SHELL BEAD AND ORNAMENT EXCHANGE NETWORKS BETWEEN CALIFORNIA AND THE WESTERN GREAT BASIN

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ABSTRACT

This study presents a synopsis of a typology for *Olivella* shell beads, with metric descriptions and refined dating of types found in California and Great Basin archaeological sites. These base-line typological data provide the foundation for a subsequent comparative analysis of over 5400 beads and ornaments from 81 Great Basin sites, which revealed fluctuations through time in the frequencies of shell artifacts likely obtained through four Pacific Coast source networks. This analysis indicates that the apex of marine shell exchange between California and the western Great Basin occurred between ca. 2000 and 200 B.C., with a significant reduction in the numbers of beads and ornaments in the succeeding time period (ca. 200 B.C.–A.D. 700). Between ca. A.D. 700 and 1500, shell bead and ornament frequencies suggest an increase in exchange over the preceding period, but by Protohistoric/Historic times (ca. A.D. 1500–1880), exchange of shell from California into the Great Basin declined dramatically.

PREFACE

Our archaeological research in Monitor Valley began in 1970 with the discovery and test excavation of Gatecliff Shelter. From then until 1983, we returned almost annually to continue excavations and initiate a program of regional archaeological survey. Initially, we planned a single volume to present our findings. But as research topics became more complex and the fieldwork continued year after year, it became obvious that one monograph, no matter how lengthy, would be inadequate to describe the results of the Monitor Valley research.

Accordingly, we settled on a five-part monograph series entitled *The Archaeology of Monitor Valley,* the first two volumes of which have already appeared (Thomas, 1983a, 1983b). The next two volumes, both in preparation, expand the scope by presenting data and interpretations from the additional excavations and surveys conducted throughout Monitor Valley. The final volume is a discussion of the specific findings of this project against a regional and theoretical background.

Any adequate consideration of Monitor Valley archaeology requires, of course, close cooperation between a number of specialists. Early in the project, James Bennyhoff and Richard Hughes generously agreed to undertake the analysis of the shell beads and ornaments recovered from Monitor Valley; their descriptions of the artifacts recovered at Gatecliff Shelter have already appeared in the second volume of the Monitor Valley series (Bennyhoff and Hughes, 1983).

Their work on the Gatecliff materials stimulated Bennyhoff and Hughes to initiate a comprehensive review of cross-dating evidence for all such Great Basin beads and ornaments—a task last undertaken two decades earlier (Bennyhoff and Heizer, 1958). Accordingly, they completed (nearly five years ago) a detailed discussion culminating in the definition of the major exchange networks that were operating throughout the Pacific coast and spanning five millennia.

We had planned initially that the Bennyhoff and Hughes synthesis would appear in Part 5 of the Monitor Valley series (see Bennyhoff and Hughes, 1983: 290). But for a variety of reasons, the final assembly of Parts 3 and 4 has taken longer than anticipated. Rather than delay publication further by waiting for the rest of Part 5 to be prepared, I suggested that their manuscript be published immediately as an independent contribution.

Bennyhoff and Hughes agreed to this plan and revised their synthesis into monograph form. Given its genesis as a spin-off from the Monitor Valley materials, it is wholly appropriate that this important work appear in the *Anthropological Papers* of the American Museum of Natural History. This research is of great significance to archaeologists working throughout the American West, and I thank the authors for their patience and understanding throughout the lengthy publication process. I feel that the product is well worth the wait.

David Hurst Thomas
American Museum of Natural History
March 1987

INTRODUCTION

This monograph had its beginning at the Great Basin Anthropological Conference in October 1978, when David Thomas asked the senior author to analyze 17 shell beads and ornaments from Gatecliff Shelter, Nevada. In the course of comparing the Gatecliff assemblage with others in the Great Basin, it became clear that the original synthesis of Bennyhoff and Heizer (1958) was out of date, both with respect to the Great Basin *and* California. Not only had views on *dating* in California and the Great Basin changed considerably since the summer of 1957, but a great deal of *distributional* data had accumulated in these two decades. Consequently, it was clear that no meaningful statement could be made about either dating or distribution until a new synthesis was completed. While preparing this synthesis (which appears as chap. 2 herein), we were forced to confront an embarrassing fact: no type-level descriptions had been published for the *Olivella* shell beads used as the temporal reference points for the synthesis.

Although several unpublished manuscripts contained smatterings of these typological data (e.g., Bennyhoff and Fredrickson, MS; Moratto, 1972), not only were they out of date but they lacked metric classification criteria for all known *Olivella* bead types in northern and central California. Because of this, we prepared a synopsis of California and Great Basin *Olivella* shell bead types (which appears as chap. 1 herein) to provide the metric criteria we followed in identifying different bead types so that other researchers could use these data to classify their own assemblages. Thus, the overall objectives of the synopsis—aside from presenting California-based age ranges for each type—were quite similar to those pursued by Thomas (1981, 1983b) for Great Basin projectile points: to quantify and objectify the classification process in the hope that this would encourage standardization of reporting.

The present study was essentially completed in late 1981, with additions and revised descriptions of several bead types appended in early 1982. Although additions to chapter 1 continued to be made as late as June 1986, all 13 tables and the analysis in chapter 2 were based solely on data compiled prior to 1982. Despite the time that has elapsed since chapter 2 was first drafted, we feel that recent data obtained from California and Great Basin sites largely corroborate our initial findings.

ACKNOWLEDGMENTS

The present study owes much to the innovative efforts of Franklin Fenenga, Robert F. Heizer, Edward P. Lanning, and James T. Davis. Recent interactions with David Fredrickson, Robert Gibson, Chester King, William Olsen, Polly Quick, and Francis Riddell have been equally stimulating.

Without the cooperation and assistance provided by the staff of the Robert H. Lowie Museum of Anthropology, University of California, Berkeley, we would have been unable to complete this study. In particular, we appreciate the assistance offered by Frank Norick, David Herod, and Charlotte Johnson.

We thank Robert Orlins for providing information on CCo-298, Allan Bramlette for Ker-824 data, Lorann S. A. Pendleton for informing us of the Grooved Rectangles from Hidden Cave and sending them to us for examination, and Dennis O'Brien and Nicholas Amorosi for illustrations. We are grateful to Brenda Jones, AMNH Scientific Publications Editor, for editorial assistance, and we are particularly indebted to Stacy Goodman and Margot Dembo for all manner of assistance and for help in transforming these studies into a coherent monograph. David A. Fredrickson and Donald R. Tuohy reviewed the final draft of the monograph and provided constructive comments that improved our presentation. Finally, special thanks to David Hurst Thomas for encouraging us to prepare this study, and for providing the technical support crucial to its completion.

CHAPTER 1. SYNOPSIS OF SHELL BEAD AND ORNAMENT TYPOLOGIES FOR CALIFORNIA AND THE GREAT BASIN

A TYPOLOGY FOR *OLIVELLA* SHELL BEADS

Two major *Olivella* shell bead typologies have been in general use among students of California prehistory. The "Bulletin 2" typology (Lillard et al., 1939: 12) was pivotal to the development of the Central California Taxonomic Framework of three temporal "Horizons" (Beardsley, 1948). Despite errors in terminology, partly corrected by Beardsley (1954: 11, Appendix A), these 14 key types provided fundamental temporal guidelines for central California archaeology for more than 40 years (Davis and Treganza, 1959; Ragir, 1972). The Gifford (1947) typology has been used throughout California for more than 30 years (Gerow and Force, 1968; Greenwood, 1972). Unfortunately, neither typological scheme could be meaningfully expanded to incorporate the new temporally significant types which recent analysis has revealed. We therefore present a new typology which incorporates these findings (see table 1).

This synopsis is not the place for detailed examination of the difficulties with the Bulletin 2 and Gifford typologies, but we should mention a few of the more glaring problems. While Lillard, Heizer, and Fenenga recognized historical types based on grave lot association and stratigraphy, their Class 3 designations followed no logic. In particular, the type 3b–3b1–3b2 arrangement allowed no convenient expansion of the Saddle class, while the 3a1 (Lipped)–3a2 (Punched) designations precluded simple expansion of the important and variable Lipped class. Despite its later publication, the Gifford typology was a simplistic descriptive effort which ignored context, size, and pertinent published data. It attempted to incorporate all classes of artifacts made from every species of shell found in California into one taxonomic system. The endeavor was truly remarkable, if awkward, but the continued use of the unmodified Gifford typology constitutes generation of useless information. For example, Gifford's type X3bI is a catchall for all simple round to oval beads, including the previously published Bulletin 2 types 3b, 3c, and 3d. Bulletin 2 type 3a1 Lipped beads from the same Protohistoric grave were split into 3 types (X3bII, X3bI, and X2b), the latter two of which contain a preponderance of Middle period specimens. Based on the presence or absence of shelving, Gifford split the Bulletin 2 type 2a Thin Rectangles and type 2b Thick Rectangles into two culturally meaningless groups, despite published evidence that these were diagnostic markers for the Late and Early periods, respectively. Misdrilled specimens were elevated to type status (X3aII, X3aIII), while the temporally significant distinction between central and end perforation in type 2a went unnoticed. The most significant shell marker type for the Early period, *Haliotis* 1a, was lost amid 4 heterogeneous ornament classes because size was not considered an important attribute.

A more coherent and sensitive shell bead typology has been needed for a long time. The senior author has devoted much of the past 30 years to measuring thousands of beads and seriating hundreds of grave lots from sites in central and southern California and the western Great Basin. An initial attempt to modify the Bulletin 2 typology (Bennyhoff and Heizer, 1958: 78) was abandoned, and a new system was outlined (Fredrickson, 1968: 26). In May 1967, David Fredrickson recorded verbal descriptions of various shell and stone bead types developed by the senior author, supplemented by comments from William H. Olsen and Francis A. Riddell. The resultant manuscript was merely a first draft, to be developed further by all of us. A limited number of copies were distributed for comment with the understanding that the typology was not yet ready for publication. Nonetheless, the manuscript was cited (Olsen and Payen, 1969; Pritchard, 1970) as Bennyhoff and Fredrickson, MS, and the senior author has since given permission for the use of pertinent sections to others (Moratto, 1971, 1972; Bickel, 1981).

It was clear, however, that virtually every

type needed more measurement, a better method for dealing with variants had to be devised, and more grave lots had to be seriated. Not one of the publications on such crucial sites as SJo-68, Ala-307, Ala-309, Mrn-266, Sac-6, or CCo-138 (to name only a few) contains accurate quantification and provenience data. The development of refined cultural units—districts and phases as well as types (Bennyhoff, 1977; figs. 2–6 in Elsasser, 1978)—has required the partial reanalysis of most of the major sites in the San Francisco Bay–Delta region. To understand southern California trade relations, Santa Cruz Island sites were sampled. As this was done, of course, each new site posed new problems and suggested revisions in the original typology; every revision meant that old data had to be reanalyzed.

While the senior author is still satisfied with the significance of the basic types (E1, E2, E3, M1a, M2a) the problem of form variation needs more attention. Many years of experience leave the impression that shelving increases through time in Class E Lipped beads and that percentage frequencies would demonstrate this; however, there are over 14,000 Lipped beads from Sac-6 alone, and the sample of measured beads is still meager. Rhomboid Rectangles (M1b, M2b) appear to increase through time at CCo-138, but there are over 15,000 Class M Rectangles yet to be analyzed at this site. Future studies at sites with large collections will employ various sampling strategies.

It should be emphasized that the present synopsis includes extensive revision of the original 1967 manuscript—in particular type C1 and C2, and Classes E, H, L, M, and the treatment of species. Classes J, O, P, and Q appear here for the first time as well as types A6, G5, G6, and L3. A large number of new names have been applied to various forms previously designated only by symbols. Although the senior author takes responsibility for the often cumbersome symbolic designations and odd names, the types presented here derive from the work of a vast number of past and present researchers. While we reject his typology, the present work could not have been undertaken without the clues and vital quantification provided by E. W. Gifford (1947).

TABLE 1
Concordance of *Olivella* Shell Bead Typologies

Bennyhoff and Hughes, herein		Lillard et al., 1939; Beardsley, 1954	Gifford, 1947
Bead name	(Class)		
Simple Spire-lopped	(A1)	1a, 1b	F5b
Oblique Spire-lopped	(A2)	1c	F5b
Drilled Spire-lopped	(A3)	1d	C23b
Punched Spire-lopped	(A4)	—	C23b
Applique Spire-lopped	(A5)	—	C23b
Side-ground	(B1)	1a, 1b	F5b
End-ground	(B2)	1a, 1b	F5b
Barrel	(B3)	—	G1a
Cap	(B4)	—	G1b
Spire	(B5)	—	G1c
Double-Oblique	(B6)	—	G1a
Bevelled	(C1)	3b1	X2b
Split Drilled	(C2)	3b1	X1b, X2b
Split Oval	(C3)	—	X2b
Split End-perforated	(C4)	—	—
Scoop	(C5)	—	—
Split Double-perforated	(C6)	—	—
Split Amorphous	(C7)	3b1	X2b
Split Rough	(C8)	3b1	X2b
Shelved Punched	(D1)	3a2	X1a
Rectangular Punched	(D2)	3a3	X2a
Oval Punched	(D3)	—	—
Thin Lipped	(E1)	3a1	X3bII
Thick Lipped	(E2)	3a1	X3bII, X5a, X1b, X2b, X3bI
Large Lipped	(E3)	3a1	X3bII, X2b, X3bI
Oval Saddle	(F1)	3b	X3bI
Full Saddle	(F2a)	3b	X3bI
Round Saddle	(F2b)	3b	X3bI
Square Saddle	(F3a)	3b2	X3c
Small Saddle	(F3b)	3b2	X3c, X3bI
Tiny Saucer	(G1)	3d	X3bI
Saucer	(G2)	3c	X3bI
Ring	(G3)	3c	X3bI
Ground Saucer	(G4)	—	—
Disk	(H1–3)	3d	X3bI, X5a
Wall Disk	(J)	—	—
Cupped	(K1)	3e	X4, X5b
Bushing	(K2)	3e	X4
Cylinder	(K3)	3e	X4, X5b
Thick Rectangle	(L)	2b	X2a, X3aI
Thin Rectangle	(M)	2a	X2a, X3aI–III
Grooved Rectangle	(N)	—	—
Whole Shell	(O)	—	C23a
Abraded Quarter-shell	(P)	—	—
Columella	(Q1–2)	—	—

CLASSIFICATION PROCEDURE

We agree with Krieger (1944: 272) that archaeological specimens should be grouped into classes which have "demonstrable historical meaning in terms of behavior patterns." Therefore, it was considered essential that the two extant central California bead typologies be revised in light of new knowledge derived from intensive study of cultural associations through time and space. The initial breakthrough involved the seemingly insignificant difference between central and end perforation in rectangular beads at CCo-138. When grave lots were plotted by depth, three subphases within Phase 1 of the Late period emerged, correlated with changes in other bead types, ornament shapes, and incising styles, as well as form changes in pipes, harpoons, and rarer artifacts (Bennyhoff, 1986a: 68). Using minor changes in other bead forms as a starting point, the Late and Middle periods have been divided into 10 phases, each roughly 200 years in duration (see fig. 10).

It will be immediately apparent that this typology is of the "splitting" variety. The primary goal has been to define historical types, that is, to determine which attributes have temporal significance. Attributes which do not change have been noted, but have not been incorporated in the definition of types. The basic unit of analysis has been the grave lot, and beads of similar shape which were strung together have been kept together. Thus Shelved and Lipless variants of Lipped beads remain in Class E because they are never found strung separately, and there is stratigraphic and grave lot evidence that these Protohistoric beads have no historical relationship whatsoever to the superficially similar Split Drilled (Class C) and Saucer (Class G) beads of the Middle period. Stratigraphy, context, and seriation prove conclusively that Late period Thin Rectangles (Class M) developed out of Middle period Square Saddles (F3a), and their remarkable similarity to Early period Thick Rectangles (Class L) is a classic example of convergence. Since two distinct bead traditions are clearly evident, separate classes have been defined. In addition, Classes D, F, H, and P are all rather clear historically related traditions. Class C, although composed only of Middle period types, has dubious historical unity, and Classes A, B, G, and O each contain several unrelated traditions. Types A5, B1, B5, and G1 are isolates; rather than use up the limited supply of letters, we have opted to place them in their closest form group. Types G2–G4 (Saucer-Ring tradition) and K1–K3 (Callus tradition) are believed to have historic unity. The original typology was designed for central California, and Class A1 Spire-lopped has already been published (Olsen and Payen, 1969: 5–6). Southern California forms were added later, so Whole Shell beads have been designated Class O, rather than the more logical Class A.

The question of how to handle descriptive variants is a serious problem which we have not completely resolved. For the Lipped class, we are satisfied that E1a, E1b, E2, and E3 are valid historical types which document a finely tuned progression from the beginning of the Protohistoric period into the Historic period. There is some evidence to suggest that E2a may be a central California manufacture, while E2b was made in both central and southern California. In addition to a Lipless variant associated with all four types, there are suggestions that the degree of shelving (shelf edge to full shelf) increases through time. A method of tabular presentation of these attributes was needed, so we chose to assign symbolic designations. Round and Oval Thin Lipped beads are both markers of the early Protohistoric period, though successive in time. Hence, the decision was made long ago to designate both Thin Lipped forms E1, the late Protohistoric Full Lipped form E2, and the Historic Large Lipped form E3. Recent incomplete analyses of size and shape variation in E2 and E3 suggested a need for two basic variants in each type, in addition to the Shelved and Lipless variants. Rather than reassign new numbers to incompletely analyzed types, we have added terminal numbers: E2a1 = Normal Full Lipped; E2a2 = Lipless variant; E2a3 = Shelf Edge variant; E2a4 = Shelved variant. Types C1 and C2 have four similar variants plus variation in perforation size, but no discussion of variations will be presented for these two important types until more analysis can be completed.

Needless to say, many of these problems

will remain so long as investigators continue to pigeonhole their thousands of beads by "type" without providing basic metrics and a description of form variations. Significance will remain uncertain unless full provenience is published (e.g., Diablo Canyon; Greenwood, 1972). The necessity to reanalyze recent publications (e.g., Wallace and Lathrap, 1975) is truly time wasted (cf. Thomas, 1975: 502).

As emphasized since Beardsley (1954: n. 81), and as is obvious in the illustrations which follow, many single beads cannot be reliably "typed" by form alone (e.g., types C3, E3, and nonshelved C2). Scattered beads found unassociated in the midden have recently become even more important, as an increasing number of hastily analyzed grave lot collections must be reburied (see chap. 2). Thus the need to recognize and define the significant attributes associated with historical types grows even greater. Vast areas of California lack more than a general cultural sequence, and such well-studied regions as the Delta and San Francisco Bay lack crucial data because of inadequate early excavation methods and improper curation. Archaeologists are only beginning to cope with the ethnographic and linguistic diversity in California; a secure taxonomic framework is essential before valid archaeological traditions can be recognized and studies of cultural processes can be truly meaningful.

THE *OLIVELLA* SHELL

The shells of varied species of *Olivella* have been collected for beads along the Pacific Coast since early Holocene times and were traded hundreds of miles into the interior. As fashions changed, an ever increasing variety of bead forms were manufactured, and new ways of utilizing various parts of this small, simple shell were developed. Here, we present a glossary of terms pertaining to parts of the *Olivella* shell that were utilized in bead manufacture (fig. 1).

Aperture: the opening or entrance of the shell.

Apex: the tip of the spire.

Body whorl: the lowest and largest whorl.

Calcareous: composed of calcium carbonate or calcite.

Callus: a calcareous deposit, such as enamel.

Canal: the basal notch opposite the spire (technically, the anterior or siphonal canal).

Columella: the solid pillar at the axis of the shell, around which the whorls form their spiral circuit.

Dorsal: the back or outside.

Fasciole: the basal white band surrounding the canal.

Full shelf: projecting concave depression on the upper interior of a split shell.

Growth lines: lines on the surface and interior of the shell which indicate rest periods during growth.

Inner lip: portion of the aperture adjacent to the columella.

Lips: the margin of the aperture.

Outer lip: final margin or edge of the body whorl, opposite the inner lip.

Parietal wall: area of the inner lip.

Penultimate whorl: the beginning of the spire, just above the body whorl.

Shelf: interior structural remnant inside the juncture of the body whorl and penultimate whorl, opposite the aperture. In standard orientation, the shelf is at top of bead, unless an end perforation indicates otherwise (in type C4a and some M3, the shelf appears at bottom).

Shelf edge: shallow groove at the upper interior of a split shell, adjacent to either side of the shelf.

Shelf remnant: small projecting segment of the shelf at the inside top (spire end) of smaller beads; lacks the concavity of a full shelf. Often triangular at the upper right corner of Rectangular beads; shallow lunate at top of Shelved Lipped beads.

Spire: the upper whorls, from the apex to the body whorl.

Standard orientation: unless end perforation dictates otherwise (types A6, C4a, C5, some M3), all shells and beads are oriented with the spire up and the canal down. Shelves are normally at the top, and callus remnants (Class E, exterior view) are at the right side. Growth lines should always be vertical because type F1 and F2 Saddles and M1d Wide Sequins are defined as *wider* than long. So far, no observed side perforation (off-center perforation at the top) has been sufficiently

standardized to warrant violation of the vertical growth line rule.

Suture: continuous line on the shell surface where whorls collide; frequently preserved on the exterior top of half-shell beads.

Ventral: the underside, or inside.

Whorls: distinct turns, or coils, of the spire.

FORMAT FOR THE SYNOPSIS

In the following pages, we present summary statements on each *Olivella* bead type by class, type designation, and name. For each named type within each class, we provide a description, species identification (where pertinent), comment on size, source of probable manufacture, temporal significance, and Great Basin occurrences. After identifying typological units we discuss, in the description section below, some of those attributes which have not been given adequate and systematic treatment in the synopsis. We provide these comments to stimulate those who employ this typology to search for these (and other) features so that fuller descriptions of bead form and function may emerge.

Typological Units, Symbols, and Bead Names

Classes, designated by capital letters, reflect ideal groupings based on similarity of form with presumed historical relatedness. This appears clear for Classes E, F, H, N, and P. Despite the relatively unambiguous development of Class E from Class K, and Class M from Class F, separate classes have been maintained because of dissimilarity in form and temporal placement (Oval vs. Round, Late vs. Middle period, respectively). On the other hand, we believe that the basic unifying form found in Classes A (Spire-lopped) and B (End-ground) outweighs the still uncertain historical connection between types within each class. At the moment, B1b and B2b form a closer central California Phase 1 Late period unit than does the older southern California tradition of B2–B3–B4 (and B5 ?).

We use types, designated by Arabic numbers within each class, to demarcate morphologically distinct variations which occur during a restricted temporal period. In some cases these are temporal types (type P1 and C5), while in other instances we have merely identified morphological types (A1 and G1).

Subtypes are designated by lower-case letters; many of these are time sensitive (E1a, E1b), while others remain descriptive or of uncertain value (M1b, M1c). Variants are designated by a second Arabic numeral; at present these are considered to be of purely descriptive value, but further analysis may reveal temporal significance (E2b3). Incising is indicated by a terminal i. Where temporal significance is apparent, Roman numerals are added (A1ciI, A1ciII). At present, hatched and crosshatched incising on Class K beads seems to be contemporaneous, so Roman numerals have not been assigned. A terminal n is used for nicked edges (C5n). See *species* (below) for a major revision of a previously published symbolic code which has since been abandoned.

Names have been assigned less systematically to classes and types, with an effort to favor brevity over meaning (see M1 for Sequin, M2 for Pendant). When suitable terms were available, one name was applied to the class and different short names were given to the types. Thus all Class K are referred to as Callus beads (the distinctive enamel source material), but the individual types are termed Cupped (a form characteristic), Bushing (a common but not exclusive function), and Cylinder (typical form). Subtypes were often more difficult (see Class E).

Description

Key attributes (shape, perforation placement, beveling, facial grinding, side grinding, etc.) are presented in the synopsis. However, much greater detail should be provided. Only minimal attention has been given to drilling herein. The vast majority of thin beads were drilled conically from the inside, with exterior retouch (visible with a hand lens). Thicker beads of any type often display biconical drilling, while the force to make punched holes was exerted from the exterior. Likewise, methods of manufacture and finish have been slighted. Chipped edges are definitely significant for H3, F2a, and C8, and considerable variation in the extent of grinding is characteristic of C7, D1, H2, and some G2. Ventral edge grinding is another variable to be

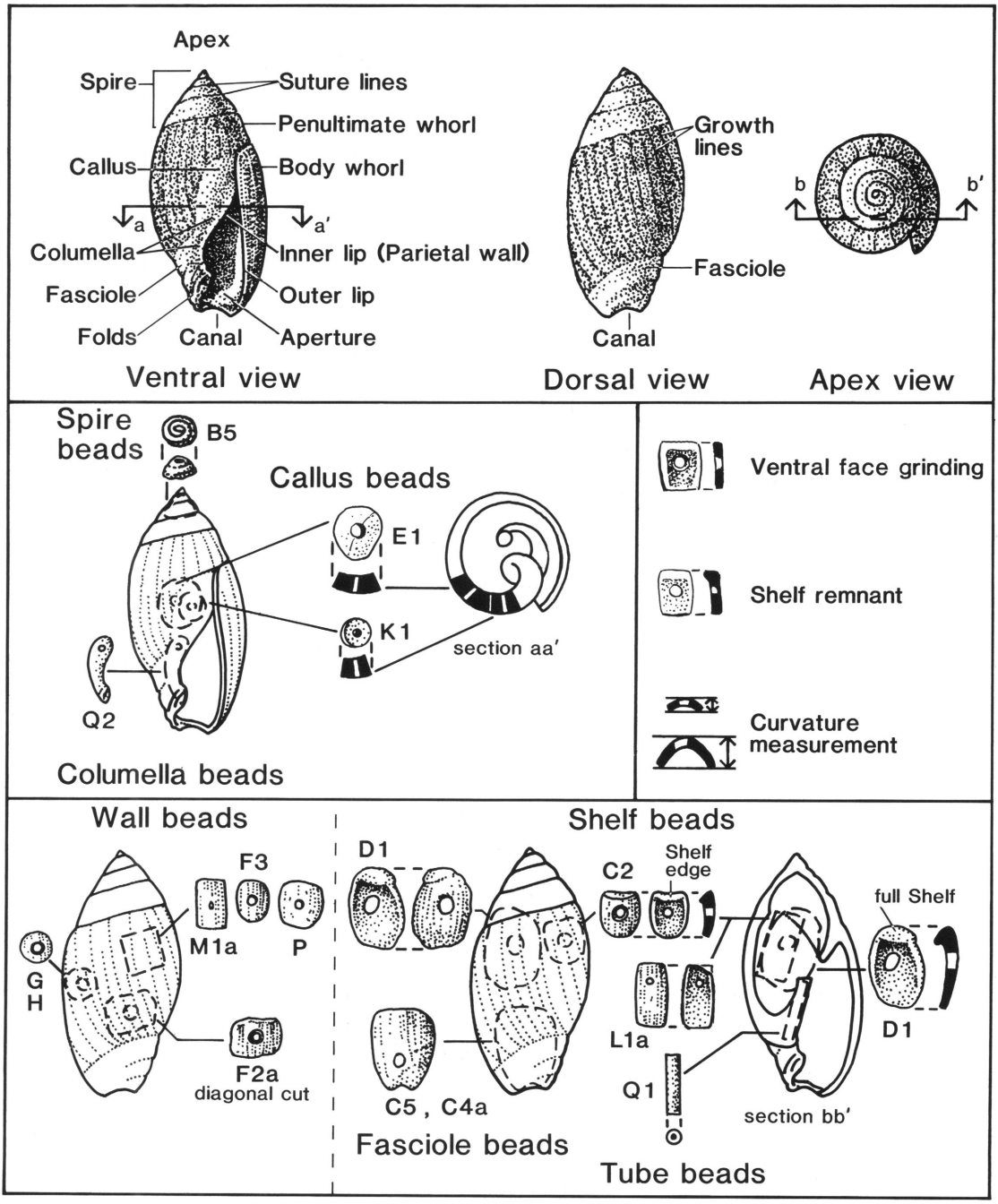

Fig. 1. The Olivella shell, showing landmarks and loci of manufacture for various classes of beads.

noted, along with uniformity. Locus of manufacture on the shell can often be determined from shelving, suture lines, fasciole edges, callus remnants, and inner lips (fig. 1).

Stringing methods and arrangements are often revealed by string wear on the perforation and end or face abrasion. While most Class A and B specimens were strung end to

TABLE 2

Components in Nevada, Oregon, and California Archaeological Sites Viewed in Terms of Central California Phases

(Lettered components are discussed by site in Appendix)

Dating scheme																					
A2	B1	California Phase	Ch2	Ch3	Ch13	Ch15	Ch16	Ch18	Ch28	Ch35	Ch36	Ch39	Ch40[a]	Ch56	Ch60	Ch65	Ch67	Ch78	Ch83[a]	Ch89	Ch118
		Late																			
A.D. 1800	A.D. 1800	Historic	–	–	A	A	–	A	–	A	–	–	–	–	–	–	–	–	–	–	–
A.D. 1700	A.D. 1700	Late Protohistoric	–	–	–	B	A	B	–	–	–	A	–	–	–	–	–	–	–	–	–
A.D. 1500	A.D. 1500	Early Protohistoric	A	–	–	C	–	C	–	–	–	B	–	X	–	X	A	–	–	–	–
A.D. 1100	A.D. 1300	Late Phase 1	–	–	–	D	–	D	–	B	X	C	–	–	–	–	–	–	–	–	–
A.D. 700	A.D. 1100	Middle Phase 1	–	–	–	E	B	E	–	–	–	D	–	–	–	–	–	X	–	–	–
		Early Phase 1	–	–	–	F	–	F	–	–	–	E	–	–	–	–	–	–	–	–	–
A.D. 300	A.D. 900	**Middle**																			
		Middle/Late Period																			
A.D. 100	A.D. 700	Transition	–	–	B	G	–	G	–	C	–	F	–	–	–	–	B	–	–	X	–
300 B.C.	A.D. 500	Terminal	B	–	C	H	–	H	–	–	–	G	–	–	–	–	–	–	–	–	X
600 B.C.	A.D. 300	Late	–	–	D	I	–	I	–	–	–	–	–	–	–	–	–	–	–	–	–
800 B.C.	A.D. 100	Intermediate	C	A	–	J	C	J	X	–	–	–	–	–	–	–	–	–	–	–	–
		Early	–	–	–	K	–	K	–	D	–	–	–	–	–	–	–	–	–	–	–
1300 B.C.	200 B.C.	**Early**																			
		Early/Middle Period																			
1500 B.C.	600 B.C.	Transition	D	–	–	–	–	L	–	–	–	–	–	–	–	–	–	–	–	–	–
2000 B.C.	1100 B.C.	Terminal	–	–	–	–	–	M	–	–	–	–	–	–	–	–	–	–	–	–	–
2200 B.C.	1250 B.C.	Late	–	–	–	–	D	N	–	–	–	–	–	–	–	–	–	–	–	–	–
2500 B.C.	1500 B.C.	Middle	E	B	–	–	–	O	–	–	–	–	–	–	X	–	–	–	–	–	–
		Early	–	–	–	–	–	P	–	–	–	–	–	–	–	–	–	–	–	–	–
	2000 B.C.																				
	4000 B.C.		–	–	–	–	–	Q	–	–	–	–	–	–	–	–	–	–	–	–	–
	7000 B.C.		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

[a] Unphased; X = number of components uncertain.

TABLE 2—(*Continued*)

Dating scheme A2	Dating scheme B1	California Phase	E125	Hu16	Hu17[a]	Ny301	Ny754	Pe6	Pe12	Pe13	Pe14	Pe27	Pe66	Pe67	Massacre Lake Cave	Wa197[a]	Wa385	Wa1016	Wa1502	WP107
		Late																		
A.D. 1800	A.D. 1800	Historic	A	—	—	A	X	—	—	—	—	A	—	—	—	—	—	—	A	—
A.D. 1700	A.D. 1700	Late Protohistoric	B	—	—	—	—	—	—	X	A	B	—	A	—	—	—	—	B	A
A.D. 1500	A.D. 1500	Early Protohistoric	C	—	—	B	—	—	X	—	—	—	—	—	—	—	—	—	—	—
A.D. 1100	A.D. 1300	Late Phase 1	—	—	—	—	—	—	—	—	—	—	—	B	—	—	—	—	—	—
A.D. 700	A.D. 1100	Middle Phase 1	—	—	—	C	—	—	—	—	B	C	—	—	X	X	X	—	C	B
		Early Phase 1	—	—	—	—	—	—	—	—	—	D	—	—	—	—	—	—	—	—
A.D. 300	A.D. 900	**Middle**																		
		Middle/Late Period																		
A.D. 100	A.D. 700	Transition	—	—	—	D	—	—	—	—	—	E	—	C	—	—	—	—	—	—
300 B.C.	A.D. 500	Terminal	—	X	—	—	—	X	—	—	—	F	A	—	—	—	—	—	—	C
600 B.C.	A.D. 300	Late	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
800 B.C.	A.D. 100	Intermediate	—	—	—	E	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Early	—	—	—	F	—	—	—	—	—	—	B	D	—	—	—	X	D	—
1300 B.C.	200 B.C.	**Early**																		
		Early/Middle Period																		
1500 B.C.	600 B.C.	Transition	—	—	—	G	—	—	—	—	—	—	—	—	—	—	—	—	E	—
2000 B.C.	1100 B.C.	Terminal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2200 B.C.	1250 B.C.	Late	—	—	—	H	—	—	—	—	—	—	—	—	—	—	—	—	F	—
2500 B.C.	1500 B.C.	Middle	—	—	—	—	—	—	—	—	—	—	—	—	—	?	—	—	—	—
		Early	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	2000 B.C.																			
	4000 B.C.		—	—	—	—	—	—	—	—	C	—	—	—	—	—	—	—	—	—
	7000 B.C.		—	—	—	—	—	—	—	—	D	—	—	—	—	—	—	—	—	—

TABLE 2—(*Continued*)

Dating scheme									Death Valley										
A2	B1	California Phase	Catlow Cave No. 1	Couger Mt. Cave	Roaring Spr. Cave	Iny-2	Iny-182	Iny-372	48-55	49-55	62-55	69-55	12-56	26-56	30-56	33-56	43-56	46A-56	68-56
		Late																	
A.D. 1800	A.D. 1800	Historic	—	—	—	A	A	A	—	—	—	—	—	—	X	X	—	—	—
A.D. 1700	A.D. 1700	Late Protohistoric	—	—	—	B	B	B	—	—	—	—	X	—	—	—	—	—	—
A.D. 1500	A.D. 1500	Early Protohistoirc	—	—	—	C	—	C	X	X	X	X	—	X	—	—	—	X	X
A.D. 1100	A.D. 1300	Late Phase 1	—	—	X	—	—	D	—	—	—	—	—	—	—	—	—	—	—
A.D. 700	A.D. 1100	Middle Phase 1	X	—	—	D	—	E	—	—	—	—	—	—	—	—	X	—	—
		Early Phase 1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
A.D. 300	A.D. 900	**Middle**																	
		Middle/Late Period																	
A.D. 100	A.D. 700	Transition	—	—	—	E	—	F	—	—	—	—	—	—	—	—	—	—	—
300 B.C.	A.D. 500	Terminal	—	X	—	—	C	G	—	—	—	—	—	—	—	—	—	—	—
600 B.C.	A.D. 300	Late	—	—	—	—	D	H	—	—	—	—	—	—	—	—	—	—	—
800 B.C.	A.D. 100	Intermediate	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Early	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1300 B.C.	200 B.C.	**Early**																	
		Early/Middle Period																	
1500 B.C.	600 B.C.	Transition	—	—	—	—	—	I	—	—	—	—	—	—	—	—	—	—	—
2000 B.C.	1100 B.C.	Terminal	—	—	—	—	—	J	—	—	—	—	—	—	—	—	—	—	—
2200 B.C.	1250 B.C.	Late	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2500 B.C.	1500 B.C.	Middle	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Early	—	—	—	—	E	K	—	—	—	—	—	—	—	—	—	—	—
	2000 B.C.																		
	4000 B.C.		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	7000 B.C.		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

TABLE 2—(*Continued*)

Dating scheme			Death Valley																
A2	B1	California Phase	139-56	228-56	235-56	12 Sites	66-57	Hole-in-Rock	Ubehebe Shelter	Mno-384	Mno-455	Mammoth Cr. Cave	Sie-20	Las-1	Las-7	Las-45	Las-194	Mod-204
		Late																
A.D. 1800	A.D. 1800	Historic	—	—	—	—	—	—	—	—	X	A	—	A	A	—	—	—
A.D. 1700	A.D. 1700	Late Protohistoric	X	X	X	X	—	—	—	—	—	B	—	—	B	—	—	—
A.D. 1500	A.D. 1500	Early Protohistoric	—	—	—	—	X	—	—	—	—	C	—	B	C	—	—	A
A.D. 1100	A.D. 1300	Late Phase 1	—	—	—	—	—	—	—	—	—	—	—	C	—	—	—	—
A.D. 700	A.D. 1100	Middle Phase 1	—	—	—	—	—	X	X	X	—	—	—	—	D	—	—	B
		Early Phase 1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	A	—
A.D. 300	A.D. 900	**Middle**																
		Middle/Late Period																
A.D. 100	A.D. 700	Transition	—	—	—	—	—	—	—	—	—	—	—	D	—	—	—	—
300 B.C.	A.D. 500	Terminal	—	—	—	—	—	—	—	—	—	—	—	E	E	—	B	—
600 B.C.	A.D. 300	Late	—	—	—	—	—	—	—	—	—	—	—	F	—	—	—	—
800 B.C.	A.D. 100	Intermediate	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Early	—	—	—	—	—	—	—	—	—	—	—	—	—	—	C	—
1300 B.C.	200 B.C.	**Early**																
		Early/Middle Period																
1500 B.C.	600 B.C.	Transition	—	—	—	—	—	—	—	—	—	—	X	—	F	—	—	C
2000 B.C.	1100 B.C.	Terminal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	D	—
2200 B.C.	1250 B.C.	Late	—	—	—	—	—	—	—	—	—	D	—	—	G	X	—	D
2500 B.C.	1500 B.C.	Middle	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Early	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	2000 B.C.																	
	4000 B.C.		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	7000 B.C.		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

TABLE 3
Great Basin Burials with Associated Shell Beads and Ornaments

	Single bead	Orn.	2–9 beads	Orn.	20–96 beads	Orn.	100–700 beads	Orn.	1000 beads	Total Beads	Total Orn.	Grand Total
Iny-372 G	m Bur. 2	2	—	—	—	—	—	—	—	1	2	3[1]
I	—	—	—	—	—	—	—	—	c Bur. 4	1000	—	1000[1]
Total	1	2[1]	—	—	—	—	—	—	1000	1001[2]	2[1]	1003[2]
Las-7 E	—		m Bur. 31: 9	1	—		—	—	—	9[1]	1	10[1]
F	—		m Bur. 29: 4	—	—	—	—	—	—	4[1]	—	4[1]
G[a]	? Bur. 8	1		—	m Bur. 7: 83	—	Cr. 5A–C[b]: 624[3]	—	—			
	m Bur. 11		—	—		6	? Cr. 2: 200	1	—			
	f Bur. 17	—	m Bur. 4: 3	—	—	—	f Bur. 3: 139	—	—	1175[11]	10[4]	1185[11]
	—	—	—	—	—	—	? Bur. 2: 123	2	—			
Total	3[3]	1	16[3]	1	83[1]	6[1]	1086[6]	3[2]	—	1188[13]	11[5]	1199[13]
Ch18 D	—	—	—	—	—	—	c Grave D: 348	—	—	348[1]	—	348[1]
L	—	—	—	—	—	—	f Grave 18: 229	—	—	229[1]	—	229[1]
N	—	—	—	—	—	—	c Lot 26: 287	—	—	287[1]	—	287[1]
O	? Feat. 5	—	—	—	? Graves A, B: 96[2]	—	—	—	—	97[3]	—	97[3]
Total	1	—	—	—	96[2]	—	864[3]	—	—	961[6]	0	961[6]
Mno-384	—	—	—	—	c Bur. 1: 70	1	—	—	—	70[1]	1	71[1]
DV 46A-56	—	—	—	—	c Infant: 56	—	—	—	—	56[1]	—	56[1]
Pe14 D	—	—	—	—	? (Burial)[c]: 52	—	—	—	—	52[1]	—	52[1]
Wa1016	—	—	—	—	m Shaman: 23	5	—	—	—	23[1]	5[1]	28[1]
Hole-in-Rock	—	—	m Bur. 1: 5	—	—	—	—	—	—	5[1]	—	5[1]
Ubehebe	—	—	m Bur. 1: 3	—	—	—	—	—	—	3[1]	—	3[1]
Iny-182 B	—	—	? Bur. 3: 2	—	—	—	—	—	—	2[1]	—	2[1]
DV 43-56	c Bur. 1	—	—	—	—	—	—	—	—	1	—	1
Total	1	0	10[3]	0	201[4]	6[2]	0	0	0	212[8]	6[2]	218[8]
Grand total	6[6]	3[2]	26[6]	1	380[7]	12[3]	1950[9]	3[2]	1000[1]	3362[29]	19[8]	3381[29]

TABLE 3—(*Continued*)

	Single bead	Orn.	2–9 beads	Orn.	20–96 beads	Orn.	100–700 beads	Orn.	1000 beads	Total Beads	Total Orn.	Grand Total
Child	1	0	0	0	126^{2}	1	843^{3}	0	1000^{1}	1970^{7}	1	1971^{7}
% Total beads	—	—	—	—	—	—	—	—	29.7	58.6	—	—
Male	2^{2}	2^{1}	24^{5}	1	106^{2}	11^{2}	416^{2}	0	0	548^{11}	14^{4}	562^{11}
% Total beads	—	—	—	—	—	—	—	—	—	16.3	—	—
Female	1	0	0	0	0	0	368^{2}	0	0	369^{3}	0	369^{3}
% Total beads	—	—	—	—	—	—	—	—	—	11.0	—	—
Unknown	2^{2}	1	2^{1}	0	148^{3}	0	323^{2}	3^{2}	0	475^{8}	4^{3}	479^{8}
% Total beads	—	—	—	—	—	—	—	—	—	14.1	—	—
Grand total	6^{6}	3^{2}	26^{6}	1	380^{7}	12^{3}	1950^{9}	3^{2}	1000^{1}	3362^{29}	19^{8}	3381^{29}
% Total beads	0.2	—	0.8	—	11.3	—	58.0	—	29.7	100	—	—
Ave/burial	1	—	4	—	54	—	217	—	—	116	2	117

Superscript numbers = number of burials; m = male; f = female; c = child (1 infant); $_{m}$ = adult sex uncertain; underlined = definite sex; others probable.

[a] Las-7G Bur. 1 not included (no data). [b] Represents 2 males and 1 child. The 624 beads with Cr. 5 have been divided equally (208 beads/burial). See text for alternative. [c] Burial association assumed (see Pe14, Appendix).

end, complex patterns were preserved on cordage at Ch18 (Carroll, 1970, fig. 1). Similar and varied pendant arrangements would be needed for Class O and some type A3 and A4. Both *O. biplicata* and *O. dama* were sometimes strung side by side (Pendleton, 1985: 240, fig. 78z). Side grinding (B1) results in a herringbone pattern when strung; a similar pattern would be possible for A5, but asphalt on most of the latter indicates applique arrangements such as used for some A1 (Gifford, 1947, type Y).

Most centrally perforated circular to oval beads were strung face to face, as documented by preserved strings of G1 (at Las-1), and innumerable examples of Class E, G, and H beads and type K1 beads still stuck together by accretion. In addition to very frequent applique (Gifford, 1940, type EE3a, FF1b; 1947: 96, 98), Class G beads were strung in vertical rows in chokers and suspended in varied pendant arrangements on baskets, plumes, etc. Types G4, N, and C1 were sewn with variable stringing in flat, overlapping patterns (Bennyhoff and Heizer, 1958: fig. 1, no. 77; Carroll, 1970: fig. 1f, g. The latter shows enlargements of two stringing arrangements but the actual specimens are tightly packed in a flat overlapping pattern).

Classes F, L, and M were seldom, if ever, strung face to face. Rather, they repeatedly occur in sequin arrangements sewn side by side in paired and other groupings to headbands, belts, girdles, and caps. In one instance (Sac-60), many type F2 were sewn to a cap with the concave side up. The most frequent arrangement for both type M1 and M2 appears as a laminated shingle on cloaks, other garments, and flexible twined bags (Gifford, 1947: 96), and type M1 was often appliqued to ornaments, pipes, and mortars. Types M3 and M4 were probably pendant ornaments, as were Class Q2 and other end-perforated forms.

SPECIES

The treatment of species has been a vexing problem, mediated only by the fact that (aside from Classes A and B) at present all classes represent *O. biplicata* only. Bennyhoff and Fredrickson (MS) dealt only with central California, and distinguished size differences in

TABLE 4
Great Basin Beads and Ornaments: Historic and Protohistoric Periods

	Site	Component	Glass beads	*O.* "saucer"	*Myt.* Tube	*Hal.* orn. O1aIII	*Myt.* Disk	*O.* Rough Disk H2	*Tiv.?* Tube	*O. dama* Spire-lopped	*Tiv.* Large Disk, incised	*Hal.* bead 5a	*Tiv.* Thick Disk	*O.* Ground Disk H1a	*Tiv.* Large Disk	*Tresus* Disk A2a	Worked *Hal.*	*Saxidomus* Disk A2a	*O.* Spire-lopped A1ciII	*Tresus* Disk A1c	*O.* Thin Lipped E1/3a1	*O.* Bushing K2/3e
		Source		S	S	C	S	S	S	G	S	S?	S	S	S	C		C	S	C		
A.D. 1880	E125	A	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Ch13	A	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Las-7	A	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Mno-455	A	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Iny-182	A	8[q]	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Iny-																					
	DV 33-56		2	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	DV 30-56		2[q]	1[q]	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Pe27	A	3	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Ch15	A	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Ny754		—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Iny-2	A	10	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Iny-372	A	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
A.D. 1816	Total	12	33[q]	3[q]	1	2	1	3														
	Iny-																					
	DV 12 sites		—	13[q]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	DV 12-56		—	1[q]	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
	DV 228-56		—	1[q]	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
	DV 139-56		—	1[q]	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
	DV 235-56		—	1[q]	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
	Iny-2	B	—	—	—	—	—	—	—	1	1	1	1	3	2	—	—	—	—	—	—	—
	Ch39	A	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—
	Ch15	B	—	—	—	—	—	—	—	—	—	—	—	—	1	4	—	—	—	—	—	—
	Ch16	A	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—
	Pe27	B	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—
	Wa1502	B	—	—	—	—	—	—	—	—	—	—	—	—	—	1	2	—	—	—	—	—
	Pe13		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—
	Ch18	B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
A.D. 1700	Iny-182	B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Total	25		17[q]					2	3	1	1	1	4	3	8	2	1				
	Las-1	B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Ch39	B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—
	Ch2	A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—
	Ch65		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—
	E125	B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—
	Ch18	C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—
	Ch15	C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	75	—
	Iny-2	C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	46	—
	DV 4 sites		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4[q]	—
	Iny-372	C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	1

TABLE 4—(*Continued*)

Limpet Ring	*Hal.* orn. AR I	Total "reliably" phased		*O. biplicata*				*Dentalium*, whole	*Dentalium*, section, incised	Turidae	Turbinidae	Pine nut bead, Type I	Pine nut bead, Type II	*Hal.* orn., see table 8	Total				Grand total
		Shell beads	*Hal.* orns.	"Spire-lopped"	Alb	Alc	Whole Shell								Shell beads	*Hal.* orns.	Pine nut	Glass	
S	S							N	N	S	S	N	N						
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
—	—	—	—	—	—	—	—	—	—	—	—	—	—	(2)	—	2	—	1	3
—	—	—	—	—	—	4	—	—	—	—	—	—	—	—	4	—	—	1	5
—	—	—	—	1	—	—	1	—	—	—	—	—	—	—	2	—	—	5	7
—	—	1	—	5[q]	—	—	—	—	—	—	—	—	—	—	6[q]	—	—	8[q]	14[q]
—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	2	3
—	—	2[q]	—	—	—	—	—	—	—	—	—	—	—	—	2[q]	—	—	2[q]	4[q]
—	—	—	1	—	—	—	—	1	—	—	—	—	—	—	1	1	—	3	5
—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	1
—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	2
—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	10	11
—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	1
		8[q]	2	6[q]		4	1	1						2	20[q]	4		33[q]	57[q]
—	—	13[q]	—	—	—	—	—	—	—	—	—	—	—	1	13[q]	1	—	—	14[q]
—	—	2[q]	—	—	—	—	—	—	—	—	—	—	—	—	2[q]	—	—	—	2[q]
—	—	2[q]	—	—	—	—	—	—	—	—	—	—	—	—	2[q]	—	—	—	2[q]
—	—	2[q]	—	—	—	—	—	—	—	—	—	—	—	—	2[q]	—	—	—	2[q]
—	—	2[q]	—	—	—	—	—	—	—	—	—	—	—	—	2[q]	—	—	—	2[q]
—	—	9	—	—	—	—	—	—	—	—	—	—	—	—	9	—	—	—	9
—	—	1	—	—	V	—	—	1	—	—	—	—	—	—	2	—	—	—	2
—	—	5	—	—	—	—	—	1	1	—	—	—	—	—	7	—	—	—	7
—	—	1	—	—	1	1	—	—	—	—	—	—	—	—	3	—	—	—	3
—	—	2	—	—	—	3	—	∧	—	(1)	(1)	—	—	—	7	—	—	—	7
—	—	1	2	—	—	—	—	—	—	—	—	1	—	—	1	2	1	—	4
—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	1
—	—	—	—	—	2	1	—	—	—	—	—	—	—	—	3	—	—	—	3
—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	2	—	—	—	2
		41[q]	2	2	3	5		2	1	1	1	1		1	56[q]	3	1		60[q]
—	—	—	—	—	—	3	—	—	—	—	—	10	2	1	3	1	12	—	16
—	—	1	—	—	—	2	—	—	—	—	—	—	—	—	3	—	—	—	3
—	—	1	—	—	—	1	—	—	—	—	—	—	—	—	2	—	—	—	2
—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	1
—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	1
—	—	1	—	—	2	1	—	—	—	—	—	—	—	—	4	—	—	—	4
—	—	75	—	—	—	1	—	∧	—	—	—	—	—	—	76	—	—	—	76
—	—	46	—	—	—	—	—	—	—	—	—	—	—	—	46	—	—	—	46
—	—	4[q]	—	—	—	—	—	—	—	—	—	—	—	—	4[q]	—	—	—	4[q]
—	—	6	—	—	—	—	—	—	—	—	—	—	—	—	6	—	—	—	6

TABLE 4—(*Continued*)

	Site	Component	Glass beads	*O.* "saucer"	*Myt.* Tube	*Hal.* orn. O1aIII	*Myt.* Disk	*O.* Rough Disk H2	*Tiv.?* Tube	*O. dama* Spire-lopped	*Tiv.* Large Disk, incised	*Hal.* bead 5a	*Tiv.* Thick Disk	*O.* Ground Disk H1a	*Tiv.* Large Disk	*Tresus* Disk A2a	Worked *Hal.*	*Saxidomus* Disk A2a	*O.* Spire-lopped A1ciII	*Tresus* Disk A1c	*O.* Thin Lipped E1/3a1	*O.* Bushing K2/3e
	Source			S	S	C	S	S	S	G	S	S?	S	S	S	C		C	S	C		
A.D. 1500	DV 46A-56		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	54	–
	DV 66-57		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	DV 68-56		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	DV 26-56		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Ch56		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Pe12		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Total	19																	3	1	185[q]	1
	Grand total	56	33[q]	20[q]	1	2	1	3	2	3	1	1	1	4	3	8	2	1	3	1	185[q]	1

O. = *Olivella, Hal.* = *Haliotis, Tiv.* = *Tivela, Myt.* = *Mytilus.*
Sources: C = Central Calif.; G = Gulf of Calif.; N = Northern Calif.; S = Southern Calif.
Definition of types according to criteria in chap. 1; components defined in Appendix.

two species by letter sets a–c and d–f (e.g., Bickel, 1981: 66). Unfortunately, expansion of geographic focus herein meant potential involvement with six species (see A1 and B2), or 18 potential but rare size categories. Because of these complications, letter designations for species have been abandoned, and a species entry will be made where pertinent.

Size

Only the most significant measurements (diameter, length, width, perforation diameter, $\bar{x}$) have usually been provided in the synopsis. All measurements are in millimeters. Figures given sometimes represent limited samples. Other useful dimensions include curvature (fig. 1), particularly for types C3, F1, F2, G2, and G3, and thickness. Types with important size distinctions (L, M, K1, K2, E1–E3, H1–H3) need additional measurement to refine proposed changes or confirm proposed types. The diameter of Class G in southern California appears to fluctuate through time (King, 1981, fig. 6), and refined phasing is possible for Class H on the basis of diameter (Gibson, 1976: 124). Changes in perforation diameter need much more attention. A possible trend from large perforations in the Early period and early Middle period followed by small perforations in later Middle phases (Class F) and Phase 1 of Late period (Class M) ends with large perforation in the Protohistoric; variation in types C1 and C2 require particular attention.

Source

The four sources of bead manufacture proposed (see chap. 2) and entered in the synopsis need more attention and refinement. Class N and types C5 and G4, once considered local Great Basin forms (Bennyhoff and Heizer, 1958: 69–70), have now been found in California. All proposed source boundaries, district centers (e.g., San Joaquin Valley, Monterey, San Luis Obispo, and each Channel Island), and specific trade routes deserve further examination. The absence of Class F and Class M in southern California

TABLE 4—(*Continued*)

Limpet Ring	*Hal.* orn. AR1	Total "reliably" phased		*O. biplicata*				*Dentalium*, whole	*Dentalium*, section, incised	Turidae	Turbinidae	Pine nut bead, Type I	Pine nut bead, Type II	*Hal.* orn., see table 8	Total				Grand total
		Shell beads	*Hal.* orns.	"Spire-lopped"	Alb	Alc	Whole Shell								Shell beads	*Hal.* orns.	Pine nut	Glass	
S	S							N	N	S	S	N	N						
2	—	56	—	—	—	—	—	—	—	—	—	—	—	—	56	—	—	—	56
1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	1
—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	1
—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—	—	1
—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1	—	—	—	1
—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1	—	—	—	1
3	1	193[q]	1		2	8		2				10	2	2	205[q]	3	12		220[q]
3	1	242[q]	5	8[q]	5	17	1	5	1	1	1	11	2	5	281[q]	10	13	33[q]	337[q]

Symbols: ( ) = phasing very uncertain; $_m$ = type uncertain; [q] = quantity uncertain; ∧ ∨, see components elsewhere for possible shifts; ornaments have been underlined.

is extremely puzzling in light of shared types during the Early and Protohistoric/Historic period.

Temporal Significance

Brief statements as to current views on phasing and marker types have been entered, with primary reference to central California data. All southern California data should be compared with King (1981), and other recent publications from that area. Our decision to incorporate southern California types was made too late to review the abundant recent literature.

Another problem of increasing importance in chronological matters concerns the breakdown in the utility of the Central California Taxonomic System (Fredrickson, 1974; Ragir, 1972: 9), and the lack of agreement on appropriate terminology to specify particular archaeological units (e.g., Traditions? Patterns? Cultures?). Although a solution to this taxonomic and cultural historical problem is clearly required, tackling the issue is beyond the scope of this study. Nonetheless, because this synopsis presents an *Olivella* bead typology of potential utility throughout California and the Great Basin, we do not believe that the perpetuation of the local culture-laden central California "Horizons" is warranted. For example, the "Early Horizon" as defined in the Delta region is not even applicable to the adjacent San Francisco Bay region. Even worse, the classic "Middle Horizon" assemblages of the Cosumnes district (north Delta region) are distinctive from their temporally coeval counterparts in the Stockton district (south Delta region).

Because of these problems, we have elected to employ temporal *periods* (cf. King, 1981: 45–46) until such time as a satisfactory solution to the taxonomic issue is agreed upon. Consequently, the Central California Taxonomic System term "Horizon" will not appear herein.

Great Basin Occurrences

Details of the site distribution (table 2) and frequency of each bead type will be found in tables 3–9. For those types which appear in a single table, we have merely entered a total count of beads and site occurrences. If sub-

TABLE 5
Great Basin Beads and Ornaments: Late Prehistoric Period

Dating A2	Dating B1	Site	Component	Sea snail, drilled	*O.* Alci I	*Dentalium* section	Pine nut bead type II	*Marg.* bead Type 2	*Marg.* bead Type 1	*Glycymeris* Gifford D9	*Glycymeris* Rectangle end perf.	*O.* Cupped K1/3e	*O.* Pendant M2/2a2	Bone Rectangle	*O.* Sequin M1/2a1	*Hal.* orn. K2bII	*O.* Tiny Saucer G1/3d	*Hal.* orn. N6aII
			Source	S	S	N	N	L	L	N	L		C	L	C	C		C
A.D. 1500	A.D. 1500																	
	A.D. 1400 (C-14)	Ch15	D	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Ch36		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Iny-372	D	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Ch18	D	—	1	15	2	—	—	—	—	—	—	—	—	—	—	—
		Ch35	B	—	—	—	175	—	—	—	—	—	—	—	—	—	—	—
		Roaring Spr. Cave, Ore.		—	—	—	1	4	—	—	—	—	—	—	—	—	—	—
		Las-1	C	—	—	—	4	—	4	—	—	—	—	—	—	—	V	—
		Ch39	C	—	—	6	—	—	—	6	1	18	130	—	—	—	—	—
		Pe67	B	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—
A.D. 1100	A.D. 1300	Total	9	1	1	21	182	4	4	6	1	18	131					—
		Catlow #1 Ore		—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
		Las-7	D	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Massacre Lake Cave		—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
		Ch78		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Ch39	D	—	—	^	—	—	—	—	—	5	8	1	8	—	—	—
		Pe27	C	—	—	—	—	—	—	—	—	1	9	—	8	1	—	—
		Wa1502	C	—	—	—	—	—	—	—	—	1	—	—	1	—	—	—
		Wa385		—	—	7	—	—	—	—	—	—	—	—	—	—	8	1
		Iny-2	D	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Iny-372	E	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		DV 43-56		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

TABLE 5—(*Continued*)

Dating A2	Dating B1	Site	Component	Sea snail, drilled	*O.* Alci I	*Dentalium* section	Pine nut bead type II	*Marg.* bead Type 2	*Marg.* bead Type 1	*Glycymeris* Gifford D9	*Glycymeris* Rectangle end perf.	*O.* Cupped K1/3e	*O.* Pendant M2/2a2	Bone Rectangle	*O.* Sequin M1/2a1	*Hal.* orn. K2bII	*O.* Tiny Saucer G1/3d	*Hal.* orn. N6aII
			Source	S	S	N	N	L	L	N	L		C	L	C	C		C
		Hole-in-Rock Shelter		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Ubehebe Shelter		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Mno-384		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Ch18	E	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Ch15	E	—	—	—	—	—	—	—	—	—	—	—	∨	—	—	—
		Mod-204	B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
A.D. 700	A.D. 1100																	
		Total	17			9						7	17	1	17	1	8	1
		Ch15	F, G	—	—	—	—	—	—	—	—	—	—	—	3	—	—	—
		Ch39	E, F	—	—	—	—	—	—	—	—	—	—	—	∧	—	—	—
		Ch35	C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Ch67	B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Pe67	C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Ch89		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Iny-2	E	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Iny-372	F	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Pe27	D, E	—	—	—	—	—	—	—	—	—	—	—	∧	—	—	—
		Ch18	F, G	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
A.D. 225 (C-14)		Ny301	D	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Las-1	D	—	—	—	—	—	—	—	—	—	—	—	—	—	230	—
		Las-194	A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
A.D. 100	A.D. 700	Total	13												3		230	
		Grand total	39	1	1	30	182	4	4	6	1	25	148	1	20	1	238	1

O. = *Olivella*, *Hal.* = *Haliotis*, *Marg.* = *Margaritifera*.
Sources: C = Central Calif.; N = Northern Calif.; S = Southern Calif.; L = local manufacture.
Bead types defined in chap. 1; components defined in Appendix.
Symbols: ( ) = phasing very uncertain; (C-14) = carbon-14 date from same component; ∧ ∨ = see components elsewhere.

TABLE 5—(*Continued*)

Dating		Site	Component	*Trivela* Thin Disk	*O.* "disk"	*O.* Split Punched D1/3a2	*O.* Oval Punched D3	*Hal.* orn. J2aIV	*Hal.* orn. U2aIII	Worked *Olivella*	Total "reliably" phased			*O. biplicata*				
A2	B1										Shell beads	*Hal.* ornaments	Pine nut/bone	Unclassified	A1a	A1b	A1c	B2a
			Source	S	S	C	L	S	C									
A.D. 1500	A.D. 1500																	
	A.D. 1400 (C-14)	Ch15	D	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–
		Ch36		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		Iny-372	D	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–
		Ch18	D	–	–	–	–	–	–	–	16	–	2	–	121	1	–	220
		Ch35	B	–	–	–	–	–	–	–	–	–	175	–	–	–	1	–
		Roaring Spr. Cave, Ore.		–	–	–	–	–	–	–	4	–	1	–	–	–	–	–
		Las-1	C	–	–	–	–	V	–	–	4	–	4	–	–	3	–	–
		Ch39	C	–	–	–	–	–	–	–	161	–	–	–	–	34	76	–
		Pe67	B	–	–	–	–	–	–	–	1	–	–	–	–	–	1	–
A.D. 1100	A.D. 1300																	
		Total	9								187	–	182	–	121	38	80	220
		Catlow #1 Ore		–	–	–	–	–	–	–	1	–	–	–	–	1	–	–
		Las-7	D	–	–	–	–	–	–	–	–	–	–	–	–	6	–	2
		Massacre Lake Cave		–	–	–	–	–	–	–	1	–	–	2	–	–	–	–
		Ch78		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		Ch39	D	–	–	–	–	–	–	–	21	–	/1	–	2	7	3	3
		Pe27	C	–	–	–	–	–	–	–	18	1	–	–	–	–	–	–
		Wa1502	C	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–
		Wa385		–	–	–	–	–	–	–	15	1	–	–	1	–	–	–
		Iny-2	D	1	–	–	–	–	–	–	1	–	–	–	–	–	–	–
		Iny-372	E	3	–	–	–	–	–	–	3	–	–	–	–	–	–	–
		DV 43-56		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

TABLE 5—(*Continued*)

Dating		Site	Component	*Trivela* Thin Disk	*O.* "disk"	*O.* Split Punched D1/3a2	*O.* Oval Punched D3	*Hal.* orn. J2aIV	*Hal.* orn. U2aIII	Worked *Olivella*	Total "reliably" phased: Shell beads	Total "reliably" phased: *Hal.* ornaments	Total "reliably" phased: Pine nut/bone	*O. biplicata*: Unclassified	*O. biplicata*: A1a	*O. biplicata*: A1b	*O. biplicata*: A1c	*O. biplicata*: B2a
A2	B1		Source	S	S	C	L	S	C									
		Hole-in-Rock Shelter		—	5	—	—	—	—	—	5	—	—	—	—	—	—	—
		Ubehebe Shelter		—	—	—	—	—	—	—	—	—	—	3	—	—	—	—
		Mno-384		—	—	—	—	—	—	—	—	—	—	70	—	—	—	—
		Ch18	E	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—
		Ch15	E	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—
		Mod-204	B	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—
A.D. 700	A.D. 1100	Total	17	4	5						67	2	/1	75	5	15	3	5
		Ch15	F, G	—	—	24	—	—	—	—	27	—	—	—	—	—	4	—
		Ch39	E, F	—		5					5	—	—	—	^	2	4	—
		Ch35	C	—	—	1	—	—	—	—	1	—	—	—	1	—	—	—
		Ch67	B	—	—	1	—	—	—	—	1	—	—	—	1	—	—	—
		Pe67	C	—	—	1	—	—	—	—	1	—	—	—	—	1	—	—
		Ch89		—	—	1	—	—	—	—	1	—	—	—	—	—	—	—
		Iny-2	E	—	—	1	—	—	—	—	1	—	—	—	—	—	—	—
		Iny-372	F	—	—	3	—	—	—	—	3	—	—	—	—	—	—	—
		Pe27	D, E	—	—	31	10	—	—	—	41	—	—	—	—	—	—	—
A.D. 225 (C-14)		Ch18	F, G	—	—	2	1	—	—	—	3	—	—	—	—	—	1	—
		Ny301	D	—	—	—	—	2	—	—	—	2	—	—	—	—	—	—
		Las-1	D	—	—	6	1	1	1	—	237	2	—	—	—	3	6	—
		Las-194	A	—	—	—	—	—	—	1	1	—	—	—	—	—	—	—
A.D. 100	A.D. 700	Total	13			76	12	3	1	1	322	4			2	6	15	
		Grand total		4	5	76	12	3	1	1	576	6	182/1	75	128	59	98	225

TABLE 5—(*Continued*)

Dating		Site	Component	*O. biplicata*			*O. baetica* A1a	*O. baetica* A1b	*Marg.* orn.	*Anodonta* orn.	*Hal.* orn. (table 8)	*Prunus* beads	Total					Grand Total
A2	B1			B2b	B2c	B3a							Shell beads	Shell orn.	Pine nut beads	*Prunus* beads	Bone bead	
			Source			S	N	N	L	L		L						
A.D. 1500	A.D. 1500																	
	A.D. 1400 (C-14)	Ch15	D	—	—	—	—	—	—	—	—	—	2	—	—	—	—	2
		Ch36		—	—	—	—	—	—	—	1	—	—	1	—	—	—	1
		Iny-372	D	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1
		Ch18	D	3	—	8	—	—	—	—	—	—	369	—	2	—	—	371
		Ch35	B	—	—	—	—	—	—	—	—	—	1	—	175	—	—	176
		Roaring Spr. Cave, Ore.		—	—	—	—	—	—	—	—	—	4	—	1	—	—	5
		Las-1	C	—	—	—	—	—	(4)	(1)	—	2	7	5	4	2	—	18
		Ch39	C	—	—	—	—	—	—	—	—	—	271	—	—	—	—	271
		Pe67	B	—	—	—	—	—	—	—	1	—	2	1	—	—	—	3
A.D. 1100	A.D. 1300																	
		Total	9	3	—	8	—	—	(4)	(1)	2	2	657	7	182	2	—	848
		Catlow #1 Ore		—	—	—	—	—	—	—	—	—	2	—	—	—	—	2
		Las-7	D	6	—	—	2	1	—	—	1	—	17	1	—	—	—	18
		Massacre Lake Cave		—	—	—	—	—	—	—	—	—	3	—	—	—	—	3
		Ch78		—	1	—	—	—	—	—	—	—	1	—	—	—	—	1
		Ch39	D	—	—	—	—	—	—	—	—	—	36	—	—	—	1	37
		Pe27	C	—	—	—	—	—	—	—	—	—	18	1	—	—	—	19
		Wa1502	C	—	—	—	—	—	—	—	—	—	2	—	—	—	—	2
		Wa385		—	—	—	—	—	—	—	—	—	16	1	—	—	—	17
		Iny-2	D	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1
		Iny-372	E	—	—	—	—	—	—	—	—	—	3	—	—	—	—	3
		DV 43-56		—	—	1	—	—	—	—	—	—	1	—	—	—	—	1

TABLE 5—(*Continued*)

Dating		Site	Component	*O. biplicata*			*O. baetica* A1a	*O. baetica* A1b	*Marg.* orn.	*Anodonta* orn.	*Hal.* orn. (table 8)	*Prunus* beads	Total					Grand Total
A2	B1			B2b	B2c	B3a							Shell beads	Shell orn.	Pine nut beads	*Prunus* beads	Bone bead	
			Source			S	N	N	L	L		L						
		Hole-in-Rock Shelter		—	—	—	—	—	—	—	—	—	5	—	—	—	—	5
		Ubehebe Shelter		—	—	—	—	—	—	—	—	—	3	—	—	—	—	3
		Mno-384		—	—	—	—	—	—	—	1	—	70	1	—	—	—	71
		Ch18	E	24	1	—	—	—	—	—	—	—	26	—	—	—	—	26
		Ch15	E	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1
		Mod-204	B	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1
A.D. 700	A.D. 1100	Total	17	30	2	1	2	1	—	—	2	—	206	4	—	—	1	211
		Ch15	F, G	—	—	—	—	—	—	—	—	—	31	—	—	—	—	31
		Ch39	E, F	—	—	—	—	—	—	—	—	—	11	—	—	—	—	11
		Ch35	C	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1
		Ch67	B	—	—	—	—	—	—	—	—	—	2	—	—	—	—	2
		Pe67	C	—	—	—	—	—	—	—	—	—	2	—	—	—	—	2
		Ch89		—	—	—	—	—	—	—	—	—	2	—	—	—	—	2
		Iny-2	E	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1
		Iny-372	F	—	—	—	—	—	—	—	—	—	3	—	—	—	—	3
		Pe27	D, E	—	—	—	—	—	—	—	—	—	41	—	—	—	—	41
		Ch18	F, G	—	—	—	—	—	—	—	—	—	4	—	—	—	—	4
A.D. 225 (C-14)		Ny301	D	—	—	—	—	—	—	—	—	—	—	2	—	—	—	2
		Las-1	D	—	—	—	—	—	—	—	—	—	246	2	—	—	—	248
		Las-194	A	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1
A.D. 100	A.D. 700	Total	13										345	4				349
		Grand total		33	2	9	2	1	(4)	(1)	4	2	1208	15	182	2	1	1408

TABLE 6
Great Basin Beads and Ornaments: Middle Prehistoric Period

Dating A2	Dating B1	Site	Component	*O.* Scoop C5	*O.* Split Drilled C2/3b1	*O.* Oval C3/3b1	*O.* End-perforated C4/3b1	*O.* Square Saddle F3/3b2	*O.* Double Perf. C6/3b1	*Marg.* bead type 4b	*Hal.* orn., see table 8	*Anodonta* orn.	*O.* Full Saddle F2/3b	*Hal.* orn.	*O.* Small Saucer G2a/3c	*Hal.* bead 3a	*Hal.* orn.	*O.* Small Ring G3a/3c
			Source	C			L	C	L	L		L	C					C
A.D. 100	A.D. 700																	
		Ch13	C	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Ch2	B	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Las-7	E	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Ch118		—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
		Pe6		—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
		Pe27	F	1	—	6	—	—	—	—	—	—	—	—	—	—	—	—
		Ch39	G	1	2	6	1	—	—	—	—	—	—	—	—	—	—	—
		Ch15	H	8	6	3	4	4	1	—	—	—	—	—	—	—	—	—
		Las-1	E	2	3	3	1	3	—	—	—	—	—	—	—	—	—	—
		Ch18	H	1	5	20	—	—	1	6	1	—	—	—	—	—	—	—
		Pe66	A	1	—	—	1	1	—	—	—	—	—	—	—	—	—	—
		Iny-372	G	—	—	2	1	—	—	—	2	—	—	—	—	—	—	—
		Hu16		—	—	—	—	1	—	—	—	—	—	—	—	—	—	—
		Las-194	B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Cougar Mt.		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
85 B.C. (C-14)		WP107	C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
300 B.C.	A.D. 500																	
		Total	16	18	18	40	8	9	2	6	3							
		Ch13	D	—	—	—	—	—	—	—	—	1	—	3	—	—	—	—
		Las-1	F	—	—	—	—	5	—	—	—	—	7	10	—	—	—	—
		Ch18	I, J	—	—	(8)	—	—	—	—	—	—	—	—	—	—	—	—
		Ch15	I, J	—	—	—	—	^	—	—	—	—	4	—	—	—	—	—
		Ch2	C	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—
		Ch28		—	—	—	—	—	—	—	—	—	1	—	—	—	—	—
		Ny301	E	—	—	—	—	—	—	—	—	—	—	1	2	—	—	—
		Ch3	A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Ch16	C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
800 B.C.	A.D. 100																	
		Total	9			(8)		5				1	14	14	2			
	A.D. 130	Wa1016		—	—	13	—	—	—	—	—	—	—	—	1	2	5[q]	6
	(C-14)	Pe66	B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
1000 B.C.		Ny301	F	—	—	—	—	—	—	—	—	—	—	—	1	1	1	—
1250 B.C.		Ch18	K	—	—	—	—	—	—	—	—	—	—	—	—	1	2	—
		Pe67	D	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Ch15	K	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—
	200 B.C.	Las-194	C	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—
	(C-14)																	
1300 B.C.	200 B.C.	Total	7			13									6	4	8	7
		Grand total	32	18	18	61	8	14	2	6	3	1	14	14	8	4	8	7

O. = *Olivella*, *Hal.* = *Haliotis*, *Marg.* = *Margaritifera*.
Sources: C = Central California; N = Northern California; S = Southern California; L = local.
Symbols: (C-14) = carbon-14 date from same component; ( ) = phasing very uncertain; [q] = quantity uncertain;

TABLE 6—(*Continued*)

Trivia	*Hal.* bead 3c	*O.* Ground Saucer G4	*O.* Grooved Rectangle N	*O.* Large Saucer G2b/3c	*O.* Large Ring G3b/3c	Total "reliably" phased		*O. biplicata*						*Marg.* bead type 3	*Hal.* bead 4d	*Hal.* bead 4a	*Hal.* bead 2a	*Hal.* orn., see table 8	Total		Grand total
						Shell beads	Shell orn.	*Dentalium* section	A1a	A1b	A1c	Whole shell	*Hal.* bead 4c						Shell beads	Shell orn.	
S		S	S		C									L							
—	—	—	—	—	—	2		—	—	—	1	—	—	—	—	—	—	1	3	1	4
—	—	—	—	—	—	1		—	—	—	—	—	—	—	—	—	—	—	1		1
—	—	—	—	—	—	1		—	4	2	14	—	—	—	—	—	—	2	21	2	23
—	—	—	—	—	—	1		1?	—	—	—	—	—	—	—	—	—	—	2		2
—	—	—	—	—	—	1		—	—	—	—	—	—	—	—	—	—	—	1		1
—	—	—	—	—	—	7		—	—	—	—	—	—	—	—	—	—	—	7		7
—	—	—	—	—	—	10		—	∧	4	8	—	—	—	—	—	—	—	22		22
—	—	—	—	—	—	26		—	—	—	∧	—	—	—	—	—	—	—	26		26
—	—	—	—	—	—	12		—	2	7	1	—	2	1	—	—	—	2	25	2	27
—	—	—	—	—	—	33	1	—	—	—	∨	—	—	—	—	—	—	—	33	1	34
—	—	—	—	—	—	3		—	—	—	—	—	—	—	—	—	—	—	3		3
—	—	—	—	—	—	3	2	—	—	—	—	—	—	—	—	—	—	—	3	2	5
—	—	—	—	—	—	1		—	—	—	—	—	—	—	—	—	—	—	1		1
—	—	—	—	—	—			—	—	2	—	—	—	—	—	—	—	—	2		2
—	—	—	—	—	—			—	—	—	2	—	—	—	—	—	—	—	2		2
—	—	—	—	—	—			—	—	—	—	1	—	—	—	—	—	—	1		1
						101	3	1	6	15	26	1	2	1				5	153	8	161
—	—	—	—	—	—		4	—	—	—	—	—	—	—	—	—	—	—		4	4
—	—	—	—	—	—	12	10	—	—	7	2	—	—	—	2	1	(2)	—	26	10	36
—	—	—	—	—	—	8		—	—	11?	—	—	—	—	1	—	—	1	20	1	21
—	—	—	—	—	—	4		—	—	—	∨	—	—	—	—	—	—	—	4		4
—	—	—	—	—	—	2		—	—	—	—	—	—	—	—	—	—	—	2		2
—	—	—	—	—	—	1		—	—	—	—	—	—	—	—	—	—	—	1		1
—	—	—	—	—	—	2	1	—	—	—	—	—	—	—	—	—	—	—	2	1	3
—	—	—	—	—	—			1	—	—	1	—	—	—	—	—	—	—	2		2
—	—	—	—	—	—			—	—	2	—	—	—	—	—	—	—	—	2		2
						29	15	1		20	3				3	1	(2)	1	59	16	75
1	—	—	—	—	—	23	5[a]	—	—	—	—	—	—	—	—	—	—	—	23	5[a]	28
—	—	—	—	—	—	1		—	—	—	—	—	—	—	—	—	—	—	1		1
—	2	—	—	—	—	4	1	—	2	—	1	—	—	—	—	—	—	—	7	1	8
—	3	226	16	—	—	246	2	—	—	6?	8	—	—	—	—	—	—	—	260	2	262
—	—	—	1	1	—	2		—	—	—	—	—	—	—	—	—	—	—	2		2
—	—	—	—	9	2	13		—	—	—	4	—	—	—	—	—	—	—	17		17
—	—	—	—	—	—	2		1	—	—	—	—	—	—	—	—	—	—	3		3
1	5	226	17	10	2	291	8	1	2	6?	13								313	8	321
1	5	226	17	10	2	421	26	3	8	41	42	1	2	1	3	1	(2)	6	525	32	557

? = type uncertain; ∧ ∨ = see components elsewhere for possible shifts; ornaments have been underlined.
Types defined in chap. 1; components defined in Appendix.

TABLE 7
Great Basin Beads and Ornaments: Early Prehistoric Period

Dating A2	Dating B1	Site	Component	*O.* Oval Saddle F1/3b	*Hal.* Ring bead H9//J2aI	*Macoma* Disk bead	*O.* Barrel B3c//G1a	*O.* End-ground B2b/1a	*O.* A1c/1b	*O.* Barrel B3b//G1a	*O.* A1b/1a	*Hal.* Square bead 1a	*O.* A1a/1a	*O.* L2b/2b	*O.* Oval C3/3b1	*O.* Spire-lopped /1a	*O.* Applique sections	*O.* Tiny Saucer G1/3d	*O. baetica* A1b	*O. baetica* A1a	*Mytilus* Square bead 1a	*Hal.* Square bead 2a	*Hal.* Square bead 2b, 2c	*O.* End-ground B2a/1a	*O.* Small Cap B4a//G1b
			Source	C	S	C	S			S		C?		C?					N	N	C?	C?	L		S
1300 B.C.	200 B.C.																								
	290 B.C.	Iny-372	I	1	1000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	(C-14)	Ch2	D	—	—	6	—	V	—	—	—	—	V	—	—	—	—	—	—	—	—	—	—	V	—
		Mod-204	C	—	—	1	—	—	—		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Wa1502	E	—	—	1	—	—	—	—	V	V	V	—	—	—	—	—	V	—	—	—	—	—	—
		Las-7																							
		Bur. 29	F	—	—	1	1	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		midden	F	—	—	4	—	V	8	2	8	13	—	—	—	—	—	—	—	—	—	—	—	—	—
		Ny301	G	—	—	—	—	—	—	1	—	5	1	—	—	—	—	—	—	—	—	—	—	—	—
		Sie-20		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	531 B.C.	Ch18 Grave 18	L	—	—	2	—	—	—	—	—	185	—	20	1	21	—	—	—	—	—	—	—	—	—
	(C-14)																								
1500 B.C.	600 B.C.																								
		Total	8	1	1000	15	1	1	9	3	8	203	1	20	1	21									
	660 B.C.	Ch18	M	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—
	(C-14)																								
	750 B.C.	—																							
2000 B.C.	1100 B.C.	—																							
	1100 B.C.	Ch16 36″	D	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
	(C-14)	Ny301	H	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
		Mammoth																							
		Cr. Cave	D	—	—	—	—	—	—	—	—	1	—	—	—	—	—	1	—	—	—	—	—	—	—
		Mod-204	D	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
		Las-45		—	—	—	—	—	—	—	—	5[a]	—	—	—	—	—	—	—	—	—	—	—	—	—
		Wa1502	F	—	—	—	—	—	—	—	3	1	2	—	—	—	—	—	2	—	—	—	—	—	—

TABLE 7—(*Continued*)

Dating A2	Dating B1	Site	Component	*O.* Oval Saddle F1/3b	*Hal.* Ring bead H9//J2aI	*Macoma* Disk bead	*O.* Barrel B3c//G1a	*O.* End-ground B2b/1a	*O.* A1c/1b	*O.* Barrel B3b//G1a	*O.* A1b/1a	*Hal.* Square bead 1a	*O.* A1a/1a	*O.* L2b/2b	*O.* Oval C3/3b1	*O.* Spire-lopped /1a	*O.* Applique sections	*O.* Tiny Saucer G1/3d	*O. baetica* A1b	*O. baetica* A1a	*Mytilus* Square bead 1a	*Hal.* Square bead 2a	*Hal.* Square bead 2b, 2c	*O.* End-ground B2a/1a	*O.* Small Cap B4a//G1b
			Source	C	S	C	S			S		C?		C?					N	N	C?	C?	L		S
		Las-7 11 Burs.	G	—	—	—	—	39	5	—	33	878	41	8	2	—	—	—	—	7	138	1	4	19	—
		midden	G	—	—	—	—	7	3	—	6	31	6	—	—	—	—	—	—	—	4	—	—	—	—
	1222 B.C.	Ch18 Lot 26	N	—	—	—	—	53	—	—	20	—	11	—	—	—	—	—	—	—	—	—	—	203	—
	(C-14)	midden	N	—	—	—	—	—	—	—	—	1	1	—	—	4	—	—	—	—	—	—	—	1	11
2200 B.C.	1250 B.C.																								
		Total	9					99	8		62	918	63	8	2	4	2	1	2	7	142	1	4	223	11
		Ch2	E	—	—	—	—	1	—	—	—	—	4	2	—	—	—	—	—	—	—	—	—	1	—
	1420, 1450 B.C.	Ch18	O	—	—	—	—	—	—	—	—	—	1	—	—	96	—	—	—	—	—	—	—	—	—
	(C-14)	Ch60	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Ch3	B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2500 B.C.	1500 B.C.																								
		Total	4					1					5	2		96								1	
3000 B.C.	2000 B.C.	Total "Early"	21	1	1000	15	1	101	17	3	70	1121	69	30	3	121	2	1	2	7	142	1	4	224	11
5000 B.C.																									
5088 B.C. (C-14)		Pe14	D	—	—	—	—	—	52	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7000 B.C.																									
		Unphased																							
		Ch40		—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Ch83		—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Hu17		—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Ch18		—	—	—	—	—	—	—	—	—	—	—	—	49	—	—	—	—	—	—	—	—	—
		Wa197		—	—	—	—	3	7	—	9	—	2	—	—	—	—	—	1	—	—	—	—	—	—
		Ch13		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Total	6					3	7		12		2			49			1						
		Grand total	28	1	1000	15	1	104	76	3	82	1121	71	30	3	170	2	1	3	7	142	1	4	224	11

O. = *Olivella, Hal.* = *Haliotis, Marg.* = *Margaritifera.*

Symbols: (C-14) = carbon-14 date from same component; ? = type uncertain; ^{q} = quantity uncertain; ∨ = see components elsewhere for possible shift.

Bead types defined in chap. 1; components defined in Appendix.

TABLE 7—(*Continued*)

Dating																									
A2	B1	Site	Component	*O.* Large Cap B4c//G1b	*O.* L1a/2b	*Olivella oblique* A2a	*Olivella oblique* A2b	*Olivella oblique* A2c	*O.* End-ground B2c/1b	*O.* Barrel B3a//G1a	*O. baetica*? A1c	Unclassified *O.*	Total beads	*Marg.* orn. CA2n/C(1)a	*Haliotis* Ornaments CA2n/C(1)a	*Haliotis* Ornaments CA4j/C(2)	*Haliotis* Ornaments AA3j/A1	*Haliotis* Ornaments CA20j/C(2)1	*Haliotis* Ornaments CA4n/C(2)a	*Haliotis* Ornaments CA6j/C(1)1	*Haliotis* Ornaments CA6n/C(1)1a	*Haliotis* Ornaments Unclassified	*Haliotis* Ornaments *Hal.* cut shell	Total shell ornaments	Grand total
			Source	S	C					S	N			L	C		C	C		C	C				
1300 B.C.	200 B.C.																								
	290 B.C.	Iny-372	I	—	—	—	—	—		—	—	—	1001	—	—	—	—	—	—	—	—	—	—		1001
	(C-14)	Ch2	D	—	—	—	—	—		—	—	—	6	—	—	—	—	—	—	—	—	—	—		6
		Mod-204	C	—	—	—	—	—		—	—	—	1	—	—	—	—	—	—	—	—	—	—		1
		Wa1502	E	—	—	—	—	—		—	—	—	1	—	—	—	—	—	—	—	—	—	—		1
		Las-7																							
		Bur. 29	F	—	—	—	—	—		—	—	—	4	—	—	—	—	—	—	—	—	—	—		4
		midden	F	—	—	—	—	—		—	—	—	35	—	—	—	—	—	—	—	—	—	—		35
		Ny301	G	—	—	—	—	—		—	—	—	7	—	—	—	—	—	—	—	—	—	—		7
		Sie-20		—	—	—	—	—		—	—	—		—	—	1?	—	—	—	—	—	—	—	1	1
	531 B.C.	Ch18 Grave 18	L	—	—	—	—	—		—	—	—	229	—	—	—	—	—	—	—	—	—	—		229
	(C-14)																								
1500 B.C.	600 B.C.																								
		Total	8										1284			1?							1	1285
	660 B.C.	Ch18	M	—	—	—	—	—		—	—	—	2	1	1	1	—	—	—	—	—	—	—	3	5
	(C-14)	—																							
2000 B.C.	750 B.C.	—																							
	1100 B.C.	Ch16 36″	D	—	—	—	—	—		—	—	—	1	—	—	—	—	—	—	—	—	—	—		1
	1100 B.C.	Ny301	H	—	—	—	—	—		—	—	—	1	—	—	—	—	—	—	—	—	—	—		1
	(C-14)	Mammoth																							
		Cr. Cave	D	—	—	—	—	—		—	—	—	2	—	—	—	—	—	—	—	—	—	—		2
		Mod-204	D	—	—	—	—	—		—	—	—	1	—	—	—	—	—	—	—	—	—	—		1
		Las-45		—	—	—	—	—		—	—	—	5[q]	—	—	—	—	—	—	—	—	—	—		5[q]
		Wa1502	F	—	—	—	—	—		—	—	—	8	—	—	—	—	—	—	—	—	—	—		8

TABLE 7—(*Continued*)

Dating A2	Dating B1	Site	Component	*O.* Large Cap B4c//G1b	*O.* L1a/2b	*Olivella oblique* A2a	*Olivella oblique* A2b	*Olivella oblique* A2c	*O.* End-ground B2c/1b	*O.* Barrel B3a//G1a	*O. baetica*? A1c	Unclassified *O.*	Total beads	*Marg.* orn. CA2n/C(1)a	*Haliotis* Ornaments CA2n/C(1)a	*Haliotis* Ornaments CA4j/C(2)	*Haliotis* Ornaments AA3j/A1	*Haliotis* Ornaments CA20j/C(2)1	*Haliotis* Ornaments CA4n/C(2)a	*Haliotis* Ornaments CA6j/C(1)1	*Haliotis* Ornaments CA6n/C(1)1a	*Haliotis* Ornaments Unclassified	*Haliotis* Ornaments *Hal.* cut shell	Total shell ornaments	Grand total
			Source	S	C					S	N			L	C		C	C		C	C				
		Las-7 11 Burs.	G	—	—	—	—	—	—	—	—	1175		—	—	6	2	1	—	—	—	1	1	11	1186
		midden	G	—	—	—	—	—	—	—	—	—	57	—	—	3	1	—	2	—	—	—	—	6	63
	1222 B.C.	Ch18 Lot 26	N	—	—	—	—	—	—	—	—	—	287	—	—	—	—	—	—	—	—	—	—		287
	(C-14)	midden	N	1	—	—	—	—	—	—	—	—	19	—	—	—	—	—	—	2	2	1	—	5	24
2200 B.C.	1250 B.C.																								
		Total	9	1									1558	1	1	10	3	1	2	2	2	2	1	25	1583
		Ch2	E	—	1	1	—	—	—	—	—	—	10	—	—	—	—	—	—	—	—	—	—		10
	1420, 1450 B.C.	Ch18	O	—	—	1	—	—	—	—	—	—	98	—	—	—	—	1	—	—	—	—	—	1	99
	(C-14)	Ch60	—	—	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—		1
		Ch3	B	—	—	1	2	2	—	—	—	—	5	—	—	—	—	—	—	—	—	—	—		5
2500 B.C.	1500 B.C.																								
		Total	4		2	3	2	2					114					1						1	115
3000 B.C.	2000 B.C.	Total "Early"	21	1	2	3	2	2					2956	1	1	11	3	2	2	2	2	2	1	27	2983
5000 B.C.																									
5088 B.C. (C-14)		Pe14	D	—	—	—	—	—	—	—	—	—	52	—	—	—	—	—	—	—	—	—	—		52
7000 B.C.																									
		Unphased																							
		Ch40		—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—		1
		Ch83		—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—		1
		Hu17		—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—		1
		Ch18		—	—	—	—	—	—	—	—	—	49	—	—	—	—	—	—	—	—	1	—	1	50
		Wa197		—	—	1	—	—	2	1	2	—	28	—	—	—	—	—	—	—	—	—	—		28
		Ch13		—	—	—	—	—	—	—	—	2	2	—	—	—	—	—	—	—	—	—	—		2
		Total	6			1			2	1	2	2	82									1		1	83
		Grand total	28	1	2	4	2	2	2	1	2	2	3090	1	1	11	3	2	2	2	2	3	1	28	3118

TABLE 8
Shell Ornaments from the Western Great Basin

Dating		Site	Component	? CD1j	? NA3j	u NA3j	? Unclassified	u Worked	u BA8j	u //AR1	u //U4b	r SB3j	*Marg.* BA3j	*Anod.* BA3j	u BB3j	r OA3j	r CA3a	? Fragment	u JB3j	u (E)B3j	u CC1j	u CA6j	u TA3j	u CA2j	u BA3j	u //Q11aII	u //AC5a	*Anod.* BB6F	u BA6j	c BA3j	c BA8j	u, c BB3j	u PA5j	u, r SA6j
A2	B1																																	
A.D. 1880			Source	L?	C	C	–	–	C	S	S	C	L	L	C	C	C	–	C	C	S	C	C	C	C	S	S	L	C	C	C	C	C	C
		Ch13	A	(2)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		Pe27	A	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
A.D. 1816		Ch15	A	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		DV 122-56		–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
A.D. 1700		Wa1502	B	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		Las-1	B	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		DV 68-56		–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		DV 26-56		–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
A.D. 1500		Total	8	(2)	1	1	1	2	1	1	1																							
		Ch36		–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		Las-1	C	–	–	–	–	–	–	–	–	–	4	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		Pe67	B	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
A.D. 1100	A.D. 1300	Las-7	D	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		Pe27	C	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		Mno-384		–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		Wa385		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
A.D. 700	A.D. 1100	Las-1	D	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	–	–	–	–	–	–	–	–	–	–
		Ny301	D	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–
A.D. 100	A.D. 700	Total	9									1	4	1	1	1	1	1	1	1	3													
		Ch13	C	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–
		Las-7	E	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	–	–	–	–	–	–	–	–
		Ch18	H	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–
		Las-1	E	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–
		Iny-372	G	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	–	–	–	–
300 B.C.	A.D. 500	Ch13	D	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	3	–	–	–	–	–
		Las-1	F	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	1	2	1	2
		Ch18	J	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

TABLE 8—(*Continued*)

Dating		Site	Component	? CD1j	? NA3j	u NA3j	? Unclassified	u Worked	u BA8j	u //AR1	u //U4b	r SB3j	*Marg.* BA3j	*Anod.* BA3j	u BB3j	r OA3j	r CA3a	? Fragment	u JB3j	u (E)B3j	u CC1j	u CA6j	u TA3j	u CA2j	u BA3j	u //Q11aII	u //AC5a	*Anod.* BB6F	u BA6j	c BA3j	c BA8j	u, c BB3j	u PA5j	u, r SA6j
A2	B1		Source	L?	C	C	–	–	C	S	S	C	L	L	C	C	C	–	C	C	S	C	C	C	C	S	S	L	C	C	C	C	C	C
800 B.C.	A.D. 100	Ny301	E	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		Ch18	K	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		Ny301	F	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
1300 B.C.	200 B.C.	Wa1016		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		Total	12																			2	1	1	2	1	1	1	4	1	1	2	1	2
1500 B.C.	600 B.C.	Sie-20		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	750 B.C. (C-14)	Ch18	M	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		Las-7	G	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2200 B.C.	1250 B.C.	Ch18	N	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2500 B.C.	1500 B.C.	Ch18	O	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		Total	5																															
		Unphased Ch18		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		Grand total	35	(2)	1	1	1	2	1	1	1	1	4	1	1	1	1	1	1	1	3	2	1	1	2	1	1	1	4	1	1	2	1	2

Haliotis species: r = *rufescens*; c = *cracherodii*; u = unidentifiable (background); $_m$ = no data; ( ) = phasing very uncertain.
Ornament types defined in chap. 1 (see table 10); components defined in Appendix.

TABLE 8—(*Continued*)

Dating A2	Dating B1	Site	Component	c S(B3)a	c Fragment	u SA3j	u BA3a	c FA3j	c OJ3j	c CC1j	? Fragments	u CA4j	c CA(4)j	u CA2n	*Marg.* CA2n	u AA3j	u CA4n	u CA20j	u CA6j	u CA6n	Unclassified	r Cut Shell	*Haliotis*	*Margaritifera*	*Anodonta*	*H. rufescens*	*H. cracherodii*	*H.* unidentified	Unknown	Classifiable	Unclass. frag.	Worked piece	No description	Grand total
A.D. 1880			Source	C	C	C	C?	C	C	C	C	–	C	C	L	C	–	C	C	C	–	–	–	–	–	–	–	–	–	–	–	–	
		Ch13	A	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	2	2	–	–	–	2
		Pe27	A	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1	1	–	–	–	1
A.D. 1816		Ch15	A	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1	–	1	–	–	–	1
		DV 122-56		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1	–	–	–	1	1
A.D. 1700		Wa1502	B	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	2	–	–	–	2	–	2
		Las-1	B	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1	–	1	–	–	–	1
		DV 68-56		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1	–	1	–	–	–	1
A.D. 1500		DV 26-56		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1	–	1	–	–	–	1
		Total	8																				10					6	4	7		2	1	10
		Ch36		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	–	–	1	–	–	–	1
		Las-1	C	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4	1	–	–	–	–	5	–	–	–	5
A.D. 1100	A.D. 1300	Pe67	B	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	–	–	1	–	–	–	1
		Las-7	D	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	–	–	1	–	–	–	1
		Pe27	C	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	–	–	1	–	–	–	1
		Mno-384		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1	–	1	–	–	1
A.D. 700	A.D. 1100	Wa385		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1	–	1	–	–	–	1
		Las-1	D	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	2	–	2	–	–	–	2
A.D. 100	A.D. 700	Ny301	D	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	2	–	2	–	–	–	2
		Total	9																				10	4	1	4		5	1	14	1		–	15
		Ch13	C	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1	–	1	–	–	–	1
		Las-7	E	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	2	–	2	–	–	–	2
		Ch18	H	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1	–	1	–	–	–	1
		Las-1	E	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	2	–	2	–	–	–	2
		Iny-372	G	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	2	–	2	–	–	–	2
300 B.C.	A.D. 500	Ch13	D	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	–	1	–	–	3	–	4	–	–	–	4
		Las-1	F	1	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	10	–	–	1	5	4	–	9	1	–	–	10
		Ch18	J	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1	–	1	–	–	–	1

TABLE 8—(*Continued*)

Dating A2	Dating B1	Site	Component	c S(B3)a	c Fragment	u $A3j	u BA3a	c FA3j	c OJ3j	c CC1j	? Fragments	u CA4j	c CA(4)j	u CA2n	*Marg.* CA2n	u AA3j	u CA4n	u CA20j	u CA6j	u CA6n	Unclassified	r Cut Shell	*Haliotis*	*Margaritifera*	*Anodonta*	*H. rufescens*	*H. cracherodii*	*H.* unidentified	Unknown	Classifiable	Unclass. frag.	Worked piece	No description	Grand total
			Source	C	C	C	C?	C	C	C	C	–	C	C	L	C	–	C	C	C	–	–	–	–	–	–	–	–	–	–	–	–	
800 B.C.	A.D. 100	Ny301	E	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1	–	1	–	–	–	1
		Ch18	K	–	–	–	–	1	1	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	2	–	–	2	–	–	–	2
		Ny301	F	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–	–	1	–	–	–	1
1300 B.C.	200 B.C.	Wa1016		–	–	–	–	–	–	–	4	1	–	–	–	–	–	–	–	–	–	–	5	–	–	–	–	1	4	1	4	–	–	5
		Total		12	1	1	1	1	1	1	4	1											31		1	1	8	18	4	27	5			32
		Sie-20			–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–	–	1	–	–	–	1
1500 B.C.	600 B.C.	Ch18	M	–	–	–	–	–	–	–	–	1	–	1	1	–	–	–	–	–	–	–	2	1	–	–	–	2	–	3	–	–	–	3
	750 B.C. (C-14)	Las-7	G	–	–	–	–	–	–	–	–	9	–	–	–	3	2	1	–	–	1	1	17	–	–	1	–	16	–	15	1	1	–	17
2200 B.C.	1250 B.C.	Ch18	N	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	2	1	–	5	–	–	–	–	5	–	4	1	–	–	5
2500 B.C.	1500 B.C.	Ch18	O	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1	–	–	–	–	1	–	1	–	–	–	1
		Total		5								10	1	1	1	3	2	2	2	2	2	1	26	1		1	1	24	–	24	2	1	–	27
		Unphased Ch18			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	–	–	–	–	–	1	–	–	–	1	1
		Grand total		35	1	1	1	1	1	1	4	11	1	1	1	3	2	2	2	2	3	1	78	5	2	6	9	53	10	72	8	3	2	85

TABLE 9
Temporal Distribution of Beads and Ornaments in the Western Great Basin

	Sax. Tresus clam disk	*Tivela*	Miscellaneous Southern beads[c]	*Dentalium*	*Glycymeris*	*Macoma* disk	*Mytilus*	*Haliotis*	*Olivella*
Historic and Protohistoric									
(56[a], 46[b])	10 (3.0)[d]	7 (2.1)	5 (1.5)	6 (1.8)	0	0	2 (0.6)	1 (0.3)	250 (74.2)
% of total	0.18	0.13	0.09	0.11	—	—	0.04	0.02	4.6
% of class	100	63.6	71.4	15.4	—	—	1.4	0.05	9.2
Late Prehistoric									
(39, 26)	0	4 (0.3)	1 (0.1)	30 (2.1)	7 (0.5)	0	0	0	1158 (82.2)
% of total	—	0.07	0.02	0.55	0.13	—	—	—	21.4
% of class	—	36.4	14.3	76.9	100	—	—	—	42.7
Middle Prehistoric									
(32, 22)	0	0	1 (0.2)	3 (0.5)	0	0	0	17 (3.1)	497 (89.2)
% of total	—	—	0.02	0.06	—	—	—	0.31	9.2
% of class	—	—	14.3	7.7	—	—	—	0.8	18.3
Early Prehistoric									
(21, 13)	0	0	0	0	0	15 (0.5)	142 (4.8)	2126 (71.2)	673 (22.6)
% of total	—	—	—	—	—	0.28	2.6	39.2	12.4
% of class	—	—	—	—	—	100.0	98.6	99.2	24.8
Humboldt									
(1, 1)	0	0	0	0	0	0	0	0	52 (100)
% of total	—	—	—	—	—	—	—	—	0.96
% of class	—	—	—	—	—	—	—	—	1.9
Unphased									
(6, 6)	0	0	0	0	0	0	0	0	82 (98.8)
% of total	—	—	—	—	—	—	—	—	1.5
% of class	—	—	—	—	—	—	—	—	3.0
Grand total									
(155, 81)	10	11	7	39	7	15	144	2144	2712
%	0.18	0.2	0.13	0.72	0.13	0.28	2.66	39.57	50.04

[a] Total components.
[b] Total sites.
[c] Includes 3 Limpet, 1 Turridae, 1 Turbinidae, 1 Sea Snail, and 1 *Trivia*.
[d] Parenthetical entries indicate percent by temporal period.

types were present (e.g., E1a, E1b), a detailed distribution by site number is given because often only type totals appear in the tables. Note that a search is sometimes necessary to match totals presented in the synopsis with totals in the tables because tabled entries can be "reliably phased" (e.g., table 4: A1cII) at the left, and "uncertainly phased" (A1c) to the right. If a type appears in multiple tables, a summary is provided here—particularly for Classes A and B.

SYNOPSIS OF THE *OLIVELLA* SHELL BEAD TYPOLOGY

CLASS A: SPIRE-LOPPED

A1. SIMPLE SPIRE-LOPPED (fig. 2a–g)

Description: Nearly complete shell with only the spire removed perpendicular to the body axis. The spire may be broken off, ground down, or naturally waterworn. Vari-

TABLE 9—(*Continued*)

"Reliably" Phased	Total Pacific Shell Beads	*Margaritifera* beads	Total Shell Beads	Pine nut, *prunus*, bone beads	Total Native Beads	Glass Beads	Total Shell Ornaments	Grand total
242 (72.0)	281	0	281	13 (3.9)	294	33 (9.8)	10 (3.0)	337
4.5	5.2	—	5.2	0.24	5.4	0.6	0.18	6.2
5.7	5.5	—	5.5	6.6	5.6	100	11.8	—
568 (40.3)	1200	8 (0.6)	1208	185 (13.1)	1393	0	15 (1.1)	1408
10.5	22.1	0.15	22.3	3.4	25.7	—	0.28	26.0
13.4	23.6	53.3	23.7	93.4	26.3	—	17.6	—
415 (74.7)	518	7 (1.3)	525	0	525	0	32 (5.8)	557
7.7	9.6	0.13	9.7	—	9.7	—	0.6	10.3
9.8	10.2	46.7	10.3	—	9.9	—	37.6	—
2956 (99.1)	2956	0	2956	0	2956	0	27 (0.9)	2983
54.6	54.5	—	54.6	—	54.6	—	5.0	55.0
69.8	58.1	—	57.9	—	55.8	—	31.8	—
52 (100)	52	0	52	0	52	—	0	52
0.96	0.96	—	0.96	—	0.96	—	—	1.0
1.2	1.0	—	1.0	—	1.0	—	—	—
—	82	0	82	0	82	0	1 (1.2)	83
—	1.5	—	1.5	—	1.5	—	0.02	1.5
—	1.6	—	1.6	—	1.5	—	1.2	—
4233	5089	15	5104	198	5302	33	85	5420
78.1	93.9	0.28	94.2	3.65	97.8	0.6	1.6	100.0

able amounts of the outer lip may be broken away to facilitate stringing.

Species: Great Basin beads were made from 3 species—*O. biplicata, O. baetica,* and *O. dama.* Three additional species have been reported for California—*O. pycna* (fig. 2b; Gifford, 1947, type F4), *O. undatella* (Gifford, 1947, type G2), and *O. pedroana* (Reinman and Townsend, 1960: 17, 19)—but will not be discussed here. The distinction between immature *O. baetica* and *O. pycna* is uncertain. Except for A1, B2, and B3, all types are made only from *O. biplicata.*

Size: Three divisions based on *maximum diameter* are used for all species in Classes A, B, and O. Length has not been used because of the variable extent of end grinding and natural wear. Small: 3.0–6.5; Medium: 6.51–9.5; Large: 9.51–14.0.

O. biplicata
(source: entire Pacific Coast)

A1a. SMALL SPIRE-LOPPED (fig. 2a)

Temporal significance: Most common during the Early period and Phase 1 of the Late

period in central California, but can occur in any period.

Great Basin occurrences: 206 beads; 18 components at 14 sites.

Late period: 128 beads (7 components at 7 sites; 122 with 2 burials). Table 5.

Middle period: 6 beads (7 components at 3 sites). Table 6.

Early period: 70 beads (9 components at 6 sites; 53 with 5 burials). Table 7.

Unphased: 2 beads (from Wa197). Table 7.

A1b. MEDIUM SPIRE-LOPPED

Temporal significance: None.

Great Basin occurrences: 187 beads; 29 components at 12 sites.

Protohistoric period: 5 beads (3 components at 2 sites). Table 4.

Late period: 59 beads (10 components at 6 sites). Table 5.

Middle period: 41 beads (8 components at 6 sites). Table 6.

Early period: 70 beads (4 components at 3 sites; 57 with 7 burials). Table 7.

Unphased: 12 beads from 4 sites. Table 7.

A1c. LARGE SPIRE-LOPPED (fig. 2e)

Temporal significance: None; in central California this type is dominant, percentagewise, in the Protohistoric and Middle periods.

Great Basin occurrences: 233 beads; 31 components at 16 sites; 58 beads with 5 burials.

Protohistoric period: 17 beads (9 components at 8 sites). Table 4.

Late period: 98 beads (10 components at 6 sites). Table 5.

Middle period: 42 beads (10 components at 9 sites). Table 6.

Early/Middle Transition: 9 beads (1 component at 1 site; 1 with 1 burial). Table 7.

Early period: 8 beads (1 component at 1 site; 5 beads with 3 burials). Table 7.

Humboldt Culture: 52 beads with 1 burial. Table 7.

Unphased: 7 beads (from Wa197). Table 7.

A1ci. INCISED SPIRE-LOPPED

Source: Southern California; possibly a local tradition (see D1ai and C6i for earlier incised beads).

Style I: Simple Linear Incision (fig. 2f)

Great Basin occurrences: One bead from Ch18D, assigned to late Phase 1 of the Late period on the basis of southern California occurrences. Table 5.

Style II: Cross-hatched Bands (fig. 2g)

Great Basin occurrences: 3 beads from 3 sites, assigned to early Phase 2 of the Late period on the basis of southern California occurrences. Table 4.

O. baetica
(source: northern California)

A1a. SMALL SPIRE-LOPPED

Temporal significance: Possible emphasis in the Early period, but also occurs in the Late period in central California.

Great Basin occurrences: 9 beads; 2 components at 1 site.

Late period: 2 beads, Las-7D (assigned). Table 5.

Early period: 7 beads, Las-7G burial. Table 7.

A1b. MEDIUM SPIRE-LOPPED (fig. 2d)

Temporal significance: Both Early and Late periods.

Great Basin occurrences: 4 beads; 3 components at 3 sites.

Late period: 1 bead, Las-7D midden (assigned). Table 5.

Early period: 2 beads, Wa1502F (stratigraphic). Table 7.

Unphased: 1 bead, Wa197. Table 7.

A1c. LARGE SPIRE-LOPPED

Temporal significance: Uncertain.

Great Basin occurrences: 2 possible beads from Wa197. Table 7.

O. dama
(source: Gulf of California)

A1a. SMALL SPIRE-LOPPED (fig. 2c)

Description: Abrasion of the suture above the aperture indicates that these beads were

usually strung side by side rather than end to end (cf. Pendleton, 1985: 240, fig. 78z).

Temporal significance: Used in the Southwest since the Sulphur Spring stage of the Cochise Culture (Gifford and Gifford, 1949). Appear rarely in all three periods in the Santa Barbara Channel region although most specimens seem to be Barrels (type B3) (King, 1981: 62, 169, 188).

Great Basin occurrences: 3 Great Basin specimens are Protohistoric (Iny-2B, DV 139-56, DV 235-56). Table 4.

O. biplicata
(source: entire Pacific Coast)

A2. OBLIQUE SPIRE-LOPPED
(fig. 2h)

Description: Spire ground off diagonally.

Size: Same metric divisions as type A1.

Source: Entire Pacific Coast.

Temporal significance: An Early period emphasis is evident in central California, while southern California specimens are placed in the Early/Middle period Transition phase and early Middle period (King, 1981: 56, 192). Gifford (1947: 10, type F5b) reported the type for the ethnographic Karok.

Great Basin occurrences: 8 beads from 4 sites. Although none have meaningful provenience, the associated beads suggest an Early period emphasis. The 5 beads from Ch3 seriate as Early, but their larger size and southern California source would support shifting them to the Early/Middle period Transition phase (see table 7).

A3. DRILLED SPIRE-LOPPED
(fig. 2i)

Description: Spire-lopped bead with perforation drilled conically in body whorl. A dubious type—the hole placement is nonstandardized, and most specimens probably represent the borings of predatory marine molluscs. However, the existence of type 01 specimens (drilled shells with intact spires) in graves supports the possibility that some type A3 were strung as pendants.

Size: Same three metric divisions as type A1, although most specimens are large (A3c). Perforation diameter 2.0–3.0.

Source: Most common in southern California, very rare in central California.

Temporal significance: In southern California, most specimens represent the Early period and Phase 1 of the Late period. In central California, 2 specimens from A1a-309 represent the early and late phases of the Middle period.

Great Basin occurrences: Not reported.

A4. PUNCHED SPIRE-LOPPED
(fig. 2j)

Description: Spire-lopped bead with perforation punched in body whorl. Difficult to distinguish from accidental breakage unless shell is well preserved (cf. type 02, which does occur in grave lots). If type is valid, stringing as a pendant is suggested.

Size: Same three metric divisions as type A1, with irregular perforation.

Source: southern California (e.g., Greenwood, 1972, fig. 22, row 4).

Temporal significance: Uncertain.

Great Basin occurrences: Not reported.

A5. APPLIQUE SPIRE-LOPPED
(fig. 2k, l)

Description: Spire-lopped bead with aperture side ground flat at a diagonal angle to the shell axis. Grinding usually penetrates interior cavity to form a second opening just below the suture line. Grinding more extensive than in type B1. Many specimens retain asphalt on the ground surface or in the cavities, indicating that the type was usually used in applique arrangements.

Size: Same three metric divisions as type A1.

Source: San Joaquin Valley center (late) and San Nicolas Island (early).

Temporal significance: Protohistoric to Historic period marker type in the San Joaquin Valley (Ker-74), the Delta (Sac-6), and probably SLO-157 (Reinman, 1961). While large (A5c) beads are emphasized, medium and small beads also occur.

Two burials from the Early period site SNI-40 yielded 477 A5a with some A5b; these shell beads yielded a radiocarbon date of 2030 ± 100 B.C. (Reinman and Townsend, 1960: 17, 19; Reinman, 1962: 13). While this shell date may be somewhat too early, the

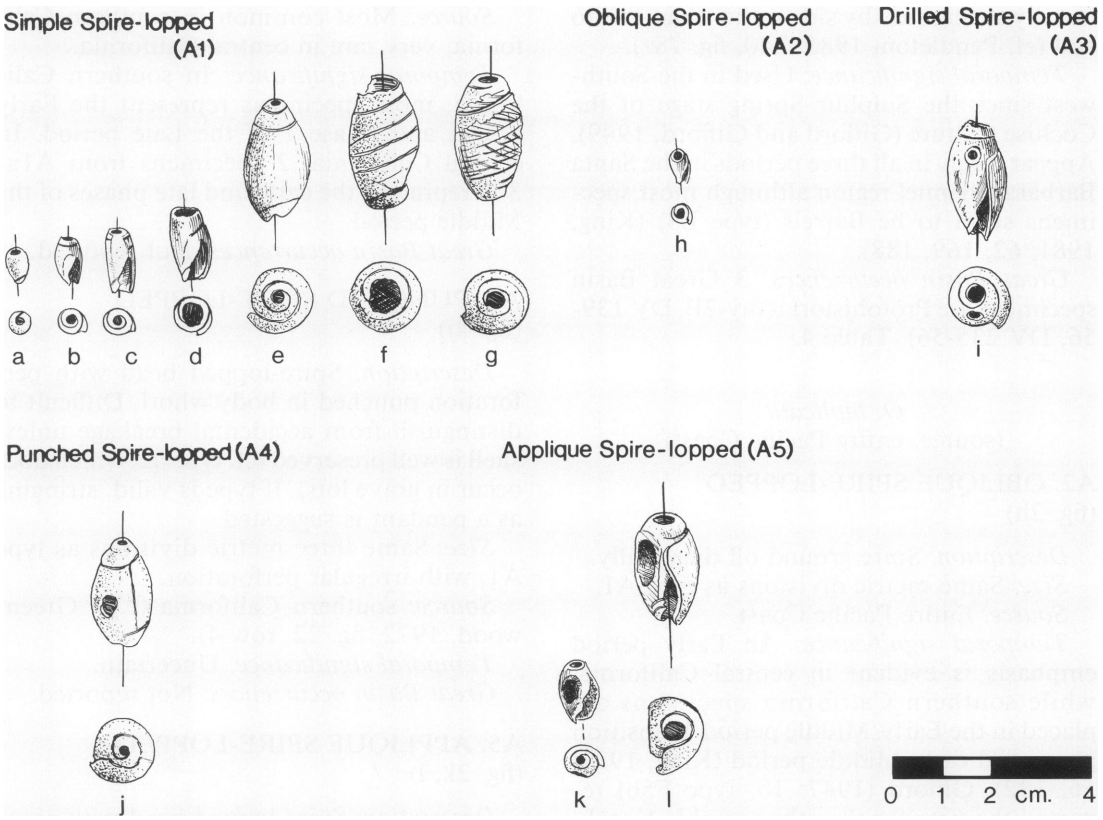

Fig. 2. *Olivella* shell beads, class A.

a. A1a, *O. biplicata,* L-15618 (SJo-56);
b. A1a, *O. pycna,* 1-25642 (A1a-309), not reported in Great Basin;
c. A1a, *O. dama,* 1-202654a (Iny-2);
d. A1b, *O. baetica,* 1-73553b (SJo-68);
e. A1c, 1-26058 (A1a-309);
f. A1ciI, 2-39444 (Ch18); g. A1ciII, 2-30496 (Ch65);
h. A2a, *O. biplicata,* L-15773a (Sac-107);
i. A3c, 1-8775 (A1a-309); j. A4c. 1-25628 (A1a-309);
k. A5b, 1-103130 (Ker-74); l. A5c. 1-118995 (Ker-74).

(Catalog numbers for all figures are those of the Robert H. Lowie Museum of Anthropology, University of California, Berkeley unless noted otherwise.)

burials occurred at depths greater than a burial with *Haliotis* type 1a, so the Early period dating seems secure. Type A5 has not been reported among the thousands of beads found at other Early period Channel Island sites.

Great Basin occurrences: Not reported.

A6. END-PERFORATED SPIRE-LOPPED (Judd, 1926: pl. 46f)

Description: Spire-ground bead with a drilled perforation near the canal end, just below the fasciole. The specimen was presumably strung as a pendant, so standard orientation does not apply.

Size: Not given by Judd (1926) but the illustration is clearly a large bead (type A6c).

Source: While the shell came from the Pacific Coast (probably southern California), this unique specimen very likely represents the local redrilling of an A1c bead to serve as a pendant.

Temporal significance: The single known specimen came from Paragonah, Utah, one

of the Parowan Fremont sites datable to A.D. 1050–1175 (Dodd, 1982: 18).

Great Basin occurrences: Confined to the Fremont Culture at present.

CLASS B: END-GROUND

Description: Both the spire and variable amounts of the aperture end have been removed. Normally made from *O. biplicata,* although two *O. baetica* B2b occurred at CCo-138 in Phase 1 of the Late period. Small numbers of *O. pycna* B2a occur in Phase 1, Late period deposits in the Cosumnes (Sac-21) and Diablo (CCo-138) districts of central California. A Gulf of California species, *O. undatella,* is represented by 24 specimens from a site near Indio, Riverside County, California (Gifford, 1947, type G2).

B1. SIDE-GROUND (fig. 3a–c)

Description: In addition to spire-lopping and end-grinding, the aperture is ground diagonally. Aperture grinding is not as extensive as in type A5. Normally strung, but grinding produces a herringbone pattern.

Size: Same three metric divisions as type A1.

Source: Central California.

Temporal significance: Marker type for Phase 1 of the Late period in central California.

Great Basin occurrences: Not reported.

B2. END-GROUND (fig. 3d–f)

Description: The canal is removed by grinding, but the maximum diameter remains toward the spire.

Size: Same three metric divisions as for type A1.

Source: Most common in central California.

Temporal significance: Most common in the Early period and Phase 1 of the Late period.

Great Basin occurrences: 591 beads.

B2a. SMALL END-GROUND

Great Basin occurrences: 449 beads; 6 components at 4 sites.

Late period: 225 beads (3 components at 3 sites; 220 with 1 burial). Table 5.

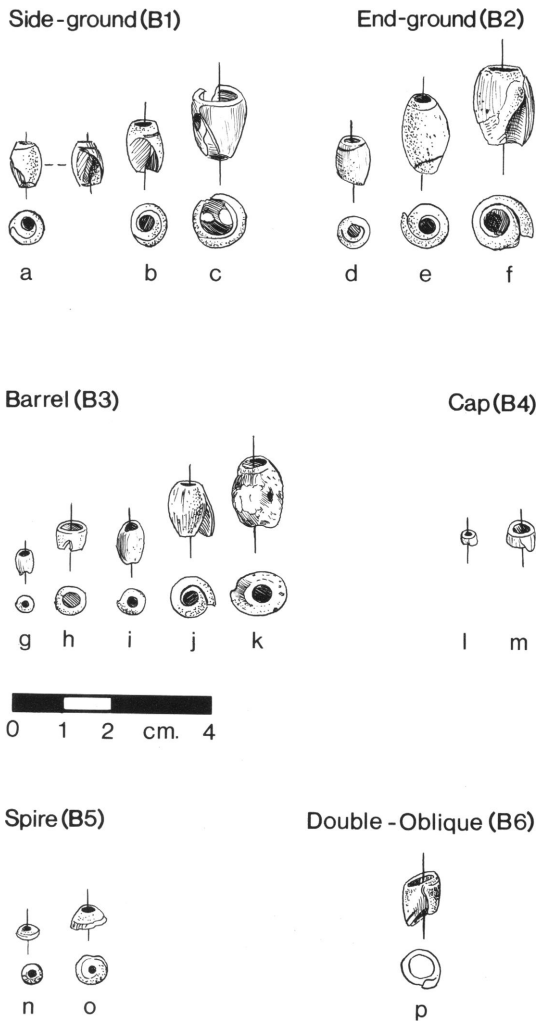

Fig. 3. *Olivella* shell beads, class B.

a. B1b, *O. biplicata,* 1-49569 (CCo-138);
b. B1b, *O. baetica,* 1-49569 (CCo-138);
c. B1c, 1-33917 (Sac-107);
d, e. B2b, 1-39216 (CCo-138); f. B2c, L-17476 (Sac-21);
g. B3a, 1-30303 (SCrI-3); h. B3a, 1-73561 (SJo-68);
i. B3a, 1-55089a (SJo-68); j. B3b, 1-55089b (SJo-68);
k. B3c, 1-196975 (Las-7);
l, m. B4a, 1-34785 (SCrI-100);
n. B5, 1-49571e (CCo-138); o. B5, 1-221476b (SJo-82);
p. B6, 298–348 (CCo-298).

Early period: 224 beads (3 components at 3 sites; 222 with 4 burials). Table 7.

B2b. MEDIUM END-GROUND

Great Basin occurrences: 137 beads; 8 components at 4 sites.

Late period: 33 beads (3 components at 2 sites; 20 on 2 strings). Table 5.

Early period: 101 beads (3 components at 2 sites; 93 with 6 burials). Table 7.

Unphased: 3 (from Wa197). Table 7.

B2c. LARGE END-GROUND

Great Basin occurrences: 5 beads; 4 components at 4 sites.

Late period: 2 beads (2 components at 2 sites). Table 5.

Early/Middle Transition: 1 bead (Las-7F, one burial). Table 7.

Unphased: 2 beads (from Wa197). Table 7.

B3. BARREL (fig. 3g–k)

Description: Extensive end-grinding produces a bead with the maximum diameter at the middle.

Size: Same three metric divisions as type A1.

Source: Southern California.

Temporal significance: Made from the Early period to early Protohistoric times. Percentage frequencies by size often significant (King, 1981: 362).

Great Basin occurrences: 14 beads; 6 components at 5 sites.

B3a. SMALL BARREL

Great Basin occurrences: 10 beads.

Late period: 9 beads (2 components at 2 sites; 8 with 1 burial). Table 5.

Unphased: 1 bead (from Wa197). Table 7.

B3b. MEDIUM BARREL

Great Basin occurrences: 3 beads.

Early/Middle Transition: 3 beads (2 components at 2 sites). Table 7.

B3c. LARGE BARREL

Great Basin occurrences: 1 bead.

Early/Middle Transition: 1 bead with 1 burial. Table 7.

B4. CAP (fig. 3l, m)

Description: Virtually all the aperture is removed to produce a caplike bead consisting of the upper one-third of the spire-lopped shell.

Size: Same three metric divisions as type A1.

Source: Southern California.

Temporal significance: Most emphasized in the late and terminal Early period, and the late Middle period into the early Late period (King, 1981: 174, 175, 220, 281, 362).

Great Basin occurrences: 12 beads, all from Ch18N. Table 7.

B5. SPIRE (fig. 3n, o)

Description: Cuplike bead made from the spire only; no thickened wall when viewed from the bottom; spiral suture visible on top.

Size: Diameter 4.0–7.0; thickness 2.0–4.0.

Source: Southern California.

Temporal significance: First appear during middle Phase 1 of the Late period and continue to Historic times (King, 1981: 281–284).

Great Basin occurrences: Not reported.

B6. DOUBLE-OBLIQUE (fig. 3p)

Description: Both the spire and the aperture are ground diagonally. 56 specimens from the controversial Tranquillity site (Fre-48) are not available for analysis. A single specimen has been found recently at the Stege Mound (CCo-298) in Richmond.

Size: Diameter 7.7 on one specimen from CCo-298.

Source: Central California.

Temporal significance: The single specimen from CCo-298 was recovered unassociated in the midden in a level dated to 2785 ± 200 B.P. (UCR-1156).

Great Basin occurrences: Not reported.

CLASS C: SPLIT

Description: Half-shell bead usually with a full shelf, or quarter-shell with shelf edge or no shelf. All edges ground, variable size. Confined temporally to the Middle period and adjacent transitional phases.

C1. BEVELED (fig. 4a–c)

Description: Split half-shell to quarter-shell with shelf edge. Exterior ground facet (flat

"bevel") appears at base of bead, rarely at top. Both bead size and perforation size variable.

Size: Length 9.0–20.0; width 8.0–14.0; perforation diameter 1.0–3.0 ($\bar{x}$ = 2.0).

Source: Central California.

Temporal significance: Marker type for the Early/Middle period Transition.

Great Basin occurrences: Not reported.

C2. SPLIT DRILLED (fig. 4d–f)

Description: Half-shell to quarter-shell with variable shelving.

Size: Length 9.0–20.0; most California lots average 17 × 12; perforation diameter 1.0–2.2.

Source: Uncertain.

Temporal significance: Early Middle period in the San Francisco Bay region; terminal Middle period in the Delta region.

Great Basin occurrences: 16 specimens from 6 sites have been assigned to the terminal Middle period, but all lack provenience. Table 6.

C2i. INCISED (fig. 4g)

Description: Incised variant unique to the Great Basin. Less spire removed than in normal C2. The two specimens from Ch15 have been assigned to the terminal Middle period.

C3. SPLIT OVAL (fig. 4h, i)

Description: Medium-size centrally perforated quarter-shell bead usually with no shelf, occasionally with shelf edge.

Size: Length 8.5–12.0; width 7.5–10.0; perforation diameter 1.8–2.8 ($\bar{x}$ = 2.0).

Source: Uncertain; Great Basin emphasis.

Temporal significance: Early period (Great Basin) to Middle/Late period Transition (California).

Great Basin occurrences: 64 beads, 10 components at 8 sites; 16 beads with 3 graves. While most occurrences are terminal Middle period, grave lots of the early Middle period and early Karlo phase are present. Tables 6, 7.

C4. SPLIT END-PERFORATED (fig. 4j, k)

C4a. Half-shell with perforation near the canal end; full shelf or shelf edge appears at opposite end. Worn as pendant, so "standard orientation" does not apply.

Size: Length 18.0–21.0 ($\bar{x}$ = 19.0); width 11.0–13.0 ($\bar{x}$ = 12.0); perforation diameter 2.0.

Source: Local Great Basin.

Temporal significance: Assigned to the terminal Middle period on the basis of seriation with site-associated types (see table 6). Four specimens from the Evans site (Parowan Fremont variant, Metcalfe, 1982: 89, fig. 29h; Alexander and Ruby, 1963: 24, pl. 1a) were dated by radiocarbon and pottery types to ca. A.D. 1113 (Dodd, 1982: 18, 106), equivalent to middle Phase 1 of the Late period in central California. Since three of the five sites in table 6 also have middle Phase 1 components, four of the specimens could be shifted to table 5 and assigned to Ch39D, Iny-372E, and Ch15E (2 specimens), although the type does not seriate as tightly in this position even with rearrangement of the types. New components would have to be assigned for two specimens from two sites: Pe66A = one C4 (the two remaining Middle period beads in table 6 would become Pe66B); Las-1D = one C4 (the three older components of tables 5 and 6 would become E–G).

Great Basin occurrences: 6 specimens from 5 sites. Table 6 (probably should be shifted to table 5, as discussed above).

C4b. Reworked segment with perforation just below or through the shelf.

Size: 7 × 8 × 4 and 12 × 12 × 4; perforation diameter 2.0.

Source: Local Great Basin.

Temporal significance: Assigned to the terminal Middle period on the basis of site-associated types (see table 6). If type C4a is shifted to middle Phase 1 of the Late period (see type C4a), then C4b should be shifted also.

Great Basin occurrences: 2 specimens from Ch15H. Table 6. As of 1986, assignment to component Ch15E (middle Phase 1 of the Late period, table 5) seems more probable.

C5. SCOOP (fig. 4l, m)

Description: Flaring bead cut from the canal end of shell with end perforation just below the fasciole. Worn as pendant so "standard orientation" does not apply.

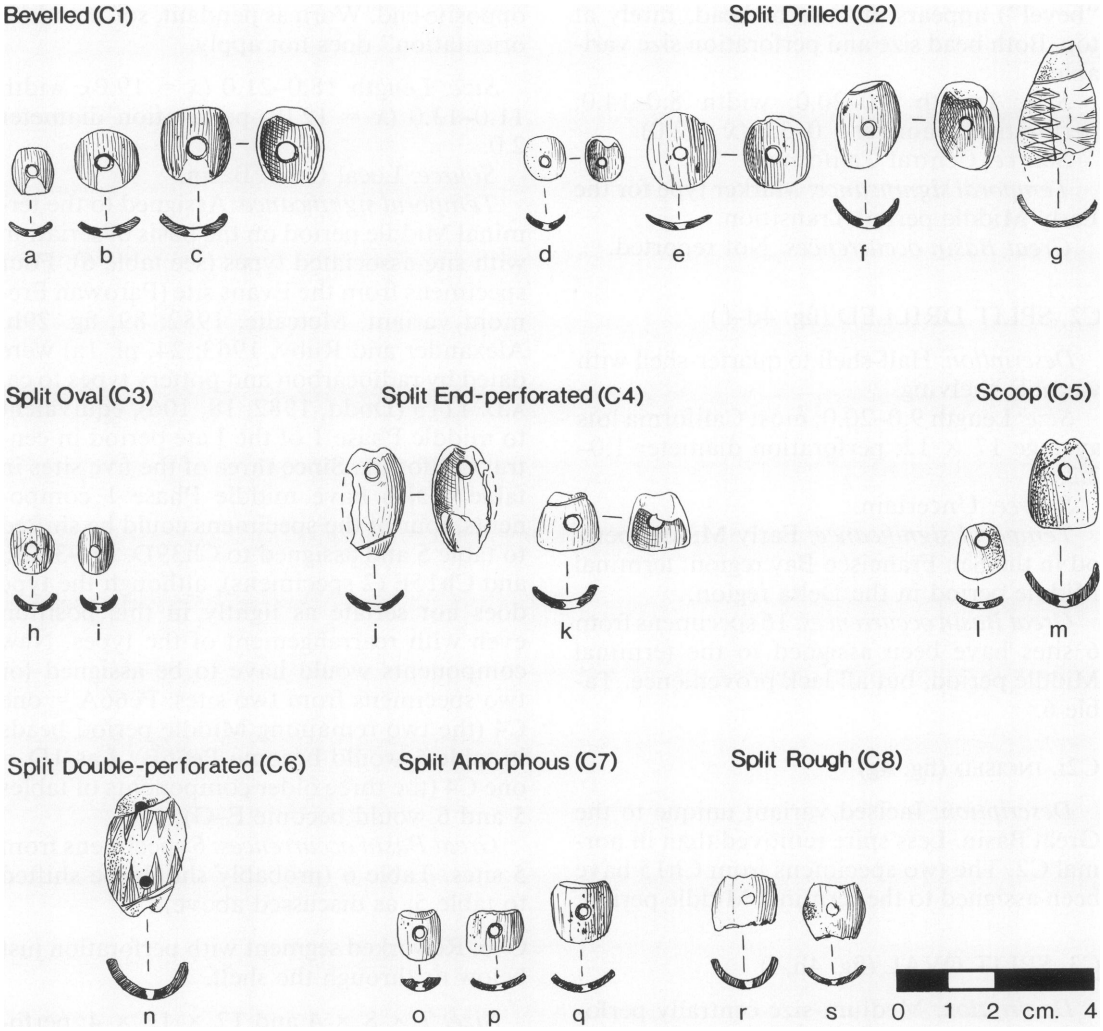

Fig. 4. *Olivella* shell beads, class C.

a, b. C1, 1-48969b (SJo-142);
c. C1, 1-48983b (SJo-142);
d, e. C2, 1-51395b (CCo-267); f. C2, 1-72712 (Nap-1);
g. C2i, 1-65711 (Ch15); h, i. C3, 1-80931 (Sol-2);
j. C4a, 1-65708b (Ch15); k. C4b, 1-65708b (Ch15);
l. C5, 1-65709c (Ch15); m. C5, 1-65708c (Ch15);
n. C6i, 1-65710 (Ch15); o, p. C7, 1-56352c (Sac-66);
q. C7, 1-56352c (Sac-66); r, s. C8, 1-53873 (CCo-250).

Size: 11.0 × 9.5–17.0 × 14.0, mode = 15.0 × 13.0, perforation diameter 1.5–2.0 ($\bar{x}$ = 2.0).

Source: North-central California.

Temporal significance: Assigned to the terminal Middle period on the basis of seriation with site-associated types.

Great Basin occurrences: 18 specimens from 9 sites. One specimen, from Ch2B, has decorative nicks along lower edge. Table 6. As

of 1986, an additional specimen from Ch16 (Stratum I) was misclassified as a Full Lipped ("E2?") bead; it is a classic C5, correctly oriented (Pendleton, 1985: 239, 243, 250, fig. 78u).

C6. SPLIT DOUBLE-PERFORATED (fig. 4n)

Description: Half-shell bead with full shelf and canal, perforated at each end.

Size: 24.0 × 16.0 × 7.0; perforation diameter 1.5–1.7.

Source: Local Great Basin.

Temporal significance: Assigned to the terminal Middle period.

Great Basin occurrences: 2 beads, one each from Ch15H and Ch18H. The Ch15H bead is incised (C6i). Table 6.

C7. SPLIT AMORPHOUS (fig. 4o–q)

Description: Quarter-shell bead of highly variable form. Most are oval to rectanguloid, but the carelessly chipped edges frequently produce irregular outlines. Partial edge grinding suggests unfinished beads, yet their widespread occurrence in central California sites suggests that they also functioned as finished beads. Most beads retain only the shelf edge, but full shelves and shelfless variants occur.

Size: Length 8.0–16.0 ($\bar{x}$ = 10.0); width 8.0–13.0 ($\bar{x}$ = 9.0); curvature 3.0–6.0 ($\bar{x}$ = 4.0); perforation diameter $\bar{x}$ = 2.0.

Source: Central California.

Temporal significance: Marker type for the Middle/Late period Transition.

Great Basin occurrences: Not reported.

C8. SPLIT ROUGH (fig. 4r, s)

Description: Quarter-shell bead of highly variable form, with only chipped edges. Unfinished beads are probably represented.

Size: Usually wider than long; smaller than type C7 ($\bar{x}$ = 7.0 × 9.0).

Source: Central California.

Temporal significance: Marker for the Middle/Late period Transition.

Great Basin occurrences: Not reported.

CLASS D: SPLIT PUNCHED

Description: Half-shell or quarter-shell beads with central punched perforations of extremely variable size. Chipped, unground edges common.

D1a. SHELVED PUNCHED (fig. 5a–c)

Description: Half-shell with full shelf; centrally punched perforations very irregular.

Size: 14.0 × 11.0 × 5.0–17.0 × 12.0 × 6.0.

Source: Probably the San Joaquin Valley (Bennyhoff and Heizer, 1958: 66–67).

Temporal significance: Grave lots at CCo-20, CCo-250, CCo-290, CCo-308, Sac-21, Sac-66, and Yol-13 indicate an emphasis during the Middle/Late period Transition phase. Persistence into early Phase 1 of the Late period is probable, although none occurred at CCo-138 or Ala-309. A contemporaneous placement is indicated for southern California (SCrI-100). One early Phase 2 Late period grave at CCo-295 also yielded this type.

Great Basin occurrences: 73 beads from 10 sites probably represent the Middle/Late period Transition. One incised specimen (D1ai) came from Ch15G, fig. 5c. Table 5.

D1b. SMALL PUNCHED (fig. 5d–f)

Description: Minor variant made from a quarter-shell with only the shelf edge retained.

Size: 13.0 × 11.0 × 7.0–15.0 × 11.0 × 5.0. Similar in all other respects to type D1a; usually occur in the same graves.

Great Basin occurrences: 3 beads from 3 sites (Ch15G, Ch39F, and Ch89). Table 5.

D2. RECTANGULAR PUNCHED (fig. 5g–h)

Description: Large rectangular beads with ground edges, a central punched perforation, and a full shelf.

Size: 13.0 × 1.0 × 3.0–17.0 × 12.0 × 6.0.

Source: Central California.

Temporal significance: Found with type D1 in graves of the Middle/Late period Transition at CCo-250.

Great Basin occurrences: Not reported.

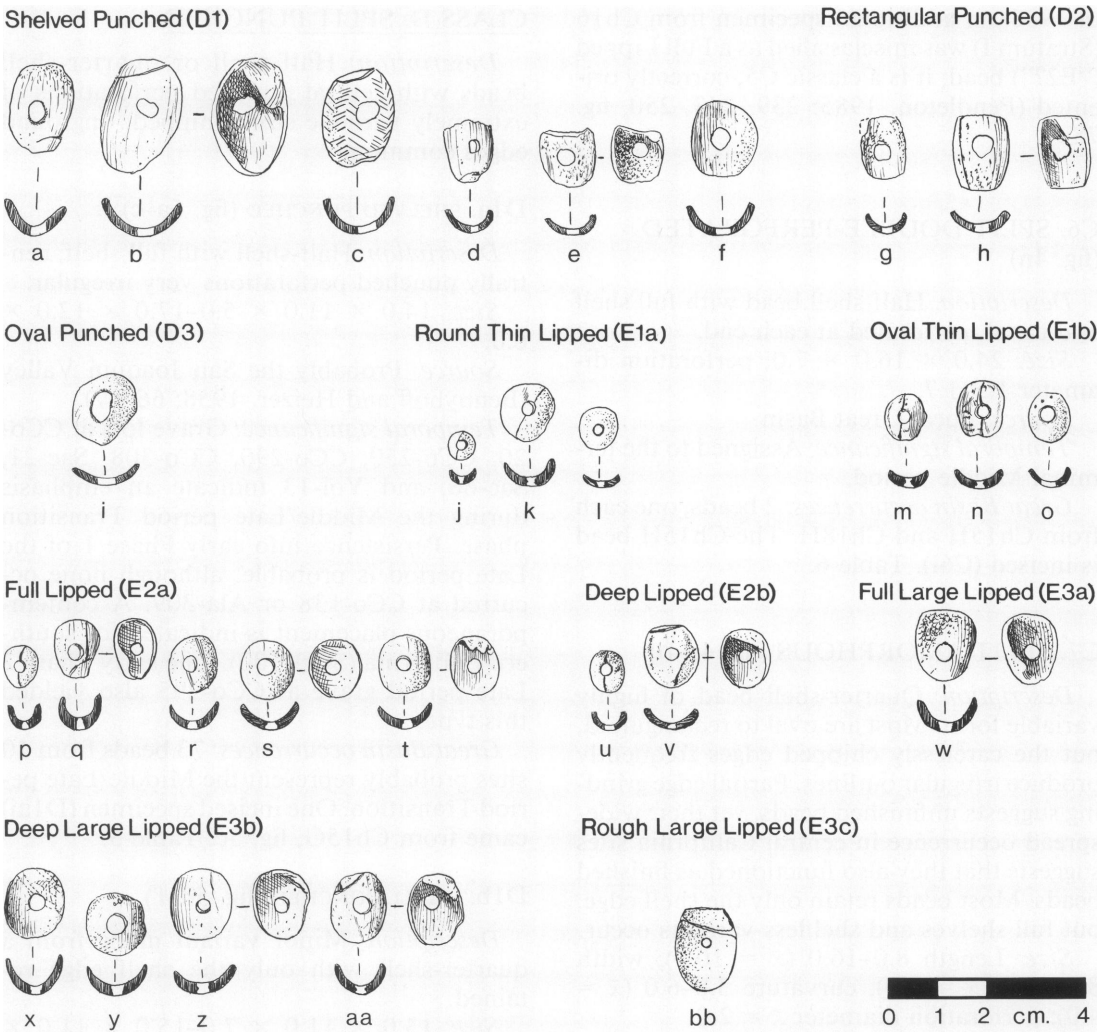

Fig. 5. *Olivella* shell beads, classes D and E.

a. D1a, L-17252 (Sac-16); b. D1a, L-17252 (Sac-16);
c. D1ai, 1-65712 (ch15); d, e, f. D1b, 1-56352b (Sac-66);
g. D2a, 1-56352d (Sac-66); h. D2a, 1-53871a (CCo-250);
i. D3, 1-74718 (Las-1); j, k. E1a1, L-16576h (Sac-127);
l. E1a2, L-16576i (Sac-127);
m, n. E1b1, 1-133721a1 (Sac-168);
o. E1b2, 1-133721a2 (Sac-168);
p. E2a1, L-15691a (Sac-56);
q. E2a1, L-15691a (Sac-56); r. E2a2, L-15691b (Sac-56);
s. E2a3, L-15691d (Sac-56); t. E2a4, L-15691c (Sac-56);
u, v. E2b, L-15576a (Sac-56);
w. E3a1, 1-54321a (Mrn-266);
x. E3b1, 1-54321b (Mrn-266);
y. E3b2, 1-54321d (Mrn-266);
z. E3b3, 1-50699 (CCo-259);
aa. E3b4, 1-54321c (Mrn-266);
bb. E3c, number not available (C. King, 1973a, 1973b).

D3. OVAL PUNCHED (fig. 5i)

Description: Oval bead, without shelving, with a central punched perforation.

Size: 9.0 × 7.0–12.0 × 10.0.

Source: Local Great Basin.

Temporal significance: Assigned to the Middle/Late period Transition.

Great Basin occurrences: 12 beads from 3 sites. Table 5.

CLASS E: LIPPED

Description: Round to oval beads normally made from the upper callus/*inner* lip and variable amounts of the adjacent body whorl. The modal size of these beads increased through time and the locus of manufacture on the shell tended to move away from the callus toward the outer lip so that many Historic period Large Lipped beads lack the exterior callus and display a shelf edge or even a shelf on the interior. In central California, a small percentage of beads in the Protohistoric period was made from the remnant body whorl with no trace of callus so these beads resemble Class G Saucers (very early Protohistoric) or Class C Ovals (C3, early and late Protohistoric). Since these "lipless variants" were never strung separately, they have been included in Class E. (In their fieldnotes, Lillard and his Sacramento Junior College students originally called the Phase 2 Class E beads [Bulletin 2 type 3a1] "lipped saucers" to distinguish them from the Middle period Saucers [Class G/Bulletin 2 type 3c] which lacked the thicker callus or "lip.")

The Lipped bead class is diagnostic of the Protohistoric and Historic periods, during which time it was the most abundant *Olivella* bead form in central California. Lipped beads developed out of Cupped beads (type K1) by enlargement, as the manufacture of Thin Rectangles (Class M, most common in Phase 1 of the Late period) was abandoned. A time-sensitive series of forms emerged, progressing from the Round Thin Lipped through Oval Thin Lipped to Full and Deep Lipped, ending with Large Lipped. The same progressive series seems to be contemporaneous in southern California, although Lipped beads are less common because the manufacture of both Wall Disks and Cupped beads continued through the Protohistoric period (King, 1972; 1974: 79; 1981).

Measurements provided for Class E specimens refer to modal size of *strings* of beads found in grave lots at Sac-6, Sac-56, Sac-60, Sac-168, Ala-328, and Mrn-266. There is an extreme overlap between types in the length of individual beads, particularly since small immature shells were occasionally used for types E2 and E3. Form thus takes priority over size.

The separation of late Phase 2 from Historic lots is another difficult problem because many Historic graves do not contain glass beads or other artifacts of European manufacture. Analysis to date indicates that measurement of Lipped beads (and Clam Disks) will be useful in distinguishing Historic lots, but more measurement is needed.

E1. THIN LIPPED

Description: Round to oval bead in which about half of the exterior surface consists of the thick callus and half is thin body whorl. The bead is therefore markedly asymmetrical in cross section (in contrast to the ancestral Cupped bead). Thin Lipped beads, being smaller, display less curvature than Thick Lipped beads—hence the name distinction. All bead edges are ground.

E1a. ROUND THIN LIPPED (fig. 5j–l)

Description: Round beads with central perforation drilled biconically through, or at edge of the callus. Asymmetrical cross section and large size differentiate it from the ancestral Cupped bead (transitional Class K to Class E forms can be distinguished also). Beads of uniform size will nest with adjacent beads when strung, but the necklace will be more irregular than a string of Callus beads; this irregularity increases as the form shifts to Oval. Most beads are Normal (E1a1) but occasional Lipless variants (E1a2, fig. 5l) occur in the same lot. Rare specimens were incised in southern California.

Size: Diameter 5.0–9.0, occasionally up to 12.0; a 1 mm difference in length and width is allowed. Modal size increased through time. Curvature $\bar{x}$ = 3.0–4.0; perforation diameter $\bar{x}$ = 2.0.

Source: Both central and southern California.

Temporal significance: Marker type for early Phase 2 of the Late period in central

California; most common at the beginning of the Protohistoric period (A.D. 1500–1600) with later shift to Oval Thin Lipped (type E1b). Hunt (1960: 123, 270) linked this type (Gifford's X3bII) with early Southern Paiute Utility ware; the grave lot was associated with limpet Rings (Gifford's type H2aIII).

Great Basin occurrences: About 131 beads from 9 sites; 54 with 1 burial. Table 4.

E1b. OVAL THIN LIPPED (fig. 5m–o)

Description: Oval bead with central perforation drilled biconically at edge of callus. Asymmetrical in cross section. Distinguished from Deep Thick Lipped (E2b) by shallower curvature; lacks the interior fold of Full Lipped (E2a). Nests irregularly with adjacent beads when strung. Most specimens are Normal (E1b1) but occasional Lipless variants (E1b2) occur in the same lot.

Size: 8.0 × 6.0–11.0 × 9.0. Modal size increased through time. Curvature usually 3.0–4.0, occasionally 5.0; perforation diameter $\bar{x}$ = 2.0 (rarely 3.0).

Source: Both central and southern California.

Temporal significance: Marker type for early Phase 2 of the Late period. Most common during the later portion of early Phase 2 (A.D. 1600–1700), with a later shift to Full Lipped (E2a).

Great Basin occurrences: About 54 at 3 sites (Ch15C = 45, Iny-2C = 8, Iny-372 = 1). Table 4.

E2. THICK LIPPED

Description: Oval, troughlike bead with central perforation usually drilled conically from the exterior. Less callus preserved at thicker edge than in type E1; distinguished from type E1b by greater curvature ($\bar{x}$ = 5.0 mm) and symmetrical cross section. Beads will not nest when strung. All edges ground. Both subtypes of E2 are diagnostic markers of late Phase 2 of the Late period, and were gradually replaced by Large Lipped (E3) beads in the Historic period.

E2a. FULL LIPPED (fig. 5p–t)

Description: Beads were made from lower on the shell so the left side (interior view) preserves the natural shape of the aperture lip with marked basal folding. Three minor variants made from the shell wall, lacking any callus, can occur in the same grave lot.

E2a1 (fig. 5p, q): Normal Full Lipped forms as described above.

Size: 8.0 × 6.0–12.0 × 10.0 ($\bar{x}$ = 10.0 × 8.0); smaller specimens made from immature shells rarely occur. Curvature 4.0–5.0. Modal size increased through time. Perforation diameter 2.0–3.0 ($\bar{x}$ = 2.5).

E2a2 (fig. 5r): Lipless variant (resembling type C3) made from central wall near the outer lip, therefore no callus present. Same size as E2a1, but shallower (curvature $\bar{x}$ = 3.0).

E2a3 (fig. 5s): Shelf Edge variant (resembling type C2) made from upper wall so shelf edge appears on the interior; callus absent. Shallower than E2a1, but same size otherwise (curvature $\bar{x}$ = 3.0).

E2a4 (fig. 5t): Shelved variant (resembling type C2—but shelf is smaller and bead is shallower) made from upper wall opposite the aperture so that projecting shelf on the upper interior is included; callus absent. Same size as E2a1; curvature $\bar{x}$ = 3.0.

Source: Probably central California.

Temporal significance: Marker type for late Phase 2 of the Late period, persisting into the Historic period.

Great Basin occurrences: Not reported. The "E2?" bead from Ch16 (Pendleton, 1985: 239, 243, 250, fig. 78u) is a Middle period Scoop bead (C5).

E2b. DEEP LIPPED (fig. 5u, v)

Description: Beads made from higher on the shell and farther from the callus than type E2a, so no interior folding is present to modify the simple troughlike interior. Left edge (interior view) slightly thicker, with less callus preserved than type E2a. Deep trough and uniform cross section distinguish this bead from type E1b, while the greater depth of curvature separates it from type C3. Shelf edge often present in the interior, and suture line frequently appears at top of exterior (fig. 5v). Same variants (Lipless, Shelf Edge, and Shelved) occur as for type E2a.

Size: 8.0 × 6.0–12.0 × 10.0 ($\bar{x}$ = 10.0 × 8.0), but rare specimens made from imma-

ture shells can be smaller. Curvature 4.0–5.0; modal size increased through time. Perforation diameter 2.0–3.0 ($\bar{x}$ = 2.0).

Source: Both central and southern California.

Temporal significance: Marker type for Phase 2 of the Late period, persisting into the early Historic period.

Great Basin occurrences: Not reported.

E3. LARGE LIPPED

Description: Half-shell oval bead with central perforation. Modal size larger than type E2, though rare specimens made from immature shells are as small as 5.6 × 5.0 mm. Most common in the Historic period, but the type first appeared in central California in late Phase 2. Distinct subtypes in central California (E3a, b) and southern California (E3c).

E3a. FULL LARGE LIPPED (fig. 5w)

Description: Larger version of E2a, with marked basal folding on left side (interior view) and significant portion of callus on exterior. Top of bead often flared in scooplike shape. All edges ground. Always associated with E3b, so variants are classed with the latter subtype.

Size: 11.0 × 9.0–15.0 × 12.0 (mode = 13.0 × 11.0); curvature 4.0–6.0; perforation diameter 2.0–4.0 ($\bar{x}$ = 3.0). Smaller specimens made from immature shells can occur.

Source: Central California.

Temporal significance: Historic period marker type when modal bead size is 13.0 × 11.0 mm.

Great Basin occurrences: Not reported.

E3b. DEEP LARGE LIPPED (fig. 5x–aa).

Description: Larger version of E2b, made from higher on the shell and farther from the callus so no interior folding is present to modify the troughlike interior. Left edge (interior view) slightly thicker, with less callus preserved than type E3a. Shelf edge usually present on interior, suture line frequently appears at top of exterior. All edges ground. Same variants as type E2a: Lipless (fig. 5y), Shelf edge (fig. 5z), and Shelved (fig. 5aa).

Size: 11.0 × 9.0–17.0 × 13.0 (mode = 13.0 × 11.0); curvature 4.0–6.0; perforation diameter 2.0–4.0 ($\bar{x}$ = 3.0). Smaller specimens made from immature shells can occur.

Source: Central California.

Temporal significance: Historic period marker type when modal size is 13.0 × 11.0 mm.

Great Basin occurrences: Not reported.

E3c. ROUGH LARGE LIPPED (fig. 5bb)

Description: Large half-shell bead made from the noncallus wall, so most beads retain the shelf or shelf edge and lack any portion of the callus. Chipped edges become more frequent through time. The Normal bead (E3c1) is shelved, but a variant (E3c2; Amorphous) is a rectanguloid wall bead (King, 1972: 5, fig. a, middle; 1974: 79, fig. 2a, middle).

Size: E3c1: 13.0 × 11.0–18.0 × 14.0 ($\bar{x}$ = 15.0 × 12.0); perforation diameter 2.0. E3c2: 8.0 × 6.0–12.0 × 10.0 ($\bar{x}$ = 10.0 × 8.0); perforation diameter 2.0.

Source: Southern California.

Temporal significance: Historic period marker type E3c1 occurs between A.D. 1770 and 1816, while E3c2 appears around A.D. 1800 (King, 1973b: 11, fig. b; 1974: 90, fig. 5b).

Great Basin occurrences: Not reported.

CLASS F: SADDLE

Description: Oval to rectanguloid beads made from the shell wall.

F1. OVAL SADDLE (fig. 6a, b)

Description: Oval bead with large central perforation, usually drilled biconically. Width equal to, or greater than, length. Not "cut" diagonally, but with ground edges. Distinguished from F2 by a larger perforation, and the lack of diagonal "cutting," deep curvature, and chipped edges.

Size: 6.0 × 7.0–11.0 × 14.0 (mode = 8.0 × 9.0); curvature 1.4–2.0; perforation diameter 2.0–4.8 (mode = 2.6).

Source: Central California.

Temporal significance: Marker type for the Early/Middle period Transition phase in the Alameda, Napa, and Cosumnes districts of central California.

Great Basin occurrences: One bead from

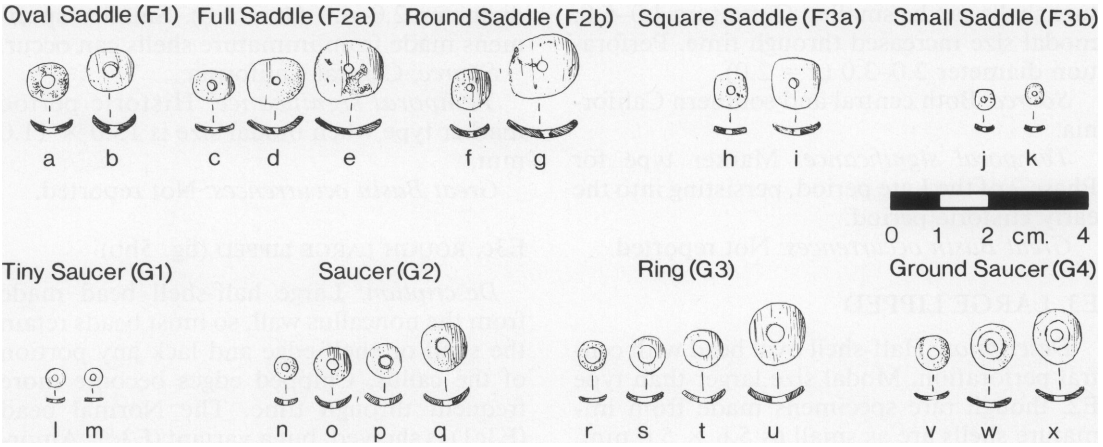

Fig. 6. *Olivella* shell beads, classes F and G.

a, b. F1, 1-54001 (CCo-283);
c. F2a, 1-11145b (CCo-295);
d. F2a. 1-25667a (Ala-309); e. F2a, 1-17218a (SMa-22);
f. F2b, 1-17220b (SMa-22); g. F2b, 1-17218b (SMa-22);
h, i. F3a, 1-11145c (CCo-295);
j. F3b1, 1-25659a (Ala-309);
k. F3b2, 1-25659b (Ala-309);
l, m. G1, L-15773e (Sac-107);
n. G2a, 1-8789 (Ala-309); o. G2a, 1-39912c (Sac-66);
p. G2b, 1-29829 (Col-2); q. G2b, L-15792 (Sac-107);
r, s. G3a, 1-39912a (Sac-66);
t. G3b, 1-39912b (Sac-66);
u. G3b, 1-67348 (Mrn-266);
v, w, x. G4, University of California, Berkeley, F.N.1a-c (A1a-413).

Iny-372. Table 7. As of 1986, an additional specimen from Ch16 should be added; it is not a type G3 Ring (Pendleton, 1985: 239, 243, 250, fig. 78v).

F2a. FULL SADDLE (fig. 6c–e)

Description: Elongate oval bead with small central perforation drilled conically from the interior, with exterior retouch. Bead width exceeds length. These short, wide beads have a deeply curved, uniform cross section, hence the name "saddle." Most beads were chipped from the shell wall parallel to the fasciole, resulting in a "diagonal cut," so that the top and bottom edges are not perpendicular to the vertical axis of the original shell. Edges more frequently chipped than ground. Distinguished from type F1 by smaller perforation, deeper curvature, diagonal cut, and chipped edges. Narrower and slightly deeper than type F2b, with higher frequency of chipped edges.

Size: 5.5 × 6.5–11.0 × 14.0 ($\bar{x}$ = 8.3 × 9.7; width/length index > 1.0); curvature 2.2–4.7 ($\bar{x}$ 3.3); perforation diameter 1.1–1.9 ($\bar{x}$ = 1.5).

Source: Central California, most common in the Cosumnes district.

Temporal significance: Middle period marker type. Grave lots with only F2 are diagnostic of the intermediate phase, but they persist through the late phase in association with the derivative type F3.

Great Basin occurrences: 12 beads from 4 sites. Table 6. 1986: add Ch16 (Pendleton, 1985, fig. 78k).

F2b. ROUND SADDLE (fig. 6f, g)

Description: Oval bead with small, central perforation drilled conically from the interior, with exterior retouch. Bead width is equal to or slightly more than its length. Most beads were "cut" diagonally from the shell wall,

producing a lopsided, roundish-oval bead with deep curvature. Edges more frequently ground than type F2a.

Size: 6.0 × 6.5–13.0 × 14.0 ($\bar{x}$ = 9.5 × 10.0; width/length index ≤ 1.1); curvature 2.4–4.7 ($\bar{x}$ = 3.0); perforation diameter 1.1–2.1 ($\bar{x}$ = 1.5); perforations 1.8–2.1, occur only on the largest beads.

Source: Central California, most common in the Alameda district.

Temporal significance: Middle period marker type. Grave lots with only F2 are diagnostic of the intermediate phase, but they persist through the late phase in association with the derivative type F3.

Great Basin occurrences: 2 beads from Ch15. Table 6.

F2c. RECTANGULOID SADDLE
(Sampson et al., 1985: fig. 16-7a–f)

Description: Rectanguloid bead with a small to medium central perforation drilled conically from the interior, with exterior retouch. Differs from other F2 types in having a definite rectanguloid rather than oval shape and not being cut on the diagonal. In addition, edges were ground and shelving was more frequent (5.6% retain a shelf edge; 5% retain a full shelf). The rounded corners distinguish F2c from M1d.

Size: 6.3 × 6.6–12.2 × 13.5 ($\bar{x}$ = 8.4 × 10.0); high width/length index: 1.01–1.44, mode 1.16; curvature 1.4–5.0 ($\bar{x}$ = 2.8); perforation diameter 1.2–2.4 ($\bar{x}$ and mode = 1.6).

Source: Shape and metrics suggest a different source than for types F2a or F2b, possibly in northern (or north-central?) California.

Temporal significance: Intermediate phase of the Middle period. One burial at Nightfire Island yielded 198 specimens, associated with 78 F2d. No other occurrences known at present.

Great Basin occurrences: Not reported.

F2d. ELLIPTICAL SADDLE
(Sampson et al., 1985: fig. 16-7g–k)

Description: Very short elongate oval with a small to medium central perforation drilled conically from the interior, with exterior retouch. Highest width/length index of all F2 Saddles. Although individual beads overlap with type F2a, the metrics provided by large numbers of beads in grave lots are quite different (see Sampson et al., 1985: 410). In addition, type F2d beads are not cut on the diagonal, edges are ground, the curvature is smaller, and the perforation size has a greater range than for F2a. Only 3 of 78 specimens retain a shelf edge; none have a full shelf.

Size: 4.8 × 7.1–8.5 × 11.2 ($\bar{x}$ = 7.0 × 9.4); extreme width/length index tightly clustered between 1.20 and 1.52, mode 1.34; curvature shallow, 1.5–3.4 ($\bar{x}$ = 2.4); perforation diameter 1.2–2.3 ($\bar{x}$ = 1.4; mode = 1.8).

Source: Shape and metrics suggest a different source than for types F2a or F2b, possibly in northern (or north-central?) California.

Temporal significance: Intermediate phase of the Middle period. One burial at Nightfire Island yielded 78 specimens, associated with 198 type F2c. No other occurrences known at present.

Great Basin occurrences: Not reported.

F3a. SQUARE SADDLE (fig. 6h, i)

Description: Squarish bead with small, central perforation drilled conically from the interior, with exterior retouch. Bead length is equal to, or slightly exceeds, width. Shallower than the ancestral type F2 Saddles, with a progressive decrease in curvature through time. These beads have rounded corners, in contrast to Class L and M Rectangular beads.

Size: 7.0 × 6.0–10.0 × 10.0 ($\bar{x}$ = 8.0 × 8.0); curvature 1.5–3.0 ($\bar{x}$ = 2.0); perforation diameter 0.8–1.7 ($\bar{x}$ = 1.5).

Source: Central California.

Temporal significance: Middle period marker type. First appears with type F2 in the late phase, occurs by itself in the terminal phase, and appears for the last time with type M1 in the Middle/Late period Transition. Ancestral to type M1 Rectangles.

Great Basin occurrences: 13 beads from at least 5 components. Table 6.

F3b. SMALL SADDLE (fig. 6j, k)

Description: Small version of the Square Saddle, less than 6.5 mm long. Distinguished as a type because it appears in different phases of the Middle period in different districts in Central California. The normal form (F3b1) is square to rectangular, but round to oval variants (F3b2) can occur in the same lots.

Round Small Saddle beads never occur by themselves, and were probably accidental productions; they lack the uniformly circular outline of type G1 Saucers.

Size: 4.0 × 3.0–6.5 × 5.0 ($\bar{x}$ = 5.0 × 5.0); perforation diameter 0.8–1.5 ($\bar{x}$ = 1.0).

Source: Central California.

Temporal significance: Middle period marker type. Most common in the late phase of the Middle period in the Cosumnes and Marin districts, and the terminal phase in the Alameda district. One Solano district occurrence is in the Middle/Late period Transition.

Great Basin occurrences: One bead from Las-1E. Table 6.

CLASS G: SAUCER

Description: Circular bead made from the wall of the main body whorl with a central perforation usually drilled conically from the interior with exterior retouch. Edges always ground. Distinguished from Class H Disks by greater curvature, larger perforation diameter and ground edges. The class is divided into types on the basis of bead diameter and perforation size; Saucers (G2) have small perforations, while Rings (G3) have large perforations. The Tiny Saucer (G1) is included here only because it is flat and circular; it can appear in any period and is not historically related to the Saucer and Ring types which are confined to the Middle period in central California. See Class J (Wall Disk) for Late period "Saucers."

G1. TINY SAUCER (fig. 6l, m)

Description: Very small circular bead, nearly flat in cross section, with carefully ground edges.

Size: Diameter 2.0–5.0 ($\bar{x}$ = 4.0); perforation diameter 0.8–2.0 (smaller beads $\bar{x}$ = 1; larger beads $\bar{x}$ = 2.0).

Source: Both central and southern California.

Temporal significance: None, can occur in any period.

Great Basin occurrences: 239 beads from 3 sites.

1. Late period (Phase 1): 8 beads from Wa385. Table 5.
2. Middle/Late Transition: 230 beads from Las-1D. Table 5.
3. Early period: 1 bead from Mammoth Creek Cave. Table 7.

G2. NORMAL SAUCER (fig. 6n–q)

Description: Circular, shallow bead with small conical or biconical central perforation made from the shell wall. All edges ground. Uniform diameter suggests that final shaping was done by rolling a string of beads.

Size: Diameter 5.0–10.0 ($\bar{x}$ = 7.0). Many lots are uniformly small or large, so, where pertinent, two size divisions have been made: G2a (Small Saucer) 5.0–7.0 diameter; G2b (Large Saucer) 7.1–10.0 diameter. Perforation diameter 1.4–2.7 ($\bar{x}$ = 2.0).

Source: Central and southern California.

Temporal significance: In central California, Saucers are a marker type for the Middle period, with an emphasis in the early phase (including the Early/Middle Transition). Small Saucers persist into the terminal phase. See King (1981: 360) for southern California where Saucers of variable size occur throughout the Middle period; measurements are needed. Only type G1 occurs in phases M5c and L1a; therefore the Late "Saucers" have been termed Disks (see classes H and J).

Great Basin occurrences: 18 beads from 5 sites. Table 6.

G3. RING (fig. 6r–u)

Description: Circular, shallow bead with large conical or biconical central perforation, made from the shell wall with all edges ground.

Size: Diameter 5.0–10.0 ($\bar{x}$ = 7.0). Some lots are uniformly small or large, so, where appropriate, two size divisions have been made: G3a (Small Ring) 5.0–7.0 diameter; G3b (Large Ring) 7.1–10.0 diameter. Perforation diameter 2.8–4.0 ($\bar{x}$ = 3.0).

Source: Central California, most common in the Marin district.

Temporal significance: Marker type for the early phase of the Middle period.

Great Basin occurrences: 9 beads from 3 sites. Table 6.

G4. GROUND SAUCER (fig. 6v–x)

Description: Circular, shallow bead with central perforation, made from the shell wall. The exterior surface around the perforation has been ground flat, probably to thin the bead for drilling. All edges ground.

Size: Diameter 4.5–9.0 ($\bar{x}$ = 6.0); perforation diameter 1.0–2.0 ($\bar{x}$ = 1.5).

Source: Southern California.

Temporal significance: Marker type for the early phase of the Middle period. According to King (1981: 208), small specimens are most common in phase M2a (300–200 B.C.), while large specimens continue through phase M2b (200 B.C.–A.D. 300).

Great Basin occurrences: 226 beads at 1 site, Ch18K. Table 6.

G5. OVAL SAUCER
(Jackson, 1978: fig. 9, no. 12 [219])

Description: Circular to slightly oval bead with variable curvature and finish. The small to large conical or biconical central perforation is often off-center. Made from the wall of the main body whorl, but 4.2 percent have a full shelf (Gifford, 1947, type X2b) and 6.3 percent have a shelf edge (Bickel, 1981: 77, "shelf scar"), so more of the shell is used than in types G2 and G3. Many beads are poorly finished, with unground edges, in contrast to types G2 and G3; Bickel did not attempt to separate breakage from erosion or unfinished beads; therefore frequencies are uncertain. A very high percentage (33% based on Bickel, 1981: 77–78, 90–91) is slightly wider than long, but these beads do not conform to the Saddle class (shapes are too variable, perforation diameters are too large, and shelving is too frequent). In 1975 the senior author termed the 158 (originally 215) beads from three grave lots from Ala-328 and the 9 (originally 11) beads from two grave lots from Ala-13 "poor saucers" (Bickel, 1981: 90), and these were published as "untypable circular *Olivella* beads" (Bickel, 1981: 77–78, 90–91). In 1978 the senior author assigned these odd saucers to a new type, designated as Oval Saucers, type C5 (Jackson, 1978: 4.38). Unfortunately, the metrics have never been completed. Bickel (1981: 77) reports 209 specimens from three graves at Ala-328; although she writes that she is describing 173 extant specimens from Burial W3 (originally 193), only 142 beads are actually described. Thus data are available for only 158 type C5 from Ala-328. While Bickel uses curvature as a significant attribute, no measurements are given; the possibility that deep curvature in Saucers reflects small shell size should be investigated. Available metrics and attributes support the separation of types G5 and G6 from types G2 and G3, but large grave lots (and better metrics) are needed (see type G6).

Size: 6.5 × 6.5–11.5 × 11.0, but 33 percent are slightly wider than long: 6.5 × 7.0–8.5 × 9.0; curvature (16% sample) 2.6–3.6, mode = 3.2, $\bar{x}$ = 3.0; perforation diameter 1.5–3.0 (a 16% sample provides a mode and $\bar{x}$ of 2.6).

Source: Southern San Francisco Bay. Confined to Ala-328, Ala-13, and Nap-261 (1 bead) at present. More related to type G6 of Monterey Bay than to types G2 or G3.

Temporal significance: Marker type for the Middle period. Possibly transitional between types G2/G3 (Saucers/Rings) and type F2b (Round Saddles) as noted by Bickel (1981: 78, 90), but better stratigraphic data are needed.

Great Basin occurrences: Not reported. Grave lots are usually needed to distinguish this type from types G2 and G6.

G6. IRREGULAR SAUCER
(Bennyhoff, 1986b: fig. 31n-ii)

Description: Shallow circular to oval centrally perforated beads which are frequently asymmetrical. First defined in 1986 based on a large grave lot at Mnt-229; previously lumped with type G2. Lack of standardization indicates that the edges of each bead were ground individually, although 14 percent have only roughly smoothed edges, providing a major contrast with the well-ground type G2. Full shelves are absent (in contrast to type G5), but 7 percent retain a shelf edge and 32 percent are thicker at the top of the bead (in contrast to the uniformity of type G2). The attributes of asymmetry, shelf edges, and wide size range indicate that the manufacturers may have been trying to get more beads from a single shell than was true of the manufacturers of type G2. The careless finish and fre-

quent off-center perforations also indicate less time expended on bead manufacture than was true of type G2.

The central perforation was drilled biconically, with the larger cone more frequently on the exterior surface than in type G2. Perforations are often off-center (13%); 3 of 3468 beads were definitely end-perforated (Bennyhoff, 1986b: fig. 31s, t) but such variants never occur by themselves in discrete grave lots. A distinctive feature on 2 percent of type G6 beads is the worn exterior cone forming a nondrilled oval depression above and below the central perforation on the outside only. It is not flat as in the face grinding of type G4, and it is more extensive than the normal string wear often found at the top of the perforation of many bead types. This wear-cone probably results from movement of the bead against a double binding in an overlapping applique arrangement (a few beads at Mnt-229 were stuck together in overlapping position, although more specimens were found in face-to-face strands). The perforation diameter is much more variable than in any other class G bead, ranging from 1.4 to 3.2 mm, though the average is 2.1 mm; only 1.4 percent (10 of 705 measured beads) range from 2.8 to 3.2 mm, and the variable shape of these beads excludes them from type G3.

Four shape variants can be distinguished, designated a–d. All of them occur together in the grave lot of Burial 5 at Mnt-229 (3271 type G6 beads), and no stratigraphic change in frequency of the four variants is apparent for 101 unassociated specimens in 160 cm of midden deposit. Three of the variants occur at four other Monterey Bay sites (see below; these were classified as type G2 by Dietz and Jackson, 1981, but poor finish and/or asymmetry support reclassification as type G6. The variability of these beads is evident in the illustrations, despite the lack of standard orientation). Mnt-101 also yielded 10 type G6 ("G2" in Dietz, 1985: 117). Full metrics for the four variants, tabulated by burial and midden, are given in Bennyhoff (1986b); only the average frequency at Mnt-229 is given below. A bimodal curve results when the bead length is plotted, separated at 6.9 mm, in contrast to the 7.0 mm usually used for types G2 and G3. These Small and Large variants have been designated G6-1 and G6-2, respectively, so frequencies can be compared to types G2 and G3. No temporal change by size is apparent.

G6a. SYMMETRICAL
(30.6%; Bennyhoff, 1986b: fig. 31n–t).

Length equals width (±0.2 mm). Difficult to distinguish from type G2, but poor finish and slight asymmetry are evident in any large sample. One G6a1 ("G2") was found at Mnt-112 (Dietz and Jackson, 1981: 325, fig. 5-71, no. 112-42), and one G6a2 ("G2") occurred at Mnt-101 (Dietz, 1985: pl. 8, top row no. 8).

G6b. ASYMMETRICAL
(23.1%; Bennyhoff, 1986b: fig. 31u-aa).

Round to oval bead with marked asymmetry indicative of individual finishing. Seven type G6b ("G2") specimens were found at four other Monterey Bay sites: Mnt-101 (two G6b1, one G6b2; Dietz, 1985: pl. 8, top row nos. 5 and 6, bottom row no. 8); Mnt-114 (G6b2, Dietz and Jackson, 1981: 370, fig. 5-94, no. 114-9); Mnt-115 (G6b2, ibid.: 398, fig. 5-110, no. 115-17); and Mnt-116 (G6b1, G6b2, ibid.: 464, fig. 5-151, nos. 116-27, 116-60, respectively).

G6c. OVAL
(29.3%; Bennyhoff, 1986b: fig. 31bb–ff).

Length exceeds width by at least 0.3 mm ($\bar{x} = 0.5$ mm) producing a symmetrical oval bead. It is distinctly smaller than the Split Oval (type C3). Five type G6c were found at Mnt-101 (two G6c1, three G6c2; Dietz, 1985, pl. 8, top row no. 7, bottom row no. 7, top row no. 2–4).

G6d. WIDE
(9.5%; Bennyhoff, 1986b: fig. 31gg–ii).

With growth lines vertical, the width exceeds the length by 0.3–1.4 mm ($\bar{x} = 0.5$ mm). Type G6d can be distinguished from type F2b by its larger perforation, lack of diagonal cut, and smaller size (including shallower curvature). The occurrence of this Saddle-like variant in three grave lots with other type G6 variants at Mnt-229 indicates that it is merely a carelessly made Saucer. The variant is scat-

tered throughout the midden between 0 and 160 cm depth like the other three variants (Bennyhoff, 1986b: table 49). Two G6d beads occurred at Mnt-101 (G6d1, G6d2; Dietz, 1985: pl. 8, bottom row no. 6, top row no. 1), while one G6d1 ("G2") was found at Mnt-115 (Dietz and Jackson, 1981: 398, no. 115-53).

Size: 4.8 × 4.9–9.9 × 10.2 ($\bar{x}$ = 7.2 × 7.0); curvature 1.2–3.2 ($\bar{x}$ = 1.9); perforation diameter 1.4–3.2 ($\bar{x}$ = 2.1). See Bennyhoff (1986b, table 52) for dimensions of each variant.

Source: Monterey Bay. At present Mnt-101 appears to be the most important manufacturing center, with 696 whole shells and 126 pieces of refuse (Dietz, 1985: 119–134); Middle period bead types predominate, including 10 type G6 (ibid.: 117, type "G2") but types of the Early and Late period were also found. Although Mnt-229 was not a manufacturing center, the differential occurrence of types G2 and G6 in grave lots and midden suggests that type G6 Irregular Saucers were manufactured at Monterey Bay as local substitutes for type G2 Normal Saucers common elsewhere in California during the Middle period.

Temporal significance: Marker type for the Middle period. The largest number of specimens (3355 beads) occurred with burials at Mnt-229 datable to the Early/Middle period Transition phase, but midden specimens spanned the Middle period (Bennyhoff, 1986b: table 57).

Great Basin occurrences: Not reported.

CLASS H: DISK

Description: Circular, shallow beads with very small central perforations, made from the shell wall. There is a progressive shift from ground edges to chipped edges, associated with an increase in size. A single tradition of the Historic period has been documented (King, 1973b: 11, fig. e, f; 1974: 90, fig. 5e, f; Gibson, 1976: 124–125). The central California distribution of the revised types is given in Bennyhoff (1982: 312–313). Metal needles were used for drilling the very small perforation. The following revised typology should replace Bennyhoff and Fredrickson (MS: 22), and the protohistoric dating suggested by Bennyhoff and Heizer (1958: 67).

H1a. GROUND DISK (fig. 7a, b)

Description: Small circular bead with all edges ground. Context and metrics allow separation from type G1.

Size: Diameter 4.0–7.0; perforation diameter 1.0.

Source: Southern California.

Temporal significance: Early Mission period, ca. A.D. 1770–1800.

Great Basin occurrences: 4 beads from 2 sites. Table 4.

H1b. SEMI-GROUND DISK (fig. 7c, d)

Description: Small circular bead with edges partially ground.

Size: Diameter 4.0–7.0; perforation diameter 1.0.

Source: Southern California missions. Beads and *Olivella* callus refuse indicate that some were manufactured at Mission Santa Cruz also.

Temporal significance: Late Mission period, ca. A.D. 1800–1816.

Great Basin occurrences: Not reported.

H2. ROUGH DISK (fig. 7e, f)

Description: Small, irregular disk with chipped edges.

Size: Diameter 5.0–7.0 ($\bar{x}$ = 6.0); perforation diameter 0.6–1.2 ($\bar{x}$ = 1.0).

Source: Southern California missions. Beads and *Olivella* callus refuse indicate that some were manufactured at Mission Santa Cruz also.

Temporal significance: Marker type for the terminal Mission period, ca. A.D. 1816–1834.

Great Basin occurrences: 3 beads from 3 sites. Table 4.

H3. CHIPPED DISK (fig. 7g–i)

Description: Large, irregular disk with chipped edges.

Size: Diameter 6.0–10.0 ($\bar{x}$ = 8.0); perforation diameter 0.6–1.2 ($\bar{x}$ = 1.0).

Source: Probably southern California.

Temporal significance: Marker type for the post-Mission period, ca. A.D. 1834 to at least 1900.

Great Basin occurrences: Not reported.

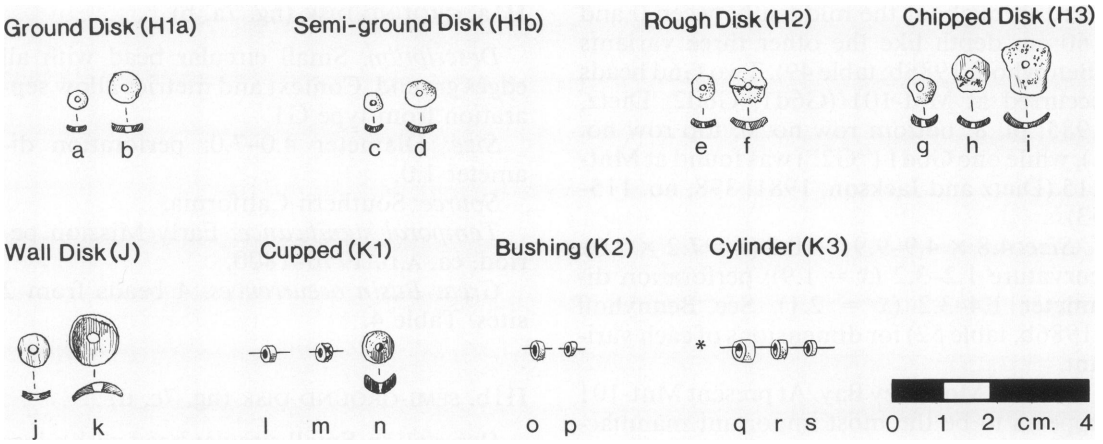

Fig. 7. *Olivella* shell beads, classes H, J, and K.

a, b. H1a, L-20080e1 (Sac-126);
c. d. H1b, L-20080e2 (Sac-126);
e, f. H2, B-45 (SJo-82); g, h, i. H3, 1-56212a (Sac-1);
j, k. J, 1-52379 (Ker-39); l. K1, 1-86234a1 (Sac-6);
m. K1i, 1-86234a2 (Sac-6); n. K1, L-17505 (Sac-21);
o, p. K2, 1-50531a (CCo-138);
q, r, s. K3, L-17816 (Sac-43).

Note: q–s drawn to three times actual size.

CLASS I: Not used.

CLASS J: WALL DISK (fig. 7j, k)

Description: Medium-size disk, round to oval in outline, with ground edges. Central perforation drilled conically or biconically. Rare specimens retain a shelf edge at the upper interior edge. This class is defined to include the late "saucers" reported from the San Joaquin Valley and southern California, but no adequate metric analysis has yet been completed. Typical specimens are illustrated by Wedel (1941: pl. 27c, d) from Ker-39 and Ker-60. Rare specimens from Fre-128 and Fre-129 (Olsen and Payen, 1968: 11, 43, 74, 76, 88, 89), Mer-3 (Pritchard, 1970: 24), and Mer-94 (Olsen and Payen, 1969: 7) have been termed "Type 3c saucers." San Joaquin Valley specimens have larger perforations than those found in southern California and are larger in diameter, but meaningful types based on these two measurements remain to be defined. Gibson (1975, 1976) has begun this task, noting a historic trend for increasing size and replacement by Class H Chipped Disks. However, his type 9 would be a mixture of type H1 and Class J as defined herein. Wall Disk beads may be confused with the Lipless variant of Class E as well as type G2; grave lots are needed for certain classification.

Size: San Joaquin Valley diameter 5.0–12.0 ($\bar{x} = 8.0$); perforation diameter 1.7–2.0, rarely 3.0 ($\bar{x} = 1.8$). Southern California diameter 5.0–6.0 ($\bar{x} = 5.5$); perforation diameter 1.0–1.5.

Source: San Joaquin Valley and southern California.

Temporal significance: Protohistoric marker type in the San Joaquin Valley (local manufacture). Probably begins in Phase 1 of the Late period in southern California (Gibson, 1975: 114, type 9) and continues until ca. A.D. 1816 (Gibson, 1976: 157).

Great Basin occurrences: By 1986 two specimens were found at Iny-1186.

CLASS K: CALLUS

Description: Small, thick, circular beads with central perforation drilled conically from the interior, with exterior retouch. Made from the upper callus, so beads are thicker than wall beads (Classes G, H, and J). When burned, Callus beads often split and resemble

Small Saucers. Beads of similar size nest evenly when strung in contrast to Lipped beads (Class E); the uniform cross section distinguishes Callus beads from Thin Lipped beads which feature an asymmetrical cross section. The spiral suture line, present in Spire beads (B5), is absent in Callus beads. Class K is ancestral to Class E Lipped beads. Cupped beads (K1) far outnumber Cylinder beads (K3), so the Bennyhoff and Fredrickson (MS: 23) designations have been revised.

K1. CUPPED (fig. 7l–n)

Description: Small, thick, circular beads with central perforations. Occasionally incised with cross hatching or, rarely, simple hatching (K1i).

Size: Diameter 3.0–7.0 ($\bar{x} = 5.0$); southern California specimens are frequently as small as 2.0 in diameter; thickness 2.0–3.0; perforation diameter $\bar{x} = 2.0$.

Source: Both central and southern California.

Temporal significance: In central California and south to San Luis Obispo, Cupped beads are markers for Phase 1 of the Late period, though they first appear in middle Phase 1 in central California. As the manufacture of Class M Thin Rectangles was abandoned in early Phase 2, Cupped beads (K1) were replaced by the derivative Lipped beads (E1). In the Santa Barbara Channel region, Cupped beads appear in early Phase 1 and continue through late Phase 2 (King, 1981: 360j). It is possible that all incised Cupped beads were made in southern California between late Phase 1 and the end of late Phase 2 (King, 1981: 360k, l).

Great Basin occurrences: 25 beads from 4 components. Table 5.

K2. BUSHING (fig. 7o, p)

Description: Small, thin, circular beads with central perforations. Often used as bushings in the large, conical perforations of tubular clam and magnesite beads, but also strung as beads.

Size: Diameter 3.0–4.0; thickness 1.0–2.0; perforation diameter 1.4–1.8.

Source: Central and southern California.

Temporal significance: In central California, this is a marker type for Phase 2 of the Late period.

Great Basin occurrences: One bead. Table 4.

K3. CYLINDER (fig. 7q–s)

Description: Small, thick, circular beads with a larger perforation than either K1 or K2, so that the wall of the bead is thinner. The perforation is nearly cylindrical rather than conical as in K1 and K2. Sides frequently incised with hatching or cross hatching (K3i).

Size: Diameter 2.0–3.0; thickness 1.0–3.0; cylindrical perforation diameter 1.0–2.0.

Source: Southern California.

Temporal significance: Marker type for Phase 2 of the Late period (King, 1981: 360m).

Great Basin occurrences: Not reported.

CLASS L: THICK RECTANGLE

Description: Rectangular to square beads with central perforation usually drilled conically from the interior, with exterior retouch. Distinguished from Class M by greater average thickness (1.5 mm), larger perforation diameter (typically 2.0 mm), more frequent shelving (10%), and more frequent grinding of the edges of the ventral face. Shelved specimens are most common in central California (11–37% at 4 Delta sites; 21% at Ala-307) and rare in southern California (0.6–2%). Large specimens (L1) are most typical of the Delta; they are absent at Ala-307 on San Francisco Bay and southern California sites. Occasional variation in placement of the perforation near the end or side has no temporal significance in Class L, nor does occasional interior pitting (misdrilling). The four shape variants of Bennyhoff and Fredrickson (MS: 24–25) have been reduced to two, and a new type L3 has been added.

L1. LARGE THICK RECTANGLE (fig. 8a–c)

Description: Rectangular to square bead, more than 10.1 mm long, with central perforation. Shelved (L1a) and nonshelved (L1b) variants usually occur in the same grave lot but, in contrast to type L2, the shelved vari-

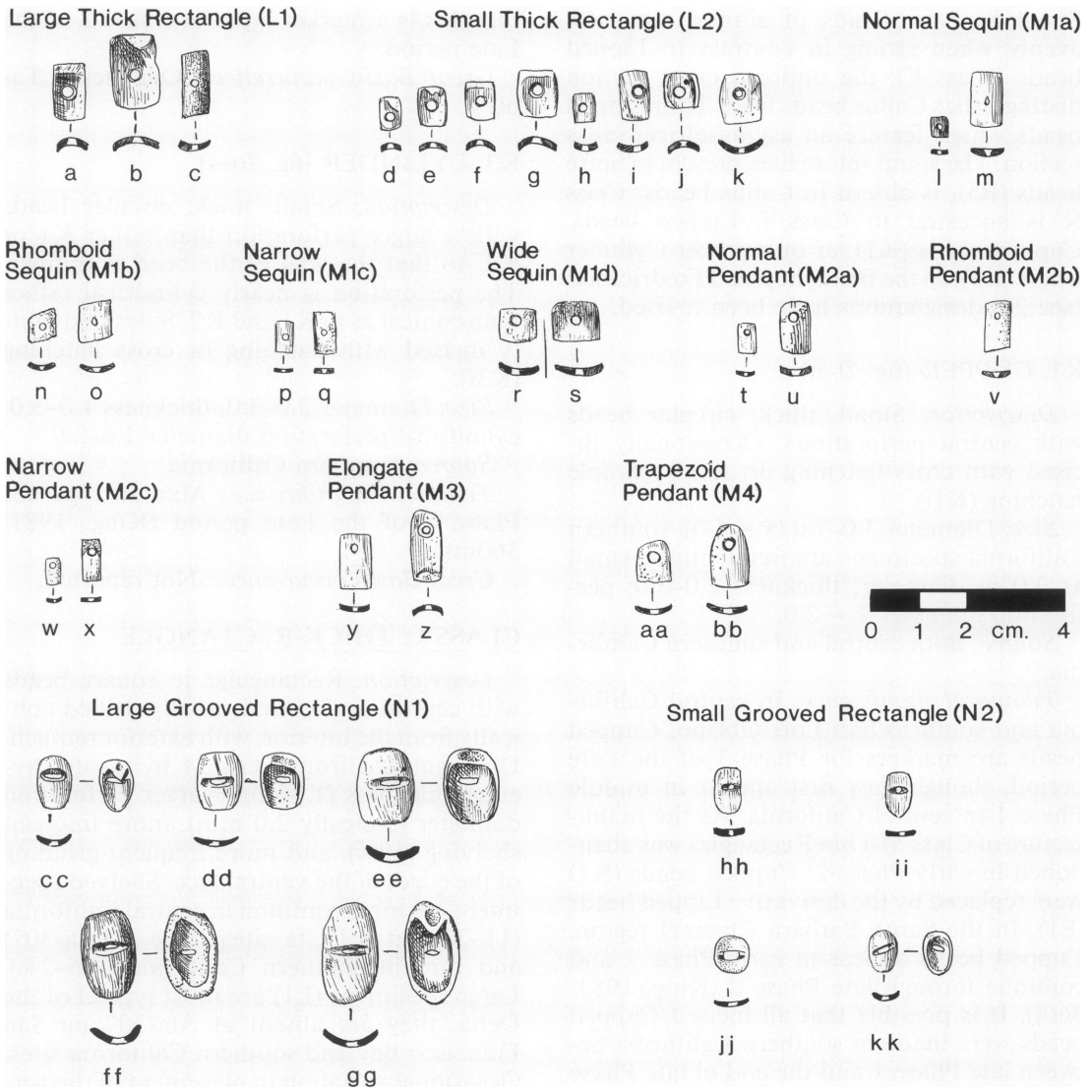

Fig. 8. *Olivella* shell beads, classes L, M, and N.

a. L1a, 1-49064a (SJo-68); b. L1a, 1-49064b (SJo-68);
c. L1b, 1-48860 (SJo-142);
d, e. L2a, 1-124008a (Ala-307);
f, g. L2a, 1-122917a (Ala-307);
h, i. L2b, 1-55058 (SJo-68);
j, k. L2b, 1-122917b (Ala-307);
l. M1a, 1-145895 (CCo-20);
m. M1a, 1-49570a (CCo-138);
n, o. M1b, 1-169183 (Mrn-39);
p, q. M1c, L-17502a (Sac-21);
r, s. M1d, 1-29137 (Ala-329);
t. M2a, 1-49570b (CCo-138); u. M2a, 1-82142 (Sac-6);
v. M2b, 1-82142 (Sac-6); w, x. M2c, L-17502b (Sac-21);
y, z. M3a, 1-133738a (Sac-168);
aa, bb. M4, 1-133738b (Sac-168);

ant outnumbers the plain variant. Shelving in L1a varies from a full projecting shelf to the shallow shelf edge; frequently only a projecting triangular remnant appears in the upper right corner of the bead (fig. 8b).

Size: Length 10.1–15.0 ($\bar{x}$ = 13.0); width 6.0–10.0 ($\bar{x}$ = 7.0); perforation diameter 1.8–3.0 ($\bar{x}$ = 2.0).

Source: Central California.

Temporal significance: Emphasis in the late phase of the Early period (Ragir, 1972, Phase 4; Phase D3 in fig. 10 herein) but first appeared in the middle phase of the Early period (Phase B2 in fig. 10 herein).

Great Basin occurrences: 2 L1a beads from 2 sites. Table 7.

L2. SMALL THICK RECTANGLE (fig. 8d–k)

Description: Rectangular to square bead, less than 10.1 mm long, with central perforation. Shelved (L2a) variants are less numerous than nonshelved variants (L2b) in the same grave lot, in contrast to type L1. Same shelving variation exists as described for type L1.

Size: Length 5.0–10.0 ($\bar{x}$ = 7.0); width 4.0–9.0 ($\bar{x}$ = 5.0); perforation diameter 1.5–2.5 ($\bar{x}$ = 2.0). Square beads (fig. 8g, j, k) were most common at Ala-307.

Source: Both central and southern California.

Temporal significance: In central California, type L2 occurs in all but the earliest phases of the Early period (phases A and B1 in fig. 10 herein). While emphasis on type L2 at Ala-307 occurred during the middle phase, the largest lots (100–500 beads) at SJo-68 appeared near the end of the occupation and emphasized L2b. In southern California, type L2b is also the latest form, last appearing in the transitional M1 phase (King, 1981: 360f). In contrast to central California, there is also an early emphasis on type L2b and this type probably preceded *Haliotis* Square beads, at least on Santa Rosa Island.

Great Basin occurrences: 30 beads from 3 sites; 28 from 3 burials. Table 7.

L3. OVOID THICK RECTANGLE (Bennyhoff, 1986b, fig. 1, ll–mm)

Description: Ovoid rectangular shape with parallel sides and rounded ends; occasionally one side is also slightly curved, suggesting a transition from an Early period Thick Rectangle (L2) to a Middle period Irregular Saucer (G6). The ground edges of the ventral face distinguish type L3 from any G6 variant, however. Overall size, width/length proportions, and perforation size distinguish L3 from type F3 Square Saddles. The central perforation is biconically drilled. (The L3 Square Thick Rectangle of Bennyhoff and Fredrickson, MS: 24, has been cancelled.)

Size: Length 6.1–7.7 ($\bar{x}$ = 6.9); width 5.6–6.9 ($\bar{x}$ = 6.2); minimum/maximum thickness 0.7–1.0/0.9–1.2 ($\bar{x}$ = 0.9/1.1); curvature 1.5–1.8 ($\bar{x}$ = 1.7); perforation diameter 1.6–1.9 ($\bar{x}$ = 1.7).

Source: Monterey Bay in central California.

Temporal significance: The nine known specimens occurred with Burial 1 at Mnt-229, along with three type L2b, 52 type G2, and 26 type G6; this mixture of Early and Middle period types in the same grave is diagnostic of the Early/Middle period Transition phase.

Great Basin occurrences: Not reported.

←

cc. N1, 20.4/1471 (Ch16); dd. N1, 20.3/9997 (Ch16);
ee. N1, 20.4/1680 (Ch16); ff. N1, 20.4/1514(Ch16);
gg. N1, 20.4/706 (Ch16);
hh, ii. N2, MAI-HF 13/4660 (Ch18);
jj. N2, Sonoma State University 80-9-81 (Ker-824);
kk. N2, 20.4/1686 (Ch16).

(All catalog numbers are those of the Robert H. Lowie Museum of Anthropology, University of California, Berkeley, except cc–gg and kk (American Museum of Natural History); hh, ii (Museum of the American Indian, Heye Foundation); and jj (Anthropological Studies Center, Sonoma State University).

CLASS M: THIN RECTANGLE

Description: Thin, rectangular, square, or trapezoidal wall beads with central or end perforation usually drilled conically from the interior, with exterior retouch. Class M beads are distinguished from Class L in that they are typically thinner (usually 1.0 mm), have smaller perforation diameters (usually 1.0 mm), are less frequently shelved (0.8%), and exhibit less-frequent grinding of the edges of the ventral face. Type M1 is distinguished from the ancestral type F3 by sharper corners and a progressive shift from a square to a rectangular shape. Analysis to date indicates that placement of the perforation (end vs. central) is the most important temporal marker for Class M. Shelving should be noted but appears to have no temporal significance—only 1 of 15,000 beads from 3 subphases at CCo-138 was shelved; while CCo-250, with 2.5 percent shelved beads marks early Phase 1, the 2.9 percent shelved beads at Sac-6 represents both middle and late Phase 1. Gifford (1947) distinguished 30 pitted beads (X3aII) and 30 double perforated beads (X3aIII); since these specimens occurred with normal beads and represent all subphases, they are considered misdrilled specimens in this typology. Square beads are more common in type M1 than M2 but always occur with rectangular forms so this variant has not been distinguished.

The vast majority of Thin Rectangles are Normal (variant a), but Rhomboids (variant b) and Narrows (variant c) are common in M1 and M2. While of minor temporal significance, they appear to reflect arrangements of beads in different patterns and therefore have been distinguished. To avoid such cumbersome designations as "Rhomboid, End Perforated, Thin Rectangle," centrally perforated rectangles (M1) will be termed Sequins, while end-perforated rectangles (M2) will be called Pendants.

M1a. NORMAL SEQUIN (fig. 8l, m)

Description: Rectangular to square bead with central perforation. Sewn side-by-side as sequins in head band and girdle arrangements, laminated ("shingled") in overlapping rows on cloaks and bags, and appliqued on ornaments, mortars, and pipes.

Size: 5.0 × 4.0–12.0 × 6.0 with modal size between 7.0 × 5.0 and 8.0 × 6.0. Perforation diameter normally 1.0.

Source: Central California.

Temporal significance: Marker type for Phase 1 of the Late period, though they first appeared with the ancestral Square Saddles (F3) in the Middle/Late period Transition. However, they are most characteristic of early Phase 1 and last appear in middle Phase 1 associated with Pendant Rectangles (M2).

Great Basin occurrences: 20 beads from 4 sites. Table 5.

M1b. RHOMBOID SEQUIN (fig. 8n, o)

Description: Centrally perforated rectangular bead with both ends ground diagonally. In grave lots, these beads usually appear as a sequin or in laminated arrangement.

Size: Same dimensions as type M1a.

Source: Central California.

Temporal significance: Marker type for early and middle Phase 1 of the Late period. Less common than type M2b.

Great Basin occurrences: Not reported.

M1c. NARROW SEQUIN (fig. 8p, q)

Description: Very narrow rectangular bead with central perforation. Used in patterned sequin arrangements with type M1a, and as applique decoration.

Size: Length 5.0–7.0 ($\bar{x}$ = 6.0); width 3.0; perforation diameter normally 1.0.

Source: Central California.

Temporal significance: Marker type for early and middle Phase 1 of the Late period.

Great Basin occurrences: Not reported.

M1d. WIDE SEQUIN (fig. 8r, s)

Description: Rectangular bead, wider than long when viewed in standard orientation (growth lines vertical). Sharp corners and lack of diagonal cut distinguish M1d from type F2a. Dimensions (especially perforation diameter) distinguish M1d from F2c. Central perforation drilled conically from the interior, with exterior retouch. Sewn side-by-side in sequin arrangement.

Size: Length 4.5–9.0 ($\bar{x}$ = 7.0); width 8.5–10.0 ($\bar{x}$ = 8.0); perforation diameter 0.8–1.5 ($\bar{x}$ = 1.0).

Source: Central California.

Temporal significance: Marker type for the Middle/Late period Transition phase at Ala-329, CCo-141, Fre-129, Mer-3, and Mrn-266.

Great Basin occurrences: Not reported.

M2a. NORMAL PENDANT (fig. 8t, u)

Description: Rectangular bead with end perforation. Usually shingled in overlapping rows on garments; varied pendant arrangements.

Size: 5.0 × 4.0–9.0 × 6.0 ($\bar{x}$ = 7.0 × 5.0); perforation diameter normally 1.0.

Source: Central California; local Great Basin manufacture documented at Ch39.

Temporal significance: The co-occurrence of M1 and M2 is diagnostic of middle Phase 1 of the Late period, while the appearance of M2 alone marks late Phase 1. Rare persistence into early Phase 2.

Great Basin occurrences: 148 beads at 3 sites. Table 5.

M2b. RHOMBOID PENDANT (fig. 8v)

Description: Rectangular end-perforated bead with both ends ground diagonally; occasionally only the lower end is oblique. Often appears in grave lots in shingled arrangement.

Size: Same dimensions as type M2a.

Source: Central California.

Temporal significance: Same time range as for type M2a, but most common in late Phase 1 of the Late period.

Great Basin occurrences: A few of the 130 type M2 beads from Ch39C were Rhomboids. Table 5.

M2c. NARROW PENDANT (fig. 8w, x)

Description: Very narrow rectangular bead with end perforation. Arrangements include sequins, shingling, and applique.

Size: 5.0 × 3.0–7.0 × 3.0 ($\bar{x}$ = 6.0 × 3.0); perforation diameter normally 1.0.

Source: Central California.

Temporal significance: Marker type for middle and late Phase 1 of the Late period.

Great Basin occurrences: Not reported.

M3. ELONGATE PENDANT (fig. 8y, z)

Description: Very long, narrow bead with end perforation. Often drilled at the aperture end so that shelving appears at the lower end (fig. 8z) rather than at the top as in M1 and M2. The appearance of the edge of the fasciole on the upper end (exterior view) also indicates this "reverse" drilling. Rarity of this variant suggests use as pendant decorations.

Size: 10.0 × 5.0–12.0 × 5.0 ($\bar{x}$ = 11.0 × 5.0); perforation diameter 1.0.

Source: Central California.

Temporal significance: Rare marker type for the early Protohistoric period at Sac-95 and Sac-168.

Great Basin occurrences: Not reported.

M4. TRAPEZOID PENDANT (fig. 8aa, bb)

Description: Trapezoidal bead drilled in the narrow upper end. Rarity indicates use as pendant decorations.

Size: Length 8.0–12.0 ($\bar{x}$ = 9.0); width 6.0–8.0 ($\bar{x}$ = 7.0).

Source: Central California.

Temporal significance: Rare Protohistoric period marker type (Sac-56 and Sac-95) with one Historic period occurrence (Sac-6, 2 beads).

Great Basin occurrences: Not reported.

CLASS N: GROOVED RECTANGLE

Description: Rectanguloid to oval bead with ground edges and an elongate perforation formed by a central groove transverse to the long axis of the shell. Large and small variants have been defined.

N1. LARGE GROOVED RECTANGLE (fig. 8cc–gg; Pendleton, 1985: fig. 78q–s)

Description: Large variant, usually more oval than rectanguloid. Six specimens recovered from Hidden Cave retain a partial, overhanging shelf (fig. 8cc, gg), nine retain only a shelf edge (fig. 8dd, ee), while one specimen has had the shelf edge ground flat (fig. 8ff). All specimens feature ventral face grinding. Six specimens retain the edge of the fasciole at the base.

Size: Hidden Cave specimens = 10.1 × 7.3–20.1 × 11.8 ($\bar{x}$ = 13.7 × 9.1). The narrow ovoid perforation varies from 0.8 × 2.1 to 1.7 × 4.5 ($\bar{x}$ = 1.3 × 3.4).

Source: Probably local Great Basin.

Temporal significance: At Hidden Cave (Ch16) this type occurred in Strata I to V,

with a concentration in Stratum IV. Radiocarbon dates for Strata III and IV cluster between 1800 and 1100 B.C. and would support Dating Scheme A2 (fig. 10). This type may date from the Early period, but a less disturbed context is needed for certain dating (see type N2).

Great Basin occurrences: 16 specimens from Hidden Cave (Ch16); not tabulated herein.

N2. SMALL GROOVED RECTANGLE (fig. 8hh–kk)

Description: Small rectanguloid bead with rounded corners and a transverse perforation formed by grooving. Shelving is absent.

Size: 5.5 × 5.3–9.7 × 7.5 ($\bar{x}$ = 6.6 × 5.6).

Source: Probably Southern California, although the largest number have been found in the Great Basin at Lovelock Cave (Ch18).

Temporal significance: This rare type has been found at four southern California sites (King, 1981), ranging from the late Early period (Ora-368), through the Early/Middle Transition (SBa-119), to the early phase of the Middle period (LAn-361, the Little Harbor site on Catalina Island). It is one of the few types more common on the mainland than on the Channel Islands, and the distinctive form of perforation suggests that the type may have originated as a replacement for Early period Thick Rectangles (Class L) as the latter dropped out of fashion on the Islands.

Great Basin occurrences: 17 specimens from two sites have been tabulated in table 6 as Early/Middle period Transition phase. An additional five specimens came to our attention too late to be included in this table—three from Kramer Cave (Hattori, 1982: 84), one from Shinners Site F (ibid.), and one from Hidden Cave (Ch16, Pendleton, 1985: 242–243). The Kramer Cave beads are radiocarbon dated between 1950 and 1670 B.C. (Hattori, 1982: 17) and support Dating Scheme A2 (fig. 10). The Shinners Site F bead dates between 1375 B.C. and A.D. 1370 (Hattori, 1982: 18). If the early dates are accepted, the 16 beads assigned to Ch18 K in table 6 should be shifted to component N or O in table 7. In contrast, Elston found six to eight type N2 beads with Protohistoric points at a Stillwater Marsh dune site (Pendleton, 1985: 243).

CLASS O: WHOLE SHELL

Description: These are whole shell beads with spires intact, which display a variety of drilled or punched perforations usually in the body whorl.

O1. DRILLED WHOLE SHELL (fig. 9a, b)

Description: Whole shell bead with perforation drilled conically in body whorl or, occasionally, in second whorl. While some perforations may have been drilled by marine molluscs, the occurrence of these intact-spire specimens in grave lots indicates that they were strung as pendants. There is no standardized placement of the perforation.

Size: Same three metric divisions as type A1. Perforation diameter 2.0–3.0.

Source: Most common in southern California, rare in central California.

Temporal significance: In southern California, most specimens represent Phase 1 of the Late period, with an emphasis on large beads (O1c). The two O1c beads from Mrn-266 are Historic.

Great Basin occurrences: Not reported.

O2. PUNCHED WHOLE SHELL (fig. 9c, d)

Description: Whole shell bead with a single punched perforation in body whorl. Difficult to distinguish from accidental breakage unless shell is well preserved. Some large specimens may be the initial stage in the manufacture of Split Punched (Class D) beads. Others, including all small specimens, were presumably strung as pendants. There is no standardized placement of the perforation.

Size: Same three metric divisions as type A1. Perforation diameter extremely variable.

Source: Noted only for southern California.

Temporal significance: Emphasis in Phase 1 of the Late period, but also occurs in the Early period.

Great Basin occurrences: Not reported.

O3. BUTTON WHOLE SHELL (fig. 9e)

Description: Whole shell bead with two punched perforations, one above the other, in the body whorl. Although unique, this

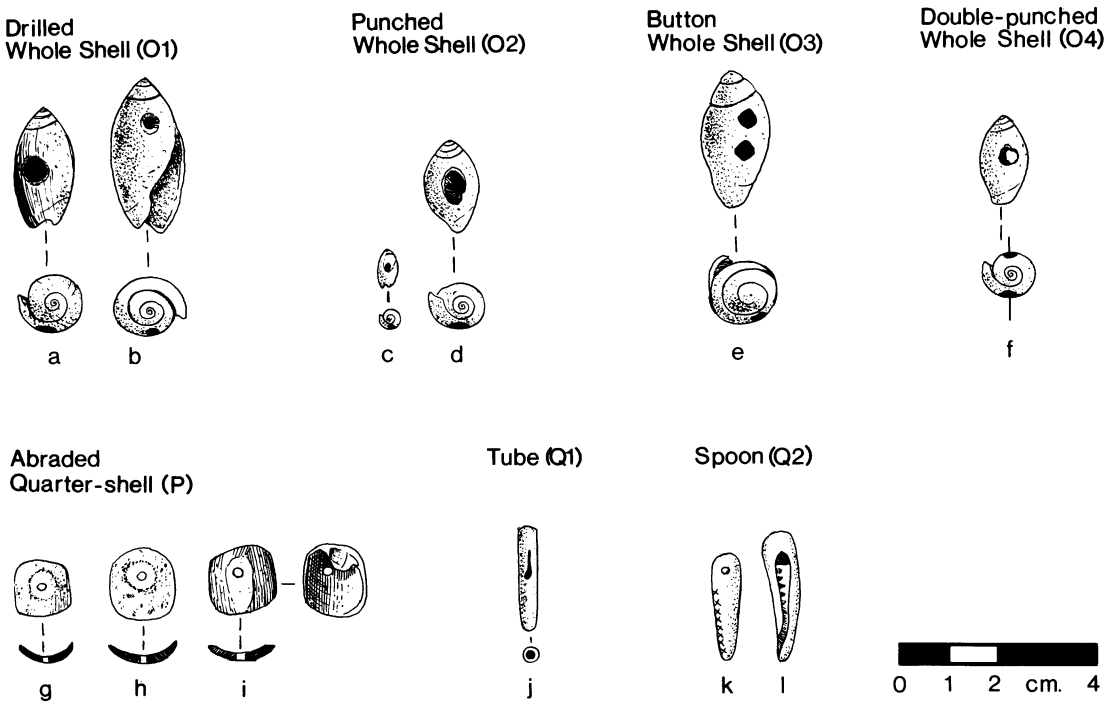

Fig. 9. Olivella shell beads, classes O, P, and Q.

a. O1c, 1-54567 (Mrn-266); b. O1c, 1-35029 (SCrI-100);
c. O2a, 1-35087 (SCrI-100);
d. O2c, 1-34670b (SCrI-100);
e. O3c, 1-31155 (SCrI-147); f. O4c, 1-30383 (SCrI-3);
g, h. P1a, 1-152042 (Teh-58);
i. P1b, 1-152013 (Teh-58);
j. Q1, k. Q2, 1. Q2 (after C. King, 1972: 86).

specimen (and type O4c) supports the purposeful manufacture of at least some type O2 and A4 beads for pendants.

Size: Same three metric divisions as type A1; the only known specimen is large (O3c).

Source: Southern California.

Temporal significance: Phase 1 of the Late period at SCrI-147.

Great Basin occurrences: Not reported.

O4. DOUBLE-PUNCHED WHOLE SHELL (fig. 9f)

Description: Whole shell bead with punched perforations on opposite sides of the body whorl. The perforations line up, indicating that this type was probably strung through these holes, as a pendant, rather than through the aperture and one hole as in type O2.

Size: Same three metric divisions as type A1; both known specimens are large (O4c).

Source: Southern California.

Temporal significance: Early period at SCrI-3.

Great Basin occurrences: Not reported.

CLASS P: ABRADED QUARTER-SHELL (fig. 9g–i)

Description: Large quarter-shell beads with perforation of variable size produced from facial abrasion, rather than drilling. All edges ground. Most specimens without shelf (P1a), but beads with shelving (P1b, fig. 9i) occur in the same grave lots.

Size: 10.0 × 9.0–14.5 × 12.7 ($\bar{x}$ = 12.3 × 11.4); curvature 2.3–3.9 ($\bar{x}$ = 3.2).

Source: Northern California.

TABLE 10
Shell Ornament Type Concordance

Ornament name	Bennyhoff herein, chap. 1	Lillard et al., 1939; Heizer, 1949	Gifford, 1947
Crescent, Plain	u AA3j	A1	AP2a II
Short Oblong, Incised	u BA3a	B1	S2b II
Short Oblong, Plain	c BA3j	B1	S2a I
Short Oblong, Plain	u BA3j	B1	S2a III
Short Oblong, Plain	u BA6j	B(1)1	S6a III
Short Oblong, Plain	c BA8j	B2	S7a III[a]
Short Oblong, Plain	u BA8j	B2	S7a II
Narrow Oblong, Plain	c BB3j	B1	S2a I
Narrow Oblong, Plain	r BB3j	B1	S2a II
Narrow Oblong, Plain	u BB3j	B1	S2a III
Narrow Oblong, Notched	BB6f (*Anodonta*)	B(1)b	S6a
Disk, Plain	u CA2j	C(1)	K1a IV
Disk, Nicked	u CA2n	C(1)a	K1b III
Disk, Incised	r CA3a	C1a	K2b II
Disk, Plain (Button)	c CA4j	C(2)	K3a I
Disk, Plain (Button)	u CA4j	C(2)	K3a IV
Disk, Nicked (Button)	u CA4n	C(2)a	K3b IV
Disk, Plain	u CA6j	C(1)1	K4a II
Disk, Nicked	u CA6n	C(1)1a	K4b II
Disk, Plain	u CA20j	C(2)1	—
Ring, Plain	c CC1j	C(1)	J2a I
Ring, Plain	u CC1j	C(1)	J2a IV
Doughnut, Plain	? CD1j	C(1)	J2a
Long Triangulate, Plain	u EB3j	E1	U2a III
Short Truncate, Plain	c FA3j	F1	Q1a I
Simple Claw, Plain	u JB3j	G	N6a I
Pentagonal, Plain	u NA3j	F1	O1a III
Short Triangular, Plain	r OA3j	E1	U4b
Teardrop, Plain	c OJ3j	E1	U4b
Short Trapezoid, Plain	u PA5j	—	Q6a III
Short Oval, Plain	u SA3j	C1	Z2a III
Short Oval, Plain	r SA6j	C(1)1	—
Narrow Oval, Plain	c SB3a	C1a	Z2b III[a]
Narrow Oval, Plain	r SB3j	C1	Z2a II
Half Ovate, Plain	u TA3j	MC1	AB1a II
Mutton Leg, Plain	—	—	AC5a
Side Scoop, Plain	—	—	AR1
Broad Truncate, Plain	—	—	Q11a II

[a] Species added.
Haliotis species: c = *cracherodii*; r = *rufescens*; u = unidentifiable (ground back); ? = unknown.

Temporal significance: Limited at present to occurrences at Teh-58 and Sha-266 where they are late Protohistoric period markers (cf. Treganza, 1954: 15, "*Olivella* half-shell"; Sundahl, 1982: 150, fig. 30d).

Great Basin occurrences: Not reported.

CLASS Q: COLUMELLA

(fig. 9j–l; specimens unavailable; illustrations after King, 1974: 86).

Description: Tubular and spoon-shaped beads made from the columella portion of the *Olivella* shell.

Q1. TUBE (fig. 9j)

Description: Cylindrical bead with central perforation (King, 1973a: 9, no. 8).

Size: Length 15.0; diameter 3.0; perforation diameter 1.0.

Source: Southern California.

Temporal significance: Occurs during late Phase 2 of the Late period.

Great Basin occurrences: Not reported.

Q2. SPOON (fig. 9k–l)

Description: Spoon-shaped bead with end perforation. Made from the inner lip of the aperture, retains the callus and basal folds (King, 1973a: 9, no. 7). One edge may be incised with "x" incision (Q2i).

Size: Length 11.0–13.0; maximum width 4.0–5.0; perforation diameter 1.0.

Source: Southern California.

Temporal significance: Occurs during Late period. Plain specimens are known from late Phase 1 and late Phase 2; incised specimens are confined to late Phase 2.

Great Basin occurrences: Not reported.

A TYPOLOGY FOR SHELL ORNAMENTS IN CENTRAL CALIFORNIA

The shell ornament typology used in table 8 is derived from Bennyhoff (MS a). The form and incising categories represent an expansion of those proposed by Lillard et al. (1939) while the perforation placement is denoted by a new system. The typology was developed specifically for central California; distinctive southern California forms are classified according to Gifford (1947), distinguished by the //prefix. A concordance is provided in table 10.

In the Bennyhoff typology the first capital letter denotes a basic class (circular, triangular, pentagonal, etc.), the second capital letter denotes a form variant, the number refers to the hole placements, and the terminal lower case letter refers to decoration. The genus or species is indicated by a lower case prefix:

a = *Anodonta* (fresh water)
c = *Haliotis cracherodii* (most emphasized during the early and intermediate phases of the Middle period)
f = *Haliotis fulgens* (most common south of Monterey Bay)
m = *Margaritifera* (fresh water)
r = *Haliotis rufescens*
u = Unidentifiable *Haliotis*

Thus type rCA3a would be a *Haliotis rufescens* (r) Simple Disk ornament (CA) with one peripheral perforation (3) and with short incised lines around the periphery (a). Parentheses denote reconstructed fragments: (E)B was probably a Long Triangulate ornament but might have been Oblong BB. CA(4) indicates half a Disk with one off-center perforation remaining; the complete ornament probably had two central perforations.

The form classes and variants found in the Great Basin are as follows (ornaments are always oriented with the primary perforation at the top):

A. Rim.

AA. Crescent. Elongate pointed ornament cut from the overlapping rim.

B. Oblong. Parallel-sided rectanguloid form with length > width.

BA. Short Oblong. Length < 55; width > one-half the length.

BB. Narrow Oblong. Length < 65; width ≤ one-half the length.

C. Circular.

CA. Simple Disk. Solid circular form.

CC. Simple Ring. Circular form with large opening cut in center.

CD. Doughnut. Circular form with large off-center hole.

E. Triangulate. Three-sided ornament with pointed tip opposite perforation (cf. Class O).

EA. Short Triangulate. Length < 35; width > one-half the length.

EB. Long Triangulate. Length > 35; width ≤ one-half the length.

F. Truncate. Tapering four-sided ornament with top narrower than base (cf. Class P).

FA. Short Truncate. Length < 55; width > one-half the length.

J. Claw.

JB. Tapering oval ornament with single clawlike base.

N. Pentagonal.

NA. Simple Pentagonal. Five-sided ornament with pointed base and no appendages.

O. Triangular. Three-sided ornament with pointed end at top (cf. Class E).

OA. Short Triangular. Length < 55; width > one-half the length.

OK. Large Teardrop. Base curved rather than angular. Length > 55.

P. Trapezoid. Four-sided ornament with tapered base (cf. Class F).

PA. Short Trapezoid. Length < 60; width > one-half the length.

S. Oval.

SA. Short Oval. Length < 55; width > one-half the length.

SB. Narrow Oval. Length > 65; width ≤ one-half the length.

T. Half-ovate.

TA. Long Half-ovate. Split disk with perforation in end.

Perforation placement is designated by Arabic numerals as follows:

1. No perforation (the large holes in CC and CD are not considered perforations so Simple Ring ornaments are designated as CC1j).

2. Single central perforation (size smaller than the holes of CC and CD).

3. Single edge perforation.

4. Double central perforation.

5. Double edge perforation.

6. One central perforation and one edge perforation.

8. Single edge perforations at opposite ends, one above the other.

20. Two central perforations and one edge perforation.

Decoration is indicated by terminal lower case letters as follows:

a. Peripheral linear incision on face of ornament (see n).

c. Punctate.

f. Notched edges.

j. Plain (undecorated).

n. Nicked (peripheral linear incision extends across edge of ornament as well as the facial periphery as in type a).

CHAPTER 2. FLUCTUATIONS IN PREHISTORIC MARINE SHELL EXCHANGE

We argue in this chapter that western Great Basin aboriginal populations participated in four major exchange networks to secure a supply of Pacific shell beads and ornaments, involving centers in northern California, southern California, central California, and the Gulf of California. The trade items were often reworked in the Great Basin and were sometimes used in conjunction with local freshwater shells. Although the data remain far from complete, the archaeological record of the Great Basin suggests a significant decline in trade between California and the western Great Basin after about 2200 years ago, a trend at variance with data from within California.

In order to evaluate the relevant evidence, it has been necessary to reexamine a massive corpus of shell beads and ornaments recovered from western Great Basin sites. Because we think it imperative that other investigators be able to evaluate our site-by-site decisions, we have prepared the Appendix which provides additional details and backup data.

THE DATING PROBLEM

Available radiocarbon dates from California suggest two quite different dating schemes for the central California cultural sequence, which we term Dating Schemes A and B (see fig. 10). Evaluation of the many factors involved, including mixed samples, poor context, reruns, and errors, must be dealt with elsewhere; we will only outline the problem here. On the basis of the first 14 radiocarbon dates (4 of which were totally unacceptable), Heizer (1958: 6–7) suggested that the Middle Horizon[1] be dated between 2000 B.C. and A.D. 300, with 400-year spans assigned to the three divisions of Phase 1 of the Late Horizon. This chronology, with the Early Horizon beginning at 4000 B.C., we designate Dating Scheme A1. Further analysis of SJo-68 (Ragir, 1972), more dates, and the addition of transitional phases between the three horizons made it appear that the Middle Horizon should be modified to 1300 B.C.–A.D 1000 (Dating Scheme A2, shown also in tables 4–7). A recent review by the senior author of some 180 uncorrected central California radiocarbon dates suggests that the Early Horizon lasted until around 500 B.C. and that the Late Horizon did not begin until A.D. 900 (Dating Scheme B1).

For late and terminal phases of the Early Horizon, 8 of 12 dates fall between 1000 and 500 B.C. (including the four latest collagen dates rejected by Ragir, 1972: 267); only 2 of the 12 dates support Scheme A2, while two other dates are impossibly late. Of 16 dates available for the Early Horizon/Middle Horizon Transition phase, 10 fall between 500 and 200 B.C. (Scheme B1); none supports Scheme A2. Of nine dates applicable to the early phase of the Middle Horizon, seven fall between 200 B.C. and A.D. 100 (Scheme B1). A similar preponderance of Late Horizon dates suggested that the three divisions of Phase 1 of the Late Horizon should be shortened to spans of 200-year duration. (Contradictory dates support Scheme B2, in which the Late Horizon begins around A.D. 1000.)

Loosely pertinent radiocarbon dates from the Great Basin have been entered in tables 4–7. While four Gatecliff Shelter dates (as well as WP107) support Scheme A2, nine other dates from four sites support Scheme B1. Clearly the question remains open, and more dates with firmly established contexts are sorely needed to resolve the discrepancies. It should be noted that a compromise (termed Scheme C herein; see Elsasser, 1978) places the Middle Horizon between 1000 B.C. and A.D. 500.

COMPARATIVE ANALYSIS

Bennyhoff and Heizer (1958) reported on 3982 Pacific Coast shell beads and 18 selected abalone ornaments found at 27 Great Basin

[1] We have already stated our objection to continued use of the Early, Middle, and Late Horizon dating scheme in central California (see pp. 99 above). It is employed in this section only in the interests of historical continuity and to facilitate comparison with earlier work.

sites.[2] Although 11 species were represented, 95 percent of the beads were made of *Haliotis* (49%) or *Olivella biplicata* (46%). Only five sites (19%) had more than 25 specimens, while 13 sites (48%) yielded only one (8 sites) or two (5 sites) beads.

In the intervening 24 years, data on 315 specimens from 54 new sites have come to our attention.[3] Of the 23 excavated sites, 166 specimens were found with seven burials ($\bar{x}$ = 24 per burial) while 78 specimens came from the middens of 17 sites ($\bar{x}$ = 5 per site). Surface collections from 30 sites yielded 44 specimens ($\bar{x}$ = 2 per site), while 28 beads were found in uncontrolled excavation at Wa197. However, no exhaustive search of the many post-1957 site reports and surveys in the Great Basin has been made.[4]

The present discussion deals with 5420 specimens from 81 archaeological sites located in the western Great Basin (table 2; figs. 11–13). In addition to 5167 Pacific Coast shell specimens, this total includes 195 pine nut beads obtained in trade from groups in northern California, and 33 glass beads of the Historic period. By way of contrast, we have also included 25 specimens of presumed local manufacture (22 fresh water shell specimens, two *Prunus* beads, and one bone rectangular bead). This discussion will not attempt to deal with the abundant bone artifacts (Jernigan, 1978: fig. 1), though Gatecliff Shelter specimens are considered by Thomas (1983b: 301–303d). These 5420 specimens are reported in tables 4–9, while bibliographic sources and our definition of components and "occurrences" are provided in the Appendix.

While the 54 new sites have expanded the spatial coverage, the distribution of shell artifacts still remains grossly uneven: 26 (32%) of the 81 sites and 2131 (41%) of the 5189 shell specimens (91% of the 195 pine nut beads) represent adjacent portions of Churchill and Pershing counties, Nevada. If the figures used here are reasonably accurate (see Appendix), Death Valley, with 29 sites (36%), yielded only 97 specimens (less than 2% of all shell artifacts). However, when the 1000 beads found with an Iny-372 burial are included, Inyo County, with 32 sites (40%), yielded 1183 shell specimens (23% of total shell). As discussed in detail below, this scat-

[2] The total number of shell specimens from these 27 sites has been dramatically altered due to new collections, incomplete data, reclassification, and errors (see Appendix). Major changes affect Ch18, Ch56, and Pe27. Final reports have since appeared on several of these sites, with a distressing number of errors or omissions (e.g., Riddell, 1960: 8–9; Tuohy, 1970: 4; Lanning, 1963: 260–261; Grosscup, 1960: 36); the specifics of these errors are considered in the Appendix.

[3] The 23 excavated sites (with burial associations underlined) are: Ch36 (N = 1), El25 (N = 1), Pe67 (N = 7), Ny301 (N = 21), Ny754 (N = 2), Wa1016 (N = 28), Wa1502 (N = 14), Massacre Lake Cave (N = 3), WP107 (N = 1), Iny-182 (N = 2 plus 6?), Hole-in-the-Rock Shelter (N = 5), Ubehebe Shelter (N = 3), Death Valley (DV) 43-56 (N = 1), DV-46A-56 (N = 56), Las-194 (N = 6), Mod-204 (N = 3), Mno-384 (N = 71), Mno-455 (N = 2), Mammoth Creek Cave (N = 2), Sie-20 (N = 1), and, in Oregon, Cougar Mountain Cave (N = 2), Catlow Valley Cave No. 1, (N = 2), and Roaring Springs Cave (N = 4). New surface collections include: Ch40 (N = 1), Hu16 (N = 1), Hu17 (N = 1), Pe66 (N = 4), Las-45 (N = 5?), and about 25 Death Valley sites which yielded at least 32 specimens. The 28 beads from Wa197 represent uncontrolled excavations.

[4] The following references to unclassified shell beads lack quantification and have not been included herein: Orr (1972: 125) mentioned a mummy with a string of *Olivella* beads (Spire-lopped?) dated to 4020 B.C. from Cowbone Cave (Pe60). Hester (1973: 53) noted that a date of 2520 B.C. from Wa525 "is applicable to several bead types." Sites in Utah (Jennings, 1957: 203; Aikens, 1970: 91–92), and Idaho (Gruhn, 1961; Rice, 1972) have yielded rare shell beads and ornaments, but since no search of the pertinent literature on these eastern regions has been made, these distant sites have not been tabulated herein. A general summary of Basin-wide occurrences appears in Hughes and and Bennyhoff (1986).

Since no site provenience is available, the 70 (?) shell beads and ornaments in the Lair collection in Reno (Strong, 1969: 154–157, fig. 93) have not been tabulated, although most of the specimens may have come from Ch15. Of particular interest are the six incised beads (probably 3 A1ci, 2 C6i, and 1 C5i) as well as the *Dentalium* and *Glycymeris* and the nonillustrated *Tivela, Saxidomus,* and pine nut beads. The tubular pipe with abalone inlay (Strong 1969: fig. 101, no. 1) from the Munk collection, Lovelock, may be compared with the Ch18 pipe with *Olivella* inlay (see Appendix). It should also be noted that Strong appears to have made Chart 3 on Cougar Mountain Cave himself, using a Lair incised *Olivella* C6 specimen in place of an A1c bead actually found by Cowles (1960: 28).

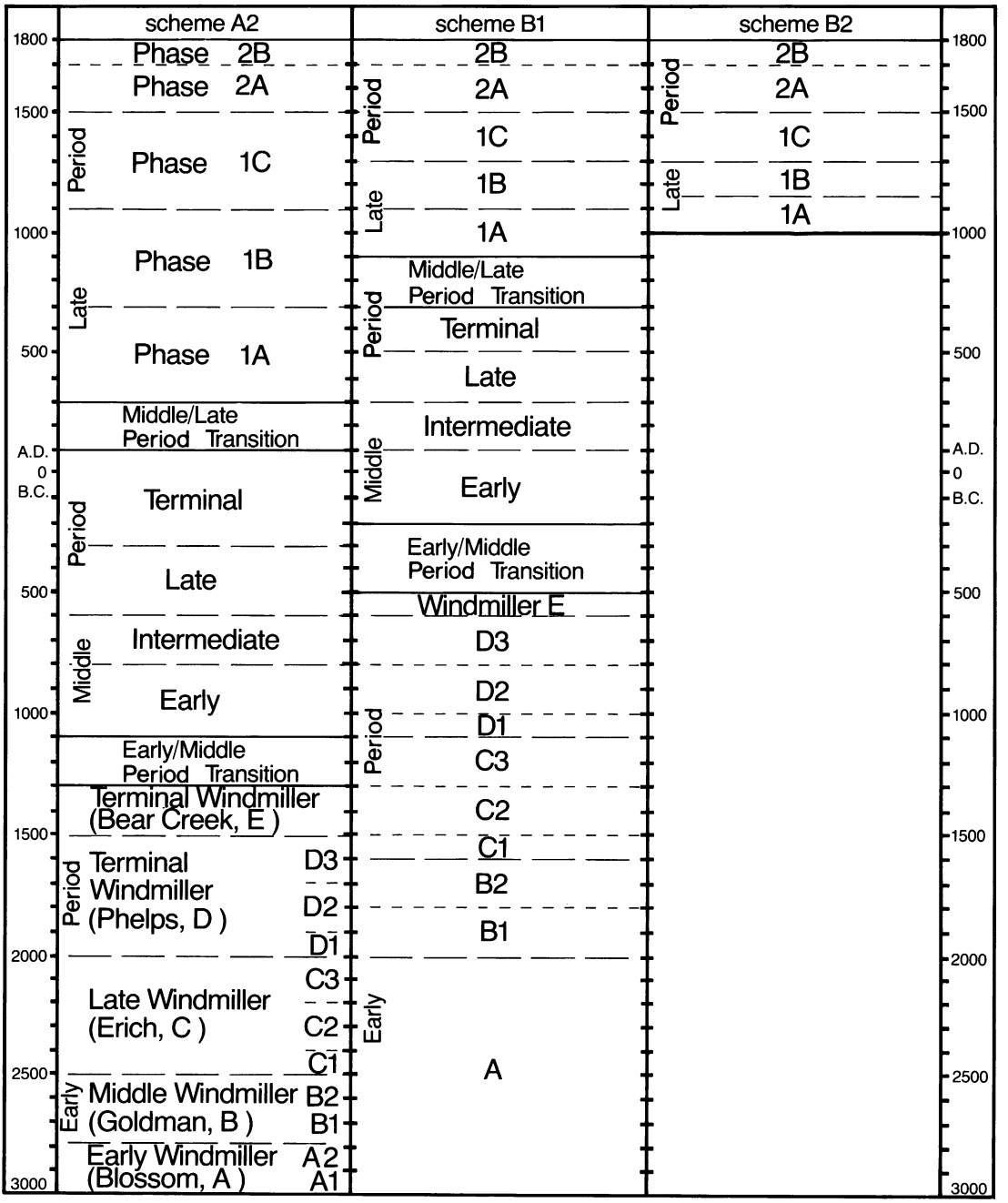

Fig. 10. Alternative dating schemes for the central California archaeological sequence.

tered occurrence of a few wealthy burials obviously distorts the significance of average frequencies. Three burial sites (Las-7, Iny-372, and Ch18) yielded 73 percent of the total shell beads, while 64 sites (79%) each yielded less than 10 beads, for a total of 125 specimens (2.4% of all shell beads); of the latter, 39 sites (49%) yielded only single beads, while four sites yielded only single ornaments.

The 22 caves and rockshelters (27% of 81

sites) yielded 1920 shell specimens (37% of total shell), while 59 open sites (73% of total sites) yielded 3268 shell specimens (63% of total shell). If three special sites (Ch15, Ch39, and Pe27) are excluded, the 45 surface sites yielded only 94 specimens, for an average of two specimens per site (range = 1–21).

Analysis of the significance of these shell bead and ornament occurrences should be assessed within the context of five general problems:

1. The Erratic Frequency of Burial/Feature Associations

It is quite surprising that, to date, the highest frequency of single lots of some California bead types has been found in the Great Basin rather than in California. For example, the largest number of *Haliotis cracherodii* Thick Ring beads (type H9, Gifford's J2aI) yet found with a single grave occurred at Iny-372 (Lanning, 1963: 261, Burial 4; see Appendix), where a single garment was represented. The only other major published occurrence of this type was at SRI-6 (Jones Camp 30) where 219 specimens were found, mostly with Burial 11 (Jones, 1956: pl. 114d).

The largest number of *Mytilus* Square beads (type M1a, Gifford's T1c) occurred with a single burial at Las-7 (113 beads with Cremation 5). Even if all three individuals in this cremation once had an equal number of *Mytilus* beads, the resultant average of 38 beads per individual would still be the largest grave lot frequency so far recorded for this type. The total of 142 *Mytilus* beads from this site is the largest site frequency yet published (11% of the 1313 beads from Las-7, 12% of the 1175 beads with Las-7 burials, 4.8% of the 2957 Early period beads). In contrast, the highest frequency of this Early period marker type previously recorded from a California site is 83 specimens from Sac-107.

Two hundred thirty *Olivella* Tiny Saucer beads (type G1/3d) were found on a single string at Las-1 (Fenenga and Riddell, 1949: fig. 58t). The largest grave lot of this type noted for central California was 154 beads with a Historic burial at Sac-56.

Similarly, the Early Lovelock child in Lot 26 at Ch18 was accompanied by a necklace of 287 *Olivella* Spire-lopped beads (Class A, B) exceeding the 245 specimens found with a Late period burial at CCo-250.

2. Lack of Meaningful Context

Some 1173 shell beads and ornaments (23% of the shell total) represent surface specimens (N = 714) or specimens without provenience within the site (N = 459). This includes 53 sites (65%) with 714 shell specimens collected from the surface as well as 459 specimens from 8 of the 33 excavated sites (10% of the 4503 "excavated" shell sample). As a consequence, many types must be phased by cross dating from California occurrences, without stratigraphic support from the Great Basin. This problem is particularly vexing for types restricted at present to the Great Basin (*Olivella* types C2i, C4, C6, *Glycymeris* Rectangle) or rare in California (*Olivella* types Alci, G4, N).

3. Midden Disturbance

The 33 excavated sites (41% of the 81 sites) yielded 4503 specimens (87% of the shell total). A great majority of these sites (25 sites with 227 specimens) yielded less than 30 shell artifacts, for an average of nine specimens per site. While bead distributions at several of these sites (notably Ny301, Wal502, Las-194, and Mod-204) helped clarify temporal

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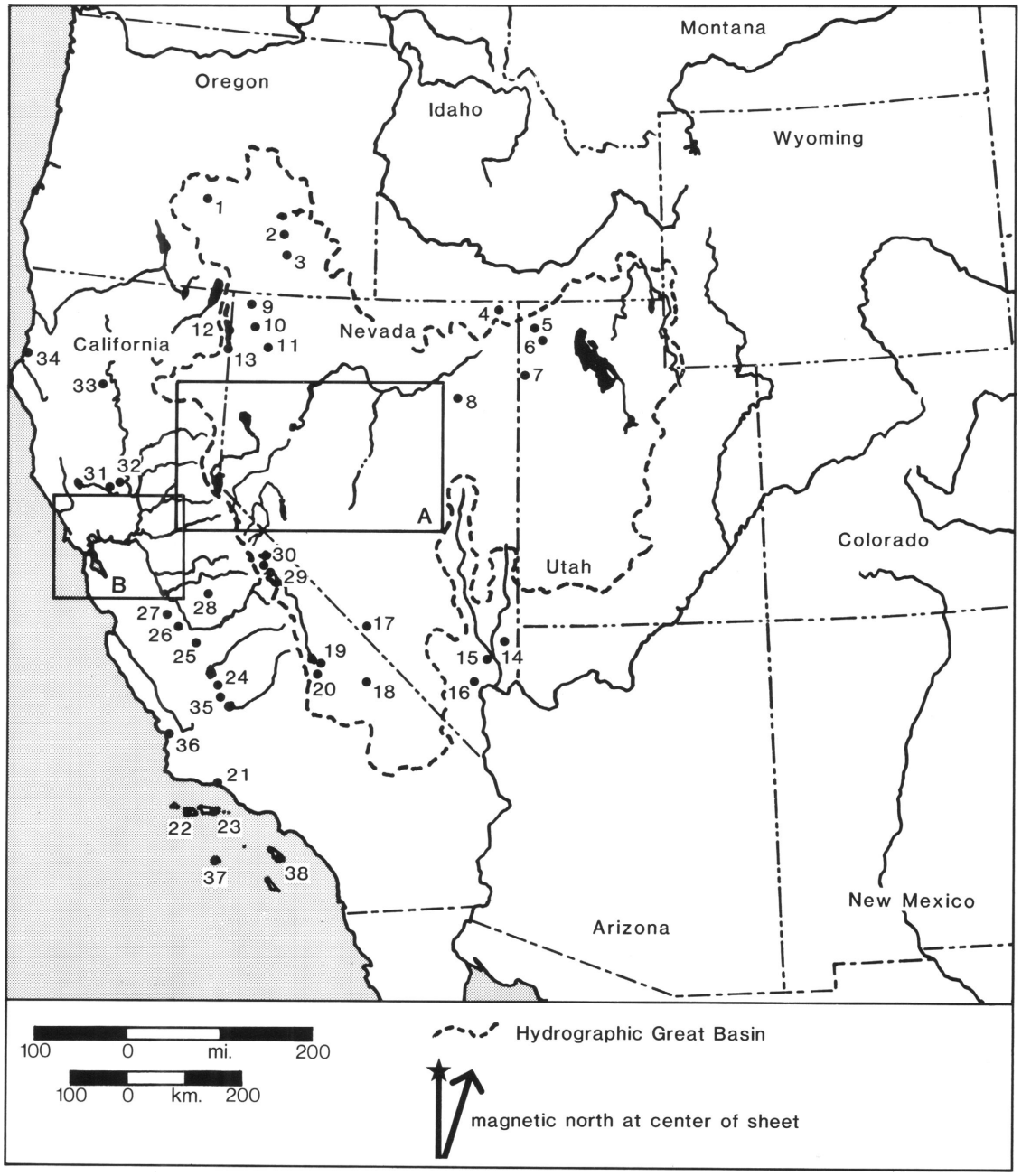
Fig. 11. Location of selected Great Basin and California sites with Californian shell beads and ornaments. Details of site locations in the western Great Basin and central California appear on maps A (fig. 12) and B (fig. 13). Broken line indicates approximate limits of the Great Basin.

1. Cougar Mountain Cave
2. Roaring Springs Cave
3. Catlow Cave
4. Deer Creek Cave
5. Swallow Shelter
6. Hogup Cave
7. Danger Cave
8. Newark Cave
9. Massacre Lake Cave
10. Wa1502
11. Hu16, Hu17
12. Mod-204
13. Las-194
14. Lost City
15. Overton



16. Gypsum Cave
17. Ny754
18. Death Valley
19. Iny-2
20. Iny-182, Iny-372
21. SBa-7
22. SRI-6, SRI-40, SRI-147
23. SCrI-3, SCrI-100
24. Ker-74
25. Fre-48
26. Mer-3
27. Mer-94
28. Mad-106
29. Mammoth Creek Cave
30. Mno-384, Mno-455
31. Yol-110
32. Col-2
33. Teh-58
34. Hum-67
35. Ker-824
36. SLO-157
37. SNI-40
38. Little Harbor

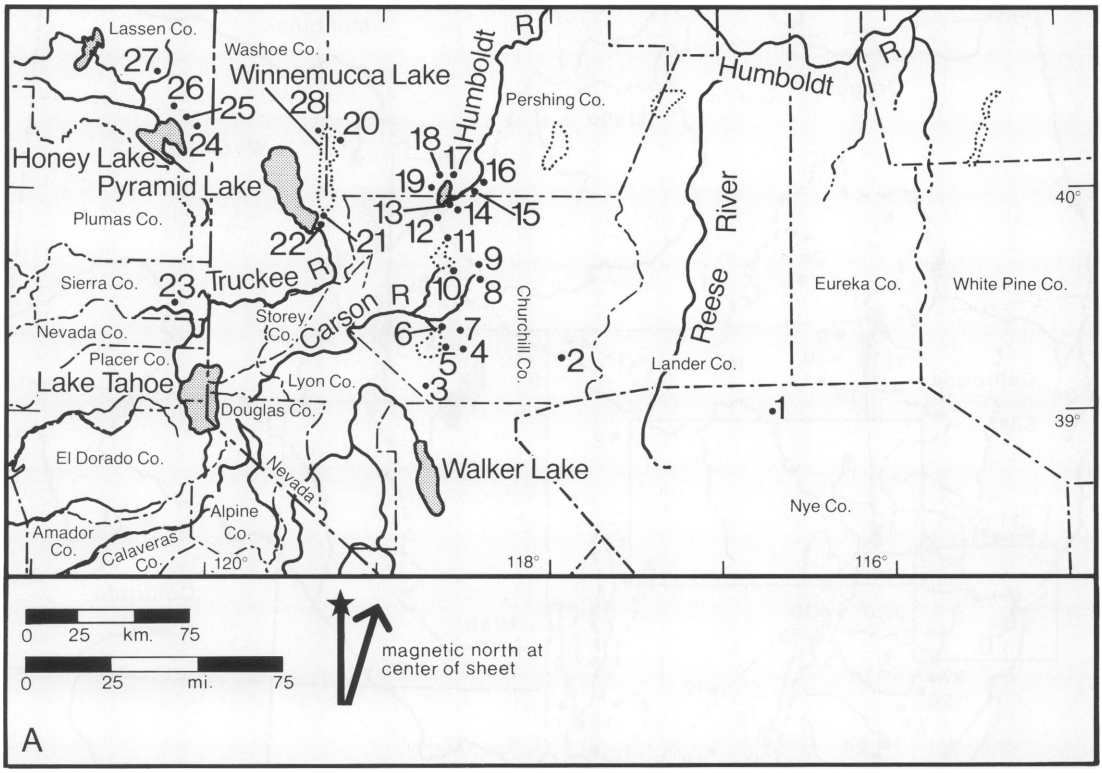


Fig. 12. Map A. Western Great Basin archaeological sites with Pacific coast shell artifacts.

1. Ny301
2. Ch36
3. Ch83
4. Ch60
5. Ch2, Ch3, Ch16
6. Ch89
7. Ch78
8. Ch65, Ch67, Ch118
9. Ch40
10. Ch39
11. Ch56
12. Ch35
13. Ch13, Ch15, Ch28
14. Ch18
15. Pe14, Pe27
16. Pe13
17. Pe66, Pe67
18. Pe12
19. Pe6
20. Pe60
21. Wa197
22. Wa385, Wa1016
23. Sie-20
24. Las-90
25. Las-1
26. Las-45
27. Las-7
28. Wa196

relationships, the four sites (Las-7, Iny-372, Ch18, and Las-1) which yielded the largest number of shell beads pose serious disturbance problems. Las-1 (with 327 specimens) is the most puzzling since no burials were encountered (see Appendix). Two sites (Las-7 and Ch18) with a very high frequency of unassociated specimens obviously represent burial sites in which many beads had been scattered by disturbance into the midden: Las-7, with 32 burials, yielded 125 unassociated beads, while Ch18, with perhaps 61 burials, yielded 367 unassociated shell specimens (see Appendix). Support for this interpretation is provided by data from Iny-372, where 9 percent of the distinctive 1000

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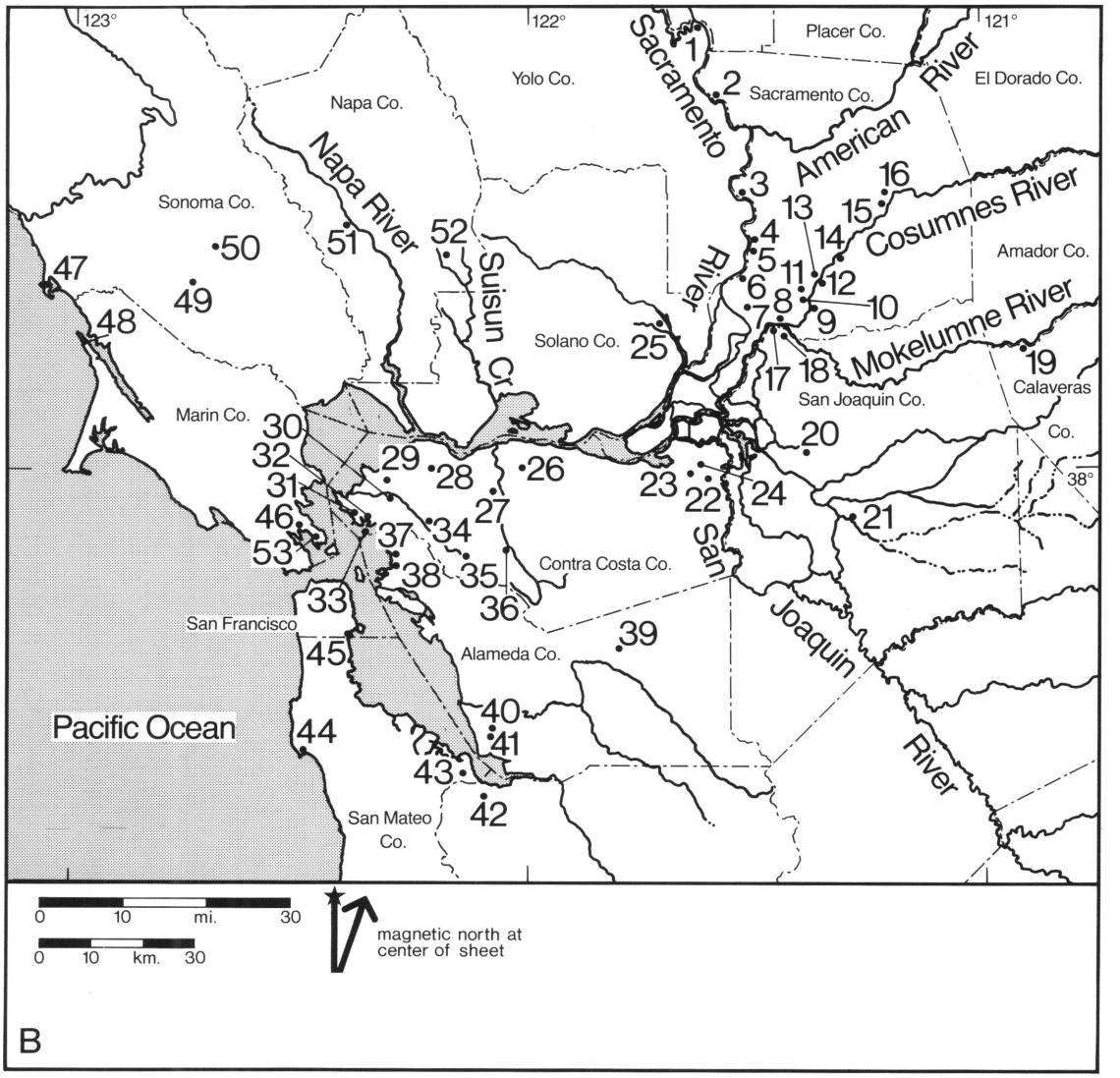
Fig. 13. Map B. Location of central California archaeological sites mentioned in text and in Bennyhoff and Hughes (1983).

1. Yol-13
2. Sac-16
3. Sac-43
4. Sac-56
5. Sac-60
6. Sac-21



7. Sac-73
8. Sac-66
9. Sac-151
10. Sac-168
11. Sac-6
12. Sac-1
13. Sac-95, Sac-211
14. Sac-107
15. Sac-126
16. Sac-127
17. SJo-68, SJo-142, SJo-145
18. SJo-56
19. Cal-237
20. SJo-112
21. SJo-82, SJo-91
22. CCo-146
23. CCo-138
24. CCo-20
25. Sol-2
26. CCo-250
27. CCo-137
28. CCo-259
29. CCo-267
30. CCo-272
31. CCo-283
32. CCo-295
33. CCo-290
34. CCo-142
35. Orinda
36. CCo-308
37. Ala-307
38. Ala-309
39. Ala-413
40. Ala-13
41. Ala-328
42. SCl-1
43. SMa-77
44. SMa-22
45. SFr-7
46. Mrn-27
47. Son-299
48. Mrn-266
49. Son-159
50. Son-455
51. Nap-1
52. Nap-57
53. Mrn-39

Haliotis Ring beads originally associated with Burial 4 (at 86 in. depth) were scattered from surface to 72 in. depth (Lanning, 1963: 261). The maximum number of unassociated beads of one type in a nonburial site is the 46 type E1 beads found at Iny-2 in the upper 18 in. of the deposit. Hence one can propose that most of the 164 unassociated beads from Ch15 and most of the 74 beads from Pe27 were originally associated with burials.

4. Variable Context

The vast majority of beads (71% of the total sample, 83% of the excavated sample) were found with burials or strung together on what probably were single trade items. Most of these beads (65% of the total shell bead sample, 76% of the excavated shell bead sample) were found with burials (3362 beads with 29 burials from only 11 sites). The average of 116 beads per burial is misleading because 30 percent of these beads occurred on a single garment at Iny-372. The 2362 beads found with 28 burials would average 84 beads per burial, while the 12 burials with less than 10 beads each would average less than three beads per burial. The actual burial associations appear in table 3.

In addition, 550 beads from three sites were found strung on native fiber which could have represented as few as 12 trading transactions; they constitute 10.7 percent of the total shell bead sample and 12.4 percent of the excavated shell bead sample. The largest quantity, 230 *Olivella* type G1, were found isolated in the midden at Las-1, as were two type F3. Ch18 yielded eight lots of 299 *Olivella* beads: 225 type G4, 27 type C3, 16 type N, 11 type B4, and 20 type B2b, as well as 15 *Dentalia.* At Roaring Springs Cave, Oregon, four *Margaritifera* beads were found strung on one garment. The comparative frequency of types G1 and G4, in particular, is distorted by these single occurrences of large numbers of beads.

5. Uncertain Source of Manufacture

Occupants of the western Great Basin participated in four major exchange networks involving Pacific shell beads and ornaments from centers in northern California, central California, southern California, and the Gulf of California. In addition to the occasional use of freshwater shells in the Great Basin, the imported beads and ornaments were often reworked. As a result, the Great Basin type frequencies are at variance with those documented at any single California center. Unfortunately, at least 22 types were manufactured in more than one center, and therefore 50 percent of the shell specimens cannot be assigned to a single source. Ethnographic data are deficient on centers of manufacture, and large sections of the California coast have not yet been sampled archaeologically. Hence, our assignments of bead classes to particular manufacturing sources should be seen as a first approximation.

CALIFORNIA TRADE CENTERS

The Northern California Exchange Network (King, 1978: 60)

This is the least known and at present has the shallowest time depth for types other than simple *Olivella* Spire-lopped beads. While the latter beads occur in the Windust phase (8000–6000 B.C.) of the lower Snake River region (Rice, 1972), and probably derived from the Oregon or Washington coast, the oldest shell beads at Hum-67 (Gunther Island) postdate A.D. 1000 (Heizer and Elsasser, 1964) by several centuries. Hum-67 provides the following sequence of appearance for three bead types: *Olivella* Spire-lopped beads deep in the midden, pine nut bead type II with the oldest burials, and *Dentalium* with the shallowest burials (Loud, 1918: 402). *Dentalia,* derived from Vancouver Island, are Historic and Protohistoric time markers in northern California and on the Columbia River, but the same species was used occasionally in southern California since at least 2000 B.C. Late *Dentalia* in the Great Basin have been assigned to the northern network, but the Middle period *Dentalia* sections have not been assigned to sources. Until older *Dentalia* are recovered in northern California, it can be suggested that the Las-194 *Dentalium,* dated to 200 B.C., came from southern California. The oldest *Glycymeris subobsoleta* valves occur in the Great Basin at Ch39 (Bennyhoff and Heizer, 1958: 68) where the reworked, end-perforated rectangle indicates

contemporaneity with late Phase 1 of the Late period. All *Olivella baetica* have been assigned to the northern center herein; while this species is widespread, available bead samples suggest that it was minimally used in central and southern California. The relative importance of *Dentalia, Glycymeris,* and pine nut beads in the Humboldt Sink and northward in the Late period suggests that many *Olivella biplicata* Spire-lopped beads also came from the northwestern California coast; this source was probably more important than we have allowed for herein. Pine nut beads (*Pinus sabiniana*) were made by various groups in northern California; data from both the Great Basin and Hum-67 suggest that type II (end-ground and perforated) is older than type I (both ends ground), although both types persisted into the Historic period. Trail 7 (Davis, 1961: map 1) along the Pit River probably was one of the major avenues of trade from the northern California center to the Great Basin, with some *Dentalia* probably passing through the Plateau in the Protohistoric and Historic periods (see Hughes and Bennyhoff, 1986).

The Central California Exchange Network

This network was the most important source of shell beads and ornaments for the western and eastern sectors of the Great Basin. While Bodega and Monterey bays were the major shell sources ethnographically, most coastal groups from the Coast Yuki to the Costanoan of Monterey Bay participated in the trade of shells. Known manufacturing centers, represented by blanks and *Olivella* refuse, include Son-299 (Middle period), and a series of Late period sites extending through Sonoma (Son-159, Son-455), Napa (Nap-1, Nap-57), and Solano (Sol-2) counties. Major bead types associated with the central California exchange network include *Saxidomus, Tresus, Macoma,* and *Olivella* types C5, D1, most of class F, and all of class M; size variations suggest that most of class L and most of the *Haliotis* and *Mytilus* Square beads also came from the central California center. Shell specimens were traded along five major trails into the Great Basin (Davis, 1961: map 1). The boundary presented by King (1978: 60) should include E125 for the Protohistoric period, and it should extend to Utah for the Middle and Early periods.

Recent excavations around Monterey Bay have produced evidence for local manufacture of types B3 and L3 in the Early period (Mnt-391, Mnt-229), C6 in the Middle period (Mnt-101; Bennyhoff, 1986b), and Class H at Santa Cruz Mission.

The Southern California Exchange Network

This network was most important for the southwestern sector of the Great Basin (Owens Valley, Death Valley), but it did extend to Honey Lake and the Reese River in the Early period. Major manufacturing centers were located on the Channel Islands, but mainland groups from Morro Bay to San Diego also participated in the exchange network. The southern California center incorporated the greatest diversity of genera for beads, but only eight non-*Olivella* groups entered the Great Basin: *Tivela, Trivia,* Turbinidae, Turridae, *Mytilus* (tube, disk), sea snail, and probably some *Dentalia* and *Haliotis* (types H5 and H9). Since this chapter was written, 20 *Amphissa* beads have been reported from Shinners site A (Hattori, 1982). Only *Olivella* types B3, B4, and class H have been assigned to the southern California network, but types E1 and K2 should probably be added. Major distribution trails passed through Owens Valley and the southern San Joaquin Valley, as well as across both the Mojave and Sonora deserts (Davis, 1961, map 1).

The Gulf of California Exchange Network (Tower, 1945; Jernigan, 1978)

This center was the primary source for the Oasis culture area from Cochise times onward and was of least importance to Great Basin inhabitants. Only three late *Olivella dama* Spire-lopped beads from Owens Valley and Death Valley can be assigned to this source. No *Laevicardium, Glycymeris maculatus* bracelets, or jet have yet been reported from Great Basin sites. Since this chapter was written, a single large ornament of *Busycon perversum* shell has been described from Ch16 (Pendleton, 1985: 249, fig. 80).

Local manufacture within the Great Basin is documented by the occurrence of unmodified *Olivella* shells at Mno-455 and WP107, and by worked abalone at Las-7 and Wa1502. The reworking of *Olivella* Spire-lopped beads and *Glycymeris* valves was most notable at Ch39 (Bennyhoff and Heizer, 1958: 68). The restriction of *Olivella* types D3, N1, C4, and C6 to the Great Basin attests that these beads were made locally; therefore various other types assigned to California sources may actually have been made in the Great Basin. We have also assumed that all *Margaritifera* and *Anodonta* specimens were made locally.

Discussion

While most of the types common in California are represented in the Great Basin, the frequency ranking of these types is totally dissimilar due to variable grave/midden associations, differential access to varied manufacturing centers, and uneven phase representations. Thus the single most abundant type in the Great Basin is the *Haliotis* Thick Ring (type H9/Gifford's J2aI), but these 1000 beads were found with a single burial at a single site. In central California the Clam Disk bead (*Saxidomus, Tresus*) ranks first (with well over 152,000 specimens), but it is represented in the Great Basin by only 10 specimens! While *Haliotis* type H1a ranks second in the Great Basin, it is outranked by at least five other types in California (*Olivella* simple Spire-lopped, Lipped, Thin Rectangles, Cupped, and Saucers). In the Great Basin, *Dentalium* ranks third (13 sites), followed by *Olivella* Split-punched beads (11 sites), while in California both of these types have only a moderate to rare distribution. The *Olivella* Tiny Saucer (type G1/3d) and Flat Disk (type G4) rank fifth and sixth in the Great Basin, but in both cases single lots of many strung beads are represented. With the exception of simple Spire-lopped beads, the frequency of site occurrences of a single type is also variant from California. Some 31 types have been reported from only a single site in the Great Basin.

EXCHANGE IN THE WESTERN GREAT BASIN

While the discovery of one wealthy burial could alter the frequencies, the available evidence indicates that the western sector of the Great Basin (Hester, 1973: 56, 105) had been the major shell redistribution center since around 6000 B.C. In terms of quantity of imported shell (and pine nut) beads, a Lakeshore core (consisting of Honey, Pyramid, Winnemucca, Humboldt, and Mono lakes) can be distinguished from the northern and eastern periphery (Surprise Valley, Eastgate, Reese River). If four excavated sites are representative, lakes Tahoe and Washoe were not part of this core. The southwestern sector (Inyo) was of intermediate status in terms of shell bead importation, though Owens Valley emerged as a major center at least by 300 B.C. Death Valley inhabitants participated, though in markedly smaller numbers, in both the southern and Gulf exchange networks during the Protohistoric period. The northern sector (Oregon) was clearly peripheral; here three sites yielded a total of only eight shell beads. On the basis of what we now know of imported shell frequencies, one could include Surprise Valley and northwestern Nevada (from the Black Rock Desert northward) with this sector because nine sites (7 excavated) provided only 36 beads. The eastern sector (Hester, 1973: 121) was clearly marginal, but had participated occasionally in the central California exchange network since at least 2000 B.C. In addition to El25 (with Protohistoric *Tresus* Clam Disk), Hogup Cave yielded Middle and Early period specimens, and Danger Cave III (Early period) contained two *Olivella* Spire-lopped beads (types A1a and A1c). Although we have not made an exhaustive search of the extant literature on the southeastern border lands, we note the following site additions: Gypsum Cave (1 *Olivella* A1b; Harrington, 1933: 152); Lost City, Pueblo II (3 specimens; Gifford, 1947: 61); Overton, Pueblo II (2 limpet; Gifford, 1947: 61); and two Basketmaker III sites at the mouth of Virgin River (7 specimens; Gifford, 1947: 61). It thus appears that even the Fremont and Puebloid components of the eastern sector were marginal (Hughes and Bennyhoff, 1986).

The bead distribution is shown in tables 4 through 7, along with that for shell ornaments, glass beads, and pine nut beads. Tentative sources have been suggested: *N* for northern California, *C* for central California,

S for southern California, and *G* for Gulf of California. *L* for local manufacture has been entered only for types confined to the Great Basin, or where manufacturing refuse occurred (Ch39). No entry has been made for types manufactured at multiple sources. We have arranged the temporal marker types in approximate order, late to early, at the left of each table, with less time-sensitive types arranged arbitrarily to the right. Site collections have been broken into components on the basis of grave associations, stratigraphy, or diagnostic types, and arranged in terms of temporal phases recognized in California (see Fig. 10); we have done this because many shell bead types permit a more refined phasing than is currently provided by Great Basin projectile point types.

Thus for Pe27 (see tables 4 and 5), the glass beads, pentagonal ornament, and *Dentalium* have been assigned to component A (Historic), the *Tresus* Clam Disk and *Olivella* Spire-lopped beads have been assigned to component B (late Protohistoric), while 19 specimens represent middle Phase 1, Late period types (component C). Needless to say, the placement of many specimens lacking provenience is arbitrary (particularly for *Dentalia* and *Olivella* Spire-lopped). Since *Macoma* Disks (see table 7) occur stratigraphically above *Haliotis* Square beads at Mod-204 and Las-7, the *Macoma* Disks at Ch2 and Wa1502 have been assigned to the Transition phase although all the other Early period types from these two sites have been assigned to earlier components. Arrows indicate that specimens placed elsewhere perhaps should be shifted; question marks denote very dubious phasing. Most of the components are based on bead types or stratigraphy, with little analysis of the total collection from each site. When available evidence indicated the existence of components lacking shell beads, these were taken into account but were not included in the tables (see Appendix for Ch18A, Las-1A, Ny301A, B, Wa1502A). For other sites, the components defined herein may be incomplete (e.g., Wa385, Ch13).

We should point out that these tables represent "tight" phasing based on the California sequence, with little allowance for persistence or local manufacture (see Bennyhoff and Heizer, 1958, for "loose" phasing). The style II incised *Olivella* Spire-lopped beads have been "reliably phased" as Protohistoric because southern California specimens are restricted to this period, but there is an earlier local Great Basin emphasis on incised beads (*Olivella* types C2, C6, D1; see tables 5 and 6). Until these beads are recovered in well-controlled contexts in the Great Basin, our phasing cannot be considered certain. We also caution that specific frequencies for particular phases should not be overemphasized, for reasons already enumerated. Despite these caveats, we suggest that the general trends represented in table 9 monitor changing patterns of prehistoric exchange in shell beads between occupants of the Pacific Coast and the western Great Basin.

Historic and Protohistoric Periods

The Historic and Protohistoric periods (A.D. 1500–ca. 1880) are represented by 56 components at 46 sites (see table 4) with only 5.5 percent of the total Pacific shell bead sample (see table 9). To a certain extent, this small quantity of beads reflects the early bias of Great Basin archaeologists toward cave sites, which seldom contained much Historic or Protohistoric material. Nonetheless, the number of sites (57%; 37% of the components) is significant, and the available data suggest a reduction in trade with California during these periods. The excavated Protohistoric collections from Las-90 and Pe67 contain no shell beads, and both late components at Ny301 also lack shell beads. The quantities of all types except *Olivella* Thin Lipped beads are very low, which may mean that few families had sufficient wealth to acquire exotic trade items and could supply little of interest to their western and southern neighbors. The most surprising deficiency is the rarity of *Saxidomus* and *Tresus* Clam Disk beads, which were by far the most common types in central California at this time. While these types definitely reached distant sites (El25; Wa1502), only 10 beads represent all three phases. Disruption of trade during the Gold Rush may account for the Historic absence, but other factors must have been operating in the Protohistoric period. The problem is particularly puzzling because *Olivella*

Thin Lipped beads were clearly entering the Great Basin during early Phase 2 (66% of 281 beads) yet no *Olivella* Full Lipped beads are present in the late Phase 2 components. Three reasons for this can be suggested: (1) inadequate sample; (2) lack of wealth in the Great Basin (no magnesite beads from central California nor columellae from southern California have yet been reported; a similar absence of these most valued beads is evident in the Sierra region through which central California types would have passed); (3) a shift in exchange networks for reasons not presently understood.

Some 17 southern California types are represented by 139 beads and two ornaments, while four definite central California types are represented by only 10 beads and two ornaments. Given the lack of *Olivella* Full Lipped beads, the rarity of *Saxidomus* and *Tresus* Clam Disks, and the southern location of Iny-2 and Iny-372, it seems likely that *Olivella* types G1, K2, and most E1 were derived from southern California. Even if half of the *Olivella* Thin Lipped beads from Ch15 were assigned to a central California source, the great preponderance of types and specimens underscores that the southern California exchange network was dominant at this time, in contrast to the late Prehistoric period. The phasing of 6 *Dentalia* and 13 pine nut beads cannot be relied upon, but a weakening of trade with northern California is also suggested for the Protohistoric period; this is supported by the rarity of *Glycymeris*. The only Great Basin beads from the Gulf of California (3 *Olivella dama* Spire-lopped) probably date from the Protohistoric period and were found at southern sites (Iny-2; Death Valley).

Late Prehistoric Period

Some 39 components at 26 sites have been grouped into the Late Prehistoric period (ca. A.D. 700–1500) in table 5; they represent 23.6 percent of the total Pacific shell bead sample. Nine of these components probably are contemporaneous with late Phase 1 of the Late period in central California, but only Ch39C is certain (it contained *Olivella* type M2). The frequency of *Dentalia, Glycymeris,* and pine nut beads attests that the period between ca. A.D. 1300 and 1500 marked the peak of trade with northern California. It appears that most large *Olivella* Spire-lopped beads were derived from this source because medium-size beads were typical of central California at this time. Of the 17 components grouped as contemporaneous with middle Phase 1, the placement of only four (Ch39C, Pe27C, Wa385, and Wa1502C) seems certain, although the quantity of *Olivella* M and K types is deficient by central California standards. Another 13 components may span both early Phase 1 and the transition from the Middle to Late period in central California. In California, most *Olivella* type D1 beads represent the Middle period/Late period Transition, but persistence into early Phase 1 is possible. The higher frequency of type D1 compared to type M1 is variant from California occurrences. A San Joaquin Valley origin for type D1 seems probable, but the incised decoration on one specimen is a local Great Basin innovation, as is the Punched Oval bead (*Olivella* type D3).

A clear interpretation of trends for this period is difficult because of erratic frequencies. Ch39 was a center for local manufacture (Bennyhoff and Heizer, 1958: 68), where rectangular beads (mostly *Olivella* type M2 but some M1) were made from imported *Olivella* Spire-lopped beads and *Glycymeris* valve beads (as well as bone). The 175 pine nut beads from Ch35 are anomalous when compared to the small numbers found in three other caves, while the 230 *Olivella* Tiny Saucers from Las-1 represent a single string and need meaningful context to be reliably phased.

Despite the fact that source determination is uncertain for *Olivella* Cupped and Tiny Saucers, the shift from an early dominance of the central California exchange network (especially the San Joaquin Valley type D1) to a late dominance of the northern California network seems reasonably clear. Even if some of the *Olivella* Cupped beads came from southern California, this southern source was of minor importance except at Iny-2, Iny-372, and at Death Valley, in strong contrast to the Protohistoric period.

Although the case is far from closed, evidence from the western Great Basin does not support the Phase 1 disruption of trade proposed for the Sierra region to the west (Mo-

ratto et al., 1978). Diagnostic middle or late Phase 1 types occur at Ch39, Pe27, Pe67, Wa385, and Wa1502, while *Olivella* Ground beads at Las-1, Las-7, and Ch18 probably date from this period. Ch15 lacks diagnostic beads of this period, but has a radiocarbon date of A.D. 1400 (Hester, 1973: 90); the 4 ft of guano at nearby Ch18 indicate actual abandonment, but this may have involved only the interior cave. While two beads of middle Phase 1 type represent a poor sample, the *Olivella* Thin Rectangle and Cupped bead found at Wa1502 suggest that the period of abandonment indicated by obsidian hydration (Layton, 1970) should be shortened by at least two centuries. However, with better information we might find that the shift in emphasis to a northern California source in late Phase 1 was in response to uncertain passage of central California beads through the Sierra. Likewise, increased use of local *Margaritifera* might reflect disrupted trade in marine shells. Unfortunately the Las-1 phasing is uncertain; other types of this local shell have been assigned to the Middle period, and its use for ornaments occurred as early as 6000–8000 B.C. in the Lower Snake River region (Rice, 1972).

Middle Prehistoric Period

Another 32 components at 22 sites are contemporaneous with the Middle period of central California (ca. 200 B.C.–A.D. 700); these represent 10.2 percent of the total Pacific shell bead sample (see tables 6 and 9). The repeated association of the first five *Olivella* types at several sites suggests that 16 components were occupied in terminal Middle period times. A distinctive local Great Basin emphasis is evident in the relatively high frequencies of *Olivella* types C2i and C6i.

The late and intermediate phases of the Middle period are difficult to distinguish without grave lots, but nine components may be placed within this general time period. The early phase of the Middle period may be represented by seven components, although *Olivella* type G2 can occur in the terminal Middle period.

Determination of sources for many types also is difficult for this time period, but they would appear to be relatively balanced between central and southern California. A *Dentalium* section appeared at Las-194 ca. 200 B.C. and may indicate that some trade was carried out to the north, but derivation from southern California seems more likely at present. Local manufacture is strongly indicated by *Olivella* type N and the terminal Middle period types discussed above.

If our phasing is correct, trade in marine shell beads during the Middle period was significantly reduced from Phase 1 of the Late period. This contrast is even more extreme when compared to the incidence of trade inferred during the Early period.

Early Prehistoric Period

The Early period (ca. 2000–200 B.C.) is represented by 21 components at 13 sites (see table 7). Despite the small number of sites, this period is represented by the largest number of beads (58.1% of the total Pacific shell bead sample) because of burial associations. Components at eight sites (all but Sie-20 were occupied earlier) have been placed in a transition phase between the Early and Middle periods on the basis of stratigraphy or the occurrences of *Macoma* Disk or *Olivella* Oval Saddle beads. The 12 sites grouped in the Early period proper share various types of the *Haliotis* Square bead complex (*Haliotis* bead types 1a, 2; *Mytilus* type M1; *Olivella* types L, A1a, A2; all *Haliotis* ornament types) which represents the earliest widespread exchange network extending from southern and central California (Bennyhoff and Heizer, 1958: 63–64) through the Great Basin as far east as Hogup Cave, Utah.[5]

It appears fairly certain that the central California exchange network was dominant

[5] The *Haliotis* ornament from Stratum 8 at Hogup Cave (Aikens, 1970: 91–92, fig. 53d) is an Early period type in central California (SJo-112, SJo-142; Windmiller phase D3). The two inconsistent radiocarbon dates from Stratum 8, 1250 ± 140 B.C. (Gak 1564) and 2660 ± 100 B.C. (Gak 1568), are too divergent to allow precise placement of the ornament, but either would support Dating Scheme A2. The *Olivella* Thick Rectangle from Swallow Shelter, Utah (Dalley, 1976: 12, 50, 56, fig. 27m) presumably came from Stratum 4, dated at 900 B.C. Unless the specimen was traded within the transition phase between the Early and Middle Horizons, the age supports Dating Scheme B1.

at this time. Most *Mytilus* Square beads from Las-7 lack the ground epidermis typical of southern California; furthermore, most Great Basin *Haliotis* Square beads are larger than typical southern California specimens. The *Olivella* Barrel and Cap beads were emphasized at this time in southern California (all B3 and B4 beads probably came from the south), so it would appear that most of the *Olivella* A1 and B2 specimens came from central California (a few large specimens probably came from northern California). Most of the *Haliotis* ornaments presumably came from central California because the southern emphasis on black abalone is not apparent in Great Basin specimens.

Available evidence further suggests that the peak of this Early period trade occurred in the late phases of the Early period and in the early part of the Transition phase. All five *Haliotis* Square beads at Gatecliff Shelter were recovered in the transition layer, while the *Haliotis* Squares and *Olivella* Thick Rectangles at Ch18 were associated with transitional *Macoma* Disks (in Grave 18). The *Olivella* type C3 at Las-7G represents the earliest occurrence of this type; it is more commonly associated with Middle period components. Likewise, the *Haliotis* type 2 bead (from Las-7G) is relatively late in both central and southern California, while *Olivella* class L is absent in Phase 1 of the Early period in central California.

The earliest beads tabulated in table 7 come from Pe14 with a radiocarbon date of 5088 ± 350 B.C.; these are *Olivella* type A1c beads which mark the Humboldt Culture (Heizer, 1951), dated between 7000 and 4000 B.C. (Hester, 1973: 106). "*Olivella* beads" dated to 4020 ± 150 B.C. from Pe60 (Orr, 1972) also may be Spire-lopped beads. *Olivella* Spire-lopped beads were present in the Lower Snake River region by 8000–6000 B.C. (Rice, 1972).

No attempt has been made to phase 80 Spire-lopped beads (1.6% of the total collection) from five sites. Single specimens represent the only beads found at three sites, but 28 specimens were found in uncontrolled excavation at Wa197. Hester (1973: 97) indicated that most of the Wa197 deposit represented the Late period, so these 24 specimens could well have been traded from central California during Phase 1 of the Late period; however, at least four specimens (types A2, B3, and *Olivella baetica*? A1c) point to Early period temporal affiliation. Most of the 49 *Olivella* type 1a beads from Ch18 are probably Early Lovelock. The two unphased Ch13 specimens were wall beads, probably marking the Middle period.

SHELL ORNAMENTS

The 85 shell ornaments (including 3 worked *Haliotis* fragments) pose even more problems than do the shell beads. The 34 proposed components (see table 8) represent only 18 of the 81 sites and 64 percent of the specimens came from only three sites (Las-1 yielded 15 *Haliotis* and 5 *Margaritifera*; Las-7 yielded 20 *Haliotis*; and Ch18 yielded 13 *Haliotis* and 1 *Margaritifera*). The phasing of the Las-1 specimens is particularly uncertain (see Appendix), as is the sourcing—in most cases based simply on proximity rather than type. Of the 75 finished *Haliotis* ornaments, 12 specimens (16%) are unclassifiable or incomplete. The vast majority of specimens are simple shapes (oblongs, ovals, trapezoids, triangles, and disks) which are nondiagnostic temporally, and require context for reliable phasing. Only two types (NA3j, JB3j) have distinctive forms typical of central California, and the absence of such common Protohistoric central California types as Gifford's K5c and class M, as well as J7-10 from southern California, is surprising. Except for type CA4j, the rarity of multiple occurrences of single types is also notable. Local manufacture may well have been of greater importance in the Great Basin than has been indicated in the source entries in table 8. The abalone shell with the rim cut off from Las-7 and the two worked sections from Wa1502 provide firm evidence for such manufacture, while at least three specimens (1 bead) from Las-1 suggest the reworking of broken ornaments. Of 65 *Haliotis* ornaments with adequate description, 51 (78%) had the epidermis removed, 9 (14%) were made from *Haliotis cracherodii*, and 5 (8%) were made from *Haliotis rufescens*. The 78 *Haliotis* specimens account for only 1.5 percent of the

5167 imported shell pieces; in contrast, *Haliotis* beads comprise 41.5 percent of this total. The rarity of ornaments again may reflect limited wealth among Great Basin inhabitants.

The seven *Margaritifera* and *Anodonta* ornaments from three sites represent 9.7 percent of the 72 classifiable shell ornaments, whereas the 15 *Margaritifera* beads from three sites make up only 0.3 percent of the total 5104 shell beads. However, the 22 freshwater shell specimens represent only 0.40 percent of the 5189 shell specimens.

If the phasing presented in table 8 is correct, the general decline in trade of *Haliotis* ornaments roughly parallels that evident in shell beads, though the trend is less dramatic. Of 84 phased specimens, 32 percent represent the Early period (only 3 sites), 38 percent represent the Middle period (7 sites), 18 percent represent the Late period (6 sites), while 12 percent represent the Protohistoric/Historic period (8 sites). The emphasis on black abalone evident in the earlier phases of the Middle period in central California also appears at three Great Basin sites (Las-1, Ny301, and Ch18). The Early period emphasis on black abalone in southern California is not reflected in Great Basin specimens. On the basis of present evidence, it appears that central California was the dominant source of abalone for all but the southern Great Basin. Only 7 (9.7%) of the 72 classifiable *Haliotis* ornaments can be assigned to a southern California source with reasonable certainty. The two Death Valley specimens (Gifford types AR1, U4b) occur at several early Protohistoric sites on the Channel Islands. The three Ground Ring ornaments (uCC1j) from Ny301C and Las-1D are reminiscent of the Phase 1 emphasis on this type at SCrI-100; the type does not occur at this time in central California. The two ornaments found with Burial 2 at Iny-2 appear to relate to Gifford types Q11aII and AC5a (among several southern California possibilities). Though less certain, the uCA4j ornament from Wa1016 probably accompanied the *Trivia* bead found in the same grave.

DISCUSSION

Our interpretation of the evidence is that shell bead and ornament trade between the Great Basin and California was at its peak during the Early period (ca. 2000–200 B.C.) and that it declined sharply during the subsequent Middle period (ca. 200 B.C.–A.D. 700). To judge from the absolute frequency of specimens, shell trade appears to have increased somewhat during the Late Prehistoric period (A.D. 700–1500), but again declined to reach a marked low in the Protohistoric period (A.D. 1500–1800). Similar trends are evident whether one considers total Pacific shell beads and ornaments, total reliably phased specimens, or total shell and pine nut beads (table 9). While central California sources were generally favored over their southern California counterparts, the Protohistoric decline in trade with central California merits further investigation, along with the sharp increase in trade with northern California in late Phase 1 of the Late Prehistoric period.

Finally, it may be noted that our shell data provide a refinement for Elston's (1982) "good times/hard times" scenarios for western Great Basin prehistory. Though only one of our sites (Pe14) can be placed in the Early Archaic ("hard times"), we identified a peak in shell trade during the early portion of the Middle Archaic ("good times") and a significant decline in the latter portion (2200–1500 BP). This latter decline may reflect drying conditions which peaked around 1500 BP. Likewise, we find a rise and fall in trade of Pacific Coast shells during the Late Archaic even though Elston characterized the entire period as "hard times." At this juncture we are hesitant to ascribe too much significance to contrasts between these shell artifact trends and Elston's generalized adaptive changes principally because it is presently unclear how the patterns are related. We plan to explore some dimensions of this relationship in future work.

APPENDIX. NOTES ON CALIFORNIA AND GREAT BASIN SHELL BEAD PROVENIENCES

We discussed in chapters 1 and 2 implications of shell bead distributions at a number of California and Great Basin archaeological sites, and these data have been summarized in tables 4–9. In the course of this analysis, it has been necessary to make a number of decisions regarding within-site provenience and distribution. In the interest of clarity, we provide the following brief site-by-site discussions.

CALIFORNIA SITES

DV33-56: All DV entries refer to the Death Valley (Inyo County) survey of Hunt (1960). Only two of the many sites yielding an unspecified number of glass beads are identified (pp. 134, 269). Excluding these two Historic sites, 16 DV IV sites yielded "saucer" [class H ?] beads (p. 270), but the number of specimens is provided for only one site (p. 133); the single beads tabulated herein are therefore minimal counts. Hunt (p. 270) used Gifford's X3b1 for most of these "saucers"; this is a meaningless catchall category that could easily mask some DV II [Middle period] occurrences. However, the *Olivella dama* (p. 269), *Tivela* ? tube (p. 269), *Haliotis* ornament (p. 266), and Panamint Shoshone (p. 173) associations suggest that most of the 16 sites were late Protohistoric. Hunt's X3bII differentiation has been accepted as equivalent to *Olivella* Thin Lipped beads (type E1), so the four west side sites (p. 147) have been assigned to the early Protohistoric period, along with burial site DV 46A-56 and campsite DV 66-57 which had limpet beads (pp. 146–147). The scattered beads at DV 46A-56 were most likely associated with the disturbed infant rather than the adult. The Pueblo II projectile points associated with the DV III burial mound DV 43-56 (pp. 123, 146) would support Dating Scheme A2 rather than B1.

Hole in the Rock Shelter, Death Valley: The description of this grave lot (Wallace, 1957: 150) is inadequate for specific classification. The point type from this site suggests Pueblo II/DV III relationships. The same problem of phasing applies to the Ubehebe Shelter burial (Wallace, 1978: 129).

Iny-2, Cottonwood: Riddell (1951: 18) refers to type F7 as *Olivella pedroana,* but we feel it is *Olivella dama* (see Bennyhoff and Heizer, 1958, for discussion).

Iny-182, Stahl: No adequate quantification of typology is provided (Harrington, 1957: 21, 70, 80). For tabulation purposes, we have assigned four glass and four *Olivella* Spire-lopped beads to the cave, and four glass, one *Olivella,* and one "saucer" to the site surface. In 1873 Hiller photographed Southern Paiute wearing large *Olivella* Spire-lopped beads (Jernigan, 1978: fig. 3) so component A (Victorian phase of the Historic period) should include *Olivella* A1c. The two Spire-lopped beads with Burial 3 have been assigned to the Protohistoric period, but they could be older.

Iny-372, Rose Spring: The Rose Spring site is discussed by Lanning (1963: 260–261), Bennyhoff and Heizer (1958), and Clewlow et al. (1970). Lanning reported seven additional beads, but misclassified two specimens. (Pl. 12J is an *Olivella* Oval Saddle, type F1, diagnostic of the Early/Middle period Transition; pl. 12F is a Split Oval *Olivella* bead, type C3.) One *Olivella* Thin Lipped bead reported by Bennyhoff and Heizer (1958) is actually type C3 also and was found near Burial 2.

Shell beads, pottery, projectile points, and stratigraphy indicate nine components:

A. Historic (*Olivella* type H2).
B. Late Cottonwood (Desert Side-notched, Sierra subtype, pottery).
C. Middle Cottonwood (*Olivella* types E1a and K2).
D. Early Cottonwood (earliest pottery and Desert Side-notched; Burials 1 and 3).
E. Terminal Rose Spring (*Tivela* Thin Disk [2 displaced], Rosegate series). The C4a bead of component G should probably be shifted to E.
F. Late Rose Spring [Middle/Late period Transition] (*Olivella* type D1, Rosegate series).
G. Middle Rose Spring [Terminal Middle period] (*Olivella* types C3, C4a; Burial 2 with 5 Rosegate, 2 Elko points). The C4a specimen should probably be shifted to component E.
H. Early Rose Spring (2 ft of midden).
I. Terminal Little Lake [Early/Middle period Transition] (*Olivella* type F1, *Haliotis* type H9; Burial 4 with Elko Corner-notched, dug ca. 60 in. from the surface at 290 B.C., UCLA-1093A).

Earlier components (with 3 radiocarbon dates) lack artifacts.

Las-1, Tommy Tucker Cave: Various diagnostic artifacts (pine nut beads, *Olivella* types D1, F3, and F2, black abalone ornaments) indicate thorough disturbance of six components (Bennyhoff and Heizer, 1958).

Las-7, Karlo: Riddell (1960: 8–9) and Bennyhoff and Heizer (1958) discuss the Karlo site, and frequencies used herein are based on inspection of the RHLMA collection. Riddell includes 12 additional *Haliotis* 1a beads (midden) and an unspecified number of beads found with Burial 1 which presumably are in the State Indian Mu-

seum, Sacramento. Seven components have been defined on the basis of burial conditions, grave lot seriation, horizontal stratigraphy, and associated projectile points:

A. Historic (glass beads).
B. Late Amedee (Desert Side-notched, Sierra subtype).
C. Early Amedee (Desert Side-notched, General subtype).
D. [Phase 1] (Rosegate series, Burials 20–22, 27, 32; beads shallow in the midden).
E. Terminal Middle period (Elko Corner-notched, Burials 18, 28, 30, 31).
F. Transitional Karlo (Gatecliff series and Large Side-notched, Burial 29, Cremations 1 and 9).
G. Early Karlo (Elko Eared, Gatecliff series, Large Side-notched; Burials 1–4, 7, 8, 11, and 17, Cremations 2 and 5, all with Early period bead complex).

Las-45: Burials were found here with *Haliotis* Square beads, though quantification is lacking (Riddell, 1960: 5, 11). For tabulation purposes we have assigned five beads, although this is surely a minimal estimate.

Las-194, Rodriguez: Discussing the Rodriguez site, O'Connell and Ambro (1968) and Hester (1973: 28–29) suggest the following components:

A. Alkali [early Phase 1].
B. Terminal Emerson [late Middle period].
C. Middle Emerson [early Middle period] (I-3209 = 200 B.C.; *Dentalium,* Elko points). Radiocarbon date supports Dating Scheme B1.

Mod-204, King's Dog: The King's Dog site has been reported by O'Connell (1971: 121, 246, 249) and Hester (1973: 102). Stratigraphy and bead types document four components:

A. Bidwell [Protohistoric].
B. Alkali phase [Phase 1].
C. Emerson phase with *Macoma* Disk, Elko points [Early/Middle period Transition] (dating supports scheme B1).
D. Bare Creek phase with *Haliotis* type 1a, Gatecliff Split Stem [Bare Creek series] [Early period].

Mammoth Creek Cave: Enfield and Enfield (1964: 410–411) have reported on Mammoth Creek Cave, suggesting three components:

A. Historic.
B. Protohistoric.
C. Early period (level III; *Haliotis* 1a).

Mno-384: The 70 *Olivella* shells with a child burial were not described (Davis, 1959: 67).

Mno-455, Hot Creek Rockshelter: Davis (1964: 278) has reported on the Hot Creek Rockshelter.

Sie-20, Sardine Valley: Unfortunately, the unique shell specimen from the Martis culture is a fragmentary black abalone Disk with only one extant central perforation (Elsasser, 1960: 64). The proportions suggest that the original ornament had two central perforations—type cCA4j. This probable Early period form, made from the most common early Middle period species, supports a placement in the Early/Middle period Transition phase.

NEVADA SITES

Ch2, Grimes Point Petroglyph Site: Diagnostic shell artifacts provide evidence for five intermittent occupations, with most specimens representing the Early period (Bennyhoff and Heizer, 1958).

Ch3, Stewart Petroglyph Site 207: Bennyhoff and Heizer (1958: 63, 73, 82) discuss the Stewart Petroglyph site 207 in terms of two components:

A. Transitional Lovelock.
B. Early Lovelock.

Ch13: Only three of the seven surface ornaments remain in the collection, but the types were illustrated (Loud and Harrington, 1929: 149–150). The two CD1j ornaments illustrated in figure 24e have unique proportions. Since Paviotso informants recognized the type as ear ornaments, these have been assigned to the Historic component as local manufactures. Had they been made of black abalone, they would be a Middle period type; unfortunately, both specimens are missing. Two of the five *Olivella* wall beads are also missing; since Loud lumped type C5 and F2 as "disks," no type can be assigned. Four components are indicated by diagnostic types (component B, Late period, Phase 1, is represented by a Rosegate point and a stone discoidal but lacks shell).

Ch15, Humboldt Lakebed: Bennyhoff and Heizer (1958) and Hester (1973: 90) have discussed the Humboldt Lakebed site, and six additional beads have been added in the present work (including those illustrated in fig. 14). Viewed in terms of phases, the shell artifacts and projectile points indicate continuous occupation from the early Middle period to Historic times (with 11 components), paralleling the use of Ch18 (Lovelock Cave). While there are no diagnostic middle or late Phase 1 beads, projectile points and a radiocarbon date of A.D. 1400 (UCLA-1071A) indicate at least intermittent visits. Another date of 733 B.C. (M-649) lacks associations and because of this, has not been entered on table 6 (Dating Scheme A2) or table 7 (Dating Scheme B1). Although projectile points suggest Early period occupation, none of the repeated collections have yet provided any diagnostic Early Lovelock beads; the central base at this time would appear to have been

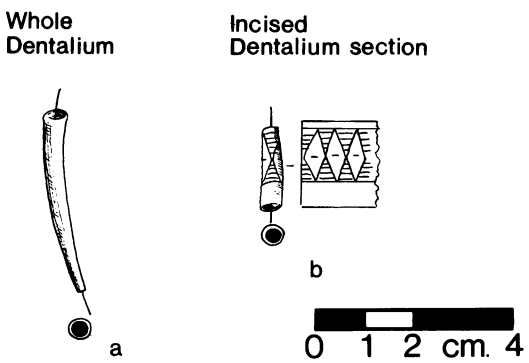


Fig. 14. *Dentalium* shell bead types. a. Whole *Dentalium,* 2-25284 (Ch15); b. incised *Dentalium* section, 2-39714 (Ch15).

Ch18. Ch15 may have flooded frequently during the shift to winter precipitation after 4200 BP (Elston, 1982: 194). Despite the plethora of points and beads exposed by recent erosion, it is interesting to recall that Loud found neither beads nor points amid an abundance of heavy stone tools on the surface in 1912.

Ch16, Hidden Cave: References to Hidden Cave in the tables are based on findings from Bennyhoff and Heizer (1958), Grosscup (1956: 61), and Roust and Clewlow (1968). Artifact types (only six shell beads were found) and stratigraphy indicate four components:

A. Dune Springs (*Tresus* Clam Disk).
B. Late Lovelock (Rosegate series points).
C. Transitional Lovelock.
D. Early Lovelock (32 in. midden; LJ-289 = 1100 B.C.).

Since the appearance of the final report (Thomas, 1985), a much more complex situation is evident. Pendleton (1985) described 143 shell specimens distributed throughout five strata. Three typological errors should be corrected. The two "Saxidomus" Clam Disk beads (Pendleton, 1985: 239, 243–244, fig. 78w) were made of *Tresus* clam shell. The *Saxidomus giganteus* of Gifford (1947: 32–33, type V1aIII with a nonridged exterior) is actually *Tresus nuttalli,* as documented by excavation of workshops in Sonoma County, California. Bennyhoff and Heizer (1958) and Bennyhoff and Fredrickson (MS) merely followed Gifford, but it is now clear that two different genera were used for central California Clam Disk beads. The Protohistoric Lipped "E2?" type (Pendleton, 1985: 239, 243, fig. 78u) is actually a Middle period *Olivella* Scoop (C5). The Oval Saddle or Ring (F1 or G3) is an Oval Saddle (Pendleton, 1985: 239, 243, fig. 78v).

Unfortunately, rodents, cache digging, and guano mining disturbed the deposit. The clear dominance of Gatecliff series points (Thomas, 1985: 370–371) in all three cultural strata is not reflected in the shell artifacts (Thomas, 1985: 372–373; Pendleton, 1985: 250). The bead types suggest repeated visits over the past 3000 years; the radiocarbon dates support Dating Scheme A2.

Ch18, Lovelock Cave: Loud reported only seven "articles of shell," and gave no count of beads found in three strung lots (Loud and Harrington, 1929: 105); Harrington provided no quantification either. Bennyhoff and Heizer (1958: 63, 75–76) discussed 790 temporally significant specimens, whereas Grosscup (1960: 37–39) reported only the 476 specimens he could locate from the 1924 Harrington collection. In fact, when specimens lacking provenience are included, Loud and Harrington actually collected over 1315 shell specimens; when these specimens are combined with the 102 additions made between 1936 and 1969, the total Lovelock Cave shell artifact assemblage is over 1417 items! In addition, the 1911 infant mummy in the Nevada Historical Society Museum in Reno has an *Olivella* bead bracelet (Morbeck, 1970: pl. 2) not tabulated herein because no bead count, type, or context is available. Unfortunately, both the Loud (RHLMA) and Harrington (MAI-HF) collections are now incomplete, so the total number of shell specimens is an approximation.

The following additions to Bennyhoff and Heizer (1958) and alterations to Grosscup (1960) have been made. The beaded child's moccasin (RHLMA 1-21640) purchased by Loud (Loud and Harrington, 1929: 47, pl. 21i; Grosscup, 1960: 24, Style 1) presently contains 133 small *Olivella* Spire-lopped beads; an estimated 41 beads are missing, thus originally there probably were about 174 beads on this left moccasin. Assuming that the extant ratio of 65 percent Class B (End-ground) and 35 percent Class A beads is representative, the 174 beads have been classified as 110 B2a, 60 A1a, and 4 B3a (Barrel). We have also assumed that the fragmentary right mate was similarly decorated, and have accordingly doubled the counts in table 5 (Ch18 D). The moccasins were presumably made locally and decorated with imported beads. There is no apparent pattern to the placement of Class A versus Class B beads, but the beads around the sole and over the instep are slightly smaller ($\bar{x}$ = 5.5 mm diameter) than the 24 beads sewn up the left side ($\bar{x}$ = 6.0 mm diameter). The sole and instep beads are sewn side by side, while the 24 top beads are staggered. James Hart claimed he found these beaded moccasins in a deep grave at the south end of the cave (Loud and Harrington, 1929: 168–169); however, moccasins are considered to be a Late Lovelock trait and would cor-

relate best with the Little Ice Age. The type B2 frequency suggests that most beads were obtained from a late Phase 1 central California source, although the eight B3a specimens probably came from southern California.

One string of beads (RHLMA 1-19344), found by Loud on the miner's dump, is no longer in the Lowie Museum collection, and no count of beads was entered in the catalog or published by Loud. A minimum of six beads were illustrated (Loud and Harrington, 1929: fig. 17c); therefore, this count has been used herein. Type B2b is suggested; although strung differently from the other 14 B2b specimens (RHLMA 1-19343) found on the dump, both strings have been assigned to Late Lovelock (Ch18 E) on the basis of type. The Lot 26 necklace found with a wealthy child (Loud and Harrington, 1929: 118, pl. 20) now has 287 *Olivella* beads and has been assigned to component N of Early Lovelock on the basis of Grosscup's (1960: 52) phasing. Loud's two mussel shell "ornaments" (Loud and Harrington, 1929: 106, pl. 53e, f) are classified herein as *Margaritifera* bead type 4b because of their morphological similarity to *Haliotis* bead type 4b. Grosscup (1960: 36; RHLMA 1-19347) classified the abalone ornament found with them as C(1)a, but the incision is so dubious that we designate it C(1). These three specimens were found in Lot 6 which Grosscup (1960: 23) placed in Late Lovelock. We feel, however, that *Margaritifera* type 4b beads have Transitional associations (see 1968/1969 specimens below) and may relate to *Haliotis* type 4b beads of the terminal Middle period. Because the horn "spoon" (Loud and Harrington, 1929: pl. 15g) from Lot 6 is also suggestive of Middle period specimens, all three shell artifacts have been assigned to Ch18 H. The remaining abalone ornament found by Loud (RHLMA 1-19346, type C[1]1a) lacks provenience, but is typologically Early Lovelock (Ch18 N). In summary, Loud recovered or purchased more than 659 specimens (655 *Olivella* Spire-lopped beads, 2 *Margaritifera* beads, and 2 *Haliotis* ornaments) which span all three phases of the Lovelock culture. Despite his wide-ranging sampling, he obtained no *Olivella* wall beads.

Grosscup's treatment of the Harrington shell collection requires extended comment. To begin with, two pertinent objects were not included under shell artifacts. Harrington (Loud and Harrington, 1929: 118, pl. 20) had purchased a ceremonial plume which still retained one *Olivella* bead. Although 50 may have been present originally, only one has been counted herein as a probable type A1a; the condition suggests a Late cache (Ch18 D), although Grave 23 (probably Early) had two plumes in association. The pipe found at 70 in. (Loud and Harrington, 1929: 113, pl. 52a) had two irregular bits of *Olivella* shell (Grosscup, 1960: 14) set in the pitch binding. These have been counted as beads herein for tabulation purposes, and we follow Harrington in assigning the specimens to Early Lovelock (Ch18 M) although Grosscup's Transitional dating may be correct.

Grosscup (1960: 37–39) noted only those specimens which he could find, so Grave 18 is credited with only one *Olivella* type 1a, two *Olivella* Thick Rectangles, two *Macoma* Clam Disks, and 20 *Haliotis* Square beads. However, Harrington (Loud and Harrington, 1929: 14) reported that this grave yielded a "number of short strings of *Olivella* shells, each terminating in a deer-hoof pendant"; Grosscup (1960: 23) elsewhere noted that two such perforated pendants had a "series" of *Olivella* beads, but provided no catalog numbers. We have arbitrarily assigned 10 *Olivella* type 1a beads to Grave 18 and have subtracted this number from Grosscup's 75 type 1a specimens lacking provenience. Harrington also noted that Grave 18 had "some" square shell beads (probably MAI-HF 13/4747), while an adjacent burned deposit yielded 200 Square shell beads (1 attached to flexible twined basketry), a "few" of disk shape (2 *Macoma* Disks; 1 *Olivella* type C3), and more *Olivella* (Spire-lopped) shells. The *Macoma* Disk beads identify MAI-HF 13/4796 as this burned lot, while Grosscup (1960: 49), in an ambiguous comment, suggests that MAI-HF 13/4746 (if not a typographical error for 13/4796) was a flexible twined bag possibly associated with Grave 18. Bennyhoff's 1958 notes, obtained from Grosscup, include reference to one unreported *Olivella* Oval bead type C3 along with two *Olivella* type 2b specimens included by Grosscup in MAI-HF 13/4746. We feel that Grosscup was somewhat too cautious in dealing with no provenience specimens and assign MAI-HF 13/4746, 13/4747 (5 *Haliotis* type 1a beads), and 13/4796 to Grave 18. We also accept Harrington's count of 200 Square beads and, applying the 13/4796 ratio of 10:1, obtain 180 *Haliotis* Squares and 20 *Olivella* Thick Rectangles (type 2b). While the additional burned Spire-lopped beads noted by Harrington may also have been lost, we assign another 10 no provenience specimens to this burned deposit, to obtain a total Grave 18 shell association of 229 beads (in contrast to Grosscup's 25 specimens). Presence of the *Macoma* and *Olivella* Oval beads places Grave 18 in the Transition between the Early and Middle periods, Ch18 L (see table 11).

Assuming that the *Olivella* type 1a specimens are part of the 75 no provenience beads counted by Grosscup, we have added 180 specimens (Grave 18, plume, pipe) to the 469 shell beads documented by Grosscup. Thus Harrington collected about 649 beads. The shell (abalone ?) disk bead

TABLE 11
Grave 18 Shell Bead Associations, Lovelock Cave
(Catalog numbers are those of the Museum of the American Indian, Heye Foundation MAI-HF)

Haliotis type 1a	*Olivella* type 1a	*Olivella* type 2b	*Olivella* type C3	*Macoma* disk
Grave 18:				
5 (13/4747)	10[a]	—	—	—
Grave 18A: (burned)				
20 (13/4796a)	1[b]	2 (13/4796b)		2 (13/4796c)
		2 (13/4746a)	1 (13/4746b)	
160 (lost)	10[a]	16 (lost)	—	—
Total				
185	21	20	1	2

[a] No provenience.
[b] Grosscup (1960: 37).

from level 4 (Loud and Harrington, 1929: 22) cannot be identified and has not been counted herein. In contrast to the two "types" (counting all *Olivella* Class A and B as a single "1a" type) represented by Loud's 657 beads, Harrington obtained nine "types." It is therefore surprising that the 97 beads collected later (see below) represent 13 "types"; clearly none of the investigators obtained a "representative" sample of the many occupation phases at Ch18.

In addition to the seven shell ornaments collected by Harrington (Grosscup, 1960: 39), Bennyhoff's 1958 notes document an additional *Haliotis* ornament (MAI-HF 13/4645; type uSA3j), assigned to Ch18 J.

One other Harrington matter concerns phasing. Grosscup gave incomplete associations for Early Lovelock Graves A and B—the disturbed burials found in 1924 at 10 ft depth in the stratapit, Lot 15 (Loud and Harrington, 1929: 17–18, 24). Grosscup (1960: 37) assigned 96 *Olivella* type 1a beads to midden level VI, but this quantity indicates an obvious burial association. Since Harrington mentioned such beads with both burials, 48 beads have been assigned to each burial in component O. Those with Grave A were strung, so it

TABLE 12
Shell Beads and Ornaments Recovered from Lovelock Cave Since 1924

	A1a	A1b	A1c	A1ci	B2a	B2b	C2	C3	C5	C6	D1	D3	E1a
1950 Dump	—	—	—	—	—	1	—	1	—	—	—	—	—
1965 Dump	1	1	2	1	1	4	5	—	1	—	2	1	1
1969 Dump	—	4	1	—	—	—	—	—	—	—	—	—	—
Dump total	1	5	3	1	1	5	5	1	1		2	1	1
West Crevice[a]	—	—	—	—	—	—	—	—	—	—	—	—	—
West End[a]	1	—	—	—	—	2	—	—	—	1	—	—	—
Lot X[a]	—	—	—	—	—	—	—	—	—	—	—	—	—
N5/W25[a]	—	—	—	—	—	—	—	—	—	—	—	—	—
Inside Total	1	—	—	—	—	2	—	—	—	1	—	—	—
Outer Cave, West Alcove	—	1	—	—	—	—	—	—	—	—	—	—	—
Grand total	2	6	3	1	1	7	5	1	1	1	2	1	1

[a] See Heizer and Napton (1970) for locations within Lovelock Cave, excavated in 1968/1969.
[b] Total includes one A1a and one B2c bead recovered from 1965 screening of the miner's dump.

may be possible to separate the two lots upon reexamination. Level VI was pure Older Guano (pre-2000 B.C.) so it is important to remove these grave associations from the "caches" or unassociated status suggested by Grosscup. In addition to the blanket noted by Grosscup (1960: 52), Grave A contained a unique headband (MAI-HF 12/4151) with a bipointed bone pin, netting, and basketry. Grave B (actually 3 individuals) contained five of the six sickles assigned to a cache (Grosscup, 1960: 21), two wooden pendants (Grosscup, 1960: 36; note that in Loud and Harrington, 1929, pl. 48c and e do *not* come from level VI, as claimed on p. 179), a wooden ball, and many baskets, bags, and nets. It is probable that the "mass of poles" with Grave B contained the net stretcher (Grosscup, 1960: 26; MAI-HF 13/4938) and the cradle fragment (Grosscup, 1960: 27; MAI-HF 13/4934). On the other hand, the L-shaped scapula awl probably was *not* associated (Grosscup, 1960: 20), but occurred in the Older Guano.

A final Harrington problem concerns typology. Grosscup described *Olivella* Spire-lopped beads in terms of the then current type 1a (small) and 1b (large), without noting end-grinding (Class B2). The Loud specimens of Early Lovelock age are so variable (cf. Lot 26, Ch18 N) that the older type 1a designation has been retained for Harrington specimens in table 7; Transitional Lovelock specimens (Ch18 J, K in table 6) have been entered as type A1b but may include type A1a.

One hundred two shell specimens have been added to the Lovelock Cave assemblage since 1924 (see table 12). Despite the small quantity, the 33 beads from the miner's talus ("dump") provided the largest number of bead types found by any Ch18 investigator, and confirm the evidence provided by projectile points (Clewlow, 1968) that Lovelock Cave was more or less continuously used, at least for caching, from Early Lovelock times to the Historic period. The following bead types are particularly noteworthy because they do not appear elsewhere: in terms of central California phases there is evidence for early Phase 2 (type E1a beads), late Phase 1 (type A1ci beads), the Middle/Late period Transition (type D1 and D3 beads), and the terminal phase of the Middle period (type C2, C5, and C6 beads). The only pine nut beads reported also came from the dump.

In contrast, the 59 beads from inside the cave are generally disappointing, because all but two specimens came from disturbed deposits. The *Margaritifera* type 4 bead was found at 48–54 in. in the West End, indicating a Transitional Lovelock temporal placement; this assignment is supported by the morphological similarity to *Haliotis* type 4b beads in central California which date to terminal Middle period times. The single *Olivella* type A1a bead was found with the Early Lovelock disturbed burial (Feature 5) which dated to 1450 B.C. (UCLA-1459C; Heizer and Napton, 1970: 39). The *Haliotis* 1a bead (an Early Lovelock period time marker) from Lot X must have been displaced because the oldest date was A.D. 50 (UCLA-1417). The 37 type G4 beads from the disturbed West Crevice were shingled in a distinctive string-

TABLE 12—(*Continued*)

G4	1a	3a2	3c2	4d	*Dental-ium*	*Margari-tifera* type 4	Total Beads	CA6j	CA6n	CA-j	Unclas-sified	Total Shell	Pine-nut II
—	—	—	—	—	—	—	2	—	—	—	—	2	—
—	—	—	—	1	—	3	26[b]	2	1	1	—	30	2
—	—	—	—	—	—	—	5	—	—	—	1	6	—
				1		3	33[b]	2	1	1	1	38[b]	2
37	—	—	1	—	—	—	38	—	—	—	—	—	—
—	—	—	—	—	—	1	5	—	—	—	—	—	—
—	1	—	—	—	—	—	1	—	—	—	—	—	—
—	—	—	—	—	15	—	15	—	—	—	—	—	—
37	1	—	1		15	1	59	—	—	—	—	59	—
1	—	1	2	—	—	—	5	—	—	—	—	5	—
38	1	1	3	1	15	4	97[b]	2	1	1	1	102[b]	2

ing method described, without quantifications, by Carroll (1970: 40, fig. 1g); pulled tight, of course, the beads lie flat on, and extend beyond, the thick composite cord. Carroll (1970: fig. 1h) also described 15 strung *Dentalia* but assigned them to the AN unit (S10/W50-55); the cataloged provenience is N5/W25, 12–18 in., which would be below Harrington's Lot 9.

While other evidence, including the 1850 gun cache (Heizer and Napton, 1970: 27) and an arrow (Loud and Harrington, 1929: 8), indicates late use and/or occupation of the outer rockshelter, the five West Alcove shell specimens must have washed into the upper 12 in. of deposit because they represent early Middle period types.

Given the uncontrolled method of excavation by Loud in the remnants left by guano miners; the extensive cache, burial, and rodent disturbance; and the multiplicity of poorly integrated reports on Ch18, it may seem foolhardy to attempt the definition of components. Although we cannot present detailed documentation here, we feel that this rich Great Basin cave was occupied or used (the interior and/or exterior portions) more or less continuously for more than 4000 years. Diagnostic bead and point types fill in gaps in the C-14 sequence (though the absence of *Olivella* class M and K at both Ch15 and Ch18 remains puzzling); thus the full set of components recognized in central California has been defined for Ch18 as well; we also include tentative correlations with redefined phases of the Windmiller culture (components L–Q, without shell counterparts at Ch15). In brief outline, the principal phase markers are as follows:

A. Historic (1850 gun).
B. Late Dune Springs (Desert Side-notched, Sierra subtype).
C. Early Dune Springs (*Olivella* type E1a, Desert Side-notched, General subtype).
D. [Late Phase 1] (*Dentalium,* pine nut beads; I-4672 = A.D. 1430).
E, F. [Early and middle Phase 1] (Rosegate series points).
G. [Middle period/Late period Transition] (*Olivella* types D1, D3).
H. [Terminal Middle period] (*Olivella* types C2, C3, C5, C6; Loud Lot 6).
I, J. [Late and intermediate Middle period] (Lot 15, levels III and IV).
K. [Early Middle period] (*Olivella* types G4 and N; *Haliotis* types H3a, H3c; black abalone ornaments).
L. [Early period/Middle period Transition; Windmiller E] (Grave 18 with *Macoma, Haliotis* 1a, *Olivella* L; C-267 = 531 B.C.).
M. [Terminal Early period; Windmiller D3] (inlaid pipe; I-4630 = 660 B.C.); abandonment 1100–750 B.C.
N. [Late Early period; Windmiller C3] (Loud Lot 26; C-735 = 1222 B.C.); abandonment 1400–1250 B.C.
O. [Late Early period; Windmiller C1] (Feature 5: UCLA-1459C = 1450 B.C.; Harrington Grave 35: I-4758 = 1420 B.C.; Grave A, B).
P. [Intermediate Early period; Windmiller B] (I-4631 = 2030 B.C.).
Q. [Windmiller A] (Older Guano, with very intermittent use).

Ch28: Discussion of Ch28 is included in Loud and Harrington (1929: 149, site 16) and Bennyhoff and Heizer (1958: 74).

Ch35, Humboldt Cave: Heizer and Krieger (1956: 67) reported a "small" *Olivella* Spire-lopped bead; therefore it was classified as type 1a by Bennyhoff and Heizer (1958: 63). The specimen has since been examined and it is Large (type A1c/1b).

The 6 ft of deposit at this small cave were thoroughly disturbed by the excavation of 31 cache pits and industrious packrats; therefore, midden depths by themselves have little significance. The single Elko Eared point was found at 0–6 in. above the *Olivella* type D1 bead (12–18 in.), pine nut beads, and Rosegate points; however, one pine nut bead occurred as deep as 66–72 in. In contrast to the two shell beads, the 175 pine nut beads (all type II) represent an anomaly: the highest archaeological frequency of this northern type occurred here at the southeastern edge of its distribution. Heizer and Krieger (1956: 88) assigned pine nut beads to both early and late levels of the Late Lovelock Culture (p. 10). After checking the cataloged locations, we cannot agree. Of the 175 beads, 100 (57%) were found in the disturbed upper deposit of the south alcove, with one specimen included with Cache 26B (below 40 in. depth) in the south alcove. Pieces of single distinctive baskets (Heizer and Krieger, 1956: 50–51, 54, 56; note especially the decorated coiled basket and Catlow Basket B) link Cache 26 to the Dump, three caches (46–48 in.), and midden occurrences in Sections 3-5 and 9, which ranged in depth from 24 to 72 in. While various assignments are possible, given such packrat disturbance, we propose that Cache 26B originally contained ca. 151 pine nut beads (1 from Cache 26, 100 from the south alcove, 18 from the Dump, and all 32 midden specimens from Section 7-11). Varying condition of the beads suggested multiple trading transactions, so 18 specimens found in three other packrat nests have been counted as three occurrences. The remaining six beads (3 surface, 3 midden) have been counted as single occurrences, so the 175 pine nut beads reduce to 10 occurrences. The actual distribution of the 35 pine nut beads with depth provenience is listed in table 13. All 175 pine nut beads (10

occurrences) have been assigned to terminal Late Lovelock, contemporaneous with late Phase 1 of the Late period. One could easily assign eight beads (3 surface, 5 in level 1) to Historic because type II beads were still in use in Historic times. We should, perhaps, extend the distribution of pine nut beads back to middle Phase 1 of the Late period, but better stratigraphic associations are needed.

Heizer and Krieger (1956: 10) suggested use of Ch35 during a single period. We suggest at least four components (possibly six):

A. Historic, Cache 1 (Cache 13).
B. Late period, late Phase 1 (and middle Phase 1 ?); Caches 4, 7, 26, 28; 175 pine nut beads, 1 *Olivella* A1c, Rosegate points.
C. Middle/Late period Transition; 1 *Olivella* D1, Rosegate points, sickles; Caches 10 and 11.
D. Middle period, early phase; Cache 30 (dated to 3 B.C., C-587, 1 Elko Eared point, 1 Humboldt Concave Base A point, L-shaped scapula awls).

TABLE 13
Distribution of Pine Nut Beads by Depth at Humboldt Cave (Ch35)

Depth (in.)	South Alcove 7	8	9	10	11	12	Total
0–6	—	5	—	—	—	—	5
6–12	4	1	—	1	—	—	6
12–18	—	1	2	—	—	—	6[a]
18–24	—	—	—	—	3	—	3
24–30	—	—	1	—	—	—	1
30–36	—	—	—	—	—	—	—
				Cache 26			
36–42	—	2	—	—	—	—	2
42–48	—	—	—	—	—	—	—
48–54	—	—	—	1	—	—	1
54–60	—	—	—	10	—	—	10
60–66	—	—	—	—	—	—	—
66–72	—	—	1	—	—	—	1
Total	4	9	4	12	3		35[a]
	32 Assigned to Cache 26B						

[a] Includes one bead from section 1 and two beads from section 2.

Ch36, Eastgate Cave: Elsasser and Prince (1961: 145) have reported on excavations at Eastgate Cave.

Ch39, Pelican Island: Bennyhoff and Heizer (1958) reported 225 classifiable beads and 214 *Olivella* fragments left from bead manufacturing. It is now estimated that the fragments once represented about 80 type A1c and 10 type A1b beads. Diagnostic bead types indicate seven components, and the Spire-lopped *Olivella* beads have been assigned to components in approximate proportions to the frequency of diagnostic types.

Ch40: The specimen in RHLMA is reported to have been collected from the surface.

Ch56, Parran Lakebed: Bennyhoff and Heizer (1958) have reported on the Parran Lakebed.

Ch60, Salt Wells: Bennyhoff and Heizer (1958: 75) mention one *Olivella* type L1a bead, a Large Thick Shelved Rectangle, which was recovered at Ch60.

Ch65, Stillwater Marsh: Bennyhoff and Heizer (1958) reported on Ch65 in the Stillwater Marsh.

Ch67, Dune Springs: Bennyhoff and Heizer (1958: 63, 74) discuss the Dune Springs site components:

A. Dune Springs phase (Desert Side-notched).
B. Transitional Lovelock (*Olivella* D1).

Ch78: Discussion of Ch78 is reported by Bennyhoff and Heizer (1958).

Ch83: Bennyhoff and Heizer (1958: 63) have reported on Ch83.

Ch89: Bennyhoff and Heizer (1958: 63, 74) discuss Ch89 in terms of Transitional Lovelock association.

Ch118, Stillwater Marsh: Bennyhoff and Heizer (1958: 85) discuss Ch118 in the Stillwater Marsh.

El25, Deer Creek Cave: Shutler and Shutler (1963) discuss Deer Creek Cave.

Hu16, Black Rock Desert: Clewlow (1968: 6) has reported Hu16 in the Black Rock Desert.

Hu17, Black Rock Desert: Clewlow (1968: 20) has discussed Hu17 in the Black Rock Desert.

Ny301, Gatecliff Shelter: Specimens described by Bennyhoff and Hughes (1983) suggest the following components:

A. Historic (glass bead).
B. Yankee Blade [Protohistoric].
C. Underdown [Phase 1].
D. Late Reveille [Middle/Late period Transition].
E. Middle Reveille [later Middle period].
F. Early Reveille (early Middle period).
G. Reveille/Devils Gate Transition [Early/Middle period Transition].
H. Devils Gate [Early period].

Radiocarbon dates support Dating Scheme A2.

Ny754, Cistern: In 1977, the Cistern site was excavated by Ann Peak.

Pe6, Toy: Bennyhoff and Heizer (1958: 73, 75) based their report on notes made long ago by Heizer. The *Olivella* C2/3b1 specimen in the Glenda Price collection has been retained herein; however, the *Dentalium* in the Luke collection (noted by Heizer as Stillwater Flats) would seem to be a repetition of the Ch118 *Dentalium* (also noted by

Heizer as in the Luke collection), and this specimen has not been tabulated under Pe6.

Pe12, Granite Point Cave: Dentalium and Desert Side-notched points suggest an early Protohistoric component here (Bennyhoff and Heizer, 1958; Hester, 1973: 92).

Pe13: Bennyhoff and Heizer (1958) have reported on Pe13.

Pe14, Leonard Rockshelter: Excavations at Leonard Rockshelter (Heizer, 1951: 89, 92–94; Bennyhoff and Heizer, 1958: 63, 82) revealed the following components:

A. Dune Springs (Cottonwood Triangular point).
B. Late Lovelock.
C. Leonard.
D. Humboldt (5088 ± 350 B.C. [C-281]). Although no bones were found in association, all 52 beads probably once accompanied a single disturbed burial.

Pe27, Humboldt Sink: Reference to the Derby collection (Tuohy, 1970) with one *Dentalium,* suggests that this is the same collection partially noted by Heizer years ago (Bennyhoff and Heizer, 1958: 73). Tuohy assigned no site numbers, so it is possible that multiple sites are represented, but the Pe27 designation has been retained here. Tuohy (1970: 4) reported the "OlaIII" pentagonal ornament as black abalone, but Gifford's III designation means "unidentifiable," the normal condition for this form. If black abalone is correct, the specimen is unique and should be designated O1aV. The six components, defined on the basis of diagnostic types, extend from Historic times to the terminal Middle period.

Pe66, Toulon: These four surface beads housed in the RHLMA were collected by Heizer in 1937, along with an L-shaped scapula awl. These types are markers of the terminal Middle period (component A), while the *Olivella* Small Ring is a classic example of type G3a, diagnostic of the early Middle period (component B).

Pe67, Hesterlee: Despite the presence of housepits and Desert Side-notched points (component A), no diagnostic Protohistoric shell specimens were recovered (Cowan and Clewlow, 1968: 200–201). The seven shell artifacts have been grouped into three earlier intermittent occupations:

B. [Late Phase 1].
C. [Middle/Late period Transition].
D. [Early Middle period].

Massacre Lake Cave: No dimensions were provided for the *Olivella* Spire-lopped beads found here (Heizer, 1942: 123).

Wa197, Nicolarsen-Jameson Cave: These 28 *Olivella* Spire-lopped beads were classified in 1973 from a photograph (Bennyhoff, MS b). This rich multicomponent site was excavated without control (Hester, 1973: 97; 1974).

Wa385, Thea Heye Cave: Bennyhoff and Heizer (1958: 73–76, map 1) inadvertently mislabeled this site Wa63 and placed it too far north (Follett, 1977: 59). This middle Phase 1 lot could have easily represented one burial or cache.

Wa1016, Shaman's burial: Though once assigned to Late Lovelock (Tuohy and Stein, 1969; see Follett, 1977: 60 for new initial date), the beads, C4 ornament, Elko point, and radiocarbon date all point to a Transitional age [early Middle period; Dating Scheme B1: I-2846 = A.D. 130]. Note the number of types shared with Ny301E, dated 1000 years earlier.

Wa1502, Hanging Rock Shelter: Shell beads and points suggest six components (Layton, 1970: 101–103):

A. Historic Last Supper phase.
B. Late Hanging Rock phase.
C. Early Hanging Rock phase.
D. Smoky Creek phase (no shell).
E. Silent Snake/Smoky Creek Transition.
F. Silent Snake phase. Layton's dating of 1500 B.C. for *Macoma* would support Dating Scheme A1.

WP107, Newark Cave: Fowler (1968: 25, 30) reports on Newark Cave, suggesting components as follows:

A. Protohistoric (Desert Side-notched, Cottonwood Triangular, pottery).
B. [Phase 1] (Rosegate series).
C. [Terminal Middle period]. Unworked *Olivella* shell found in level 4 with Elko points; elsewhere level 4 yielded a radiocarbon date of 85 B.C. (WSU-538) which could support Dating Scheme A2.

OREGON SITES

Catlow Cave No. 1: Cressman (1942: 66) reports on excavations at Catlow Cave No. 1.

Cougar Mountain Cave: Cowles (1960) reports that Elko points were found in Newberry pumice. Hester (1973: 16) dates the cave to 100 B.C. and if accepted, the date would support Dating Scheme A2.

Roaring Springs Cave: Roaring Springs Cave is reported by Cressman (1942: 66).

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