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Early Holocene San Dieguito Complex Lithic Technological Strategies at the C.W. Harris Site, San Diego County, California

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The C.W. Harris site, type site for the early Holocene San Dieguito complex in San Diego County, has a long history of investigation, much of it driven by culture-historical and typological questions. We deviate from this pattern by describing the Warren and True (1961) chipped stone assemblage and documenting the San Dieguito inhabitants' organization of lithic technology. Technological and high-power usewear analyses reveal that the biface and flake tool dominated assemblage consists almost entirely of manufacturing rejects and/or unused specimens. This and other evidence indicates that C.W. Harris functioned primarily as a non-residential, special-purpose workshop for biface (mostly Type 1 bifaces) and flake tool (mainly scrapers) manufacturing, with a possible secondary campsite function. Bifaces and scrapers are common in toolkits used to kill and process game, and imply that as a lithic workshop C.W. Harris was a feeder for new tools critical to sustaining a mobile lifeway.

The C.W. Harris site is the type site for the early Holocene San Dieguito complex in San Diego County, California, and remains a topic of debate since Malcolm J. Rogers excavated it in 1938 (Warren 1966). Key debates include the chronological relationship between the San Dieguito, La Jolla, and Pauma complexes (e.g., Bull 1987; Rogers 1938, 1945; True 1958; Wallace 1960; Warren et al. 1961, 2008); possible connections between the San Dieguito complex and terminal Pleistocene-early Holocene cultural complexes in the California deserts, Great Basin, and Columbia Plateau (e.g., Moratto 1984; Warren 1967; Warren and Ranere 1968; Warren and True 1961; Warren et al. 2008); whether C.W. Harris functioned as a campsite or workshop; and its efficacy as the type site for the San Dieguito complex (Ezell 1987; Vaughan 1982; Warren 1987). Considerably more can also be learned about the organization of San Dieguito lithic technology, which is the focus of this paper. Resolving these debates and issues is important for understanding how and when people settled into the greater San Diego County region.

Studies traditionally portray the San Dieguito complex as an early Holocene hunting-oriented adaptation dominated by campsites along streams, rivers, and margins of coastal lagoons (Rogers 1939, 1966; Warren 1967; Warren et al. 2008:62). Newer research softens the edges of this long-held view, however. San Dieguito sites are now known from a broader range of ecozones than just the foothills of the coastal range. The Desert Edge site (Pigniolo 2005:Fig. 1), for example, is in a montane setting at the edge of a desert escarpment. Bifaces and scrapers dominate inland San Dieguito lithic assemblages, and probably signal a hunting adaptation focused on the acquisition of artiodactyls and small game. However, some transitional San Dieguito sites have shellfish (Kaldenberg 1982, but see Warren et al. 2008:49), and others groundstone as part of a plant-collecting and processing subsistence strategy (Warren et al. 2008:61). San Dieguito peoples thus had more than a hunting-oriented lifeway and are probably best considered broad-based (generalized) mobile foragers. Documenting the organization of San Dieguito

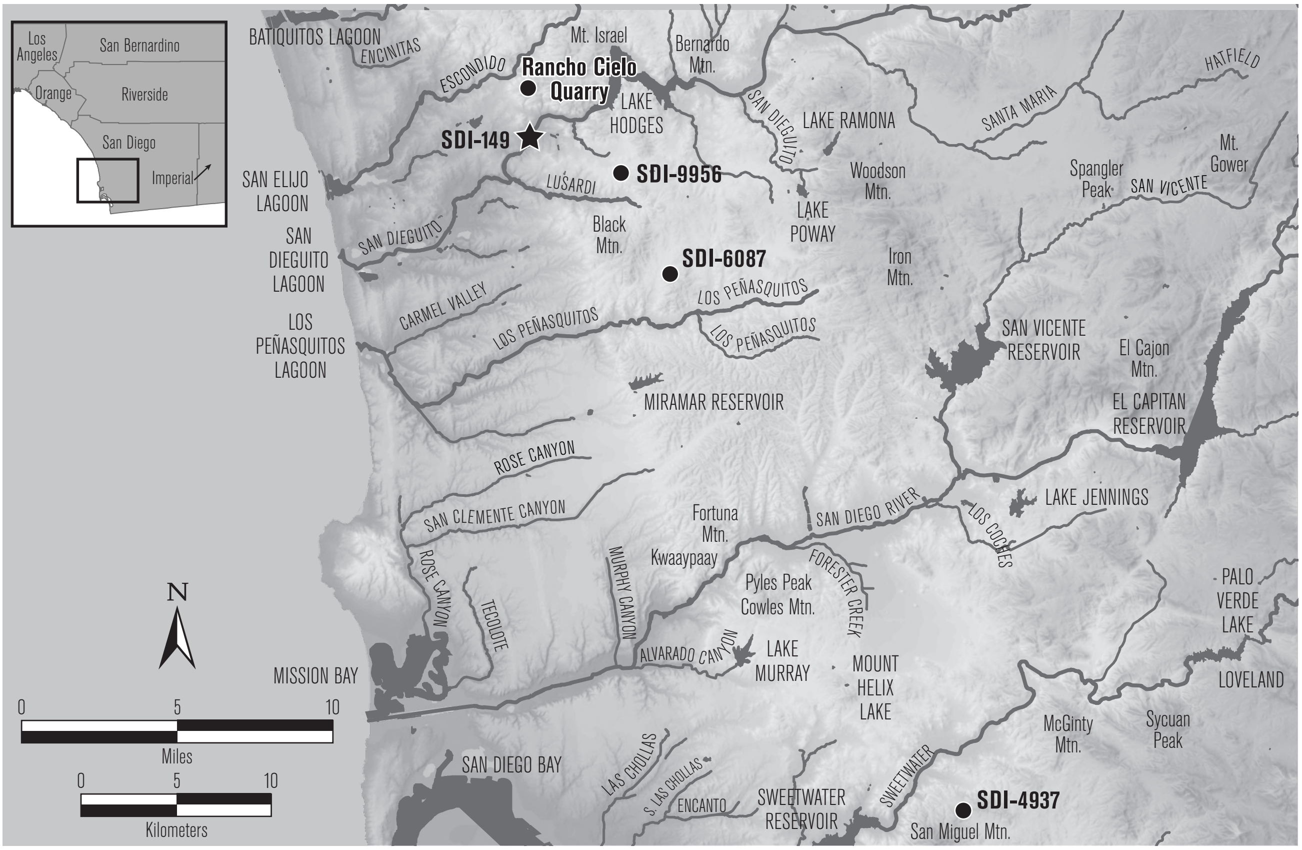

Figure 1. Map depicting the location of the C.W. Harris site (SDI-149) and other San Dieguito complex sites in San Diego County.

lithic technology at the C.W. Harris site contributes to this broader cultural-historical understanding only tangentially, but provides new insights into the adaptive behaviors of early Holocene foragers in the San Diego region.

To document San Dieguito lithic technological strategies at the C.W. Harris site, we consider key "activities" such as lithic raw material acquisition, tool manufacture, use, re-use and discard (e.g., Andrefsky 2009; Carr and Bradbury 2011; Nelson 1991). Vaughan (1982) was first to consider the organization of lithic technology at C.W. Harris. She used Flenniken's (e.g., 1981, 1984) replicative systems analysis (RSA) to develop and test modeled production sequences for the scrapers (blank acquisition, primary flaking, edging, use, retouch, and edge rejuvenation) and bifacial "knives" (blank acquisition, primary flaking, thinning, edging, use, retouch, and edge rejuvenation). Vaughn concluded that (1) C.W. Harris was a "general habitation area indicated by the secondary stages of tool production, tool maintenance and tool discard" (Vaughn 1982:134), and (2) the scraper and bifacial "knife" blanks were created by free-hand percussion rather than bipolar reduction. Flenniken et al. (2008) later used RSA to compare technological strategies between sites of different age throughout San Diego County, including the C.W. Harris site. The majority (71%) of their C.W. Harris debitage sample was biface reduction debris (mostly early percussion biface thinning flakes), with the remainder indicative of cobble core reduction. Flenniken et al. (2008:192) conclude that C.W. Harris was a "biface production workshop whose inhabitants produced large bifaces for transport." We build on these prior studies through an assemblage-level analysis of the artifacts excavated in 1958 and 1959 by Warren and True (1961).

C.W. HARRIS SITE

The C.W. Harris site is located near the city of Rancho Santa Fe in northern San Diego County, California, about 11 km. east of the Pacific Ocean, on the west slope of the Coast Range (Fig. 1). More specifically, it is on a terrace along the southeast bank of the San Dieguito River, just below a steep, narrow canyon. Several other sites in close proximity to the C.W. Harris site are collectively known as the Harris site complex; however, our sole focus is on the C.W. Harris site itself (CA-SDI-149).

C.W. Harris has a long history of excavation since its discovery by Malcolm Rogers in 1928. Rogers excavated the Harris site in 1938 and 1939 (Rogers 1938; Warren 1966), with subsequent excavation by Claude Warren and D. L. True (1961) in 1958 and 1959 to increase the sample of San Dieguito complex artifacts and address controversies stemming from Rogers' research. Paul Ezell excavated in 1964 (Ezell 1977), with a return by Warren from 1965 to 1967 (no final report). The final research was conducted by Carrico and Ezell (1978) prior to commercial development of the property. Carrico et al. (1991) supplemented this research with excavation and analysis of several sites (but not SDI-149) within the Harris site complex. The majority of the C.W. Harris collection is curated at the San Diego Museum of Man; the smaller Warren and True collection analyzed here is at the UCLA Fowler Museum.

The Warren and True (1961) excavation consisted of several test pits and four excavation areas (Area 1, 1-E, 1-W, and 2), each 10 feet square in size. Only one of the four areas was completely excavated, however. Artifact-bearing levels were hand troweled and the back dirt screened through 1/4-inch mesh. Excavators collected all of the tools, but only a sample of the debitage. The debitage counts provided below are thus partial, and likely biased.

The stratigraphy and chronology are described in several prior publications about the site. The most recent is by Warren and Ore (2011), whose sequence we summarize here. They recognize five major geological strata (A-E), though we only consider the lowest stratum (E) because it contains the San Dieguito artifacts. Stratum E has three units—EI, EII, and EIII—that formed during separate cut and fill events tied to the San Dieguito River. EI is a gravel bar and sand lens that contains *in situ* San Dieguito artifacts of unknown age. EII is channel fill with gravel and sand lenses and San Dieguito artifacts that washed into the site (i.e., were redeposited) sometime before 9,030 ± 350 B.P. (11,222–9,322 cal B.P. at 2σ; Warren and Ore 2011:81). EIII is also channel fill (gravel and sand lenses) with redeposited San Dieguito artifacts that date to 8,490 ± 400 B.P. (10,561–8,540 cal B.P. at 2σ; Warren and Ore 2011:81). The San Dieguito component thus includes *in situ* artifacts of unknown age, and artifacts that were redeposited before 9,030 B.P. but no more recently than 8,490 B.P. (Warren and Ore 2011:81). This fits within the estimated 10,500–8,200 B.P. timeframe for the Initial Period in Western San Diego County, which includes the San Dieguito, Transitional San Dieguito, and early La Jolla cultural complexes (Warren et al. 2008:36).

Attempts to link the artifacts to this stratigraphic sequence were unsuccessful because the available catalog does not in most cases specify the geologic stratum or unit the artifacts are from; it usually only specifies the excavation area (e.g., test pit, bulldozer trench, area 1), level (e.g., upper 4″, 12–24″ below datum B), and remarks (e.g., gravel deposit, gray sand). This is not enough information to consistently link the artifacts to a specific geological stratum or unit. Instead, artifacts were identified to the San Dieguito component by (1) notations in the catalog that identify them as "San Dieguito" or from a "gravel deposit" (one of the Stratum E sand and gravel lenses; C. Warren, personal communication 2016), and (2) identifying them in published pictures or illustrations. This method of attribution is far from ideal and limits our ability to link artifacts to a specific geological unit, although all or nearly all of the analyzed artifacts are certainly from Stratum E and the San Dieguito component.

METHODS

A number of qualitative and quantitative variables were recorded for each artifact in the Warren and True (1961) collection. Variables recorded for all or most of the artifacts included lithic raw material type, platform type, cortex, artifact type, blank type, reason for rejection, and various quantitative attributes. Each tool, core, and debitage specimen was assigned to a type using the definitions in Andrefsky (2005), Bamforth (2002), Knell et al. (2009), and particularly Root (1999; 2004:73–76). We used a technological typology because certain artifact types hold immediate behavioral information that are diagnostic of a specific technology (*sensu* Andrefsky 2001:6). For example, alternate (removed from alternate sides of tabular blanks to create a sinuous bifacial edge) and biface thinning flakes are byproducts of biface manufacture, and core reduction flakes result from producing flake blanks from non-bifacial cores. Common byproducts are technologically non-diagnostic debitage: complex (≥3 dorsal flake scars) and simple flakes (<3 dorsal flake scars), primary decortication flakes (100% dorsal cortex), and shatter. Blocky core and cobble core reduction flakes were not distinguished in this analysis, except that core reduction flakes with cobble cortex were considered to come from cobble cores. This distinction was prudent because the assemblage lacks cobble cores, and blocky and non-cortical cobble core reduction flakes sometimes look similar. Other technological variables and attributes are described as necessary.

Each tool was analyzed for usewear at low-power magnification (10–80×) using a Leica S8APO microscope, as were 23 bifaces and flake tools under high-power magnification. The non-randomly selected sample of artifacts for high-power usewear included tools deemed likely to retain microwear traces. Bifacial implements were chosen if the edges were potentially usable, regardless of stage of manufacture. Scrapers were targeted because distinctive use traces often form after only a few minutes, and studies show that scraper edges are a reasonable indicator that a collection has sufficiently preserved microwear traces (Bamforth and Becker 2009; Becker 1999, 2003).

The high-power microwear analysis was accomplished using a Nikon Optiphot incident light microscope with magnifications of 50–400×, and followed the approaches of Keeley (1980) and Vaughn (1985). Each artifact was first drawn to facilitate recording the location and other details of any microwear traces. The artifacts were then cleaned using detergent, but no other chemicals, since polishes are very rare on this material type (based on experimental samples in M.B.'s possession). After cleaning, each artifact was visually scanned over its entire surface at 100× magnification, with the most intense analysis reserved for the margins. If this initial scan revealed potential microwear polish, the artifacts were treated in the necessary chemical baths before further examination at 200–400×. Edge damage was identified at 50× (frequently using darkfield illumination) and 100×, with the location of any striae recorded.

ARTIFACT ASSEMBLAGE

The San Dieguito lithic assemblage includes 397 artifacts (Table 1). Debitage and tools account for most of the assemblage (70.1% and 28.5 %, respectively), with a small number of cores (1.4%). More than 95 percent of the artifacts are made from locally available green and black fine-grained volcanic (FGV) lithic material, probably Santiago Peak Volcanics and Eocene age river cobbles.

Table 1

FREQUENCY OF TOOLS, CORES, AND DEBITAGE BY RAW MATERIAL TYPE

	Raw Material Type			
Artifact type	FVG	CCS	QZ	Total
Tools (n = 113)				
Bifacial (n = 59)				
Biface Tool Blank	55	–	–	55
Crescent	0	1	–	1
Projectile Points	3	–	–	3
Unifacial (n = 53)	–	–	–	–
Chisel	1	–	–	1
Denticulate	1	–	–	1
Graver-Perforator, single spur	5	–	–	5
Graver-Perforator, multiple spur	3	–	–	3
Modified Cobble Tool	1	–	–	1
Retouched Flake, Patterned	6	–	–	6
Retouched Flake, Unpatterned	5	1	–	6
Scraper, unspecified	19	–	–	19
Scraper, domed	2	–	–	2
Scraper, end	3	–	–	3
Scraper, scraper plane	2	–	–	2
Scraper, side	2	–	–	2
Utilized Flake	2	–	–	2
Other (n = 1)	–	–	–	–
Hammer Stone	1	–	–	1
Cores (n = 3)				
Bifacial	2	–	–	2
Multidirectional	1	–	–	1
Debitage (n = 281)				
Alternate Flake	5	1	–	6
Biface Thinning Flake	82	5	1	88
Core Reduction Flake	18	–	–	18
Flake, blade-like	3	–	–	3
Flake, simple	32	–	–	32
Flake, complex	109	8	–	117
Primary Decortication Flake	3	1	–	4
Shatter	12	1	–	13
TOTAL	**378**	**18**	**1**	**397**

The lone quartz (QZ) artifact is probably from a local outcrop (Dietler 2004). The remainder (4.5%) are highly knappable cryptocrystalline silicas (CCS; chalcedony and chert, with one macrocrystalline clear quartz specimen included) with color variations typical of materials found far to the east in the Colorado Desert. As a contrast, local varieties of CCS are typically low quality chert or high quality materials with distinctive colors and/or textures (e.g., petrified wood, Monterey chert). A crescent from the Harris site is made from Piedra de Lumbre (PDL) chert that outcrops 44 km. to the northwest on Marine Corps Base Camp Pendleton. Using 40 km. as the cutoff between local and nonlocal sources (*sensu* Gould and Saggers 1985; Meltzer 1989), 95.4 percent of the artifacts are local (FGV and QZ) and 4.6 percent are CCS from nonlocal sources to the east and northwest of C.W. Harris.

The 113 tools include 59 bifacial and 53 unifacial implements, and a hammer stone. The bifacial implements include three FGV San Dieguito projectile points[1] and a PDL crescent, and 55 FGV unfinished and unused biface tool blanks (blanks and preforms). Six unifacial flake tool types are recognized: chisel, denticulate, graver-perforator (spurred flake), retouched flake, scraper (several subtypes), and utilized flake. There is also a unifacially-worked modified cobble tool. Scrapers are the most common unifacial tool type, followed by retouched flakes and graver-perforators; the other flake tool types are present in trace amounts. All of the flake tools are made from FGV, except for a CCS retouched flake. The hammer stone is made from a subrounded FGV cobble. Overall, biface tool blanks (unfinished and unused bifaces) are the most common artifact type, followed by scrapers, retouched flakes and graver-perforators; the other types are present in low numbers (Fig. 2).

The manufacturing debris consists of three FGV cores (two bifacial, one multidirectional) and 281 debitage specimens (divided into eight types). The alternate and biface thinning flakes are diagnostic of biface manufacture, and the core reduction flakes of flake blank manufacture. The remaining flake types (blade-like, simple, complex, and primary decortication) and shatter are not alone diagnostic of a particular technology. None of the debitage has the characteristics of bipolar reduction. Overall, 112 flakes are technologically diagnostic: 83.9 percent are diagnostic of biface manufacture (n = 94) and 16.1 percent of core reduction (n = 18).

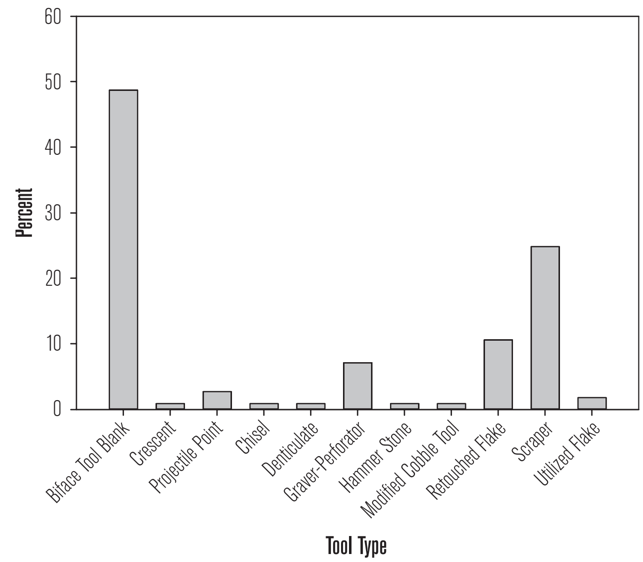

Figure 2. Percentage of each tool type.

TECHNOLOGICAL ORGANIZATION

This section documents the San Dieguito occupants' lithic technological strategies, particularly patterns of lithic raw material acquisition, tool manufacture and tool use, and the off-site transport of artifacts. These strategies capture the flow of lithic raw materials and tools into, at, and away from the C.W. Harris site. Table 1 summarizes the frequency of tools, cores and debitage by raw material type.

Lithic Raw Material Procurement

Fine-grained volcanics account for 95.2 percent of the lithic assemblage. This is unsurprising, since Santiago Peak Volcanics (SPV) outcrop across large areas of San Diego County (Dietler 2004; Kennedy and Patterson 1975; Scharlotta and Quach 2015), including at the nearby Rancho Cielo quarry (Cook 1985) and other quarries along the San Dieguito River (Flenniken et al. 2008:191). SPV is light gray-green to black and varies from basalt to rhyolite, but is mostly dacite and andesite (Scharlotta and Quach 2015:286). SPV with tabular edges usually comes from primary bedrock exposures, and cobbles from secondary deposits (Dietler 2004:58). An attempt to geochemically distinguish SPV from other FGV materials in San Diego County met with limited success (Scharlotta and Quach 2015). Some of the FGV artifacts at C.W. Harris are probably locally available Eocene age river cobbles rather than SPV.

Figure 3. Early Stage (left side) and Middle Stage (middle and right side) bifacial tool blanks.

Other lithic raw materials include a quartz flake that is probably of local origin and 18 CCS artifacts that are likely of nonlocal origin. These comprise less than five percent of the overall assemblage, and attest to a FGV-centered procurement strategy.

Tool Production

Biface Production. Early researchers of the C.W. Harris bifaces identified three "knife and knife blank" types (e.g., Vaughn 1982:104; Warren 1966:15, 1967:173–174; Warren and True 1961:8). Type 1 "knives" have parallel sides with a slightly rounded base and a tip; Type 2 "knives" are leaf-shaped with a rounded base and narrow tapered tip; and Type 3 "knives" have a round base, expanding margins and blunt tip. We recognize these types and agree with Warren (1967; Warren and True 1961) that they form a continuum of reduction. However, whereas Warren views them as variations of

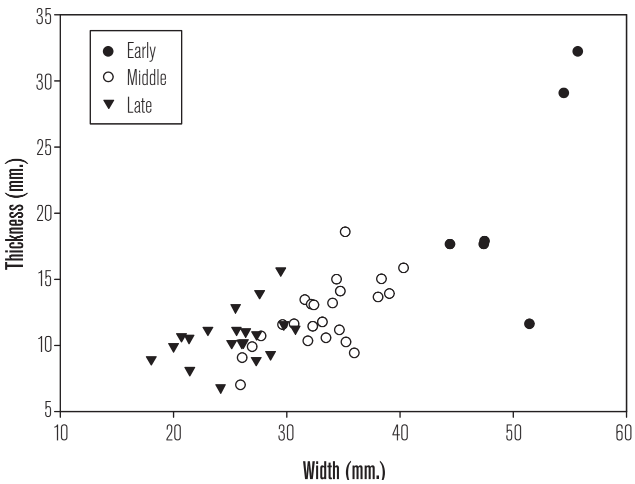

Figure 4. Scatterplot depicting the width and thickness of the bifacial tool blanks by manufacture stage. Complete and broken specimens are plotted.

finished, functional knives, we interpret the bifaces to be unfinished tool blanks and see the types as different stages in a single production sequence.

Multiple lines of evidence indicate that 55 of the bifaces are unfinished blanks and in most cases preforms, and together are best considered bifacial tool blanks. First, the irregular margins (poorly formed or jagged) on many specimens would preclude effective scraping or cutting. Second, usewear studies reveal that the margins are beveled and abraded as though prepared for reduction, and have locations where large flake scars crosscut this preparation. Third, the breakage patterns are more typical of manufacture than use: multiple step and hinge fractures that precluded further thinning (n=7), perverse fractures (n=17), bend breaks that likely resulted from end shock (n=23), and breaks along a flaw in the material (n=6). Two bifaces are small in size and are considered exhausted. Because the bifaces are unfinished they cannot be finished "knives," as is implied by the currently used typology. To avoid confusion, we replace the term "knives" with "bifaces" (e.g., "Type 1 bifaces") for the remainder of this paper, and especially when referring to our sample.

To better understand the biface manufacture sequence, we assigned 50 of the bifaces to a manufacturing stage; five are too small, fragmentary, or heavily waterworn for identification. Because the C.W. Harris bifaces did not readily fit Callahan's (1979) five-stage manufacture sequence, we instead used an early-, middle-, and late-stage system. The six early-stage bifaces have percussion flake scars that—with one exception—extend to but not beyond the midline. The ends range from roughly shaped to nicely ovate (Fig. 3 [left side]), and are comparatively wider and thicker than the later-stage bifaces (Fig. 4). The goal of the early stage was to create leaf-shaped rough-outs free of major humps and ridges. The 24 percussion-flaked middle-stage bifaces have ovate bases and pointed tips (Fig. 3). Transmedial flake scars are fairly common, resulting in comparatively narrower and thinner bifaces than the early stage. Some improperly thinned specimens are narrow but thick in cross-section, which typically occurred when flakes struck from the plano face of plano-convex specimens terminated in step and hinge fractures instead of crossing the midline of the convex face (also see Vaughn 1982). Some middle-stage bifaces overlap the late stage in size, the smallest of which are tip fragments with little midsection. During the middle stage knappers created reasonably thin leaf-shaped bifaces with an ovate base and pointed tip, which are key hallmarks of Type 2 and Type 3 bifaces. The emphasis switched among the 20 late-stage specimens towards reducing the width by creating parallel-sided bifaces with pointed tips and slightly round bases (Fig. 5)—the exact characteristics of Type 1 bifaces. The transition from leaf-shaped to parallel-sided bifaces progressed by flaking from tip to base, possibly after successive repetitions of this sequence. This top-down flaking sequence is evident in Figure 6, where the specimens on the left have tips that are narrow and parallel compared to the body (i.e., tapered tips), with the flaking sequence finished or nearly finished in the parallel-sided specimens on the right side of the figure. The specimens on the left are Type 2 bifaces with tapered tips and leaf-shaped bodies, and those on the right side parallel-sided Type 1 bifaces with slightly round bases. Type 1 bifaces thus seem to be the intended endpoint of the production sequence, which (given their size) were likely knives or spear points.

Not having studied the projectile points, we are uncertain whether they are manufacturing rejects, or finished and resharpened tools transported to and discarded at C.W. Harris as unwanted items. The latter seems plausible, since the projectile points are considerably shorter in length (about 4–5 cm.) than the complete late-stage bifaces (about 9.1 cm.), but this is speculation since we did not analyze the points.

Figure 5. Late Stage bifacial tool blanks. Top row are Type 2 bifaces and bottom row Type 1 bifaces.

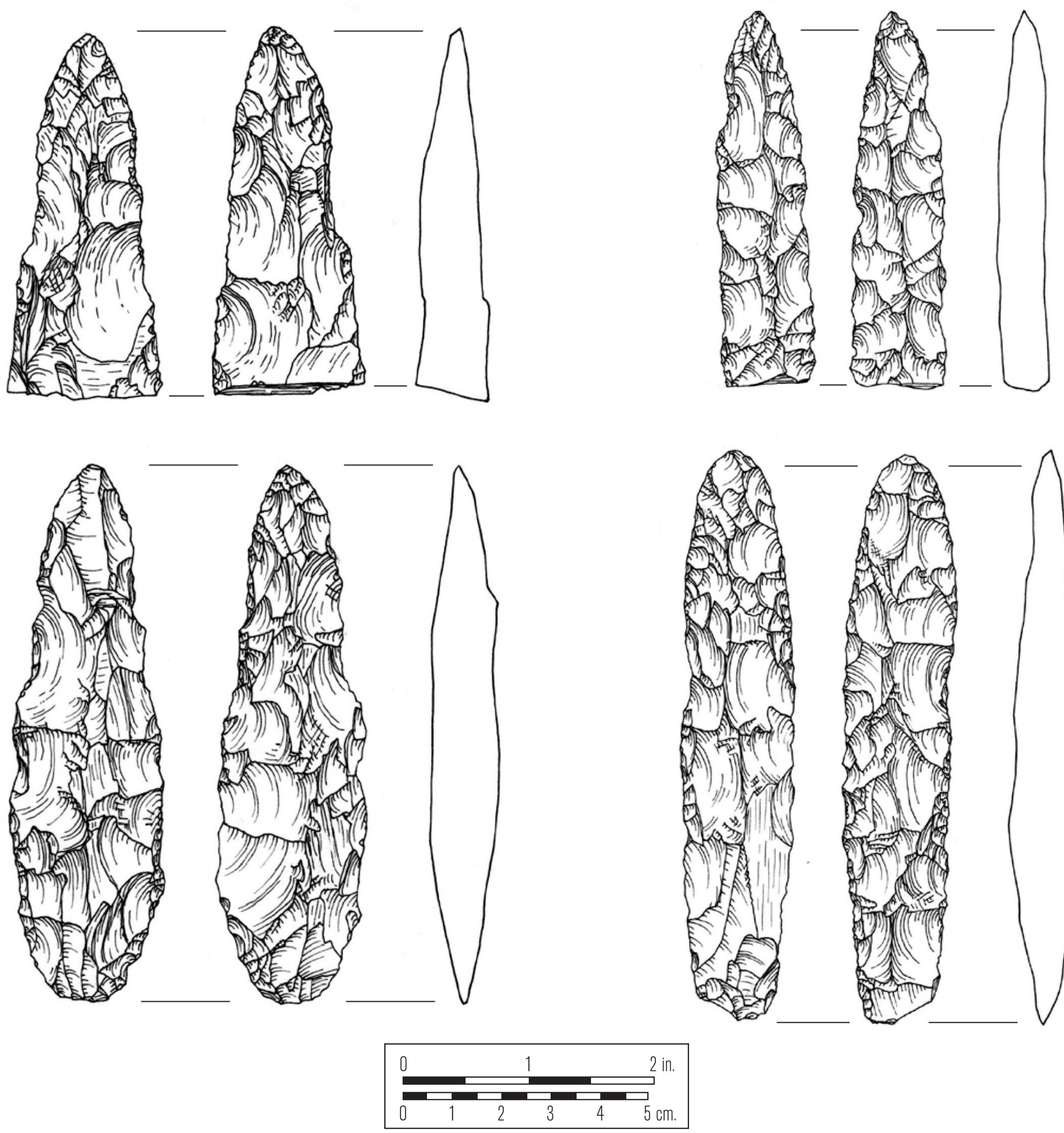

Figure 6. Progression of Type 2 bifaces (left side) into Type 1 bifaces (right side). Note that if the flaking sequence on the Type 2 biface tips continued towards the midsection it would result in parallel-sided Type 1 bifaces.

The six alternate and 88 biface thinning flakes provide further clues to the biface manufacturing strategy. The alternate flakes suggest that knappers sometimes created sinuous bifacial edges from tabular stones by beveling the edges in an alternating fashion (Root 2004:74). Because alternate flakes are usually removed early in production, this implies that unmodified or minimally modified blanks with tabular edges were sometimes manufactured into bifaces at C.W. Harris. After creating a sinuous bifacial edge, transmedial flakes were struck to thin the bifaces (usually with an antler billet [see Vaughn 1982:117]) and marginal flakes then removed to shape or edge the bifaces. Some edging flakes are included among the 88 biface thinning flakes. More than 94 percent of the biface thinning flakes have platforms prepared with facets, edge abrasion or both; about half of these have a heavily abraded platform to improve knapability of the difficult-to-work FGV and quartz (also see Flenniken et al. 2008). Biface thinning flakes account for 93.6 percent of the biface manufacturing debris and attest to the importance of biface production at C.W. Harris. Pressure flakes are absent from the bifaces we studied and from the debitage assemblage (but see Vaughn 1982), although such flakes, if present, would not likely be recovered in the 1/4-inch screen mesh.

More than 93 percent of the biface thinning flakes are FGV; the rest are CCS and quartz. Using weight as a measure of debitage size, the FGV biface thinning flakes are about double the size (on average) of the CCS biface thinning flakes, suggesting that larger FGV than CCS bifaces were modified at C.W. Harris. The use of locally procured FGV probably explains this difference, and supports our contention that the CCS flakes are from nonlocal sources.

The biface tool blanks and thinning flakes are largely free of dorsal cortex (83.6% and 93.2%, respectively), and none of the flakes has cortex on the platform. Among those with dorsal cortex, just one biface and one thinning flake has more than 50 percent cortex. The paucity of cortex suggests that the acquisition and initial preparation of bifaces occurred away from C.W. Harris, presumably at one of the nearby quarries, and that the on-site production sequence began with entirely or largely decorticated blanks (see also Flenniken et al. 2008 and Vaughn 1982). These blanks were transported as flakes (12 bifaces have flake attributes and up to 20 were made from flakes when the plano-convex bifaces are included) and cobbles or tabular nodules. We ultimately conclude, like Vaughn, that biface thinning and edging were primary activities at C.W. Harris, but view the existing biface assemblage (except for the crescent) as manufacturing rejects with the desirable (finished?) bifaces transported off-site.

Flake Tool and Blank Production. The San Dieguito component has a small amount of core reduction debris: three cores and some core reduction flakes. The two bifacial cores are biconvex and thick with flake scars that meet near the midline. The paucity of transmedial flake scars suggests an intention to remove flake blanks rather than to create a thin biface tool; the lack of usewear along the margins supports this contention. The biface cores are cortex-free and exhausted (judging by their small size), and have limited potential for additional large flake blank removals. The multidirectional core was fashioned from the proximal end of a large, decorticated flake fragment. Flakes were struck from the original platform onto the dorsal surface and from a bend break onto the ventral surface. The short length of the flake scars suggests the potential to remove other large flake blanks was limited and that the core was exhausted. Coinciding with the small number of cores are just 18 FGV hard-hammer percussion core reduction flakes (conchoidal initiation with a thick, straight cross-section, and usually an unprepared platform), and seven blocky shatter specimens. Eight core reduction flakes have dorsal cortex, most (75%) having been struck from cobble cores and the remainder from cores with tabular cortex. The paucity of core reduction flakes, and lack of cortex-bearing and otherwise prepared cores, suggests that some (perhaps most) of the core reduction flakes were transported to rather than manufactured at C.W. Harris.[2]

Table 2 lists the frequency of blank types for the unifacial tools and reveals that among those with a technologically identifiable blank, 90 percent are core reduction flakes. Many (60.7%) of the flake tools made from core reduction blanks retain cortex—a pattern that contrasts with the largely cortex-free bifaces.

Three unifacial tools are made from blanks other than core reduction flakes (Table 2). One is a retouched

Table 2

FREQUENCY OF UNIFACIAL TOOL BLANK TYPES

Flake Tool Type	BFT	BP	CO	SRC	UN[a]
Chisel	–	–	1	–	–
Denticulate	–	–	–	–	1
Graver-Perforator, single spur	–	–	3	–	2
Graver-Perforator, multiple spur	–	–	2	–	1
Modified Cobble Tool	–	–	–	1	–
Retouched Flake, Patterned	–	–	3	–	3
Retouched Flake, Unpatterned	1	–	2	–	3
Scraper, unspecified	–	–	13	–	6
Scraper, domed	–	–	1	–	1
Scraper, end	–	–	1	–	2
Scraper, scraper plane	–	1	1	–	–
Scraper, side	–	–	–	–	2
Utilized Flake	–	–	–	–	2
TOTAL	**1**	**1**	**27**	**1**	**23**

Note: BFT=biface thinning flake; BP=bipolar flake; CO=core reduction flake; SRC=sub-rounded cobble; UN=unknown.

[a] Many of the unknown blank types are actually core reduction flakes, but lack platforms making them unidentifiable to a technological type. The frequency of flake tools made from core reduction flake blanks is thus higher than indicated.

flake made from a large, early-stage biface thinning flake. Another is a scraper plane whose blank was created using the bipolar technique. The third is a modified cobble tool made from the end of a subrounded cobble. The unmodified cobble cortex differentiates this from other tools made from cobbles that had all or most of their cortex removed to shape the tool. These "other" technologies occur in low numbers compared to core reduction flake blanks

The plan view of each unifacial tool (regardless of blank type) was assessed to establish if a preference existed for certain shapes of unifacial tools (Table 3). Excluding the broken or indeterminate specimens, oval/discoidal tools are most common (46.3%). More than half are scrapers, with the remainder graver/perforators, retouched flakes, and the modified cobble tool. Irregularly shaped tools are second most common, and are primarily gravers, retouched flakes, and scrapers (unspecified types). The triangular and rectangular tools are mainly scrapers. The cross-section of almost all of these tools is plano-convex. The plano face of most tools is remarkably flat, having been intentionally created by striking the blanks at the appropriate angle to create this effect, or (in a few cases) removing the bulb of percussion (also see Vaughn 1982:77, 81).

Table 3

FREQUENCY OF UNIFACIAL TOOLS BY PLAN VIEW/SHAPE

Flake Tool Type	REC	TRI	OVL	IRR	NA
Chisel	–	–	–	1	–
Denticulate	1	–	–	–	–
Graver-Perforator, single spur	–	–	2	2	1
Graver-Perforator, multiple spur	–	1	1	1	–
Modified Cobble Tool	–	–	1	–	–
Retouched Flake, Patterned	–	–	3	2	1
Retouched Flake, Unpatterned	1	–	1	1	3
Scraper, unspecified	2	3	8	4	2
Scraper, domed	–	–	2	–	–
Scraper, end	–	2	–	–	1
Scraper, scraper plane	–	–	1	–	1
Scraper, side	–	1	–	–	1
Utilized Flake	–	–	–	–	2
TOTAL	**4**	**7**	**19**	**11**	**12**

Note: REC = Rectangular; TRI = Triangular; OVL = Oval/Discoidal; IRR = Irregular; NA = Broken or Indeterminate.

Tool Use

The 113 tools are nearly evenly divided between bifacial (n = 59) and unifacial (n = 53) implements, with one hammer stone. Tool function was assessed by analyzing 11 bifaces and 12 unifacial flake tools (8 scrapers, 2 graver-perforators, 1 utilized flake, and 1 retouched flake) under high-power magnification (Table 4). A retouched flake was reclassified as debitage after usewear revealed the modified edges were natural. The remainder of this

Table 4

SUMMARY OF HIGH-POWER USEWEAR RESULTS

Tool Type	Microwear Observations	Catalog #
Bifacial Implements		
Biface Tool Blank – unk. stage	No usewear observed	250–17
Biface Tool Blank – middle stage	No usewear observed, some edge grinding	250–23
Biface Tool Blank – middle stage	No usewear observed	250–25
Biface Tool Blank – middle stage	No usewear observed	250–29
Biface Tool Blank – late stage	No usewear observed	250–41
Biface Tool Blank – late stage	Unused	250–52
Biface Tool Blank – middle stage	No usewear observed	250–60
Biface Tool Blank – middle stage	Stone abraded? Intentional grinding?	250–76
Biface Tool Blank – late stage	No usewear observed	250–86
Biface Tool Blank – late stage	No usewear observed	250–155
Biface Tool Blank – middle stage	No usewear observed, but intentionally ground edge	250–205
Unifacial Implements		
Scraper, unspecified	Edge rounding from use? Natural?	210–5
Scraper, domed	No usewear observed	250–24
Scraper, unspecified	No usewear observed	250–49
Scraper, unspecified	No usewear observed	250–93
Scraper, unspecified	No usewear observed	250–110
Scraper, domed	No usewear observed	250–124
Scraper, unspecified	No usewear observed	250–125
Scraper, end	No usewear observed	250–138
Graver-Perforator	Graver tip edge rounded, use unknown	250–165
Graver-Perforator	No usewear observed	250–166
Utilized Flake	Abraded edge, use unknown	250–256

Note: "Unused" indicates a high level of confidence in the usewear interpretation. "No usewear observed" indicates a lower confidence interpretation used in cases where the edge is not pristine enough to confidently say the artifact did not undergo very brief episodes of utilization.

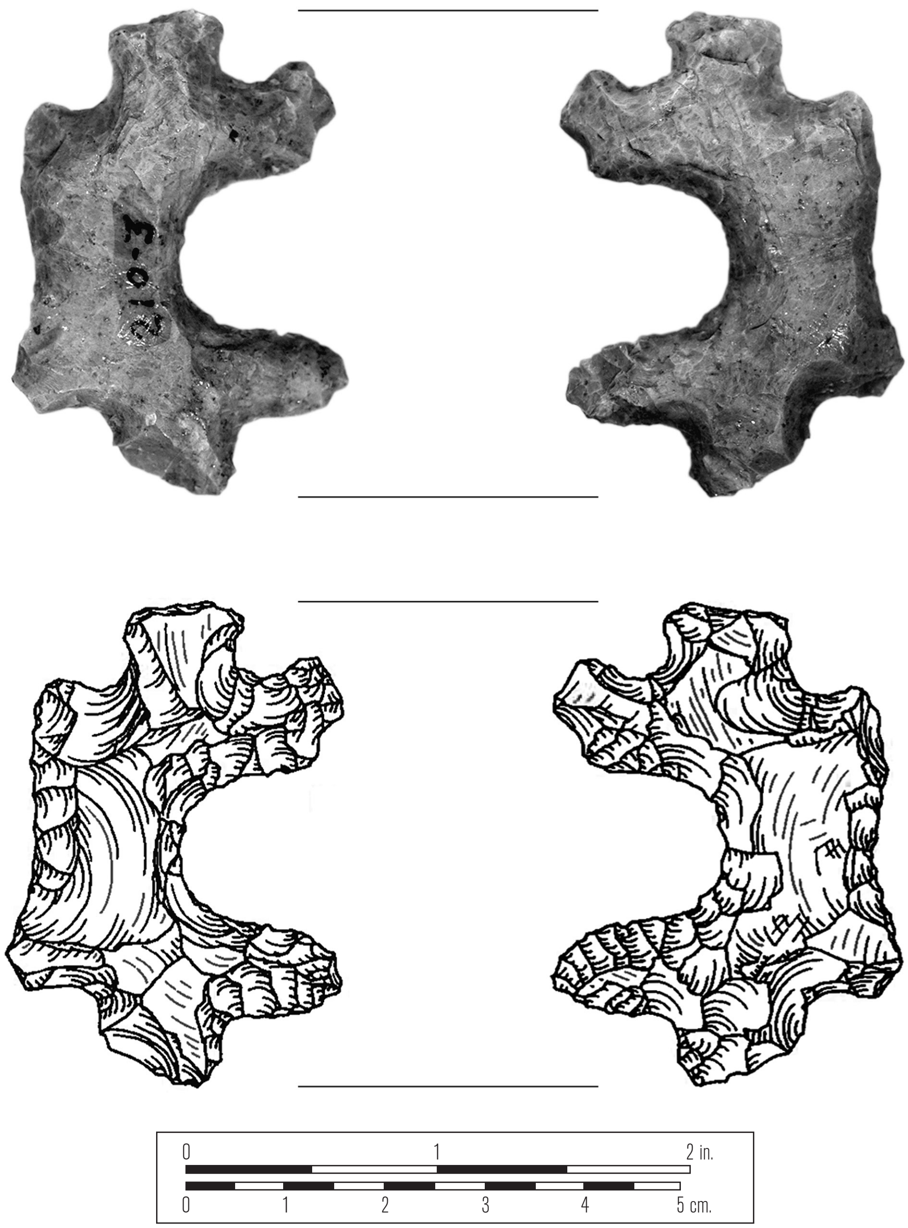

Figure 7. Eccentric crescent.

section integrates the usewear results into a general description of the tool assemblage.

Bifacial Implements. The 59 bifacial implements include three projectile points (unavailable for analysis), an eccentric crescent, and 55 bifacial tool blanks. The crescent has a lateral projection on both sides and two lateral side notches, a concave axial edge at the top (27.05 mm.), and a pronounced axial notch at the bottom (26.77 mm.; Fig. 7). It is a Type 5A eccentric crescent (Fenenga 2010:14) that is 48.92 mm. long, 34.09 mm. wide, and 7.93 mm. thick. Crescents have a largely unknown and highly debated function, although eccentric crescents potentially were ceremonial or effigy stones, amulets, scrapers, surgical implements, or the tips of projectiles (see Fenenga 2010:5). Lenzi (2015) suggests that lunate crescents likely functioned as transverse projectile points. The C.W. Harris eccentric crescent was not analyzed for usewear and its function is unknown.

The 11 bifaces analyzed for usewear under high-power magnification include six middle, four late, and one unknown-stage specimen. We selected these bifaces, regardless of manufacturing stage, because their edges were potentially usable and no real differences exist in the degree of edge refinement between many of the middle and late-stage specimens. Thus, while the late-stage bifaces are narrower and better refined overall, usability of the edges did not vary greatly between the stages. This relates to our interpretation that the bifaces, including the late-stage specimens, are unfinished manufacturing rejects.

None of the bifaces has distinctive evidence for use as a tool, although one has ambivalent characteristics. Nine (5 middle, 3 late, 1 unknown stage) bifaces have jagged rather than pristine margins and lack observable usewear. If these were used, which we doubt, the use was probably too brief for wear traces to form. Two middle-stage bifaces have edge abrasion on high spots (projections) that likely resulted from edge preparation during manufacture. The margin of another middle-stage biface has edge abrasion from a stone, which likely formed during production. One late-stage biface has pristine edges and lacks microwear traces, suggesting it was unused. Overall, the high-power magnification study revealed that the bifaces lack microwear traces from use as tools, but have abraded edges from strengthening platforms during manufacture. Brief use and immediate discard is viewed as an inefficient strategy that further supports our contention that the bifaces, even the late-stage specimens, are unfinished and unused manufacturing rejects.

Ezell (1977) recovered two bifaces with traces of resin (presumably mastic for hafting) from the C.W. Harris site; neither is present in our collection. Microwear analysis of one specimen revealed ambivalent wear results (production or use), and blood residue on this same specimen tested positive for deer (Carrico et al. 1991:7–46). The deer blood suggests it was a tool and that the wear traces likely resulted from use rather than production. In contrast, the lack of resin and use-related wear traces on our specimens suggests they are unused manufacturing rejects. The presence of resin and/or use traces on Ezell's specimen may indicate that it was manufactured elsewhere and discarded at C.W. Harris. If so, this fits with a tool discard and replacement strategy; if not, it implies that some bifaces were finished and used at C.W. Harris, which would be unsurprising given the extensive evidence for biface production and the presumed need to conduct activities requiring tools at the site.

Unifacial Implements. The 53 unifacial flake tools are divided into seven types. Among these, scrapers occur in the highest proportion (Fig. 2); they include the domed, end, scraper plane, side, and unspecified subtypes (Fig. 8). Seven of the eight scrapers analyzed under high-power magnification lack observable usewear and have jagged (non-pristine) edges; these were used for short periods of time at most. One scraper has edge rounding from cultural or natural processes; if cultural, its use was brief. None of the analyzed scrapers thus bears solid evidence of utilization; this is unexpected, considering the high proportion of scrapers at C.W. Harris and M. B.'s experiments on replicated SPV scrapers that indicate hide scraping leaves obvious traces of usewear (primarily edge rounding) in less than 5 minutes. It also suggests that the overlapping small flake scars along the intended working edge(s) of some specimens are from regularizing (edging) the working margin (see Vaughn 1982:83) rather than use; other scrapers have working edges with jagged margins (also see Vaughn 1982:85) and apparently did not undergo a refined edging process. These lines of evidence imply that many, if not all, of the scrapers were undergoing manufacture at the time of discard. This, coupled with the high frequency of unused scrapers, suggests that C.W. Harris was, in part, a scraper manufacturing hub.

Retouched flakes, which include the patterned and unpatterned subtypes, are the second most common (22.2%) flake tool type. Unpatterned retouch flakes are expediently created tools whose flake blank shape and size determined the final tool morphology (Root 1999); patterned retouched flakes are formal tools or fragments that do not readily fit into a recognized tool type. Most of the patterned retouched flakes are scrapers or scraper fragments that do not fit into a formal scraper type. None of the retouched flakes were analyzed for usewear.

The third most common tool type is graver-perforators. These have one (n = 5) or more (n = 3) relatively thick, wide spurs or projections on what is, in most cases, a thick flake with the morphology of a scraper (Fig. 9)—they possibly served this function as well. One graver-perforator analyzed under high-power magnification has no observable usewear; the graver tip of the other has edge rounding from an unknown action. M. B.'s preliminary experiments indicate that graver-perforators were used for boring, usually by inserting the spur into a hard material.

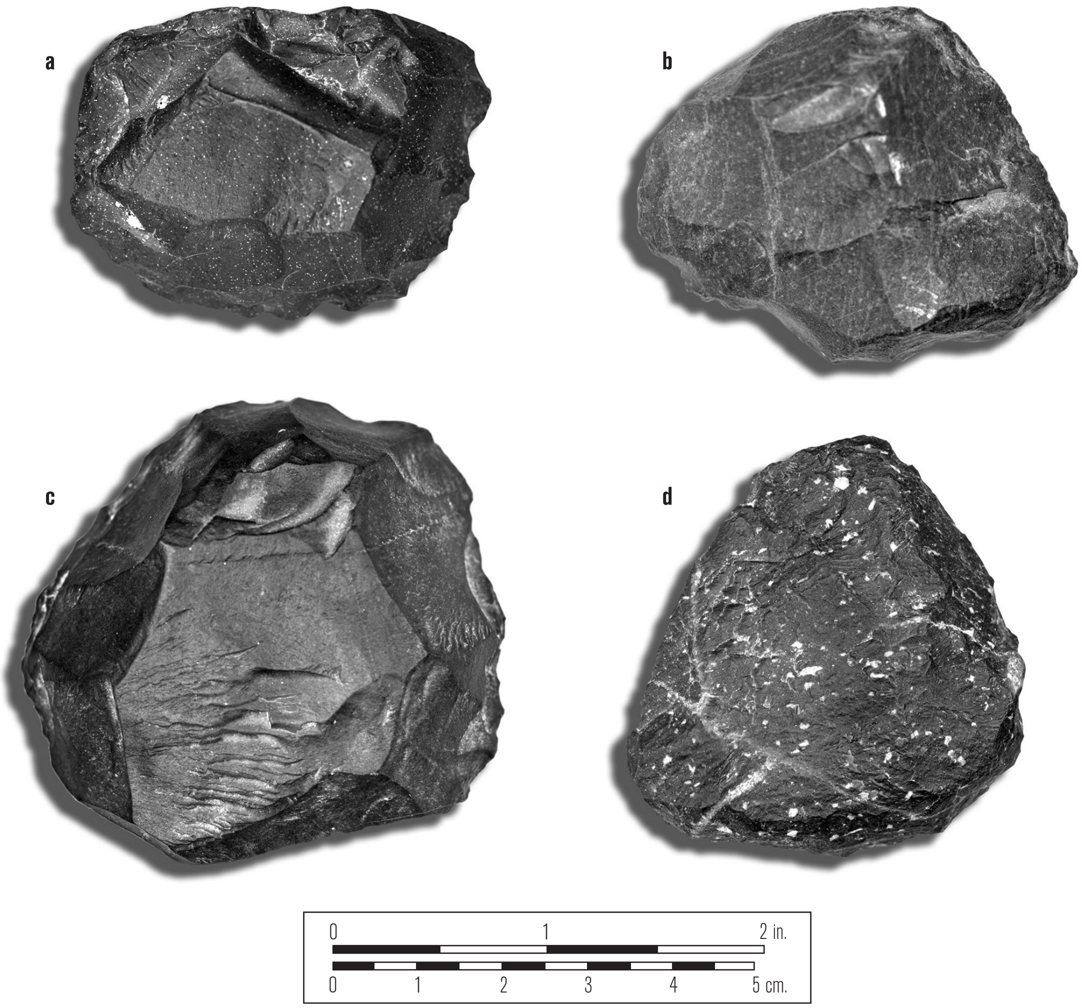

Figure 8. Scrapers: a, b=scrapers (unspecified types); c=domed scraper; d=end scraper.

The remaining unifacial tools—chisel, denticulate, modified cobble tool, and utilized flakes—are present in low numbers (≤3.7%). The chisel is made from a large flake that has hard-hammer battering on the proximal end and battering and flake removals on both faces of the distal end. It seemingly was held at an angle and struck via hammer against hard material. The denticulate is plano-convex in cross-section, has a roughly-shaped convex working area, and is roughly flaked from the plano face to create jagged notches on the long margins. The denticulate was not analyzed under high-power magnification, though preliminary experiments suggest these tools were for slicing and cutting, possibly for cutting plant materials in a sickle-like motion. The modified cobble tool is a large primary flake with unifacial flake scars and edge rounding along the distal margin. It was not analyzed under high-power magnification either, but it has a knife-like edge. One utilized flake analyzed under high-power magnification has edge abrasion from an unknown type of action; low-power magnification reveals that another utilized flake has edge abrasion and slight scalar flaking.

To summarize, just 2 of 23 bifacial and unifacial implements have microwear traces indicating use as a tool when examined under high-magnification; the others have edge abrasion that formed during manufacture or they lack usewear traces entirely. The low percentage of used tools is surprising, since our sample is biased towards specimens deemed likely to retain microwear traces. Assuming the usewear results reasonably reflect the activities undertaken at C.W. Harris, the assemblage depicts a production-based rather than a use-based trajectory.

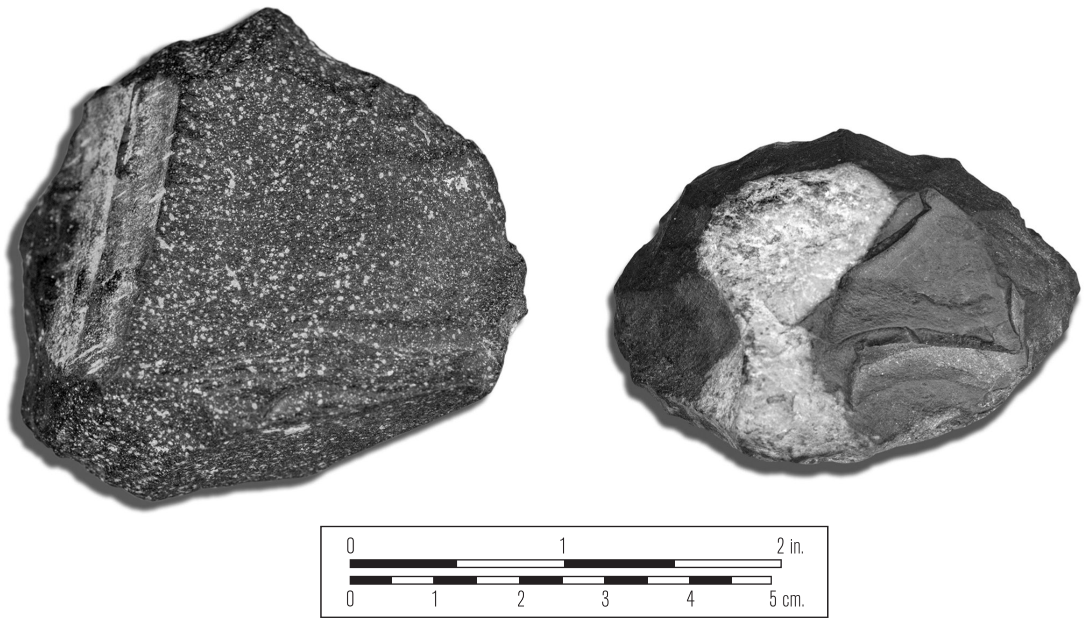

Figure 9. Graver-perforators. Note the wide spurs/projections.

SITE FUNCTION

The C.W. Harris site's function has long been debated; some researchers suggest it was a campsite (e.g., Vaughn 1982; Warren 1967, 1987; Wiener 2015) and others a workshop (e.g., Ezell 1987; Flenniken et al. 2008; Warren 1966). To establish its function—campsite/habitation site or workshop—we develop and evaluate several test expectations.

Campsites and lithic workshops usually differ in fundamental ways. Long-term or reoccupied campsites typically have assemblages with a mixture of production debris (much of it from retooling and maintaining worn toolkits) from local lithic raw material sources and used tools and/or resharpening flakes from nonlocal sources. Since a variety of subsistence and household activities occur at campsites, the assemblages should have a wide range of tool types (knives, projectile points, scrapers, chisels, drills/gravers, and flake cores) that are, for the most part, technologically finished and utilized. Lithic workshop assemblages (particularly special purpose workshops without a campsite component), by contrast, consist entirely or almost entirely of locally-procured lithic materials that match the range of colors and textures at nearby quarries or procurement areas. Because lithic workshops are gearing-up locales, they usually have assemblages dominated by production debris, as well as unfinished and unused tools (blanks and preforms). The dominant tool types should be those that are the focus of production. These expectations are applied to the C.W. Harris site to evaluate its function.

Multiple lines of evidence reveal that C.W. Harris functioned primarily as a lithic workshop, likely a special-purpose workshop for the production of bifaces (mainly Type 1 bifaces) and scrapers. First, the lithic material is almost entirely (>95%) locally available FGV, much of it similar to the colors and textures available along the San Dieguito River. In fact, Cook (1985) suggests that the nearby Rancho Cielo quarry was a key procurement area for much of the SPV and that the many biface thinning flakes at the quarry came from large bifaces that were transported elsewhere for further manufacture. This matches our (and Vaughn's 1982) conclusion that the bifaces, flake blanks, and cores were, on the whole, transported to the Harris site as partially worked, largely cortex-free objective pieces. Second, biface production debris (tool blanks and biface thinning flakes) and debris from flake tool manufacture (unused flake tools and core reduction flakes) dominate the assemblage, with used bifaces (other than the crescent and possibly the projectile points) and used flake tools minor contributors (Fig. 10). This should result when tool production is the primary trajectory, such as occurs at workshops. Third,

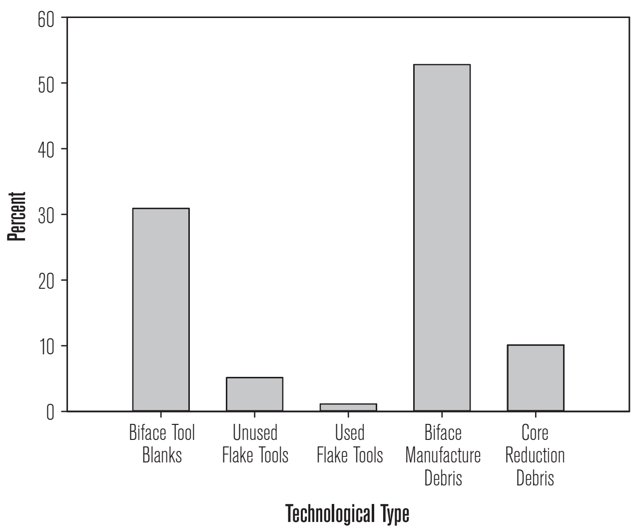

Figure 10. Percentage of tools and debitage by technological type. Note that the percentage of used and unused tools is based on the high-power usewear results.

while we note that the San Dieguito assemblage has the full range of tool types (projectile points, biface tools/knives, scrapers, chisels, drills/gravers, and flake cores) found at campsites, most tools are unfinished and unused, as expected at workshops. Together, the abundance of manufacturing debris and unfinished tools of local lithic material, and the paucity of finished/used tools, suggests that C.W. Harris was a workshop for making tools whose intended use was off-site. The emphasis on gearing-up with bifaces (primarily Type 1 bifaces; see above) and scrapers indicates that C.W. Harris was a special-purpose workshop for replenishing implements common to hunting-oriented toolkits.

Though we think that C.W. Harris functioned primarily as a special-purpose workshop, it possibly had a secondary campsite function. The utilized bifaces (crescent, possibly the projectile points, and Ezell's biface) and a variety of less common tool types (chisel, denticulate, graver-perforators, modified cobble tool, utilized flake) best fits the campsite rather than the workshop expectations. Because it is unclear whether these tools were related to the manufacturing procedures, were discarded items replaced with newly manufactured tools, and/or were byproducts of short-term encampments during gearing-up episodes, we are uncertain whether C.W. Harris had a secondary campsite function. If so, the campsite component was a minor part of the overall site activities, which leads us to conclude that C.W. Harris is best viewed in aggregate as a special-purpose, non-residential workshop.

DISCUSSION AND CONCLUSIONS

This study sought to improve our understanding of the C.W. Harris site through an in-depth, assemblage-level analysis of the chipped stone collected by Warren and True (1961) in the late 1950s. Unlike the broadly descriptive and typological analyses of the 1960s, we documented the technological strategies (behaviors) used by the San Dieguito occupants. Vaughn (1982) and Flenniken et al. (2008) contributed significantly to this understanding, but their analyses are comparatively limited in scope: Vaughn only analyzed bifaces and scrapers, and the Flenniken report is short. Studies of other San Dieguito components from San Diego County (CA-SDI-4937, -6087, -9956 [see references in Warren et al. 2008:61], the Desert Edge site [Pigniolo 2005:Fig. 1], and the Ignacio Zaragosa site in Baja California [Porcayo 2009]) are largely typology-based and limited in scope. Our study thus provides the first detailed assemblage-level and behavior-based analysis of the lithic raw material acquisition, tool production, tool use, and off-site transport strategies of a San Dieguito component. We ultimately conclude that C.W. Harris functioned primarily as a non-residential, special-purpose workshop for bifaces (including many Type 1 bifaces, or "knives" in Warren's terminology) and flake tools (scrapers) in preparation for off-site activities.

The insights gained from studying a single assemblage contribute in general ways to a broader understanding of the San Dieguito complex. Mobile and stationary hunter-gatherers alike must continually replenish supplies of lithic material and tools. Transporting stone is costly (e.g., Beck et al. 2002), so hunter-gatherers often bring decorticated or partially decorticated blanks and cores to workshops for preprocessing before transporting them to distant sites. Based on the abundance of largely cortex-free bifaces and flake tools that were, for the most part, unused, the C.W. Harris site was such a workshop. While there, the San Dieguito occupants geared-up with tools common in toolkits used for killing and processing game. Where the newly manufactured items were taken and used is, of course, unknown, but we can certainly surmise that some tools left the Harris site as finished implements for immediate use and others were finished elsewhere. As such, C.W. Harris and similar workshops functioned as feeders for replenishing tools critical to the lifeway of mobile hunter-gatherers. Having adequate tools and supplies of lithic raw material to meet expected and unexpected needs is critical to the survival of mobile hunter-gatherers, and implies a degree of planning depth (e.g., Kuhn 1995) by San Dieguito complex peoples. Moreover, new technological details from a San Dieguito workshop should provide researchers with insights into the tool types and manufacturing strategies recovered from San Dieguito camp, kill, and processing sites in the region.

The implications of our study thus extend beyond the confines of the Warren and True (1961) collection, since they illustrate the role that workshops likely played in the San Dieguito lifeway. Moreover, this study improves our understanding of the lithic technological strategies employed by members of the enigmatic San Dieguito cultural complex, and more broadly, provides a deeper understanding of early Holocene culture history and lifeways in the greater San Diego region.

NOTES

[1]The projectile points are reported in Warren and True (1961), but have since been removed from the collection (lost?). We did not study them directly, but include them in the overall frequency count and some discussions.

[2]The low core to biface ratio (0.05; see Bamforth and Becker 2000) possibly suggests that some cores passed through C.W. Harris. Since the three cores are exhausted and there is little to suggest they were reduced on-site, they possibly were abandoned after being replaced with cores newly obtained from a nearby quarry. Despite the low frequency of cores, we believe they were part of the toolkit, since they are common at early Holocene habitation sites like Rancho Park North, San Elijo 1A, and CA-SDI-10723 (Becker and Iversen 2013; Byrd 2004; Kaldenberg 1976).

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REFERENCES

Andrefsky, William, Jr.
2001 Emerging Directions in Debitage Analysis. In *Lithic Debitage: Context, Form, Meaning*, W. Andrefsky, Jr., ed., pp. 2–14. Salt Lake City: University of Utah Press.
2005 *Lithics: Macroscopic Approaches to Analysis*, 2nd ed. Cambridge: Cambridge University Press.
2009 The Analysis of Stone Tool Procurement, Production, and Maintenance. *Journal of Archaeological Research* 17:65–103.

Bamforth, Douglas B.
2002 High-Tech Foragers? Folsom and Later Paleoindian Technology on the Great Plains. *Journal of World Prehistory* 16:55–98.

Bamforth, Douglas B., and Mark Becker
2000 Core/Biface Ratios, Mobility, Refitting, and Artifact Use-Lives: A Paleoindian Example. *Plains Anthropologist* 45:273–290.
2009 Microwear, Tools, and Handles: A Pilot Functional Investigation of the Chipped Stone Assemblage. In *Hell Gap: A Stratified Paleoindian Campsite at the Edge of the Rockies*, Mary Lou Larson, Marcel Kornfield, and George C. Frison, eds., pp. 285–299. Salt Lake City: University of Utah Press.

Beck, Charlotte, Amanda K. Taylor, George T. Jones, Cynthia M. Fadem, Caitlyn R. Cook, and Sara A. Millwarde
2002 Rocks are Heavy: Transport Costs and Paleoarchaic Quarry Behavior in the Great Basin. *Journal of Anthropological Archaeology* 21:481–507.

Becker, Mark S.
1999 *Reconstructing Prehistoric Hunter-Gatherer Mobility Patterns and the Implications for the Shift to Sedentism: A Perspective from the Near East*. Ph.D. dissertation, University of Colorado, Boulder.
2003 Spatial Patterning in the Upper Palaeolithic: A Perspective from the Abu Noshra Sites. In *More than Meets the Eye: Studies on Upper Palaeolithic Diversity in the Near East*, Nigel Gorring-Morris and Anna Belfer-Cohen, eds., pp. 134–150. Oxford: Oxbow Books.

Becker, Mark S., and David R. Iversen (eds.)
2013 *Data Recovery at SDI-10723: The Early Archaic and Late Prehistoric Occupation of a Coastal Residential Site from Camp Pendleton, California*. MS on file at the South Coastal Information Center, San Diego State University.

Bull, Charles
1987 A New Proposal: Some Suggestions for San Diego Prehistory. In *San Dieguito-La Jolla: Chronology and Controversy*, Dennis Gallegos, ed., pp. 35–42. [*San Diego County Archaeological Society Research Papers* 1.] San Diego County Archaeological Society, San Diego.

Byrd, Brian F. (ed.)
2004 *Results of NSF-Funded Archaeological and Paleoenvironmental Investigations at San Elijo Lagoon, San Diego County, California*. MS on file at the South Coastal Information Center, San Diego State University.

Callahan, Errett
1979 The Basics of Biface Knapping in the Eastern Fluted Point Tradition: A Manual for Flintknappers and Lithic Analysts. *Archaeology of Eastern North America* 7:1–181.

Carr, Philip J., and Andrew P. Bradbury
2011 Learning from Lithics: A Perspective on the Foundation and Future of the Organization of Technology. *PaleoAnthropology* 2011:305–319.

Carrico, Richard L., Theodore G. Cooley, and Joyce M. Clevenger
1991 *Archaeological Excavation at the Harris Site Complex, San Diego County, California*. MS on file at the South Coastal Information Center, San Diego State University.

Carrico, Richard L., and Paul H. Ezell
1978 *Archaeological Mapping and Testing of the Harris Site and Adjacent Cultural Resources, Rancho Santa Fe Area, San Diego County, California*. MS on file at the South Coastal Information Center, San Diego State University.

Cook, John R.
1985 *An Investigation of the San Dieguito Quarries and Workshops near Rancho Santa Fe, California*. MS on file at the South Coastal Information Center, San Diego State University.

Dietler, John
2004 Lithic Material Use in Late Prehistoric San Diego County. *Proceedings of the Society for California Archaeology* 14:57–67.

Ezell, Paul H.
1977 New Information on San Dieguito III Technology. *Journal of California Anthropology* 4:306–308.
1987 The Harris Site–An Atypical San Dieguito Site or Am I Beating a Dead Horse? In *San Dieguito-La Jolla: Chronology and Controversy*, Dennis Gallegos, ed., pp. 15–20. [*San Diego County Archaeological Society Research Papers* 1.] San Diego County Archaeological Society, San Diego.

Fenenga, Gerrit L.
2010 A Typological Analysis of the Temporal and Geographic Distribution of the Eccentric Crescent in Western North America (1984). In *A Riddle Wrapped in a Mystery Inside an Enigma: Three Studies of Chipped Stone Crescents from California*, G. L. Fenenga and J. N. Hopkins, eds. pp. 3–46. Tulare Lake, Cal.: Tulare Lake Archaeological Research Group.

Flenniken, J. Jeffrey
1981 Replicative Systems Analysis: A Model Applied to the Vein Quartz Artifacts from the Hoko River Site. *Laboratory of Anthropology Reports of Investigation* 59. Pullman, Wash.: Washington State University, Laboratory of Anthropology.
1984 The Past, Present, and Future of Flintknapping: An Anthropological Perspective. *Annual Review of Anthropology* 13:187–203.

Flenniken, J. Jeffrey, James D. Eighmey, and Meg McDonald
2008 Comparative Technological Lithic Analysis of Selected Temporally Diagnostic San Diego Sites. In *Prehistoric and Historic Archaeology of Metropolitan San Diego: A Historic Properties Background Study*, pp. 171–213. MS on file at the South Coastal Information Center, San Diego State University.

Gould, R. A., and S. Saggers
1985 Lithic Procurement in Central Australia: A Closer Look at Binford's Idea of Embeddedness in Archaeology. *American Antiquity* 50:117–136.

Kaldenberg, Russell L.
1976 *Paleo-Technological Change at Rancho Park North, San Diego County California*. Master's thesis, San Diego State University.
1982 Rancho Park North: A San Dieguito-La Jolla Shellfish Processing Site in Coastal Southern California. *Imperial Valley College Museum Society Occasional Papers* 6. El Centro, California.

Keeley, Lawrence H.
1980 *Experimental Determination of Stone Tool Uses*. Chicago: University of Chicago Press.

Kennedy, M. P., and G. L. Peterson
1975 Geology of the San Diego Metropolitan Area. *California Division of Mines and Geology Bulletins* 200.

Knell, E. J., M. G. Hill, and A. D. Izeta
2009 The Locality IIIS/V Eden Complex Component. In *Hell Gap: A Stratified Paleoindian Campsite at the Edge of the Rockies*, M. L. Larson, M. Kornfeld, and G. C. Frison, eds., pp. 157–179. Salt Lake City: University of Utah Press.

Kuhn, Steven L.
1995 *Mousterian Lithic Technology*. Princeton: Princeton University Press.

Lenzi, Mark R.
2015 *An Experimental Program to Evaluate Proposed Functions of Crescents from the Western United States*. Master's thesis, University of Nevada, Reno.

Meltzer, D. J.
1989 Was Stone Exchanged among Eastern North American Paleoindians? In *Eastern Paleoindian Lithic Resource Use*, C. J. Ellis and J. C. Lothrop, eds., pp. 11–39. Boulder, Colorado: Westview Press.

Morrato, Michael J.
1984 *California Archaeology*. New York: Academic Press.

Nelson, Margaret C.
1991 The Study of Technological Organization. In *Archaeological Method and Theory, Vol. 3*, Michael J. Schiffer, ed., pp. 57–100. Tucson: University of Arizona Press.

Pigniolo, Andrew R.
2005 A Different Context: San Dieguito in the Mountains of Southern California. *Proceedings of the Society for California Archaeology* 18:247–254.

Porcayo, Michelini A.
2009 Proposal for Identifying San Dieguito Sites in Baja California. *Proceedings of the Society for California Archaeology* 22:1–8.

Rogers, Malcolm
1938 Archaeological and Geological Investigations of the Cultural Levels in an Old Channel of the San Dieguito Valley. *Carnegie Institution Year Book* 37:344–345.

1939 Early Lithic Industries of the Lower Basin of the Colorado River and Adjacent Desert Areas. *San Diego Museum Papers* 3. San Diego.

1945 An Outline of Yuman Prehistory. *Southwestern Journal of Anthropology* 1:157–198.

1966 The Ancient Hunters... Who Were They? In *Ancient Hunters of the Far West*, Richard F. Pourade, ed., pp. 23–108. San Diego: Union-Tribune Publishing.

Root, M. J.
1999 Field and Laboratory Methods and Techniques for the Lake Ilo Archaeological Project. *Contributions in Cultural Resource Management* 60. Center for Northwest Anthropology, Washington State University, Pullman.

2004 Technological Analysis of Flake Debris and the Limitations of Size-Grade Techniques. In *Aggregate Analyses in Chipped Stone*, C. T. Hall and M. L. Larson, eds., pp. 65–94. Salt Lake City: University of Utah Press.

Scharlotta, I., and Tony T. Quach
2015 Provenance Analysis of Porphyritic Volcanic Materials in San Diego Using Portable X-ray Fluorescence. *Journal of Archaeological Science Reports* 3:285–294.

True, D. L.
1958 An Early Gathering Complex in San Diego County, California. *American Antiquity* 23:245–263.

Vaughan, Patrick
1985 *Use-Wear Analysis of Flaked Stone Tools*. Tucson: University of Arizona Press.

Vaughan, Sheila J.
1982 *A Replicative Systems Analysis of the San Dieguito Component at the C. W. Harris Site*. Master's thesis, University of Nevada, Las Vegas.

Wallace, William J.
1960 Archaeological Resources of the Buena Vista Watershed, San Diego County, California. *Archaeological Survey Annual Reports* 1959–1960, pp. 277–306. Los Angeles: University of California.

Warren, Claude N.
1966 Excavations of the San Dieguito Type Site. In *The San Dieguito Type Site: M. J. Rogers' 1938 Excavation on the San Dieguito River*, Claude N. Warren, ed. [*San Diego Museum Papers* 5.] San Diego.

1967 The San Dieguito Complex: A Review and Hypothesis. *American Antiquity* 32:168–185.

1987 San Dieguito and La Jolla: Some Comments. In *San Dieguito-La Jolla: Chronology and Controversy*, Dennis Gallegos, ed., pp. 73–85. [*San Diego County Archaeological Society Research Papers* 1.] San Diego County Archaeological Society, San Diego.

Warren, Claude N., and H. T. Ore
2011 The Age of the San Dieguito Artifact Assemblage at the C.W. Harris Site. *Journal of California and Great Basin Anthropology* 31:81–97.

Warren, Claude N., and Anthony J. Ranere
1968 Outside Danger Cave: A View of Early Man in the Great Basin. *Eastern New Mexico University Contributions in Anthropology* 1(4):6–16. Portales: Eastern New Mexico University.

Warren, Claude N., and D. L. True
1961 The San Dieguito Complex and Its Place in California Prehistory. *Archaeological Survey Annual Reports* 1960–61, pp. 246–338. Los Angeles: University of California.

Warren, Claude N., D. L. True, and Ardith A. Eudey
1961 Early Gathering Complexes of Western San Diego County: Results of Interpretations of an Archaeological Survey. *Archaeological Survey Annual Reports* 1960–1961, pp. 1–108. Los Angeles: University of California.

Warren, Claude N., Gretchen Siegler, and Frank Dittmer
2008 Paleoindian and Archaic Periods. In *Prehistoric and Historic Archaeology of Metropolitan San Diego: A Historic Properties Background Study*, pp. 13–107. MS on file at the South Coastal Information Center, San Diego State University.

Wiener, Jonathan
2015 *Flake Tool Curation Strategies and Site Function at the C.W. Harris Site: Type Site of the Early Holocene San Dieguito Complex, San Diego County, California*. Master's project, California State University, Fullerton.