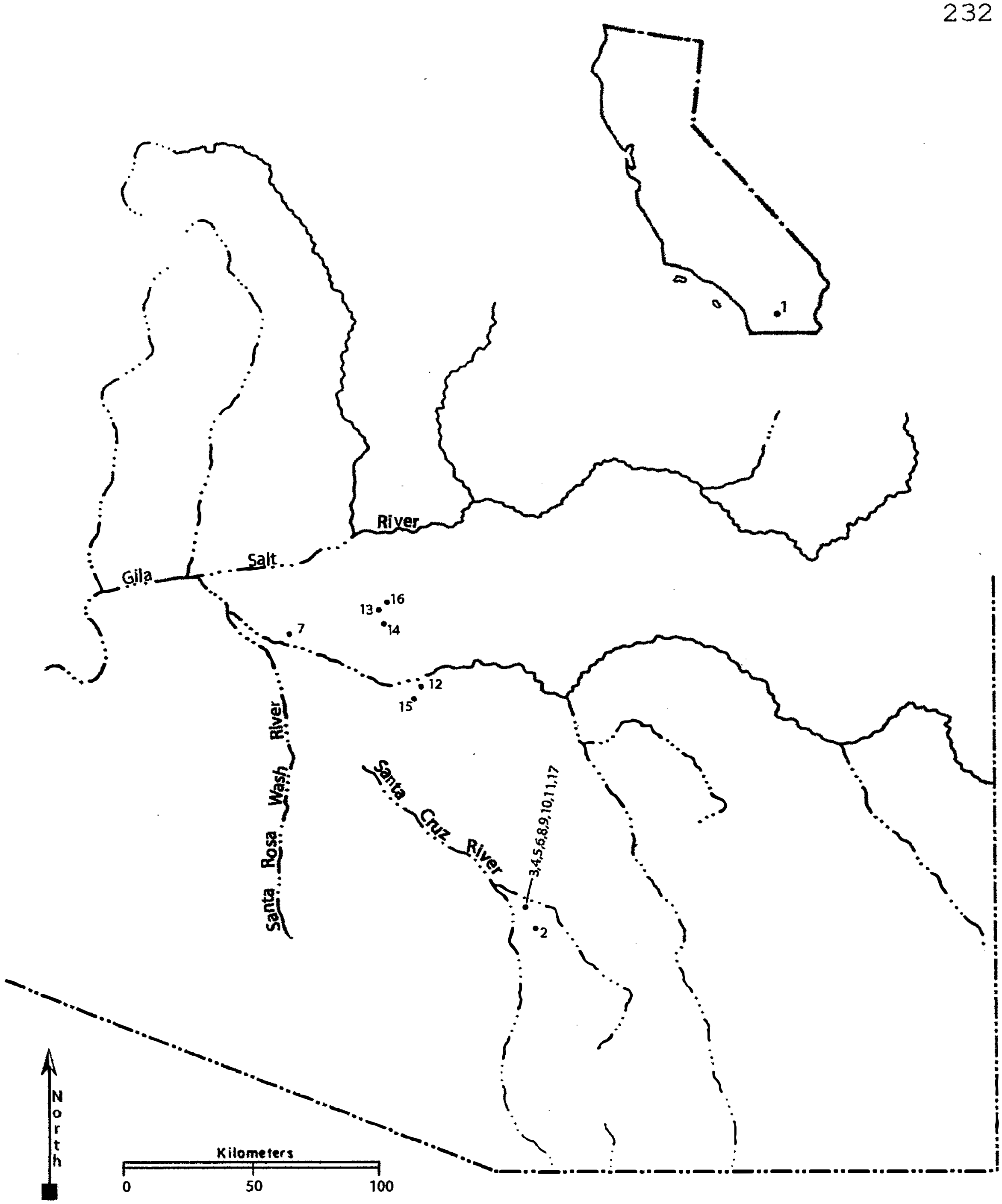


Figure 31. Hohokam Sites containing *Haliotis*.

Table 27. Hohokam Sites containing *Olivella*

Sites Dated to before AD 900 may also Evidence Artifacts Dated to after AD 900.

< AD 900	> AD 900
1. Donaldson Site (Tucson Basin)	19. Sunset Mesa Ruin (Tucson Basin)
2. Milagro Site (Tucson Basin)	20. Allentown Ruin (Tucson Basin)
3. Santa Cruz Bend (Tucson Basin)	21. Buttes Dam Site
4. Stone Pipe Site (Tucson Basin)	22. Escalante (Tucson Basin)
5. Wetlands Site (Tucson Basin)	23. Hodges (Tucson Basin)
6. Square Hearth Site (Tucson Basin)	24. Frogtown
7. Wetlands Site (Tucson Basin)	25. Rabid Ruin
8. Snaketown	26. Whiptail Ruin
9. AZU 13:21	27. Winona Village
10. Sacaton Turnkey	28. Cashion
11. AZU 13:9	29. Ellsworth Site
12. Fortified Hill	30. Dust Bowl Site
13. Grewe	31. Gayler Ranch
14. La Lomita	32. Siphon Draw
15. Los Muertos	33. Ellsworth
16. Junkyard Site	34. El Polovron
17. San Cayetano	35. Rancho Sin Vacas
18. Las Fosas	36. Casa Grande
	37. Las Acequias
	38. Las Guanacos
	39. Los Hornos
	40. AZU 13:24 (Tucson Basin)
	41. Guvo Hiktani
	42. Quijotoa Valley

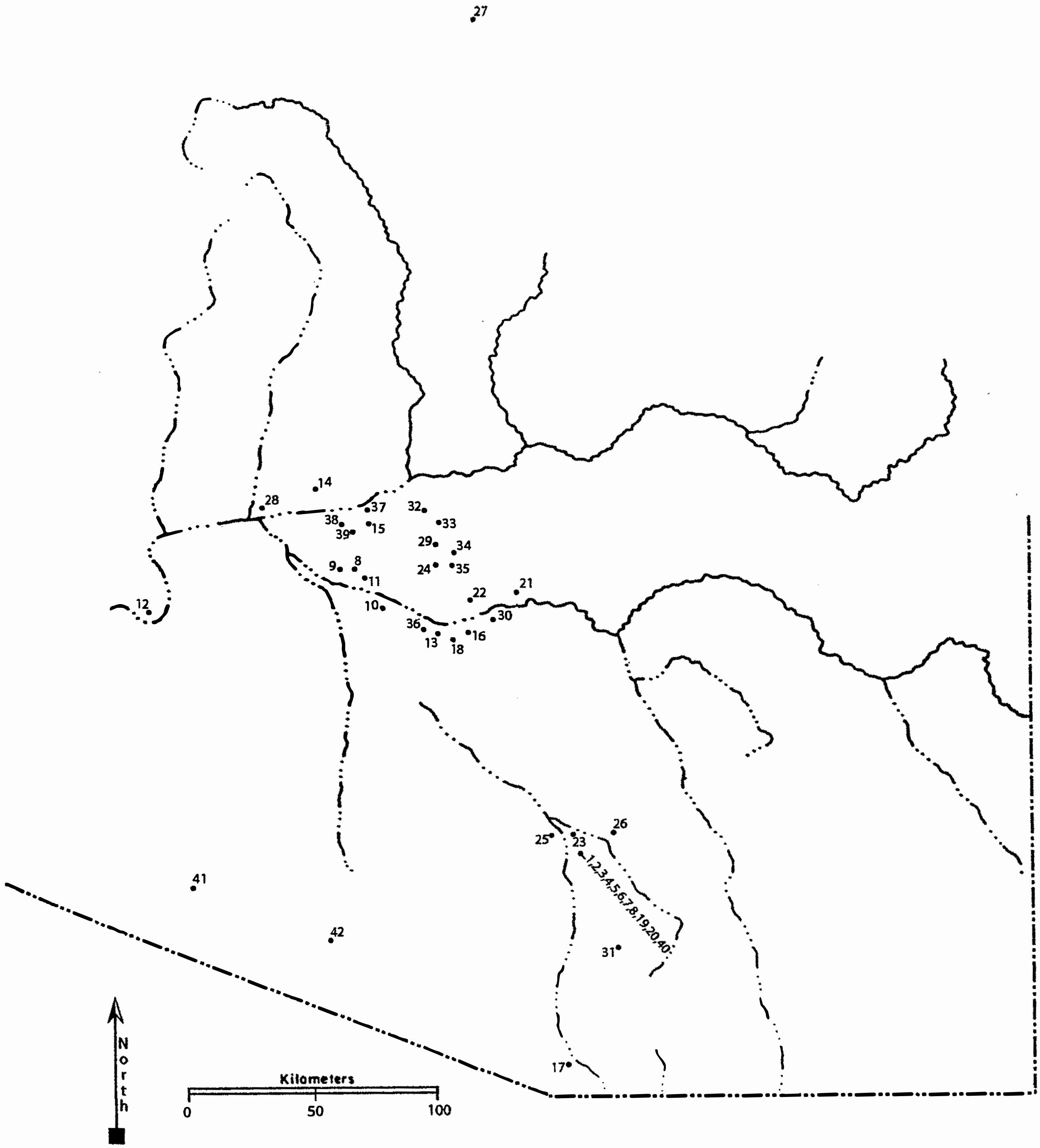


Figure 32. Hohokam Sites containing *Olivella*.

Table 28. Hohokam Sites Containing *Spondylus* Artifacts

Sites Dated to before AD 900 may also Evidence Artifacts Dated to after AD 900.

< AD 900	> AD 900
1. Snaketown	3. Painted Rocks
2. Los Muertos	4. Las Acequies
	5. Los Guanacos
	6. Hodges
	7. San Cayetano
	8. Cemetery Ridge
	9. Tinaja Canyon
	10. Gleeson Village
	11. Siphon Draw
	12. Smiley's Well
	13. Las Fosas
	14. Frogtown
	15. Casas Pequenas
	16. Gayler Ranch
	17. Casa Buena
	18. Casa Grande

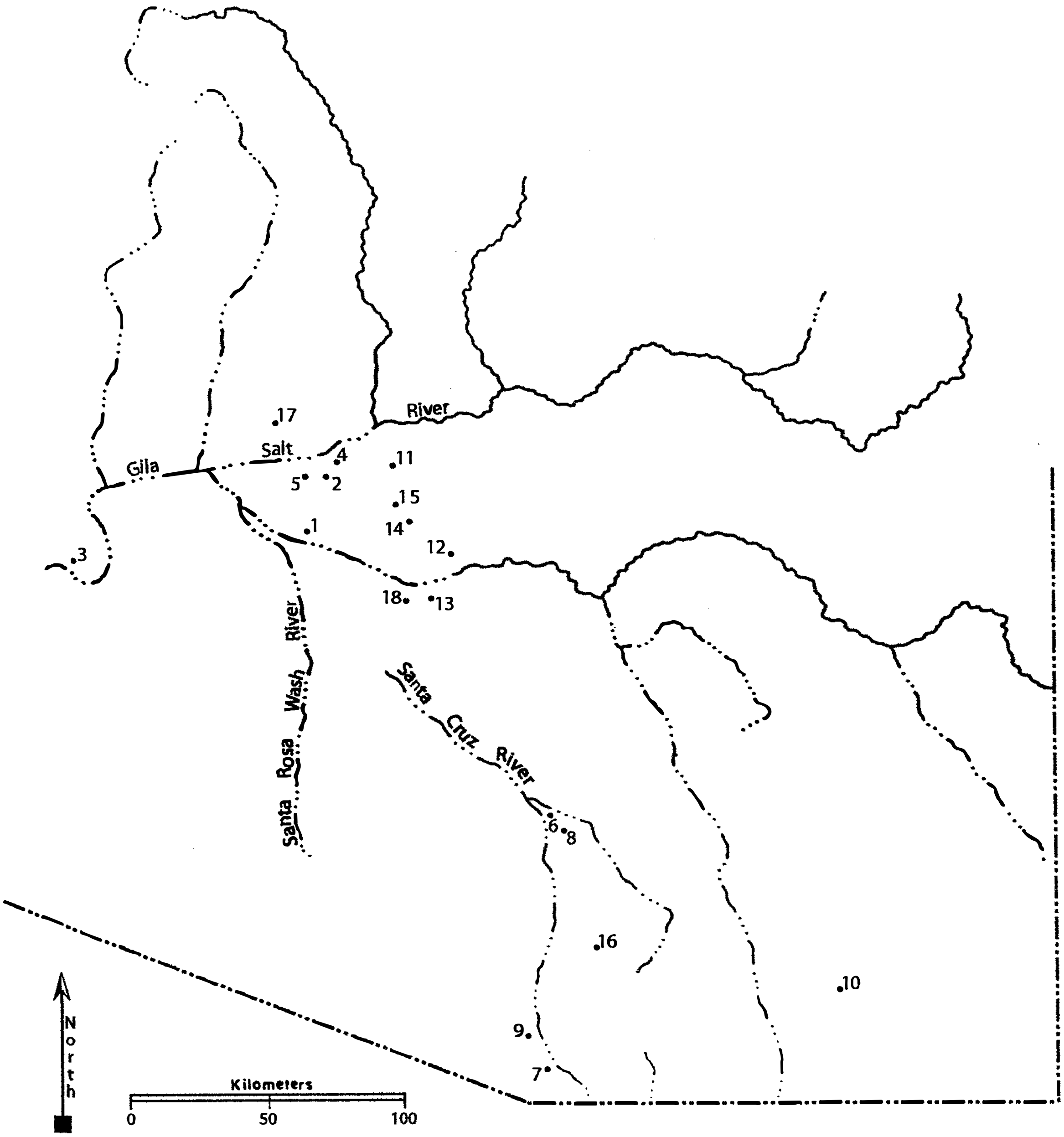


Figure 33. Hohokam Sites containing *Spondylus*.

Table 29. Anasazi Sites Containing *Haliotis*.

< AD 900	> AD 900
1. Chaco Canyon	14. Ramp Site (Hopi Mesas)
2. Marsh Pass	15. Etna Cave
3. Animas Rock Shelter	16. Willow Beach
4. Prayer Rock	17. Black Mesa, Site 3141
5. Canyon Del Muerto (Pictograph Cave)	18. Black Mesa, Site 2038
6. Broken Flute Cave	19. Pecos
7. Main Ridge/Lost City	20. Chaco Site 391
8. Chaco Site 628	21. Chaco Site 633
9. Chaco Site 627	22. Keet Seel
10. Kiatuthlana	23. Wupatki
11. Chaco Site 389	24. Grand Canyon
12. Chaco Site 423	25. Poncho House
13. Pueblo Bonito	26. Tusayan
	27. Ridge Ruin (Winona)
	28. Arroyo Hondo

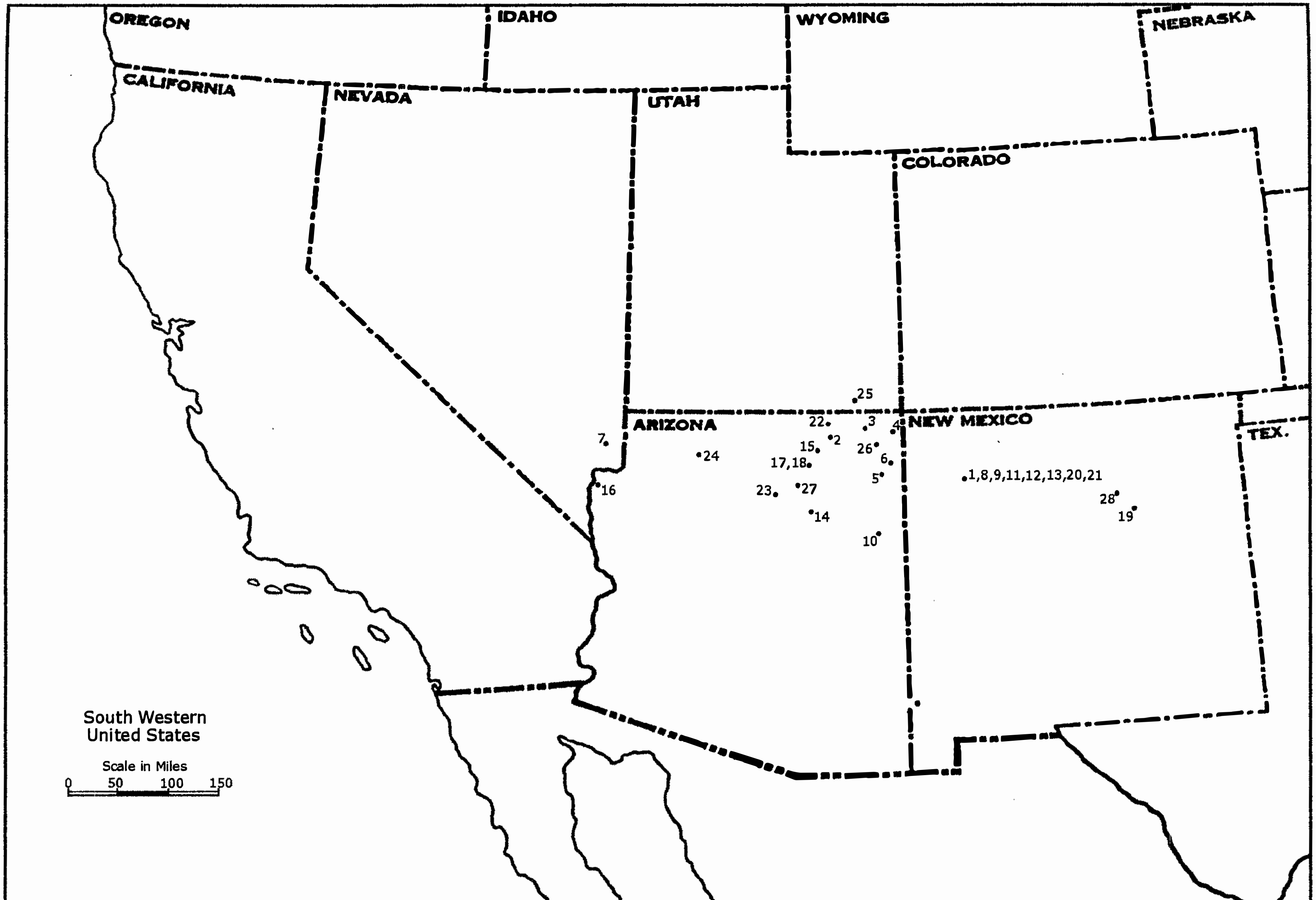


Figure 34. Anasazi Sites containing *Haliotis.*

Table 30. Anasazi Sites Containing *Olivella*.

< AD 900	> AD 900
1. Chaco Site 423	14. Pueblo Bonito
2. Chaco Site 1659	15. Main Ridge/Lost City
3. Chaco Site 116	16. Chaco Site 389
4. Durango	17. Chaco Site 633
5. Marsh Pass	18. Paragoonah
6. Sayodneechee	19. Big Mound
7. Canyon Del Muerto	20. Tusayan
8. Segihatsoei	21. Monument Valley
9. Chaco Site 724	22. Bonanza Dune
10. Chaco Site 299	23. Willow Beach
11. Chaco Site 627	24. Nephi Site
12. Chaco Site 391	25. Kiatuthlana
13. Caldwell Village	26. Tsi Taa
	27. Black Mesa
	28. Mesa Verde
	29. Arroyo Hondo
	30. White Dog Cave
	31. White Rock Village
	32. Gilbert Site
	33. Barrier Canyon
	34. Aztec
	35. Pecos
	36. Wupatki
	37. Halonowan
	38. Chevelon
	39. Homolovi

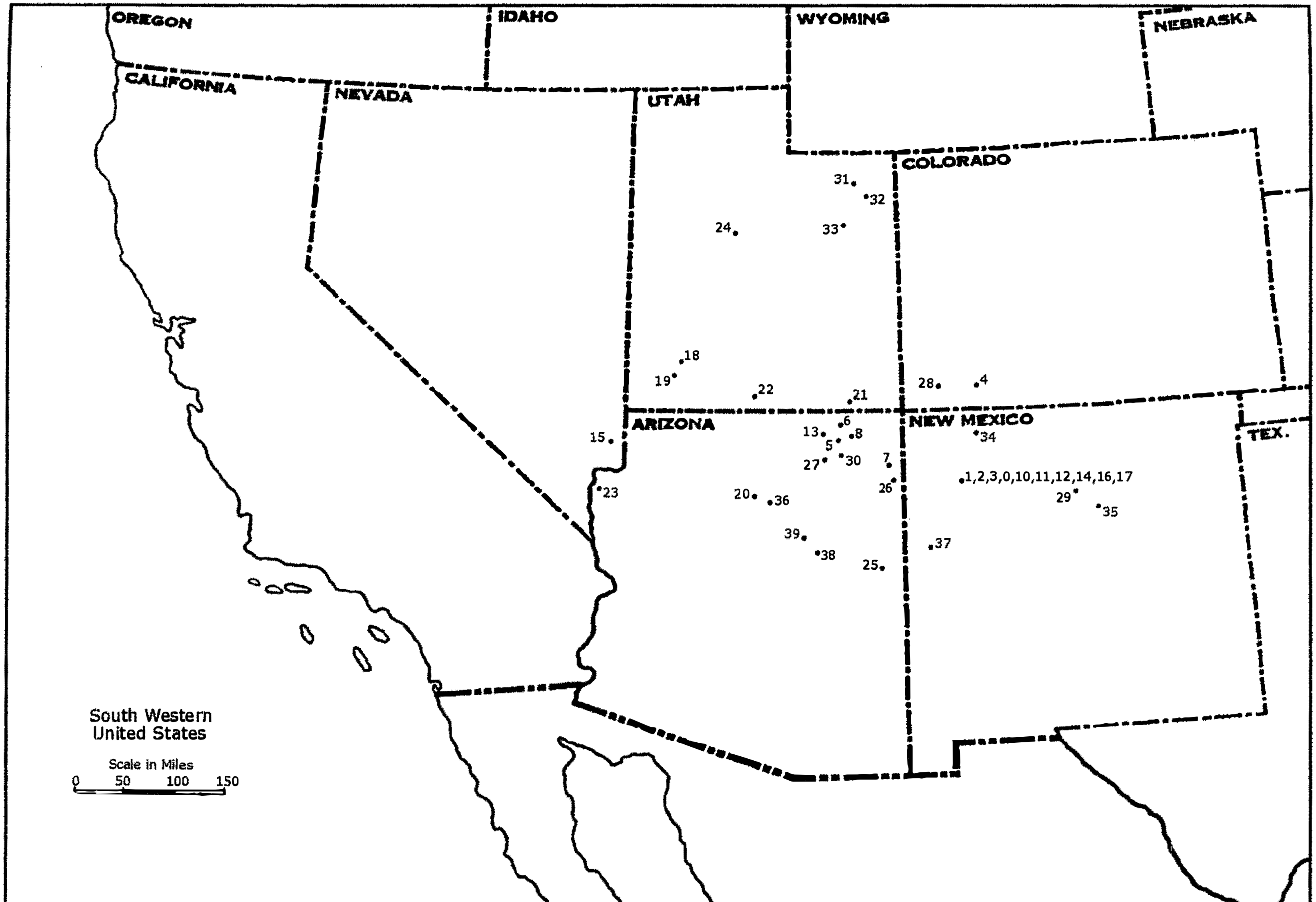


Figure 35. Anasazi and Fremont Sites containing *Olivella*.

Table 31. Anasazi Sites Containing *Spondylus*.

Sites dated to before AD 900 may also evidence artifacts dated to after AD 900.

< AD 900	> AD 900
1. White Dog Cave	3. Pueblo Bonito
2. Durango	4. Chaco Canyon
	5. Main Ridge/Lost City
	6. Wupatki
	7. Arroyo Hondo
	8. Chevlon
	9. Pecos

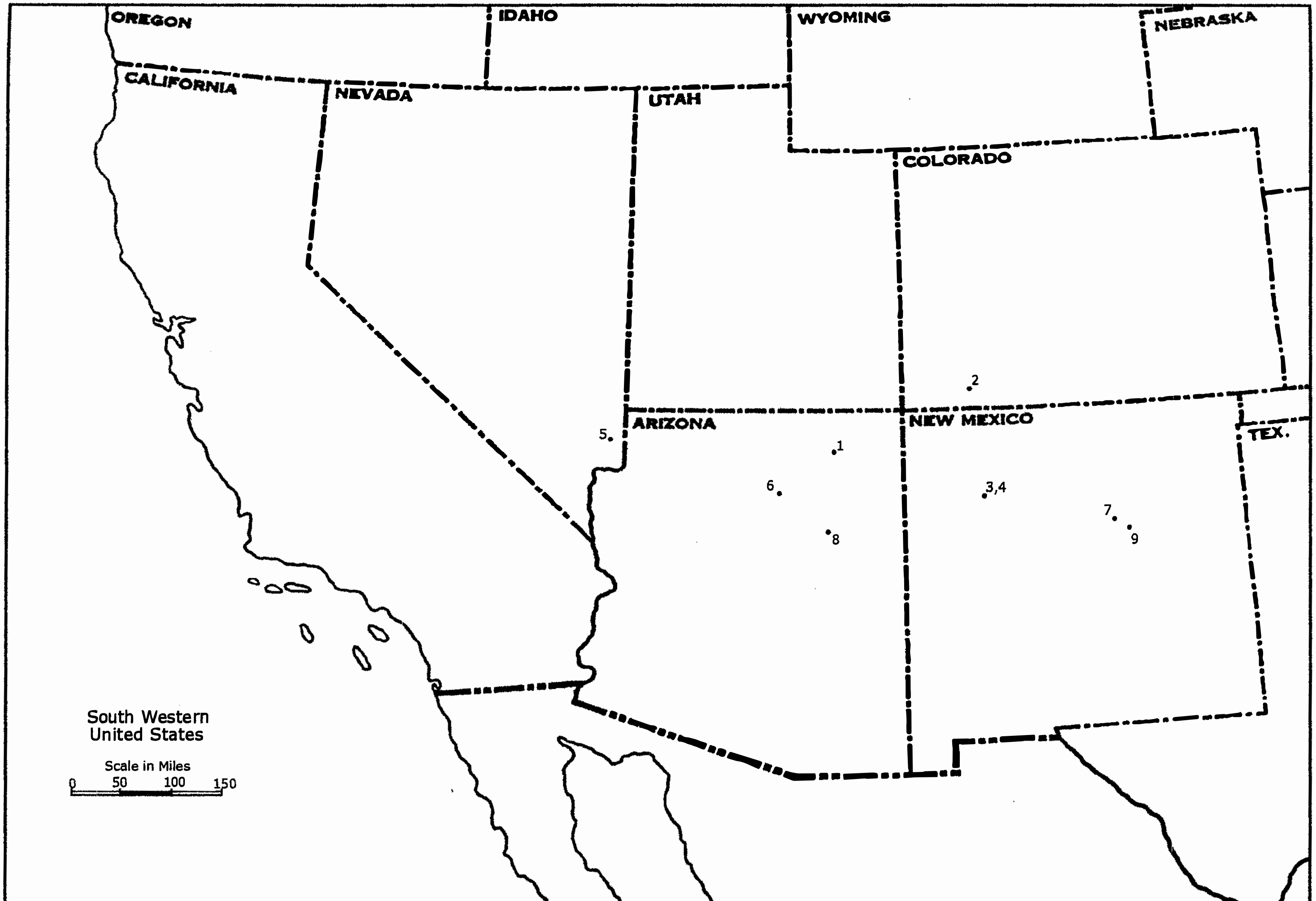


Figure 36. Anasazi Sites containing *Spondylus*.

Table 32. Mogollon Sites Containing *Haliotis*.

Sites Dated to before AD 900 may also Evidence Artifacts Dated to after AD 900.

< AD 900	> AD 900
1. Mogollon	6. Alamogordo
2. Mimbres Valley	7. Casas Grandes
3. Point of Pines	8. Wind Mountain
4. Tuzigoot	9. Montezuma's Castle
5. Mariana Mesa	

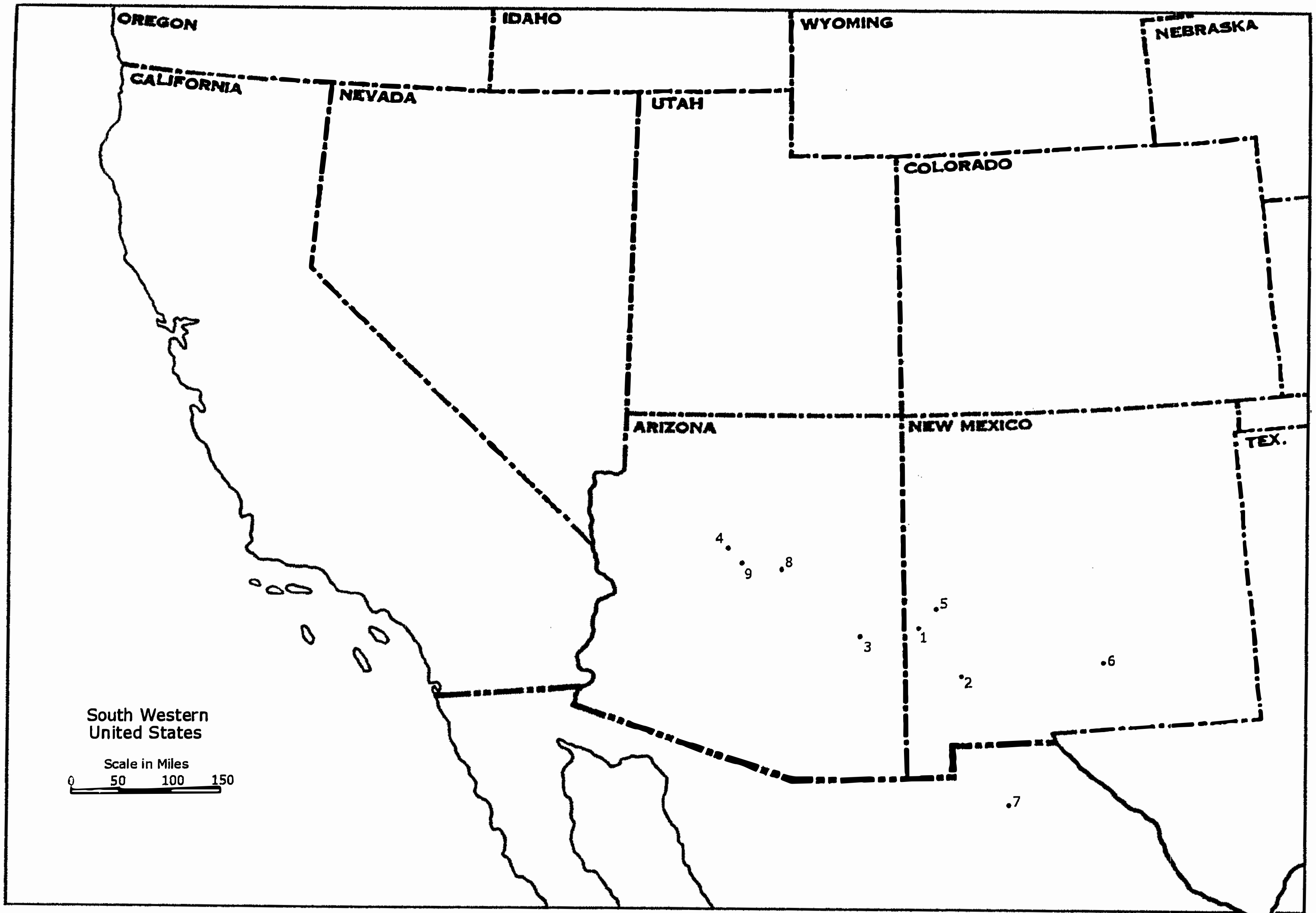


Figure 37. Mogollon Sites containing *Haliotis*.

Table 33. Mogollon Sites Containing *Olivella*

Sites dated to before AD 900 may also evidence artifacts dated to after AD 900.

< AD 900	> AD 900
1. ElPaso	3. Mule Creek
2. Casas Grandes	4. Flagstaff
	5. Kinishiba
	6. Mimbres
	7. Carter Ranch
	8. Swartz Ruin
	9. Gran Quivera
	10. Wind Mountain
	11. Exhausted Cave
	12. Red Bow Cliff Dwelling

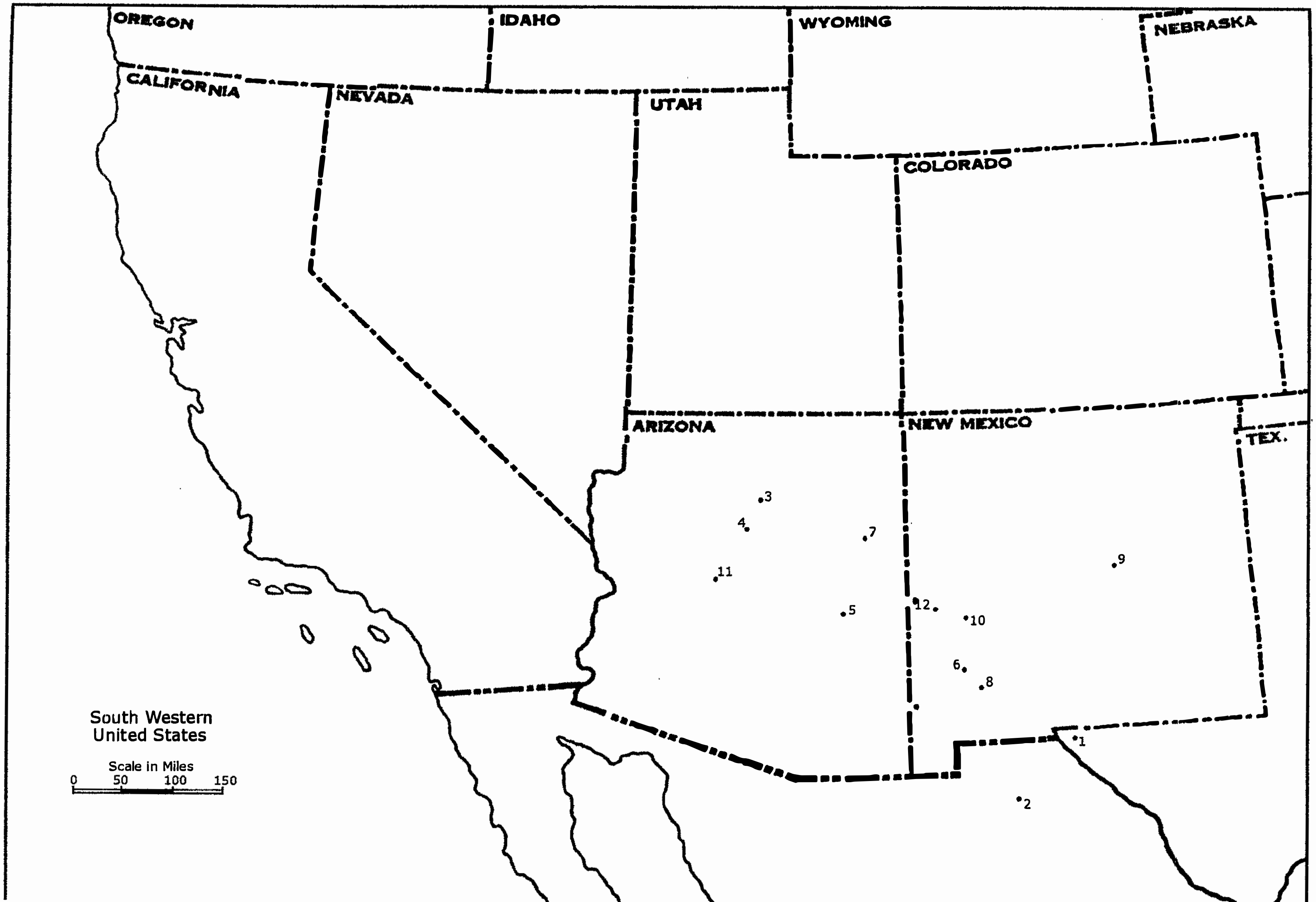


Figure 38. Mogollon Sites containing *Olivella*.

Table 34. Mogollon Sites Containing *Spondylus*

Sites Dated to before AD 900 may also Evidence Artifacts Dated to after AD 900.

< AD 900	> AD 900
1. Casas Grandes	2. Exhausted Cave
	3. Pine Flat Cave
	4. Red Bow Cliff Dwelling
	5. Point of Pines
	6. Grasshopper
	7. Ridge Ruin
	8. Wupatki

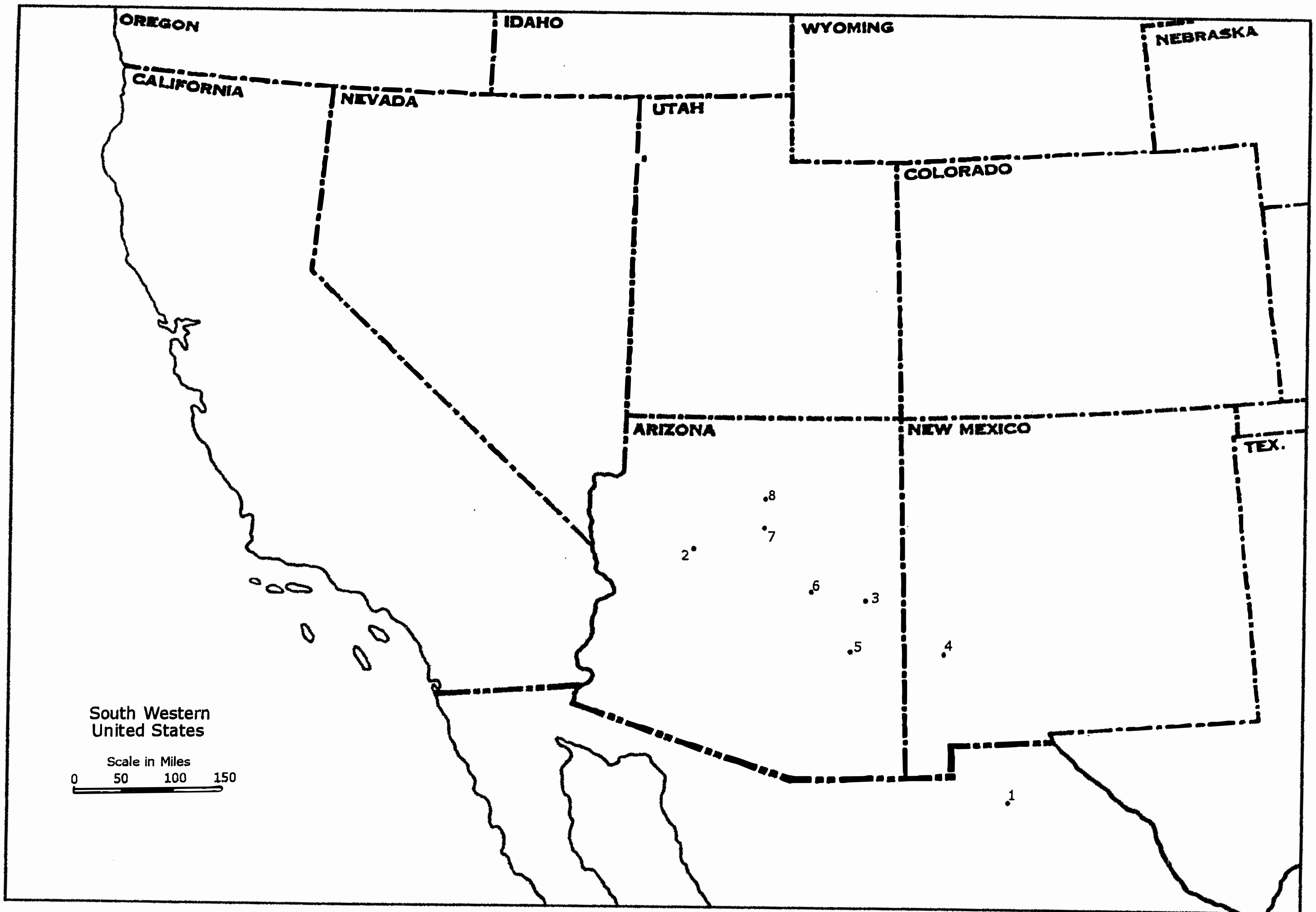


Figure 39. Mogollon Sites containing *Spondylus* Artifacts.

Some southern California and Farwest sites which contained artifacts made from *Haliotis*, *Olivella*, and *Spondylus*. These sites are arranged by genus and in general chronologic order, beginning with number one. Sites dated to before AD 900 may also evidence artifacts dated to after AD 900.

Table 35. Some Southern California Sites Containing *Haliotis*

< AD 900	> AD 900
1. Daisy Cave	25. Palmdale
2. CaOra-339	26. SRI-2
3. Diablo Canyon	27. SCrI-135
4. CaOra-967	28. Lan-629
5. CaOra-965	29. Lan-243
6. CaOra-971	30. CaOra-195
7. CaOra-928	31. SRI-24
8. CaOra-929	32. SRI-26
9. Buchanon Reservoir (5 Sites)	33. SRI-20
10. Indian Hill Rock Shelter	34. SCrI-60
11. CaOra-246	35. SRI-76
12. Death Valley	36. Lan-264 (Malibu)
13. Mammoth Creek Cave	37. SBa-46
14. ScrI-3	38. SRI-30
15. San Nicolas Island	39. San Joaqin Valley
16. SCrI-138	40. Catalina Island
17. SRI-41	41. San Clemente Island
18. CaOra-340	42. SCrI-104
19. SBa-81	43. Ventura
20. SRI-6	44. Oro Grande
21. SBa-71	45. Ker-307
22. SRI-83	46. SCrI-240
23. SCrI-100	47. SBa-210
24. SRI-154	48. CaOra-855
	49. CaOra-1208

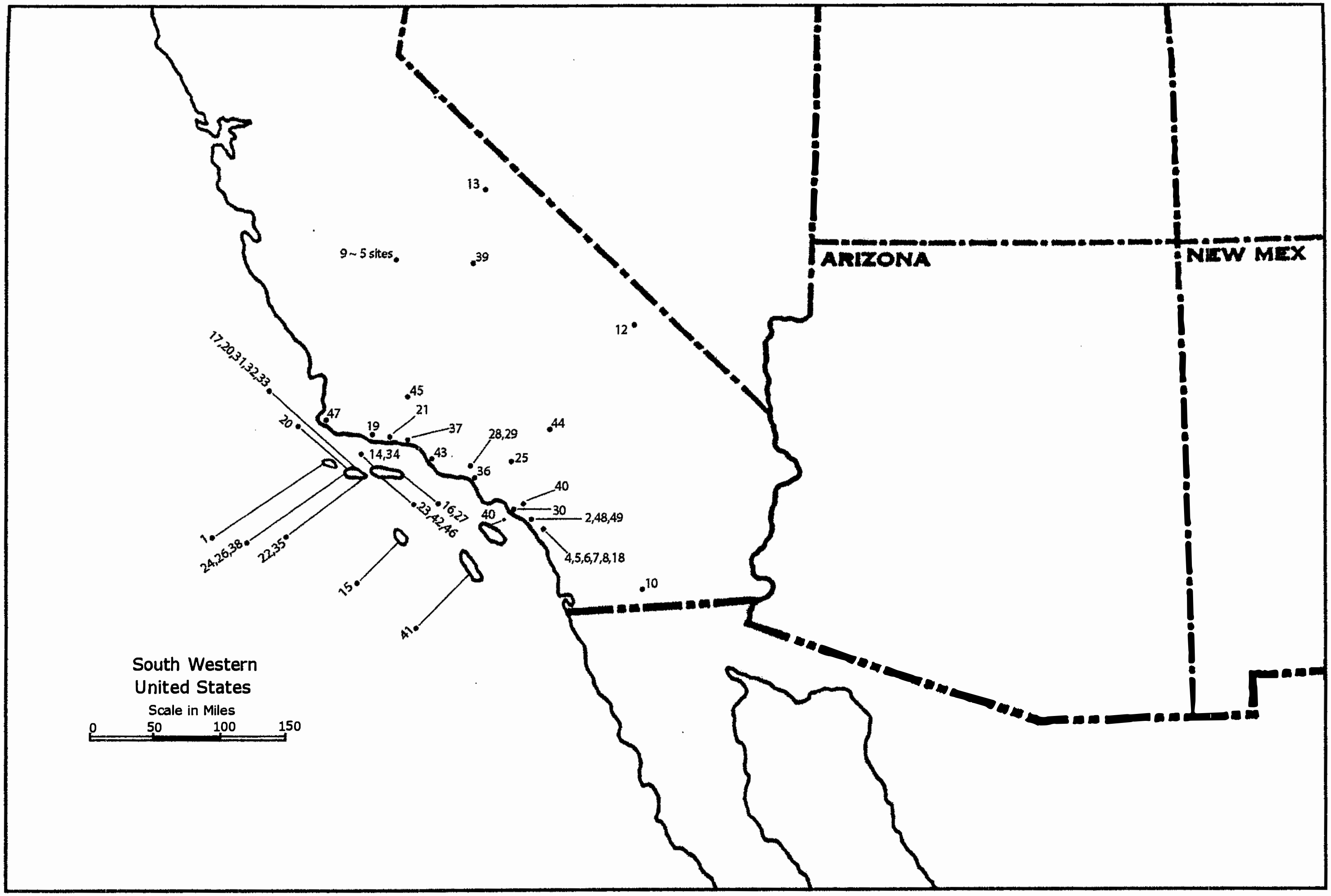


Figure 40. Some Southern California Sites containing *Haliotis*.

Table 36. Some Southern California Sites Containing *Olivella* Artifacts

Sites dated to before AD 900 may also evidence artifacts dated to after AD 900.

< AD 900	> AD 900
1. CaOra-339	16. Rose Spring
2. CaOra-246	17. SRI-41
3. CaOra-660	18. SCrI-83
4. CaOra-665	19. SBa-81
5. CaOra-929	20. SRI-34
6. CaOra-928	21. ScrI-100
7. SRI-3	22. SBa-72
8. SBa-142	23. SCrI-76
9. SCrI-3	24. SCrI-135
10. SCrI-162	25. SCrI-60
11. LAn-828	26. SRI-24
12. CaOra-1208	27. SRI-76
13. CaOra-340	28. SRI-147
14. Indian Hill Rock Shelter	29. Ker-307
15. SBa-46	30. Mammoth Creek Cave
	31. LAn-488
	32. Deep Creek (Mojave)
	33. Oro Grande
	34. Snow Creek Rock Shelter
	35. Cahuilla Site

Table 37. Southern California and Farwest Sites Containing *Spondylus*.

1. San Miguel Island (Heye Expedition Excavations) (Chronologic Placement Uncertain)
2. Indian Dan Site (Columbia Plateau) (Before AD 900) (not shown)

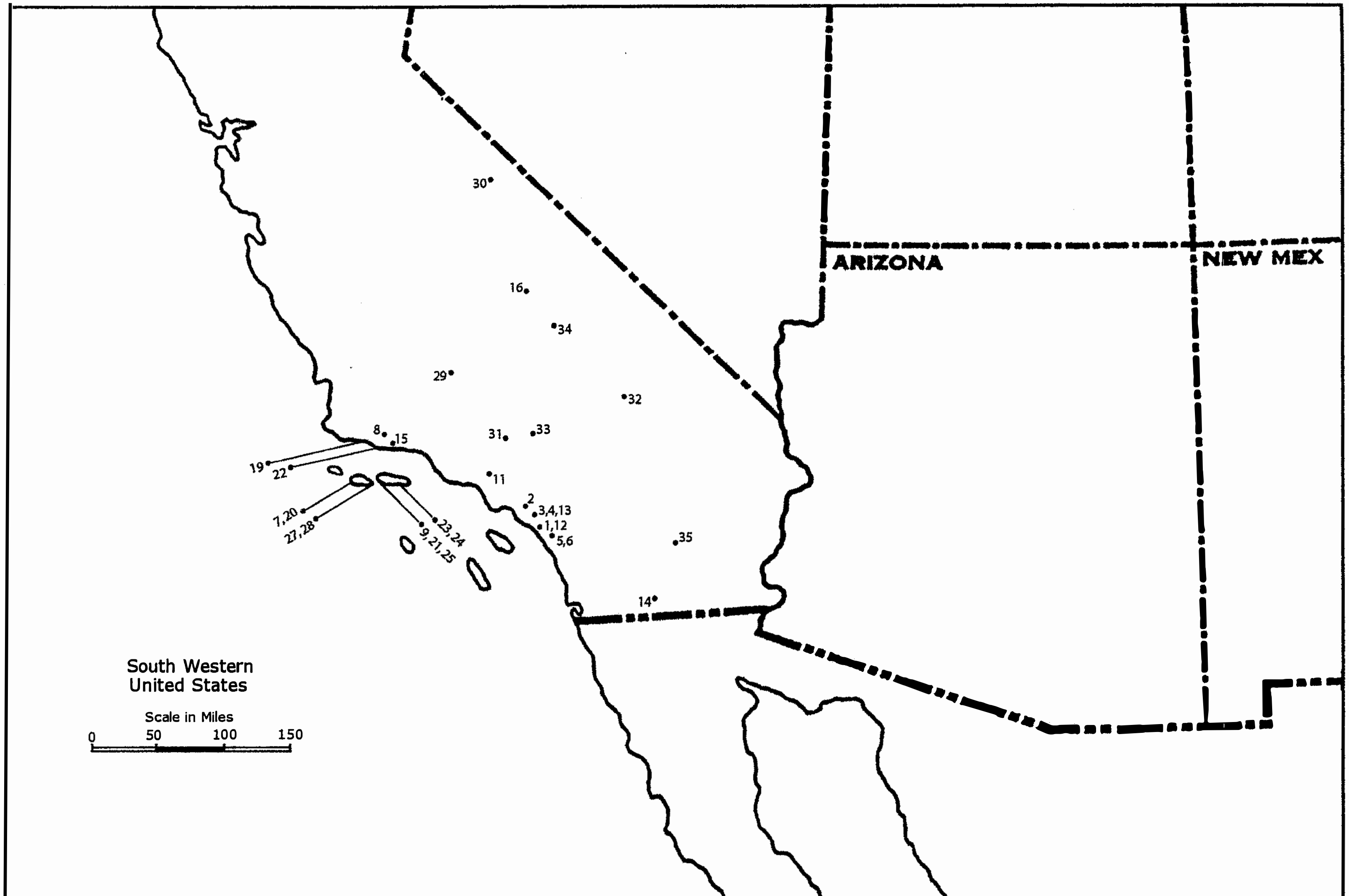


Figure 41. Some Southern California Sites containing *Olivella.*

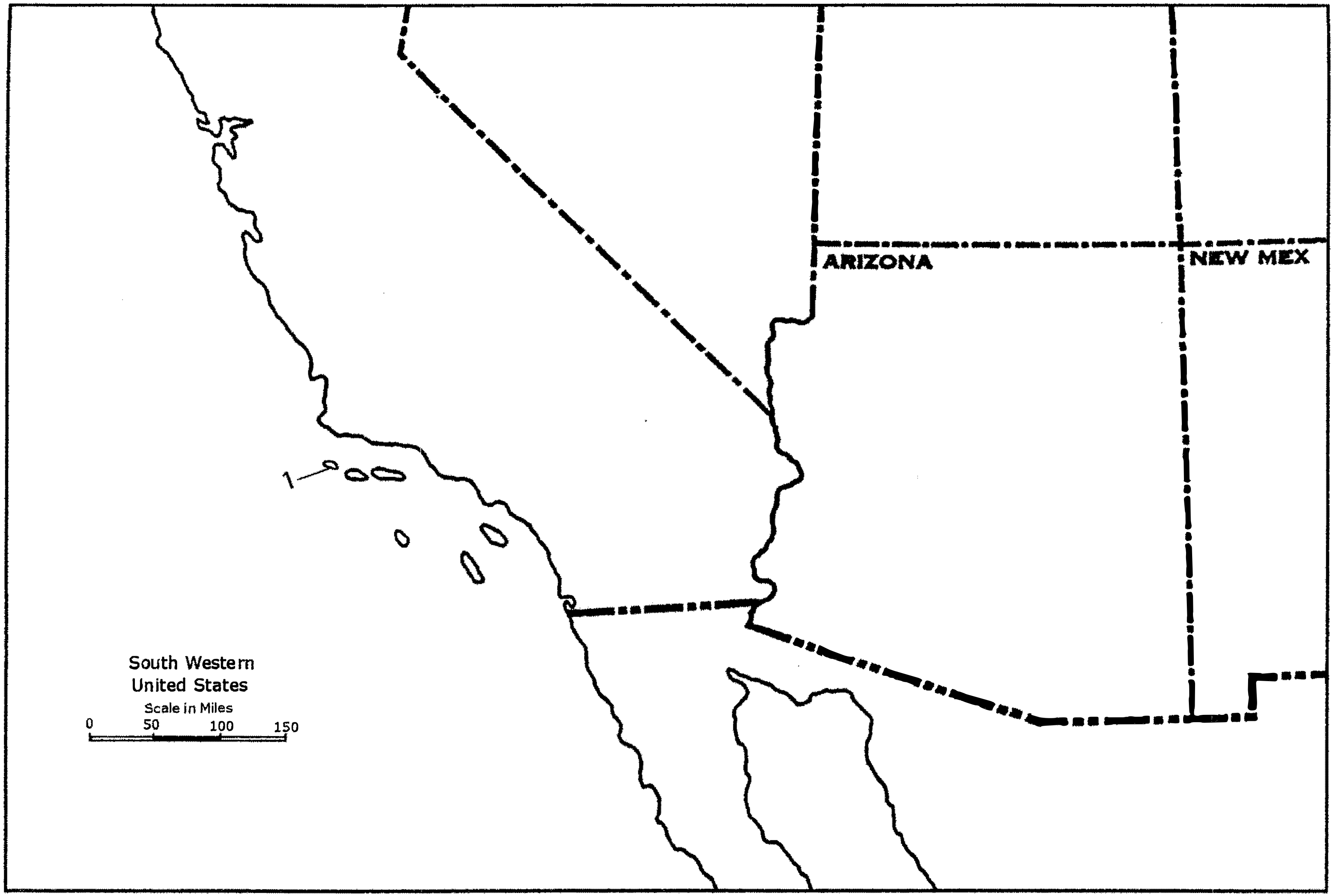


Figure 42. Some Southern California and Farwest Sites containing *Spondylus*.

Evidence of *Haliotis* from Southwest Archaeologic Sites

Hohokam

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
cracherodii	Indian Hill Rock Shelter (trade)	Almost square bead	1	Archaic (Middle Horizon)	Site is halfway between Gulf And Pacific	Townsand 1960
undetermined	Valencia Road Site	Worked fragment	1	Archaic (Late Horizon)	N/A	Mayro 1985:216
undetermined	Stone Pipe site	Worked fragment	2	Early Agricult.	N/A	Vokes 1996
cracherodii	Wetlands AZAA:12:9 0(ASM)	Modified nearly whole shell pendant	1	Early Agricult.	Large bicon perfs near midpoint of edge 57X89mm.	Vokes 1999
cracherodii imperforata/ californiens is?	Wetlands Feature 1541 burial. Top of bonepile	Unperf whole shell	1	Early Agricult.	Subspecies or anomaly has no open vent holes. Found in Burton Mound	Vokes 1999 Abbott 1974
undetermined	Wetlands	Discoid beads	3	Early Agricult.	N/A	Vokes 1999
undetermined	Wetlands	Squared disc	1	Early Agricult.	N/A	Vokes 1999
undetermined	Wetlands	End perf cut pendants	13	Early Agricult.	With 36 cut nacreous pendants, unident	Vokes 1999:252
undetermined	Wetlands Burial 1541	Discoid. beads	19	Later Early Agricult.	With 48 nacreous artifacts unident. Contemp. with Pozos	Vokes 1999 Gregory 1997

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
undetermined	Los Pozos AZ AA:1291	Disc beads	2	Late Early Agricult	N/A	Vokes 1996
undetermined	Los Pozos	Carved fragment	1	Late Early Agricult	N/A	Vokes 1996
undetermined	Los Pozos	Worked fragment	1	Late Early Agricult	N/A	Vokes 1996
cracherodii? may be pinctada?	Coffee Camp (ASM)AZ AA:6:19	Small square to rectang. beads	885	Late Archaic	Adult cremation. Strung as necklace?	Dongoske 1993:178 Huckell 1993b:308-310 Vokes 1999
undetermined	Snake-town	Disc beads	5	Vahki	1.5-11mm. in diameter	Haury 1976
undetermined	Snake-town	Disc beads	4	Estrella	N/A	Haury 1976
undetermined	Snake-town	Disc beads	10	Sweet Water	N/A	Haury 1976
undetermined	Snake-town	Disc beads	7	Pioneer	1.5-11mm. in diameter	Haury 1976
rufescens	Snake-town	Cut shell zoomorph	1	Pioneer	Cougar zoomorph About 4cm. long	Haury 1976
undetermined	Snake-town	Disc beads	8	Snake town	N.A	Haury 1976
undetermined	Snake-town	Disc beads	4	Gila Butte	N/A	Haury 1976
undetermined	Snake-town	Disc beads	5	Santa Cruz	N/A	Haury 1976
undetermined	Santa Cruz Bend	Worked fragment	1	Colonial	Feature 79 pit structure	Mabry 1998 Anth.papers No.19 CDR

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
cracherodii	Santa Cruz Bend	Cut pendant/ washer	1	Colonial	Feature 84 pit structure	Mabry 1998
rufescens	Santa Cruz Bend	Worked fragment	1	Colonial	N/A	Mabry 1998
fulgens	Santa Cruz bend	Unfin. geomet pendant	1	Colonial	Feature 102 pit structure	Mabry 1998
fulgens	Santa Cruz bend	Geomet. pendant	1	Colonial	Feature 102	Mabry 1998
fulgens	Santa Cruz Bend	Rectang. pendant	1	Colonial	Feature 102 pit structure	Mabry 1998
corrugata	Santa Cruz bend	Geomet. pendant	1	Colonial	Feature 127	Mabry 1998
undetermined	Santa Cruz Bend	Partial pendant	1	Colonial	Feature 1 pit structure	Mabry 1998
fulgens	Santa Cruz Bend	Cut pendant/ washer	1	Colonial	Feature 24 pit structure	Mabry 1998
undetermined	Santa Cruz Bend	Cut pendant/ washer	1	Colonial	Featuare 167 trash lens	Mabry 1998
cracherodii	Santa Cruz Bend	Worked fragment	1	Colonial	Feature 99 pit structure	Mabry 1998
undetermined	Snake town	Disc beads	15	Sacaton	N/A	Haury 1976
rufescens	Snake Town	Cut pendants	2	Sacaton	Central perf Aviform winged?	Haury 1976
undetermined	Santa Cruz Bend	Rectang. cut pendant	1	Colonial Sedentary	N/A	Mabry 1998

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
rufescens	Hodges Pit house Entryway	Zoomorph pendant	1	Sedentary	Forelimb and trunk Cipactli?	Haury 1976 Vokes 1986 Layhe ASM170
Sites Dated to Before AD 900 ↑					↓ Sites Dated to After AD 900	
cracherodii	Rancho Espero AZBB:9:31 6ASM	Cut pendant washers	2	Sedentary	No epiderm. 16.49mm dia 9mm cent perf	Vokes 2000 Arch. rep 17 Old Pueb. Arch Tuc.
undetermined	Siphon Draw AZ U:10:6	Pendant ring	1	Sedentary	Unburned fragment Gen. fill	Vokes 1984 Cent Ariz Proj no.150
undetermined	Las Fosas Az U:15:19	Rectang. pendant	1	Sedentary	Unburned structure 2 floor	Vokes 1984
undetermined	Ellsworth AZ U:15:19	Rectang. pendant	1	Sedentary	Structure 5 unburned Fill	Vokes 1984
undetermined	Ellsworth AZ U:15:19	Triang. pendant	1	Sedentary	Structure 5 unburned fill	Vokes 1984
undetermined	Ellsworth AZ U:15:19	Triang. unperf. geomorph	1	Sedentary	Structure 5 unburned fill	Vokes 1984
undetermined	Frogtown AZ U:15:16	Rectang. pendant	1	Sedentary	Gen.site fill	Vokes 1984
undetermined	Frogtown AZ U:15:19	Pendant fragment	1	Sedentary	Structure fill unburned fragment	Vokes 1984
undetermined	Frogtown AZ U:15:19	Worked fragment	2	Sedentary	Gen.site fill unburned	Vokes 1984
undetermined	Gopher-Ette AZU: 15:87	Aviform pendant	1	Sedentary	Structure 8 fill Unburned frag	Vokes 1984
undetermined	Casas Pequenas AZ U:15:97	Aviform pendant	1	Sedentary	Gen. Site fill locus A Unburned frag	Vokes 1984

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
undetermined	Sunset Mesa Ruin AZ:AA:12: 10 (ASM)	Cut shell pendant	1	Sedentary	Tucson Basin	Vokes 1999:151 Tech series 66 Statistical Research Inc. Tucson
cracherodii	Snaketown	Disc beads	2	Classic/ Civano	N/A	Haury 1976
cracherodii	Snaketown	Circular disc	1	Classic/ Civano	Circ. geomet. form unperf.	Haury 1976

Evidence of *Haliotis* from Southwest Archaeologic Sites

Anasazi

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
rufescens	Chaco Canyon	Thin disc beads	1	Basket maker II	Nacreous .1 cm. thick	Jernigan 1978
assimilis	Marsh Pass (Kayenta area)	Pendant (wing shaped)	1	Basket maker II	N/A	Tower 1945:21
undeter.	Animas Rock Shelter E.H.Morris No. F4	Shell ring Lg.manu-factured aperture	1	Basket Maker II	Gifford class no. J2aIV. Found in Cal. Coast sites.	Gifford 1947:61
undeter.	Prayer Rock	Half ovoid	1	Basket Maker II	Flat side deeply notched 3.5 cm.width	Jernigan 1978
cracherodii	Picto-graph Cave. Canyon Del Muerto UVC 2631	Shell ring Lg.manu-factured aperture	9	Basket Maker III	Gifford class no. J2aI. Found in Cal. Coast sites.	Gifford 1947:61-62
cracherodii	Picto-graph Cave. Canyon Del Muerto UVC 2631	Shell ring med. manuf. aperture	36	Basket Maker III	Gifford class J2aIV Found In Cal. Coast sites.	Gifford 1947
undeter.	Broken Flute Cave E.H.Morris No. 1195A	End perf. rectang. ornament or bead	5	Basket Maker III	Gifford class no. S2aIII Found in Cal. Coast sites	Gifford 1947
cracherodii	Ridge Ruin/Lost City	Cent. perf. disc or oval	1	Basket Maker III	Gifford class No. K1aI. S.W. Museum spec. no. 8-F-103	Gifford 1947
rufescens	Prayer Rock	End perf. irregular elongate pendants	4	Basket Maker III	Longest 4 cm. Shortest 2.5 cm.	Jernigan 1978; Morris 1919:92
cracherodii	Site 628 Chaco Canyon	Pendants	N/A	Basket Maker III	N/A	Mathien 1997

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
cracherodii	Site 627 Chaco Canyon	Ornaments	N/A	Pueblo I	N/A	Mathien 1997
rufescens	Kiatuth lana	End perf. rectang. pendant	1	Pueblo I	About 2.5 cm. in length	Jernigan 1978
cracherodii	Site 389 Chaco Canyon	Ornaments	N/A	Pueblo II	N/A	Mathien 1997
cracherodii	Site 423 Chaco Canyon	Ornaments	N/A	Pueblo II	N/A	Mathien 1997
undeter.	Pueblo Bonito	Edge perf. circular disc	1	Pueblo II	Highly polished, about 2.5 cm. in dia.	Jernigan 1978 Judd 1954
rufescens	Pueblo Bonito	Edge perf. flat oval	1	Pueblo II	Highly polished, and symetrical	Jernigan 1978 Pepper 1920
rufescens	Pueblo Bonito	Edge perf. aviform pendant	1	Pueblo II	About 2 cm.in length. 6 lobes. Arch. repair	Jernigan 1978 Pepper 1920
rufescens	Pueblo Bonito	Human face in profile	1	Pueblo II	About 1.5 cm. in length. 9 lobed	Jernigan 1978 Pepper 1920
undeter.	Ridge Ruin/Lost City	End perf. elongate trapezoid pendant	1	Pueblo II	Gifford class no. Q1aIV. S.W. Museum spec. No. 13-F-560	Gifford 1947
Sites Dated to Before AD 900 ↑					↓ Sites Dated to After AD 900	
cracherodii	Ramp Site (Hopi Mesas) N/A 9183. Burial in fill of Pithouse 7	Edge perf. circ. backing for mosaic construct.	1	Pueblo II	About 2.5cm in dia. Mosaic Made of turq., blkspindl/jet, Pink *Spondylus* Found near left wrist of adult m. bur.	Gumerman 1988:129
undeter.	Etna Cave	Shell fragment	1	Pueblo II Muddy River Phase	N/A	Aikens 1966:34 Wheeler 1942:28,32
undeter.	Willow Beach 1937 excav.	Disc beads	3	Pueblo II?	Burial 5, near head. Child age 5-6	Schroeder 1961:69
undeter.	Willow Beach 1937 excav.	Pendants	2	Pueblo II?	Burial 5	Schroeder 1961:69

Species	Site or Locality	Artifact type	No	Period or Phase	Description & Comments	References
fulgens	Lost City/ Main Ridge	Edge perf. circular disc	1	Pueblo II	About 7.5 cm. in dia. epiderm. and grooves	Lyneis 1992
cracherodii	Lost City/ Airport Bench	Edge perf. matching discs gold sheen	2	Pueblo II	N/A	Lyneis 1992
rufescens	Lost City/ Airport Bench	End perf. rectang. pendants	6	Pueblo II	Adult flexed grave. 28 in under floor	Lyneis 1992 Perkins 1934
rufescens	Lost City/ Airport Bench	End perf. irregular pendants	2	Pueblo II	Found with 110 clam beads. Worm holes	Perkins 1934
rufescens	Lost City/ Airport Bench	End perf. irregular pendants	2	Pueblo II	Found with 110 clam beads. Worm holes	Perkins 1934 Shutler 1961
cracherodii	Lost City House 102 Burial 102	Edge perf. pendant	1	Pueblo II-III	About 7.5cm.long 5cm. on perf end 9cm.wide	Shutler 1961
cracherodii	Lost City House 102 Ash dump	Edge perf. ovoid pendant	1	Pueblo II-III	About 5cm. long, 4cm. wide	Shutler 1961
cracherodii	Lost City Pithouse 3	Epidermal disc beads	6	Pueblo II-III	Largest 2.5cm. In dia. 4mm.perf. holes	Shutler 1961
cracherodii	Lost City House 89 Room 19	Edge perf. disc pendant	1	Pueblo II-III	About 2.5cm dia. Geometric	Shutler 1961
undeter.	Lost City House 50 Burial 159	Rectang. pendants	3	Pueblo II-III	Longest 4cm. Others about 2.5cm.	Shutler 1961
undeter.	Lost City House 102	End perf. rectang. pendant	1	Pueblo II-III	About 3cm. long	Shutler 1961
undeter.	Lost City House 102 Burial 159	End perf. rectang. pendant	2	Pueblo II-III	Longest 4.5cm Shortest2.5cm	Shutler 1961
undeter.	Lost City House 102 Burial 159	Edge perf. lunate pendant	1	Pueblo II-III	Flat end perf. other end rounded	Shutler 1961
fulgens	Lost City House 102 Burial 230	Edge perf. irregular square pendant	1	Pueblo II-III	About 4.5 cm long, with rounded corners	Shutler 1961

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
rufescens	Lost City House 102 Burial 105	Cresent pendant	1	Pueblo II-III	About 4.5cm. long. Perf. end broken	Shutler 1961
rufescens	Lost City House 102 Burial 185	Edge perf half circ ring	1	Pueblo II-III	About 6.5 cm wide.Reworked Ring pend?	Shutler 1961
rufescens	Lost City House 102 Burial 167	Edge perf ring pendant	1	Pueblo II-III	About 7.5cm in width	Shutler 1961
undeter.	Lost City House 102 Burial 265	Oval pendant notched	1	Pueblo II-III	About 6.5cm wide. Epiderm. removed	Shutler 1961 Gifford 1947
undeter.	Lost City House 47 Plaza	Irregular pendant	1	Pueblo II-III	Made on Cal. coast?	Shutler 1961 Gifford 1947
undeter.	Lost City House 89	Drilled fragment	1	Pueblo II-III	N/A	Shutler 1961
cracherodii	Lost City House 89	Whole shell	1	Pueblo II-III	Container?	Shutler 1961
cracherodii	Lost City Room 3 Burial 247	Whole shell	1	Pueblo II-III	Container?	Shutler 1961
cracherodii	Lost City House 102 R25. Burial 191	Whole shell	1	Pueblo II-III	Contained red ochre. With adult burial	Shutler 1961
undeter.	Lost City House 89 Room 43	Fragment	1	Pueblo II-III	N.A	Shutler 1961
undeter.	Lost City Room 50	Pendant fragment	1	Pueblo II-III	N.A	Shutler 1961
undeter.	Black Mesa site D:7:3141	Pendant	1	Pueblo II-III	Feature 11, burial	Nichols and Smiley (editors) 1984:801
undeter.	Black Mesa site D:11:2038	Bead	1	Pueblo II-III	Structure 2, pit house	Nichols and Smiley 1984:801
undeter.	Lost City House 50 Burial 105	Edge perf pendants	2	Pueblo III	Adult male head to SW	Shutler 1961
undeter.	Lost City House 102 Burial 163	Pendant fragment	1	Pueblo III	Infant burial	Shutler 1961

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
cracherodii	Pecos	Unworked whole shell	1	Pueblo III	N/A	Kidder 1932 Tower 1945:26
cracherodii	Site 391 Chaco Canyon	Ornaments	N/A	Pueblo III	N/A	Mathien 1997
cracherodii	Site 633 Chaco Canyo	Ornaments	N/A	Pueblo III	N/A	Mathien 1997
undeter.	Keet Seel, Segie Canyon	Central perf. disc or oval bead	1	Pueblo III	Gifford class No. K2aIII. ASM 3217. Found in Calif. Sites	Gifford 1947:61-62
undeter.	Keet Seel, Segie Canyon	Edge perf. disc or oval bead	1	Pueblo III	Gifford class no. K6aIII. Found in Calif Sites.	Gifford 1947: 61-62
rufescens	Wupatki Pueblo	Edge perf pendant	1	Pueblo III	MNA no. 693-Na405	Gifford 1947
undeter.	Grand Canyon	Worked pieces	N/A	Pueblo III?	Found in a ceramic vessel with Olivella beads	1987 Balsam
undeter.	Keet Seel Segie Canyon	End perf rectang pendant or bead	1	Pueblo III	Gifford class No.S2aIII. Found in Calif sites	Gifford 1947:61-62
undeter.	Poncho House	Earring pendants	2	Pueblo III	N/A	Tower 1945:21
fulgens	Tusayan	Ornaments	N/A	Pueblo III	N/A	Tower 1945:41
undeter.	Ridge Ruin (near Winona)	Whole shell	1	Pueblo III	From the Magician's Burial. Vents plugged with asphaltum	Tower 1945:35
undeter.	Ridge Ruin (near Winona)	Earring pendants	2	Pueblo III	Fishook blank pattern. No *Olivella*	Tower 1945:35
rufescens	Arroyo Hondo N.M.	End perf elongate pendants	3	Pueblo IV	All about 4 cm. long	Jernigan 1978
cracherodii	Arroyo Hondo N.M.	Disc beads	2	Pueblo IV	Both about 2.5 cm. in diameter	Jernigan 1978
cracherodii	Arroyo Hondo N.M.	Edge perf ovoid pendant	2	Pueblo IV	Asso. with 94 cylind beads, 4 pendants	Lang and Harris 1984

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
cracherodii	Arroyo Hondo N.M.	Sub rectang. pendant	3	Pueblo IV	Asso. with cylind. beads and pendants	Lang and Harris 1984
fulgens	Pecos Pueblo	Trapezoid ornament	1	Pueblo IV	Gifford class No. Q1aII. Irregular with round corners	Gifford 1947:61-62

Evidence of *Haliotis* From Southwest Archaeologic Sites

Mogollon

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
rufescens	Mogollon	Edge perf. plate pendant	1	Mog. III	12.5 cm wide ¼ shell Pectoral?	Jernigan 1978
rufescens	Mimbres Valley	Edge perf. plate pendant	1	Mog. IV	Pectoral Ethnographic Hopi	Jernigan 1978
undeter.	Point of Pines	End perf. elongate zoomorph	1	Mog. V	About 5cm. long. curved. Lizard?	Jernigan 1978
undeter.	Tuzigoot	Pendants	4	Mog. V	N/A	Caywood and Spicer 1935
rufescens	Mariana Mesa	End perf. rectang. pendants	5	Mog. V	From rooms C2 and C5	McGimsey 1980
Sites Dated to Before AD 900 ↑						↓ Sites Dated to After AD 900
rufescens	Alamo gordo	Unperf. zoomorph	1	Mog. V	5cm. long, 2.5 cm. wide with notches	Jernigan 1978
cracherodii	Casas Grandes	Central perf. rectang.	2	Medio	Large geometric GG/1373	DiPeso 1974
cracherodii	Casas Grandes Room 15-12, fill	Cental perf. notched oval	1	Medio	N/A	DiPeso 1974
cracherodii	Casas Grandes Room 18 B-8 fill	End perf. tapered pendant	1	Medio	About 3cm. long, .7cm. wide	DiPeso 1974:458
cracherodii	Casas Grandes Room 22-16 fill	End perf. tapered pendant	1	Medio	Perf dia. .1 Width .8cm. Length 1.2cm	DiPeso 1974:458
cracherodii	Casas Grandes Plaza 2-6 Fill E·	Pendant fragment	1	Medio	Length 2.7cm Width 2.3cm.	DiPeso 1974:462
cracherodii	Casas Grandes	Pendant fragment	1	Medio	Length 2.6cm Width 1.4cm. .4cm. thick	DiPeso 1974:463

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
cracherodii	Casas Grandes	Spangle human zoomorph	1	Medio	Fragmented human form Type IIIB CG/1699	DiPeso 1974:488
cracherodii	Casas Grandes Room 25-16 floor	Spangle	1	Medio	Length .9-1.7 cm.Width .7-1.4cm.	DiPeso 1974:492
cracherodii	Casas Grandes Room 25-16 floor	Irreg. tesserae	5	Medio	Av.length .8cm. Av. Width .6cm.	DiPeso 1974:512
cracherodii	Casas Grandes Plaza 3-8 stair fill	Rectang. tesserae	14	Medio	Av.length .7cm. Av. Width .4cm. .1 cm. thick	DiPeso 1974:512
cracherodii	Casas Grandes Dead end str.U-13	Knife? Type II	1	Medio	Length 7.5cm Width 1.6 .4cm. thick CG/3555	DiPeso 1974:522
undeter.	Wind Mountain Block46C	Disc Bead Cat.No. WM/SL48	1	Medio	Dia 1.2cm. .2cm. thick	Woosley and McIntyre Wind Mountain U. of N.M. press 1999
rufescens	Tuzigoot	Aviform Winged?	1	Late Mog.V	About 2.5cm. Long, and .4cm. in width	Jernigan 1978
undeter.	Monte Zuma's Castle	End perf. zoomorph pendant	1	Late Mog.V	About 4.5cm. long Lizard?	Jernigan 1978
undeter.	Point of Pines	Edge perf. Oval Pendant	1	Late Mog.V	About 5cm. long, and 3.4cm. wide	Jernigan 1978

Evidence of *Olivella* from Southwest Archaeologic Sites

Hohokam

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
undetermined	Leonard Rock Shelter	Spire Removed Beads	50	8000 BP Archaic Desert Culture	String of beads. In bat guano	Heizer 1951 Jernigan 1978:15
undetermined	Lovelock Cave	Spire Removed Beads	N/A	6000 BP Archaic Desert Culture	Intricate knotting of necklace shells	Loud and Harrington 1929:105
undetermined	Danger Cave	Centperf. disc	5	Archaic	N/A	Loud and Harrigton 1929:105
undetermined	Donaldson Site	Beads	2	Late Archaic	N/A	Huckell 1993:313
undetermined	Milagro Site	Spire Removed Beads	2	Late Archaic	N/A	Huckell 1993:313
dama?	Santa Cruz Bend	Spire Removed Beads	47	Late Archaic	N/A	Vokes 1996
dama	Santa Cruz Bend	Complete valves	2	Late Archaic	N/A	Vokes 1996
dama	Stone Pipe Site	Spire Removed Beads	8	Late Archaic	N/A	Vokes 1996
dama?	Los Pozos	Spire Removed Beads	61	Late Archaic	N/A	Vokes 1996
undetermined	Square-hearth AZ AA:12:745(ASM)	Spire Removed Beads	1	Early Agricult.	Feature 54 cremation	Mabry (editor) 1998; Vokes: 849
dama	Santa Cruz Bend	Spire Removed Beads	1	Early Agricult.	Feature 11 Pit structure	Mabry (editor) 1998; Vokes: 849
dama	Santa Cruz Bend	Whole valve	1	Early Agricult.	Feature 12	Mabry (editor) 1998; Vokes: 849
dama	Santa Cruz Bend	Spire Removed Beads	1	Early Agricult.	Feature 90 Pit Structure	Mabry (editor) 1998; Vokes:849

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
dama et al.	Santa Cruz Bend	Spire Removed Beadss	88	Early Agricult.	Total count for site, predominate *dama*	Mabry (editor) 1998; Vokes: 849
dama	Wetlands Site	Spire Removed Beads	3	Early Agricult.	Structure 154, pit house. Part of a necklace	Huckell 1993
undetermined	Donaldson Site	Spire Removed Beadss	2	Early Agricult.	N/A	Huckell 1995
dama?	Snaketown	Spire Removed Beads	2	Vahki	N/A	Haury 1976:309
undetermined	Snaketown	Spire Removed Beads	6	Estrella	N/A	Haury 1976:309
dama?	Snaketown	Spire Removed Beads	2	Pioneer	N/A	Haury 1976:309
undetermined	AZU:13:21 ASM	Unworked waste shell	N/A	Pioneer	N/A	Nelson 1991:31
undetermined	Sacaton Turnkey AZU:13:27 ASM	Unworked waste shell	N/A	Pioneer	N/A	Nelson 1991:31
undetermined	Snaketown	Unworked waste shell	N/A	Pioneer	N/A	Nelson 1991:31
undetermined	Snaketown	Barrel beads	N/A	Pioneer	Numerous	Nelson 1991:9,31
undetermined	AZU:13:9 ASM	Barrel beads	N/A	Pioneer	Numerous	Jernigan 1991
undetermined	Fortified Hill AZT:13:8 ASM	Barrel beads	N/A	Pioneer	N/A	Nelson 1991:7,33
undetermined	Snaketown	Spire Removed Beads	12	Sweet-water	N/A	Haury 1976:309
undetermined	Snaketown	Spire Removed Beadss	3	Snaketown	N/A	Haury 1976:309
biplicata	Snaketown	Spire Removed Beads	3	Gila Butte	N/A	Tower 1945:27-28

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
undetermined	Snaketown	Spire Removed Beads	4	Gila Butte	N/A	Haury 1976:309
undetermined	Snaketown	Spire Removed Beads	8	Santa Cruz	N/A	Haury 1976:309
undetermined	Grewe	Unworked waste shell	N/A	Colonial	N/A	Nelson 1991:31
undetermined	Snaketown	Shaped saucer	1	Colonial	N/A	Jernigan 1978:37
dama	La Lomita Complex (Phoenix)	Spire Removed Beads	5	Colonial	N/A	Gross 1990:30
dama	Los Muertos	Spire Removed Beads	41	Colonial	N/A	Tower 1945:20
undetermined	Snaketown	Spire Removed Beads	N/A	Sacaton	Cremation Mound (6G:12)	Nelson 1991:75
undetermined	Junkyard Site AZU:15:61 ASM	Unworked shell and waste	N/A	Sacaton	N/A	Nelson 1991:9,31
undetermined	Snaketown	Spire Removed Beads	6	Sacaton	N/A	Haury 1976:309
biplicata	San Cayetano AZDD:8:12 Amerind	Spire Removed Beads	N/A	Sacaton	N/A	Nelson 1991:8
biplicata	Los Muertos	Spire Removed Beads	N/A	Sacaton	N/A	Nelson 1991
undetermined	Las Fosas AZU:15:19A SM	Unworked shell and waste	N/A	Sacaton	N/A	Nelson 1991:9,31
Sites Dated to Before AD 900 ↑ ↓ Sites Dated to After AD 900						
dama?	Sunset Mesa Ruin	Spire Removed Beads	1	Sedentary	From Feature 13	Vokes 1999:158
undetermined	Snaketown	Barrel beads	1,8-53	Sedentary	From a single cremation in Block 6F	Nelson 1991:58
undetermined	Allentown Ruin	Whole shells	N/A	Sedentary	N/A	Roberts 1940:131

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
undetermined	Buttes Dam Site AZU:16:4 ASM	Unworked shell and waste	N/A	Sedentary	N/A	Nelson 1991:6,31
undetermined	Escalante AZU:15:3 ASM	Unworked shell and waste	N/A	Sedentary	N/A	Nelson 1991:6,31
undetermined	Hodges AZ AA:12: 18 ASM	Unworked shell and waste	N/A	Sedentary	N/A	Nelson 1991:7,31
undetermined	Frogtown AZU:15:61 ASM	Unworked shell and wasste	N/A	Sedentary	N/A	Nelson 1991:9,31
undetermined	Rabid Ruin	Barrel beads	N/A	Sedentary	N/A	Nelson 1991:8,33
undetermined	Whiptail Ruin AZ BB:10:3 ASM	Barrel beads	N/A	Sedentary	N/A	Nelson 1991:8,33
undetermined	Winona Village NA2133	Barrel beads	N/A	Sedentary	N/A	Nelson 1991:8,33
undetermined	Cashion	Barrel beads	N/A	Sedentary	N/A	Nelson 1991:8,33
undetermined	Ellsworth Site AZU: 1576 ASM	Barrel beads	N/A	Sedentary	N/A	Nelson 1991:9,33
undetermined	Dustbowl Site	Barrel beads	N/A	Sedentary	N/A	Nelson 1991:9,33
undetermined	Las Fosas AZU:15:19A SM	Barrel beads	N/A	Sedentary	N/A	Nelson 1991:9,33
undetermined	Gayler Ranch SiteAZEE:2 :76 ASM	Barrel beads	N/A	Sedentary	N/A	Nelson 1991:9,33
biplicata	Snaketown	Spire Removed Beads	N/A	Sedentary	N/A	Nelson 1991:19
dama	Hodges fill, Pit house 6	Spire Removed Beads	1	Sedentary	Burned, with heat fracturing	Layhe 1986; Vokes:208
undetermined	Siphon Draw AZ U:10:6	Spire Removed Beads	8	Sedentary	One bead from Structure 20	Teage and Crown 1984; Vokes:553

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
undetermined	Las Fosas	Barrel bead	1	Sedentary	Structure 5, floor pit Unburned	Teage and Crown 1984; Vokes:553
undetermined	Las Fosas	Unworked Whole shell	1	Sedentary	Gen. site fill Unburned	Teage and Crown 1984; Vokes:559
undetermined	Las Fosas AZU:15:19	Spire Removed Beads	1	Sedentary	Gen. site fill Unburned	Teage and Crown 1984; Vokes:553
undetermined	Ellsworth	Barrel bead fragment	1	Sedentary	Gen site fill Unburned	Teage and Crown 1984; Vokes:560
Undetermined	El Polovron AZU:15:59	Spire Removed Beads	7	Sedentary	Unburned	Teage and Crown 1984; Vokes:560
undetermined	Frogtown AZU:15:61	Spire Removed Beads	1	Sedentary	Gen. site fill Unburned	Teage and Crown 1984; Vokes:561
Undetermined	Frogtown	Spire Removed Beads	16	Sedentary	Trash pit Unburned	Teage and Crown 1984; Vokes:561
Undetermined	Frogtown	Spire Removed Beads	4	Sedentary	Cremation 14 Burned	Teage and Crown 1984; Vokes:561
Undetermined	Frogtown	Spire Removed Beads	1	Sedentary	Structure 20, fill	Teage and Crown 1984; Vokes:561
Undetermined	Frogtown	Unworked whole shell	1	Sedentary	Trash mound F-4 Unburned	Teage and Crown 1984; Vokes:571
undetermined	Rancho Sin Vacas AZU:15:62	Spire Removed Beads	1	Sedentary	Unburned	Teage and Crown 1984; Vokes:571
undetermined	DustBowl Site	Barrel bead	1	Sedentary	Unburned	Teage and Crown 1984; Vokes:572
undetermined	Junkyard Site	Spire Removed Beads	1	Sedentary	Structure 30, fill Unburned	Teage and Crown 1984; Vokes:573
undetermined	Junkyard Site	Unworked whole shell	35	Sedentary	Structure 31, fill Unburned	Teage and Crown 1984; Vokes:573
undetermined	Snaketown	Spire Removed Beads	3	Civano	N/A	Haury 1976:309

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
undetermined	Casa Grande Compound A AZ AA:2:14 ASM	Worked and waste shell	N/A	Classic	N/A	Nelson 1991:31
undetermined	Casa Grande Compound F	Worked and waste shell	N/A	Classic	N/A	Nelson 1991:31
undetermined	Los Muertos	Worked and waste shell	N/A	Classic?	N/A	Nelson 1991:6,31
undetermined	San Cayetano	Spire Removed Beads	N/A	Classic	Found with numerous *Nassarius*	Jernigan 1978:74 DiPeso 1956:94-99
Undetermined	Las Acequias	Unworked shell and waste	N/A	Classic	N/A	Nelson 1991:6.31
undetermined	Las Guanacos	Unworked shell and waste	N/A	Classic	N/A	Nelson 1991:6,31
undetermined	Los Hornos	Unworked shell	N/A	Classic	N/A	Nelson 1991:6,31
undetermined	AZU:13 24 ASM	Unworked shell	N/A	Classic	N/A	Nelson 1991:31
undetermined	San Cayetano del Tumacacori AZ DD:8:12	Unworked wastew shell	N/A	Classic	N/A	Nelson 1991:8,31
undetermined	Guvo Hiktani AZ A:14:3 ASM	Whole shells and waste	N/A	Classic	N/A	Nelson 1991:33
undetermined	Fortified Hill Site AZ T:13:8 ASM	Barrel beads	N/A	Classic	N/A	Jernigan 1978:7,33
biplicata	Casa Grande	Spire Removed Beads	N/A	Classic	N,A.	Nelson 1991:19
dama	Los Muertos	Spire Removed Beads	125	Classic	N/A	Tower 1945:20
undetermined	Quijotoa Valley Site AZ Z:11:5	Spire Removed Beads	3	Classic	N/A	Rosenthal 1978

Evidence of *Olivella* from Southwest Archaeologic Sites

Anasazi

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
dama	Site 423 Chaco Canyon	Spire Removed Bead	N/A	Basket II	N/A	Mathien (editor) 1997 :1136
dama	Site 1659 Chaco Canyon	Spire Removed Beads	N/A	Basket II	N/A	Mathien (editor) 1997:1136
dama	Site 116 Chaco Canyon	Spire Removed Bead	N/A	Basket II	N/A	Mathien (editor) 1997:1136
dama	Durango	Spire Removed Bead	6	Basket II	N/A	Jernigan 1978:179,fig .85
dama	Marsh Pass	Spire Removed Beads	110	Basket II	Formed 3 necklaces	Tower 1945:19
biplicata	Marsh Pass	Spire Removed Beads	7	Basket II	N/A	Tower 1945:21
dama	Sayodnee-chee	Spire Removed Bead	5	Basket II	Spire removed Part of a necklace with stone disc beads	Jernigan 1978:179 fig.85
dama	Canyon del Muerto	Spire Removed Beads	2000	Basket III	Necklace 40ft. long	Tower 1945:20
undetermined	Segihat-soei	Barrel beads	N.A	Basket III	Includes beads forming a 4 strand necklace	Jernigan 1978:179,fig .84
dama	Site 724 Chaco Canyon	Spire Removed Beads	N/A	Basket III	N/A	Mathien 1997:1136
dama	Site 299 Chaco Canyon	Spire Removed Bead	N/A	Basket III	N/A	Mathien 1997:1136
dama	Site 627 Chaco Canyon	Spire Removed Beads	N/A	PuebloI	N/A	Mathien 1997:1337

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
dama	Site 391 Chaco Canyon	Spire Removed Bead	N/A	Pueblo I	N/A	Mathien 1997:1137
biplicata	Caldwell Village	Cent perf. Split Punched	1	Pueblo I Fremont	Gifford bead type X1b 1947:34	Ambler 1966:64
undetermined	Caldwell Village	Cent perf. irreg. rectang.	7	Pueblo I Fremont	N/A	Ambler 1966:64
dama?	Caldwell Village	Barrel beads	4	Pueblo I Fremont	N/A	Ambler 1966:64
Sites Dated to Before AD 900 ↑				↓ Sites Dated to After AD 900		
undetermined	Pueblo Bonito	Spire Removed Beads	10	Pueblo II	Part of a necklace of clam discs and *Spondylus* pendants	Judd 1954
dama	Site 627 Chaco Canyon	Spire Removed Beads	N/A	Pueblo II	N/A	Mathien 1997:1137
dama	Site 423 Chaco Canyon	Spire Removed Beads	N/A	Pueblo II	N/A	Mathien 1997:1137
biplicata	Main Ridge/ Lost City	Cap Bead	2013	Pueblo II	N/A	Shutler 1984:40, Plate 75b
dama	Site 389 Chaco Canyon	Spire Removed Beads	N/A	Pueblo II	N/A	Mathien 1997:1137
dama	Site 633 Chaco Canyon	Spire Removed Beads	N/A	Pueblo II	N/A	Mathien 1997:1137
dama	Site 423 Chaco Canyon	Spire Removed Beads	N/A	Pueblo II	N/A	Mathien 1997:1137
undetermined	Para-goonah	Spire Removed Bead	1	Pueblo II	N/A	Tower 1945:21
biplicata	Big Mound near Paragoonah	Spire Removed Beads	N/A	Pueblo II	N/A	Tower 1945:40

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
biplicata	Tusayan	Spire Removed Beads	N/A	Pueblo II	N/A	Tower 1945:28
undetermined	Monument Valley Tse Biyi Canyon	Spire Removed Beads	3	Pueblo II	Sm. beads 7mm. wide, 12mm.long Lg. bead 1.6cm. wide, 2.6cm. long	Neely and Olsen 1983
biplicata	Caldwell Village	Saucer beads	3	Pueblo II	N/A	Ambler 1966:64
pedroana?	Caldwell Village	Spire Removed Bead	1	Pueblo II	N/A	Ambler 1966:64
biplicata	Caldwell Village	Spire Removed Bead	1	Pueblo II	N/A	Ambler 1966:64
undetermined	Bonanza Dune, Johnson Canyon Utah	Shell fragment	1	Pueblo II	N/A	Aikens 1965:124
biplicata	Main Ridge/ Lost City	Cap Bead	N/A	Pueblo II	N/A	Shutler 1961:40, Plate 75b
dama	Site 423 Chaco Canyon	Spire Removed Beads	N/A	Pueblo II	N/A	Mathien 1997:1137
biplicata	Main Ridge/ Lost City	Cap Bead	N/A	Pueblo II	N/A	Shutler 1961:40, Plate 75b
biplicata	Main Ridge/ Lost City	Thin lipped disc beads	449	Pueblo II	House 47, ash dump	Shutler 1961:40
biplicata	Main Ridge/ Lost City	Thin lipped disc bead	3	Pueblo II	House 73	Shutler 1961:40
biplicata	Main Ridge/ Lost City	Thin lipped disc beads	75	Pueblo II	Burial 181	Shutler 1961:40
biplicata	Main Ridge/ Lost City	Thin lipped disc bead	2	Pueblo II	Room 8	Shutler 1961:40
biplicata	Main Ridge/ Lost City	Thin lipped cupped beads	N/A	Pueblo II	House 75, room 4	Shutler 1961:40

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
biplicata	Main Ridge/ Lost City	Barrel beads	5	Pueblo II	In rubble of House 65	Shutler 1961:40
biplicata	Main Ridge/ Lost City	Barrel beads	3	Pueblo II	Plaza of House 50	Shutler 1961:40, plate 77f
dama	Main Ridge/ Lost City	Barrel bead	1	Pueblo II	N/A	Shutler 1961:40
biplicata	Main Ridge/ Lost City	Barrel beads	20	Pueblo II	N/A	Shutler 1961
biplicata	Main Ridge/ Lost City	Barrel beads	2	Pueblo II	House 50, Rooms 7a, and 7	Shutler 1961
undetermined	Main Ridge/ Lost City	Barrel bead	4	Pueblo II	N/A	Shutler 1961:40
undetermined	Main Ridge/ Lost City	Beads	N/A	Pueblo II	Burial 159 (infant), house 102AD. Head to south	Shutler 1961:47
undetermined	Main Ridge/ Lost City	Barrel beads	9	Pueblo II	N/A	Shutler 1961:40
undetermined	Main Ridge/ Lost City	Barrel beads	23	Pueblo II	Burial 230	Shutler 1961:40
undetermined	Main Ridge/ Lost City	Barrel? beads	N/A	Pueblo II	Burial 28, flexed adult associated with house 20AD. 2 turq. pendants	Shutler 1961:45
biplicata?	Main Ridge/ Lost City	Barrel beads?	N/A	Pueblo II	Burial 31, house 20RA. Infant,R.S. flexed, head to S.E. With small turq. and jet beads	Shutler 1961:45
undetermined	Main Ridge/ Lost City	Barrel beads?	100	Pueblo II	Burial 84, house 77R3	Shutler 1961:45

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
biplicata	Main Ridge/ Lost City	Spire Removed Beads	6	Pueblo II	Burial 137 (infant), house 50 R18	Shutler 1961:46
biplicata	Main Ridge/ Lost City	Cut bead Barrel?	8	Pueblo II	Burial(infan t)138, house 50 AD	Shutler 1961:77, Plate77c
undetermined	Main Ridge/ Lost City	Spire Removed Beads	6	Pueblo II	Burial (head to NE) 150, house 102. With 15 snail shells	Shutler 1961:47
undetermined	Main Ridge/ Lost City	Cut bead	1	Pueblo II	Burial 132, House 50AD. Red ochre and selenite crystals	Shutler 1961:45
undetermined	Main Ridge/ Lost City	Beads	N/A	Pueblo II	Burial (adult), house 102R4 Head to north	Shutler 1961:47
biplicata	Main Ridge/ Lost City	Spire Removed Beads	2	Pueblo II	Burial 171. house 102R4 One side punched. With red and yellow ochre	Shutler 1961:47, Plate 76 d,e
undetermined	Main Ridge/ Lost City	Disc beads	25	Pueblo II	Burial 195 (adult), house 102AD	Shutler 1961:48
undetermined	Main Ridge/ Lost City	Disc beads	3	Pueblo II	Burial 206 (infant LS flexed), Red ochre. Head to south	Shutler 1961:48
dama	Main Ridge/ Lost City	Cut beads	16	Pueblo II	Burial 229 (infant), house 102P Head to north	Shutler 1961:48
dama	Main Ridge/ Lost City	Cut beads	39	Pueblo II	Burial 230, house 102P From a necklace with abalone pendants	Shutler 1961:48
dama	Main Ridge/ Lost City	Cut bead	1	Pueblo II	Burial 262 (adult), house101P. With metate fragments. Head to west	Shutler 1961:48
undetermined	Main Ridge/ Lost City	Spire Removed Bead	1	Pueblo II	Burial 279 (adult), house 50AD. Flexed RS	Shutler 1961:48

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
biplicata	Willow Beach 1936 excav.	Disc beads	N/A	Pueblo II?	Burial 4. Older woman	Schroeder 1961:69
undetermined	Willow Beach 1937 excav.	Saucer beads	N/A	Pueblo II?	N/A	Schroeder 1961:67
biplicata	Willow Beach	Spire Removed Beads	2	Pueblo II	Sites G1, G2, trench IV	Schroeder 1961:73
dama	Nephi Site Utah 42jb2	Spire Removed Beads	3	Pueblo II	1.0-1.5cm long	Sharrock and Marwitt 1967:39
undetermined	Willow Beach 1936 excav.	beads	N/A	Pueblo II	Burial 2- one cluster of 27 beads, one of 833. Infant	Schroeder 1961:68
biplicata	Nephi Site	Cent. perf. saucer discs	3	Pueblo II	Diameters: 1.0,1.1, and 1.3cm.	Sharrock and Marwitt 1967:39
undetermined	Kiatuth-lana	Spire Removed Beads	N/A	Pueblo II	Found in most burials. Mouths of deceased filled with *Olivella*	Jernigan 1978:164 Roberts 1931
undetermined	Kiatuth-lana	Spire Removed Beads	300	Pueblo II	Formed a belt or girdle	Jernigan 1978:164
undetermined	Tsi taa Canyon de Chelly	Spire Removed Beads	1	Pueblo II-III	With incised designs	Steen 1966
undetermined	Black Mesa Kayenta AZD:11:3	Spire Removed Bead	1	Pueblo II-III	Found in trash mound Length 1.3cm Width .6cm.	Gumerman 1972
undetermined	Black Mesa site D:7:2085	Spire Removed Bead	1	Pueblo II-III	Stair 3, fill	Christenson and Parry 1983
undetermined	Black Mesa site D:7:2103	Spire Removed Beads?	N/A	Pueblo II-III	Structure 5, burial	Nichols and Smiley 1984:801
undetermined	Black Mesa site D:3141	Spire Removed Beads	5	Pueblo II-III	Feature 11, burial	Nichols and Smiley 1984:801
undetermined	Black Mesa site D:11:2027	Spire Removed Bead	1	Pueblo II-III	Feature 10, storage cist. Burial?	Nichols and Smiley 1984:801

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
undetermined	Black Mesa site D:11:3133	Spire Removed Bead	1	Pueblo II-III	Pit structure 4	Nichols and Smiley 1984
biplicata	Main Ridge/ Lost City	Spire Removed Bead	1	Pueblo II-III	N/A	Lyneis 1992:69
biplicata	Main Ridge/ Lost City	Split drilled bead	N/A	Pueblo II-III	Part of a burial necklace	Lyneis 1992:69, tables 65-66
dama	Main Ridge/ Lost City	Barrel beads	N/A	Pueblo II-III	N/A	Lyneis 1992:69
biplicata	Main Ridge/ Lost City	Saucer beads	N/A	Pueblo II-III	Popular type in Cal. by AD600	Lyneis 1992:70
undetermined	Black Mesa site D:11:2051	Spire Removed Bead	1	Pueblo II-III	N/A	Nichols and Smiley 1984:801
dama	Mesa Verde	Spire Removed Beads	20	Pueblo III	Part of jet bead necklace	Jernigan 1978:164, plate 11
dama	Arroyo Hondo	Spire Removed Beads	93	Pueblo III	Formed a necklace with 5 *H. rufescens* pendants	Jernigan 1978:164, plate 12
undetermined	White Dog Cave	Spire Removed Beads	N/A	Pueblo III	Formed a necklace with stone beads	Jernigan 1978:164
dama	Marsh Pass Kayenta	Spire Removed Beads	11	Pueblo III	N/A	Tower 1945:20
undetermined	Marsh Pass Kayenta	Spire Removed Beads	2	Pueblo III	N/A	Tower 1945:21
undetermined	White Rocks Village Uinta River, Utah	Beads	5	Pueblo III	N/A	Shields 1967
undetermined	Gilbert Site, Uinta River, Utah	Spire Removed Bead	1	Pueblo III	N/A	Shields 1967
biplicata	Barrier Canyon	Spire Removed Bead?	1	Pueblo III	N/A	Tower 1945:21

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
undetermined	Aztec	Spire Removed Beads	N/A	Pueblo III	Formed two 4 strand burial necklaces	Morris 1924
volutella	Aztec	Spire Removed Bead	1	Pueblo III	N/A	Tower 1945:28
undetermined	Aztec	Spire Removed Beads	N/A	Pueblo III	Formed an anklet in burial	Morris 1919:93
undetermined	Pecos	Spire Removed Beads	12	Pueblo III	Found strung around waist As belt?	Kidder 1932:186
dama	Wupatki	Spire Removed Bead	47	Pueblo III	Formed a necklace	Stanislawski 1963:310
biplicata	Wupatki	Spire Removed Bead	1	Pueblo III	Side perf.	Stanislawski 196310
dama	Halono-wan	Spire Removed Beads	100	Pueblo III	N/A	Tower 1945:20
biplicata	Wupatki	Centperf. saucer shaped disc	2	Pueblo III	N/A	Stanislawski 1963:313
biplicata	Chevelon	Spire Removed Beads	N/A	Pueblo III	N/A	Fewkes 1896:366
biplicata	Homolovi	Spire Removed Beads	N/A	Pueblo III	N/A	Fewkes 1896:366
dama and biplicata	Durango	Beads	N/A	Pueblo III	N/A	Morris 1939:178
dama	Halono-wan	Spire Removed Beads	100	Pueblo III	N/A	Tower 1945:20
undetermined	Pecos	Spire Removed Beads	1000	Pueblo III-IV	Found around a stone in floor of Kiva	Kidder 1932:186
dama	Pecos	Spire Removed Beads	N/A	Pueblo IV	Formed a 4 strand necklace	Jernigan 1978:179, figure 84
dama	Pecos	Barrel beads (short)	N/A	Pueblo IV	Formed a single strand necklace	Jernigan 1978:179. figure 84

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
biplicata	Halona-wan Zuni	Spire Removed Beads	9	Pueblo IV	N/A	Tower 1945:21
dama	Arroyo Hondo	Spire Removed Beads	176	Pueblo IV	Length .9-1.7cm. Width .5-.7cm	Lang and Harris 1984; 233

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Mogollon

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
dama	ElPaso, Texas	Spire Removed Beads	5	Mog I	N/A	Tower 1945:20
dama	Casas Grandes	Barrel beads	9	Pilon	Burial 31 Bead type IIA	DiPeso 1974:392
dama	Casas Grandes	Barrel beads	9	Perros Bravos	N/A	DiPeso 1974:392
dama	Casas Grandes	Spire Removed Beads	62	Perros Bravos	Burial 7 Bead type IIIB1. Formed a necklace	DiPeso 1974:360-
dama	Casas Grandes	Barrel bead	1	Viejo	Surface find Bead type IIA	DiPeso 1974:392
dama	Casas Grandes	Barrel bead	1	Viejo	Surface find Bead type IIA Length .6cm. Width .6cm.	DiPeso 1974:394
dama	Casas Grandes	Barrel bead	8	Viejo	Burial 7 Average length .6cm. Average width .6cm.	Di Peso 1974:394
dama	Casas Grandes	Barrel bead	1	Viejo	Burial 9 Length .4cm. dia. .5cm.	Di Peso 1974:394
Sites Dated to Before AD 900 ↑				↓ Sites Dated to After AD 900		
dama	Mule Creek	Spire Removed Bead	1	Mog IV	N/A	Tower 1945:20
undetermined	Flagstaff	Barrel beads	N/A	Mog. V (early)	Numerous	Jernigan 1978:129
dama	Kinish-iba	Spire Removed Beads	N/A	Mog. V	Strung with barrel beads	Jernigan 1978:129
dama	Mimbres	Barrel beads	10	Mog. V	Strung with shell disc beads	Jernigan 1978:133

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
dama	Carter Ranch	Barrel beads	4	Mog. V	Strung with *Glycemeris maculata*	Jernigan 1978:133
baetica	Swartz Ruin	Spire Removed Beads	112	Mog V	N/A	Tower 1945:21
dama	Swartz Ruin	Spire Removed Beads?	304	Mog V	N/A	Tower 1945:20
undetermined	Mimbres	Spire Removed Beads	4	Mog. V	Strung with shell beads	Jernigan 1978:133
dama	Gran Quivera	Spire Removed Beads	28	Mog V (late)	N/A	Hayes 1981
gracilis	Gran Quivera	Spire Removed Beads	6	Mog. V (late)	N/A	Hayes 1981
anazora	Gran Quivera	Spire Removed Bead	1	Mog V (late)	N/A	Hayes 1981
dama	Gran Quivera	Spire Removed Beads	82	Mog V (late)	Mound 7 24.6% of collection	Hayes 1981
dama	Wind Mountain	Barrel bead	1	Mog. V	Burial 103 Length 1.2cm. Width .6cm. Thickness .1	Woosley and McIntyre 1999
dama	Wind Mountain Block 36-C	Barrel bead	1	Mog. V	Burial 1 Length 1.6cm. Width .7cm. Thickness .1	Woosley and McIntyre 1999
dama	Wind Moutain	Barrel bead?	1	Mog. V	Length 1.9cm Width .9cm. Thickness .1	Woosley and McIntyre 1999
dama	Wind Mountain	Barrel bead?	1	Mog V	Burial 7 Length 1.5cm. Width .7cm. Thickness .1	Woosley and McIntyre 1999
undetermined	Exausted Cave	Spire Removed Beads	N/A	Mog V	N/A	Hudgens 1975

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
undetermined	Red Bow Cliff Dwelling Room 4, ceremon. area.	Spire Removed Beads	19	Mog V	Range of length 9-20.5mm. mean 14mm.	J.Gifford 1980
dama	Casas Grandes Rm. 15C-8, fill	Barrel beads	8	Medio	Range of length .5-1.4cm. Width .4-1cm.	DiPeso 1974:418
dama	Casas Grandes Rm. 18B and 18C-8, fill	Barrel beads	9	Medio	N/A	DiPeso 1974:418
dama	Casas Grandes Rm. 12-16, fill	Barrel beads	35	Medio	Range of lengdth .8-1.3cm., width .4-.6cm.	DiPeso 1974:418
dama	Casas Grandes Rm. 23-16, fill	Barrel beads	3	Medio	Range of length .7-.9cm., width ..4-.6cm.	DiPeso 1974:418
dama	Casas Grandes Rm.23-16 fill	Barrel beads	44	Medio	Range of length .8-1.6cm, width .5-8cm.	DiPeso 1974:418
dama	Casas Grandes Rm. 31-16, fill	Barrel bead	1	Medio	Length .8cm. Width .5cm	DiPeso 1974:418
dama	Casas Grandes Rm.33-16, fill	Barrel beads	2	Medio	Range of length .9-1.6cm., width .5-6cm.	DiPeso 1974:418
dama	Casas Grandes Rm. 42-8, floor	Barrel bead	1	Medio	Length.8cm Width.5cm.	DiPeso 1974:418
dama	Casas Grandes	Spire Removed Beads (Type IIIB)	7	Medio	Ball Court U.3. S. end of field structure, platform fill	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	8	Medio	Rm.2C-4, floor fill	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	4	Medio	Central Plaxa, platforms 1,2	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	15	Medio	Rm. 9-6, fill	DiPeso 1974:423

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
dama	Casas Grandes	Spire Removed Beads	14	Medio	Burial 23-6 Rm. 20-6	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	32	Medio	Plaza 2-6, fill	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	18	Medio	Rm.7B-8, fill	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	139	Medio	Rm.8 B-8, fill	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	2	Medio	Rm. 9C-8, fill	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	11	Medio	Rm. 10B-8, floor fill	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	6	Medio	Rm. 13-8, fill	DiPeso 1974:423
dama?	Casas Grandes	Spire Removed Beads	1253	Medio	Rm 15C-8	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	22	Medio	Central Plaza fill trove	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	3085	Medio	Rms. 18B and 18C-8, fill	DiPeso 1974:423
dama	Casas Grandes Rm.25C-8	Spire Removed Beads	15	Medio	6-cache 4 6-cache 2 3-cache 3	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	17	Medio	Rm.6-12, cache	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	4	Medio	Rm. 16-12, fill	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	28	Medio	Rm.25C-8, fill	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	5	Medio	Rm.38-11, floor. 3 in central cache	DiPeso 1974:423

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
dama	Casas Grandes	Spire Removed Beads	7	Medio	Rm. 17-12, floor	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	5	Medio	Plaza 3-13, floor A, trove	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	39	Medio	Plaza 3-13, floor A	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	14	Medio	Rm. 24-13	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	13	Medio	Rm.A-13, Burial 40-13	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	21	Medio	Rm. 3-13, Burial 41, 42-13	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	7	Medio	Rm.3-13, Burial 44A-G-13	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	61	Medio	Rm.26-14, floor	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	4	Medio	Rm. 33-14, fill	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	6	Medio	Rm. 35, fill	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	1259	Medio	Rm. 12-16, fill	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	163	Medio	Rm. 12-16, floor	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	14	Medio	Rm. 14-16, floor trove	DiPeso 1974:423
dama	Casas Grandes	Spire Removed Beads	6	Medio	Rm.18-16, fill	DiPeso 1974:424
dama	Casas Grandes	Spire Removed Beads	383	Medio	Rm. 20-16,fill	DiPeso 1974:424

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
dama	Casas Grandes	Spire Removed Beads	4	Medio	Rm. 22-16, floor	DiPeso 1974:424
dama?	Casas Grandes	Spire Removed Beads	2991	Medio	Rm. 25-16, fill	DiPeso 1974:424
dama?	Casas Grandes	Spire Removed Beads	1562	Medio	Rm.23-16, fill	DiPeso 1974:424
dama?	Casas Grandes	Spire Removed Beads	1821	Medio	Rm.23-16, fill, trove	DiPeso 1974:424
dama	Casas Grandes	Spire Removed Beads	35	Medio	Rm. 29-16 Burial 12-16	DiPeso 1974:424
dama	Casas Grandes	Spire Removed Beads	4	Medio	Rm. 30-16, floor A	DiPeso 1974:424
dama	Casas Grandes	Spire Removed Beads	57	Medio	Rm. 31-16, fill	DiPeso 1974:424
dama	Casas Grandes	Spire Removed Beads	160	Medio	Rm. 33-16, fill	DiPeso 1974:424
dama	Casas Grandes	Spire Removed Beads	5	Medio	Plaza 1-16, fill. One charred	DiPeso 1974:424
dama	Casas Grandes	Spire Removed Beads	14	Medio	Rm. 30-8, floor fill. Necklace	DiPeso 1974:424
undetermined	Casas Grandes	Spire Removed Beads	25	Medio	Plaza 3-8, level changer	DiPeso 1974:424
dama?	Casas Grandes	Spire Removed Beads	63	Medio	Plaza 3-8, NW passageway, floor A	DiPeso 1974:424
dama?	Casas Grandes	Spire Removed Beads	104	Medio	Rm. 43-8, floor	DiPeso 1974:424
dama	Casas Grandes	Spire Removed Beads	9	Medio	Rm. 8-13, floor	DiPeso 1974:424
dama	Casas Grandes	Spire Removed Bead	1	Medio	Rm. 23-16,fill. With incised surface	DiPeso 1974:424

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
undetermined	Casas Grandes	Spire Removed Bead	1	Medio	Rm. 5-8, fill	DiPeso 1974:424
dama	Casas Grandes	Spire Removed Bead	1	Medio	Rm. 23-16, fill, trove Double perf.	DiPeso 1974:424

Evidence of *Spondylus* from Southwest Archaeologic Sites

Hohokam

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
calcifer and princeps	Snaketown	Disc beads	N/A	Pioneer (Sweet-water, Estrella, and Vahki)	N/A	Haury 1976:308
calcifer and princeps	Snaketown	Pendants	N/A	Pioneer	N/A	Haury 1976:308
calcifer and princeps	Snaketown	Bilobed beads and pendants	N/A	Pioneer	N/A	Haury 1976:308
calcifer and princeps	Snaketown	Disc beads	N/A	Colonial (Santa Cruz and Gila Butte)	N/A	Haury 1976:308
calcifer and princeps	Snaketown	Pendants	N/A	Colonial	N/A	Haury 1976:308
calcifer and princeps	Snaketown	Bilobed beads and pendants	N/A	Colonial	N/A	Haury 1976:308
undeter.	Snaketown	End perf. bead or pendant	12	Colonial (Santa Cruz)	From the ashes of cremation 1:10E	Haury 1976:311
undeter.	Snaketown	Double perf. bead or pendant	13	Colonial (Santa Cruz)	From ashes cremation 110E. Longest pend. 14mm.	Haury 1976:311
undeter.	Snaketown	Lump bead	1	Colonial	N/A	Jernigan 1978:Fig.7,G
undeter.	Snaketown	End perf. dentate or claw bead	1	Colonial	N/A	Jernigan 1978: Fig.7,F
calcifer and princeps	Los Muertos	Irregular beads and bead pendants	N/A	Colonial	N/A	Nelson 1991:6,33
Sites Dated to Before AD 900 ↑					↓ Sites Dated to After AD 900	
princeps	Snaketown	Whole unworked shell	1	Sedentary	N/A	Jernigan 1978:Plate 14

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
princeps	Painted Rocks	Aviform pendant? Unperf. Mosaic?	1	Sedentary	N/A	Jernigan 1978: Fig.32
calcifer	Snaketown	Disc beads and pendants	N/A	Sedentary (Sacaton)	Diag. by purple color	Haury 1976:308
calcifer and princeps ?	Snaketown	Disc and bilobed beads	250+	Sedentary (Sacaton)	Formed one necklace 80cm. long	Haury 1976:311 Jernigan 1978:Plate 3
calcifer and princeps	Las Acequies	Irreg. beads and pendants	N/A	Sedentary	N/A	Nelson 1991:6,33
calcifer and princeps	Los Guanacos	Irreg. beads and pendants	N/A	Sedentary?	N/A	Nelson 1991:6,33
calcifer and princeps	Hodges Site AZ AA:12:18 ASM	Irreg. beads and pendants	N/A	Sedentary	N/A	Nelson 1991:7,33
undeter.	San Cayetano del Tumaca-cori	Irreg. beads and pendants	N/A	Sedentary	N/A	Nelson 1991:8, 33
undeter.	Cemetery Ridge Site AZ DD:8:122 ASM	Irreg. beads and pendants	N/A	Sedentary	N/A	Nelson 1991:8,33
undeter.	Tinaja Canyon AZ DD:8:128 ASM	Irreg. beads and pendants	N/A	Sedentary	N/A	Nelson 1991:8,33
undeter.	Gleeson Village	Irreg. beads and pendants	N/A	Sedentary	N/A	Nelson 1991:8,33
undeter.	Siphon Draw AZ U:10:16 ASM	Irreg. beads and pendants	N/A	Sedentary	N/A	Nelson 1991:8,33
undeter.	Siphon Draw AZ U:10:6	Irreg. bead pendants	2	Sedentary	Structure 17, fill Unburned	Teague and Crown 1984; Vokes:533
undeter	Smiley's Well AZ U:14:73	Disc bead	1	Sedentary	Structure 3, fill Unburned	Teague and Crown 1984; Vokes:555
undeter.	Las Fosas AZU:15:19	Disc bead	1	Sedentary	Trash filled pit F.2 Unburned	Teague and Crown 1984; Vokes:556

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
undeter.	Las Fosas	Irreg. bead pendant	1	Sedentary	Structure 6, fill Unburned	Teague and Crown 1984; Vokes:556
undeter.	Frogtown AZ U:15:61	Disc bead	1	Sedentary	Structure 15, fill	Teague and Crown 1984; Vokes:561
undeter.	Casas Pequenas	Disc bead	1	Sedentary	Gen. site fill, Locus A. Unburned	Teague and Crown 1984; Vokes:574
undeter.	Las Fosas AZ U:15:87 ASM	Irreg. beads and pendants	N/A	Sedentary?	N/A	Nelson 1991:9,33
undeter.	Gayler Ranch AZ EE:2:76 ASM	Irreg. beads and pendants	N/A	Sedentary	N/A	Nelson 1991:9,33
princeps	San Cayetano	Globular Pendants	6	Classic	N/A	Jernigan 1978: Fig. 26
princeps	Casa Buena	Disc beads	N/A	Classic	N/A	Jernigan 1978:Fig. 26
princeps	Casa Grande	Aviform in turq. mosaic	1	Classic	N/A	Jernigan 1978:Plate 4
princeps	Casa Grande	Rectang. center piece in turq. mosaic	1	Classic	N/A	Jernigan 1978:Plate 4

Evidence of *Spondylus* from Southwest Archaeologic Sites

Anasazi

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
undeter.	White Dog Cave	End perf. pendant	1	Basket II	N/A	Jernigan 1978:Fig.77
undeter.	Durango	Ovoid pendant with 5 edge perfs.	1	Basket II	N/A	Jernigan 1978:Fig.78
Sites Dated to Before AD 900 ↑					↓ Sites Dated to After AD 900	
calcifer and princeps	Pueblo Bonito	Bilobed beads	N/A	Pueblo II	N/A	Jernigan 1978:Fig.71
undeter.	Pueblo Bonito	Dentate beads	N/A	Pueblo II	N/A	Jernigan 1978:Fig.71
princeps	Chaco Canyon	Off cent. perf. disc bead	1	Pueblo II	N/A	Jernigan 1978:Plate 10
undeter.	Pueblo Bonito	End perf. right angle pendant	1	Pueblo II	N/A	Jernigan 1978:Fig.81
undeter.	Pueblo Bonito	Irregular lump or pendant beads	5	Pueblo II	Beads end perf. and with lg. cent. perf.	Jernigan 1978:Fig.85
undeter.	Lost City/ Main Ridge	End perf. pear shaped pendant	1	Pueblo II	N/A	Shutler 1961:83;Plate 75-d
calcifer ?	Lost City/ Main Ridge	End perf. rectang. pendant	1	Pueblo II	N/A	Shutler 1961:83;Plate 75-r
princeps	Lost City/ Main Ridge	Disk bead no. 13/6744	1	Pueblo II	N/A	Lyneis 1992:Plate 70; tables 65,66
princeps	Lost City/ Main Ridge	End Perf. globular/ twisted pendants	6	Pueblo II	2.5cm. ave. length	Lost City collections Personal exam June 2000
Calcifer ?	Wupatki	Unworked pieces	N/A	Pueblo II-III	N/A	Stanislawski 1963:307

Species	Site or Location	Artifact type	No.	Period or Phase	Description & Comments	References
undeter.	Arroyo Hondo	Frog zoomorph pendant or mosaic	1	Pueblo IV	N/A	Jernigan 1978:Fig.81
undeter.	Chevlon	Cent.perf. lizard zoomorph	1	Pueblo IV	N/A	Jernigan 1978:Fig.81
undeter	Pecos	Disc beads	N/A	Pueblo IV	N/A	Jernigan 1978:Fig.84

Evidence of *Spondylus* from Southwest Archaeologic Sites

Mogollon

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
princeps	Casas Grandes	Disc bead flat cross sec.	1	Viejo	From Burial 9	DiPeso 1974:395
princeps	Casas Grandes	Irregular pendant Medio type XIIB	1	Viejo	From Burial 29 Length 1.5cm. Width 2.3cm.	DiPeso 1974:398
Sites Dated to Before AD 900 ↑					↓ Sites Dated to After AD 900	
undeter.	Exausted Cave Sinagua Verde V.	Double lobed bead	1	Mog. IV	Found near rat's nest	Hudgens 1975
princeps	Pine Flat Cave	Bilobed bead	1	Mog. V	Length 10mm. Width 5mm. 2mm.thick Point of P.	J. Gifford 1980
undeter	Red Bow Cliff Dwelling	End perf. bilobed beads	6	Mog. V	N/A	J. Gifford 1980
undeter.	Red Bow Cliff Dwelling	Zoomorph pendant Fish or mud puppy	1	Mog. V	Length 93mm. Width 23mm. 16mm. thick	J. Gifford 1980
undeter.	Point of Pines	Cent.perf. rectang. aviform	1	Mog. V	N/A	Jernigan 1978:Fig,46
princeps	Point of Pines	Bilobed beads	N/A	Mog. V	N/A	Jernigan 1978:Fig.57
princeps	Point of Pines	Disc beads	N/A	Mog. V	N/A	Jernigan 1978:Fig.57
princeps	Grass-hopper	Disc beads	N/A	Mog. V	N/A	Jernigan 1978:Fig.49
undeter.	Grass-hopper	Perf. aviform	1	Mog. V	N/A	Jernigan 1978:Fig.65
princeps	Ridge Ruin	Perf. aviform in mosaic on lac	1	Mog. V	N/A	Jernigan 1978:Fig.65

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
undeter.	Wupatki	Unperf. Zoomorph lizard?	1	Mog. V	N/A	Jernigan 1978:Fig.49
princeps	Casas Grandes	Disc beads flat cross section	1	Medio	Room 2A-4 trench offering 2 .5cm. dia.	DiPeso 1974:425
princeps	Casas Grandes	Disc beads flat cross section	106	Medio	Room 9C-8 fill, trove Ave.dia..2cm.	DiPeso 1974:425
calcifer	Casas Grandes	Disc beads flat cross section	69	Medio	Room 9C-8 fill, trove Ave.dia..2cm.	DiPeso 1974:425
princeps	Casas Grandes	Disc beads	2	Medio	Room 15C-8 fill	DiPeso 1974:426
princeps	Casas Grandes	Disc bead type IV	1	Medio	Ball Court 1 U.3 central playing field floor 6cm.dia.	DiPeso 1974:428
princeps	Casas Grandes	Disc beads type IV	2	Medio	Room 2C-4 floor .6cm. in dia.	DiPeso 1974:428
princeps	Casas Grandes	Disc bead type IV	1	Medio	Room 15C-8 fill .7cm. dia.	DiPeso 1974:428
princeps	Casas Grandes	Disc bead type IV	1	Medio	Room 26-14 cache 1 .6cm. in dia.	DiPeso 1974:429
princeps	Casas Grandes	Disc bead type IVA3	1	Medio	Room 14B-8 fill 1.2cm. in dia.	DiPeso 1974:430
princeps	Casas Grandes	Disc bead type IVA3	1	Medio	Room 22-16 floor 1.2cm. in dia.	DiPeso 1974:430
princeps	Casas Grandes	Disc beads type IVA3	2	Medio	Room 42-8 floor 1.0cm., and 1.3cm. in dia.	DiPeso 1974:430
princeps	Casas Grandes	Zoomorphic button beads type V	7	Medio	Room 14-16 floor. Part of necklace. Ave. length .8cm., width .7cm.	DiPeso 1974:431

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
calcifer	Casas Grandes	Zoomorphic button beads type V	5	Medio	Room 14-16 floor. Part of necklace Ave. length .8cm., width .8cm.	DiPeso 1974:431
princeps	Casas Grandes	Plain button bead	1	Medio	Room 15C-8 fill. Bead is T shaped	DiPeso 1974:431
princeps	Casas Grandes	Plain button bead	1	Medio	Room 35, 37-14 fill Bead is unfinished	DiPeso 1974:431
calcifer	Casas Grandes	Barrel beads	11	Medio	Room 14-16 floor Ave. length .5cm.	DiPeso 1974:431
calcifer	Casas Grandes	Cylindrical beads type VIII	3	Medio	Room 9C-8 fill, trove	DiPeso 1974:432
princeps	Casas Grandes	Cylindrical beads type VIII	2	Medio	Room 25C-8 Cache 3	DiPeso 1974:432
princeps	Casas Grandes	Irregular beads type XI	2	Medio	Room 25C-8 Cache 4	DiPeso 1974:432
princeps	Casas Grandes	Edge perf. ovoid Pendant type IV	1	Medio	Room 14-16 floor trove Length 4cm. Width 3.1cm.	PiPeso 1974:454
princeps	Casas Grandes	Mult. edge perf. ovoid pendant	1	Medio	Room 10B-8 floor fill Length 6 cm. Width 3.9cm.	DiPeso 1974:455
princeps	Casas Grandes	Mult. edge perf. ovoid pendant	1	Medio	Room 43-8 floor A Length 5.3cm. Width 4.cm.	DiPeso 1974:455
princeps	Casas Grandes	Mult. perf. in broad end ovoid pendant type VIIA3	1	Medio	Room 31C-14 fill Length 3.2cm. Width 2.2cm.	DiPeso 1974:457
princeps	Casas Grandes	Dentate pendant, type XB with transver. perf.	1	Medio	Room 15B-8 fill Length 2.4cm. Width .7cm.	DiPeso 1974:457

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
princeps	Casas Grandes	Dentate pendant type XB, with transverse perf.	1	Medio	Room 25C-8 fill	DiPeso 1974:459
princeps	Casas Grandes	Shield gorget with deco. surface type XIVC2	1	Medio	Room 9C-8 fill, trove Base of turtle effigy mosaic pendant 7.1 X 7.5cm.	DiPeso 1974:460-61
princeps	Casas Grandes	Gorget	1	Medio	Plaza I-8 fill 2.5 X 4.2cm.	DiPeso 1974:261
princeps	Casas Grandes	Gorget	1	Medio	Plaza 2-13 floor A 4.4 X 7.0cm	DiPeso 1974:261
princeps	Casas Grandes	Gorgets	3	Medio	Plaza 3-13 floor A Largest 4.9 X 8.1cm.	DiPeso 1974:261
princeps	Casas Grandes	Gorget	1	Medio	Plaza 5-14 floor 4.3 X 4.0cm.	DiPeso 1974:261
princeps	Casas Grandes	Gorget	1	Medio	Plaza 3-8 Stairwell, fill over landing 3.6 X 5.3cm.	DiPeso 1974:461
princeps	Casas Grandes	Pendant fragment type XVI	1	Medio	Plaza I-8 fill Length 4.5cm. Width 4.1cm.	DiPeso 1974:462
princeps	Casas Grandes	Pendant fragments type XVI	3	Medio	Room 23-16 fill	DiPeso 1974:462
princeps	Casas Grandes	Pendant fragment type XVI	1	Medio	Room 21-16 floor. Length 2.2cm., width 1.6cm.	DiPeso 1974:462
princeps	Casas Grandes	Perforated fragment	1	Medio	length 1.4cm., Width 1.0cm.	DiPeso 1974:463
princeps	Casas Grandes	Unfinished pendant	1	Medio	Plaza 3-8 floor A Length 2.9cm., Width 1.1cm.	DiPeso 1974:464

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
princeps	Casas Grandes	Reworked pendant type XVIII	1	Medio	Room 18B-8 fill. Length 3.6cm., Width 3.1cm.	DiPeso 1974:464
princeps	Casas Grandes	Reworked pendant type XVIII	1	Medio	Room 13-16 fill. Length 2.6cm., Width 2.3cm.	DiPeso 1974:464
princeps	Casas Grandes	Reworked pendant type XVIII	1	Medio	Room 32-14 floor. Length 3.5cm., Width 1.3cm.	DiPeso 1974:464
princeps	Casas Grandes	Rectang. tesserae type 1	1	Medio	Plaza 3-13 floor A, trove. .6 X .7cm.	DiPeso 1974:512
princeps	Casas Grandes	Rectang. resserae type 1	13	Medio	Plaza 3-8 stairwell floor, fill Ave. length .7cm., Width .4cm.	DiPeso 1974:512
princeps	Casas Grandes	Triang. tesserae type III	1	Medio	Plaza 3-13 floor A, trove. Length 1.0cm., Width .8cm. .1cm. thick	DiPeso 1974:512
undeter.	Casas Grandes	Worked shell	1	Medio	Room 3-13 fill	DiPeso 1974:525

Evidence of *Haliotis, Olivella,* and *Spondylus* from Some Southern California Archaeologic Sites

The following collection of sites and artifacts emphasizes those found in the region of the Santa Barbara Channel area of coastal southern California. The larger region under consideration also includes sites from about 32 to 37 degrees north latitude, and sites in the eastern California deserts.

Haliotis artifacts from such large sites as SCrI-3 (Forney's Cove, Santa Cruz Island), and SBa-81 near present day Santa Barbara, illustrate the diversity of artifact types employed by coastal cultures. These large sites were often the central places of artifact development, manufacture, and dispersal.

The entries in the following tables are made in chronologic order according to the dating system employed by King (1990)(Table 1.). The abbreviations SCrI, and SRI refer to Santa Cruz and Santa Rosa Islands. SBa refers to sites in the Santa Barbara mainland vicinity.

Evidence of *Haliotis* from Some Southern California Archaeologic Sites

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
rufescens	SMI-261 (Daisy Cave)	Whole shell	N/A	11,500 BP	N/A	Erlandson
undeter.	ORA-339	Shell fragment	1	Pre-Milling stone	Unit 17, Level 50-60cm.	Mason 1991
rufescens	SMI-261 (Daisy Cave)	Worked Shell	N/A	9,000 BP	N/A	Erlandson
undeter.	SLO-585 (Diablo Canyon)	Shell	1	14C date 8960+-190 Gak2044 Paleo Coastal	N/A	Moratto 1984:112
undeter.	SLO-585 (Diablo Canyon)	Shell	1	14C date 8410+-190 Gak 2040	N/A	Moratto 1984:112
undeter.	ORA-667	Whole shells	N/A	Milling stone	N/A	Mason 1992:89
undeter.	ORA-965	Shells	N/A	Milling Stone	N/A	Mason 1992:89
undeter.	ORA-971	Shells	N/A	Milling Stone	N/A	Mason 1992
undeter.	ORA-928	Pendant fragment	1	Milling stone	Unit 47, level 10-20cm.	Mason 1992
undeter.	ORA-929	Rectang. with off centperf.	2	Milling stone	Unit 16, level 50-60cm.	Mason 1992
undeter.	Buchanan Reservoir site 117 Burial 72-59	Discs	4	14C date 2750+-90 (UCLA 1860B)	N/A	Moratto 1984:324
cracherodii	Buchanan Reservoir site 159	Edge perf. oval disc with notched edge	N/A	Chow-chilla Phase 300 BC-AD 300	About 5cm. in diameter	Moratto 1984:318

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
rufescens	Buchanan Reservoir site 159	Double centperf. rectang.	1	Chow-chilla Phase 300 BC-AD 300	About 4cm long. One end narrower	Moratto 1984:318
cracherodii	Buchanon Reservoir site 117	End perf. triang. segment with round end	1	Chow-cilla Phase 300 BC-AD 300	About 3.5cm wide	Moratto 1984:318
undeter.	Buchanan Reservoir site 106 Burial 72-01	Discs	N/A	14C date 2000 BP+-80 (UCLA 1860)	N/A	Moratto 1984:324
cracherodii	Indian Hill Rock Shelter	Almost square Bead	1	Archaic Middle Horizon	Halfway between Gulf And Pacific	Towndsand 1960
undeter.	Buchanan Reservoir site 159	Ornament	1	14C date 1800+-95 (1-5363)	Found with 12 *Olivella* beads	Moratto 1984:324
undeter.	Buchanan Reservoir site 159 Burial 7206	Discs	N/A	14C date 1630+-80 (UCLA 1860P)	Found in flexed burial with bone wands & whistles	Moratto 1984:324
undeter.	Buchanan Reservoir site 159 Burial 72-05	Ornament	N/A	14C date 1540+-110 (UCLA 1860)	Found in flexed burial with *Olivella* beads	Moratto 1984:324
undeter.	Buchanan Reservoir site 117 Burial 7259	Disc beads	N/A	14C date 1470+-100 (UCLA 1860C)	Found with milling stone, mortar and cairn	Moratto 1984:325
Undeter.	ORA-246	Shell from midden	1	Early	Unit 56, Level50-60cm.	Mason 1992
undeter.	Death Valley IV	End perf. triang. pendant	1	Early Period	About 3cm. long	Moratto 1984:388
undeter.	Death Valley IV	End perf. irreg. pendant	1	Early Period	About 1.2cm long	Moratto 1984
undeter.	Mammoth Creek Cave Mono County	Square bead	1	Early Period	N/A	Enfield and Enfield 1964:418 Moratto 1984:388

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
cracherodii	SCrI-3 Units K-Q Burial P12	Central perf. rectang. beads	13	Eya	N/A	King 1990:270
cracherodii	SCrI-3 Burial P4	Double end perf. rectang. pendant	1	Eya	N/A	King 1990:270
fulgens	SCrI-3 Burial P4	Double edge perf. oval pendant	1	Eya	N/A	King 1990:270
fulgens	SCrI-3 Burial P4	End perf. 2 hole oval pendant	1	Eya	N/A	King 1990:270
cracherodii	SCrI-3 Burial P9	Worked shell piece	1	Eya	N.A	King 1990:270
fulgens	SCrI-3 Burial Q3b	End perf. 2 hole oval pendant	1	Eya	N/A	King 1990:271
rufescens	SCrI-3 Burial Q3b	Whole shell dishes	3	Eya	One dish perforated with punched hole	King 1990:271
undeter.	SCrI-3 Burial P3	Centerperf rectang. beads	21	Eya	N/A	King 1990:271
rufescens	SCrI-3 Burial P3	Whole shell dishes	2	Eya	N/A	King 1990:271
undeter.	SCrI-3 Burial P3	Double centerperf rectang.	1	Eya	N/A	King 1990:271
rufescens	ScrI-3 Burial P3	Whole shell	1	Eya	Contained red ochre	King 1990:271
cracherodii	SCrI-3 Burial P3	Shell spoons	3	Eya	N/A	King 1990:271
undeter.	SCrI-3 Burial Q3	Double centerperf disc	1	Eya	N/A	King 1990:272
cracherodii	SCrI-3 Burial Q4	Whole shell dishes	2	Eya	N/A	King 1990:272

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
cracherodii	SCrI-3 Burial Q4	Whole shell dishes	2	Eya	N/A	King 1990:272
undeter.	SCrI-3 Burial Q2	Rectang. beads large	8	Eya	N/A	King 1990:272
cracherodii	SCrI-3 Burial Q8	Double centperf. rec./trap. ornament	2	Eya	N/A	King 1990:272
cracherodii	SCrI-3 Burial Q1	Whole shell with one punched hole	1	Eya	N/A	King 1990:272
cracherodii	SCrI-3 Burial Q8	Pendant fragment	2	Eya	N/A	King 1990:272
undeter.	SCrI-3 Burial M3	Trapez. bead	1	Eya	N/A	King 1990:272
cracherodii	SCrI-3 Burial M3	Double end perf. edge incised ornament	1	Eya	N/A	King 1990:272
cracherodii	SCrI-3 Burial Q5	Whole shells med. size	3	Eya	N/A	King 1990:273
undeter.	SCrI-3 Burial Q5	Double centerperf serrate edged discs	4	Eya	N/A	King 1990:273
undeter.	SCrI-3 Burial M12	Rectang. beads	21	Eya	Found with a schist pipe which had a perf. aba. disc on one end	King 1990:273
fulgens	SCrI-3 Burial M12	Double centperf. disc	1	Eya	N/A	King 1990:273
undeter.	SCr-I-3 Burial M12	Double centperf. disc	3	Eya	N/A	King 1990:273

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
cracherodii	SCrI-3 Burial M12	Triple perf. small disc	1	Eya	N/A	King 1990:273
cracherodii	SCrI-3 Burial 02	Double centperf. rectang. with incised edge	5	Eya	N/A	King 1990:273
cracherodii	SCrI-3 Burial Q7	Double end perf. trapez. edges incised	1	Eya	N/A	King 1990:274
fulgens	SCrI-3 Burial 07	Double centperf. disc, serrated	1	Eya	N/A	King 1990:274
fulgens	SCrI-3 Burial 010	Double centperf. disc, serrated	1	Eya	N/A	King 1990:274
fulgens	SCrI-3 Burial 09	Double centperf. oval ornament	1	Eya	N/A	King 1990:274
rufescens	SCrI-3 Burial M2	Broken shell	1	Eya	N/A	King 1990:274
undeter.	SCrI-3 Burial M7	Centperf. rectang. beads	8	Eya	N/A	King 1990:274
undeter.	SCrI-3 Cemetery	Rectang. beads	1005	Ez	Largest Early Period village on Santa Cruz Island	King 1990:111
cracherodii	San Nicolas Island	Rectang. beads	4	Ez	N/A	Reinman 1964:9,11
undeter.	ScrI-138 Burial C-13	Centperf. epiderm. disc beads	23	Ez	N/A	King 1990: 270
undeter.	ScrI-3 Burial C7 Units A-I	Rectang. beads	4	Ez	N/A	King 1990:278
undeter.	SCrI-3 Burial C7	Double end perf. pendant	1	Ez	N/A	King 1990:278

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
undetermined	SCrI-3 Burials C3-C4	Rectang. beads	654	Ez	N/A	King 1990:278
undetermined	SCrI-3 Burials C3-C4	Double end perf. Pendant	1	Ez	N/A	King 1990:278
cracherodii	SCrI-3 Burial C3-C4	Centperf. circular ornament	1	Ez	N/A	King 1990:278
undetermined	SCrI-3 Burial C15	Rectang. beads	47	Ez	N/A	King 1990:278
cracherodii	SCrI-3 Burial C15	Double end perf. pendants	10	Ez	N/A	King 1990:278
fulgens	SCrI-3 Burial C15	Double end perf. pendant	1	Ez	N/A	King 1990:278
cracherodii	SCrI-3 Burial C15	Double centperf. disc	1	Ez	N/A	King 1990:278
undetermined	SCrI-3 Burial C14	Rectang. bead	1	Ez	N/A	King 1990:278
rufescens?	SCrI-3 Burial C14	Whole shell dishes	2	Ez	N/A	King 1990:278
undetermined	SCrI-3 Burial C14	Unperf. chipped disc	1	Ez	N/A	King 1990:278
cracherodii	SCrI-3 Burial A2	Double centperf. disc	1	Ez	N/A	King 1990:278
undetermined	SCrI-3 Burial E5	Whole shell dish	1	Ez	N/A	King 1990:278
cracherodii	SCrI-3 Burial C10	Centperf. disc	1	Ez	N/A	King 1990:279
cracherodii	SCrI-3 Burial D2	Double endperf. pendants	9	Ez	N/A	King 1990:280
cracherodii	SCrI-3 Burial I2	Double endperf. pendants	2	Ez	N/A	King 1990:279

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
cracherodii	SCrI-3 Burial E2	Double centperf. disc	1	Ez	N/A	King 1990:280
undetermined	SCrI-3 Burial E3	Centperf. rectang. beads	196	Ez	N/A	King 1990:280
cracherodii	SCrI-3 Burial E4	Centperf. chipped disc	1	Ez	N/A	King 1990:280
cracherodii	SCrI-3 Burial E9	ScrI-3 double centperf. disc	1	Ez	N/A	King 1990:280
undetermined	SCrI-3 Burial H1	Unperf. rectang.	2	Ez	N/A	King 1990:280
cracherodii	SCrI-3 Burial H2	Double centperf. disc beads	2	Ez	N/A	King 1990:280
fulgens	SCrI-3 Burial H2	Double centperf. disc	1	Ez	N/A	King 1990:280
undetermined	SCrI-3 Burial H2	Double endperf. pendants	11	Ez	N/A	King 1990:280
undetermined	SCrI-3 Burial H2	Rectang. beads	75	Ez	N/A	King 1990:280
cracherodii	SCrI-3 Burial H4	Whole shell dish	1	Ez	N/A	King 1990:280
undetermined	SCrI-3 Burial I2	Whole shell dish	1	Ez	N/A	King 1990:279
undetermined	SCrI-3 Burial I4	Unperf. rectang.	1	Ez	N/A	King 1990:280
cracherodii	SCrI-3 Burial I4	Double centperf. discs	2	Ez	N/A	King 1990:280
undetermined	SCrI-3 Burial I4	Double end perf. pendants	8	Ez	N/A	King 1990:280

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
undetermined	SCrI-3 Burial I6	Unperf. rectang.	4	Ez	N/A	King 1990:280
undetermined	SRI-41	Nacreous disc beads	1075	M1	N/A	Orr:1968 165-169
rufescens	ORA-340	Irregular disc	1	M1	Unit 19, level20-30cm.	Mason 1991
undetermined	ORA-340	Disc bead Off cent. perf.	1	M1	Unit 20, level 20-30cm.	Mason 1991
cracherodii	ORA-340	Irregular disc	1	M1	Unit 11, level 20-30cm.	Mason 1991
cracherodii	ORA-340	Disc bead	1	M1	Unit 5, level 40-50cm.	Mason 1991
cracherodii	ORA-340	Disc bead	1	M1	Unit 1, level 20-30cm.	Mason 1991
undetermined	SRI-41	Nacreous rectang.	8	M1	N/A	Orr:1968
undetermined	SBa-81 Burial 1 Ex unit N2a	Disc beads	3	M2a	Excavation depth 24 in.	King 1990:287
undetermined	SBa-81 Burial 2 Ex unit 36	Disc beads	218	M2a	Excavation depth 36 in.	King 1990:287
undetermined	SBa-81 Ex unit 46	Disc beads	2	M2a	N/A	King 1990:287
undetermined	SBa-81 Burial 2	Disc beads	305	M2a	Excavation depth 14 in.	King 1990:287
undetermined	SBa-81 Burial 3 Ex unit 9I	Disc beads	4	M2a	Excavation Depth 30 in.	King 1990:287
undetermined	SBa-81 Buriall Ex unit 10J	Disc beads	255	M2a	N/A	King 1990:287
undetermined	SBa-81 Burial 1 Ex unit 8I	Disc beads	588	M2a	Excavation depth 30 in.	King 1990:287

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
undetermined	SBa-81	Disc beads	1377	M2a	N/A	King 1990:289
cracherodii	SRI-6	Disc beads	12	M2b	N/A	King 1990:288
undetermined	SBa-71 Cemetery	Disc beads	187	M2b	N/A	King 1990:288
undetermined	SRI-83 Cemetery 2	Disc beads	167	M2b	N/A	King 1990:288
undetermined	SRI-83 Cemetery2	Irreg bead blanks	112	M2b	N/A	King 1990:288
undetermined	SCrI-100 Burial L4	Disc beads	11	M3	N/A	King 1990:288
cracherodii	SCrI-83	Disc beads	9	M3	N/A	King 1990:289
undetermined	SRI-154	Disc bead	1	M3	N/A	King 1990:289
undetermined	SBa-72 Burial 9A2	Globular pearl beads	4	L1a	Part of necklace with stone beads	King 1990:169
Sites Dated to Before AD 900 ↑					↓ Sites Dated to After AD 900	
rufescens	Palmdale	Epidermal disc beads	2	L1b	Gifford bead type K1eII	King 1990:186
undetermined	SCrI-100 Burial F32	Undrilled tube blank	1	L1b	N/A	King 1990:167
undetermined	SCrI-100 Burial F14?	Tube beads	16	L1b	N/A	King 1990:292
rufescens	SCrI-100 Burial F18	Epiderm. disc beads	3	L1b	N/A	King 1990:292
rufescens	SCrI-100	Tube beads	2	L1b	N/A	King 1990:292

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
rufescens	SCrI-100 Burial F31	Tube beads	50	L1b	N/A	King 1990:292
cracherodii	SCrI-100 Burial F31	Tube bead	1	L1b	N/A	King 1990:292
rufescens	SCrI-100 Burial F32	Tube bead	1	L1b	N/A	King 1990:292
rufescens	SCrI-100 Burial F33	Tube beads	10	L1b	Four with incised lines	King 1990:292
rufescens	SCrI-100 Burial F41	Tube beads	15	L1b	One bead with clam disc inlay	King 1990:292
rufescens	SCrI-100 Burial F41	Epiderm. beads	3	L1b	N/A	King 1990:292
undetermined	ScrI-100 Burial A13	Tube beads	2	L1c	N/A	King 1990:293
undetermined	SRI-2	Tube beads	17	L1c	N/A	Orr 1968:200
rufescens	SCrI-100	Pendant	2	L1c	Employs area of siphon holes	King 1990:169 Gifford 1947
undetermined	SCrI-100 Burial F7	Tube beads	2	L1c	N/A	King 1990:293
undetermined	SCrI-100 Burial F13	Tube bead	1	L1c	N/A	King 1990:293
rufescens	SCrI-100 Burial F13	Epiderm. disc beads	1	L1c	N/A	King 1990:293
undetermined	SCrI-100 Burial F15	Tube beads	38	L1c	11 with incised lines	King 1990:293
undetermined	SCrI-135 Burial F27	Tube bead	1	L1c	XXX design at ends	King 1990:293
undetermined	SCrI-135 Burial A5	Tube beads	5	L1c	All with incised lines	King 1990:293

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
undetermined	SCrI-135 Burial A9	Tube beads	8	L1c	N/A	King 1990:293
rufescens	LAn-629	Epidermal disc beads	3	L2	San Fernando Valley	King 1990:186
rufescens	LAn-243	Rim, tube, and glob. beads	18	L2	Medea Creek cemetery	King 1990:168
cracherodii	ORA-195	Rim and tube beads	2	L2	Burial 4 Newport B.	King 1990:168
rufescens?	SRI-24	Pearl beads	2	L2a	Burial 3	King 1991:169
cracherodii	SRI-26	Lunate bead1	1	L2a	Burial 12 Gifford type AY3	Gifford 1947
rufescens	ScrI-20 Burial 48	Tube beads	2	L2a	One with XXX Incising	King 1990:293
rufescens	SCrI-20 Burial 53	Epidermal Cylinders	23	L2a	N/A	King 1990:293
rufescens	SCrI-24	Epidermal disc	2	L2a	N/A	King 1990:294
rufescens	SCrI-60 Burial 13	Epidermal disc beads	335	L2a	N/A	King 1990>294
rufescens	SCrI-60 Burial 13	Epidermal cylinder	10	L2a	N/A	King 1990:294
rufescens	SRI-76 Burial 46	Epidermal disc beads	19	L2a	N/A	King 1990:294
rufescens	SrI-76 Burial 46	Epidermal cylinder	2	L2a	N/A	King 1990:294
rufescens	SRI-24	Unperf. epidermal disc bead	21	L2b	Burial 3	King 1990:185
undetermined	SCrI-138	Tube bead	4	L2b	Burials B8,B9 One incised	King 1990:169

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
rufescens?	SCrI-138	Pearl bead	1	L2b	Burial G2	King 1990:169
rufescens	LAn-243	Pendant	1	L2b	Area between siphon holes	King 1990:169
rufescens	LAn-243	Unfinished glob. rim bead	1	L2b	N/A	King 1990:170
rufescens	ScrI-138 Burial B1	Epidermal disc bead	1	L2b	N/A	King 1990:295
rufescens	ScrI-138 Burials B8 & 9	Epidermal Disc beads	7	L2b	N/A	King 1990:295
cracherodii	ScrI-138 Burial N/A	Epidermal disc beads	7	L2b	N/A	King 1990:295
rufescens	ScrI-138 Burials 8&9	Tube beads	4	L2b	N/A	King 1990:295
cracherodii	ScrI-138 Burial 62	Epidermal disc bead	2	L2b	N/A	King 1990:295
rufescens	LAn-264 Malibu	Tubular bead	1	L3	N/A	King 1990:170
rufescens	SBa-46	Globular bead	1	L3	Burial KK 5	King 1990:170
cracherodii	SCrI-138	Epidermal disc beads	92	L3	Burial C-13	King 1990:170
rufescens	SBa-46 Burial VV8	Disc bead	4	L3a	N/A	King 1990:295
rufescens	Santa Rosa Island	End perf elongate pendant, with 4 nat. vent openings	1	probable Late Period	About 6.5 cm Long, and 2.3cm wide Nat vent hole not used	Gifford 1947:12, plate p. 70
rufescens	Santa Cruz Island	Edge perf. eccentric disc notched edge on lower half	1	probable Late Period	About 7.5cm in diameter	Gifford 1947:17, plate p. 70

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
rufescens	ScrI-100 Posa Landing	End perf. elongate pendant with square end	1	probable Late Period	About 10cm long	Gifford 1947:24, plate p.85
cracherodii	Santa Cruz Island, Forney's Cove	Double end perf. elongate pendants Gifford ID no.Z4a	2	probable Late Period	Both about 5cm long and 2 cm in width with notches	Gifford 1947:99
undetermined	Posa Landing SCrI-100	Lunate pendant half disc/ovoid Gifford ID no.AB4aII	4	probable Late Period	Perforation on flat edge side.	Gifford 1947:38
undetermined	Santa Rosa Island	Lunate pendants half disc/ovoid Gifford ID no.AB4aII	7	probable Late Period	Perforation on flat edge side	Gifford 1947:40
undetermined	Santa Rosa Island	Lunate cresent both ends perf.	2	probable Late Period	Incised edges	Gifford 1947:40
undetermined	SCrI-100	Lunate cresent	1	probable Late Period	N/A	Gifford 1947:40
undetermined	SCrI-100	Double centperf. rectang. Bead	1	probable Late Period	About 2.5cm in dia	Gifford 1947:29, plate p. 91
undetermined	Santa Rosa Island Site 30	Double centperf. rectang. beads	66	probable Late Period	Largest about 2.5cm in dia. Smallest about 1cm in dia.	Gifford 1947:29. Plate p. 91
fulgens	Santa Cruz Island, Forney's Cove	Double edgeperf. rectang. edge incised Gifford ID no S8bII	2	probable Late Period	About 3.5cm in dia	Gifford 1947: plate p. 91
cracherodii	Santa Cruz Island, Forneys Cove	Double cent perf. large disc Gifford ID No K3aI	1	probable Late Period	About 7.5cm in dia	Gifford 1947:17
cracherodii	SCrI-100	Disc beads	18	probable Late Period	5 of these are only 5mm. in diameter	Gifford 1947:74

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
undetermined	SCrI-100	Elongate Crescent Gifford ID No AP2aII	8	probable Late Period	Made from the aperture rim.Some 17.5cm. long Ave 12.5cm.	Gifford 1947
undetermined	SCrI-138	Elongate cresent Gifford ID No. AP2aII	6	probable Late Period	Made from the aperture rim	Gifford 1947
undetermined	San Joaqin V.Site 2	Elongate crescent Gifford ID No Ap2aII	14	probable Late Period	N/A	Gifford 1947
rufescens	Santa Rosa Island	Fishook with notched and pointed shank Gifford ID NO AT2bII	1	probable Late Period	N/A	Gifford 1947:44, Plate p. 110
cracherodii	Catalina Island	fishook with nobbed shank Gifford ID no. AT2CIII	1	probable Late Period	N/A	Gifford 1947:44, plate p. 110
cracherodii	San Clemente Island	Fishook with nobbed shank Gifford ID no AT2cIII	3	probable Late Period	N/A	Gifford 1947:44 Plate p. 110
fulgens	Catalina Island	fishook with nobbed shank Gifford ID no.AT2cIV	1	probable Late Period	N/A	Gifford 1947: 41, plate p. 110
fulgens	San Clemente Island	Fishook with nobbed shank Gifford ID no.AT2cIV	6	probable Late Period	N/A	Gifford 1947:41, plate p. 110
rufescens	SCrI-100	fishook nobbed elongate shank Gifford ID no. AT2cIV	1	probable Late Period	N/A	Gifford 1947:45, plate p.110

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
rufescens	SCrI-104	Fishhook with nobbed shank Gifford ID no. AT2cIV	1	probable Late Period	N/A	Gifford 1947:45, plate p. 110
rufescens	Gifford site no.M10 SE bank of Rincon Creek, VenturaC.	Fishhook with nobbed shank Gifford ID no.AT2cIV	1	probable Late Period	N/A	Gifford 1947:45, plate no.110
rufescens	San Nicolas Island	Fishhook with nobbed shank Gifford ID no.AT2cV	17	probable Late Period	N/A	Gifford 1947:45. plate p.110
rufescens	Santa Rosa Island (combined sites)	Fishhook with nobbed shank Gifford ID no. AT2cV	6	probable Late Period	N/A	Gifford 1947:45, plate p. 110
undetermined	San Nicolas Island	Fishhook with nobbed shank Gifford ID no. AT2cVI	4	probable Late Period	N/A	Gifford 1947:45, plate p.110
undetermined	Oro Grande Complex (upper Mojave River)	Centperf. disc	1	M5a Pueblo II	N/A	Moratto 1984:402
undetermined	Buchanan Reservoir site 159 Burial 7601	Disc	1	N/A	N/A	Moratto 1984:324
rufescens	Ker307 *Kashtiq*	Epidermal discs	7	Late Period	From about .5cm. to 1.5cm. in dia	Moratto 1984:143 King 1974
undetermined	SCrI-240 *Kaxas*	Fishhook with square nobbed shank	2	Late Period	Smaller is 1.5cm. in dia. Larger is 3cm. in dia found with large mortars and long pestles	Moratto 1984:131
undetermined	SBa-210 *Noqto*	Fishhook with smooth shank	1	Late Period	About 3cm in diameter	Moratto 1984:131

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
cracherodii	ORA-855	Unperf. disc no. 1710	1	Late Period	Dia. 26.4mm. Thickness 2.5mm. With dark epidermis	Koerper, Earle, Mason and Apodaca 1999
undetermined	ORA-662	Disc	1	Late Period	Similar to above	Gibson and King 1991
undetermined	ORA-855	Disc fragment no.2049	1	Late Period	Possibly a fishook 1.5mm.thick	Koerper, Earle, Mason and Apodaca 1999
undetermined	ORA-855	Endperf. pendant fragment no.1176	1	Late Period	N/A	Koerper, Earle Mason and Apodaca 1999
undetermined	ORA-855	Double end perf. pendant fragment no.1369	1	Late Period	N/A	Koerper, Earle, Mason and Apodaca 1999
undetermined	ORA-855	Rough rectangle no.3217	1	Late Period	Length 95.8mm. Width 35.8mm 7.2mm thick	Koerper, Earle, Mason and Apodaca 1999
rufescens	ORA-855	Fishook with nobbed shank, grooved on both sides	1	Late Period	Dia.14.9mm 3.3mm thick With pink epidermis	Koerper, Earle, Mason and Apodaca 1999
cracherodii	ORA-340	Disc bead	1	Late Prehist.	Unit 17, level 0-10	Mason 1991
cracherodii	ORA-340	Disc bead	1	Late Prehist.	Unit 15, level 20-30cm.	Mason 1991
undetermined	ORA-340	Disc bead	1	Late Prehist.	Unit 13, level 10-20cm.	Mason 1991
cracherodii?	ORA-340	Irregular disc bead	1	Late Prehist.	Unit 13, level 0-10cm.	Mason 1991
undetermined	ORA-1208	Irregular disc, non perf.	1	Late Prehist.	Unit 23, 27.7mm.dia.	Mason 1991
undetermined	ORA-1208	Fish hook fragment	1	Late Prehist.	Unit 34, level 0-10 no perf.	Mason 1991

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
undetermined	ORA-1208	Fish hook fragment	1	Late Prehist.	Unit 27, level 10-20 no perf.	Mason 1991
undetermined	ORA-1208	Fish hook fragment	1	Late Prehist.	Unit 25 no perf.	Mason 1991
undetermined	ORA-1208	Fish hook blank	1	Late Prehist.	Unit 27, level 0-10 Bicon. perf.	Mason 1991
undetermined	ORA-1208	Fish hook blank	1	Late Prehist.	Unit 35, level 10-20cm.	Mason 1991
undetermined	ORA-1208	Shell pieces rep. 331 MNI	331	Late Prehist.	N/A	Mason 1991
undetermined	ORA-1208	Shell pieces rep. 29 MNI	29	Late Prehist.	Feature 1, level 0-10cm.	Mason 1991

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Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
biplicata	ORA-339, unit 1	Spire Removed Bead	1	Early Pre-Milling stone	perpendicular spire removal Level 40-50cm.	Mason 1991 table 33
biplicata	ORA-339, unit 17	Cup bead	1	Early Pre-Milling stone	Level 50-60cm.	Mason 1991 table 33
biplicata	ORA-246, unit 59	Shells	3	Early (Milling stone)	level 80-100cm. 8550+-50 RCYBP	Mason 1992
biplicata	ORA-246, unit 63	Shells	4	Early (Milling stone)	3 -80-90cm. 1 -90-100cm.	Mason 1992
biplicata	ORA-246, unit 56	Shells from midden	30	Early (Milling stone)	level 50-70cm	Mason 1992
biplicata	ORA-246, unit 62	Spire Removed Bead	1	Early (Milling stone)	level 20-30cm Asphaltum stains	Mason 1992
biplicata	ORA-339, unit 28	Spire Removed Bead	1	Early	Oblique spire removal Level 0-10cm.	Mason 1991
biplicata	ORA-339, unit 17	Spire Removed Bead	1	Early	Oblique spire removal Level 30-40cm.	Mason 1991
biplicata	ORA-339, unit 17	Wall disc	1	Early	Level 20-30cm.	Mason 1991
biplicata	ORA-339, unit 19	Cup beads	2	Early	Level 10-20cm.	Mason 1991
biplicata	ORA-660, unit 26	Barrel bead	1	Early	Level 100-120cm. 4.1 X 4.5 mm.dia.	Mason 1992
biplicata	ORA-665, unit 245	Spire Removed Bead	1	Early	Level 30-40cm. 5010-4590BP	Mason 1992
biplicata	ORA-665, unit 982	Spire Removed Bead	1	Early	Level 0-35cm.	Mason 1992

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
biplicata	ORA-665, unit 693	Grooved rectang. bead oval rectang.	1	Early	Level 35-40cm. Irregular perf. hole	Mason 1992
biplicata	ORA-929, unit 26	Spire Removed Bead	1	Early	Level 0-20cm. All levels in 929 dated to 4540-3990 BP	Mason 1991
biplicata	ORA-929, unit 54	Spire Removed Bead	1	Early	Level 50-60cm.	Mason 1991
biplicata	ORA-929, unit 62	Spire Removed Bead	1	Early	Level 50-60cm.	Mason 1991
biplicata	ORA-929, unit 7	Spire Removed Bead	1	Early	Level 0-10cm.	Mason 1991
biplicata	ORA-929, unit 62	Barrel bead	1	Early	Level 80-90cm.	Mason 1991
biplicata	ORA-929, unit 26	Barrel bead	1	Early	Level 10-20cm.	Mason 1991
biplicata	ORA-929, unit 54	Barrel bead	1	Early	Level 0-10cm.	Mason 1991
biplicata	ORA-929, unit 61	Barrel bead	1	Early	Level 40-50cm.	Mason 1991
biplicata	ORA-929, unit 55	Barrel bead	1	Early	Level 10-20cm.	Mason 1991
biplicata	ORA-929, unit 33	Barrel bead	1	Early	Level 90-100cm.	Mason 1991
biplicata	ORA-929, unit 19	Cap bead	1	Early	Level 20-30cm.	Mason 1991
biplicata	ORA-929, unit 33	Cap bead	1	Early	Level 20-30cm.	Mason 1991
biplicata	ORA-929, unit 43	Cap bead	1	Early	Level 20-30cm.	Mason 1991

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
biplicata	ORA-929, unit 60	Rectang. bead, off center perf.	1	Early	Level 80-90cm. Rounded corners, 4.8 X 5.8mm.	Mason 1991
biplicata	ORA-928, unit 13	Spire Removed Bead	1	Early (late Mill. stone)	Level 30-40cm. 4250-3900 BP	Mason 1991
biplicata	ORA-928, unit 15	Spire Removed Bead	1	Early	level 20-30	Mason 1991
biplicata	ORA-928, unit 32	Spire Removed Bead	1	Early	Level 0-10	Mason 1991
biplicata	ORA-928, unit 15	Barrel bead	1	Early	Level 50-60cm.	Mason 1991
biplicata	ORA-928, unit 42	Barrel bead	1	Early	Level 20-30cm.	Mason 1991
biplicata	ORA-928, unit 10	Cup bead off center perf.	1	Early	Level 10-20cm.	Mason 1991
biplicata	ORA-928, unit 20	Cup bead (Deep cup)	1	Early	Level 40-50cm.	Mason 1991
biplicata	ORA-928, unit 23	Cup bead (thin cup)	1	Early	Level 30-40cm.	Mason 1991
biplicata	ORA-339, unit 19	Spire Removed Bead	1	Early	Level 10-20cm. 2780 BP	Mason 1991
biplicata	SRI-3	Spire Removed Beads	189	Ex	N/A	King 1990:285 Orr 1968
biplicata	SRI-3	Rectang. beads	22	Ex	N/A	King 1990:285
biplicata	SBa-142	Spire Removed Beads	65	Ex	N/A	King 1990:285
biplicata	SBa-142	Rectang. beads	3	Ex	N/A	King 1990:285

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
biplicata	SCrI-3	Spire Removed Beads	69	Eya	N/A	King 1990:285
biplicata	SCrI-3	Rectang. beads	408	Eya	N/A	King 1990:285
biplicata	SCrI-162	Spire Removed Beads	498	Eyb	N/A	King 1990:285
biplicata	SCrI-3	Spire Removed Beads	7358	Ez	Spire and base ground	King 1990:285
biplicata	SCrI-3	Rectang. beads	275	Ez	N/A	King 1990:285
undetermined	LAn-828 Antelope Valley, east	Beads	N/A	Intermed iate Horiz.	AKA Saratoga Springs Period	Moratto 1984:389
biplicata	ORA-246	Shells	22	Intermed iate Horiz.	Level 30-40cm.	Mason 1992
biplicata	ORA-246, unit 57	Shells	4	Intermed iate Horiz.	Level 30-50cm.	Mason 1992
undetermined	ORA-1208	Pieces rep. 18 MNI	18	Inter mediate Horiz.	Level 10-20cm.	Mason 1992
biplicata	ORA-340, unit 4	Spire Removed Bead	1	Intermed iate Horiz.	Level 30-40cm.	Mason 1992
biplicata	ORA-340, unit 20	Wall disc	2	Inter mediate Horiz.	Level 20-30cm.	Mason 1992
biplicata	ORA-340, unit 1	Wall disc	2	Inter mediate Horiz.	Level 40-50 One burned	Mason 1992
biplicata	ORA-340, unit 4	Cup bead	1	Intermed iate Horiz.	Level 40-50	Mason 1992
biplicata	ORA-340, unit 19	Cup bead	1	Intermed iate 2780 BP	Level 40-50cm. Burned	Mason 1992

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
undetermined	Indian Hill R.S.	Beads	N/A	Intermediate Horiz.	N/A	Moratto 1984:404
undetermined	SBa-46 Mes. Is.	Disc bead overlay on bone	N/A	M1	N/A	Moratto 1984:161
Sites Dated to Before AD 900 ↑					↓ Sites Dated to After AD 900	
undetermined	Rose Spring Death V.	Cupped beads	3	M1	N/A	Moratto 1984:379
biplicata	SRI-41	Spire Removed Beads	11052	M1	N/A	Orr 1968:165-169
biplicata	SRI-41	Disc and saucer	129	M1	N/A	Orr 1968:165-169
biplicata	SCrI-83	Spire Removed Beads	2099	M1	From Cemetery 2	Orr 1968:165-169
biplicata	SCrI-83	Disc and saucer	10	M1	From Cemetery 2	Orr 1968:165-169
biplicata?	SBa-81	Spire Removed Beads	357	M2a	From burials 1-5	Orr 1968:165-169
biplicata	SBa-81	Disc beads Small perf.	1235	M2a	From cemetery Burials 1-5	King 1990:287
biplicata	SBa-81	Saucer beads Large perf.	5030	M2a	From cemetery burials 1-5 14-36 inch lev.	King 1990:287
undetermined	SRI-34	Spire Removed Beads	50	M4	From Burial 6	King 1990:290
undetermined	SRI-34	Barrel beads	4	M4	From Burial 6	King 1990:290
undetermined	SRI-34	Disc and saucer	5363	M4	From Burial 6	King 1990:290
undetermined	SCrI-83	Disc and saucer	491	M4	From Burial J9	King 1990:290

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
undetermined	SBa-46	Disc and saucer	153	M4	From Burial H4	King 1990:290
undetermined	SBa-46	Disc and saucer	682	M5a	From Burial AAA-1	King 1990:290
undetermined	SBa-46	Disc and saucer	1000+	M5a	N/A	King 1990:290
undetermined	SBa-46	Disc and saucer	554	M5a	From Burial B6	King 1990:290
undetermined	SCrI-100	Disc and saucer	1043	M5a	From Burial B7	King 1990:290
undetermined	SBa-46	Disc and saucer	190	M5b	From Burial O2	King 1990:290
undetermined	SCrI-100	Disc and saucer	1113	M5b	From Burial K21 Applique?	King 1990:290
undetermined	SCRI-83	Disc and saucer	191	M5b	From burial 115	King 1990:290
undetermined	SCRI-83	Disc and saucer	490	M5b	From burial N7	King 1990:290
undetermined	SBa-46	Barrel beads Small	317	M5b	From Burial R5	King 1990:290
undetermined	SCrI-83	Barrel beads Small	656	M5b	From Burial 15	King 1990:290
undetermined	SBa-46	Disc beads	1468	M5c	From Burial F3	King 1990:291
undetermined	SBa-72	Disc beads	485	M5c	From Burial 6b-1	King 1990:291
undetermined	SCrI-100	Disc beads	736	M5c	From Burial K9	King 1990:291

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
undetermined	SCrI-83	Disc beads	3936	M5c	From Burial I12	King 1990:291
undetermined	SBa-46	Spire Removed Beads	822	M5c	From Burial O5	King 1990:291
undetermined	SBa-72	Spire Removed Beads	32	M5c	From Burial 6B-1	King 1990:291
undetermined	SBa-100	Spire Removed Beads	316	M5c	From Burial K9	King 1990:291
undetermined	SBa-72	Split punched beads	2600	M5c	From Burial 6B-1	King 1990:291
undetermined	SCrI-100	Split punched beads	770	M5c	From Burial B8	King 1990:291
undetermined	ScrI-100	Disc beads	1869	L1a	From Burial F5	King 1990:291
undetermined	SCrI-100	Disc beads	1350	L1a	From Burial F21	King 1990:291
undetermined	SCrI-100	Disc beads	1488	L1a	From Burial C17	King 1990:291
undetermined	SCrl-83	Cupped beads	3981	L1a	From Burial C17	King 1990:291
undetermined	SCrl-83	Cupped beads	211	L1a	From Burial F21	King 1990:291
undetermined	SCrI-100	Cap beads	2807	L1a	From Burial F5	King 1990:291
undetermined	SCrI-100	Cap beads	1207	L1a	From Burial K7	King 1990:291
undetermined	SCrI-83	Cap beads	11	L1a	From Burial C21	King 1990:291

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
undetermined	SCrI-100	Cupped beads	493	L1b	From Burial F18	King 1990:292
undetermined	SCrI-100	Cupped beads	1006	L1b	From Burial F31	King 1990:292
undetermined	SCrI-100	Cupped beads	2393	L1b	From Burial F41	King 1990:292
undetermined	SCrI-100	Disc beads	172	L1b	From Burial F18	King 1990:292
undetermined	SCrI-100	Disc beads	104	L1b	From Burial F31	King 1990:292
undetermined	SCrI-100	Disc beads	117	L1b	From Burial F40	King 1990:292
undetermined	SCrI-100	Cupped beads	1046	L1c	From Burial F13	King 1990:293
undetermined	SCrI-100	Cupped beads	179	L1c	From Burial F16	King 1990:293
undetermined	SCrI-76	Cupped beads	107	L1c	From Burial 45	King 1990:293
undetermined	SCrI-135	Cupped beads	70	L1c	From Burial AF	King 1990:293
undetermined	SCrI-100	Disc beads	67	L1c	From Burial F13	King 1990:293
undetermined	SCrI-100	Disc beads	459	L1c	From Burial K22	King 1990:293
undetermined	SCrI-135	Disc beads	4	L1c	From Burial A5	King 1990:293
undetermined	SRI-60	Cupped beads	108	L2a	From Burial 6	King 1990:294

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
undetermined	SRI-24	Cupped beads	3	L2a	From Burial 1	King 1990:294
undetermined	SRI-76	Cupped beads	286	L2a	From Burial 46	King 1990:294
undetermined	SRI-147	Cylinder barrel beads	282	L2a	From Burial 40	King 1990:294
undetermined	SRI-60	Cylinder barrel beads	24	L2a	From Burial 13	King 1990:294
undetermined	SRI-60	Wall disc beads	64	L2a	From Burial 13	King 1990:294
undetermined	SRI-76	Wall disc beads	4	L2a	From Burial 47	King 1990:294
undetermined	SCrI-138	Cylinder barrel beads	92	L2b	From Burial B1	King 1990:295
undetermined	SCrI-138	Cupped beads	162	L2b	From Burial B17	King 1990:295
undetermined	SCrI-138	Cupped beads	47	L2b	From Burial C13	King 1990:295
undetermined	SCrI-138	Cupped beads	290	L2b	From Burial G2	King 1990:295
undetermined	SCrI-138	Cylinder barrel beads	32	L2b	From Burial G2	King 1990:295
undetermined	SRI-60	Cupped beads	2	L2b	From Burial 17	King 1990:295
undetermined	SCrI-138	Wall disc beads	19	L2b	From Burial G2	King 1990:295
undetermined	SBa-46	Disc beads Small	519	L3a	From Burial LLX	King 1990:296

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
undetermined	SBa-46	Disc beads Small	196	L3a	From Burial 0013	King 1990:296
undetermined	SBa-46	Disc beads Small	48	L3a	From Burial VV8	King 1990:296
undetermined	SBa-46	Disc beads Large	113	L3a	From Burial VV8	King 1990:296
undetermined	Ker-307 Kastiq	Cupped beads	9	Late Prehist.	N/A	Moratto 1984:143
undetermined	Ker-307 Kastiq	Full lipped beads	5	Late Prehist.	N/A	Moratto 1984:143
undetermined	Ker-307 Kastiq	Wall disc beads Incised	5	Late Prehist.	N/A	Moratto 1984:143
biplicata	SBa-72	Split punched beads	3	Late Prthist.	N/A	Moratto 1984:143
undetermined	Mammoth Creek Cave Mono Co.	Disc beads	N/A	Late Prehist.	N/A	Moratto 1984:379
undetermined	LAn-488 Antelope Valley, south	Disc beads	N/A	Late Prehist.	N/A	Moratto 1984:379
undetermined	Deep Creek site Mojave	Disc beads	N/A	Late Prehist.	N/A	Moratto 1984:398
undetermined	Oro Grande Victor-ville	Spire Removed Beads	N/A	Late Prehist.	N/A	Moratto 1984:398
undetermined	Oro Grande	Barrel beads	N/A	Late Prehist.	N/A	Moratto 1984:402
undetermined	Snow Creek R.S.	Disc bead	1	Late Prehist.	N/A	Moratto 1984:406
dama	Cahuilla site	Disc beads	N/A	Late Prehist.	N/A	Moratto 1984:407

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
biplicata	ORA-246	Shell	12	Late Prehist.	Level 0-30cm.	Mason 1992
biplicata	ORA-246, unit 62	Shell	1	Late Prehist.	Level 20-30cm	Mason 1992
biplicata	ORA-246, unit 73	Shells	2	Late Prehist.	Level 0-20cm.	Mason 1992
biplicata	ORA-1208, unit 25	Spire Removed Bead	1	Late Prehist.	Level 0-10cm. Waterworn	Mason 1992
biplicata	ORA-1208, unit 37	Spire Removed Bead	1	Late Prehist.	Level 0-10cm.	Mason 1992
biplicata	ORA-1208, unit 38	Spire Removed Bead	1	Late Prehist.	Level 10-20cm.	Mason 1992
biplicata	ORA-1208, unit 32	Spire Removed Bead	1	Late Prehist.	Level 0-10cm.	Mason 1992
biplicata	ORA-1208, unit 30	Spire Removed Bead	1	Late Prehist.	Level 10-20cm.	Mason 1992
biplicata	ORA-1208, unit 38	Barrel bead	1	Late Prehist	Level 10-20cm.	Mason 1992
biplicata	ORA-1208, unit 31	Cup bead	1	Late Prehist.	Level 10-20cm.	Mason 1992
biplicata	ORA-1208, unit 35	Cup bead	1	Late Prehist.	Level 0-10cm.	Mason 1992
biplicata	ORA-1208, unit 27	Cup bead	1	Late Prehist.	Level 10-20cm.	Mason 1992
biplicata	ORA-1208, unit 31	Thin lipped bead	1	Late Prehist.	Level 10-20cm. 5mm. dia. Bicon. perf.	Mason 1992
biplicata	ORA-1208, unit 34	Thin lipped bead	1	Late Prehist.	Level 20-30cm. 5.9-6.9 in dia.	Mason 1992

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
biplicata	ORA-1208, unit 27	Full lipped bead	1	Late Prehist.	Level 0-10cm.	Mason 1992
biplicata	ORA-1208, unit 38	Wall disc bead	1	Late Prehist.	Level 0-10cm.	Mason 1992
biplicata	ORA-1208, unit	Wall disc bead	1	Late Prehist.	Level 20-30	Mason 1992
biplicata	ORA-340, unit 18	Spire Removed Bead	1	Late Prehist.	Level 0-10cm.	Mason 1991
biplicata	ORA-340, unit 17	Spire Removed Bead	1	Late Prehist.	Level 0-10cm. Perpendicular spire removal	Mason 1991
biplicata	ORA-340, unit 4	Spire Removed Bead	1	Late Prehist.	Level 0-10cm. Oblique spire removal	Mason 1991
biplicata	ORA-340, unit 1	Wall disc	1	Late Prehist.	Level 0-10cm. Shiny	Mason 1991
biplicata	ORA-340, unit 18	Wall disc	1	Late Prehist.	Level 0-10cm. Max dia. 3.0mm.	Mason 1991
biplicata	ORA-340, unit 17	Wall disc beads	3	Late Prehist.	Level 0-10cm.	Mason 1991
biplicata	ORA-340, unit 19	Wall disc beads	2	Late Prehist.	Level 0-10cm.	Mason 1991
biplicata	ORA-340, unit 13	Wall disc beads	2	Late Prehist.	Level 0-10	Mason 1991
biplicata	ORA-340, unit 20	Wall disc beads	2	Late Prehist.	Level 0-10cm.	Mason 1991
biplicata	ORA-340, unit 15	Wall disc beads	4	Late Prehist.	Level 10-20	Mason 1991
biplicata	ORA-340, unit 13	Cup bead (callus)	1	Late Prehist.	Level 0-10cm.	Mason 1991
undetermined	Ker 307	Chipped wall discs	5	Mission Period	N/A	Moratto 1984:143

Evidence of *Spondylus* from Southern California and Farwest Archaeologic Sites

Species	Site or Locality	Artifact type	No.	Period or Phase	Description & Comments	References
princeps	San Miguel Island	Disk beads	3	N/A	From a funerary deposition? Red and pink in color	Heye 1921
undeter. *princeps*?	Indian Dan site 45-OK-58 Wash.	Disc bead	1	Archaic Desert Cult.	Columbia Plateau 1000-0 BC	Erickson 1990

APPENDIX B:

PHYSICAL CHARACTERISTICS AND GEOGRAPHICAL DISTRIBUTIONS OF PRINCIPAL MOLLUSKAN SPECIES KNOWN FROM ARCHAEOLOGIC SITES IN THE AMERICAN SOUTHWEST AND SOUTHERN CALIFORNIA

The following biologic and ecologic data emphasize species of the genera *Haliotis, Olivella,* and *Spondylus.* I have targeted these three genera because their shells are so widespread in archaeologic sites throughout the Southwest and Southen California. Species from these genera may be traced to definite points of origin. Biologic data and profiles of some other species of mollusks which appear in the prehistoric record have also been included.

These profiles emphasize the description, comparative characteristics, variability, and habitat locations of the targeted molluskan species. These species come from either the southern California Pacific coast (Californian Molluskan Marine Faunal Province) or the Gulf of California (Panamic Molluskan Marine Faunal Province) (Figs 3, 43).

This compilation of specific molluskan information is useful to archaeologic investigations of marine shell trade because certain marine shells have limited ranges of habitat. These ecologic limitations may greatly narrow and define the source locations that began the trade pathway for numerous Pacific shell objects found in Southwest sites.

The information in Appendix B is intended to provide a basis for the assessment of origins, and a handbook for field and laboratory identification. It covers *Haliotis, Olivella, Spondylus,* and some other molluskan species used prehistorically within the Southwest and southern California. Key references for this material, which are also cited various places within the text, are Abbott (1974), Bevelander (1988), Cox (1962), Dance (1984), Keen (1971), Keen and Coan (1974), Keep (1935), Saul (1974), and White (1971).

Mollusks and Humans

The phylum Mollusca is a large body of diverse animals, comprising as many as 100,000 living species. The soft body parts of most mollusks are protected by a hard carbonate shell, which is produced by specialized tissue called the mantle. In the Class Gastropoda (Composed of 37,500 living species and 15,000 fossil species) the outer shell-producing tissues secrete or form the outer shell at the margin of the aperture. The shells of most mollusks manifest a great diversity of forms, textures, patterns, and colors. Gastropod shells are generally composed of three layers; an outer layer or periostracum, a middle layer or epidermis/dermis (basically composed of calcium carbonate), and a third layer (aragonite) secreted and formed by the mantle, which lies directly over the mantle. In several molluskan species, such as the abalone, this third inner layer may be variably nacreous and pearl producing.

Marine molluskan gastropods, including species of *Haliotis* (abalone), *Olivella, Spondylus,* and others have played significant roles in sustenance and ritual in indigenous societies around the world. The establishment of maritime cultures on the California coast during the early and later Holocene may have been dependent, in part, upon various species of abalone. *Haliotis* is one of the earliest known ritualized faunal genera in North America. Santa Rosa and San Miguel Islands have provided Early to Mid-Holocene evidence of the use of red abalone shells in funerary contexts or rituals (Erlandson and Colten 1991). The diverse and striking iridescence of the interior of abalone shells, more than any other aspect, has made them highly prized by people around the world.

Olivella is probably the most pervasive and widely distributed shell species in the Southwest and Farwest. *Olivella* spire removed beads are found in domestic as well as ritual contexts, and in both elite and common burials. Styles of beads made from various parts of the shell wall are used as chronologic markers of cultural change.

Spondylus probably began its highly ritualized uses in Mesoamerica as a marker of elite social status. Its colored and polished surfaces show resemblace to dried blood, colored corn, flowers, and feathers. *Spondylus* was the principal shell used in prehistoric Mesoamerica and the Southwest for the manufacture of purple, pink, red, and orange jewelry and ritual objects.

Haliotidae

The abalone is a marine mollusc and univalve which, unlike most other snails, does not have an operculum with which the animal can seal iself inside the shell. The aperture of even the smaller species of abalone is so large that this gastropod is often mistaken for a bivalve or clam. East Pacific abalone feed on marine algae captured or scraped from rocks or shells with their rasp like tongue or radula. Abalone are in turn fed upon by crabs, sea otters, octopi, moray eels, cabezon fish, sea stars, and humans (Keep 1935; White 1976). There are some 150 species and subspecies of *Haliotis* distributed around the world. Abalones are regionally referred to as sea snails (United States-Mexico), ormers (northwestern France), and ear shells or sea ears (Australia)(Dance 1974). Abalone are found in temperate or tropical seas from high intertidal zones to depths of one-hundred and ninety meters (Cox 1962; Keen and Coan 1974).

Fossil abalones are known from the upper Cretaceous, Eocene, Oligocene, Miocene, Pliocene, and Pleistocene. Fossils recovered in California closely resemble living forms. Fossil abalones have also been recovered in Europe, Africa, Japan, Australia, Asia Minor, and the Mediterranean area (Abbott 1974; Cox 1962; Keen 1971).

Abalones were mentioned as early as the fourth century BC by Aristotle, and Japanese records describe an incident in their abalone fishery that took place in AD 425. Linne, in 1740 was the first to apply the generic name *Haliotis*, while Cuvier, in 1817, was the first to publish a detailed account of abalone anatomy (Abbott 1974; Dance 1984).

Abalones in New World Prehistory

In California, the earliest evidence for the use of abalone as food dates to about 11,500 years ago at Daisy Cave on San Miguel Island. Ornamental use of abalone begins by at least 9000 years ago at the same site (Erlanson 1991; Jones 1992).

In the prehistoric American Southwest, abalone beads, pendants, and discs (traded from the California coast) were popular ritual adornments during the early Basketmaker Period (AD 200)(Haury 1976; Jernigan 1978). In the ritual-jewelry complexes of the prehistoric Great Basin, the Columbia Plateau, and the Southwest, drilled abalone tabs were often combined with different species of *Olivella* shells (especially in necklaces) which are indigenous to both the California and Panamic Marine Faunal Provinces. In the prehistoric Southwest and northern Mesoamerica, abalone shell pieces were fashioned into geometric tesserae that were used in composite mosaic constructions. *H. cracherodii (as tesserae)* have been found in both Viejo and Medio Period (AD 1 to AD 1000) excavations in the site of Casas Grandes, Mexico (DiPeso 1974).

Pacific Coast Abalones

The eight Pacific Coast abalone species (RED, BLACK, GREEN, PINK, WHITE, THREADED, PINTO, and FLAT) are confined to the Californian, Oregonian, and Aleutian Marine Faunal Provinces, which extend along the northeast Pacific coast from Alaska to Baja California. Occasional hybrids or ecologic forms of *Haliotis* are not uncommon. These hybrids may considerably add to the difficulty of species-subspecies identification. Twelve types of hybrid crosses have been recognized. In commercial catches approximately two individuals per thousand may be hybrids (Abbott 1974).

Red Abalone
Haliotis rufescens Swainson, 1822

Differentiating Characteristics:

Reds are the largest of all abalones, reaching more than 12 inches in diameter. In September 1993, a 12.3 inch (312 mm) specimen was captured in northern California. In 1999 a specimen, reported from northern California, was over 14 inches long. Subcircular to ovate shell. Shell very thick with numerous spiral growth ridges. Outside (epidermal) color of the shell is usually a dull brick red. Surface sculpure of the shell is lumpy, and usually covered with marine growth. The nacreous inner shell is highly iridescent with a large prominent muscle scar having dark green markings. The muscle scar has a central flow area with smooth borders crossed by numerous parellel fine brownish colored lines. The outer lip of the shell extends over the inner nacreous surface typically forming a narrow red rim. The rim may occasionally be mottled, or colored green, brown, blue, or orange. Three to four open vent holes are typically slightly raised, and oval, but specimens with no vent holes or more than four holes are found. Body and epipodium are smooth and usually colored black, although in some individuals the upper edge of the epipodium is colored white. Edges of the epipodium are scalloped, with black tentacles extending beyond the edge of the shell (Abbott 1974; Cox 1962; Dance 1984; Keen 1971.

Figure 43. Principal Habitation Zones of *Haliotis, Olivella, and Spondylus* used in the Southwest and Southern California. Dots represent modern cities.

Cultural Uses:

Food, beads, money, ornaments, fishhooks, tools, scoops, containers, ritual costumes, inlay, and paint coloring.

Distribution:

Sunset Bay, Oregon, to Turtle Bay, Baja, California. Found in all the Channel Islands, and the Farallones. Found in archaeologic contexts throughout the western United States, and east to Texas.

Habitat and Ecology:

Inhabits rock shores from near the high tide mark out to at least 540 feet. In northern California it is found near shore in relatively shallow water. South of Point Conception it becomes increasingly rare and is found in deeper water. Red abalone seem to require a very active surf, and are usually not found in sheltered bays. After a beginning diet of diatoms and *Coralline* algae, reds begin to eat macroalgae such as bull kelp, *Nereocystis lutekeana*, which they prefer. Reds have also been seen feeding on a variety of marine algae including the sea palm (*Postelesia palmaeformis*).

Black Abalone
Haliotis cracherodii Leach, 1817

Differentiating Characteristics:

The most intertidal and warm water tolerant of all the east Pacific abalones. Color of the outside shell is typically dark blue or greenish black, although orange or green specimens may be found. The exterior is usually quite smooth with little or no marine growth. The inner shell is very nacreous and silvery, with pink, green, and gold reflections. Muscle scars typically appear only in older individuals. Shell is deep and bluntly oval, although variations in shape and form are common. The shell may reach more than eight inches in diameter. The outer edge of the shell projects over the inner nacreous surface forming a narrow dark blue, black, green, or orange rim. Vent holes are typically flush with the surface of the shell, are small in diameter, and five to nine are usually open. The body is smooth, black in color with small scallops along the upper edge of the epipodium. Scattered short slender black tentacles protrude slightly beyond the edge of the shell.

A subspecies found on Guadalupe Island, Baja California *H. cracherodii californiensis* Swainson is characterized by its circular shell shape, and 12 to 18 tiny vent holes.

H. cracherodii imperforata Dall is a freak or subspecies which has no open vent holes. These shells are often circular and have been found in archaeologic sites in southern California.

Cultural Uses:

Food, beads, ornaments, fishooks, fish bait, tools, scoops, music, money, inlay, and containers. Subspecies of *H. cracherodii were* used as specialized containers because of their lack of vent holes and distinct circular shape.

Distribution:

Coos Bay, Oregon (Sunset Bay) to Cabo San Lucas, Baja California. Found in all the Channel Islands, Guadalupe Island, and the Farallones.

Habitat and Ecology:

Found from near high tide out to 20 feet, with most being intertidal. Often found crowded close together, or stacked two or three on top of each other. The intertidal area is often lacking in macroalgae, which prompts the blacks to graze on each other's shells. After an initial diet of diatoms and *Coralline* algae, blacks begin to eat (after attaining 10 mm in length) macroalgae such as *Macrocystis spp.* (Leighton 1959). Experimentally fed blacks showed a preference for feather boa kelp (*Egregia laevigata*). Blacks are known to thrive on a diet of *Pelvitia fastigiata*, and *Gigartina canaliculata* (red algae).

Green Abalone
Haliotis fulgens Philippi 1845

Differentiating Characteristics:

Adult shell is oval, thin to fairly thick, reaching 10 inches in greatest diameter. Today, 8 inch individuals are rare. Outer surface is olive green to reddish brown in color, regular in sculpture and form, with numerous broad, flat-topped ribs separated by narrow, straightsided grooves. The vent holes are small, circular, only slightly elevated, and typically five to seven are open. A groove often parallels the outer edge of the line of vent holes. The shell may be encrusted and covered with marine growth. The shell interior is brilliantly iridescent, with shades of green, blue, pink and iron-copper stain. The muscle scar is one of the largest among haliotids, and brilliant in appearance. The epipodium is olive green to cream, with patches of brown. It is scalloped along the edge and small protuberences give it a textured and frilled surface. The tentacles are grayish green, short and thick, and project from under the shell enough to be seen. There is considerable variation within this species. *H. spendens Reeve, H. turveri, and H. revea Bartch* are all synonyms.

Cultural Uses:

Food, beads, ornaments, tools, scoops, containers, and inlay

Distribution:

Point Conception, California (a few specimens are occaionally found north of Point Conception. I found several greens north of San Simeon in May, 1984) south to Bahia Magdalena, Baja California. A small subspecies (*H. fulgens guadalupensis*) is found on Guadalupe Island, Mexico. Greens flourish especially well on the southern Channel Islands, such as Catalina and San Clemente.

Habitat and Ecology:

Greens are a shallow water species inhabiting rocky areas from low tide out to about 25 feet. Individuals in the southern part of their range have been taken at 70 feet, but the majority thrive between 10-20 feet. Greens begin life on a diet of diatoms and *Coralline* algae. Adult greens are often seen feeding on feather boa kelp (*Egregia laevigata*) which, like the green abalone is a littoral, shallow water species. Adult greens also feed on *Macrocystis pyrifera*. Greens seem especially suseptible to attack by *Cliona*, a yellow boring sponge, which may bore hundreds of pencil lead size holes in the epidermis of many greens and reds. This weakens the shell and is a cause of adult abalone mortality.

Pink Abalone
Haliotis corrugata Gray 1828

Differentiating Characteristics:

The shell may be very thick, is circular, and when adult is typically highly arched. The epidermal surface is roughened with numerous parallel corrugations. Round to oval vent holes are highly elevated and number from two to four. The edge of the shell is sharply scalloped due to the line of corrugations coming to the shell aperture. The exterior (epidermis) of the shell may be colored dull pastel olive green to reddish brown. The shell surface may be covered by heavy marine growth such as *Vermetus* worm castes. Interior of the shell is highly iridescent, predominately colored pink with traces of green and blue. The muscle scar is typically large (3 inches in diameter) and shows brilliant dark green and pink markings. Juvenile specimens are very flat in shell morphology, until attaining 4 inches in diameter, after which their shells begin to arch. Adult shell forms and colors may vary somewhat, which may cause objects made from pink abalone to be mistaken for other abalone species such as green and red. The epipodium that extends below the shell has a roughened texture. The upper edge of the epipodium is colored black and white, and has a lacelike structure. The long slender tentacles and the body are blackish.

Cultural Uses:

Food, beads, ornaments, containers, and inlay

Distribution:

Point Conception south to Turtle Bay, Baja, California. Pinks seem to thrive on all the Channel Islands, particualarly on the southern Channel Islands of San Clemente and Catalina, where there are large beds of giant brown kelp (*Macrocystis*).

A subspecies is found on Guadalupe Island, Baja California *H. corrugata guadalupensis*, is characterized by its relative small size. This subspecies may also be found on the Cortez Bank.

Habitat and Ecology:

Found along rockey shores from the intertidal out to as deep as 180 feet in the southern part of its range. Most pinks reside in depths between 20-80 feet. Pinks are found in both protected coves and bays, and on the open coast in active surf. Pinks, like most other Pacific abalones begin life with a diet of diatoms and *Coralline* algae. Adult pinks typically feed on *Macrocystis pyrifera*, but may also consume other forms of marine algae. While young pinks are known to be quite mobile, adult pinks tend to become sedentary, and may remain in the same position for years without moving.

White Abalone
Haliotis sorenseni Bartsch 1940

Differentiating Characteristics:

The adult shell is relatively thin, oval in shape, and highly arched. Shell exterior is typically colored reddish brown, but may be orange or red. Surface sculpture of the shell is regular with low spiral ribs. Shell surface may be covered with *Vermetus* tube dwelling mollusks. Three to five holes are typically open, and are the most elevated of the eight California species. The shell interior is relatively smooth and usually pearly white and pinkish. The edge of the shell aperture is often marked with a thin red border. The muscle scar is usually not apparent. Clumps of nacreous turquoise colored clumps may be scattered throughout the interior. Shell diameter may be as much as 10 inches. The epipodium appears textured and is yellow-green and/or beige in color. The epipodium edges are lacy and scalloped, and may be edged in orange. The tentacles are long and yellowish green. The portion of the mantle over the head region is edged in purple. The body and foot of the animal range from yellow to orange in color.

Cultural uses: Food; other cultural uses are undetermined.

Distribution:

Found from Point Conception to Turtle Bay, Baja, California. Most abundant on the Channel Islands of Santa Catalina, Santa Cruz, and San Clemente. Once very abundant off peninsulas such as Palos Verdes.

Habitat and Ecology:

Generally a deep water form. May be occasionally found as shallow as 15 feet (in the northern part of its range), to depths of more than 150 feet. Most whites are found throughout their range near depths of 100 feet. Whites begin life consuming pelagic plankton, then transition to specific diatoms and *Coralline* algae. As adults, whites feed on elk kelp (*Pelagophyeus porra*), a deep water form of Pacific macroalgae.

Pinto (Japanese) Abalone
Haliotis kamtschatkana Jonas 1845

Differentiating Characteristics:

The most northerly of Californian species. The shell form and epidermal color may vary considerably. The largest specimens (up to 6 inches) are generally found in the northern part of its range, from southern Alaska south to Point Sur, California. The shells of these northern pintos tend to be long, narrow, and highly arched. In the southern part of its range (Point Sur to Point Conception) pintos tend to be smaller, flatter, and more oval in shape. In all pintos the shell is thin and variously colored dull brick red to orange or green, with occasional pinto patterns of blue, white, or green. The interior of the bumpy and uneven shell is usually a silvery mother of pearl. The muscle scar is usually not apparent, but may show green colored nacre at the attachment. Vent holes are elevated and number from 3 to 6. A grooved channel may be seen under the line of vent holes running parellel to the edge. The epipodium is colored greenish brown, with a scalloped and lacelike edge. The body is tan and grrenish brown, with occasional edgings of orange. The slender tentacles are usually colored green, and extend beyond the edge of the aperture.

Cultural Uses:

Food, container, fish bait, scoop, ornament, inlay

Distribution:

Found from Sitka, Alaska to Point Conception, California. The actual Japanese form of the pinto is a separate subspecies. Native to the Oregon coast.

Habitat and Ecology:

In Alaska, pintos are found inter-tidally among the rocks. Farther south, in California, pintos are commonly found at depths between 35 and 50 feet. Pintos begin life, like most other Pacific abalones, on a diet of pelagic plankton and *Coralline* algae. As Adults they primarily rely on various forms of algae, which grows upon their own shells and the local substrate. The diverse diet of diatomaceous and

Coralline algae as adults is largely responsible for the mottled and variable colors of pintos. This species was a valuable food resource to Northwest coastal peoples.

Flat Abalone
Haliotis walallensis Stearns 1899

Differentiating Characteristics:

Shell is typically long, oval, narrow, and is quite flat in form, even in the adult stage. Open vent holes may number five to eight, with six being typically open. There is very little variation in shell morphology, with shells attaining more than seven inches in diameter. Surface sculpture of the shell is regular with numerous rounded ribs which are crossed by fine lammelae-like striations. The inside of the shell is moderately brilliant, with tints of pink and green. Epidermal color may vary from dull brick red, to mottled green, blue, white, and red/orange. The muscle scar is not usually apparent, but some individuals may have small clumps of green and brown nacre at the attachment area. The body is yellow and brown in basic color, with occasional tints of green. The epipodium is rough in texture, its upper surface lacelike, and colored yellow-green with occasional large spots of brown and green. The slender tentacles are dark green.

Cultural Uses:

Food, container, ornament; other cultural uses are undetermined.

Distribution:

British Columbia to La Jolla, California. Generally rare within its range, and especially so south of Monterey Bay. Once abundant around Gualala, California. Flats are native to the Oregon Coast.

Habitat and Ecology:

A subtidal species found at depths to 100 feet. Begins life feeding on a diet of pelagic plankton, followed by *Coralline* algae. In addition to a diet of low growing algae, adult flats consume a significant amount of diatomaceous and *Coralline* algae, which is a principle reason for the appearance of their mottled colored shells.

Threaded Abalone
Haliotis assimilis Dall 1878

Differentiating Characteristics:

The shell form is oval, and may be highly arched. Shell surface is regular, and formed by broad spiral ribs interspaced with several low narrow ridges. Shell may be thick to thin, and attain a diameter of more than 6 inches. Vent holes are small, raised, and four to six are typically open. A shallow groove may be seen between the line of vent holes and the shell aperture. Color of the shell epidermis is greenish to orange, with random spots of red, yellow, white, and brown. The outer lip of the shell epidermis extends over the inner nacreous surface, producing a narrow green or brown border. Shell interior has a light, white, silvery iridescence. The muscle scar is usually not apparent, but some individuals may manifest greenish colored nacre in the area of the muscle attachment. The body is yellowish with random spots of brown. The epipodium is banded cream and tan. Upper edge of the epipodium is fringelike, and spotted with white. The edge of the foot, mantle, and eye stalks are tinted in orange. The relatively short tentacles are yellow-brown in color.

Cultural Uses:

Food, container, scoop; other cultural uses are undetermined.

Distribution:

Often considered a mainland species, threaded abalones are found from Point Conception, south to Turtle Bay, Baja, California.

Habitat:

Occasionally found as shallow as 10 feet in the northern part of its range, but most are found in 70-100 foot depths. Threaded abalones begin life, like most other abalones, feeding on pelagic plankton and *Coralline* algae. As adults, *Coralline* algae and some diatoms constitute a major portion of the threaded abalone diet.

Olividae

Members of the subfamily Olivellinae, commonly referred to as the *Olivellas* (family Olividae), are among the most abundant snails of Pacific beaches and estuaries. The genus *Olivella* is basically distinguished from the genus *Oliva* by its smaller shell and the possession of an operculum (aperture door). In most *Olivellas* the operculum is a relatively thin horny scale which is not large enough to completely close the shell aperture.

The entire family of Olividae is generally characterized by glossy elongated shells with numerous wrinkles and fine folds on the columella. Species of the genus *Olivella* are marine univalve gastropods, which are primarily carnivorous scavengers. The shells of these digging gastropods are typically characterized by elongated oval whorls, narrow apertures, diminished spires, and a notched canal. In life, the shells of this family (although usually covered by a fleshy mantle), are strikingly shiny and glasslike, until they are beached and exposed to the elements.

Four principal species of *Olivella* have been found in archaeologic sites in the Southwest and southern California. In their relative order of prominance, these are: *O. biplicata, O. dama, O. pedroana, and O. baetica*. Of these four species, *O. dama* is the only species not indigenous to the Pacific Marine Faunal Provence. *O. dama* is native to the northern sections of the tropical Panamic Marine faunal Provence.

The Principal Western *Olivellas*

The following is a descriptive guide to the principal species of *Olivella* which have been recovered in Southwest and Farwest archaeologic sites. These profiles are intended to provide a means of differentiating western North American *Olivella* species through comparative description, ecology, use, and origin or habitat. By these considerations and delineations trade routes, origins, motivations, and relationships within and between the Southwest and Farwest, may be better understood.

The *Olivella* shell may have been initially seen as similar in form to seeds. Additionally, the perfect spiral at the spire end, uniform small size, Pacific source, color, and glossy shine (before fire parching to whiteness when desired) may have all contributed to the widespread ritualization and elite use of *Olivella biplicata* in the Southwest and far west for ornament, ritual, and status.

Purple Dwarf Olive
Olivella biplicata (Sowerby, 1825)

Differentiating Characteristics:

Olivella biplicata is the largest in size (to 1.5 inches in length) and generally one of the more rotund in shell form, of the eastern Pacific *Olivellas*. The shell is heavily made. Shell has four whorls, with a greatly enlarged body whorl. Color is rather variable, and may be regionally specific. Shell color ranges from almost white to dark bluish gray or brown. Shell is typically colored purple at the suture and canal. Columellar wall has a heavy callus layered with enamel, with two pleats at the base. Aperture is long, being narrow at the spire end, and wider at the canal. A notch is present at the canal end. *O. pedroana* may be mistaken for immature *O. biplicata* because of its occasional similar rotundity, but overall shorter length. Common synonyms are *O. angelena, O. fulcana, and O. parva (*The Nautilus 1961. vol.73, p.65 and p.95. Principal identification is determined by size (largest), rotundity, lack of shell markings (except for fine growth lines), very short spire, and coloration (Abbott 1974; Dance 1984; Keen 1971; Keep 1935; White 1971).

Cultural Uses:

Whole as an ornament or spire removed bead. The shell wall was used to manufacture a great variety of beads. Manufactured beads and spire removed whole shells were strung for use as currency. Probably used occasionally for food (soup or stew) and as as fish bait. Finely ground shells may have had several practical and symbolic uses. May be symbolically associated with seeds, fertility, wealth, and the ocean.

Distribution:

From Northwest Canada and Vancouver Island to La Paz, Baja California.

Habitat and Ecology:

Intertidal to depths of 20 feet. Found in colonies on sandy beaches, sandflats, and in estuaries along the northeast Pacific Coast. Rarely seen in life due to burrowing habits. Carnivorous. In the northern extent of its range, it is often found in the company of *O. baetica*.

Dama Dwarf Olive
Olivella dama (Wood 1828)

Differentiating Characteristics:

May be as much as 20mm in length, and 9mm in diameter. Typically, the shell has five whorls, with brown streaks at the suture line. The spire is almost as long overall as the aperture. The aperture is long and narrow, and usually no more than half the total length of the shell. Shell is more elongated, with a longer, more pointed spire than *O. biplicata*. Tip of the spire is usually purple or violet in color. The outer lip is brownish within. Shell is basically white with brownish or grayish zigzag lines, and scalloped or chevron shaped markings on the body whorl. Markings on the main body whorl are blocky and irregular, unlike *O. biplicata*, which is relatively unmarked (except for fine growth lines), and evenly colored. The faciole may be white or shades of yellow. The enveloping mantle of the living animal is white. This is the type species of the genus *Olivella*. Most common synonyms are *O. purpurata* Swainson (1831), and *O. lineolata* Gray (1839). Principle idenification is by small size, zigzag lines and chevron markings on the main body whorl, and elongated and pointed spire. Not as rotund as *O. biplicata* (Abbott 1974; Dance 1984; Keen 1971; Keep 1935).

Cultural Uses:

Whole as an ornament or spire removed bead. The shell wall was used to manufacture several forms of discoidal beads. Possibly used occasionally as fish bait. Probably competed with *O. biplicata* throughout prehistory as the principally used species of the genus *Olivella* within western North America.

Distribution:

Panamic Marine Faunal Province from the extreme northern area of the Gulf of California (Puerto Penasco and San Felipe), as far south as Mazatlan (possibly Acapulco) on the west Mexican coast. From the same areas of the Gulf of California are found the similar species of O. zaneota Duclos (1835), and O. fletcherae Berry (1958).

Habitat and Ecology:

Found on sandy beaches and sand spits. Carnivorous scavenger. Often found in the company of *Oliva incrassata*.

Beatic Dwarf Olive
Olivella baetica (Carpenter 1864)

Differentiating Characteristics:

As much as .75 in. in length. The shell form of *O. baetica* is basically more elongate than *O. biplicata*, although rotund shell forms may be seen. Shell thickness is relatively thin. Shell is colored dull tan or brown, with purple and brown colorations which are usually more pronounced near the suture. Faciole is typically white, stained with brown. The first to third whorls after the apex are commonly bluish purple. *O. diegensis* and *O. mexicana* are synonyms. Principal identification is by small size, zigzag lines on the main body whorl, white faciole, and thin shell.

Cultural Uses:

Whole as an ornament or spire removed bead.

Distribution:

Kodiak Island, Alaska to Turtle Bay, Baja, California.

Habitat and Ecology:

Shares the same habitat as *O. biplicata*, but is smaller and not as common. Basically a carnivorous scavenger. Most northerly species of *Olivella* on the Pacific Coast

San Pedro *Olivella*
Olivella pedroana (Conrad 1876)

Differentiating Characteristics:

Up to 15mm in length. Generally shows a longer and more pointed spire than *O. biplicata*. Though similar in length, *O. pedroana* is often somewhat more rotund and less elongated than *O. baetica*. Shell is colored light buff to brown or gray, with long axial stripes of darker brown. Shell is stout with a heavy callus. The faciole and callus are usually white. The lowest columellar ridge is single. The inner edge of the outer lip is usually white, and the main body whorl is usually soft brown. *O. pycna* Berry 1935 (mentioned in Bennyhoff and Hughes 1987), and *O. intorta* Carpenter 1857 are also this species. Principal identification is made by rotund to elongate shell form, pointed spire, and brown coloration of main body whorl.

Cultural Uses:

Used as an ornament for necklaces or dress fringe (whole, spire removed) by a number of California and western groups, including the Hupa (The Nautilus vol. 55, p.92; 1942). Often used in combination with young *O. biplicata* of about the same size. The University of California Museum of Anthropology at Berkeley possesses at least 885 archaeologic specimens, mostly provenienced from Indian mounds in central California.

Distribution:

Coos Bay, Oregon to Turtle Bay, Baja California. Common in the vicinity of Cresent City, California.

Habitat and Ecology:

Found in depths from one to fifteen fathoms, in sandy areas that may be somewhat protected from heavy surf.

Spondylidae

These brightly colored and "thorn-encrusted" bivalve Pelecypods or clams are exclusively native to warm or tropical seas. They are commonly referred to as thorny oysters, although they are not closely related to the true oysters (*Ostrea spp.*). Adult *Spondylus* are permanently attached to substrate objects, such as rocks or coral, by their right valves. The exterior shell surface of most species is comprised of raised and narrow ridges which are variably spiny. The unusual ball and socket hinge consists of two interlocking teeth in each valve. It is often necessary to break these interlocking hinge teeth in order to separate the valves.

Small archaeologic artifacts, made from colorful species of *Chama* may be confused with *Spondylus* artifacts because of similar colors and hardness. Members of the *Chama* genus, however, do not possess the ball and socket hinge of the Spondylidae, nor do Californian species of *Chama* ordinarily possess the brilliant colors or elongated thorny projections of *Spondylus*. Objects made from *S. princeps* may also be confused with red or pink artifacts made from *Haliotis* epidermis, and with objects made from red or pink coral, which entered Native American culture after the Historic Period.

Spondylus and the Prehistoric World

Spondylus was extremely important to peoples of both prehistoric and historic Europe. During the Neolithic, Aegean *Spondylus (S. gaederopus)* served as a raw material for the manufacture of purple colored high status prestige goods, such as those found in Neolithic burials throughout southeastern Europe (Shackleton and Renfrew 1970).

In Asia, *Spondylus* species have been ritualized for thousands of years, and have been symbolically associated with chrysanthemum flowers. The hard, sharp, brightly colored projections of the *Spondylus* shell may have been symbolically seen as petrified petals or feathery fronds in both the Old, and New Worlds (Abbott 1974; Dance 1984). Before the advent of the Spanish in Mesoamerica and the Southwest, *Spondylus* was the principal source of workable red, pink, purple, or orange material hard enough for the manufacture of lustrous and permanent jewelry work. After the Spanish incursion, red coral began to replace *Spondylus* as a hard jewelry material (Haury 1976; Jernigan 1978).

Purple Thorny Oyster
Spondylus calcifer (Carpenter 1857)

Differentiating Characteristics:

Largest and heaviest shell and body (150mm in diameter and over 3 pounds in total weight) of all the American species of *Spondylus*. Adult shells show a typical wide band of dark purple, lavender, or reddish purple on the inside shell margins. Orange colors may also be present on the umbo or outer shell, but are usually minor. The thick, heavy, roundly oval valves are usually riddled with the burrows of sponges and other parasites. These burrows and holes, which are often serpentine and the size of a pencil lead, are diagnostic for artifacts made from most species of *Spondylus*, especially *S. calcifer*. It is difficult to find an adult Pacific *Spondylus* without a few parasitic holes. Common synonyms include *S. limbatus, S. radula, and S. smithi*. Young shells of *S. calcifer* may be easily confused with *S. princeps*. *S. princeps*, unlike *S. calcifer*, does not typically manifest a dark purple shell color as an adult.

Cultural Uses:

As beads, jewelry, inlay, ornament, and money. *S. calcifer* (calcifer means lime-bearer) was used by the colonial settlers of the Pacific side of central America, as a source of lime for making cement. Globular, elongate, or discoidal beads, fetishes or zoomorphs were and still are made from the colored portion of the shell or inner band. May have some ritual connection or similar worth to purple quahog, purple dye *Murex,* and purple hinged rock oyster (*Hinnites*). May be symbolic of venous blood. This species, because of its purple color, may have been specifically associated with the identification and demarcation of political elites.

Distribution:

Panamic Marine Faunal Province. From the head of the Gulf of California (San Felipe and Puerto Penasco) to Ecuador.

Habitat and Ecology:

Filter feeder in depths of 20 to 150 feet. Completely sedentary as adults.

Pacific Thorny Oyster
Spondylus Princeps (Broderip 1833)

Differentiating Characteristics:

Valves may be up to 5 inches in diameter. Color is variable and regional. This species is often considered one of the most brilliantly colored of all Spondylidae. Synonyms are *S. pictorum,* (Schreiber 1793), *S. bicolor* (Sowerby 1847), and *S. dubius and leucantha*. Thorny spines of *S. princeps* are generally longer and straighter than those of *S. calcifer and S. americanus*.

Subspecies: *Spondylus princeps unicolor* (Sowerby 1847) may be an ecologic form of the variable *S. princeps,* rather than an actual subspecies. Rows of spines are more widely spaced than in *S. princeps,* with three rows of smaller spines between the primary rows. Color is variable from white to orange, pink, and red. Colored inner band is narrow or nonexistent. Reported from as far north as Cedros Island on the Pacific side of the Baja peninsula, south into the Gulf of California to Jalisco, Mexico.

Cultural Uses:

As globular, elongate, dentate, or discoidal beads, and as ornaments, and inlay. May have been culturally significant because of its resemblance to dried human blood, and may have some symbolic association with arterial blood. Jewelry made from the epidermis of *H. rufescens* may closely resemble similarly shaped jewelry made from *S. princeps.*

Distribution:

Gulf of California; Conception Bay to Jalisco, Mexico.
Habitat and Ecology:

Adult is a sedentary filter feeder. Found live at depths of 7-30 meters. Shells rarely found on beaches with intact thorny projections, but may still be used to produce colorful jewelry.

Orange *Spondylus*
Spondylus ursipes (Berry 1959)

Differentiating Characteristics:

Valves are ovate in general shape. Length 126 mm, width to 100 mm. Spines and shells are somewhat similar to *S. calcifer,* though smaller. Inner shell and narrow inner colored band are usually shades of bright orange.

Cultural Uses:

Because of its distinctive orange coloration this subspecies, and the area of its habitation, may have been of ritual, strategic, and economic importance, to each of the sequential political states of prehistoric northern Mesoamerica.

Distribution:

Found in the vicinity of Angel de la Guarda Island, in the central portion of the Gulf of California.

Habitat and Ecology:

Northern area of the Panamic Marine Faunal Province.
Filter feeder at depths of 50 feet.

Atlantic Thorny Oyster
Spondylus americanus (Hermann 1781)

Although *S. americanus* is a southern Gulf of Mexico and Caribbean species, it is included here because of far reaching trade routes throughout virtually all of prehistoric North America and Mesoamerica. These established routes often transported small, rare, and imperishable objects thousands of miles from their original sources.

Differentiating Characteristics:

Round or oval valves may be four inches in greatest diameter. Spines may be two inches in length, are usually bent or curved, and are not as numerous or as close together as in the Panamic *S. princeps*. Because of stubby spines, young *S. americanus* greatly resemble species of *Chama*. Color may be quite variable. Valves are typically red, pink, or orange. The entire shell and spines may be one color or white, while the umbones may be yellow, purple, or red. Synonyms include *S. americanus* Lamark 1818), *S. echinatus* (Martyn) , and *S. dominicus* (Roding).

Cultural Uses:

As jewelry, currency, transportable wealth, funerary offering, and ritual containers for such things as blood. Sharp fronds were used as body lancets for ritual bloodletting among the Maya. Red colored *S. americanus* was symbolic of blood, red corn, fertility, life, death, and flowers.

Distribution:

From North Carolina to Florida. South Texas to the coast of southern Brazil.

Habitat and Ecology:

Sedentary as adults. Filter feeder at depths of 30 to 150 feet.

Principal Ritualized Marine Molluskan Species of Southern California other than *Haliotis, Olivella, and Spondylus,* which were Traded and Employed at Southern California Sites

The following molluskan profiles include culturally important species native to the Californian Marine Molluskan Faunal Province other than *Haliotis, Olivella, and Spondylus*. The selection of these primary species is determined from ethnographic references and descriptions, identifiable specimens recovered from archaeologic sites, and depictions in rock art. Whole shells or artifacts made from these species were primarily traded intraregionally among groups in southern California. These profiles are arranged alphabetically according to genus.

Wavy Turban
Astraea undosa (Wood 1828)

Differentiating Characteristics:

Large, solid, and heavy shell which may reach five inches in both diameter and height. Shell typically has six to eight steeply sloping whorls, a sharp apex, and a rather flat base. Each volution of shell whorls is formed into a heavy wavy cord at the edge, which follows the suture line. The calcareous operculum has three strong prickly ridges on the outer side. Shell color is dull brown under a darker brown periostracum. The polished shell itself is extremely iridescent and pearly.

Cultural Uses and Archaeologic Contexts:

Used as food, especially on the southern Channel Islands such as San Nicolas. The removed columella structure was used as an ornament or pendant. The spiral groove which encircles the length of the white columella was often filled with black asphaltum. The wavy and corded shell edge may have been used ornamentally (Blackburn and Hudson 1984; Gifford 1947).

A. undosa globular and tube beads are first documented from Phase L2 contexts. Globular, nacreous beads were made from *A. undosa* during Phase L2a, such as those associated with burial J17 at site SCrI-100 (King 1990).

Five *A. undosa* globular beads were found in Burial C13 at site SCrI-138, dated to Phase L2b. One *A. undosa* globular bead was found in Burial G2 at the same site.

Distribution:

Ventura, California (including the northern and southern Channel Islands) to Cabo San Lucas, Baja, California. Very common around Todos Santos Bay, Baja, California.

Habitat and Ecology:

Found among algae in rocky areas. Feeds upon a variety of subtropical marine algae.

California Horn Shell
Cerithidea californica (Haldeman 1840)

Differentiating Characteristics:

Shell is typically one to one and a half inches in length. Shell is composed of eleven spiral whorls which are weakly threaded. Each whorl has 12-18 ribs per whorl. Shell is typically dark brown in color with one or several yellow or white colored areas on the spire.

In the Gulf of California this species is replaced by the subspecies *C. Mazatlanica*. *C. albonodosa,* which is found in Hohokam and other Southwest sites is an ecologic form of *C. mazatlanica*.

Cultural Uses and Examples from Archaeologic Sites:

A punched *Cerithidea* ornament was recovered from Burial P12 of site ScrI-3, dated to Phase ya of the Early period (Eya) (King 1990).

A *Cerithidea* pendant with a punched perfornation, was found in burial D12 of site SCI-100, dated to Phase M3 (King 1990)

Seven *C. californica* beads were recovered from Burial 36 of site SRI-40, dated to Phase L3 (King 1990).

Distribution:

Bolinas Bay to Cedros Island, Baja California.

Habitat and Ecology:

Intertidal. Found in large colonies on mud flats.

Chestnut Cowrie
Cypraea spadica (Swainson)

Differentiating Characteristics:

The only true cowrie (family Cypraeidae) native to the western United States, and the Californian Marine Faunal Provence. Shell is oval or egg shaped, and may be as much as two and a half inches in length. Exterior or dorsal area of the shell is colored light chestnut brown with bluish undertones. The sides of the shell below the dorsal chestnut colored area are often flesh colored. The dorsal chestnut coloration is bordered by a dark brown or black wavy band. The base of the shell (ventral surface) is typically white with 20-25 off white "teeth" on each side of the narrow aperture. A notch is visible at each end of the shell when viewed from above (dorsal). Synonym: *Zonaria spadica*.

Cultural Uses and Examples from Pacific Coast Archaeologic Sites:

The partial or complete toothed shell aperture (shell base removed from the bulbous dorsal area) was strung as a bead or ornament, sewn to clothing, or used as inlay on such things as wooden bowls. Ritualized because of its shiny chestnut color, overall shape, and symbolic resemblance of the aperture or ventral base area to female genitalia.

42 punched *C. spadica* shells were recovered from site SCrI-3, dated to Phase Eya (King 1990).

15 punched *C. spadica* shells were recovered from site SCrI-162, dated to Phase Eyb (King 1990).

Two *C. spadica* punched shells recovered from cemetery A of site SRI-41 (Orr 1968).

Cypraea pendant blanks, and a finished *Cypraea* pendant were found in association with burial J17, from site SRI-100.

A finished pendant and blanks made from *S. spadica* were recovered from burial J17 of site SCrI-100, dated to Phase L2a (King 1990).

Nine *Cypraea* pendants were recovered from the Medea Creek Cemetery (LAn-243), and dated to Phase L2b (King 1990).

Two C. spadica beads were reported by Gifford from San Nicolas Island (1947:7).

Distribution:

Santa Barbara (possibly found as far north as Monterey) to Cerros Island, Baja California.

Habitat and Ecology:

Low tide zone to depths of 40 meters. Found in rocky areas and reef formations, often in the company of sea urchins.

Six Sided Tusk
Dentalium neohexigonum (Pilsbry and Sharp 1897)

Differentiating Characteristics:

Shell is as much as one inch long, and moderately curved. Shell length is 12-14 times the greatest diameter of the shell. Shell color is typically white. Shell has sculpture of six strong rounded ribs. The aperture is also six sided, but the angles are very rounded. Anal orifice is round to oval, without a notch or slit. Synonym: *D. pseudohexagonum* (Arnold 1903).

Cultural Uses and Examples from Pacific Coast Archaeologic Sites:

Used as a bead whole or cut into sections. Used by the Chumash in the form of beads during the late Middle Period (M4-5) (King 1990). Used as a nasal septum nose ornament and occasionally as earings.

The earliest use in the Santa Barbara Channel area is documented from site SRI-154 (Phase M3).

The latest use in the Santa Barbara Channel area was during Phase L1a. 143 *D. neohexigonum* beads were recovered from Burial C21 at site SCrI-83, dated to Phase L1a (King 1990).

D. neohexigonum beads were used as bushings in large columella tube beads, and *Hinnites* beads during Phases L2-L3 (King 1990).

70 *D. neohexigonum* shells and shell sections were recovered from Burial D16 at site SCrI-100, dated to Phase M4.
Distribution:

Monterey, California to the Gulf of California.

Habitat and Ecology:

Found at depths of from 2-200 meters. Larger specimens typically inhabit deeper water.

Indian Money Tusk
Dentalium pretiosum (Sowerby 1860)

Differentiating Characteristics:

Member of the molluskan Class Scaphopoda. These are mollusks which produce a hollow, tubular, calcareous shell, which is open at both ends, and somewhat resembles an elephant's tusk. Adult shell is about two inches in length. Shell structure is solid, and slightly curved. Apex end has a short notch on the convex side which is a primary diagnostic characteristic. The Aperture is the larger end of the tusk. Shell color is white or ivory, and typically shows faint light brown growth rings.

Subspecies: *Dentalium p. berryi* (Smith and Gordon 1948). This is a deeper water species than *D. pretiosum, which is* found at depths of 37 to 298 meters.

Cultural Uses and Examples from Pacific Coast Archaeologic Sites:

Most commonly used species of Dentalium which was used for money. Popular as a strung ornament and bead because of color, shape, and the possession a natural passage hole for stringing. For details on cultural and malacologic uses of Dentalium by Northwest indigenous peoples see the 1963 article by R.B. Clark, "The Economics of Dentalium" in the Veliger vol. 6, pp. 9-19.

40 *D. pretiosum* artifacts were found at Otter Cave on San Miguel Island, dated to 6600 BP (Erlandson, Vellanoweth, Caruso and Reid 2002).

3 *D. pretiosum* artifacts were found in Daisy Cave (CA-SMI-261) on San Miguel Island in a shell midden deposit dated between 6800-6600 BP (Erlandson personal comm. 2001).

12 *D. pretiosum* shells (No longer than 1½ inches) were recovered from site SBa-142, dated to Phase Ex (King 1990).

41 *D. pretiosum* beads were recovered from Burial H1 at site SCrI-3, dated to Phase z of the Early Period (Ez) King 1990).

A *D. pretiosum* shell was recovered from Burial D3 of site SCrI-100, dated to Phase M3 (King 1990)

D. pretiosum beads were used as bushings in large columella tubebeads and *Hinnites* beads during Phases L2 and L3 (King 1990).

Distribution:

Alaska to Baja, California

Habitat and Ecology:

Found at depths of 2-60 meters. A shallow water species in some northern localities, such as Vancouver Island, Canada.

Semi Polished Tusk
Dentalium sempolitum (Broderip and Sowerby 1829)

Differentiating Characteristics:

Shell is thin, curved, round in cross section, and one to one and a half inches in length. Color is typically white and very glossy. Numerous fine lines (longitudinal striae) extend from the apex to two thirds of the shell length. The aperture is circular, the shell or apex is unnotched. Synonym: *D. hannai* (Baker 1925).

Cultural uses:

Same as *D. pretiosum, and neohexigonum,* but not used to the extent as the aforementioned.

Distribution:

Monterey, California to Costa Rica.

Habitat and Ecology:

Shoreline to depths of 70 meters.

Rough Keyhole Limpet
Diodora aspera (Rathke 1833)

Differentiating Characteristics:

Shell is up to two and a half inches in diameter. Shell is typically one third as high in relation to shell length. The roundish to oval vent hole is one eleventh the length of the shell. External shell color is grayish white with 12-18 purplish blue radial bands of color. Synonym: *D. marina* Arnold 1903.

Cultural Uses:

Edible. Shell orifice and surrounding callus was occasionally used to make beads.

Distribution:

Cooks Inlet, Alaska to Magdalena Bay, Baja California.

Habitat and Ecology:

In Alaska, found intertidal to depths of 9 meters. In southern California found intertidally and no deeper than 40 meters. Feeds principally on bryozoans. Often found on stems of kelp.

Apple Seed Erato
Erato vitellina (Hinds 1844)

Differentiating Characteristics:

Glossy smooth shell is up to one half inch in length. Body whorl area is purple, and may be bounded by a white line. Most of the shell is colored cream or tan. The columella typically shows 5-8 whitish teeth.

Cultural Uses and Examples from Pacific Coast Archaeologic Sites:

Generally used whole as a bead. Often used in combination with beads made from *Trivia californiana*.

2 punched *E. vitellina* shell beads were found in site SRI-6, and dated to the Early Middle Period (M2b) (King 1990).

13 punched *E. vitellina* beads were found in burial 14 of site SCrI-100, and dated to Phase M3.

3 punched *E. vitellina* beads were recovered from burial D6 of site SCrI-100, dated to Phase M3.

2 *E. vitellina* beads were recovered from Burial 36 at site

SRI-40, dated to Phase L3 (King 1990).

Distribution:

Bodega Bay, California to Baja California

Habitat and Ecology:

Subtidal to 100 meters. Lives in the company of several kelp species in shallow water.

Volcano Limpet
Fissurella volcano (Reeve 1849)

Differentiating Characteristics:

As much as one inch in length, and one half inch in height. The single elongate orifice is at the top, and slightly nearer the smaller anterior end. Exterior shell color is grayish off white to dark gray, with numerous radial rays of gray or pink. Interior of the shell is glossy white, and often found with a fine pink line around the aperture edge. The foot of the living animal is colored yellow, and the mantle typically has red stripes. Synonyms are *Hemitoma golischae* Dall 1916, and *F. crucifera* Dall 1908.

Cultural Uses:

Edible. Orifice and surrounding callus were used to make beads. Callus ornaments were used from Phases M1-M5a. Ornaments made from *F. volcano* were never as common as *Megathura crenulata* in any period or phase.

Three *F. volcano* rings were recovered from the cemetery of site SBa-81, which were dated to Phase M2a (King 1990).

A single ring made from *F. volcano* was recovered from Burial N2 at site SCrI-83.

Distribution:

Cresent City, California to Baja California.

Habitat and Ecology:

Intertidal. On rocks and beach tossed shells.

Purple Hinge Rock Oyster
Hinnites multirugosus (Gale 1928)

Differentiating Characteristics:

Also known as the giant rock scallop. Shell length may be as much as 10 inches, and the live animal (including shell) may weigh as much as 20 pounds. Shell is circular, oval, or oblong, and is sculpted with numerous wrinkled lines. Adult shells have radiating ridges of flat curving spines. Immature exterior shell color is orangish red to greenish white, but as it increases in size the colors tend to fade to shades of brown, dull green, or gray. Some young, as free swimming half inch specimens, are colored bright orange. Adult shell interior is white, ivory, or dull light gray, with a rich purple area around and including the hinge. The mantle is colored orange (Abbott and Dance 1984; Keen 1971; White 1971).

Synonym: *H. giganteus* (Gray 1825). Some refer to this larger and more northerly ecologic form of Hinnites, as *H. giganteus* (White 1971).

Cultural Uses And Examples From Pacific Coast Archaeologic Sites:

An excellent food resource, but may be toxic at certain times of the year. A variety of beads and ornaments were fashioned from the purple hinge area. Used as a plate or container. May have similar ritualization and worth to purple quahog (*Mercenaria mercenaria*) and purple *Spondylus* (*S. calcifer*). A single specimen from the Preclassic Hohokam Grewe site was identified in June, 2000 by the author.

Hinnites tube beads (classified by Gifford as AV2C and AV2DI) recovered from prehistoric California sites were described by Gifford, with illustrations on page 111 (Gifford 1947:7)

Harrington found 24 *Hinnites* tube beads with the natural hinge notch from the shell base, and 50 *Hinnites* purple beads without the shell notch in California site SBa-28. All these beads were perforated (Harrington 1928:160-162).

During the Late Period of Chumash culture in coastal southern California, globular, pendant, and tubular shell beads were made from the thick purple colored hinge area of *H. multirugosus* (King 1990: 240-241).

1 *Hinnites* tube or cylinder bead was recovered from burial F41 at California site SCrI-100 dated to Phase L1b (King 1990). 65 globular and tube beads made from *Hinnites* were recovered from

burial 3 at California site SRI-24, dated to Phase L2a. The larger beads were found in the burial's mouth. These beads were found in proximity with many beads made from abalone epidermis (King 1990).

9 globular and tube *Hinnites* beads were recovered from California site SCrI-138, dated to Phase L2b (King 1990).

18 *Hinnites* tube beads were found at California site SBa-46, and dated to Phase L3a (King 1990:296).

Unperforated tube and shaped pieces of *Hinnites* hinge were found in burial G-1 of California site SCrI-138 (King 1990).

Distribution:

Aleutian Islands, Alaska to Baja, California.

Habitat and Ecology:

Found from low tide to depths of 60 meters. Free swimming in early stages. Becomes completely sedentary (like an oyster) as an adult, by attaching the lower right valve to substrate objects. Life ways, such as filter feeding and reproduction, resemble those of warm water Spondylidae.

Lewis's Moon Shell
Lunatia lewisii (Gould 1847)

Differentiating Characteristics:

Shell is moderately heavy and may be as much as 5 inches in length. Shell whorls are rounded and regularly enlarging. The umbilicus is small, and there is a brown stained button like callus, which partially obscures the top edge of the umbilicus. The corneous operculum completely fills the aperture.

Cultural Uses and Examples from Archaeologic Sites:

Edible. Whole shell used as a container, pendant, and ritual charm. The shell wall and columella were used for making beads and ornaments. Occasionally used as a noisemaker or trumphet.

A single large *L.lewisii* shell with the spire broken off, which suggests use as a trumphet, was recovered from burial P10 of site SCrI-3, dated to Phase ya of the Early Period (Eya) (King 1990).

A specimen was found in Lost City, Nevada (Pueblo II - Middle Period (M5)), and documented by Gifford in 1947.

Distribution:

British Columbia to Baja California.

Habitat and Ecology:

Carnivorous. Found in shallow water to 50 meters. Eggs are laid in a collar of sand and mucus.

Great Keyhole Limpet
Megathura crenulata (Sowerby 1825)

Differentiating Characteristics:

Shell is rather flat and may reach 6 inches in diameter. The elongated single venthole (keyhole) is one sixth the length of the shell, and bordered in white. There is a rim of heavy enamel around the venthole oriface. Exterior of shell is colored gray to brown, is finely striated, and has often been described as beaded. Inside of the shell is typically white and very smooth in texture. The mantle of the animal is colored brown or black, and may envelop the entire outer shell. The muscular and edible foot is colored yellow. Common synonym is *Macrochasma* (Dall 1915).

Cultural Uses and Examples from Southwest and Farwest Archaeologic Sites:

Used as a food (especially on the Channel Islands) similarly to abalone. The edge of the shell was abraded to manufacture rings, which used the vent aperture as a finger hole. Used as a tinkler or noisemaker. Abalone shell and *Olivella* wall pieces were used to make ornaments shaped like flat-ended *M. crenulata* rings (King 1990:146).

Traded to the Southwest from southern California (Gifford 1947). Gifford reported two end-flattened *M. crenulata* rings at Scorpion Hill in the Moapa Valley/Lost City complex, dated to AD 900-1100 (M4 or Pueblo II).

In the Santa Barbara Channel region, *Megathura* ornaments first appear at the beginning of the Middle Period (M1a), and are more widespread than are abalone ornaments. After Phase Lla, *Megathura* ornaments were rarely used.

Megathura ornaments were important social markers during the Chumash late Middle Period, and as late as Phase L2a (King 1990: 145). *Megathura* ornaments have been found with traces of red ocher and painted designs.

In a funerary context from site SBa-81, *Megathura* ornaments were found near the head of a burial, in an arrangement that would suggest being strung end to end as a headband or necklace (King 1990; Orr 1954).

Megathura ornaments have been recovered from the 29 Palms area, east of Los Angeles (S.W. Campbell 1931).

Distribution:

From Monterey Bay, California to Cabo San Lucas, Baja California

Habitat and Ecology:

Found from the low tide line to depths of 16 meters. Common on rocky headlands and breakwaters.

California Mussel or Sea Mussel
Mytilus californianus (Conrad 1837)

Differentiating Characteristics:

Equivalve shells are commonly 2-3 inches in length, but 10 inch specimens, which have been referred to as *M. gigantea* Nordmann 1862, do exist, making this the largest of New World mussels. Shell is typically thick with the ventral margin being nearly straight. Outer shell coloration is typically bluish black, although young specimens may show streaks of white or brown. Growth lines are course and obvious. The outer shell is marked by as many as a dozen radial ribs which are prominent in the middle part of the shell. *M. californianus* may be distinguished from *M. edulis* by these radial lengthwise running ribs and grooves. Though having fine growth ring lines (similar to *M. californianus*), *M. edulis* is totally without these radial ribs and grooves. The ventral edges of the shells of *M. californianus* are typically straight and/or much less curved than the ventral edges of *M. edulis (Abbott 1968; White 1971)*.

Cultural Uses and Examples from Pacific Coast Archaeologic Sites:

Nutritious and relatively easy to collect. A principle food resource on the Northeast Pacific Coast since the Late Pleistocene and Early Holocene. Manufactured into jewelry such as discoidal and geometric beads, ornaments, and pendants. Used as tool, scoop, scraper, and container. Occasionally used in inlay with other molluskan species. Used as a sound tinkler alone or with other species such as abalone (Blackburn and Hudson). Edibility from May to August is questionable because of the accumulation of injested neurologic toxins (paralytic shellfish poisoning), which are the result of seasonal algal bloom.

Disc beads made from *Mytilus californianus* were most commonly used during phase 5 of the Middle period. *Mytilus* shell is softer than *Haliotis* epidermis, so ornaments made from *M. californianus* were somewhat easier to manufacture than abalone epidermal ornaments.

Black, blue or brown mussel shell parts were most often used to make disc beads. These *Mytilus* beads are often found in association with *O. bliplicata* wall disc and abalone epidermal beads, which were probably used to provide contrast. Thirteen *Mytilus* shell discs were found with burial N2 at SCrI-83, and dated to Phase M3, but shell dicsc beads made from *Mytilus* are rarely used prior to Phase M5a.

Discs made of *M. californianus* have been found on San Clemente Island at the Eel Point site dated to about 9000 BP (Erlandson 2002, personal comm.)

125 *M. californianus* disc beads were recovered from Burial K21 at site SCrI, dated to Phase M5b (King 1990).

168 *M. californianus* dics beads were recovered from Burial N7 at site SCrI-83, dated to Phase M5b (King 1990).

19 *M. californianus* disc beads were recovered from Burial O2 at site SBa-46, dated to Phase M5b (King 1990).

Distribution:

Aleutian Islands to Socorro Island, Baja, California.

Habitat and Ecology:

Intertidal filter feeder. Adults are sedentary, fastened to substrate by byssus fibers. Typically found from near high tide line to depths of 20 feet. Thrives in rough or open surf attached to stable rocks, pilings, or substrate.

Common Blue Mussel or Bay Mussel
Mytilus edulis (Linne)

Differentiating Characteristics:

Shells may be as much as three inches long. The exterior of adult shells are typically bluish black, but juveniles may manifest various shades of gray, brown, and green, with occasional rays of differing colors. The outer shell surfaces are covered by a shiny, brown colored, and varnish-like periostracum. Shell form is not as symmetrically "boat" shaped as *M. californianus.* The ventral margin of *M. edulis* is curved, unlike that of *M. californianus*, which is straight. Outer shell is without radial ribs but has numerous fine growth lines. Interior of shell is pearly white with a border of purple blue. Although archaeologic specimens of *M. edulis* show a deterioration of original coloration, size, shape, and shell structure/texture are diagnostic for differentiating *M. californianus* from *M. edulis.*

M. edulis diegensis (Coe 1946), said by some to represent a subspecies living from northern California to Baja, California, may be a regional ecologic form rather than a separate subspecies.

Cultural Uses:

Nutritious and very easy to collect. Important food resource on the Pacific coast from the Upper Pleistocene and early Holocene. Presently cultured as a food resource primarily in Europe. Used as a scraper, scoop, and tool to a lesser extent than *M. californianus.* Used a music/sound tinkler, and as a noisemaker or door alarm (Blackburn and Hudson 1986). Byssus attachment fibers have been used in the Old World, in the manufacture of ornamental golden tinted thread and textiles (Abbott 1974). *M. edulis* may not manifest the same degee of shellfish toxins as *M. californianus*, allowing it to be used as food when *M. californianus* has become seasonally toxic.

Distribution:

Near world wide. In the northeast Pacific region, *M. edulis* is found from Alaska to Cedros Island, Baja, California.

Habitat and Ecology:

Intertidal filter feeder. Typically lives in inshore colonies in somewhat protected situations such as bays and inlets. Attaches to rocks and substrate with fine byssal threads.

Butter or Washington Clam
Saxidomus nuttalli (Conrad 1837)

Differentiating Characteristics:

Shell may be five inches in length. Shape is oblong with the beaks nearer the anterior ends. Shell typically has course concentric ribs, which are a major diagnostic trait. Hinge has 4 or 5 teeth in the right valve, and 4 in the left valve. Exterior shell color is dull reddish brown to gray, with rusty colored stains. Interior of both valves is glossy white, with a taint of purple at the posterior margins. This species may be distinguished from S. giganteus (a more northerly species) in having a series of pronounced ridge-like encircling growth lines. *S. giganteus* is slightly larger and appears smoother in exterior shell texture than *S. nuttalli*, hence, it is called the smooth Washington clam.

Cultural Uses:

An important food resource. Used for the manufacture of ornaments, but to a much lesser extent than was Pismo clam (*Tivela stultorum*). Manufactured into discoidal beads and edge perforated discs and pendants. Shells were probably used as containers and scraping tools. Traded to the Southwest (Gifford 1947).

Distribution:

Humbolt Bay, California to Baja California

Habitat and Ecology:

Lives in mud or sand. Intertidal to depths of 30 feet. In one year a five inch clam filters about 10,000 gallons of sea water to obtain algal food (Abbott 1968).

Pismo Clam
Tivela stultorum (Mawe, 1823)

Differentiating Characteristics:

In the subgenus Pachydesma, and the only representative of the genus *Tivela* found on the California coast. The shells are large with smooth interior margins. Exterior of shell is covered with a thin varnishlike periostracum. Shells are typically 3-6 inches in length, ovate in basic shape, and heavy. Shells are glossy smooth except for lines of growth. Shell color is typically brownish cream. Some specimens show wide gray-blue radial bands, while others show no bands.

Cultural Uses and Examples from Pacific Coast Archaeologic Sites:

Edible. Shell used as an ornament and scraping tool. The shell was used to make discoidal beads and punctate encised ornaments. Pismo clam is one of the hardest shells used for bead manufacture in the Santa Barbara Channel area.

Clam cylinder and tube beads were often made from Pismo clam shell. *Tivela* clam tube bead blanks, which suggest a manufacturing location, were found at the Burton Mound in Santa Barbara (site SBa-28) (Harrington 1928). *Tivela* tube and cylinder beads were occasionally used as nasal septum ornaments.

The earliest recovered *T. stultorum* bead in the Santa Barbara Channel area is a single disc bead recovered by Phil Orr from cemetery A, at Tecolote Point on Santa Rosa Island (Orr 1968).

168 disc beads made from *T. stultorum* were found in site SRI-41, dated to Phase one of the Middle Period (M1)(King 1990).

Three *T. stultorum* tube beads were recovered in front of the chest area of burial 22 at site SRI-60 (Jones 1956).

Distribution:

San Mateo County, California to Baja California.

Habitat and Ecology:

Inhabits the intertidal zone just beneath the sand. Spawns in August. Largest clam on record was 7 1/2 inches long, and 26 years old (Abbott 1968).

Californian Trivia
Trivia californiana (Gray 1827)

Differentiating Characteristics:

Shell is typically as much as 11 mm. in length. Shell is mauve in color, with a lighter colored dorsal crease and radiating riblets, which cover the entire dorsal surface. Although *T. californiana* is slightly smaller overall than *T. solandri, T. californiana* is slightly more rotund. *T. californiana* does not have the narrow light colored dorsal groove of *T. solandri.*

Cultural Uses and Examples from Archaeologic Sites:

During Phase M1, in southern California, the use of *T. californiana* increased (King 1990:124).

After Phase M3, *T. californiana* beads tend to be infrequently used (King 1990:135).

A single *T. californiana* bead was found in an early Middle Period context at site BCM-616, on the Mojave River (King 1983).

More than 3,300 *T. californiana* shells were found in site SBa-8, dated to Phase M2a. This was in the area of the cemetery with the most wealth/elite objects.

189 punched *T. californiana beads were* recovered from Burial D6 at site SCrI-100, dated to Phase M3 (King 1990).

7 *T. californiana* beads were recovered from Burial 46 at site SRI-76, dated to Phase L2a (King 1990).

15 *T. californiana* beads were recovered from Burial 36 of site SRI-40, dated to Phase L3 (King 1990).

245 punched *T. californiana* beads were found associated with burial 14 of site SCrI-100.

Distribution:

Cresent City, California to Acapulco, Mexico

Habitat and Ecology:

Littoral to 80 meters. Lives on and around marine vegetation.

Principal Marine Molluskan Species other than *Haliotis, Olivella, and Spondylus,* which Were Traded and Employed at Southwest Sites

The prehistoric American Southwest consists of what are now Arizona, New Mexico, southern Nevada, Utah, Colorado, and northwest Mexico. Evidence of shell ritualization and use in the prehistoric Southwest and Farwest begins with the ancient Desert Culture (Cressman 1977; DiPeso 1974; Haury 1986; Jernigan 1978).

Evidence from archaeologic sites, ethnographic records, and photos suggests that necklaces made from such shells as *Dentalium*, pismo clam (*Tivula sultorum*), and the Washington butter clam (*Saxidomus nuttali*) were popular among peoples of the Desert Culture (Jernigan 1978; Strong 1969: 155-157). Whole shells or slightly altered shells, rather than manufactured objects, were used by the Desert or Cochise Culture (Jernigan 1978).

Circular Scallop
Argopecten circularis (Sowerby 1835)

Differentiating Characteristics:

Shell ears are nearly equal in size. Both valves are convex and nearly equal. Length 50 mm. Closely resembles the European ritualized genus *Aquepecten* (Fisher 1886). A very wide variety of markings and colors are found on the exterior shells. Shells may be pure white to solid orange or purple. Streak or blochy patterns, which may be a variety of colors typically cover all or part of the exterior valves. The mantle margin is equipped with short filaments and light-sensitive organs referred to as ocelli (Keen 1971). This is the commonest species within the family Pectinidae, which is found in the Panamic Marine Faunal Province. The Californian species *A. aequisultatus* (Carpenter 1864), which is found in protected bays south to La Paz, Baja California, has been considered a subspecies of *A. circularis*. The exterior shell of *A. aequisultatus* is larger and not as brightly colored as those of *A. circularis*. Synonyms: *P. tumidus; P. ventricosus; P. inca; P. solidulus; and P. filitextus* (Abbott 1954; Keen 1971).

Cultural Uses:

Very edible. Used whole as an ornamental pendant, attached to clothing, as a foundation base for mosaic constructions, as a finger ring, and occasionally as a scoop or scraper (DiPeso

1974; Haury 1976; Jernigan 1978; Nelson 1991).

Distribution:

From Cedros Island, Baja California, south through the Gulf of California, to Paita, Peru.

Habitat and Ecology:

Filterfeeder. Found subtidally in sandy or muddy areas, in depths of from one to 135 meters

Mexican Cerith
Cerithidea albonodosa (Gould and Carpenter 1857)

Differentiating Characteristics:

Shell is sculpted with a network of spiral ribs. Shell height 30mm, and diameter 12mm. Shell is typically colored brown with regular varices of white, and a white peripheral stripe. Aperture opening is oval in shape and wide mouthed. In the living animal, the aperture opening is covered by a multispiral horny operculum. *C albonodosa* is generally smaller and more gracile than *C. californica*.

C. albonodosa is sometimes considered to be an ecologic form of *C. californica and C. mazatlanica.*

Cultural Uses:

Used as a pendant, bead, and whitsle. Occasionally used as a punch or engraver

A *C. albonodosa* whole shell bead was found in the site of Snaketown, dated to the Santa Cruz Phase (Haury 1976:309)

Distribution:

San Ignacio Lagoon, Baja California to Guaymas, Mexico

Habitat and Ecology:

Thrives at midtide level in brackish mud on tidal flats. Very prolific in the northern reaches of the Gulf of California. *C. albonodosa* dwells in slightly deeper water than *C. mazatlanica*.

Menke's Cerith
Cerithium menkei (Carpenter 1859)

Differentiating Characteristics:

In the subgenus *Thericium.* Similar to *Cerithidea albonodosa* in form, except that the axial whorls are not as pronounced as in *C. albonodosa*. Shell sculpture is of fine spiral ribs, two or three of which are noticably larger with low nodes. Irregular spiral threads and ribs are variously noded or beaded by weak axial lirae.

Cultural Uses:

Used as a bead or pendant similarly, but less commonly than C. albonodosa.

Distribution:

Gulf of California to Ecuador.

Habitat and Ecology:

Lives under rocks at low tide.

Mexican Jewel Box
Chama mexicana (Carpenter 1857)

Differentiating Characteristics:

Within the family Chamidae. Irregular shell may be as much as 100mm in length. External shell surface has two rows of large whitish spines and several rows of smaller spines on a dark red shell. Calcareous algae may coat the spines.

Distinguished from *C. buddiana* in that *C. buddiana* has a pink color band near the shell margin, while *C. mexicana* has no distinct band near the margin, except the colored shell edge itself (Keen 1971).

Synonym: *C. frondosa fornicata* (Carpenter 1857).

Cultural Uses:

Artifacts made from *Chama* may resemble those made from *Spondylus princeps*

Chama was used similarly to *Spondylus* for the manufacture of beads, ornaments and pendants. *Chama* may have replaced or was substituted for *Spondylus* by the Anasazi, at such places as Pueblo Bonito (Judd 1954 fig.16)

Little, if any *Chama* has been identified from Hohokam sites (Haury 1976). This is probably because of the heavy use of purple, red, and pink *Spondylus* and possibly *Hinnites.*

Distribution:

Puertecitos, near the head of the Gulf of California, to southern Mexico.

Habitat and Ecology:

Intertidal and offshore to 53 meters, attached to rocks and reefs. Older shells are typically riddled by borers, similar to Spondylus.

Ferguson's Conus
Conus fergusoni (Sowerby 1873)

Differentiating Characteristics:

Within the subgenus *Lithoconus.* Shell may be as much as 150mm in length, and 87mm in width. Adult shell is white with little if any coloration. Young shells may be yellow or orange. The outer covering or periostracum is colored brown, and is typically velvet- like in texture. Compared to many members of the *Conus* genus, the spire of *C. fergusoni* is flat and low. The aperture margins are very nearly paralell. Synonyms: *C. xanthicus* Dall 1910, and *C. crysocestus* Berry 1968 (Abbott and Dance 1982; Keen 1971).

Cultural Uses and Examples from Southwest Archaeologic Sites:

Used whole as an ornamental pendant, whistle, and penetrating tool. Manufactured into beads and tinklers. The most important use of *Conus* in the Southwest was as as a noise making tinkler, which was attached to leggings or clothing. *C. fergusoni* was also attached to the ends of ritual sticks and rattles. In Hohokam sites, *Conus artifacts are* most abundant during the Classic Period.

Conus tinklers have been found in all Anasazi (Pueblo) Periods (Jernigan 1978). Numerous *Conus* tinklers were found at Aztec ruin in northern New Mexico, which were dated to Pueblo III (Morris 1939). At Aztec, *Conus* tinklers were found strung as necklaces, in the same manner as were *Olivella* (Morris 1919).

Many musical tinklers made from *Conus* were found at the Mogollon site of Ridge Ruin (McGregor 1943).

Distribution:

Turtle Bay, Baja California, throughout the Gulf of California south to Santa Elena, Ecuador.

Habitat and Ecology:

Found intertidally and offshore to depths of 165 meters.

Giant *Bittersweet Clam*
Glycemeris gigantea (Reeve 1843)

Differentiating Characteristics:

This is the largest of all species within the family Glycemerididae. May be as much as 100mm in length. Exterior shell is rather smooth and porcellin like. White base color of shell is mottled with zigzag patterns of reddish brown, which typically cover the entire shell exterior.
Many *Glycemeris* bracelets are made from partially fossilized shells, which were deposited in the northern Gulf of California area during the Late Pleistocene (Haury 1976; Kroeper 1996; Nelson 1991).

Cultural uses and archaeologic examples of *Glycemeris* artifacts arranged according to recovery from Hohokam, Anasazi, Mogollon, and Southern California sites.

Primary Cultural Uses

Glycemeris gigantea was principally used in the manufacture of bracelets.

Large shells of *G. gigantea and L. elatum* have both been found holding traces of colored pigment in several Southwest sites (Haury 1976: 309).

Whole or nearly whole archaeologic specimens of glycemeris retain little of the rich brown shell colorations which appear in life. This gives support to the assumption that virtually all glycemeris shell used in the Southwest was collected as beach drift, by the practice of beachcombing (Haury 1976:308).

The Anasazi used *Glycemeris* similarly to the Hohokam and Mogollon. In the Anasazi area whole Glycemeris is found from Basketmaker II onwards. *Glycemeris* artifacts are never really common until Pueblo IV. (Jernigan 1978:162).

Small immature *Glycemeris* (one half inch diameter), which had been drilled near the umbo were used like disc beads (Jernigan 1978).

Glycemeris and *Pecten* shells were centrally perforated with a hole one fourth to one third the diameter of the whole shell.

The shell was then covered with turquoise mosaic (DiPeso 1974 Haury 1976; Jernigan 1978).

Archaeologic Examples

Hohokam

In the Hohokam site of Snaketown during all phases, *Glycemeris* is found in concentrations which are about 10 times more than those of *Laevicardium elatum*, which was a popular tool and bead making material (Haury 1937, 1976).

During the Hohokam Colonial Period the most popular *Glycemeris* bracelet style consisted of thin bracelets, in which the umbo or beak is shaped into an angular tab shape (Haury 1976; Jernigan 1978:61).

During the Hohokam Sedentary Period, medium width bands were most popular. At this time the umbo is reduced to a rounded, angular, or pointed shape. Often found with a perforation.

The widest *Glycemeris* shell bracelet is most characteristic of the Hohokam Classic Period. In the late phases of the Classic these bracelets were occasionally engraved with geometric designs (Gadwin 1937:142) Some Hohokam *Glycemeris* bracelets from several periods and phases, have the umbo area carved into a stylized frog, bird, or occasional bird-snake motif (Jernigan 1978:237).

Anasazi

Hohokam carved *Glycemeris* bracelets were found at Kiatuthlana. Twenty shell bracelets were found on a single burial at this site (Roberts 1931:162).

Kidder found no actual *Glycemeris* shell bracelets at Pecos, but much other shell. Imitation *Glycemeris* shells made of stone or clay have been found at the sites of Pecos and Kuaua (Kidder 1932).

At the Swartz site, the Cosgroves (1932) found 39 *Glycemeris* bracelets on a single individual, as opposed to many Hohokam sites where one to four bracelets are most often found (Haury 1976). This may suggest that among the Hohokam plain braceletes were less a mark of wealth, and used more as ornament. Among the Anasazi, Salado, and other groups (where the bracelets were not manufactured, and more difficult to aquire) plain *Glycemeris* bracelets were used to visually indicate wealth and status.

Mogollon

Trade between the Mogollon and Hohokam is documented by carved *Glycemeris* bracelets, which the Mogollon used, but did not manufacture (DiPeso 1974; Jernigan 1978:124).

Southern California

The presence of *Glycemeris* artifacts in several different prehistoric California sites, suggests the possibility of a shell for shell exchange relationshelp between the Southwest and southern California.

A *Glycemeris* shell bracelet (*G. gigantea*) was recovered from site CA ORA-225 in Orange County, California in 1995. According to style and dimensions, it is probable that this bracelet was introduced into southern California after AD 900 (Koerper 1996).

A *Glycemeris* bracelet find is also documented from a prehistoric cremation in the western area of present day Indio, California (Graffam 1978:26).

A whole *Glycemeris* bracelet, which is presently in the Southwest Museum, was purportedly found on Catalina Island (Kroeper 1996).

A whole *Glycemeris* bracelet (associated with a human burial) was recovered from the San Joaquin Valley Gun Club site (CA. OKA 57-77) (Kroeper 1996).

Distribution:

Bahia Magdalena to Acapulco, Mexico.

Habitat and Ecology:

Prefers warm shallow water and sandy bottoms. Does not thrive in intertidal conditions. Found at depths of from 7-13 meters.

Little Bittersweet Clam
Glycemeris maculata (Broderip 1832)

Differentiating Characteristics:

Earlier parts of shell tend to be covered with small spots of chestnut brown. Shell length is typically 35mm, height 31mm, but specimens may be as much as 80mm. May be easily confused with immature specimens of *G. giganteus (Keen 1971)*.

Cultural Uses:

Used as pendants, finger rings, beads(whole), and earrings.

A pair of centrally abraded, and umbo perforated *Glycemeris* ear rings (1½ inches in outside diameter) were recovered from Lost City Nevada, dated to Pueblo II (Linais 1981)

A necklace of tiny *Glycemeris* shells (probably *G. maculata*) was found at the Hodges site (Jernigan 1978).

At Casas Grandes, 2 *G. maculata* beads were recovered from floor A of Plaza 3-8, dated to the Medio Period (DiPeso 1974:422).

At Casas Grandes 9 *G. maculata* beads were recovered from fill within room 18B-8, dated to the Medio Period (DiPeso 1974:420).

Distribution:

Northern Gulf of California, including the Pacific area around the Baja peninsula to Magdalena Bay, south to Zorritos, Peru.

Habitat and Ecology:

Found intertidally at depths of from 7-13 meters. Prefers warm shallow water and sandy bottoms (Keen 1971).

Giant Pacific Cockle
Laevicardium elatum (Sowerby 1833)

Differentiating Characteristics:

Outer shell color is typically yellow (which may be quite bright) with occasional light brown streaks. The interior is white and may show traces of radial shell ribs on the exterior, which are pronounced but never spinose. The shell may be as long as 150mm, making it the largest species in the subfamily Laevicardiinae. Young shells are broad in form in relation to the adults, and colored buff rather than yellow.

Cultural Uses and Examples from Southwest Archaeologic Sites:

Throughout the Southwest the shell wall was used to manufacture beads, pendants, and rings. Used as a scoop, container, and mixing bowl. The whole shell was occasonally used as a foundation for mosaic constructions. Principle shell used in the Hohokam acid etching process (Haury 1976; Jernigan 1978; Nelson 1991). The central parts of *L. elatum* shells were removed to produce what appear to be bracelets, during the Hohokam Gila Butte Phase (Haury 1976:316).

Forty-seven pieces of Laevicardium elatum (which had probably been a container) were found in the earliest level of Ventana Cave (Haury 1950:190).

L. elatum was probably the first marine import into Arizona, suggested by its presence in the pre-10000 BP level of Ventana Cave (Haury 1950: 189-190).

Laevicardium was a principal species used in the manufacture of disc beads (Haury 1976; Jernigan 1978; Nelson 1991).

Haury found loose *Laevicardium* beads in an abalone shell placed in a burial at Bear Ruin (Haury 1940).

Distribution:

Southern California to Baja California, throughout the Gulf of California, and south to Panama.

Habitat and Ecology:

Intertidal to depths of 5 meters. Thrives on tidal mud flats which are subject to a heavy tide flow.

Pacific Lion's Paw
Lyropecten subnodosus (Sowerby 1835)

Differentiating Characteristics:

Occasonally included in the genus *Nodipecten*. Typical shell length 175 mm, diameter 75mm. Shell has 10-11 ribs, some with large nobs and nodules. External shell colors are variable, ranging from dull purple or whitish with purple lines to bright shades of magenta and orange (Keen 1971; Abbott and Dance 1982; Eisenberg 1981).

Similar species: *L. nodosa* (Lion's Paw) of the Caribbean Marine Faunal Province, has one less rib than *L. subnodosus*, and typically shows more pronounced knobs and nodules.

Cultural Uses:

Edible. Used as a plate, container, scoop and scraper. Used whole as an ornamental pendant. Beads were probably made from the shell wall.

Distribution:

Scammons Lagoon, Baja California to Peru.

Habitat and Ecology:

Found to depths of 100 meters.

Basket shell or Nassa Mud Snail
Nassarius iodes (Dall 1917)

Differentiating Characteristics:

Within the subgenus *Arcularia*. Shell is light colored with a purplish and light brown band in the center of the whorl. The apertural callus is white. Shell length to 8mm, diameter to 5mm. The animal's foot is divided into two lobes.

May be confused with immature or stunted specimens of *N. luteostoma*. This species is much larger (22mm long, 16mm wide) than *N. iodes*, and typically has some yellow coloration in the aperture callus.

Changeable and regionally variable salinity, overcrowding, or diminished food supply may dwarf or change both the shell size and structure. This variability is a major cause of confusion, and makes identification difficult (Abbott and Dance 1982; Keen 1971; Nelson 1991).

Cultural Uses and Examples from Archaeologic Sites:

Used as a bead, primarily in necklaces. *Nassarius* was a popular bead in the Mimbres and western Pueblo areas (Jernigan 1978).

At Pecos, New Mexico the *Nassarius* shells present are of western Caribbean, or Gulf of Mexico origin (Kidder 1935).

Over 3 million *Nassarius* shells were found at the site of Casas Grandes (DiPeso 1974; Nelson 1991).

Distribution:

Head of the Gulf of California (Adair Bay), to Mazatlan, Mexico.

Habitat and Ecology:

Intertidal carnivorous scavenger with a very developed sense of smell.

Vogdes's Scallop
Pecten vogdesi (Arnold 1906)

Differentiating Characteristics:

Within the subgenus *Oppenheimopecten*. Right valve is strongly arched, left valve is flat or slightly concave. Both length and height to about 100 mm. Right valve typically shows 21 low rounded ribs. The left valve shows 20 ribs. Color varies from buff to reddish brown. The left valve is usually more brightly colored. The shell interior is white to purple-brown.

Synonyms: *P. dentatus* Sowerby 1835; *P. excavatus, and P. cataractes* Dall 1914.

Cultural Uses and Examples from Archaeologic Sites:
Among the Hohokam *Pecten* was most popular as a whole shell pendant. Both valves (concave and flatter valve) were used (Haury 1976).

Common during the Colonial and Sedentary Periods. Numerous *Pecten* shells were found at the Grewe site (Jernigan 1978).

Pecten shells were highly ritualized in Classic Period of Teotihuacan. This may have some relationship to the great numbers of whole Pecten shells, which have been found at Hohokam sites.

No whole *Pecten shells* have been found in Anasazi sites, but *Pecten* was popular among the Mogollon (Jernigan 1978).

A row of strung whole *Pecten* shells was found at Montezuma Castle, Arizona (Jackson and Van Valkenburgh 1954).

Distribution:

Punta Euglina, Baja California throughout the Gulf of California to Panama.

Habitat and Ecology:

Near intertidal, to depths of 155 meters.

Western Wing Oyster
Pteria sterna (Gould 1851)

Differentiating Characteristics:

One of two genera in the family Pteriidae. More than one species or several subspecies may be represented under the name *Pteria sterna*. Shell length 100 mm, height 85mm. Identification of one or more whole shells is determined by the long wing-like extension of the hinge margin. The thin brittle shell is dark brown outside with bluish nacre inside. This nacre color may resemble the inner shell of some specimens of *H. cracherodii*. Outer shell surfaces are covered in life with a shaggy periostracum. The relative sizes of the shell hinge ears and wings may be diagnostic of subspecies or regional and ecologic forms. In the southern Gulf of California near La Paz, *Pteria sterna* was once very abundant, but populations have been drastically reduced by commercial pearl fishing.

Cultural Uses:

Edible. Producer of natural pearls. Nacreous shell wall was used to manufacture ornaments and beads. In the historic period, *P. sterna* shells were a valuable resource for the manufacture of buttons.

The primary temporal distribution of *P. sterna* in the Southwest was late, during the Hohokam Sacaton Phase of the Sedentary Period. The principal Anasazi use of *P. sterna* was during Pueblo II.

The relative freshness of unworked pieces of *P. sterna* found in Hohokam archaeologic sites suggests they were collected as live specimens during low tide conditions.

A fragment of *P. sterna* shell (presumably used as an eye) was inserted into the head of a clay figure, which was recovered from Snaketown (Haury 1976:317).

Distribution:

Southern Baja California, through the Gulf of California, south to Peru.

Habitat and Ecology:
Lives in shallow water offshore. Thrives in mud flats.

Mexican Pearl Oyster
Pinctada mazatlanica (Hanly 1856)

Differentiating Characteristics:

One of two genera of the family Pteriidae. Shell length is as much as 125 mm. Outer shell color is dark brown. *P. mazatlanica* shells are considerably heavier than those of *Pteria sterna.*

Cultural Uses:

Edible. Pearl producer. Used in Casas Grandes for making spangles which were attached to clothing and head wear. This is similar to the use of iridescent *Haliotis* in the Southwest for the manufacture of iridescent spangles.

In Casas Grandes, an unfinished pendant of *P. mazatlanica* was found in burial 26, room 29-12, dated to the Medio Period. In the same site, in fill within room 12-16, a finished pendant was found.

Distribution:

Southern Baja California through the Gulf of California, south to Peru.

Habitat and Ecology:

Filter feeder. Strong byssus threads attach shells to substrate, rocks and coral.

Giant Eastern Pacific Conch
Strombus galeatus (Swainson 1823)

Differentiating Characteristics:

Very heavy shell. Mature shells are colored ivory white with a darker colored spire. Young *S. galeatus* may resemble *Conus*. Shell length is typically 7 1/2 inches, and width 5 inches. Young shells are varigated brown and white in color, with bands or blotches of yellow-orange. A heavy periostracum covers the body whorl (see Emerson 1963). The spire, if present, shows axial ribs and spiral striae. The most similar Atlantic/Caribbean species is *S. goliath* Sowerby 1842 (Abbott and Dance 1982; Eisenberg 1981; Keen 1971).

Synonyms: *S. crenatus* Sowerby 1825; *S. galea* Wood 1828.

Primary Cultural Uses and Examples from Southwest Archaeologic Sites:

S. galeatus is one of the principal gastropods traditionally used for human food in the Gulf of California area.

Culturally, S. galeatus was used as a trumpet (aerophone), which could produce the loudest and deepest sound of all the available shells used as trumpets in the Southwest. Also used as a container, and as a base for mosaic constructions (DiPeso 1974).

Ethnographic evidence indicates ritual use of *Strombus* by the Hopi (Fewkes 1896:366). *Strombus* trumpets were reported to be used by the Hopi in the snake-antelope ceremony (Parsons 1938).

In Mesoamerica and the Southwest trumpets were made from large shells of *Strombus galeatus, S. gracilior, Melongena Patula*, and occasonally trumpets were fashioned from large *Murex*

shells. Within the Southwest, trumpets made from *Murex* are only found in larger Anasazi sites such as those of Chaco Canyon (Nelson 1991).

Hohokam:

Most *Strombus* trumpets found in the Phoenix Basin are associated with platform mounds Haury 1976; Nelson 1991).

2 *S. galeatus* trumpets were found in square 6F (in trash), adjacent to platform mound 16 in the site of Snaketown, dated to the Sacaton Phase (Haury 1976).

A single *Strombus* trumpet was found in the Jackrabbit Ruin site, dated to the Sells Phase (Nelson 1991).

12 complete *S. galeatus* shells were recovered from compound B (includes two platform mounds), located near the west side of the Big House Compound at the site of Casa Grande, Arizona. These shells were dated to the Soho Phase of the Hohokam Classic Period (Nelson 1991).

Many *Strombus* fragments have been found at the ritually specialized Grewe site (Haury 1976).

Anasazi:

A *Strombus galeatus* trumpet which was associated with clay mouthpieces was found in room 13 of Pueblo Bonito (Pepper 1920:69).

Mogollon:

In total, at least 160 Trumpets or their fragments were recovered from Casas Grandes (DiPeso 1974).

Used as an open and lidded container, and as a base for mosaic constructions (DiPeso 1974).

Distribution:

Panamic. Northern Gulf of California to Ecuador.

Habitat and Ecology:

Lives in shallow water, predominately intertidal or below tide line. Herbivorous, prefering fine filamentous algae.

Eastern Pacific Fighting Conch
Stombus gracilior (Sowerby 1825)

Differentiating Characteristics:

Substantially smaller than *S. galeatus*. Shell length is typically 3 inches, and width 2 inches. *S. gracilior* typically has a shorter spire than *S. galeatus*. The shell projecting spines of *S. gracilior* are usually more pointed than those of *S. galeatus*. The shell covering or periostracum is thin and horn colored. The most similar Atlantic/Caribbean species is *S. pugilis* Linnaeus 1758 (Abbott and Dance 1982; Keen 1971; Eisenberg 1981).

Cultural Uses and Examples from Southwest Archaeologic Sites:

Used as a trumpet and container, but to a much lesser extent than *S. galeatus*. DiPeso reported no specimens of *S. gracilior* from the Mexican site of Casas Grandes.

Specimens of S. gracilior were found by Haury (1976) in Snaketown.

Distribution:

Panamic. Gulf of California to Peru

Habitat and Ecology:

Offshore to depths of 45 meters. Thrives on sand flats and in muddy lagoons.

Solander's Trivia
Trivia solandri (Sowerby 1832)

Differentiating Characteristics:

Within the Subgenus *Pulsula*. Adult Shell length is typically 16mm, and width 12mm. Ends are blunt, with a dorsal furrow present. Resembles T. radicans, which is colored pink with brown spots, but T. solandri is slightly smaller, and usually browner, with fewer tranverse ribs. (Keen 1971; Abbott and Dance 1982).

Similar Species:

Coffee bean shell, *Trivia californiana* (Gray 1827). T. solandri is similar to *T. californiana,* but *T. solandri* is larger, with a distinct white or light colored dorsal groove. Synonym, *Cypraea californica* (Sowerby 1832). Similar in size and shape to a coffee bean. 10mm in length. Range is from central California to Acapulco, Mexico.

Cultural Uses and Examples from Archaeologic Sites:

Used as an ornament in necklaces and sewn to clothing. May have been used as a charm or gaming piece.

After *Olivella*, the shells of *Trivia solandri* comprise the second most numerous shell found in Hohokam sites. Archaeologic specimens of *Trivia* are usually found with two holes in line with the length of the shell on the dorsum, or with two large side holes. Among the Hohokam, the use of *Trivia* begins in the Vahki Phase (Haury 1976:309).

The Sinagua, who resided to the north of the Hohokam, used relatively large amounts of *Trivia* (Jernigan 1978; Spicer 1935).

Distribution:

Southern California (Palos Verdes), throughout the Gulf of California, south to Peru.

Habitat and Ecology:

Lives intertidally under rocks and in reef formations.

Tropical Periwinkle
Turritella leucostoma et al.(Valenciennes 1832)

Differentiating Characteristics:

Of the family Turritellidae. Shell is typically light buff in color with stripes and mottles of reddish brown. Shell is as much as 115mm in length, greatest diameter about 20mm. The aperture is circular, with a corneous operculum (Abbott and Dance 1984; Keen 1971).

Cultural Uses:

Usually collected as beach tossed shells. Used as a pendant, ornament, whistle, and as a tool or punch.

18 *T. leucostoma* bead pendants were recovered in the fill over the landing from plaza 3-8 at the site of Casas Grandes, dated to the Medio Period (DiPeso 1974).

Distribution:

Cedros Island, Baja California, throughout the Gulf of California to Panama (Keen 1971).

Habitat and Ecology:

Found in sandy areas throughout the intertidal zone, to depths of 40 meters.

Comphrehensive Listing of Marine Molluskan Species Used in the Southwest

The following compilation is a list of all the known molluskan species used in the Southwest (Brand 1938; DiPeso 1974; Haury 1976; Nelson 1991; Ruby 1970; Tower 1945). Primary shell species have been selected and profiled from this list beginning on page 363 of Appendix B. If the claimed identity of a shell is dubious, the entry will include a question mark, and the site and/or name that may be associated.

Shell Species from the Pacific Coast

Gastropoda:

1. *Cerithidea californica* Haldeman
2. *Ceridita nodulosa* Dall
3. *Conus californicus* Hinds
4. *Diadora aspera* Eschscholtz
5. *Erato vitellina* Hinds
6. *Haliotis assimilis* Dall
7. *Haliotis corrugata* Gray
8. *Haliotis cracherodii* Leach (several subspecies)
9. *Haliotis fulgens* Philippi (several subspecies)
10. *Haliotis rufescens* Swainson
11. *Megathura crenulata* Sowerby
12. *Mitra catalinae* Dall
13. *Olivella baetica* Carpenter
14. *Olivella biplicata* Sowerby
15. *Olivella pedroana* Conrad
16. *Polinices (Lunatia) lewisii* Gould
17. *Searlesia dira* Reeve

Pelecypoda:

18. *Cardita nodulosa* Dall
19. *Hinnites multirugosus* Gale
20. *Pecten circularis (Argopecten) Carpenter*
21. *Saxidomus nuttalli Conrad*

Shell Species from the Gulf of California

(For several species this may also include the Pacific side of the Baja peninsula, north to Magdalena Bay.)

Gastropoda:

1. *Acmaea faccicularis* Menke
2. *Agaronia testacca* Lamark
3. *Agaronia testacea* Lamark
4. *Anachis coronata* Sowerby
5. *Cerithidea albonodosa* Carpenter
6. *Cerithidea mazatlanica* Carpenter
7. *Cerithium stercusmuscarum* Valenciennes
8. *Conus fergusoni* Sowerby
9. *Conus gladiator* Broderip
10. *Conus perplexus* Sowerby
11. *Conus princeps* Linnaeus
12. *Conus purpurascens* Broderip
13. *Conus regularis* Sowerby

14. *Conus ximenes* Gray
15 *Conus ximenes mahogani* Reeve
16. *Melongena patula* Broderip and Sowerby
17. *Muricanthus callidinus* Berry ? (Pueblo Bonito: Judd 1954)
18. *Muricanthus nigritus* Philippi
19. *Nassarius complanatus*
20. *Nassarius iodes* Dall
21. *Nassarius moestus* Hinds
22. *Nassarius moestus brunneostoma* Stearns
23. *Nassarius versicolor* Adams
24. *Nerita funiculata* Menke
25. *Neritina luteofasciata* Miller
26. *Nomaeopelta mosoleuca* Menke
27. *Oliva incrassata* Solander
28. *Oliva polpasta* Duclos
29. *Oliva spicata* Roding
30. *Olivella dama* Wood
31. *Olivella tergina* Duclos
32. *Olivella volutella* Lamark
33. *Ostrea columbiensis* ? (Haury 1950)
34. *Pyrene fuscata* Sowerby
35. *Pyrene major* Sowerby
36. *Pyrene strombiformis* Lamark
37. *Strombus galeatus* Sowerby
38. *Strombus gracilior* Sowerby
39. *Turbo fluctuosus* Wood
40. *Turritella leucostoma* Valenciennes
41. *Turritella gonivstoma* Valenciennes
42. *Turritella tigrina* Kiener
43. Vermetus tripsycha Pilsbry

Pelecypoda:

44. *Arca pacifica* Sowerby
45. *Arca tuberculusa* Sowerby
46. *Chama echinata* Broderip
47. *Chama Mexicana*
48. *Codakia distinguenda* Tyron
49. *Dosinia ponderosa* Gray
50. *Glycemeris bicolor* Reeve
51. *Glycemeris giganteus* Reeve
52. *Glycemeris maculata* Reeve
53. *Glycemeris multicostata* Sowerby
54. *Glycemeris tesselata* Sowerby
55. *Lyropecten subnodosus* Sower
56. *Megapitaria squalida* Sowerby
57. *Pecten purpuratus* Lamark
58. *Pecten vogdesi* Dall
59. *Pinctada mazatlanica* Hanley
60. *Spondylus calcifer* Carpenter
61. *Spondylus princeps* Broderip

62. *Spondylus ursipes* Berry
63. *Trachycardium panamense* Sowerby
64. *Trachycardium procerum* Sowerby

Shells which may be from both the Gulf of California
and the California Coast

Gastropoda:

1. *Aletes centiquadrus* Valenciennes
2. *Aletes squamagerus* Carpenter
3. *Avicula peruviana* Reeve
4. *Nassarius tegula* Reeve
5. *Polinices recluzianua* Deshayes
6. *Trivia solandri* Gray

Pelecypoda:

7. *Anomia sp.*
8. *Chama buddiana* Adams
9. *Donax gouldii* Dall
10. *Dusinia ponderosa* Gray
11. *Laevicardium elatum* Sowerby
12. *Panope generosa solida* Dall
13. *Pecten circularis aequisulcatus* Carpenter
14. *Pinctada sp.*
15. *Pteria sterna* Gould
16. Tagelus californianus Conrad

Scaphopoda:

17. *Dentalium neohexigonum* Sharp and Pilsbry
18. *Dentalium sempolitum* Broderip and Sowerby

Shell species found in Southwest Sites which Originated in the
Caribbean Marine Faunal Province (Atlantic,
Gulf of Mexico or Caribbean)

Gastropoda:

1. *Columbella mercatoria* Linne
2. *Faciolaria distans* Lamark
3. *Nassarius vibex* Say
4. *Neretina reclivata* Say
5. *Oliva sayanna* Ravennel
6. *Strombus gigas* Linnaeus

7. *Strombus pugilis* Linnaeus

Pelecypoda:

8. *Anadonta sp.* (fresh water Gila-Salt River system)
9. *Donocardium robustum* Solander
10. *Noetia ponderosa* Say
11. *Pecten exasperatus* Sowerby
12. *Pecten irradians* Lamark
13. *Pinctada sp.*

Shell Species which are Native to All Gulfs or Oceans Previously Mentioned, or Mentioned in the Inventory of Archaeologic Molluskan Profiles which are Included in Appendix A.

Gastropoda:

1. *Cypraea sp.*
2. *Tritonalia sp.*

Pelycypoda:

3. *Chione sp.*
4. *Tivela sp.*

Scaphopoda:

5. *Cadulus sp.*

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