Lithic Workshops at Huerfanito,
Baja California

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Abstract
Construction of the San Felipe-Laguna Chapala highway in 2009 revealed lithic workshops at Huerfanito. Topographic recording, collection of a lithics surface sample, and excavation of two units in 2010 were accomplished. Technological and morphological analyses of the workshop waste products is presented, and speculations are offered concerning chronological and technological relationships with other sites in Baja California.

Introduction
Few lithic workshops have been identified on the Baja California peninsula. Of those reported, there are no detailed technological analyses that would allow comparisons among lithic traditions. This study presents a technological analysis of the lithic workshops at Huerfanito that avoids fallacies commonly committed in characterizing any concentration of flakes as a workshop. Following Clark (1989), characterization of a workshop begins with a quantitative technological analysis in order to demonstrate that the lithic assemblage is a workshop and not some other kind of archaeological deposit. Taking Clark’s recommendations into account, the lithic industries at other regional sites were also analyzed to help understand the chronology, distribution, and possible function of Huerfanito’s biface industry. Finally, a series of questions are presented for future archaeological investigations on the Gulf of California coast and in the center of the peninsula.

Salvage Project
The San Felipe-Laguna Chapala salvage project arose from the modernization of a 133.8-km stretch of rural road between the communities of San Felipe and Laguna Chapala as part of the project designated the Puertecitos-Laguna Chapala highway by the Secretaría de Comunicaciones y Transportes (SCT) (Figure 1). The SCT requested the Centro Instituto Nacional de Antropología e Historia (INAH) Baja California to inspect the location to determine the impact that the construction work would have on archaeological resources. During the summer of 2010, the recording and some excavation of the lithic workshops at Huerfanito were undertaken to characterize the lithic industry.

Huerfanito Workshops
The location of the workshops is on a hill with a slope of approximately 20 degrees. Lithic exploitation occurred in open areas where massive deposits of rhyolite outcrop at the margins of the hill. It is here that the wastes were discarded and biface preforms prepared and reduced.

On the flat portion of the area, there are naturally produced flakes and sparse flaking wastes that had descended downslope. Moving along the margins of the
hill, there were six work areas (Loci 1–6) with waste flakes and biface preforms. No deep waste deposits were seen in the loci of lithic concentrations; only in Locus 3 was there a small mound of flakes. Highway construction only affected Locus 1.

In addition to the six loci, on the southern edge of the hill, there are two rockshelters with evidence of past human occupation. The first rockshelter designated El Juanjo (Figure 2) is oriented to the southeast. Its dimensions are 4.5 m on its east-west axis and 3 m north-south. A 2.5-m-by-1-m unit was excavated to determine the cultural sequence. From the few archaeological materials encountered, it was not possible to understand its relationship to the lithic workshop area. The second, Caro rockshelter, covers an area approximately 15 m by 15 m (Figure 3). In a 12 m by 9 m area, some units were chosen for excavation, but others were only surface collected.

**Description of the Huerfanito Workshops**

**Locus 1**

The center of the highway alignment passes through this locus. It is in the vicinity of Caro and El Juanjo rockshelters. To the south is a quarry on the slope of the hillside; it is east of El Juanjo rockshelter. The archaeological material is scattered on the surface. The rhyolite at this locus has a distinct color (Munsell 2.5YR 4/3 to 4/2; reddish brown to weak red) and contains large crystals that only allow the extraction of poor quality flakes; the nature of the flakes made it possible to delimit Locus 1. All the diagnostic surface...
material was collected because the locus would be adversely impacted by highway construction.

**Locus 2**

This locus lies to the west of Locus 1. The quarry is to the south and west of El Juanjo. Archaeological materials are more concentrated and abundant than at Locus 1 (Figure 4). This is a surface deposit, and only diagnostic materials such as bifaces and hammer stones were collected.

**Locus 3**

This is the largest locus, with a great density of archaeological material including small flakes, blocks, and a basalt hammer stone on the surface. The quarry is on the slope of the hillside (Figure 5). In plan view the quarry is linear and narrow. The locus also contains an area of workshop waste, including several accumulations of biface preforms. Two 2 m by 1 m units were excavated in 10-cm levels in the northeast corner at a 1.3 m diameter accumulation of flakes to

Figure 2. El Juanjo rockshelter.

Figure 3. Caro rockshelter.
determine the deposit’s depth. The removed soil was screened to recover small flakes.

Two strata were observed (Figure 6). Stratum I consists of homogeneous clayey soil, with little compaction, colored 10YR 7/4 (very pale brown). It contains abundant rocks, generally slabs with a covering of cream-colored salts. It extends from a depth of 4 cm to 48 cm. Stratum II consists of loosely compacted sand, 5YR (pink) in color, characterized by the presence of rhyolite slabs covered with cream-colored salts. It extends from a depth of 9 cm to 86 cm.

**Locus 4**

This locus sits on a small mound in the farthest west end of the site, well removed from the other loci, and at which the least quarrying was seen. All the archaeological material was collected.

**Locus 5**

This locus includes a surface workshop deposit which lies to the northeast of Locus 4 and north of Locus 3. To the north, quarry activity was concentrated on the
hill’s margin, and decortication and flaking wastes extend along the slope. The wastes are more abundant than at Locus 4 and less than those at Locus 3.

**Locus 6**

Quarrying is concentrated at the margins of the hill. The density of archaeological material is lower than at Locus 5. The deposit is mostly on the surface.

**Analysis of the Recovered Lithic Artifacts**

**Flake Industry**

The flake industry includes polyhedral cores, decortication flakes, and percussion flakes. Artifact types and their counts are given in Table 1.

Polyhedral cores are either parallelepipeds (prisms with six faces) or cubic in shape. They were produced by the removal of flakes from two to four surfaces, detached in various directions (Figure 7a).

Decortication flakes are rectangular, triangular, and circular in plan view. They have small striking platforms and dorsal surfaces with more than 50 percent cortex.

Percussion flakes are triangular, quadrangular, circular, or rectangular in plan view. On the ventral surfaces there are chipping scars at the point of impact, percussion striations, a cone of percussion, and secondary removals; the bulb is large and pronounced. On the dorsal surfaces there are flake scars in longitudinal and transverse orientations. The platform is smooth (Figure 7b, c).

High-backed flakes are rectangular in plan view, triangular and thick in cross section, with a large platform. The dorsal face was formed by four flake removals that converge in the center to produce a pyramidal shape in section. This is possibly a special type of flake for the production of high-backed scraper planes (Figure 7d, e).

**Tools**

The tool category includes knives, choppers, two kinds of scraper planes, and three kinds of scrapers.

Convex scraper planes were manufactured from percussion flakes, circular in form and thick in section. By means of oblique, continuous, and deep retouch, an edge that is undulating in plan view was produced on a thick edge or on the bulb. Based on their dimensions, it is possible that they were used to remove pulp from leaves of fibrous plants or, if carried to the coast, used to eliminate the fat from marine mammal hides.
Table 1. Counts from the Huerfanito Workshop Lithic Industry.

<table>
<thead>
<tr>
<th>Artifact Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hammer stones</td>
<td>61</td>
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<tr>
<td>Polyhedral cores</td>
<td>18</td>
</tr>
<tr>
<td>Percussion flakes</td>
<td>325</td>
</tr>
<tr>
<td>High-backed flakes</td>
<td>13</td>
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<td>Tools based on rectangular flakes</td>
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</tr>
<tr>
<td>Basalt flakes</td>
<td>4</td>
</tr>
<tr>
<td>Biface preform manufacturing errors on blocks</td>
<td>3</td>
</tr>
<tr>
<td>Biface preforms from blocks</td>
<td>29</td>
</tr>
<tr>
<td>Biface preform decortication flakes from blocks</td>
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<tr>
<td>Biface preform percussion flakes from blocks</td>
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<tr>
<td>Biface decortication flakes</td>
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<td>Crested flakes</td>
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<tr>
<td>Slabs</td>
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<tr>
<td>Biface preforms from slabs</td>
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<td>Biface preforms from semicircular slabs</td>
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<tr>
<td>Biface preforms from triangular, convex-based slabs</td>
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</tr>
<tr>
<td>Biface preforms from triangular, straight-based slabs</td>
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<tr>
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<td>Biface preforms from triangular, convex-based flakes</td>
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<tr>
<td>Chunks</td>
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<td>Concave scrapers</td>
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<td>Convex scrapers</td>
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<td><strong>Total</strong></td>
<td><strong>9562</strong></td>
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Elliptical scraper planes were made from rectangular flakes, triangular in section. A dorsal surface shows 90 percent cortex. The edges of the flake were retouched around the margin to produce an area to facilitate hafting (Figure 8a).

Convex scrapers are circular in plan view. On the distal end there is continuous, sloping retouch to produce a refined edge that is convex in plan view (Figure 8b).

Straight scrapers are flakes that are rectangular in plan view and triangular in cross section. On some edges, continuous marginal retouch has produced an edge that is straight in plan view (Figure 8c).

Concave scrapers are flakes that are triangular in plan view. On the narrowest edge, continuous marginal retouch produced an edge that is concave in plan view (Figure 8d).

Knives were made from flakes that are rectangular in plan view. The functional edge was prepared with oblique bifacial retouch. The opposite edge was prepared with steep bifacial retouch. On one face, 5 percent cortex is observed (Figure 8e).

Choppers were made from polyhedral cores subjected to bifacial, continuous, oblique retouch to produce a straight or convex bifacial edge with an angle of 45 degrees. In some cases, overlapping microflakes and ground edges are visible, indicating that the tools were used to pound a hard surface (Figure 8g).

**Bifaces**

The biface category includes four kinds of artifacts.

Biface preforms on triangular, straight-based flakes were fashioned from decortication flakes. The rectangular percussion flakes, triangular in plan view, were modified by bifacial, oblique retouch. A straight base was achieved through continuous bifacial retouch and occasionally through transverse fracture (Figure 9a, b).

Bifacial preforms on triangular, convex-based flakes took shape using thick, circular flakes. Bifaces that are triangular in plan view with convex bases were produced by applying oblique, overlapping, bifacial retouch. The artifact was further developed through sloping bifacial retouch (Figure 9c, d).
Biface preforms that are elliptical in plan view and relatively thick were knapped from circular flakes through oblique, overlapping retouch (Figure 9e, f).

Some biface preforms were rectangular, made by oblique, invasive retouch. The bases of these artifacts are straight. On one of the faces of a broken example, 10 percent of the cortex is seen (Figure 9g, h).

**Biface Industry Based on Slabs**

Using rhyolite slabs that naturally emerge from the outcrop and whose plan view shapes vary from elliptical to rectangular, bifacial artifacts were manufactured through invasive bifacial retouch. Each type was distinguished by its general shape in plan view (see Table 1).
Slabs are large pieces of raw material on which one or several flaking episodes were performed in order to test a slab’s working characteristics. More than 90 percent of the cortex is present on both faces and edges. These are still only generalized preforms (Figure 10a).

Biface decortication flakes are of various sizes, elliptical in plan view, convex in cross section, with 90 percent of the cortex remaining on their ventral faces. These represent the first phase of biface reduction on slabs (Figure 10b). They were found only in the units excavated at Locus 3; however, the other lithic workshops were not excavated, and their flakes were not collected.

Biface reduction flakes are of various sizes, elliptical in plan view, convex in cross section, and in some cases with 10 percent of the cortex remaining on their ventral faces. Evidence of two or more oblique flake removals is seen. This is the second phase of biface reduction.

Figure 10. Slab-based biface industry: (a) slab preform, (b) biface decortication flake, (c) biface thinning flake; slab-based biface preforms that are (d) elliptical, (e) semicircular, (f) rectangular, (g) triangular with a convex base, (h) triangular with a straight base.
reduction on slabs. They were found only in the units excavated at Locus 3, again because the other lithic workshops were not excavated and flakes were not collected.

Biface thinning flakes were produced in various sizes, elliptical or semicircular in plan view, convex in cross section, and very thin. On the ventral surfaces there are negative scars from the previous flaking. This represents the third phase of biface reduction. It is not possible to associate them with any specific biface group (Figure 10c). They were found only in the units excavated at Locus 3.

Slab-based biface preforms are specimens made from rhyolite slabs. Working began on one or both edges, attempting to arrive at shapes that are elliptical (Figure 10d), semicircular (Figure 10e), rectangular (Figure 10f), triangular with a convex base (Figure 10g), or triangular with a straight base (Figure 10h). In some cases 80 percent of the cortex remains on one of the surfaces. Subsequently, there was an effort to eliminate the cortex through oblique and invasive bifacial retouch. Finally, there were attempts to thin the specimen to obtain a standardized form and size. During these two processes, sometimes the midsection of the specimen broke.

Manufacturing errors occurred on biface preforms from slabs. Some specimens split transversely, hindering the reduction process, due to the presence of inclusions in the raw material or a loss of control over force.

Biface Industry Based on Blocks

The counts of biface preforms, biface preform decortication flakes, and biface preform percussion flakes from blocks are given in Table 1.

Biface preform decortication flakes from blocks are of various forms and sizes. Reduction by percussion was to eliminate the cortex of a block. They were found only in the units excavated at Locus 3.

Biface preform percussion flakes from blocks vary in size and form. They resulted from percussion that began the process of forming bifaces from blocks. These flakes were only found in the units excavated at Locus 3 because the other workshops were not excavated and flakes were not collected.

Biface preforms from blocks are inferred to have resulted from the percussion of large blocks selected on the basis of their dimensions and the presence of cortex on only one face. Examples were found that were elliptical (Figure 11a), semicircular (Figure 11b), rectangular (Figure 11c), and triangular with a straight base (Figure 11d) or convex base (Figure 11e). Their reduced numbers reflect the archaeological collection strategy that favored specimens that were not too heavy and bulky; accordingly, in the future it will be necessary to devote special sampling to this technological type.

Biface preform manufacturing errors on blocks are biface specimens that split transversely due to the presence of inclusions within the raw material or to a loss of force control that hindered the process of reduction.

Fragments

Fragments are specimens of various shapes and sizes having angular edges. They are secondary products of working waste or thermal fracture. It is not possible to associate them with any established technological process.

Hammer Stones

Cobbles and pebbles of andesite, basalt, rhyolite, quartzite, and granite were chosen for hammer stones. Their shapes are parallelepipeds (Figure 12a), spheres (Figure 12b), and ellipses (Figure 12c).
Based on dimensions, they can be classified as large, medium, and small. Traces of grinding and flaking occur on one or even two ridges. Size, shape, and weight all relate to a phase of stone working. The large specimens served to split blocks, the medium specimens served to flake slabs and to thin preforms, and the small examples served to retouch preforms and to make tools.

**Distribution of Biface Preforms**

**Introduction**

To better understand the distributions and periods regarding biface preform use, an analysis of the lithic materials recovered elsewhere in the vicinity was conducted, including at two rock shelters on the same hillside and at a third location 4 km distant. The results are below.

**Caro Rockshelter**

Rhyolite and obsidian were the main materials used at Caro Rockshelter to manufacture artifacts, especially projectile points. Rhyolitic raw material was separated into two categories: rounded cobbles and material derived from bedrock. These categories are easily distinguished because cortex on bedrock material is flat and slightly rough, while cortex on cobbles is spherical and smooth. This

![Figure 11. Block-based biface industry: biface preforms that are (a) elliptical, (b) semicircular, (c) rectangular, (d) triangular with a straight base, (e) triangular with a convex base.](image)
distinction was applied with the objective of isolating the specimens that could pertain to the Huerfanito quarries. Based on the type of cortex, color, and characteristics of inclusions, all rhyolitic bedrock material was collected from Locus 1 adjacent to the rockshelter. In walking along the nearby arroyos, we observed the presence of rhyolite cobbles, undoubtedly where rhyolitic raw materials were collected for making tools. Conical cores were produced to generate elliptical and rectangular flakes, from which scrapers and knives were manufactured (Figures 13a, b, c, d). Also encountered was an incomplete artifact of volcanic tuff manufactured using the techniques of abrasion and cylindrical perforation; its tubular form suggests it was intended as a sucking tube or smoking pipe (Figure 13f).

**El Juanjo Rockshelter**

Few lithic materials were found at El Juanjo rockshelter, mostly cores and flakes (Figures 14a, b). All cores and flakes were of rhyolite. As in the previous case, an effort was made to distinguish cobble and bedrock rhyolite. Only bedrock rhyolite from Locus 1 and some obsidian bifaces were found (Figure 14c).

**Zacateco**

The Zacateco archaeological site on the Gulf of California coast south of Puertecitos sits on a small hill. Scattered concentrations of lithic materials, shell, and bone were encountered.

The lithics were separated by raw material. Rhyolite predominated, followed by felsite and basalt (Figure 15d–e). Quartz was only used to make projectile points, and a rock of unidentified igneous origin was found. Outside the area of concentrated archaeological material in an area of low hills, two obsidian projectile points were found. The rhyolite pertained to arroyo cobbles and pebbles. Scrapers and knives were produced with this material (Figure 15a–c).
Lithic Workshops at Huerfanito, Baja California

Figure 13. Lithics from Caro rockshelter: (a–d) scrapers and knives from conical cores, (e) projectile point, (f) stone pipe.

Figure 14. Lithics from El Juanjo rockshelter: (a) core, (b) flake, (c) biface.
Chronology

Chronology poses a major problem in the study of the Huerfanito lithic workshops. Not finding artifacts with similar morphologies in the literature, we turned to technological-typological comparisons with dated locations in the vicinity to try to understand the relative dating.

From Caro rockshelter there are two charcoal dates from hearths found in stratum II at 40–50 cm (70 ± 23 BP; modern; INAH-2905) and in stratum II at 80–90 cm (478 ± 28 BP; AD 1411–1450, two-sigma range using Calib 7.0; INAH-2906). That is to say, this stratum was formed perhaps as early as ca. AD 1400 and continued to form as late as the early historic period. There are two shell dates from stratum III at 70 cm (1445 ± 74 BP; AD 1300–1590, using a reservoir correction of 546 ± 35; INAH-2908) and from the surface (1134 ± 73 BP; AD 1560–1950; INAH-2909), which loosely corroborate the charcoal dating.

Historic period charcoal dates and obsidian projectile points have been reported for the Faro I shell midden at San Felipe (Porcayo 2010:7). Faro II, another shell midden in the same area, yielded shell dates from depths of 50 cm (2390 ± 74 BP; AD 377–707; INAH-2917), from the 60–80 cm level (2430 ± 74 BP; AD 336–679; INAH-2918), and from 100–120 cm (2581 ± 74 BP; AD 144–548; INAH-2919).

The information obtained from these three sites allows us to propose a cultural chronological horizon during

Figure 15. Zacateco lithics: (a–d) scrapers and knives, (e) projectile points.
which projectile points were made from obsidian pebbles popularly known as “Apache tears,” perhaps beginning as early as AD 200 and continuing up to the nineteenth century. Based on technological-typological comparisons, Caro rockshelter and El Juanjo both date between ca. AD 1100 and 1810. Because of an absence of bifaces and rhyolite from Loci 2 through 6 of the Huerfanito workshops, we conclude that the exploitation of the quarries near Huerfanito may be dated tentatively to before AD 200.

It is possible that there was an earlier lithic industry that was based on rhyolite cobbles. The lithic industry of the Zacateco site (dated to AD 1216–1465 [1574 ± 74 BP; INAH-2915] on the basis of shell samples recovered 7–30 cm below surface) had neither obsidian in the areas of concentrated lithic materials nor the Huerfanito lithic industry.

We would thus have three lithic periods for this region. The first would be characterized by the exploitation of the Huerfanito quarries in the areas of Loci 2 through 6 and by manufacture of large biface preforms. During a second period, the use of rounded rhyolite cobbles to make scraper planes, knives, and scrapers would have begun, as well as the use of quartz and igneous rocks to make projectile points. In a final period rhyolite cobbles continued to be employed; Locus 1 with its lower quality rhyolite was exploited, and obsidian was brought long distances to manufacture projectile points.

Some Questions for Future Investigation

More than offering definitive conclusions, our study has raised a number of questions to be resolved in future archaeological projects along the Sea of Cortés coast and involving Baja California in general. In the future we hope to know more about the distribu-tional extent and chronology of the Huerfanito biface preform lithic industry on the basis of the morphology of tools. Consideration of biface preform size allows speculation that projectile points and bifacial knives larger than those manufactured during later periods were produced. What would cause such size reduction? Was it only a change in raw material? Were the high-quality sources for making large bifaces exhausted, or were smaller points manufactured because it was necessary to adapt to smaller game? Did the introduction of the bow and arrow play a role? Do smaller bifaces reflect the technology of hunters of marine mammals?

Many more questions can be asked. Only new investigations involving recovery and analysis of larger lithic samples might answer these questions.

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