The ancient Maya produced a variety of chipped stone tools which were used to aid them in everyday chores and for ritual purposes. The Xibun Archaeological Research Project (XARP) recovered chipped stone tools from both settlements and caves. Since caves are an entirely ritual context, it can be assumed that the tools found in the caves were used for ritual purposes. If the tools found in the settlements were meant largely for everyday use and the tools found in the caves were meant primarily for ritual purposes, several questions arise. Are the tools from the settlements different from the tools found in the caves? Did the Maya use different raw materials for the tools meant for ritual purposes? Were the cave tools flaked more expertly than the settlement tools? Did the tools from both contexts show evidence of use like reworking or wear patterns? Are the same types of tools found in both contexts?

Because the tools from the caves were used in rituals theoretically meant to appease the gods, it seems reasonable that the Maya would use tools of the finest material and quality. Thus, one might expect to find that the tools from the caves are produced from raw materials of finer quality and are knapped more expertly than the tools from the settlements. One might also expect to find different types of tools in the caves than in the settlements, assuming that the cave tools were produced specifically for ritual functions. Tools made for ritual purposes might be larger both because a larger tool is more impressive, and because tools used in rituals may not have been reworked as often. Settlement tools were presumably used in everyday chores and would have needed reworking fairly frequently. If a tool was used strictly in ritual contexts it was probably not used often and did not require frequent reshaping.

Methods

This study examined all the formal chipped stone tools from the XARP 1999 and 2001 field seasons. Altogether there were 38 tools. Included in the sample were all the tools found in the excavations of settlements, shovel test pit excavations, settlement surface collection, and cave surface collection. This study did not look at debitage, flake tools, or ground stone tools. Flake tools were defined as large reworked flakes with evidence of use. Chipped tool fragments were examined as well as whole tools. One tool that was not included in the study was an archaic projectile point found on the surface of the Hershey site.

Once the sample had been collected and processed through the lab, each tool was examined individually. The “Protocol for Analyzing K’axob Lithics” developed by Polly Peterson, with the guidance of Dr. Patricia A. McAnany, was used to determine the tool types, raw material, and condition of each tool. Because the protocol was developed for lithics in a different area of Belize, there were some modifications to the protocol in the tool type category. A spreadsheet was created to record the information for each tool. Provenience was noted for each tool, as well as the type of tool, the type of raw material from which the tool was produced, and the fragment type (proximal,
distal, medial, or whole tool). Also recorded were the length, width, and thickness of each tool in centimeters, and the weight of each tool in grams. Finally, each tool was examined for use wear, evidence of reshaping, evidence of burning and patination, and the quality of workmanship in producing the tool. Use wear was determined by examining the edges of the tool for any evidence that the tool was utilized. Tools that showed heavy use tended to have edges that were crushed. A tool with many small secondary flakes taken off the edge was thought to have been reshaped. Burning of the tool was determined partially by the color of the stone. Chert tends to take on a reddish color when burned. Pot lidding and fire crazing on the surface of the tool also determined burning. The quality of workmanship was determined primarily by the size of the flakes removed from the tool. Tools that had large, uneven flakes taken off were determined to be of poorer workmanship. A tool produced with very good workmanship had very fine, even flakes removed from it.

The biggest difficulty encountered was trying to determine raw material classes. All of the tools in the data set happened to have been produced from chert. However, trying to determine what type of chert proved to be very difficult. At first it appeared that the majority of the tools were produced from a chert source in northern Belize. However, during the 2001 season a possible chert source was discovered along the Sibun River near the Augustine Obispo and Samuel Oshon sites. The chert from the Sibun source appeared very similar to the chert from the northern Belize source. Both types of chert were similar in color, both contained fossilized material, and both had similar cortex. Both types of chert also appeared to be of similar quality. Without microscopically comparing the two types of chert it was not possible to distinguish which tools were produced from the northern Belize chert and which were produced from the Sibun chert.

Data Set Description

Of the 38 chipped stone tools examined in this study, eight were found in the caves, two were recovered from shovel test pits, and one was discovered on the surface at the Hershey site. The other 27 tools came from settlement excavations. The most common tools in the data set were oval bifaces with a total of 21 examples. Oval bifaces are oval shaped tools with flakes removed from both the dorsal and ventral sides. These were all-purpose tools probably used for digging and chopping. Of the 21 oval bifaces found, five of them were discovered in the caves, two came from shovel test pits, and the remaining 14 were from settlement excavations. Blades and projectile points were the next most common tools with five blades and four projectile points in the data set. Blades are tools that are produced from a large flake. They generally do not have flakes taken from the surface and they have at least one very sharp edge. Blades will often have reshaping flakes removed from the edges. Projectile points generally have flakes removed from both the dorsal and ventral sides, but unlike oval bifaces, projectile points come to a sharp point on the distal end. Only one of blades was recovered from the caves. The other four blades came from the settlements. Of the seven projectile points, six were found in the settlements and one was found in the caves. Other types of tools in the data set include a hammerstone, which showed extensive evidence of battering on the distal end, a stemmed biface fragment, a reworked biface, and a reworked blade. There was also one non-diagnostic tool fragment recovered from the caves. The hammerstone, stemmed biface, reworked biface, and reworked blade all came from the settlements. The settlement sites from which tools were recovered include the Samuel Oshon site, Pakal Na, Pechtun Ha, Augustine Obispo, and Hershey. The caves that contained tools include Chrissy’s Crawl Through, Actun Ik,
Metate Cave, Shoepot Cave, K’in Rockshelter, and Arch Cave. The majority of the tools (n=18) were recovered from the Samuel Oshon site.

Of the five oval bifaces from the cave, four were whole tools and one was proximal fragment. All of the cave bifaces were produced from fine chert. All were well flaked but the tool from Metate Cave was more expertly flaked than the other tools. All of the tools showed signs of wear. The edges were crushed and there was evidence of sharpening along the edges of the tools. The four tools from Shoepot Cave and Arch Cave were well-used tools. They bore evidence of extensive reworking and were fractured from use. Also, the tools from Shoepot Cave appeared to have been shortened by reshaping during the time they were used. One of the tools from Shoepot Cave and one from Arch Cave showed evidence of hafting with polish in the area where the tools may have been affixed to a haft. All of the tools from the caves were patinated, indicating exposure to the elements, but the two tools from Shoepot Cave were each heavily patinated, although only on one side.

The oval bifaces from the settlements all were made of chert. Only one tool was produced from poor quality chert. All of the settlement bifaces show heavy use. The edges of the tools are crushed and edge refurbished flakes have been removed from all of the tools. Many of the tools exhibited a dull polish indicating use and there is evidence of hafting on some of the tools. Most of the bifaces are well flaked but some had large flakes removed from the surface and uneven edges, perhaps indicating that they were produced quickly or by someone who was not an experienced flint knapper. All of the settlement tools were either patinated, indicating exposure to the elements, or burned. The burned tools were discolored by fire, pot lidded, and often fire crazed. Only two of the settlement bifaces were whole tools. Thirteen of the tools were fragments. The bifaces were not very well distributed through the settlements. Twelve of the bifaces were found at the Oshon site, three from Obispo, and one from Pakal Na.

There was one macroblade fragment recovered from the Actun Ik (Figure 22.1). It was a proximal fragment produced from fine chert and it was well flaked. It bore evidence of use with crushing along the edges and flakes had been removed from the edges to sharpen the tool. The original bulb of percussion was intact on the dorsal side of the blade. Additionally, four fragmentary blades were excavated from the settlements. All were produced from quality chert and all were well flaked. All showed evidence of use and had fine flakes from the edges to sharpen them when they were dull. One of the fragments had polish along the edge indicating use, and one fragment was badly burned. The burned fragment was discolored with pot lidding and fire crazing.

Six projectile points were found in the settlements. Five of the points were distal fragments, while one was a complete tool. One complete projectile point was recovered from Chrissy’s Crawl Through. Of the projectile points from the settlements, three were from the Oshon site and Pakal Na, Obispo, and Hershey each yielded one (Figure 22.2). Three of the six projectile points from the settlements were badly burned. All were finely flaked and produced from quality chert. All of the points showed evidence of reworking around the tip, perhaps to sharpen the tool. Three of the tools have crushed edges indicating wear on the edges. All of the tools may originally have been larger but then reworked to their present smaller size.
Of the six projectile points found in the settlements, two were laurel leaf spear points. One was found in a surface collection at the Hershey site imbedded in a tree, the other was from the Obispo site. The tool from the Hershey site, while broken, was complete and the tool from Obispo was a distal fragment. Both tools were made of quality chert, and both were expertly flaked. The complete tool showed evidence of reworking and was polished in the area where it had been hafted. It was also almost completely patinated from being exposed to the weather while being imbedded in the tree. The distal fragment shows no evidence of reworking. Both tools are still sharp and the edges were not crushed.

The projectile point found in Chrissy’s Crawl Through was a lanceolate spear point. It was a whole tool produced from very fine chert possibly from the chert source in northern Belize. The tool is expertly flaked with very fine, delicate flakes removed from the tool. The chert was almost translucent but there was patination beginning on the proximal end. There was no evidence of reworking and the tool was still sharp. The tool was produced from chert of very good quality and the workmanship in producing the tool was excellent.

The Oshon site yielded a bifacial tool that appeared to have been used as a hammerstone (Figure 22.3). The tool was produced from good chert but was not flaked particularly well. There were large, uneven flakes taken from the surface. The tool is thick and fairly stout. The proximal end tapers to what may have been a stem for hafting. There is polish on the stem to indicate that it may have been hafted. The edges of the tool are crushed from use and are not sharp. The distal end
of the tool is badly battered and there are large fractures at the distal end that may have been the result of battering. The proximal end also shows evidence of battering but not nearly as extensive as the evidence on the distal end. The tool appears to have been a large oval biface that was reworked into a hammerstone.

![Figure 22.3 Bifacial tool used as a hammerstone (illustration by author).](image)

Operation 22 at Pakal Na yielded what appears to be a stemmed biface fragment, possibly a stemmed spear point (Figure 22.4). Since the category for that type of tool was not on the protocol used to identify the tools, a new category was added. The fragment was from the proximal end of the tool and contained the entire stem. The tool was expertly chipped from fine chert. There was no polish on the tool to indicate use but there was evidence of the tool being sharpened. Also, though the stem did not seem to be reworked, there was evidence of edge-damage on the stem. One of the edges on the stem had been crushed. Because there is a stem on this tool and because there is crushing on the edge of the stem, the tool appears to have been hafted.

![Figure 22.4 Fragment of stemmed spear point (illustration by author).](image)

At Pechtun Ha a reworked biface was discovered. The tool appeared to have been an oval biface that was broken and reworked into a new tool (Figure 22.5). The fragment from the biface seemed to be a medial fragment and the new tool may have been some kind of scraping or wedging tool. The tool was produced from good-quality chert and was well flaked. The dorsal side of the tool retains the flake characteristics of a biface. The ventral side of the tool had two large, even flakes removed across the width of the tool. The ventral side is flat with few flake scars. The newer edge of the tool shows evidence of reworking in fine flakes removed from the edge to make it sharp. Both of the original edges of the tool remained and they show evidence of reworking and one edge was crushed.
A reworked distal blade fragment was found at the Oshon site. It was produced from coarse chert and the workmanship was poor with large, uneven flakes removed from the tool. The tool may have been produced as a blade but then later reworked bifacially. One edge of the tool was reworked to be sharp while the other edge of the tool was reworked to be flat. There was no evidence of use-wear polish or crushing on the tool. The dorsal side of the tool had large flakes removed from it and the bulb of percussion was no longer present.

The only non-diagnostic tool was discovered in the K’in Rockshelter. The fragment is a medial fragment, possibly of an oval biface. The tool was well flaked from good-quality chert. It had been fractured at both the distal and proximal ends and one edge of the tool was missing. There was no evidence of reworking on the edge that remained and the tool was still sharp.

All five of the blades recovered were fragments. Even though only fragments of blades were found, it appears that the blade that came from the cave was a much larger tool than any of the blades form the settlements. The tool from the cave was wider by two centimeters than the widest settlement blade. The cave blade was also about two centimeters thicker than any of the tools from the settlements, and significantly heavier.

The bifaces did not show much variability in size between the cave tools and the settlement tools. The largest biface came from Metate Cave. It was longer than any of the settlement tools but about the same width. It was, however, thinner than the tools from the settlements, albeit heavier. The other cave bifaces were similar in size and weight to the tools from the settlements. The settlements yielded many more biface fragments than the caves. The settlements yielded only two whole tools and 13 fragments, while the caves contained four whole tools and only one fragment. This means that it is difficult to characterize differences between the bifaces from the caves and those from the settlements. The tools from the caves may in fact be different from the settlements tools in size but because the majority of the settlement tools were only fragments it is difficult to get an idea of the average size of the bifaces that were used in the settlements. Also, the cave artifacts were large items that were visible on the surface while the settlement artifacts contained items that were recovered by excavation.
Analysis of Tools

Of the 38 tools included in this study, eight came from caves and thirty from settlements. There were 18 oval bifaces, five of them from caves. There were five blades in the data set with one coming from the caves. Six projectile points came from settlements and one came from a cave. The hammerstone, stemmed biface, reworked biface, and the reworked blade were all discovered in settlements. The only non-diagnostic tool came from a cave. Of the tools that came from the settlements, 18 were found at the Samuel Oshon site, five were from the Obispo site, four were from Pakal Na, two came from Pechtun Ha, and one was discovered at the Hershey site. There was one tool each found in Chrissy’s Crawl Through, Actun Ik, Metate Cave, and Actun K’Ic. Shoepot Cave and Arch Cave each contained two tools. There were nine whole tools recovered, five of them from the caves. There were 13 distal fragments, eight medial fragments and six proximal fragments examined in the study.

All of the tools were made of chert and most of them were well made. None of the tools from the caves were burned, though eight of the tools from the settlements were burned. All of the tools that had been burned were tool fragments. Though most of the tools seemed to be of good quality, none of the tools from the caves were poor quality. The tools that were not as well made, or were produced from chert of a lesser quality, came from the settlements. All of the tools from the caves were of good quality and workmanship. With the exception of three fragments, the majority of the tools from caves were whole, while the majority of the tools from the settlements were fragments.

The Oshon site not only contained the most tools, but it also yielded the most variety of tools. There were five different types of tools at the Oshon site: one hammerstone, 12 oval bifaces, one blade, three projectile points, and one reworked blade. The Oshon site yielded a higher proportion of bifacial tools than any other site. Of the 18 tools from the Oshon site, twelve of them were bifaces. Obispo was the only other site with more than one biface and it only yielded three. Pakal Na had four different types of tools but only one of each type: a blade, a biface, a stemmed biface, and a projectile point. Of the seven projectile points in the data set three of them were found at the Oshon and Pakal Na sites, while the Hershey and Obispo sites each yielded one.

Oval bifaces seem to be the most common tool but they do not seem to be common throughout the region. They are extremely common at the Oshon site and fairly common at the Obispo site but they are rather uncommon at the other sites. The Oshon and Obispo sites are situated fairly close together and the other three sites are located in the upper reaches of the Sibun River Valley. Tools in general seem to be more common at the Oshon site. Of the 30 tools that were recovered from all settlement sites, 18 of them came from the Oshon site. The other twelve tools were distributed among the other four settlements. The high percentage of cortical debris from the Oshon and Obispo sites (see Cesario, Chapter 23), suggests that tool production occurred locally. Tools did not seem to be common at the Hershey site although the excavations at the Hershey site were not as extensive as at the other sites represented in the data set. Presumably more will be found in future field seasons.

The lanceolate spear point found in Chrissy’s Crawl Through is perhaps the one tool of the best quality material and workmanship in the data set. The tool shows no signs of use and it retains
its sharp edge. It is possible that this tool was produced specifically for placement in the cave, or it may have been produced as a weapon and therefore did not see much everyday use. The fact that there are no other tools of this type in the data set indicates that this type of tool is rather rare in the region and possibly was produced only for specific purposes.

The other tools from the caves all showed evidence of use. The macroblade fragment from Actun Ik, the biface fragment from Arch Cave, and the non-diagnostic fragment from Actun K’ic all seemed to have been placed in the caves after they had been broken. Since there were no other fragments of the broken tools found in the caves, it can be presumed that they were broken during everyday use before they were placed in the caves. The fragment from Actun K’in is still sharp, indicating that it may have broken while being produced. The complete tools from the cave all bear evidence of use except for the lanceolate spear point. The bifaces from Metate Cave, Shoepot Cave, and Arch Cave show evidence of reworking and sharpening as well as showing use wear along the edges of the tools. Since caves are ritual contexts, it seems likely that the tools were used outside the cave and then brought into the caves as offerings.

**Discussion and Conclusions**

The ancient Maya were using tools in their everyday chores and in their rituals. We know that some of the tools were used in ritual because they are found in caves, which are entirely ritual contexts. It would seem a likely assumption that the tools that were used for ritual purposes were different than the tools used in everyday life, but this does not seem to be the case. With the exception of the lanceolate spear point, all of the tool types that were found in the caves were found in the settlements. In fact, there were some tools found in the settlements, like the laurel leaf spear points, that were not represented in the tools types from the caves. So it seems that the Maya were using the same tools in their rituals as they used for everyday work. Most of the tools from the caves showed evidence of use in the form of crushed edges and reworking, indicating that the tools were used before being brought to the caves. These tools do not appear to have been produced especially for ritual use with the possible exception of the lanceolate spear point. The lanceolate spear point shows no evidence of use or reworking, indicating that it might have been produced specifically to be placed in the cave in a ritual context. The edges of the tools are still sharp and there is no evidence of sharpening indicating that this tool was not used for everyday chores. The other tools from the caves however, show evidence of heavy use. They were reworked and sharpened many times. In fact, the two bifaces from Shoepot cave appear to have been reworked to a fraction of their original size. The biface from Metate Cave shows signs of use but seems to be about the size it was when it was produced. The blade fragment from Actun Ik shows evidence of being sharpened and possibly broke while being used. These tools all seem to have been used before they were deposited in the caves. The original purpose of these tools was to aid the Maya in their daily chores of farming, chopping, hunting and all the other things the Maya did to survive.

There is no need for tools like these in the caves except in ritual contexts. These tools may have been placed in the caves as offerings to the gods. However, they were not produced specifically for offering. Their original function was for everyday use. At some point the Maya who used these tools decided that they would be more useful as offerings to the gods and placed them in the caves. But until they were placed in the caves, these tools were used as any of the tools found in the settlements were used. The tools from the caves did not differ greatly from the tools from the
settlements because the tools for everyday use were sometimes left as cave offerings. More of the tools from the caves are whole tools than those from the settlements but that may be because of the circumstances of artifact recovery. Also, the Maya would rework broken tools into other tools so that if a tool broke it may not make it to the cave as an offering because it might be reworked into something else.

One big difference between the tools from the caves and those from the settlements are that none of the cave tools were burned. Several of the tools from the settlements showed evidence of burning. Since none of the cave tools were burned it is unlikely that the Maya were offering the tools to the gods by burning them in the caves. The settlements tools that were burned may have simply been tools that fell into a fire, or they may have been left in a settlement when a burning event took place. Of the eight burned tools, three of them were projectile points. It seems likely that the projectile points were used in hunting. Presumably a projectile point would become imbedded in the hunted animal and not be removed before cooking the animal. If the animal were cooked with the point still in the flesh the point would be burned as well.

Because the caves and the settlements were two very different contexts, one might expect the artifacts from the two contexts to be different. The caves were an entirely ritual context for the ancient Maya and the artifacts from the caves are therefore associated with ritual. The settlements were where the Maya lived and worked in everyday life, and the artifacts are associated with the activities of daily routine. Chipped stone tools do not seem to vary between the cave and settlement contexts. With a few exceptions, the same types of tools were recovered from both contexts. Also, the tools from both contexts showed evidence of similar use. So, the ancient Maya did not appear to be producing tools specifically for their rituals. Instead, they seem to have been placing tools that they had used in the settlement in the caves as offerings.
Lithic tools were used in both the utilitarian and ritualistic aspects of Maya life: agriculture, hunting, and offerings to the gods, are a few noteworthy examples. Through the study of chipped tool debitage – the flakes, debris, and shatter resulting from the production and maintenance of stone tools – we can attempt to gain further insight into certain facets of Maya society that are not directly related to stone tool usage. This study examines debitage from three sites of the Sibun River Valley: Pakal Na, Samuel Oshon, and Augustine Obispo. Pakal Na is a Late Classic to Postclassic site located in the middle Sibun River Valley, while the Oshon and Obispo sites were occupied in the Terminal to Postclassic periods in the lower Sibun River Valley. An analysis of the debitage found at these sites can inform us about Maya utilization of local raw materials for stone tool production in the vicinity of Pakal Na, Oshon, and Obispo as well as answer questions about the possible trade networks between these Sibun River Valley sites.

**Research Methods**

**Sampling**

The sample size for this analysis consisted of three hundred pieces of debitage in total, one hundred from each site. The samples were selected from the following deposits. Pakal Na, Operation 37, Zone 5, Square A, is a midden deposit located in front of a retaining wall on the northern side of Structure 130 (where all of the burials were excavated). Operation 24, Zone 4, Square D at the Oshon site is construction fill beneath and supporting Stela 1. Operation 30, Zone 1 of the Obispo site is a topzone/earthen layer located around and below fractured altar-pieces (Monument 1). While these are not true random samples, they were chosen particularly because they are areas of primary deposition. This is desirable in debitage analysis because it allows for more definitive interpretations of tool production within a specific locale at a certain site.

**Protocol**

As the basis for my analysis I used a protocol developed by Polly A. Peterson and Patricia A. McAnany for K’axob debitage and adapted it for use with the Sibun River Valley sites. After recording the provenience of a piece of debitage, the first step was to identify the debitage type: a quarry blank, core (nodule used for flaking), core tool (a tool later utilized as a core), flake (with bulb of percussion, platform, and smooth ventral surface), flake fragment, fire shatter (evidence of burning and cracking), angular debris (angular chunks without flake scars), Tranchet flake, or cobble (Figure 23.1). Next, the raw material of the debitage piece had to be determined. In the event that it was overly burned or patinated, the material was deemed unknown due to alteration. The remaining raw material differentiation was based on the color and texture of the sample. The options included Northern Belizean (or Colha) chert, a smooth banded rock; chalcedony, which exhibits a light frosted color and grainy texture; Lower Sibun River Valley chert, a banded rock with varying textures; other chert and other/unknown raw material. The third step in the procedure was to evaluate the condition of the flake.
Burning can be indicated by a black, dark grey, or reddish color, potlidding (round cavities in the surface), and a uniform layer of polish. Patinated pieces, those that have been chemically weathered over a long period of time, appear frosted with white speckles. Sharp chunks taken off a flake can identify modern damage, usually due to plowing or excavation.

Following that initial categorization, I examined the various attributes of debitage, cortex being the first (Figure 23.2). Cortex is the original limestone surface of a chert nodule and is useful in the analysis process because it indicates the stage of production at the time the flake was removed. The presence of a significant amount of cortex on a piece of debitage indicates that it was removed during the primary reduction phase, the more cortex the earlier in production the flake was chipped. Counting the number of dorsal scars, also referred to as flake scars, on a flake or flake fragment is a second indication of the type of reduction occurring at a site (Figure 23.1). Few dorsal scars indicate
a primary reduction phase, while several scars are a sign that the flake was removed from an intensively reduced core, or possibly from a finished tool during a period of retouch. Finally, I examined the platform characteristics of flakes and flake fragments. The platform of a flake is that portion of the original core or tool from which the flake was struck off (Figure 23.1). A flake removed from a biface during resharpening will exhibit a diagnostic two-sided peaked platform often with use wear.

Using a hand lens with 6x magnification, each artifact was analyzed for the presence of use-wear. Polish results from the repeated utilization of a stone tool. If a flake has a significant amount of polish, it was probably struck off of a whole tool during an episode of resharpening. Marginal edge-wear can be found around the flake edges farthest from the platform, and indicates that a flake was retouched and reused as a tool itself (Figure 23.1). The last step was to weigh the sample from each zone and measure the length, width, and thickness of every piece of debitage.

**Difficulties with Raw Material Identification**

As previously stated, during debitage analysis I based my raw material identification on the color and texture of each artifact. As raw material references I used a large nodule of Northern Belizean chert (also referred to as Colha chert) from the site of Altun Ha as well as several small cores of Lower Sibun River Valley chert, collected from the Obispo site. Remarkably, the two materials are amazingly similar to each other. For instance, both exhibit a rough, white/tan cortical layer and while the Northern Belizean chert is characterized by a smooth texture, the local chert displays not only the smooth quality of Colha chert but a variety of more coarser grained textures as well. In addition, the two share the same principle colors – the classic Colha honey/caramel shade, as well as tan, grey, greyish tan, and brown. The lower Sibun River Valley chert, though, has a light cream color that was not apparent in the nodule of Northern Belizean chert. Lastly, both the Northern and local samples exhibit banding – different layers of color running throughout the chert. Clearly, the Lower Sibun River Valley and Colha chert share an uncanny resemblance with each other and differentiating between the two was problematic.

Although not yet located, there is a chert source proximate to the Obispo and Oshon sites, as is evident in a geological map of the Sibun watershed (Boles 1999: Figure 23.3). In addition to the atlas, we can be certain that there is a local chert source because at the Obispo site large chert cobbles were used as flooring material. Because of the excessive amount and heavy weight of these chert cobbles, it is unlikely that large nodules of Colha chert would have been transported a great distance to the Sibun River Valley to be used as construction material. On the other hand, we have yet to find biface preforms made of lower Sibun River Valley chert. This absence is most likely due to the fact that we have not pinpointed the quarry area yet. For the sake of parsimony and because we do have a local chert source, I have chosen to assume that, when in question, a piece of chert debitage is one of the lower Sibun River Valley chert as opposed to that of Northern Belize.
Results

Debitage Types

At all three sites the major debitage types are flakes and flake fragments (Table 23.1). They comprise over ninety percent of the Pakal Na sample, seventy-four percent of the debitage at the Oshon site, and eighty percent of the sample from Obispo.

Table 23.1 Percentage of Debitage Types at Each Site

<table>
<thead>
<tr>
<th>Site</th>
<th>% Quarry Flake</th>
<th>% Core</th>
<th>% Core Flake</th>
<th>% Flake</th>
<th>% Flake Frag.</th>
<th>% Fire Shatter</th>
<th>% Angular Debris</th>
<th>% Tranchet Flake</th>
<th>% Cobble</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pakal Na</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>44</td>
<td>47</td>
<td>0</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Oshon</td>
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<td>0</td>
<td>0</td>
<td>39</td>
<td>35</td>
<td>22</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Obispo</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>40</td>
<td>40</td>
<td>12</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>

All three sites yielded low percentages of angular debris, but whereas the Oshon and Obispo sites have a significant amount of fire shatter, Pakal Na has none. Because the Oshon debitage was taken from a zone lying below a stela and the Obispo sample from a zone around a fragmented altar, it is possible that the fire shatter is the result of some kind of ritual burning episode. In any case, the high percentage of flakes and flake fragments suggests that there was a great deal of tool production and resharpening at these sites.
Raw Materials

Table 23.2 Percentage of Lithic Raw Materials at Each Site.

<table>
<thead>
<tr>
<th>Site</th>
<th>Unknown due to alteration</th>
<th>Colha chert</th>
<th>Chalcedony</th>
<th>Lower Sibun River Valley chert</th>
<th>Other chert</th>
<th>Other/Unknown</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pakal Na</td>
<td>4</td>
<td>0</td>
<td>12</td>
<td>80</td>
<td>4</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Oshon</td>
<td>33</td>
<td>0</td>
<td>2</td>
<td>65</td>
<td>0</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Obispo</td>
<td>27</td>
<td>0</td>
<td>1</td>
<td>71</td>
<td>0</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>% of Total</td>
<td>21.3</td>
<td>0</td>
<td>5</td>
<td>72</td>
<td>1.3</td>
<td>0.3</td>
<td>100</td>
</tr>
</tbody>
</table>

The Pakal Na, Oshon, and Obispo sites were predominantly utilizing the local chert of the lower Sibun River Valley; in fact seventy-two percent of all debitage was manufactured from this raw material (Table 23.2). However, a greater amount of chalcedony was found at Pakal Na than anywhere else. This could be an indication that both the Oshon and Obispo sites were utilizing only the local chert source for tool production, at that Pakal Na acquired its chalcedony from another area.

Condition

Table 23.3 Percentages of Debitage per Condition Type at Each Site.

<table>
<thead>
<tr>
<th>Site</th>
<th>% Not Altered</th>
<th>% Burned</th>
<th>% Patinated</th>
<th>% Burned and Patinated</th>
<th>% Modern Damage</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pakal Na</td>
<td>86</td>
<td>5</td>
<td>7</td>
<td>2</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Oshon</td>
<td>45</td>
<td>30</td>
<td>20</td>
<td>5</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Obispo</td>
<td>60</td>
<td>35</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>

Burned and patinated areas are usually undesirable traits for a stone tool and would be removed during the primary phases of tool production. Because stone tools were generally made without the presence of these damaged areas, when resharpened the resulting flakes would lack those burned and patinated qualities as well.

The Oshon and Obispo sites contained a great deal of burned and patinated debitage (Table 23.3). However, analyzing the condition of the debitage from the Oshon and Obispo sites becomes difficult due to the possibility that the damaged flakes resulted from a post depositional burning episode. As stated earlier, the Oshon and Obispo sites contained a stela and altar, respectively, and were therefore sacred areas. Because of that, it is highly likely that ritual burning events could have occurred, damaging the flakes after they had already been removed.

At Pakal Na, on the other hand, there is little altered debitage. This absence of burned and patinated debitage could suggest that it was more an area of resharpening and retouch than primary production, or this can merely just indicate that post depositional burning episodes did not occur at Pakal Na. However, because these three sites have not been exposed to the same post depositional events and/or processes that affected the condition of the debitage it is not wise to draw absolute conclusions from this information.
Exchanging the level of cortex on the debitage within a deposit is a good indicator of the stage of tool production occurring at that locale (Table 23.4, Figure 23.2). Roughly one third of the debitage at the Samuel Oshon site had cortex covering up to fifty percent of its surface and seven percent of the pieces exhibited between fifty and ninety percent cortex. However, about two thirds of the Oshon sample contained debitage pieces completely devoid of a cortical layer. A similar pattern occurred at the Obispo site, where cortex was absent on about two thirds of the debitage, but present on up to half of the dorsal surfaces in nineteen percent of the sample. Six percent of the Obispo debitage had a cortical layer covering between fifty and ninety percent of its surface and seven percent of the pieces within the sample were almost completely cortex. Because the Oshon and Obispo sites yielded have a large amount of cortex-covered debitage, we can infer that a great deal of primary reduction was occurring in those areas. The cortical layers of chert nodules were removed to create a clean core from which to flake a tool. But we also find a large amount of debitage without cortex at these two sites. The noncortical debris may indicate that tool manufacturing, as well. It appears that all levels of tool production were occurring at these lower Sibun River Valley sites.

At Pakal Na eighty-eight percent of the debitage pieces did not have any remnants of a cortical layer and of the remaining twelve percent, eight pieces had less than half of their surface covered with cortex, leaving only four pieces exhibiting cortex on fifty to ninety percent of the flake. At Pakal Na, cortex had already been removed from the cores and/or tools before they reached the site. Unlike Oshon and Obispo, it seems that Pakal Na was an area of only secondary production, maintenance, and retouch.

**Dorsal Scars**

When counting the number of dorsal (or flake) scars, one includes only flakes and flake fragments because no other forms have dorsal or ventral surfaces. Over half of the debitage from the Oshon and Obispo sites displayed between zero and four flake scars, a very small amount indicative of primary reduction (Table 23.5). The next range of five to eight dorsal scars was found on a substantially smaller number of flakes from the Oshon and Obispo sites, and may be evidence of secondary reduction – the
shaping of the actual tool surfaces. Only four and five percent of the flakes from these two sites respectively contained nine to twelve dorsal scars. A high number of dorsal scars when combined with a bifacial platform and use-wear indicate that a flake came from a resharpened whole tool. The low dorsal scar counts plus platform and use wear patterns presented below indicate that tool retouch was not a primary activity in the sampled excavation units of the Oshon and Obispo sites.

At Pakal Na, there is evidence of nearly equal amounts of primary and secondary reduction, thirty-two and thirty-nine percent respectively. Unlike the two lower Sibun River Valley sites, at Pakal Na flakes included twenty three percent with a complex pattern of dorsal scars, between nine and sixteen suggesting final stage tool production or retouch.

**Use Wear and Platform Characteristics**

<table>
<thead>
<tr>
<th>Site</th>
<th>% Polished</th>
<th>Retouched Pieces</th>
<th>Biface Platforms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pakal Na</td>
<td>43</td>
<td>15</td>
<td>22</td>
</tr>
<tr>
<td>Oshon</td>
<td>15</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Obispo</td>
<td>5</td>
<td>0</td>
<td>10</td>
</tr>
</tbody>
</table>

Forty-three percent of the debitage at Pakal Na contained use wear polish, indicating that those pieces were removed from a heavily utilized whole tool, probably to resharpen a tool edge (Table 23.6). The Oshon and Obispo sites revealed significantly fewer pieces exhibiting polish, indicating, once again, that these areas were sites of manufacture rather than maintenance.

In Zone 5 of the Pakal Na midden, fifteen pieces of debitage were found with marginal retouch; at Oshon only one; and none at Obispo. In addition, twenty-two flakes were recovered with biface platforms at Pakal Na, ten at Obispo, and one at Oshon. A platform that identifies a particular flake as having been detached from a biface, indicates that the flake is a product of late stage production or resharpening. It is clear that much more resharpening and retouch occurred at Pakal Na and once again, that the Oshon and Obispo sites were areas of primary reduction and production.

**Measurements**

<table>
<thead>
<tr>
<th>Site</th>
<th>Weight (g)</th>
<th>Average Length (mm)</th>
<th>Average Thickness (mm)</th>
<th>Average Width (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pakal Na</td>
<td>131.5</td>
<td>15.651</td>
<td>13.301</td>
<td>2.944</td>
</tr>
<tr>
<td>Oshon</td>
<td>481.55</td>
<td>25.901</td>
<td>21.293</td>
<td>6.574</td>
</tr>
<tr>
<td>Obispo</td>
<td>442.3</td>
<td>24.103</td>
<td>18.144</td>
<td>6.871</td>
</tr>
</tbody>
</table>
The Pakal Na, Zone 5 sample weighs three times less than either the Oshon or the Obispo samples (Table 23.7). Plus, the average size of the debitage pieces from Pakal Na are smaller than that of the two lower Sibun River Valley sites. This supports the notion that Pakal Na was an area of tool maintenance, while the Oshon and Obispo sites were in a region of primary production because cortical flakes and chunks are larger and weightier than small retouch flakes.

Large, long flakes are the result of primary reduction activity to remove any cortical, burned, or patinated areas. Smaller, shorter flakes, on the other hand, are removed during secondary reduction and maintenance, more precise work. The range of debitage lengths found within a site can help us to determine what types of lithic activity had occurred there. At Pakal Na, the range of debitage lengths is small, most pieces falling somewhere between twelve and nineteen millimeters. This small size range of the Pakal Na debitage suggests that secondary reduction and retouch were the primary tool production activities occurring there. At the Oshon and Obispo sites, though, there is a huge range of measurements. The debitage pieces are fairly equally distributed between about eight and forty millimeters in length. This large range of eight to forty millimeters suggests that primary reduction as well tool production was taking place at the Oshon and Obispo sites.

**Discussion and Conclusion**

Comparative analysis of debitage from Pakal Na, Oshon, and Obispo suggests that different types of lithic reduction occurred at each site. At Oshon and Obispo the presence of burned and patinated pieces, high levels of cortex, and absence of polish, retouch, and biface platforms indicates that these sites were major areas for primary reduction. The lower dorsal scar counts as well as the huge range of debitage sizes further suggest that these two lower Sibun River Valley sites were also producing tools. Combining those results with the close proximity of the Oshon and Obispo sites to a local chert source leads me to believe that these two sites did not only produce chipped tools, but also controlled the large scale preparation of chert cobbles into clean, smooth nodules perfect for the manufacture of stone tools.

On the other hand, the high number of flakes, absence of cortical, burned and patinated pieces, and small average measurements, suggest that Pakal Na was an area where secondary tool production occurred. The biface platforms, marginally retouched flakes, and polished debitage point to resharpening and retouch happening at Pakal Na as well.

How is what we now know about lithic reduction at the Pakal Na, Oshon, and Obispo sites significant to an understanding of trade along the Sibun River? The Maya at the Oshon and Obispo sites may have been exploiting local chert sources of the lower Sibun River Valley for the purpose of trade with sites further up river. The evidence suggests that they could have prepared not only stone tools but also clean, chert blanks for exchange. Pakal Na, being distant from the lower Sibun chert, would then have been acquiring pre-worked chert nodules as well as tools from the Oshon and Obispo sites, and acquiring its chalcedony from yet another trading partner elsewhere. The Oshon and Obispo sites were likely key players in a chert tool production and trade system within the Sibun River Valley.
References Cited

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1999  
Obsidian has been a prominent feature of the ancient commerce in the Maya region. Imported from Central Mexico and the Maya highlands in Guatemala, obsidian was used to manufacture both utilitarian and ritual objects. Known locations for sources of obsidian include Zinapécuaro, Pachuca, and Otumba all of which are near Teotihuacan. In Guatemala, the sites of Tajumulco, San Martín Xilotepeque, El Chayal, and Ixtepeque were mined for obsidian. Other sources include the more remote sites of Zaragoza and Cerro de Las Minas in Central Mexico (Clark 1984: 242).

The Sibun River Valley in Central Belize is devoid of any obsidian sources, hence the Maya of this region only could have obtained this material through trade. It is not known, however, whether the Maya living in the Sibun River Valley imported the obsidian as a raw material or unprocessed cores and manufactured the tools on site, or simply obtained the tools prefabricated.

Excavations of the Xibun Archaeological Research Project (XARP) conducted during the 2001 season yielded 195 specimens of obsidian from eight different sites. In the tradition of preceding researchers, Kuba (1997) and Paling (1999), the XARP 2001 obsidian analysis includes the study of use wear, typology, density, and context of the specimens uncovered from excavations at five surface sites and collection from three caves.

Site Descriptions

The obsidian of XARP 2001 was collected from two distinct cultural contexts: caves and settlements. No excavations were conducted in the caves and all obsidian specimens were obtained either through surface collection or examined and studied in situ. Traditional excavation techniques were employed at the settlement sites and obsidian was either retrieved directly from in situ deposits or from the screen.

Cave sites from which obsidian was recorded and analyzed include Actun Chanona (C-21), K’in Rockshelter (C-22), and Arch Cave (C-24). Settlement sites include Hershey, Pakal Na, Obispo, Oshon, and Cedar Bank.

**Actun Chanona.** Located in the Hershey District, Actun Chanona is a limestone cave situated in the Hummingbird karst. Currently, the only access to this cave is via a citrus orchard and a precipitous one-hour mountain trek. The cave is oriented on an east-west axis with a large eastern entrance and a precarious fissure as a western entrance. The inner and central chamber of the cave contains a large modified area of breakdown known as the Great Platform. The ceiling of this chamber is approximately 17 m high. Obsidian artifacts were found on the Great Platform and in its vicinity. The eastern to the western entrance of the cave is approximately 485 m in length in its entirety. Actun Chanona is culturally rich in artifacts and human modifications to the cave can be witnessed throughout. There are remains of at least five individuals located near the two entrances and an abundance of ceramic artifacts, including several
whole vessels with kill holes. From the artifacts and evidence gathered, it does appear that Actun Chanona was a site of ritual significance (see Peterson, Chapter 3).

*K'in Rockshelter.* Situated in the Glenwood Cave District across the Sibun River from the Monkey Bay camp, access to the cave requires a one-hour hike from the river. Although the cave consists primarily of two tunnels, the majority of the structure is a rock shelter beneath an overhang. The entrance to the small rock shelter is veiled by a curtain of vines. Artifacts include the usual array of sherds, jute, debitage, and so forth. Human modification includes a wall that blocks the main entrance (see Peterson, Chapter 9).

*Arch Cave.* Situated in the Gracy Rock District, approximately a 15 minute drive from the village of Gracy Rock, Arch Cave is the most accessible of all the caves. Residents of the village of Gracy Rock maintain a walkway and staircase that leads into the cave. Once a week, Arch Cave becomes a tourist attraction and local villagers provide guided tours. The entrance to the cave is located at the top of the staircase and below a wide pass-through or archway from which the cave derives its name. The entrance itself is a narrow crevice along the wall of the arch, but quickly opens up into a wide passage that forks to the north and south. Arch Cave, though not as large or cathedral-like as Actun Chanona, is culturally rich. The main chamber of the cave contains as many as nine whole vessels, some almost a meter in height, and many large sherds. Many of the vessels are associated with possible altars and possess kill holes. Several sub chambers were found; one of particular interest is the assassin bug chamber, a low-ceilinged room containing some 15 whole vessels. Throughout the entire cave are rubble piles interlaced with pottery sherds. Other culturally significant artifacts of considerable quantity include jaguar teeth, animal bones, jute, and marine shell. Human modifications to Arch Cave are noticeable, predominantly at the entrance which features the remains of a collapsed wall that once sealed the cave (see Peterson, Chapter 9).

*Hershey Site.* The Hershey site, on the northern bank of the Sibun River, is situated on a flat alluvial plain. The southern bank in this area of the Sibun River has tall, steep, karst formations. The Hershey site is located on the first flat piece of land encountered when descending from the headwaters upstream in the Maya Mountains. The Sibun River is not very wide at this point and according to local reports flood waters can run high, possibly due to the close proximity of the karst across the river and the site’s location on a bend (this constriction causing the flood waters to rise onto the western banks). Currently the site is situated in a cacao plantation that was owned by Hershey-Hummingbird Ltd. in the 1960s (hence the site’s name) and is today owned by Hummingbird Citrus Ltd. Hershey is accessible from the Hummingbird Highway, about 5 km south of Blue Hole National Park. Hershey is comprised of five plaza groups identified as Plaza A, B, C, D, and T. Excavations were conducted in Plaza Groups A, C, and D, with Operations 51 and 52 at Group A, Operation 53 at Group C, and Operation 50 at Group D respectively. In general, the most remarkable feature of the site is the 11.3 m high pyramid in Group A. Plaza B is located within 100 m of the river.

*Pakal Na Site.* Located on a terrace set back from the Sibun River, Pakal Na is close to the confluence of the Sibun River and Indian Creek. The site is accessed from the Western Highway through a privately owned citrus orchard. Here the river is in its middle reaches and meander bends increase in frequency (compared to Hershey site, where the river bed is narrower and cuts a straighter course than in the middle reaches). The site encompasses a total area of about 1 km² and presently is surrounded by citrus orchards, with gravel and sand mining operations on portions of the land. In 2001, three excavations were conducted at Pakal Na; Operations 22, 36, and 37. A chief interest of the XARP 2001 field season at Pakal Na was the completion of Operation 22, an excavation at a large platform that enclosed a burial
deposit containing several individuals. Preliminary studies reveal that perhaps as many as five individuals may have been interred at Operation 22, with at least one individual buried in a primary, articulated position while the others were placed in secondary bundles. Abundant grave goods also distinguish the burial.

*Samuel Oshon Site.* Situated in the Freetown Sibun District on a small private farmstead, the Oshon site can be entered via a roadway through the village of Hattieville, which is situated on the Western Highway. Minor crop cultivation has taken place on the site since the former owner Mr. Samuel Oshon sold the land in 1999. The Sibun River runs along the southern side of the site, within 15 m at its closest point. Here the water level of the Sibun is affected by the tidal fluctuations of the Caribbean Sea, as the Oshon site is approximately 10 km away from the mouth of the river. The site itself is placed on a high ridge, possibly above the reaches of seasonal flooding. Architecturally, the Oshon site is interesting because it is a relatively small settlement with stone monuments (i.e., two stelae) that are absent from larger sites such as the Hershey site. Oshon site has a distinctive round structure in its main plaza group. A single operation was carried out at Oshon, Operation 24.

*Augustine Obispo Site.* Located in the Freetown Sibun District, the Obispo site is another small settlement with stone monuments. It is one of the few settlement sites identified by XARP that is situated on the southern bank of the Sibun River. The site is located on a privately owned farmstead with moderate crop cultivation. Two excavations were conducted at this site, Operations 30 and 31 (see Morandi, Chapter 15). As with the Oshon site, Obispo is intriguing in terms of its stone monuments found wanting at other sites. Another interesting discovery was that significant amounts of chert were recovered from both the Oshon and Obispo sites. Chert nodules were used in construction fill for platforms. Chert debitage, flakes, and worked tools were found in excavations at both sites.

*Cedar Bank Site.* Within the confines of Gracy Rock District, Cedar Bank site can be reached through the Gracy Rock Village roadway. The site is located about five minutes west of the village. It is situated on a high bank with substantial mounds and architecture. Cedar Bank consists of two plaza groups that are surrounded by house groups. Excavations in a single small operation, Operation 40, uncovered artifacts from the Late Classic through Colonial periods.

**Methodology**

The first and foremost task of the XARP 2001 obsidian analyst, after having restricted the goals and objectives of the study to use wear, typology, density and context, was the creation of a cataloging system which would permit the analyst to identify and refer to each individual obsidian sample as and when necessary. This study adopted the identification number cataloging system utilized by Paling (1999). This season’s cataloging sequence began with the 300 series, starting with ID # 301 and running through ID # 495. The 300 series was chosen to provide a sufficient buffer, should work be conducted on the remaining unprocessed obsidian samples from both the 1997 and 1999 seasons.

With each piece of obsidian tagged by a unique identification number, the provenience information was entered into an Excel data set. Provenience information was collected as follows:
i) Field Collection Bag (FCB) Number.
ii) Operation or Cave Number.
iii) Zone or Cave Component Number.
iiv) Square or Cave Unit Number (also Cave Surface Collection Unit Number).

Categorization of each obsidian sample involved both identification and measurements. These categories are introduced and defined as follows:

Identification (Figure 24.1)

i) Type – Blade, Core, or Flake. (Should a sample be identified as a Blade, it is possible to further breakdown the identification process by fragment type).
ii) Fragment – Complete, Proximal, Medial, Distal, or Unknown.
iii) Shape – Trapezoidal, or Triangular in cross-section.
iv) Use Wear – Irregular, Systematic, Absent, or N/A.

As with Paling’s (2001:204) classification, after an obsidian artifact was categorized as a blade, core, or flake, “blades could then be identified either as distal, medial, or proximal fragments or whole (complete) pieces. Indication of a bulb of percussion would denote a proximal end of a blade fragment. Distal pieces were identified by a tip or point. Medial segments exhibited no signs of a bulb of percussion or a tip. Whole (complete) have both a bulb of percussion and a tip.

Shape is identification of the cross section of obsidian specimens that tends to be either triangular or trapezoidal. Edge Damage comprised of distinguishing the edge wear on the blade fragments. Blades with distinct non-uniform damage on both edges were considered irregular in terms of edge damage. Systematic identifies only use wear on a single edge. Absent represents lack of any edge damage. Flakes generally have an N/A classification for edge damage, meaning that post-depositional processes have obscured any clear evidence of use wear.

Should a particular sample bear traits of two classifications, the leading classification took precedence. For example, a Blade/Flake sample is more plausibly in the likeness of a blade. Other combinations include (but not limited to) Medial/Distal fragments, Triangular/Trapezoidal shape, Irregular/Systematic use wear etc. Examination and identification of the samples were made with a 3x hand held magnification lens.

The measurement categorization of obsidian incorporates the following:

i) Length (mm)
ii) Width (mm)
iii) Thickness (mm)
iv) Weight (g)

Each piece of obsidian was measured at its greatest length, width, and thickness, to the tenth of a millimeter. Weight measurements were taken to the hundredth of a gram. The data were entered into an
Excel spread sheet with solver function, enabling the quantification of obsidian characteristics and distribution.

Figure 24.1 Diagram showing blade fragment types (illustration by author).
Results

A total of 195 pieces of obsidian were processed through the field laboratory of the XARP 2001 field season. The cave sites yielded a total of four pieces of obsidian, one of which was not collected but studied *in situ*. As expected, the settlement sites provided the bulk of the obsidian specimens with 191 pieces distributed over six sites and ten operations.

A break down of the distribution of obsidian by site would be as follows:

<table>
<thead>
<tr>
<th>Site</th>
<th>Qty</th>
<th>Site</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-21 Chanona Cave</td>
<td>2</td>
<td>C-22 Actun Kin Cave</td>
<td>1</td>
</tr>
<tr>
<td>C-24 Arch Cave</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hershey Op 50</td>
<td>2</td>
<td>Pakal Na Op 22</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Op 51</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Op 52</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Op 53</td>
<td>12</td>
</tr>
<tr>
<td>A.Obispo Op 30</td>
<td>13</td>
<td>Oshon Op 24</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>26</td>
<td>Cedar Bank Op 40</td>
<td>15</td>
</tr>
</tbody>
</table>

Pakal Na accounted for 42% of the obsidian recovered this season, followed by the Obispo site with 20%, Oshon site at 18%, Hershey site 10%, Cedar Bank 8%, and the remaining 2% coming from the three caves.

The sample produced 147 blade fragments and 48 flakes. No obsidian core was uncovered. The blade fragments have been identified as 38 proximal pieces, 57 medial pieces, 35 distal pieces, 13 medial/distal pieces, one proximal/medial piece, two distal/medial pieces, and one medial/proximal piece. A percentile division of proximal, distal and medial fragments revealed strikingly similar results as in XARP 1999 Field Season. This season yielded 27% proximal, 25% distal, and 48% medial fragments, as opposed to last season’s 25%, 27%, and 45% respectively.

Actun Chanona yielded 2 blades of obsidian, one of which is of particular interest. Obsidian ID # 302 is unique in that it appears to have been melted with sediments fused into the ventral and a portion of the dorsal surfaces. Its proximal tip is fused and misshapen. Along with evidence of large fires and burning around the Great Platform, this obsidian blade was either deliberately or more likely accidentally damaged by fire.

K’in Rockshelter provided a sole blade fragment collected by primatologist, Robin Brockett. Arch Cave too only revealed a single blade of obsidian (Figure 24.2, ID # 304).

Operation 50, in Plaza Group D of the Hershey site, was probably a residential area and yielded a blade and a flake. Operation 51, in Plaza Group A, was located on the northern front of the pyramid and exposed a total of four pieces. Operation 52, a narrow trench excavated by Dan Finamore in search of the
Spanish *visita* yielded a single blade. The largest amount of obsidian was collected from Operation 53 of Group C — a total of 12 pieces. Quite surprisingly, a large and complex site such as Hershey only disclosed a collection of 19 obsidian pieces. Operation 53, which was placed in a residential group, yielded the largest amount of obsidian. Use wear examinations indicate heavy utilization of the blades.

Pakal Na, which had three operations, provided 82 specimens of obsidian. Operation 22, with its complex burial deposit, and Operation 37 — an ancillary structure to the burial mound — disclosed 44 and 38 pieces of obsidian respectively. Operation 22 has the highest yield of obsidian for the entire season. This finding is in keeping with our identification of the mound as part of an elite residential complex. Operation 37, discovered through magnetometry survey, ranked next in terms of obsidian frequency from a single operation. This discovery is intriguing, as Operation 37 is believed to be an auxiliary structure to Operation 22. Operation 37, however, contained a midden deposit within its confines.

Excavations at the Obispo site brought to light a total of 39 pieces: 32 blade fragments and seven flakes from Operations 30 and 31. Work performed at the Oshon Site uncovered 36 pieces from Operation 24. Oshon Site has the highest number of retouched or reworked flakes or blade fragments with 10 such pieces.

Cedar Bank boasts only Operation 40 which produced 15 samples of obsidian. Most amazingly, Cedar Bank was excavated in four days and yet revealed a respectable quantity of obsidian. (Figure 24.2 shows a sample of obsidian pieces from the above-mentioned sites).

The study of edge damage shows that the highest proportion of blade fragments bear irregular damage (54%), followed by systematic damage (30%), and 16% with no visible edge damage. Probable retouched flake or blade fragments total some 16 pieces, 10 of which were found in Operation 24 at the Oshon site. Three pieces were unearthed at Obispo site, Operation 31 (none from Operation 30), two from Cedar Bank site, Operation 40, and a single specimen from Pakal Na, Operation 37. The high percentile of possible reworked flakes or blade fragments found at Samuel Oshon site leads one to speculate the economic nature of this settlement. Not only is this site interesting in terms of the presence of stone monuments, but in the large proportion of reworked obsidian (63%) in direct association with the monuments. Apart from the sole sample uncovered at Pakal Na, all other probable reworked obsidian pieces hail from the smaller sites investigated during this field season. Perhaps these smaller settlements were not only heavily utilizing the obsidian but also more cautious in their conservation of the locally unavailable commodity.

The paucity of obsidian blades recovered from cave sites possibly indicates that the obsidian collected this field season was more utilitarian in nature then of pure ritual significance.

The density and distribution of obsidian is quite remarkable in the sense that the largest site excavated this season was the Hershey site, which only yielded 10% of the total obsidian recovered. The smaller sites, Obispo and Oshon, both have a larger harvest with 20% and 18% respectively. Given the number of working days and time constraints at the Cedar Bank Site, it still accounted for a 8% of the entire sample size.

A significant amount of investigation is still needed to thoroughly understand or rather begin to comprehend the obsidian data presented here and those from the prior seasons. A question left
Figure 24.2 Samples of obsidian blades discussed in this chapter (illustration by author).
unanswered is how the obsidian arrived in the Sibun River Valley. Was it through trade or other mechanisms? How did the obsidian arrive at its journey’s end -- as an unprocessed raw material or as prefabricated tools? No evidence of core preparation or rejuvenation is contained within the sample of obsidian from the 2001 season, providing some measure of support for the latter option. It is hoped that the data collected and scrutinized here may be of some assistance to future researchers, who may undertake the challenge of examining the uses of obsidian by the Xibun Maya residents, and perhaps formulate a model that would address obsidian acquisition.

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The category of “groundstone” can encompass a wide variety of artifacts. Here, it refers to the method of manufacture, and not to raw material, shape, or function. As a result, this study discusses five-kilogram granite metates, as well as jade beads weighing less than one-third of a gram. Artifacts of this inclusive definition encompass many different activities, from food preparation to ritual activities. In this paper, I present the groundstone artifacts collected from the Sibun River Valley, observe patterns within and between artifact classes as well as raw material types. Finally, observations are offered regarding the distribution and diversity of groundstone types, both within and among sites.

Most of the raw material from which groundstone is made is readily available near the sites. Granite is abundant in the Maya Mountains of southern Belize. These mountains may also be a source of basalt and other porous igneous rocks, but the area has not been well documented geologically (Coleman, personal communication, sited in Ebersole 2001: 29). The nearest known location of basalt is much farther away, in the Pacific coastal highlands of Guatemala. Limestone is easily accessible in the floodplain around the sites, and slate is found nearby to the south (Furley and Crosbie 1974: 6). Jade is the most difficult of the raw materials to acquire, the nearest source of it is the Montagua River Valley in Guatemala (Ebersole 2001: 30).

This study includes all groundstone artifacts found by the Xibun Archaeological Research Project (XARP) during the 1999 and 2001 field seasons, from both settlements and caves (Table 25.1). The settlements which yielded groundstone artifacts include Hershey site, Samuel Oshon site, Pechtun Ha, Augustine Obispo site, Cedar Bank, and Pakal Na. Caves from which groundstone was collected include Actun Ik, Actun Yax Tun, Actun Chanona, and Arch Cave.

Methods

The majority of the artifacts (93.5%) came from settlements; caves are under represented, yielding only 5 artifacts in my data set. The reason for this difference is that the percent of artifact collection in caves is very low for all artifact types, and large, heavy artifacts, such as whole metates and complete ceramic vessels, were even less likely to be collected than smaller, lighter artifacts such as pottery sherds and hachas. I include descriptions of uncollected artifacts from Actun Chanona and Metate Cave in the discussion of my data, but did not include them in my main data set because measurements and weights were not available. I will therefore not enter into a detailed discussion of cave versus settlement groundstone in this analysis, although the topic would be a fruitful one for future analysis.
Eight types of artifacts are included in my sample, including both artifacts ground in manufacture and those ground through use. Some artifacts, such as *manos* and *metates*, fit into both categories, becoming even more shaped and ground over time. The majority of the artifacts were identified, labelled and catalogued before my analysis, but I will discuss the general typology anyway. When there was any ambiguity, I tried to maintain consistency and generally followed protocols established by Justin Ebersole (2001) in his study of the groundstone of K’axob, a Maya site in northern Belize.

*Metates* are flat, often rectangular stones used as a surface for grinding, usually food products. Often only the “lip,” or edge of the *metate* is found, and surfaces exhibit varying degrees of smoothness, depending on both the raw material, and the extent to which it was used. *Manos* also comprise a large portion of my sample. These are the cylindrical tools used to grind materials against the surface of a *metate*. They are made from a variety of materials and exhibit different cross-sectional shapes, as I will discuss in the next section.

*Hachas* are also included in my sample, and show relatively little variation in shape. They are small and roughly rectangular, although one end is often rounded and was probably used for hafting. The other end is straight, with a steep edge-angle; this edge often exhibits signs of retouching and/or battering.

The “pounder” category is a little less clear-cut. As I said above, I tried be consistent with Ebersole’s typology, but for this category I feel it had some shortcomings. The artifacts encompass a wide variety of shapes and, I believe, functions, but are all classified as “pounders” consistent with Ebersole’s description (2001: 12) of them as large tools, with the lateral surface utilized, and without any evidence for hafting (this is in contrast with his category of “hammers,” which are smaller, lighter, and were hafted: called the *hacha* category in this analysis). Some of the “pounders” in my sample were hardly, if at all, shaped prior to use. Some were nearly spherical, and were battered on the edges; some had flat surfaces that were literally used for pounding, while others were shaped like large hachas or hand axes, but were more roughly made, and because of their size and the lack of evidence for hafting, they were still categorized as “pounders.”

The jadeite artifacts seem to have purely non-utilitarian functions, and were extensively shaped from the raw material. There are only three artifacts fabricated from jadeite and they are all very different. The combination of their apparent functions and the rarity of the raw material persuaded me to discuss these artifacts as a single category.

*Celts* were included in my analysis, even though they comprise a grey area technologically, being chipped and polished, as well as ground. There is only one complete celt in my sample, and one extremely fragmentary piece which was classified as a “celt” because of it was formed out of chert, and because it showed evidence of being ground, polished, and chipped.

The artifacts labelled as “unidentified” include fragments that have a ground or smoothed surface, but are so fragmentary that the original shape and/or function of the artifact could not be determined. Other artifacts included in this category include more complete artifacts, such as geometrically incised limestone artifact 63, which had an
enigmatic function that can only be guessed at. The three limestone artifacts are grouped together, even though they likely had very different functions. Each merits individual discussion, however.

Some objects were not included in this analysis at all. Some bagged and catalogued “artifacts” included unworked river pebbles that lacked worn or striated surfaces. In agreement with staff members, these were not included. Net weights also were not included. They comprise a distinctive class of artifacts, being smooth river pebbles with notches placed on two sides.

Seventy seven artifacts included in this study (Table 25.1). The data set includes the artifact type and the site and field season from which it was collected, and the operation number (with component number being substituted for operation for the cave artifacts). Number 71 is also from the caves, but the component number was not recorded by this author. The “surface” designation was used for artifacts collected from the surface (operation numbers were not included in these artifacts’ provenience). The length, width, height, and weight of each artifact is listed in the next four columns of Table 25.1. The length, width and height measurements represent the longest, widest and highest points on the artifact, unless the ground surface is considerably smaller than this measurement, in which case the dimension of the ground surface is given. When the length and width or width and height measurements given in the table are identical, it is because the object is round, so both measurements are equivalent to the diameter. The majority of artifacts were measured with digital callipers, and these measurements are given to 0.1 millimeter. Measurements of objects too large to use calipers were accomplished with a metric ruler, and are precise to the millimeter. Most weights were done with a triple beam balance, and are precise to 0.05 grams. *Metates* 64-68 and 70 were too large to weigh using the triple beam balance and were weighed instead on a large hanging scale; these measurements are only precise to five hundred grams.

The last column in Table 25.1 contains the raw material from which the artifact was made. This information is tentative because of my limited knowledge of rock types. Fifty of the 77 artifacts in this sample (64.9%) have been identified by raw material. These identifications were accomplished without the benefits of a geologist or geology texts that would clarified the Maya area geology. Because of this limitation, known types are skewed towards those that are easily identifiable, such as granite, volcanic or igneous rocks, jadeite, and slate. Many of the pounders that have an “unidentified” rock type were probably made from a metamorphic material, but in the absence of certainty, I classified them as unidentified. In this paper, I refer to “granite,” and to “volcanic” or “igneous” rocks, even though granite is technically igneous as well. The artifacts I discuss as being “igneous” are made from an unknown gray, porous volcanic material, similar to basalt. For reasons of clarity, granite is never referred to as igneous, so as to distinguish it from the more porous volcanic rocks.

Future investigations would do well to include use-wear or residue analysis, especially of the *metates* and *hachas*. It would be interesting to test the *metates* manufactured from different materials to determine if they were used to process different substances, or to see if there was a difference in residue between *metates* found in
settlements versus those found in caves. Use-wear and possibly residue analysis may also be useful for hachas, to examine their battered edges.

Future studies should also include a thorough analysis of groundstone in caves, examining the artifacts in situ so that the quantities and types of groundstone are found in caves could be compared to settlement groundstone.

Data Description and Analysis

A total of 77 artifacts were analyzed from the XARP 1999 and 2001 field seasons. By far the most abundant artifacts were metate fragments, which made up 37.7% (29/77) of the groundstone. Of these metates, 13 were identified as granite, and 13 as either basalt or another igneous rock. Three of the metate fragments (10.3%) could not be identified as any particular rock type, and an igneous metate foot was also found. Fourteen of the metate fragments had at least one edge, numbers 4 and 8, being exemplary (Figure 25.1). Number 4 is a small granite edge fragment from the Hershey site, and number 8, a larger corner piece made of a very porous volcanic rock was excavated from the Oshon site. Most of the fragments in this analysis are small: 18 (62.1%) of the metates weigh less than 400 grams, and only 5 fragments and the metate foot weigh over 1 kilogram. All five of the large metate fragments, although not the metate foot, are surface collections from the Hershey site.

Figure 25.1 Metate fragments (illustration by author).
The granite *metates* tend to be smoother than those fabricated from the more porous igneous rock, both on the unused surfaces, and on the grinding surfaces themselves. The granite *metates* tend to be worn down to extremely slick, smooth surfaces, while the more basalt-like materials continue to be rough and porous, even after the *metate* has obviously been used extensively. Perhaps different materials were used to grind different substances, or one type was used for food, and another type used to grind something else; further use-wear analysis might clarify these differences.

Eight *metate* fragments were collected from the Hershey site in 2001 and another eight were recovered from the Oshon site. Most of the *metates* from Oshon, however, were recovered during the 1999 season, with only two *metate* fragments and one *metate* foot found during the 2001 season. Pechtun Ha and Pakal Na produced five *metate* fragments each, all recovered during the 1999 season. Two fragments were also recovered during excavation at the Obispo site. Only one *metate* was collected from a cave (*metate* 6 from Actun Ik), but many uncollected *metates* were noted in the caves. As an illustration of the abundance of groundstone in caves, despite its under representation in this analysis, I review the cave groundstone briefly.

Most of the descriptions of groundstone come from Actun Chanona. A granite *mano* and *metate* were built into a wall on the Great Platform. There is one white granite *metate* and one pink granite *metate* next to the altar on the Great Platform, both associated with *manos* of the same material. On a slope to the south of the Great Platform, near the drum room, there are two *metates*, one yellowish, and one green with phenocrysts, and both without associated *manos*. There is a granite *metate* to the east of the Great Platform, near a burned area, and there is another in the net weight area of the cave, and neither of these have associated *manos*. There is also a *metate* in Metate Cave, along with a *mano*.

The second most abundant type of artifacts the *mano*. Nearly a quarter (18/77, 23.4%) of the groundstone artifacts from the Xibun are *manos*. Most are fragmentary, and by examining cross sections, we can see a number of variations on a true cylinder (Figure 25.2). Of the six cross sections, some such as 28 and 37 do not have the entire cross section, but appear to be roughly ovals. Eighteen and 44 are flatter ovals, 18 possessing a flatter bottom than does 44 (the bottom of the *manos* in the drawings represent the flattest or smoothest surface, or the one most likely to have been used as the grinding surface). *Mano* 51 had the flattest bottom of any of the *manos*, and it was also unusual in that it was the only slate *mano* in the sample. Larger and more complete *mano* fragments were found compared to the *metates*: less than half (44.4% or 8/18) of the *manos* found weighed under 400 grams, but fewer *manos* could be identified in terms of raw material: only one-third (6/18) of the *manos* were made from an identifiable raw material, in contrast to nearly 90% of the *metate* fragments.

Only one *mano* in this sample is from a cave (*mano* 71), but see the Methods section above for a brief description of *manos* found in association with *metates* in Actun Chanona and Metate Cave. In addition to those found with *metates* in Chanona, there is a broken granite *mano* near the eastern side of the Great Platform. A pink granite *mano* was recorded near the entrance to Actun Chanona. I think it is interesting that complete *manos* and *metates* are usually paired in caves, but all of the *metates* found in settlement excavations are
extremely fragmentary, and nearly all the manos found in settlements are small sections of the original cylinder. Whole metates could be used and would therefore not be discarded in a settlement. Complete manos and metates were likely brought into caves by the Maya after they had already been used for a substantial period of time (P. Peterson, personal communication, 2001), probably because of the association between caves and rain, and its importance for ensuring future crops.

All other artifact types combined comprise only 39% of the total groundstone artifacts and each type is represented by less than ten artifacts. Six of the groundstone artifacts found in XARP excavations were placed in the “pounder” category. As discussed above, this category encompasses a range of shapes, and probably functions as well. Four of the pounders weigh between 400 and 600 grams, with one pounder below this range (pounder 41 at 283.5 grams), and one above it (pounder 34 at 878.5 grams). Five of the six pounders are made from the same unidentified, possibly metamorphic, rock discussed above, and one pounder is granite. Pounders 11 and 26 are nearly spherical, but slightly flatter in one dimension, and both bear evidence of battering along one edge. They are also approximately the same weight, and have similar dimensions, but they are from different sites (Hershey, Pakal Na, Pechtun Ha, and Oshon) and were excavated in different seasons (Table 25.1). Pounder 13 is more similar to a hand-axe: it is long and rounded on the end that was likely held in the hand, and has a straight, steep edge on the other end, which shows signs of battering. This is the only pounder whose raw material was definitely identified as granite. Artifact 24 was tentatively identified as a pounder; it is a dome-shaped stone, with one relatively flat surface. However, it is unclear whether this surface is rough due to being broken off a larger artifact, such as a larger hammerstone or even a mano, or due to battering from use. Pounder 27 is broad and rounded on one end, with a rounded point on the other.

Figure 25.2 Cross-sections of mano fragments (illustration by author).
end. Comfort while holding suggests that the pointed end was the used end, perhaps as a chopping tool similar to pounder 13, but there was no obvious evidence of battering on this tool. The identification of artifact 34 as a pounder is also tentative. It is the largest artifact in this category and doesn’t have any obvious signs of battering. It was broken by a smooth clean fracture diagonally along one end, so that I could not tell whether the artifact was used as it was found or, if not, its precise original shape. The final pounder is artifact 41, and is also the smallest artifact in this category. It is similar to an irregular square in planview, and one surface is rounded, while the other is flat.

Half (3) of the pounders were found at the Hershey site, and none was found at Obispo, Cedar Bank, or in the caves. Pakal Na and Oshon, in contrast, yielded only one pounder each in two seasons of excavation. The total number of pounders found in the Xibun, however, is too small to say much more about their distribution.

The next most abundant artifact type found was the *hacha*. Five examples of this type were found, two of which were collected from caves. *Hachas* are small, light tools, used for chopping or cutting. They are roughly rectangular, with a steep cutting edge on one end, and a more rounded end on the other. They are similar to hand axes but smaller, generally finely finished by grinding and polishing, and are hafted. They all weigh between 30 and 200 grams (Table 25.1).

*Hacha* 7 was collected from Actun Chanona and is only slightly smaller than *hacha* 12. The slate was ground extremely smooth, except for a few natural pock marks on the surface. There is some battering on the working edge of the tool, but overall it is very well made and is in excellent condition. *Hacha* 12 also is made of slate and is the largest hacha recovered during the Xibun project. *Hacha* 12 was recovered from a settlement excavation at Oshon site. It too is well made, with a smooth surface finish, but there is more extensive battering on the working edge, and it is also broken diagonally along the hafted end. There are also striations near the cutting edge and perpendicular to it. *Hacha* 14 is made from greenstone and was collected from the cave Actun Yax Tun (which means “greenstone cave”). The surface is smoothed, it is is well made, has very little to no use-wear, and is the second smallest of the *hachas* in this sample. Unlike some of the others in this analysis, this *hacha* was probably ornamental and not functional, and may have been placed in the cave because of the association the Maya believed existed between its color and fertility and water (McAnany et al 2001: 47). *Hacha* 19 is the smallest found in the Xibun (in both length and weight), and it is also the most crudely made. Only 5.5 cm long, *hacha* 19 is very roughly cut, and is hardly ground or polished at all; the finished surface is rough to the touch, and the original large breaks that formed the hacha are still visible. This is in stark contrast to *hacha* 14, which was very well made and finished. The final example of this artifact type is *hacha* 74. It was recovered from Oshon site during the 1999 field season, and is slightly larger and more damaged than *hacha* 14, but also is made from greenstone. Unlike *hacha* 14, this one was most likely actually functional. Some general patterns are evident in the hachas found. Three of the five were recovered from the Oshon site during the 1999 season, and the remaining two were collected from caves. Two of the *hachas* found were made from slate, and two from greenstone; the remaining one (*hacha* 19) was made from an unidentified material. The *hachas* found in caves were in better condition than those found in
settlements, probably because these were more likely ritual and not functional, but the remaining three were also in very good condition.

Of the three jadeite artifacts found in the Xibun the first is artifact 1, a large, pale jadeite bead collected from the surface at Pakal Na during the 1999 season (see illustration McAnany et al 2001: 129). It is a 12.7 cm long tube with raised sections on one end, and was drilled through the entire length of the bead. In contrast to this large tubular bead, a small jadeite bead 1 mm thick and weighing one-third of a gram was collected from Actun Chanona (artifact 35). This bead was made from a much darker jade and is oval in shape (5.1 cm long and 5.9 cm wide). The third jadeite artifact was recovered from excavation at the Obispo site. It is a small fragment broken in the shape of a triangle one centimeter long on two sides, but the original shape of the object is not evident. It weighs just over a gram, and is approximately half a centimeter thick. One side is polished and smoothed, and has part of an incision of a quarter of a circle. There is also another line radiating out from the edge of the arc, but it is not clear whether this scratch was made before or after it was discarded (perhaps by my own trowel!). The other side is very rough and unfinished, which leads me to believe that it was originally inlaid. The value of jadeite in the southern lowlands can account for its relative rarity in this data set. The small, broken fragment from Obispo was found in construction fill and rubble in the corner of Operation 31. The large bead was found along with several obsidian blades in what was probably a cache that was disturbed by citrus planting at Pakal Na (McAnany et al 2001:129). The small jade bead from Chanona cave was probably deposited on the Great Platform on purpose, perhaps because of the connection between the color green and water and fertility, similar to hacha 14.

Artifacts 21 and 52 are flat stone disks, made from river cobbles. Disk 21 is from Pechun Ha, and is larger than disk 52, which was recovered from Pakal Na. Artifact 38 is a very small version of these larger disks; it is a small rounded river pebble two centimeters in diameter, and was found this season at Hershey. Both the larger disks were found during the 1999 season, and none of the three are drilled or have any striations or other obvious use-wear, so I am at a loss to explain their function. The smallest disk does not appear to have been ground into its present shape, and may have been used as a smoothing stone for finishing pottery. The two larger disks are included in this analysis because they are both almost perfect circles, and almost perfectly flat on each side, which leads me to believe that they were ground from river cobbles into their current shape.

There are three limestone artifacts included in this sample. The first, a bark-beater, was excavated from Oshon site (Figure 25.3). It is a square block of limestone, with parallel v-shaped grooves cut into one surface. The block is roughly rectangular, and is broken on one end, and was probably originally much longer. Artifact 63 was also recovered from Oshon site during this season, but its function is less clear. It also is a large limestone block, larger than the bark-beater, and it has grooves on one surface. But this artifact surface has been scored with a checkerboard pattern, and in one direction the grooves are much deeper (Figure 25.4). All edges are eroded, so it is difficult to determine the original size or shape of the artifact. The left edge of the artifact in Figure 5 is the most likely to be an original edge, because the lines end near this edge. I am at a loss as to its purpose; all examples of bark-beaters from the area bear unidirectional striations. Checkerboard patterns have been found
incised on pottery fragments and were used as graters (P. McAnany, personal communication, 2001), but the material of this artifact is so much softer that this option seems unlikely. The third limestone artifact is number 16, and was found at Pechtun Ha during the 1999 season. It is a small cylinder, just over a centimeter in diameter and just under a centimeter long with has two shallow circular depressions, one on the top and one on the bottom, which leads me to infer that it is an unfinished bead blank. An unfinished ear spool is another possibility, although the outside is straight and not grooved or angled.

Figure 25.3 Barkbeater (illustration by author).

Figure 25.4 Grooved stone (illustration by author).
The final artifacts are made of chert and include Artifact 3, a chert celt found at the Oshon site during the 1999 season. It is dark gray and dome-shaped, and appears to have been chipped, polished, and ground. Artifact 75 is an incomplete polished chert fragment collected this season from Pakal Na, and I would not have considered it to be a celt except for the way in which it was worked: it was also highly polished, and appeared to have been chipped and ground, as well.

**Conclusions**

The Oshon site, Hershey site, and Pakal Na by far have yielded the most groundstone artifacts. The Oshon groundstone is pretty evenly divided between the 1999 and 2001 seasons. Pakal Na yielded almost all of its groundstone in 1999; hardly any was found there during 2001. The Hershey site yielded 16 groundstone artifacts during one season of excavation and an earlier season of reconnaissance, including the largest artifacts in this sample. The large *metates* were collected from the surface. The presence of these large *metates* at Hershey may be due to the location of the site at the base of a gorge where large granite and metamorphic stones are easily available (P. McAnany, personal communication, 2001).

*Metates* are by far the most abundant groundstone artifacts. Oshon and Hershey yielded the most *metate* fragments, followed closely by Pechtun Ha and Pakal Na. Pakal Na yielded at least twice as many *mano* fragments as any other site, and Hershey was the only site that yielded more than one pounder. Oshon yielded the only complete celt, the only bark-beater, as well as the only hachas recovered from the settlements. The caves, as I mentioned in the Methods section above, are under represented in this analysis. There are large numbers of complete *metates* in the caves, often associated with *manos*, but these were not collected and therefore could not be analyzed: not one *mano* was collected from the caves (the *mano* from Arch Cave was measured and sketched by this author *in situ*), and only one small *metate* fragment was collected from Chanona. Artifact collection from the caves was kept to a minimum deliberately; all four artifacts that were collected from the caves are small (three of the four are under 200 g), and were collected partly to protect them from being looted, especially in the cases of the jade bead and the hachas.

The Oshon site, Hershey, and Pakal Na are the three sites which produced the largest number of groundstone artifacts. Of the three, Oshon exhibits the greatest variety of artifacts, with at least one example of nearly every artifact class (excluding the “miscellaneous” category and jadeite). Pakal Na yielded five of the seven artifact types, lacking only an *hacha* and a bark beater. Hershey is the least diverse, having only three of the artifact types. Pechtun Ha and Obispo each produced only two artifact types each. The caves cannot be considered individually in this part of the analysis because no more than two groundstone artifacts were collected from any one cave, although when the caves are taken as a whole, they contain four of the seven artifact types.

The raw material of the artifacts can tell us about Maya trade patterns. Much of the raw material was mined locally, and could have been acquired either by the communities themselves, or else easily and probably cheaply traded through their neighbors to the south.
The Maya of the southern lowlands were also part of a larger trade network that reached all the way to the Maya in the Pacific Highlands of Guatemala. From these communities the Maya living in the Sibun River Valley traded for jadeite and obsidian. The distance this resource had to travel explains why there are so few jadeite artifacts found in these excavations, although obsidian is abundant (see Lim, Chapter 24). It also may imply that there is a source of volcanic rock closer than Guatemala, since nearly one quarter (18/77) of the groundstone found in the Xibun is made from this material, including a few very large igneous metate fragments. As was mentioned above, large metate fragments at the Hershey site demonstrate that the Maya were using the abundant supply of river cobbles available at this location.

We can conclude from the range of artifacts found in the XARP excavations that the Sibun River Valley was host to a variety of activities. The sites contain many functional tools, such as manos, metates, and pounders, as well as objects used for ornamental and ceremonial purposes, like the jadeite bead and inlaid jade fragment. We can also see that groundstone played a part in the ritual activities of the caves, by the presence of ceremonial and functional hachas, jade, and used manos and metates. These artifacts support the idea of caves as a place for rituals related to fertility in general, and to crops and rain in particular.

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