Projectile Points from the Three Sisters' Lagoons of West Central Baja California

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Abstract

Recent archaeological research along the shores of the Three Sisters' Lagoons of Ojo de Liebre, Guerrero Negro, and Manuela on the central Pacific side of Baja California have revealed extensive archaeological evidence in a fresh-water impoverished area. Projectile points are relatively numerous and are dominated by the triangular Guerrero Negro Series. These may have functioned as harpoon insets. A variety of other projectile point types also occurs at select sites including a triangular glass point, those of the late prehistoric Comondú series, points of the Elko-like series, and numerous others. Many points types are as yet undated and unnamed. Marine and terrestrial animals were pursued with weapons tipped by these points by individual hunters and by family groups visiting the coast from mountain bases to the east. This hunting pattern is most evident during late prehistoric and protohistoric times with less distinct earlier use.

Abstracto

La reciente investigación arqueólogica a lo largo de las orillas de las lagunas de las Tres Hermanas de Ojo de Liebre, de Guerrero Negro y de Manuela en el lado del Pacifico central de Baja California ha revelado la evidencia arqueólogica extensa en una area sin mucha agua dulce. Los puntos del proyectil son relativamente numerosos y se dominan por la serie del Guerrero Negro. Éstos pueden haber funcionado como las intercalaciones del arpón. Una variedad de otros tipos de punto de proyectil también ocurre a los sitios selectos incluso un punto de vidrio triangular, aquéllos de la serie de Comondú al fin del tiempo prehistórico, los puntos como la serie de Elko, y numerosos otros. Muchos tipos de los puntos son todavia sin fecha y anónimo. Se siquieron los animales marinos y terrestres con armas ladeadas por estos puntos por los cazadores individuales y por grupos de la familia que visitan la costa de las bases de la montaña al este. Este modelo de la caza es muy evidente durante el fin de los tiempos prehistóricos y protohistoricos pero el uso más temprano es menos distinto.

Introduction

Late 20th century archaeological research within the sister lagoons of Ojo de Liebre, Guerrero Negro, and Manuela, straddling the border between the states of Baja California and Baja California Sur, Mexico (Fig. 1) can be characterized as pioneering and highly informative (Ritter and Payen 1992, Ritter 1999). This research has yielded considerable evidence of seasonal occupation and use within an area that today is nearly lacking in fresh water. This locality provides a focus for the procurement of a rich marine-based food source with secondary use of terrestrial resources (see Gobalet 1999).

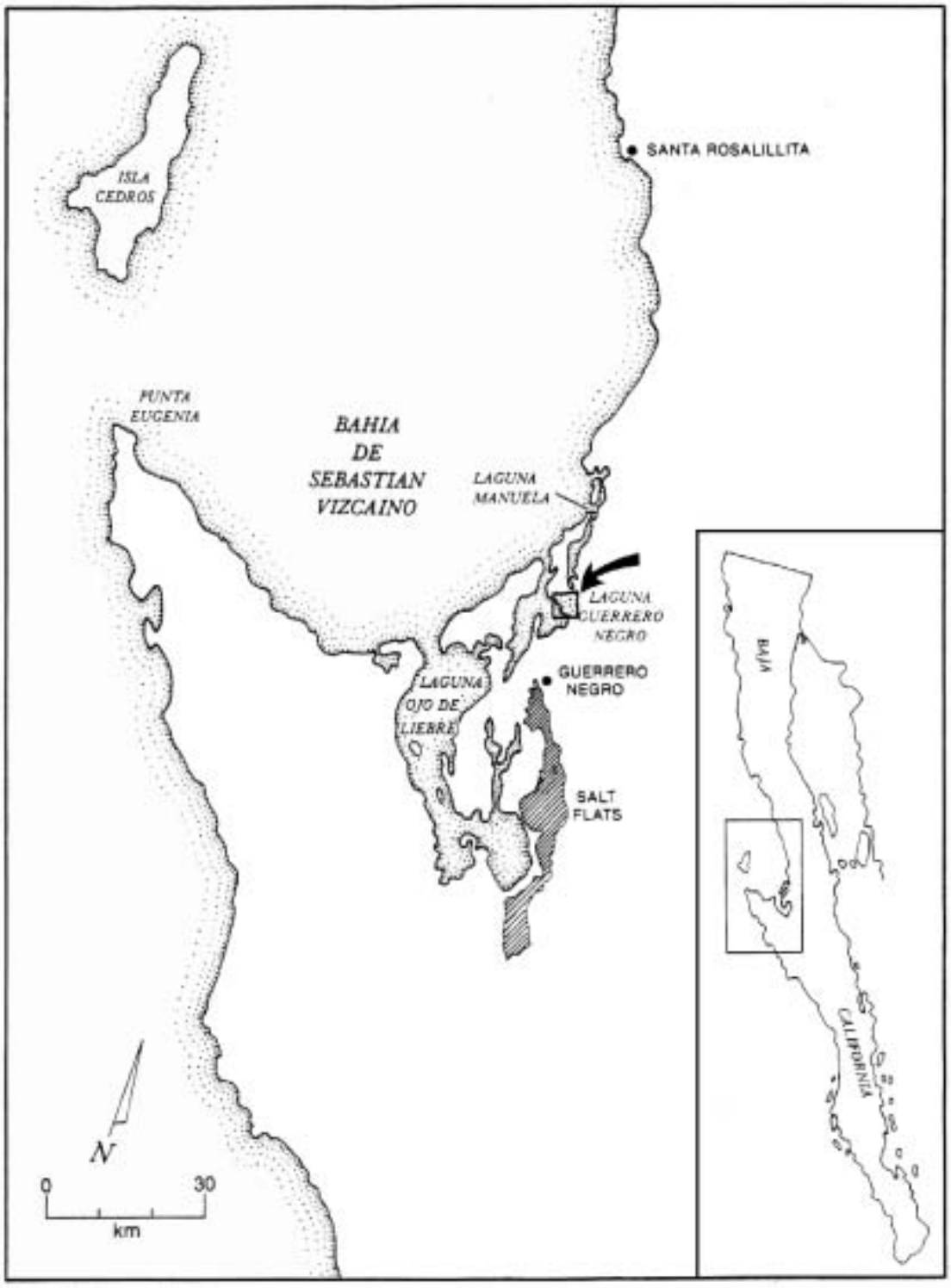

Fig. 1. Area of Study by joint University of California, Berkeley and Instituto Nacional de Antropología e Historia expedition, 1997 and 1999.

One of the keys to temporal-spatial ordering of archaeological sites locally and to an assessment of variable regional hunting strategies is the projectile point types that formed part of the pursuit assemblage. We recognize that points also served other purposes. This paper deals with (1) those projectile points found during University of California, Berkeley-Instituto Nacional de Antropología e Historia (UC-INAH) work around Laguna Guerrero Negro and Laguna Manuela; (2) those projectile points in a private collection from around the three lagoons; and (3) those projectile points analyzed previously by the senior author and Louis A. Payen (1992) from a site along Laguna Ojo de Liebre. In addition to temporal-spatial considerations, the issues of function, technological skills, material limitations, rejuvenation, and socio-cultural variability based on ethnic tradition also are discussed (cf. Carmean 1994:52).

The study region falls within the fringes of the central Baja California Viscaíno Desert, a low-lying arid plains formed on the east by the central volcanic cordillera (Sierra de San Francisco) and on the west by the Pacific Ocean and Sebastían Viscaíno Bay (Fig. 1). Aside from the Viscaíno Desert plain, major geomorphic features along the coast are the lagoon systems and extensive dune fields. There are also relict near-shore terraces in places and at least one ancestral shoreline with habitation and use debris.

Nelson (1919:111) relates that "when Lower California was discovered (by Euro-Americans) its shores swarmed with whales, elephant seals, fur seals, and sea otters and game abounded." Among all the land animals noted by Orr (1960:172), rodents, lagomorphs and artiodactyls, including antelope and deer, are known within the lagoon vicinity. This region also lies along the Pacific flyway that attracts considerable waterfowl, especially in the winter.

In a previous work (Ritter 1999:13-15), the senior author discussed a socio-ecological approach to the archaeological study for this region and outlined the field inventory strategy. The field strategy was to systematically inventory a section of Laguna Guerrero Negro in 1997 and later a portion of Laguna Manuela in 1999. Thirty-three sites along Laguna Guerrero Negro and the southern fringes of Laguna Manuela have been recorded. These sites are quite similar, composed of small to extensive surface and near surface (5-10 cm) patches of prehistoric and protohistoric residential and activity debris. These areas of archaeological debris are found within inter-dune pans or flats or on lower, older dune ridges.

The field crew conducted sample collections, excavations, and judgmental inventories. Adding to the corpus of data was avocational site survey information from all three lagoons and an extensive artifact collection from the various sites found as part of the systematic archaeological work and from other sites as yet unrecorded (Lysel Muñoz Collection). The extensive avocational collection and that from the UC-INAH work is housed at the Museum of Culture and Natural History in Bahía de los Angeles in Baja California. Both the 1997 UC-INAH and Muñoz Collection form the primary basis for this article with added notes on the 1999 collection under analysis at the time of this article's writing and with consideration of other regional work.

The Projectile Points

Projectile points are defined as any late-stage biface with intact, or visible remnants of a hafting apparatus, or basal thinning that would facilitate hafting on a relatively small shaft such as used for an arrow (Ritter and Burcell 1999a:147). Not included in this paper are the late-stage bifaces found in the region and discussed by Ritter and Burcell (1999b). Some of these may have served as projectile points, although they are generally broader, thicker, heavier, and not as well thinned. Of the 130 total projectile points examined, 116 specimens were adequate for analysis; 14 were too fragmentary to allow classification. The sample included 38 specimens collected from 15 documented sites (LGN-1, 2, 3, 4, 9, 13, 17, 18, 26, 27, 29, 30 and LM-1, 2 and 3) and 78 specimens from the Muñoz Collection. As noted, these latter points were recovered in the vicinity of Laguna Guerrero Negro, in many cases most likely from sites recorded as part of the UC-INAH project, and at locations at the south end of Laguna Manuela. All projectile points visible during the UC-INAH inventory effort were collected.

Because of past collecting, the biases regarding representativeness that previous projectile point removal present to the collection from the UC-INAH efforts are uncertain. However, by including the Muñoz Collection specimens in this analysis the total range of projectile point types that would be expected in the region can be approximated. Furthermore, shifting sands probably periodically expose buried projectile points. Such exposures, then, followed by formal collecting procedures would be expected to offset the past collecting biases to some extent. Earlier sites would tend to be less visible over time and perhaps in some cases destroyed by geomorphological processes.

Previous research in the central peninsula (Carmean 1994, Hyland 1997, Massey 1966a; Ritter 1979, 1994, 1995, 1997; Ritter and Payen 1992, and Smith 1986) has led to the definition of a number of projectile point types (or in cases, simply morphological variations of uncertain temporal- functional utility). The definitions of these point types or forms appear to be a blending of types confined to the peninsula and types that have permeated the peninsula from Alta California, the Great Basin, and the Southwest. As will become evident, this appears to be the case regarding the projectile points from the Laguna Guerrero Negro and Laguna Manuela region.

Analysis of the point types included several steps. Each specimen was weighed and standard metric measurements were taken including length, width, and thickness. Measurements were estimated for fragmentary specimens whenever possible (Appendix Table 1). A number of additional measurements were assessed on some of the shouldered points (basal indentation ratio, notch opening index, distal shoulder angle, and proximal shoulder angle). These measurements were derived from Thomas' (1981) central Great Basin metric attribute assessment system or projectile point key. The attempt here is not a blind application of a classification system to a set of projectile points far removed from the Great Basin. It is an attempt to see

how well certain notched projectile points might fit quantitatively with given Great Basin types, especially those within the Elko series. Spatially there appears to be a geographic continuity between Baja California and the Great Basin and Southwest with regard to Elko or Elko-like projectile point distribution. As such, the application was thought to have some merit and serve as a guide. There is no final word regarding that subject in this discussion, however, and the designation of Elko is applied provisionally to some of the points in this sample. Various attributes and graphs regarding the projectile point sample provide much of the empirical data regarding these points. In addition, many of the points have been illustrated to assist the reader in forming an opinion concerning the typology's usefulness.

For the most part the analysis relies on projectile point types previously defined through a largely objective fashion based on quantifying attributes. However, a measure of subjectivity was also applied in this study. As further work progresses in the central peninsula, this classification can be better assessed and modified as necessary.

Each sample was assigned to one of the following four material classes: 1) obsidian (OBS in Appendix Table 1) (exclusively from the Valle del Azufre source [Shackley 1999, Shackley et al. 1996]), 2) quartz (QTZ), 3) cryptocrystalline silicates (CCS), which include silicified tuff, felsite, and, possibly, chert; and 4) fine grained volcanics (FGV) which consist of basalt and rhyolite or rhyolite-like rock. These latter materials are probably from the mountainous spine of the central peninsula, drainages emanating from this range and flowing to the Pacific side, or from the small volcanic hills at the north end of Laguna Manuela. The above information, along with site data and a drawing of the specimen, was recorded on cards. Any general information specific to individual specimens was also noted on these cards. For example, observations pertaining to manufacture techniques, use wear, or breakage were noted.

The 116 classifiable specimens comprising the study were divided into three categories based on morphology: 1) Guerrero Negro Series projectile points; 2) Elko-like projectile points, and 3) a catch-all category of eccentric projectile points and unique or locally rare types (Fig. 2).

Guerrero Negro Series Projectile Points

The Guerrero Negro series artifact (Figs. 5a-l, n-p; 6a-f) is by far the most common projectile point found in the study area. The research identified 51 of this type. Twenty-eight of these points were collected during the 1997 field project. Ritter and Payen defined this type based on work at nearby Laguna Ojo de Liebre. This is the only point series found by Ritter and Payen (1992) at a site along nearby Laguna Ojo de Liebre aside from an infrequent small stemmed type. The Guerrero Negro Series points are well-made, thin triangular artifacts with slightly concave to triangular bases and frequent fine serrations along the blade. Ritter and Payen (1992:257) found a division in their sample of point lengths with a break between 2.9 cm and 3.6 cm. This division does not stand up with this larger sample. However, there is a division in the Laguna Guerrero Negro sample by weight, and to a lesser extent by thickness

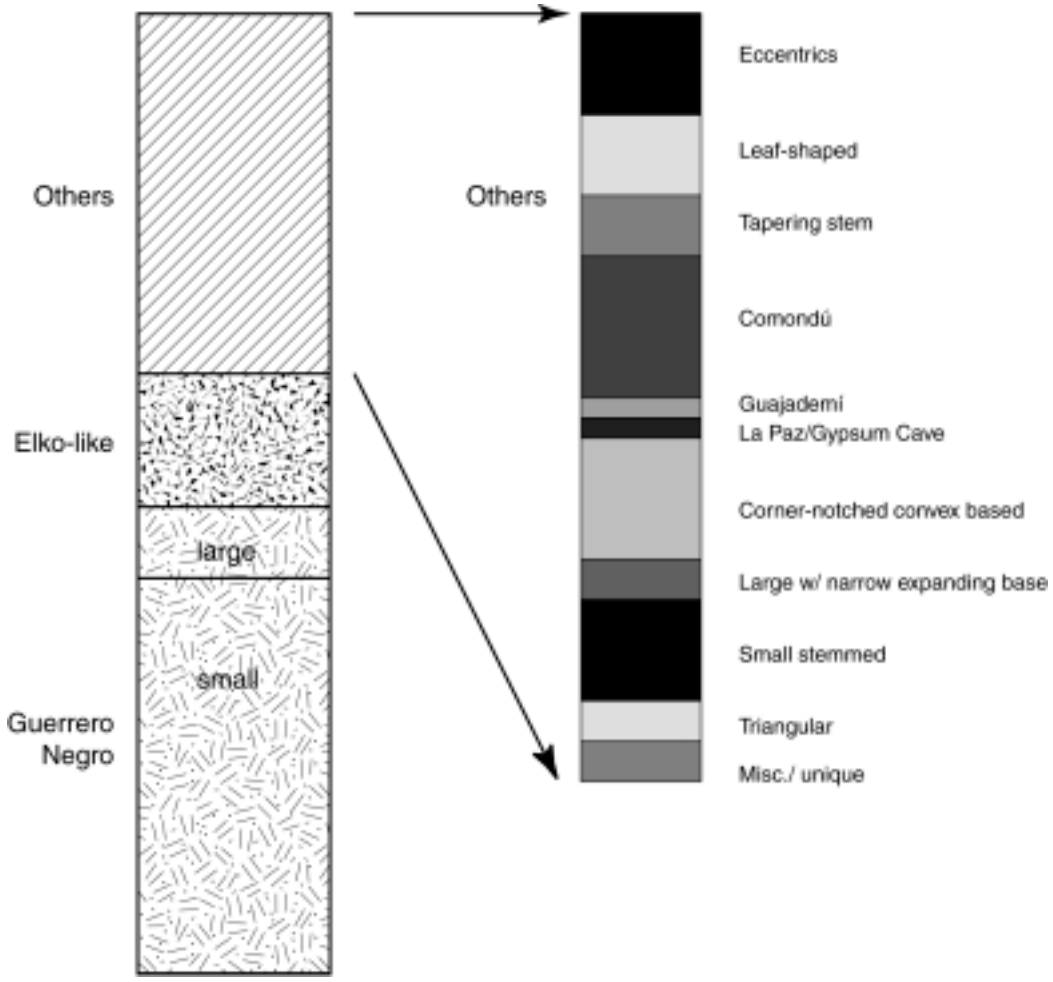

Fig. 2. Relative frequency of general projectile point forms from combined collections; with small versus large Guerrero Negro Series projectile points; and with relative frequencies of Other point types.

(Figs. 3 and 4). No points were found that weigh between 4.4 grams and 8.2 grams. That the earlier division no longer holds true is probably a reflection of the small sample size of Ritter and Payen (1992). They found few points of the larger range, once again a probable nuance of sampling. A two-fold division is proposed here for the Guerrero Negro projectile point series, but in this case at a larger scale than previously as discussed above. There are 42 points that fall within the small subdivision and nine that fall within the large subdivision (Appendix Table 1).

Obsidian hydration readings and presumed artifact associations indicate this point type is a late prehistoric form. Twelve obsidian hydration readings on Guerrero Negro Series projectile

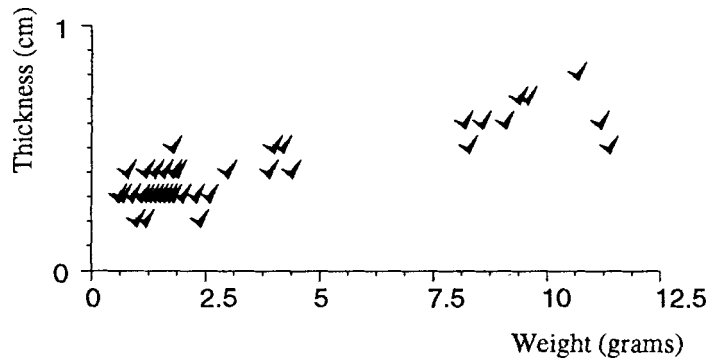

Fig. 3. Scatter diagram of weight versus thickness of Guerrero Negro Series projectile points clearly illustrating series division.

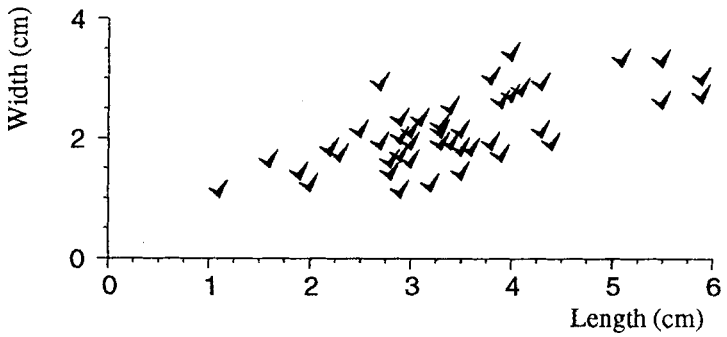

Fig. 4. Scatter diagram of length versus width of Guerrero Negro Series projectile points that illustrates possible division within this type.

points (Appendix Table 2) range from 1.1 to 3.95 microns with a mean of 2.5 microns (standard deveiation of 0.6). There is a double band on one specimen (LGN-18-41) with readings of 2.56 and 4.24 microns suggesting obsidian reuse (see King 1999). At one site, LGN-1, these points were found in association with Spanish-era historic remains from the late 1500s to early 1800s (Ritter 1999). For comparative purposes, obsidian hydration readings from all obsidian artifacts analyzed are included in the table, a sample spread among sites and artifact types.

Ritter and Payen (1992:257-258) have discussed in some detail the possible coastal distribution and function of these points. They believe they may have served largely as insets on bone

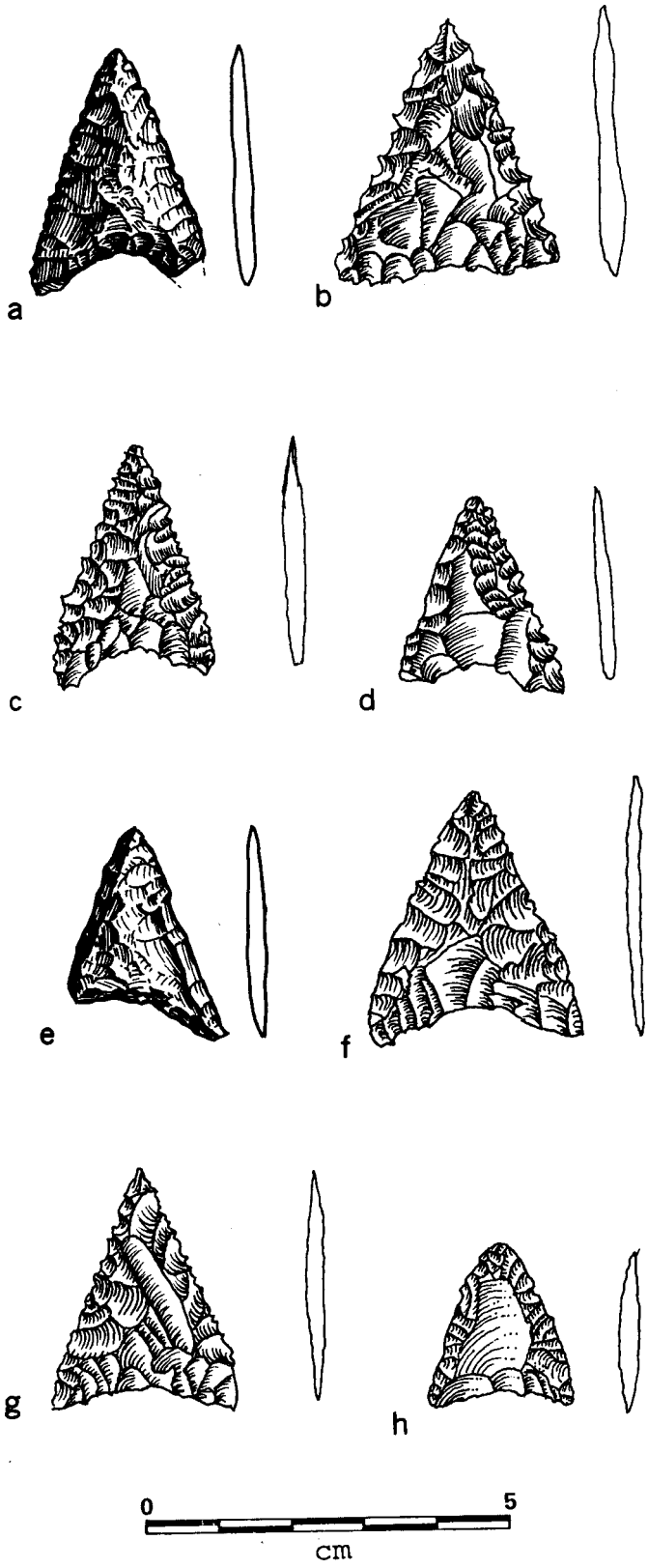

Fig. 5. Projectile Points,

a. LGN-3 (Guerrero Negro Series)obsidian,

b. 495-161 (Guerrero Negro Series) Cryptocrystalline silicate,

c. 495-272 (Guerrero Negro Series) obsidian,

d. 495-PJ293 (Guerrero Negro Series) obsidian,

e. LGN-1-177 (Guerrero Negro Series) obsidian,

f. 495-PJ270 (Guerrero Negro Series) obsidian,

g. 495-PJ303 (Guerrero Negro Series) cryptocrystalline silicate,

h. 495-PJ274 (Guerrero Negro Series) obsidian.

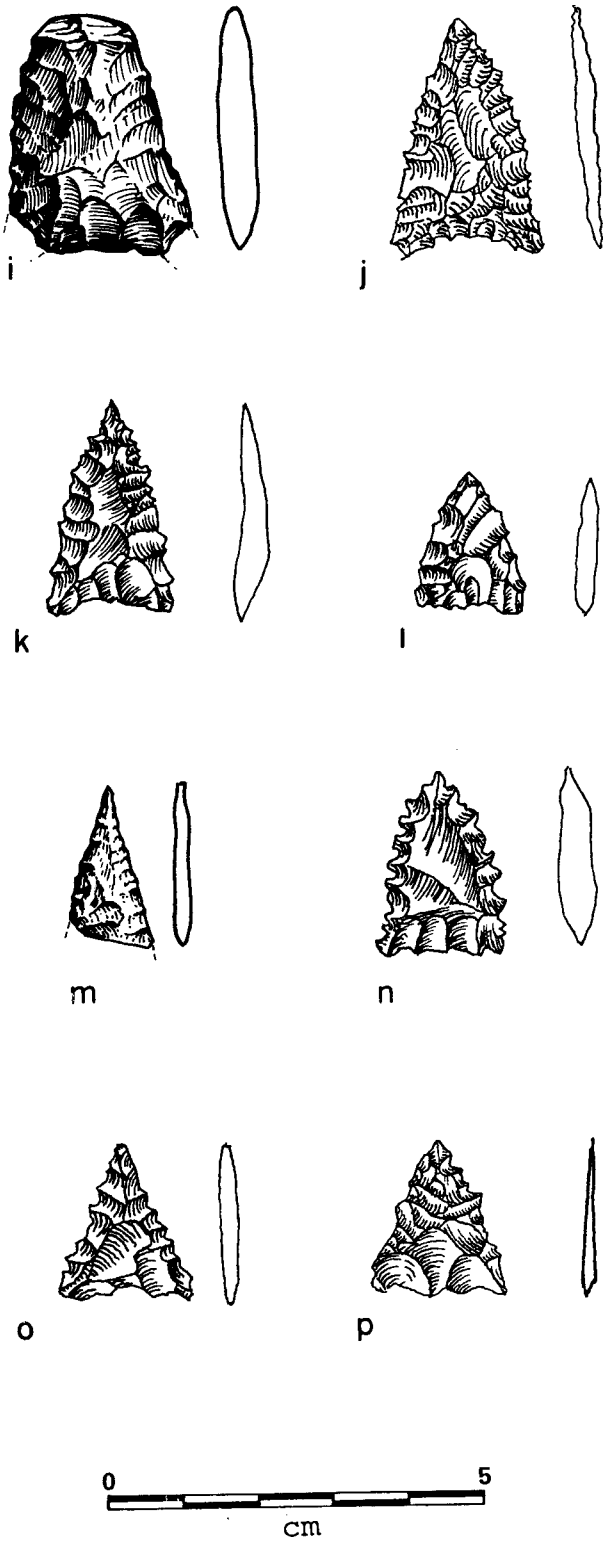

Fig. 5. Projectile Points, cont.

i. LGN-4 (Guerrero Negro Series) obsidian,

j. 495-PJ301 (Guerrero Negro Series) obsidian,

k. 495-PJ301 (Guerrero Negro Series) obsidian,

l. 495-288 (Guerrero Negro Series) obsidian,

m. LGN-1-156 (Unknown series) green glass,

n. 495-143 (Guerrero Negro Series) obsidian,

o. 495-PJ265 (Guerrero Negro Series) obsidian,

p. 495-147 (Guerrero Negro Series) (Laguna Manuela) obsidian.

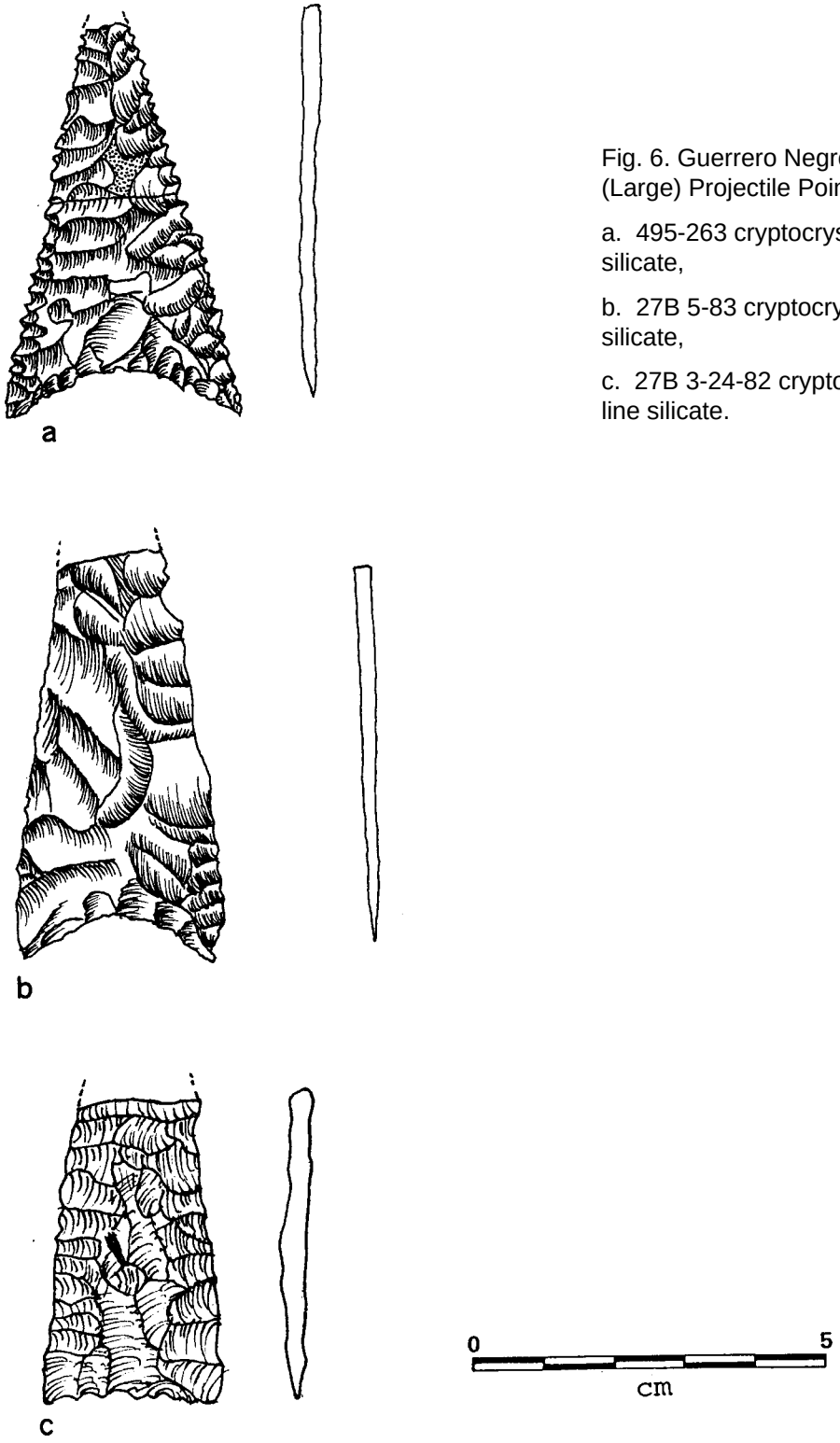

Fig. 6. Guerrero Negro Series (Large) Projectile Points,

a. 495-263 cryptocrystalline silicate,

b. 27B 5-83 cryptocrystalline silicate,

c. 27B 3-24-82 cryptocrystalline silicate.

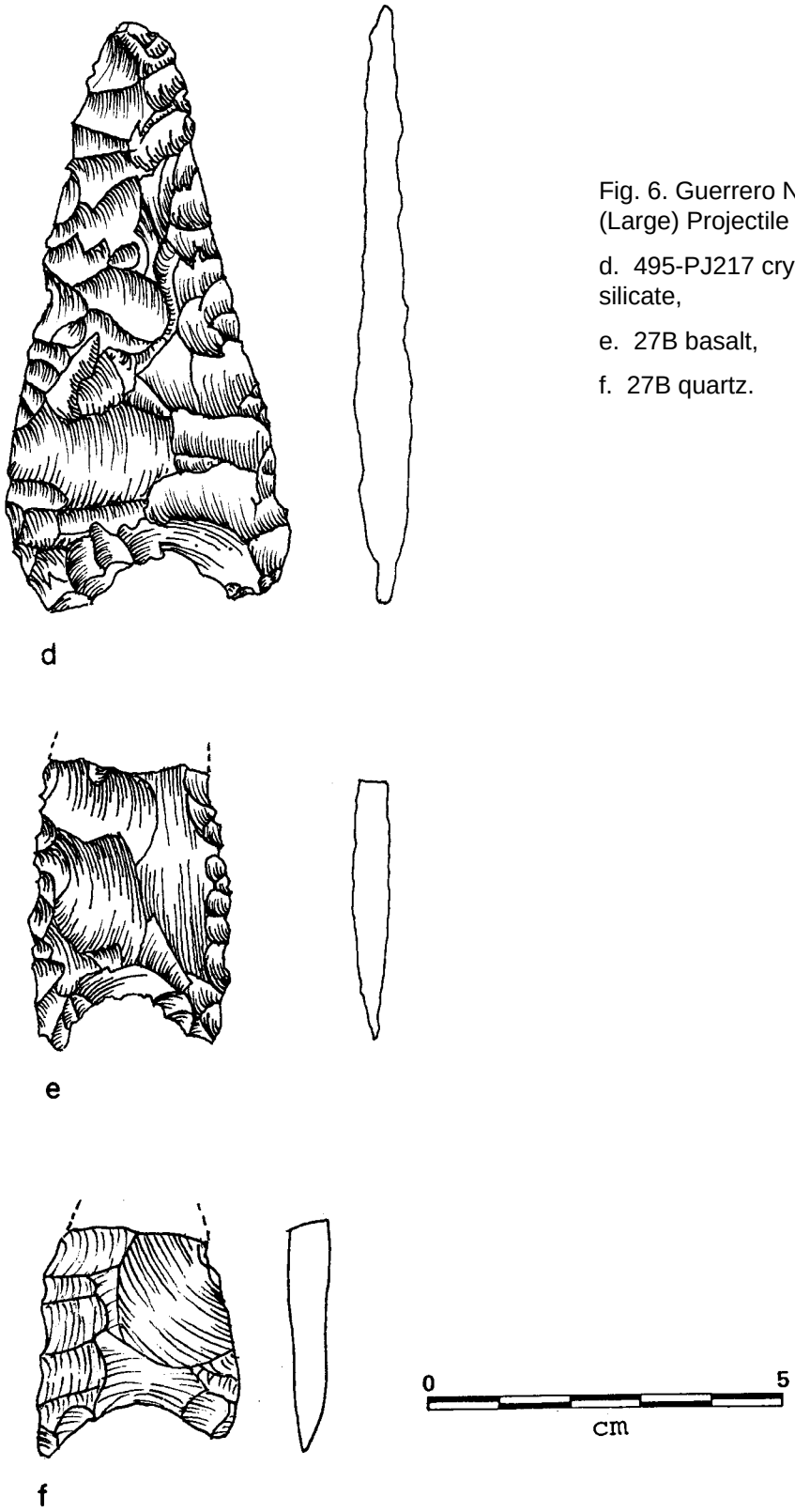

Fig. 6. Guerrero Negro Series (Large) Projectile Points, cont.

d. 495-PJ217 cryptocrystalline silicate,

e. 27B basalt,

f. 27B quartz.

or wood harpoon heads for use in penetrating the tough skin of sea mammals in the central west peninsula coast region, as was the case for Pacific coastal groups further north in California and Oregon. It is also possible they were points specifically made for tipping arrows used in hunting sea mammals and other local game along the coast, or they may have served more than one function.

The larger style of this point series, as defined in this study, may have served a different purpose than the smaller variety, at least for some specimens. These may have been attached to larger harpoons or spears or even been hafted on a small handle. The question of projectile point ended harpoons versus bone harpoons as found regionally is somewhat puzzling, temporal factors aside. Each form may have functioned differently: bone fish and turtle harpoons versus flaked stone projectile point tipped sea mammal harpoons (see Ritter and Payen 1992:Fig.15.2).

Debitage (core flakes, large flakes, pressure flakes) and biface series suggest these points were made locally from imported obsidian and other materials. At least one specimen exhibits an apparent manufacture break. Many others appear to have been broken in use and discarded at the local sites. A few exhibit some reworking.

Elko-like Series

Only one Elko-like point was found during the 1997 fieldwork that focused on Laguna Guerrero Negro. However, within the Muñoz Collection from the region there are 16 points that fall within this category (four additional points that appear Elko-like from the region in the Muñoz Collection are not included in Appendix Table 1)(Fig. 7a-l). These points include a number from the southerly portion of Laguna Manuela. (The 1999 expedition also recovered a dozen or so Elko-like points from the Laguna Manuela area, but, since analysis of this season's findings is still underway, further data on these must wait for a future publication).

Intuitively, these points appear to be largely Elko in style as defined by Heizer and Baumhoff (1961) and Hester and Heizer (1973), and they relate well to points discussed by Rogers (1939) at the Baja California gateway to the north in the Colorado Desert and by Haury (1950) from Ventana Cave in southern Arizona. Massey (1966a) illustrates and discusses a number of these points from throughout the southern peninsula. Ritter (1979) has discussed in some detail the Elko question and the possible relationships of these Elko-like points to the Pinto (Amsden 1935:44; Plate 13 and Rogers 1939:54; Plate 13) and San Pedro types (Haury 1950:Fig. 62a-g) based on a large collection from the Bahía de la Concepción region on the Gulf coast. He has identified numerous points that are Elko-like in that region. Carmean (1994:58, 68) describes similar specimens from southern peninsula sites. Hyland (1997:299-300) found Elko-like points to be the third most common projectile point (following Comondú Serrated and Comondú Triangular types) in his mostly upland central peninsular study.

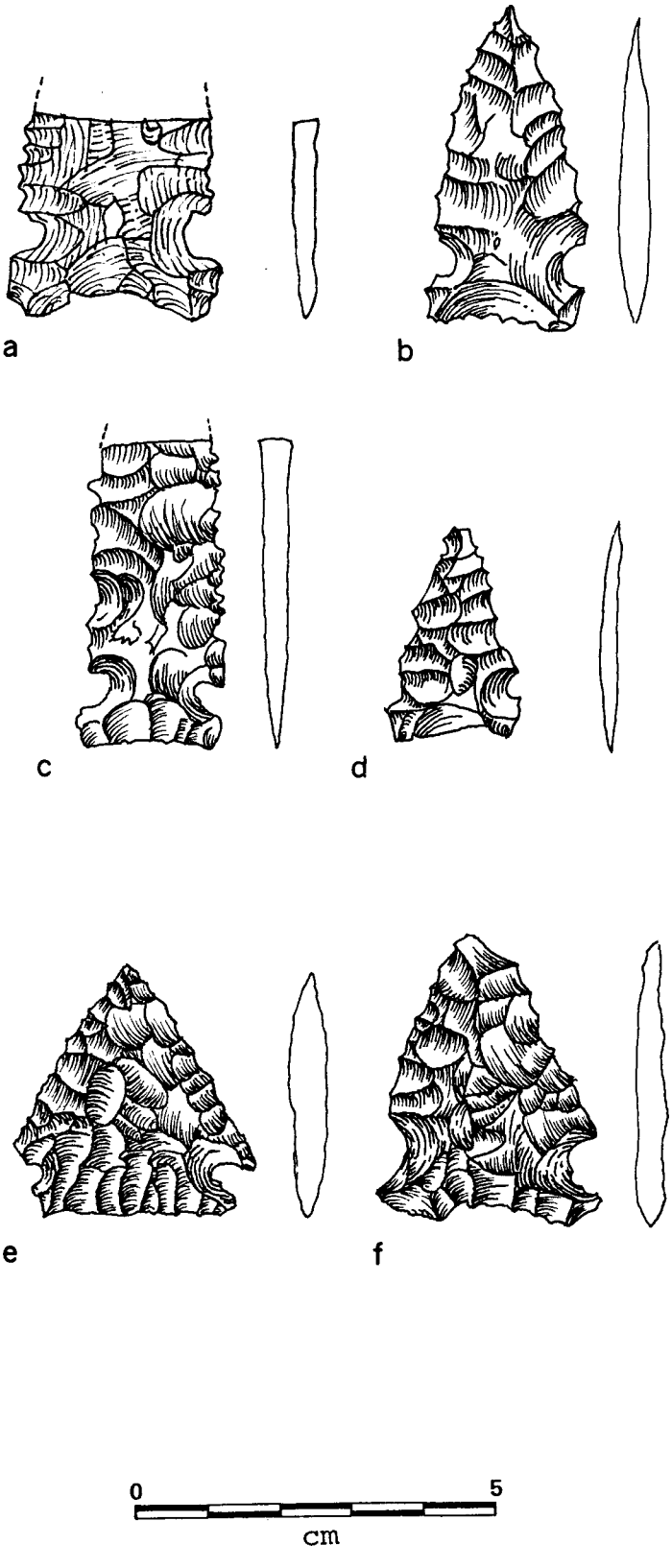

Fig. 7. Elko-like Projectile Points

a. 27B 28-92 (side-notched) cryptocrystalline silicate,

b. PJ235 (side-notched) cryptocrystalline silicate,

c. 11-81 (side-notched) cryptocrystalline silicate,

d. A32 (side-notched) cryptocrystalline silicate,

e. 27-26 (corner-notched) cryptocrystalline silicate,

f. 27-46 495-169 (corner-notched) fine-grained volcanic.

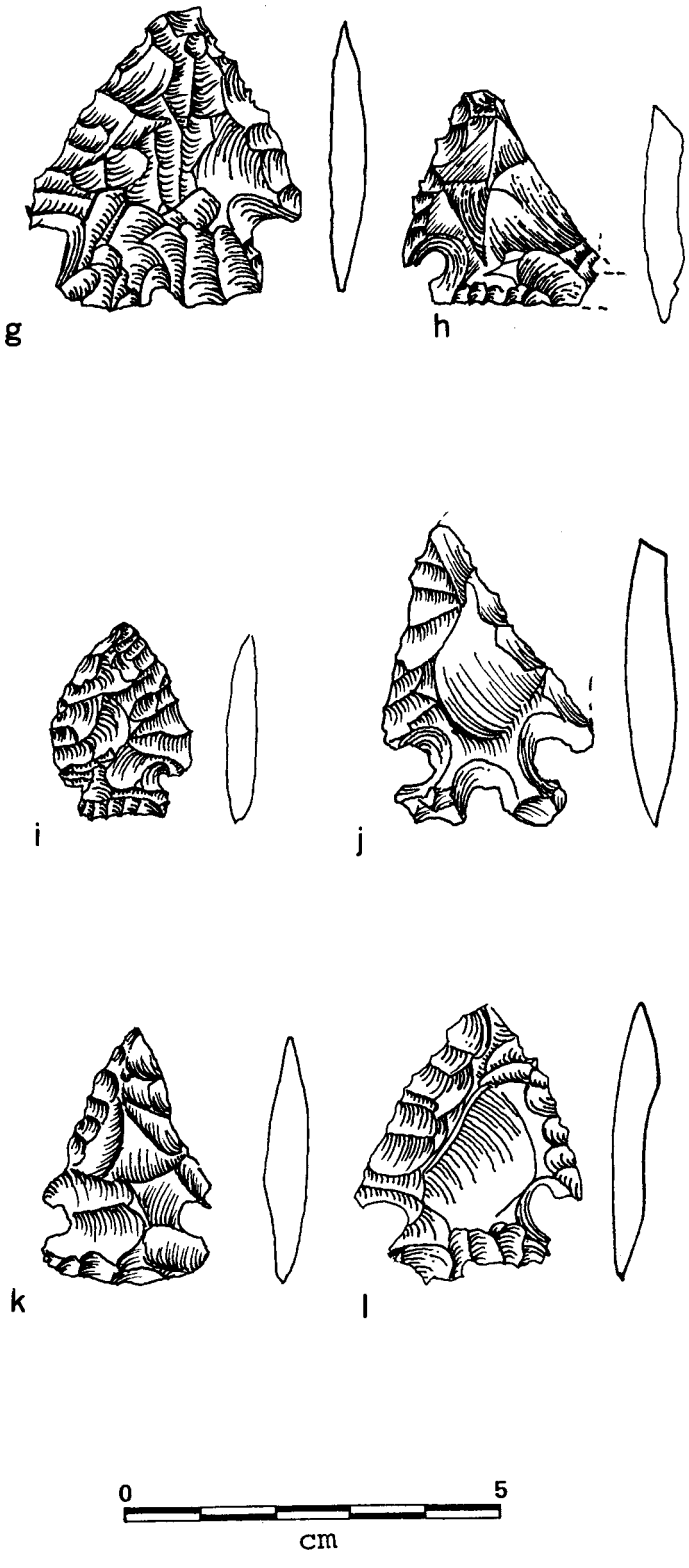

Fig. 7. Elko-like Projectile Points, cont.

g. PJ229-495 (corner-notched) basalt,

h. 27-11-81 (corner-notched) cryptocrystalline silicate,

i. A32 (corner-notched) obsidian,

j. PJ231 (eared) basalt,

k. 27B 3-24-83 (corner-notched) cryptocrystalline silicate,

l. 27B (corner-notched) obsidian.

It is recognized that these Laguna Guerrero Negro/Laguna Manuela points are Elko-like, but also in some cases San Pedro-like (Fig. 7a-c) and Pinto-like (Fig. 7d, j?). It is still possible that some or all may be distinct types to the peninsula.

As an aid in the inquiry, points that intuitively seem to fit the Elko category of the Great Basin were subjected to Thomas' (1981) key as discussed above. It is fully realized that the key was not set up for this portion of North America and that there are probably aerial and temporal variations as between more gracile and more robust forms (see Beck 1995). Still, the points selected when keyed fall into the Elko series, with nine side-notched (one of which was not keyed), six corner-notched, and two eared. Based on a subjective assessment and use of the Thomas key, these points are labeled Elko-like, although Thomas and Bierwirth (1983:180) have rejected the side-notched and contracting stem types as time-sensitive.

Only two of the seventeen points, both side-notched varieties, are obsidian (Fig. 7i, l) as compared to almost all of the Guerrero Negro series points. The remainder are made from fine-grained to cryptocrystalline igneous rock. It is likely that these points were brought into the Laguna Guerrero Negro region and not manufactured locally. Most Elko-like points appear to have been broken during use. At least one has been reworked (see Appendix Table 1).

Dating of these points is uncertain in this region. At Gatecliff Shelter in central Nevada, Thomas and Bierwirth (1983:182) found Elko corner-notched and eared types to date between 1300 B.C. and A.D. 700 (in uncorrected radiocarbon years). Fowler, Madsen, and Hattori (1993) in their excavations in southeastern Nevada date Elko points between 5,000 and 6,000 years ago. Moore (1999) has radiocarbon dates from two San Quintín-El Rosario region sites with Elko-like points that date from around 6200 years and 3700 years before present (adjusted for reservoir effect). In Orange County in southern California, Koerper et al. (1996) suggest that arrow-sized points (ones that would replace the Elko-like dart points) appeared ca. A.D. 400.

How these dates fit within the Laguna Guerrero Negro region is uncertain and the Elko dating issue is far from resolved in the peninsula. It is even possible that the studied Elko-like points were scavenged from older sites. Most of the obsidian hydration values (Appendix Table 2) suggest late regional occupation, although the tail end of Elko-like point use at the earliest substantial residency within the region cannot be ruled out, and more of the Elko-like points seem to occur at sites not well-dated as yet (i.e. 1999 finds). Furthermore, an occasional hunter or party of Indians may have briefly visited the region during the middle Archaic periods.

Eccentrics, Unique and Rare, or Unnamed Projectile Points

This grouping includes any unique, locally rare, eccentric, unclassifiable or unnamed projectile point, with a few in the eccentric category that may be perforators (Figs. 8, 9, 10). Each is briefly discussed below (see Appendix Table 1).

Unnamed Triangular Glass Projectile Point

A triangular green glass tip of a probable arrow point was recovered from site LGN-1 (Fig. 5m). Also found at this site was green glass debitage, possibly from a paneled bottle. It is uncertain whether the green glass was derived from one of the missions in the mountains to the east or from historic debris along the outer coast of Laguna Guerrero Negro, some of which dates to at least the 1570s, if not before (see Ritter 1999, Von der Porten 1999).

Eccentrics or Perforators

This category applies to medium-sized needle-nosed, deeply serrated or notched flaked stone artifacts with variable bases. One or more of these five artifacts may be perforators, in several cases reworked projectile points (Fig. 8a,b). Smith (1986) discusses similar points from the Laguna San Ignacio area to the south, and the senior author has seen private collections from that area with many similar points. They also have been noted in private collections from the Sierra de San Francisco and in projectile point samples recovered by Hyland (1997:301) from the central peninsula. Massey (1966a:41, 42, 53) appears to place varieties of these points in different categories as illustrated in his publication. These include IB2, IC1 and IIB3b1 types. Small versions of IC1 are attributed by Massey (1966a:10) to the Comondú period. Carmean (1994:66) also includes several possible related examples from south peninsula sites.

Comondú Series Points

Seven of the small Comondú Serrated or Side-notched subtype examples characteristic of the late prehistoric Comondú period (Massey 1966b) are present in the Muñoz Collection. These points are all obsidian and include both serrated and non-serrated specimens (Fig. 8c-f). Points like these are thought to be affiliated with the Comondú period (Massey 1966b) and occur throughout the southern two-thirds or so of the peninsula (see Massey 1966a:12; Ritter 1979, 1994, 1995, 1997; Carmean 1994:57, 66; and Hyland 1997:300). Ritter (1979:177-180) has defined two subtypes, a triangular and a serrated/side notched variety. One of the triangular subtypes may include a small specimen (LGN-30-10) not listed on Appendix Table 1 that has the end worked into a sharp perforator. Two additional obsidian specimens from the general region not included in the table include an example with a slightly concave base (2.53 x 1.19 x 0.28 cm, 1.6 gm) and another with a straight base (1.88 x 1.3 x 0.39 cm, 1.4 gm). Massey (1966a:56) illustrates a similar specimen to the perforator-like example discussed above and labels it a drill. It is suspected that these Comondú points were probably coming from the Sierra de San Francisco, if they were not made locally, for use on arrows in procuring various game animals and for protection. This is the most common projectile point series in the central highland region (see Hyland 1997:302). The few obsidian hydration readings on Comondú points (Appendix Table 2) fall within the Guerrero Negro Series range suggesting concurrent use and perhaps a functional dichotomy (i.e. harpoon inset versus arrow point).

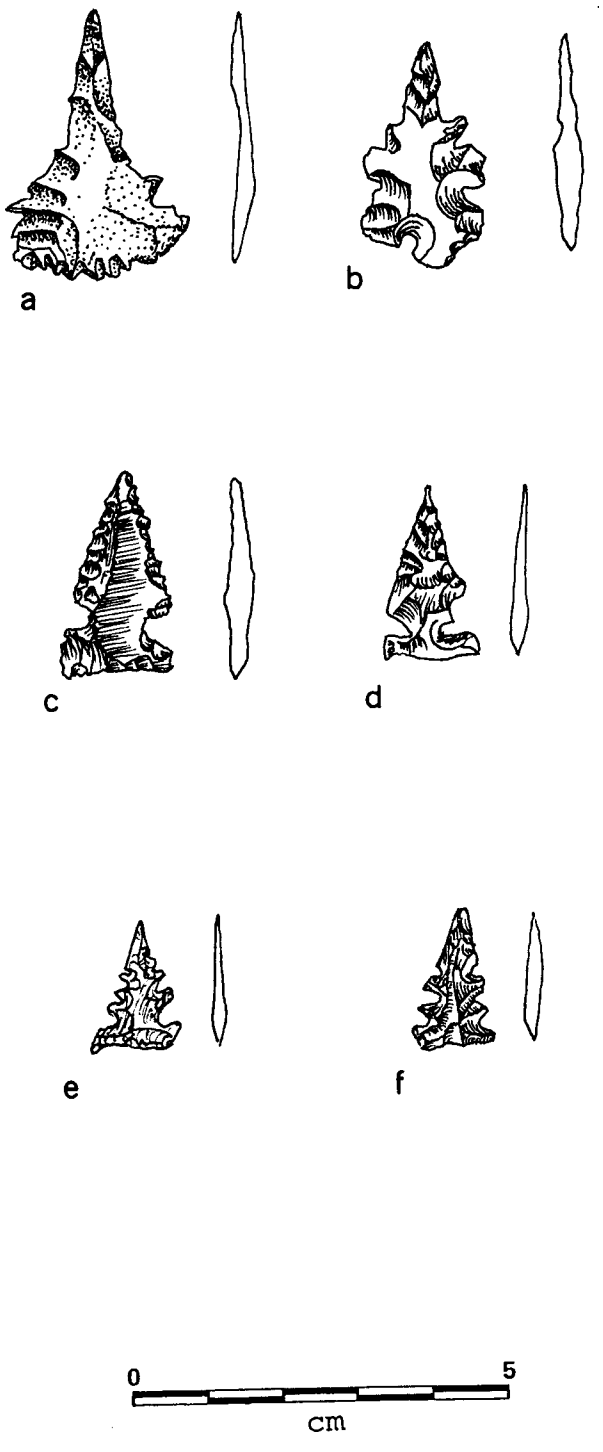

Fig. 8 Projectile Points/Perforators,

a. 495-144 1B-21 (perforator) obsidian,

b. 27-59-495 (eccentric) obsidian,

c. 27-55-49-150 (Comondú Series) obsidian,

d. 27-57-495-148 (Comondú Series) obsidian,

e. 27-40 (Comondú Series) obsidian,

f. 27-495-149 (Comondú Series) obsidian.

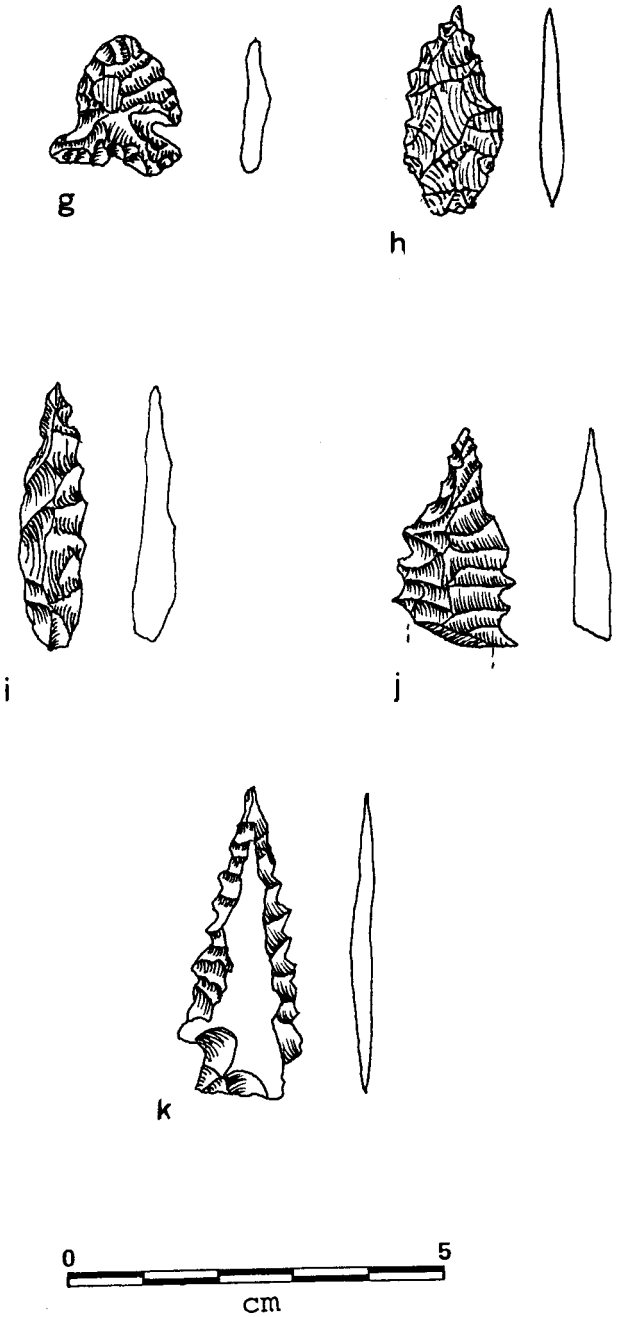

Fig. 8 Projectile Points/Perforators, cont.

g. 27-85 (Guajademí Split-Stemmed) obsidian,

h. 27B 2-5-92 (leaf-shaped) obsidian,

i. 27-48 495-155 (leaf-shaped) cryptocrystalline silicate,

j. 27-1181 (miscellaneous unique) basalt,

k. 27 PJ233 (miscellaneous unique) felsite/chert.

Guajademí Split-Stemmed Point

A single cryptocrystalline silicate example of this point type is represented in the Muñoz Collection (Fig. 8g). This squat point type was defined by Ritter (1979:180-181) as a small point with a split stem with ovate or straight blades and straight or sloping shoulders. Bases are usually wider than the blade and the haft element juncture is lateral-lateral or lateral-basal coincidental (cf. Binford 1963:212). Massey (1966a:53) illustrates one of these points from the southern peninsula and Carmean (1994:68) may have one or two examples in her analyzed collection (of Massey) from the same region. Hyland (1997:299) lumps this form in his Elko category, although as originally defined (Ritter 1979:180-181) they are arrow point in size. They are probably associated with the Comondú period. A single obsidian hydration reading (Appendix Table 2) suggests a late prehistoric affiliation.

Leaf-Shaped Points

These points are in essence final stage bifaces lacking hafting elements. Four are within the collection, none of which is obsidian (Fig. 8h,i). One quartz specimen appears slightly shouldered and one point has blade serrations (Fig. 10h). No two are alike. A crystalline quartz specimen (LGN-2-6) has a nib on the tip, possibly for graving. Another specimen (27-48-495-155)(Fig. 8i), chert-like, is long and thin and could have been hafted as a perforator since it is narrow at the tip. Overall, these are probably as much specialized tools as projectile points. These artifacts have no real defined cultural affinity and appear widespread in the peninsula (see Carmean 1994:55, and Hyland 1997:300).

Miscellaneous Unique

Another small grouping of projectile points was not easily classified. One basalt specimen may fit within the eccentric category as it was deeply serrated along the blade with a narrow, tapering tip (Fig. 8j) (see Hyland 1997:513 for a comparable example from the highlands to the east). The base configuration is uncertain. A similar larger specimen is illustrated in Massey (1966a:Fig. 5). The second specimen is a medium-size corner-notched point of felsite or chert with a straight sided blade that has been moderately deeply serrated (Fig. 8k). The point has been corner-notched and the short base is slightly concave. Both were probably used on arrows during late prehistory. This latter specimen is not among those points discussed by Ritter (1979, 1994, 1995, 1997) nor Massey (1966a) as near as can be ascertained.

Tapering Stem, Diamond, Ovate Base Points

These three specimens are variations of small bifaces with shouldering in two of the three examples forming a diamond shaped-outline (Fig. 9a). The third example is a convex-based example with a graver-like tip. All artifacts are obsidian and these may represent reworking of other forms and/or specialized tools that were not projectile points, such as the possible graver

mentioned above. They do not fit within any easily defined category and obsidian hydration suggests they are late prehistoric in age (Appendix Table 2).

La Paz/Gypsum Cave-like

A single cryptocrystalline silicate specimen of a dart-size tapering stem projectile point is included in the Muñoz Collection (Fig. 9b). These points are discussed at length in Massey (1966b:37) and Ritter (1979:190-194) and are listed in the groupings of Carmean (1994:60, 61, 63-66) from the southern peninsula. Hyland (1997:300) found 15 examples (six per cent of his collection) in his central peninsula study focusing on the Sierra de San Francisco. They may have an origin from northern sources, including the Great Basin and Southwest. These points appear to generally predate the Comondú period and probably occur throughout the peninsula, at least in the Gypsum Cave-like form, probably approximating the time span of the Elko-like points. (Also consider in cases possible rejuvenation following breakage of Elko-like points into smaller La Paz/Gypsum Cave like points [cf. Flenniken and Raymond 1978]).

Unnamed Small Stemmed

Five of these projectile points are from the Muñoz Collection and include obsidian, basalt, and cryptocrystalline silicate volcanic materials (Fig. 9c-f). These are relatively small projectile points, perhaps arrow points characterized by a straight-sided blade and basal notching leaving a short, generally tapering to straight-sided stem. Little, if any, development of barbs is evident. Massey (1966a:20) lists these points noting a concentration in the Mulegé area. Ritter (1979:Fig. 45) lumps these with the La Paz/Gypsum Cave type, which probably is not correct based on morphology, size, and apparent absence of extensive rejuvenation. They reasonably should stand as a separate type, perhaps early Comondú period or slightly earlier considering their possible association with the bow and arrow.

Unnamed Triangular

These two moderate-sized cryptocrystalline silicate points are long, narrow triangular points, very nicely made with straight bases (Fig. 9g-h). An additional specimen not included in the original analysis and table from the same Laguna Guerrero Negro region is silicified tuff, nearly 5.0 cm long, 2.57 cm wide, and 0.57 cm thick with an estimated weight of 8.0 grams. Massey (1966a:11, 43) discusses and illustrates a number of these points, noted as occurring throughout the southern peninsula and, at least in smaller sizes, relates them to the Comondú period. With a rare exception, Ritter (1979) did not find these points in the Bahía de la Concepción region. Hyland (1997:300) records 13 (six per cent) large triangular points in his upland central peninsula study.

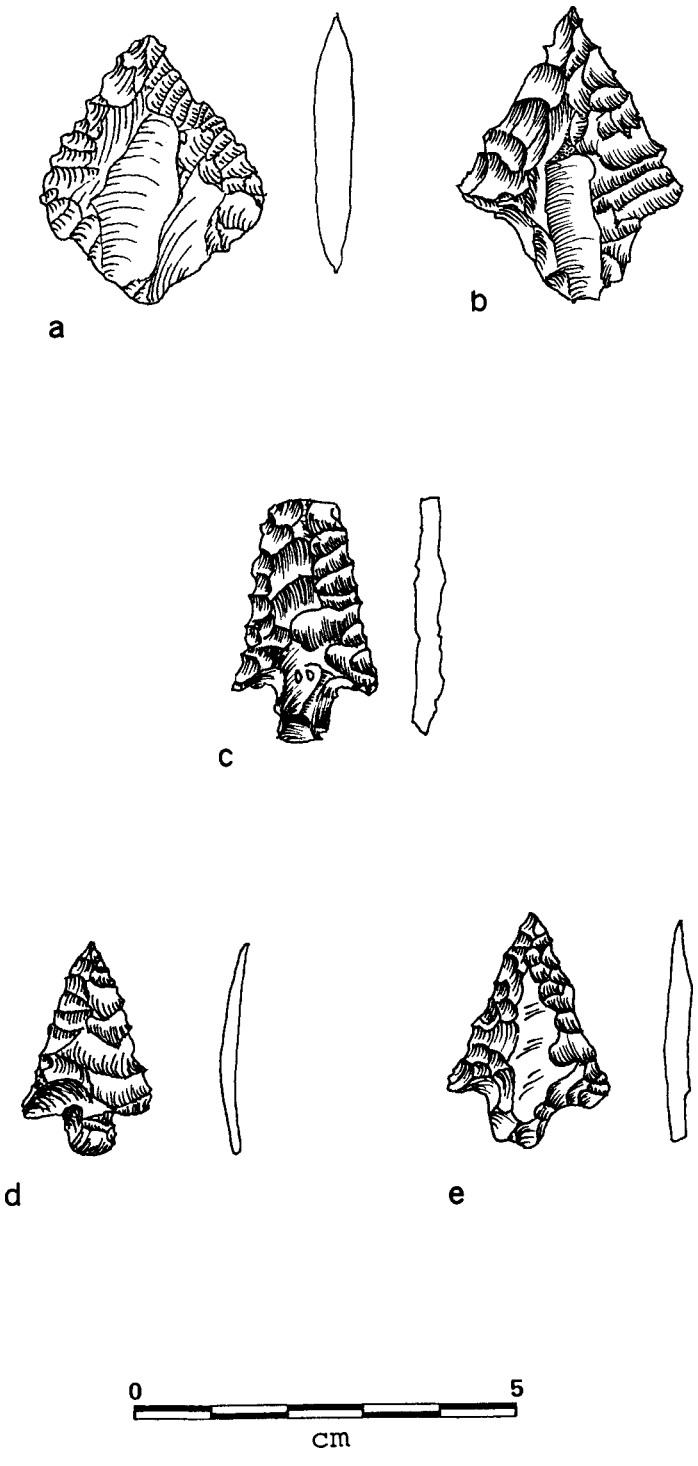

Fig. 9. Miscellaneous Types, Projectile Points,

a. 495 PJ225 (diamond-shaped) obsidian,

b. 27-495-170 (unnamed small tapering stemmed) cryptocrystalline silicate,

c. 27-4-10-78 (unnamed small tapering stemmed) cryptocrystalline silicate,

d. 27-11-495 (unnamed small tapering stemmed) obsidian,

e. 72-27 (unnamed small tapering stemmed) cryptocrystalline silicate.

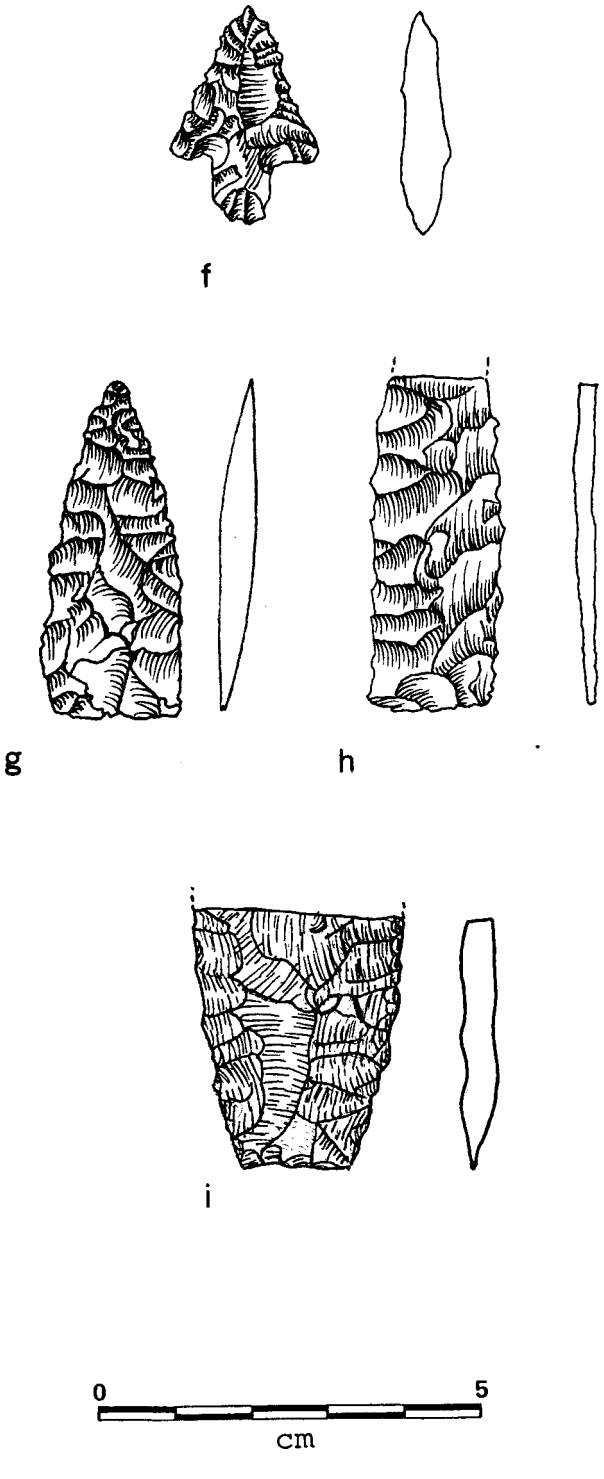

Fig. 9. Miscellaneous Types, Projectile Points, cont.

f. 27-11 495-143 1/3 (unnamed small tapering stemmed) obsidian,

g. 2-7-92 (unnamed triangular) cryptocrystalline silicate,

h. 6-30-82 (unnamed triangular) cryptocrystalline silicate,

i. 27B (unnamed series) possibly “early” basalt.

Possible Wide Stemmed Point

A somewhat weathered base of a possible wide-stemmed variant point of basalt was found along the east shore of Laguna Guerrero Negro. It is in the Muñoz Collection (Fig. 9i). This stem is 2.79 cm wide, 0.67 cm thick, and the entire point probably exceeded six centimeters in length. It may have a shoulder on one side. The base is tapered, straight on the bottom, and thinned by careful pressure flaking. It is also possible that this is merely a well-made biface/knife. If this is a wide-stemmed variant such as a Silver Lake form present in the western Great Basin and found in Baja California in the Bahía de la Concepción region (Ritter 1979:202-203) and observed by the senior author in the Laguna Chapala region (also see Davis 1968, 1971), then it may be associated with early to mid-Holocene times. If this is an older wide-stemmed point, then there may have been sporadic early use of the lagoon region or someone from a later time picked up an earlier point and brought it to the coastal area.

Unnamed Corner-notched with Convex Base

Points of this type are large in size and are distinguished by a straight to ovate-sided blade and corner notches with a convex base that is relatively short in relationship to the long blade. Of the eight specimens analyzed (two not included on Appendix Table 1), only one is obsidian and the remainder are cryptocrystalline silicate, generally volcanic in origin (Fig. 10a-c, e-f). All are from the Muñoz Collection from Laguna Guerrero Negro/south Laguna Manuela sites. These points are infrequent in the Castaldí Collection of Baja California Sur discussed by Massey (1966a), and in this state they have a sporadic distribution. Rounded ends on several examples discussed here suggest they may in cases be hafted knives, while others with sharp tips may have been hafted to lances or spears. This form is grouped in Carmean's (1994:Fig. 2) Cluster 1 from the southern peninsula.

Unnamed Large Points with Narrow Expanding Base

These two points are reminiscent of the points discussed immediately above (Fig. 10d). They are large and long, relatively thin with a straight-sided blade and basal notching that has produced a small, narrow, short convex base. These points are very well-made and both are cryptocrystalline silicate volcanic material. Both these points are from an unrecorded site along the east side of Laguna Guerrero Negro. Such points could have been hafted as knives. They may also be status or ritual pieces due to their size and quality.

Discussion

By numbers alone, the Guerrero Negro Series is the most prevalent projectile point in the region, a type that is associated with the predominant late prehistoric and protohistoric use of the study region. This frequency of occurrence is true for both the scientific-based collections and for those obtained by avocationalists. These points may have been used as harpoon tips

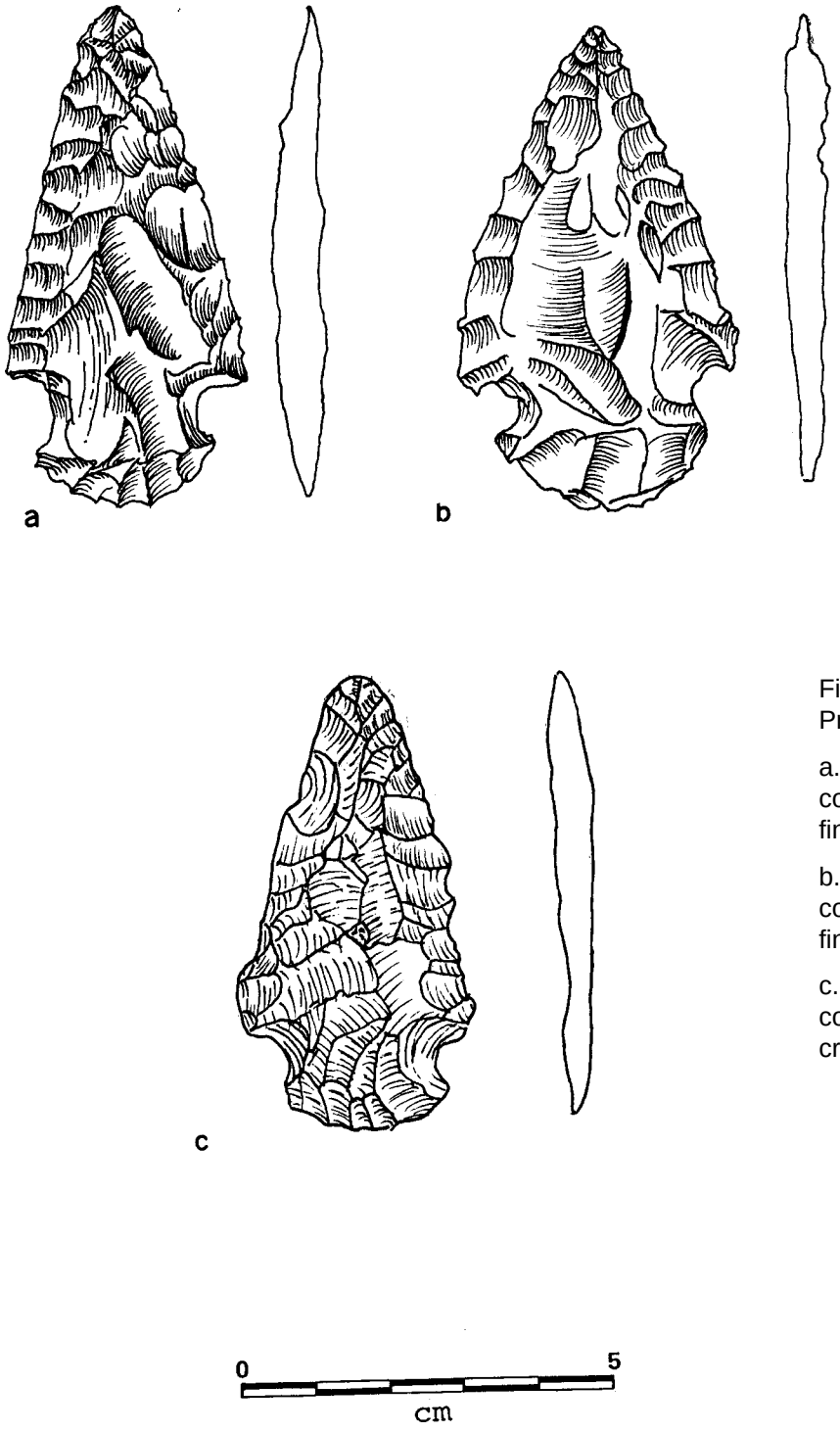

Fig. 10. Large Corner-notched Projectile Points,

a. PJ495-210 (unnamed corner-notched convex base) fine-grained volcanic,

b. PJ495-216 (unnamed corner-notched convex base) fine-grained volcanic,

c. PJ495-209 (unnamed corner-notched convex base) cryptocrystalline silicate.

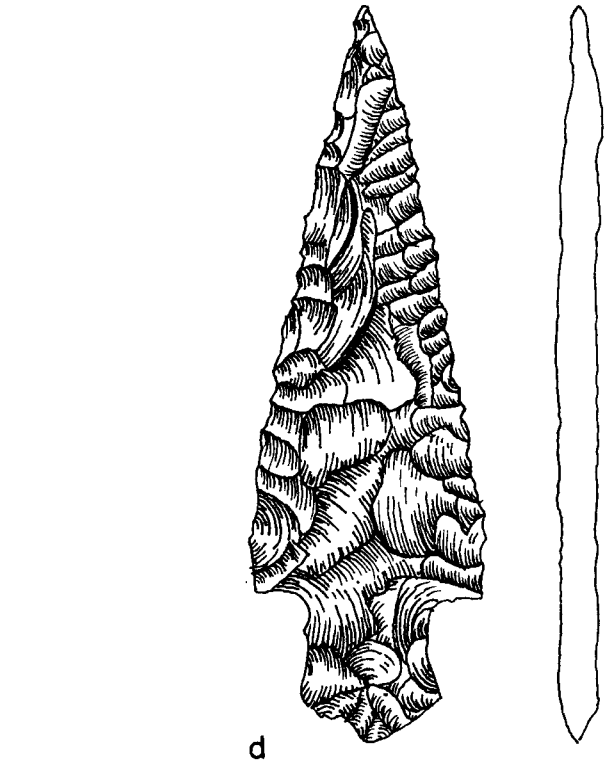

Fig. 10. Large Corner-notched Projectile Points, cont.

d. PJ495-215 (large unnamed type with narrow expanding base) cryptocrystalline silicate,

e. 32-PJ495-185 (unnamed corner-notched with wide convex base) (Laguna Manuela) cryptocrystalline silicate,

f. 32-PJ495-182-212 (unnamed corner-notched with probable wide convex base) (Laguna Manuela) cryptocrystalline silicate.

complemented by other late types that served as arrowheads (Guajademí, Comondú, triangular, and a few others). However, the use of the smaller Guerrero Negro Series points on arrows also, or exclusively, cannot be ruled out.

Some of the types discussed here were probably not projectile points but rather specialized hafted tools (e.g. the eccentrics, and leaf-shaped and diamond-shaped artifacts). Still others may have served as specialized tips for knives or spears/lances, especially the very large points, lasting even into contact times. There are also the largely non-obsidian small stemmed points, the Elko-like points, the La Paz/Gypsum Cave-like point, the long-bladed corner-notched points, and the possible wide stem point that probably reflect pre-Comondú use of the region. This seems intuitively more likely than a late prehistoric pattern of picking up older points from sites and bringing them to camp, although instances of this practice are possible. Furthermore, obsidian hydration readings on various artifacts and flaking debris suggest only late prehistoric use of the sites around Laguna Guerrero Negro. The 1999 UC-INAH inventory of sites along an ancestral Laguna Manuela shoreline included both Guerrero Negro Series as well as Elko-like points. It is possible that this relatively late use of the Laguna Guerrero Negro sites overlaps periods that preceded the introduction of the bow and arrow. The possibility of a co-occurrence of the bow and arrow and the atlatl is also possible (see Massey 1961 for a discussion of atlatl retention into historic times in the Cape), with differing functions (e.g. hunting, ritual, etc.) ascribed to each implement.

This projectile point assemblage is probably a reflection of both temporal and functional variability. The combination of marine and terrestrial animals and shore birds, and especially medium to large-sized mammals and the sea turtle probably necessitated a varying set of flaked stone tips for the kill. This may have been especially true for any procurement from rafts versus hunting on the land, whether along the shore or inland. The point assemblage in part is a reflection of this subsistence variability. Pre-Comondú points probably reflect atlatl-dart hunting in the region, an implement possibly far less efficient in securing larger game animals. This may account to some extent for the scant occupation evidence in this region, putting aside preservation and survey sampling factors.

The projectile point assemblage can be examined in a broader anthropological perspective considering the previously listed works of Ritter (1999), Ritter and Burcell (1999), Shackley (1999), and King (1999). The Three Sisters' Lagoons have overall seen apparent extensive, protracted and productive use, with assemblages predominately late prehistoric and protohistoric. As one proceeds a few kilometers or more away from the current shores of Laguna Guerrero Negro, somewhat earlier evidence, as in the Elko-like points, can be found. Ritter and Payen (1992:25) report a date of 1680 ± 110 B.P.: A.D. 270 (UCR 2319/UCRAMS 82) from a Laguna Ojo de Liebre archaeological site, more in agreement with pre-Comondú times as currently known.

Another consideration in the association of a variety of point types is scavenging from older sites, retention of an older technology (atlatl) following the introduction of the bow and arrow, and interaction among groups with stylistic (ethnic-social) variation (see Wiessner 1983).

Most of the points, with the exception of the Guerrero Negro Series and perhaps a few of the small arrow-like points, were probably carried in by highland visitors. However, flaked stone technology (obsidian, historic glass) strongly suggests that at least small triangular/Guerrero Negro Series points were being made locally from imported stone or scavenged historic glass, based solely on their occurrence at sites with relevant debitage suggesting their local manufacture (see Ritter 1999).

The archaeology of the Laguna Guerrero Negro region represents a distinct Pacific coastal focus, part of an interaction network of central highlands to coast mobility based on focused coastal food-based resource exploitation. This coastal use at its height (at least Comondú) appears to represent a new focus for central peninsula aboriginal peoples.

Why did these coastal lagoons exhibit "pronounced" multi-family and perhaps individual or task-group use during late prehistoric and protohistoric times? While this is discussed at length in Ritter (1999), some possible factors include intrusive group influence (and disruption), late Holocene environmental change, technological change (harpoon type[s]), bow and arrow introduction, and stress management through ritual and diversification/intensification of diet breadth. This last explanation would involve more ritual requiring less leisure time and increased food searches as in rock art production, mortuary ceremonies, cults promoting social change, and various multi-group gatherings. Furthermore, Bernbeck (1991:54) notes that after some time, demographic increase, and an associated depletion of resources, populations tend to disperse into unexploited areas, as from the highlands to certain coastal areas. This pattern helps mediate the subsistence crisis.

There seems to have been short term regularized visits by people to the coast spanning 1000 to 2000 years with the resulting artifact and product transformations and transportations. The schedule may have varied depending on which mountain group was involved with late winter-spring-early summer visitation most probable. The projectile points used clearly reflect an important part of the tool kit in seasonal hunting of marine animals and other game.

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Appendix Table 1. Attributes for Projectile Points: Guerrero Negro Series.

Specimen Number	Description	Length (cm)	Width (cm)	Thickness (cm)	Weight (gms)	Comments:
Small Guerrero Negro Series Points						
LGN-29-15	OBS	3.3	1.9	0.3	(2.0)	Tip retouched, 1 Tang missing.
LM-2-15	OBS	3.9		0.3		Fragment
LGN-3-26	OBS	(4.3)	2.1	0.3	(1.8)	Tip and 1 tang missing.
LGN-1-69	OBS	2.0	1.2	0.3	(1.7)	Tip gone. Hinge break (Impact fracture).
LGN-18-38	CCS	(3.5)	1.4	0.4	(1.9)	Tip and 1 tang missing.
LM-1-10	OBS	(3.5)	2.1	0.2	(2.4)	Tip and 1 tang missing.
LGN-1-171	OBS	3.0	1.6	0.2	(1.2)	
LGN-9-9	OBS	(3.0)	1.9	0.3	(1.5)	Mid-section. Tip and tangs missing.
LGN-20-31	OBS		1.9	0.3	(1.5)	Mid-section. Tip and tangs missing.
LM-2-17	OBS	4.3	2.9	0.3	(2.6)	Tang missing.
LGN-4-5	OBS	2.8	1.6	0.4	1.6	Tang missing. Reworked?
LGN-20-30	OBS	3.6	1.8	0.4	1.8	
LGN-13-5	OBS	2.7	1.9	0.3	(1.5)	
LGN-3	OBS	3.4	1.9	0.3	(1.8)	
LGN-1-80	OBS	2.9	1.1	0.3	(1.5)	Tangs missing.
LGN-1-81	CCS	(3.8)	1.9	0.4	(3.0)	Tip gone. Hinge break. Green Chert.
LGN-1-74	OBS	3.1	2.3	0.3	(1.4)	
LGN-1-88	OBS	(3.5)	1.8	0.3	(1.6)	Tip missing.
LGN-24-21	OBS	1.1	1.1	0.4	0.8	
LGN-18-41	OBS	2.8	1.4	0.3	(1.5)	
LGN-26-27	FGV	3.9	1.7	0.3	(2.3)	Tangs missing.
LGN-1-35	OBS					Midsection.
LGN-17-3	OBS	(2.5)	2.1	0.2	(1.0)	
LGN-1-94	OBS	1.9	1.4	0.3	0.7	
*495-PJ302	OBS	4.0	2.7	0.3	2.3	
*27-55-33	OBS	3.9	2.6	0.3	1.7	
*32-113	OBS	2.2	1.8	0.4	0.8	
*27-86	OBS	2.2	1.8	0.3	0.9	

Appendix Table 1. Attributes for Projectile Points: Guerrero Negro Series, cont.

Specimen Number	Description	Length (cm)	Width (cm)	Thickness (cm)	Weight (gms)	Comments:
*495-	OBS	2.9	2.0	0.4	1.2	
*NO	OBS	1.6	1.6	0.3	0.6	Mahogany OBS.
*27-29	OBS	2.3	1.7	0.4	1.4	Denticulate
*75-27	OBS	2.7	2.9	0.3	2.0	
*27-8	OBS	3.2	1.2	0.3	1.2	
*27-71	OBS	2.9	1.7	0.5	1.8	
*27-84	OBS	3.4	2.5	0.3	1.7	
*27-25	OBS	2.9	2.3	0.3	1.2	
*27-59	OBS	3.3	2.2	0.3	1.3	
*27-24	OBS	3.0	2.1	0.3	1.1	
LM-2-16	OBS	4.4	1.9	0.4	(4.4)	Base, Perverse fracture (manufacture break).
LGN-4	OBS	3.3	2.1	0.5	4.2	Fragment. Reworked.
*405-288	OBS	1.9	1.4	0.5	4.0	
*27-495-161	CCS	3.8	3.0	0.4	3.9	
	mean	3.0	1.9	0.3	1.6	
standard deviation		0.7	0.5	0.1	0.5	
Large Guerrero Negro Series Points						
LGN-27-23	FGV	4.3	2.9	0.5	8.2	
LGN-18-45	FGV	5.5	2.6	0.6	8.6	Andesite??
*27B-3-24-83	QTZ	(5.9)	2.7	0.8	(10.7)	Hinge fracture. Tip Missing.
*27-3-14-78	CCS	4.0	3.4	0.7	9.4	Tip Missing.
*27-5-83	CCS	5.9	3.0	0.5	11.4	Hinge fracture. Tip Missing.
*27B-6-30-82	CCS	(5.1)	3.3	0.6	9.1	Fragment
*PJ-263	CCS	5.5	3.3	0.5	8.3	Hinge fracture (tip and midsection). Heat treated, brown chert.
*27B	BAS	5.9	3.0	0.6	11.2	Tip missing.
*27B-3-14-78	CCS	4.1	2.8	0.7	9.6	Tip missing.
	mean	4.6	2.7	0.6	7.9	
standard deviation		1.2	0.6	0.1	2.7	

Estimated values in parenthesis. Values rounded to nearest one-tenth. * denotes Muñoz Collection.

Appendix Table 1. Attributes for Projectile Points: Elko-like.

Specimen Number	Material	Max. Length (cm)	Max. Width (cm)	Thickness (cm)	Basal Indent. Ratio	Notch Opening Index	Distal Shoulder Angle (cm)	Proximal Shoulder Angle (cm)	Weight (gm)	Comments:
Side-Notched Points										
*27- 630- 82	CCS		2.5	0.6		70				Hinge break. Denticulate.
*11-81	FGV		2.0	0.6		35				Hinge break.
*PJ235	CCS	4.6	2.1	0.6	0.9	55	220	155	4.9	
*27-4- 10- 78- 50	FGV	(9.5)	3.8	0.6		70			7.9	Perverse break.
*a-32	OBS	2.5	1.8	0.4	1.0	40	165	125	1.2	
*a-32- 51883- 30	CCS	2.8	1.9	0.5	1.0	90	230	150	1.6	
*27-15- 79	FGV		2.4	0.3		55				Hinge break.
*32-34	OBS	(3.8)	3.1	0.7	1.0	45	135	120	6.1	
*27B-2- 8- 92	FGV	(4.5)	3.0	0.6					(8.0)	Visual estimate for series.
	mean	4.6	2.5	0.5					5	
standard deviation		2.3	0.6	0.1					2.7	
Corner-notched Points										
LM-3-2	CCS	6.1	2.0	0.5					6.6	
*27-495- 169	FGV	3.9	2.9	0.7	1.0	70	210	145	7.1	Reworked.
*27	CCS			0.5						Fragment.
*27-26	CCS	3.5	3.3	0.6	1.0	40	165	125	7.0	
*27-45	FGV		3.0	0.8		70				Hinge break.
*27-11- 81	CCS		2.6	0.5		35				Hinge break.
	mean	4.5	2.8	0.6					6.9	
standard deviation		1.0	0.4	1.0					0.2	
Eared-like Points										
*32-5	FGV	4.0	2.8	0.7	0.9	35	145	120	4.8	
*32-6	FGV	4.0	3.6	0.7	0.9	43	160	120	4.6	
	mean	4.0	3.2	0.7					4.7	

Appendix Table 1. Attributes for Projectile Points: Eccentrics, Perforators, and Others.

Specimen Number	Description	Length (cm)	Width (cm)	Thickness (cm)	Weight (gms)	Comments:
Eccentrics/Perforators						
LGN-10-24	BAS	4.4	1.9	0.6	3.2	
LM-2-21	FGV	4.0	1.1	05	2.3	Perforator tip? Perverse fracture - manufacture break.
LGN-3-25	OBS					Perforator tip?
*IB-21	OBS	3.7	2.2	0.3	1.7	
*27-59-495	OBS	2.9	1.7	0.4	1.2	
Leaf Shaped Points						
LGN-2-6	QTZ	3.1	1.6	0.8	3.4	Specialized tool. Perforator?
LM-1-9	QTZ	4.0	2.1	0.6	5.0	Specialized tool.
*27B-2-5-92	CCS	2.7	1.3	0.4	1.1	Specialized tool. Serrated.
*27-48-495- 155	CCS	3.4	1.2	1.2	1.7	Specialized tool.
Tapering Stem, Diamond, Ovate Base Points						
LGN-26-38	OBS	2.3	1.9	0.5	1.6	Specialized tool. Perforator? Reworked.
LGN-1-93	OBS	2.4	2.0	0.5	1.9	Specialized tool. Perforator?
*PJ225	OBS	3.5	3.0	0.6	4.7	Specialized tool. Perforator?
Comondú Points						
LGN-3-24	OBS	1.4	1.2	0.3	0.3	Projectile point. Side- notched/denticulate.
LGN-30-14	OBS	1.8	0.8	0.2	0.3	Projectile point. Side- notched.
*27-495-150	OBS	2.8	1.4	0.3	0.7	Projectile point. Serrated.
*27-495-149	OBS	1.8	1.2	0.3	0.3	Projectile Point. Denticulate.
*27-40	OBS	1.8	1.1	0.2	0.4	Projectile Point. Denticulate.
*27-495-150	OBS	2.3	1.2	0.3	0.1	Projectile Point.
*27-55-495- 150	OBS	2.8	1.4	0.3	0.1	Projectile Point.
Guajademí Split-stemmed Points						
*27-85	CCS	1.8	1.6	0.4	5.0	Projectile Point
La Paz/Gypsum Cave Points						
*27-4-18-83	CCS	3.8	2.9	0.7	5.9	Projectile Point.

Estimated values in parenthesis. Values rounded to nearest one-tenth. * denotes Muñoz Collection.

Appendix Table 1. Attributes for Projectile Points: Eccentrics, Perforators, and Others, cont.

Specimen Number	Description	Length (cm)	Width (cm)	Thickness (cm)	Weight (gms)	Comments:
Unnamed Corner-notched Convex Base Points						
*PJ-216	CCS	6.7	3.3	0.6	16.1	Projectile Point.
*495-185	CCS	5.4	3.7	0.7		Projectile Point.
*PJ-210	CCS	6.6	3.2	0.7	14.0	Projectile Point.
*27B-6-28-83	CCS	3.4	2.2	0.6	14.0	Projectile Point.
*No#	OBS	3.6	3.0			Projectile Point.
*PJ-209-32-12	CCS	6.3	3.3	0.5	12.7	Projectile Point.
Unnamed Large with Narrow Expanding Base Points						
*27B-495- PJ215	CCS	9.8	3.1	0.6	20.3	Projectile Point.
*27B-3-14-78	CCS	9.7	2.9	0.6	10.9	Projectile Point.
Unnamed Small Tapering-stemmed Points						
*27-73-495- 154	FGV	2.6	1.5	0.3	1.1	Projectile Point.
*27-11-495- 143 1/3	OBS	2.8	1.9	0.4	1.5	Projectile Point.
*72-27	CCS	3.0	2.1	0.4	1.9	Projectile Point.
*27-495-170	CCS	3.8	3.0	0.7	5.8	Projectile Point.
*27-4-10-78	CCS	3.9	1.9	0.4	1.8	Projectile Point.
Unnamed Triangular Points						
*2-7-92	CCS	4.5	1.8	0.5	4.3	Projectile Point. Ground/reworked.
*6-30-82	CCS	4.4	1.7	0.5	4.4	Projectile Point.
Misc. and Unique Points						
*27-1181	BAS - Proj. Pt.	3.0	1.8	0.5	2.0	Projectile Point. Base gone. Denticulate.
*27-PJ-233	CCS - Proj. Pt.	4.2	1.7	0.4	2.6	Projectile Point. Denticulate.

Estimated values in parenthesis. Values rounded to nearest one-tenth. * denotes Muñoz Collection.

Appendix Table 2. Obsidian Hydration Data.

	Catalog No.	Item	Mean 1	Mean 2	Source
1	LGN-3-26	Guerrero Negro Series Projectile Point	2.58 ± 0.12		
2	LGN-9-9	Guerrero Negro Series Projectile Point	2.14 ± 0.08		
3	LGN-18-41	Guerrero Negro Series Projectile Point	2.56 ± 0.10	4.24 ± 0.04	
4	LGN-1-80	Guerrero Negro Series Projectile Point	2.00 ± 0.03		
5	LGN-29-15	Guerrero Negro Series Projectile Point	1.90 ± 0.08		
6	LGN-20-31	Guerrero Negro Series Projectile Point	2.11 ± 0.05		
7	LGN-17-3	Guerrero Negro Series Projectile Point	2.56 ± 0.16		
8	LM-2-16	Guerrero Negro Series Projectile Point	2.49 ± 0.12		
9	LM-1-10	Guerrero Negro Series Projectile Point	2.98 ± 0.04		Valle del Azufre
10	LGN-14	Guerrero Negro Series Projectile Point	3.95 ± 0.13		Valle del Azufre
11	Unassigned	Guerrero Negro Series Projectile Point	2.5 ± 0.1		Valle del Azufre
12	Unassigned	Guerrero Negro Series Projectile Point	1.1 ± 0.0		Valle del Azufre
13	LM-2-17	Guerrero Negro Series Projectile Point	3.09 ± 0.10		
14	32-5-18-83	Elko-like Projectile Point	3.43 ± 0.07		Valle del Azufre
15	LGN-30-14	Comondú Series Projectile Point	1.53 ± 0.06		
16	LGN-3-23	Comondú Series Projectile Point	2.31 ± 0.09		
17	27-57-495-148	Comondú Series Projectile Point	2.89 ± 0.10		
18	27-55-495-150	Comondú Series Projectile Point	2.56 ± 0.08		
19	27-85-495-137	Comondú Series Projectile Point	2.87 ± 0.11		Valle del Azufre
20	LGN-2-18	Leaf-shaped Projectile Point	5.97 ± 0.15		Valle del Azufre
21	27-59-495-139	Eccentric Projectile Point	3.72 ± 0.10	4.78 ± 0.17	Valle del Azufre
22	27-11-495-143	Small Unnamed Tapering-stem Projectile Point	2.89 ± 0.10		
23	LGN-26-38	Unnamed Tapering-stem Projectile Point	2.89 ± 0.13		Valle del Azufre
24	LGN-1-94	Triangular Projectile Point	2.69 ± 0.11		
25	LGN-20-6	Untyped	1.60 ± 0.06		

Appendix Table 2. Obsidian Hydration Data, cont.

	Catalog No.	Item	Mean 1	Mean 2	Source
26	LGN-26-54	Unifacial Scraper	1.66 ± 0.08	2.71 ± 0.04	
27	LGN-22-34	Uniface	NVH		
28	LGN-26-35	Uniface	1.69 ± 0.09		
29	LGN-10-15	Uniface Fragment	NVH		
30	LGN-1-75	Uniface Fragment	2.60 ± 0.14		
31	LGN-29-13	Uniface Fragment	2.43 ± 0.09		
32	LGN-1-87	Biface	2.71 ± 0.10		
33	LGN-24-9	Biface	2.60 ± 0.09		
34	LGN-1-93	Biface	3.61 ± 0.12		
35	27-23-495-149	Biface	1.44 ± 0.03		
36	LM-2-24	Biface Fragment	1.41 ± 0.03	2.76 ± 0.10	
37	LGN-22-15	Utilized Flake	3.14 ± 0.09		Valle del Azufre
38	LGN-4-18	Pebble Core	2.74 ± 0.08		Valle del Azufre
39	LGN-1-109	Large core	2.80 ± 0.07		Valle del Azufre
40	LGN-19-5	Flake	2.76 ± 0.12		Valle del Azufre
41	LGN-28	Flake	DFV		Uknown A
42	LGN-1-158	Flake	4.22 ± 0.06		Valle del Azufre
43	LGN-4-12b	Core Flake	2.65 ± 0.10		
44	LGN-4-12a	Bipolor flake	2.65 ± 0.04		
45	LM-1-4a	Bipolor Flake	2.62 ± 0.07		
46	LM-1-4b	Core Reduction Flake	3.07 ± 0.10		
47	LGN-1-31	Burin/Tranchet flake	2.47 ± 0.08		
48	LGN-22-38	Burin/Tranchet flake	2.15 ± 0.06		
49	LGN-10-17	Burin/Tranchet Flake	2.65 ± 0.10		
50	LGN-20-21	Burin	2.53 ± 0.10		Valle del Azufre