APPENDIX G

Lithics

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Part 1 of this appendix provides more detailed descriptions of the cores and modified chipped stone artifacts from Chalcatzingo to supplement Chapter 18. Part 2 consists of the variable-by-variable comparisons of the sample lithic assemblages summarized in Chapter 18.

PART 1. DESCRIPTIONS OF LITHIC ARTIFACTS

CORES

Obsidian Industry

The obsidian cores from T-37ob are discussed in detail in Chapter 19. The collection from all other areas included twenty discarded cores and fragments and nineteen cores modified for or by tool use (including nine edge-modified and ten shaped tools). Of these thirty-nine cores and fragments, nine are complete. Three of the complete specimens are fully polyhedral (i.e., have blades removed from the entire circumference), while the other six have a half cylindrical shape with one flat, unworked side. In two cases this unworked side is cortex covered. Pointed distal ends are the norm for the complete specimens; however, in one case the distal end is hinged off as a result of faulty blade removal and in two other instances the distal ends are battered from use as tools. In all five cases with core platform intact, the surfaces are multifaceted. In the other four cases, an attempt has been made to rejuvenate the core by striking off the old platform with a single blow transverse to the core's longitudinal axis. Overall core dimensions are presented in Table G.1.

Chert Industry

Two types of chert flake cores were identified in the overall collection which includes T-37ob. Cores of the more common type show no preparatory shaping; they are blocky and irregular in form with flakes removed from various directions. Cores of the second type are also fairly rough and blocky, but each has a single prepared platform surface which served as the origin point for flake removal. These prepared cores tend to have a general pyramidal shape with the platform area forming the broad end of the pyramid. Recorded chert cores include thirty-four blocky cores (twenty complete, fourteen fragments), and eight prepared cores (six complete, two fragments). As a result of inconsistencies in analytical procedures, detailed information was not recorded on all complete specimens; however, available overall dimensions are summarized in Table G.2.

MODIFIED PIECES

The modified lithic artifacts at Chalcatzingo (including T-37ob) comprise two basic classes, edge-modified and shaped. These categories were used for both the obsidian and chert industries. They are described in detail below.

Obsidian Industry

Edge-Modified Pieces

The working edge characteristics which define the subcategories of edge-modified pieces are defined as follows. Utilized edges show chipping, and in some cases crushing, which appears to be entirely the result of actual use as tools. Re-

Table G.1. **Dimensions of Complete Blade Cores in the Analyzed Lithic Collection from Chalcatzingo[a] (N = 9)**

Dimension	*Range*	*Mean*	*SD*
Length (mm)	30–88	59.33	15.71
Width (mm)	12–25	20.00	3.74
Weight (gm)	5–44	22.44	10.07
Platform circumference (mm)	35–74	52.67	12.32
Number of facets around core circumference	8–13	9.44	1.89
Maximum facet width (mm)	6–9	7.78	0.92

[a]T-37 obsidian concentration not included.

Table G.2. **Dimensions of Complete Chert Cores in the Analyzed Lithic Collection from Chalcatzingo**

Core Type and Dimension	*Range*	*Mean*	*SD*
Blocky cores (*N* = 12)			
Length (mm)	43–87	67.25	11.66
Max. width (mm)	38–77	56.58	10.47
Max. thickness (mm)	32–75	48.00	12.08
Weight (gm)	72–535	208.00	113.34
Prepared cores (*N* = 5)			
Length	25–62	43.40	11.74
Max. width (mm)	20–53	33.60	11.98
Max. thickness (mm)	20–41	30.60	7.86
Weight (gm)	17–130	61.60	40.30

touched edges have been intentionally flaked in an effort to shape and/or sharpen them in preparation for tool use. Flake scars along retouched edges are overlapping and relatively even and deep. In the course of analysis, it was observed that all the specimens readily identifiable with traditional retouched artifact classes, such as scrapers, gouges, and spokeshaves, showed a maximum depth of chipping along the individual working edges of at least 5 mm and often more. As a result, a 5 mm maximum chipping depth was established as a useful dividing line between the utilized and retouched subcategories. Edges with depth of chipping from 1 to 4 mm are classified as utilized, while edges with 5 mm or greater chipping depth are classified as retouched.

Ground edges have been rounded, smoothed, and polished as a result of tool use. They may show utilization chipping or intentional retouch underlying the grinding. Edges classified as battered show battering and crushing as the exclusive evidence of tool use.

Edge-Modified Blades: This category includes 434 blades and blade fragments with a total of 741 working edges. Only 5 of these blades are complete; the remainder of the collection includes 281 midsections, 119 proximal sections, 19 distal sections, and 10 other fragments. Dimensions of the 5 complete specimens and a random sample of the blade sections are summarized in Table G.3. Data concerning maximum depth of chipping along individual working edges and edge angles are summarized in Table G.4.

Utilized blade edges. The vast majority (615) of the working edges on edge-modified blades show simple utilization chipping. Bifacial chipping is dominant on these utilized blade edges (390 specimens). Unifacial specimens are predominantly chipped on the dorsal surface (144) with only 69 ventrally chipped and 11 chipped on alternate faces. In one case the face involved cannot be identified. Most of the use chipping is irregular (538 specimens); however, a few specimens (77) show even chipping. Only a very small number of edges (7) are crushed or battered.

As might be expected, given basic blade shape, the majority of utilized edges (328) are straight. Other common edge outlines include convex (105), concave (92), concave-convex (42), and sinuous/irregular (37). Less frequent edge shapes are denticulate (10) and pointed

Table G.3. **Dimensions of Edge-Modified Obsidian Pieces in the Analyzed Lithic Collection from Chalcatzingo**

Artifact Category and Dimension	*Range*	*Mean*	*SD*
Complete blades (N = 5)			
Length (mm)	50–58	54.50	3.14
Max. width (mm)	13–34	18.00	8.07
Max. thickness (mm)	4–6	5.00	0.63
Weight (gm)	3–8	4.60	1.85
Sample of incomplete blades[a] (N = 105)			
Length (mm)	15–58	31.50	10.21
Max. width (mm)	8–22	13.57	2.86
Max. thickness (mm)	2–7	3.32	1.04
Weight (gm)	0.5–6	1.73	1.19
Complete flakes (N = 48)			
Length (mm)	10–104	36.31	18.48
Max. width (mm)	10–58	29.23	12.20
Max. thickness (mm)	2–21	8.73	4.88
Weight (gm)	1–100	11.54	16.57
Chunks (N = 4)			
Length (mm)	25–86	42.75	25.30
Max. width (mm)	16–45	29.75	10.38
Max. thickness (mm)	9–40	19.25	12.48
Weight (gm)	3–94	32.00	36.20
Distal blade core fragments (N = 6)			
Length (mm)	23–40	31.00	6.83
Max. width (mm)	13–22	16.00	3.37
Weight (gm)	2–13	6.33	3.73

[a] A 25 percent random sample of the 419 recorded blade midsections, proximal sections, and distal sections.

Table G.4. **Characteristics of Working Edges for Edge-Modified Obsidian Pieces in the Analyzed Lithic Collection from Chalcatzingo**

	Maximum Depth of Chipping (mm)			*Edge Angle (5° intervals)*		
Artifact Subcategory	*Range*	*Mean*	*SD*	*Range*	*Mean*	*SD*
Sample of utilized blade edges (N = 123)[a]	1–4	1.56	0.79	30–90	50.77	13.31
Retouched blade edges (N = 12)	5–10	5.50	2.18	35–85	58.33	14.48
Ground blade edges (N = 89)	1–5	1.84	0.92		NA[b]	
Utilized flake edges (N = 144)	1–4	2.36	1.13	35–105	68.54	15.24
Retouched flake edges (N = 61)	5–17	8.05	3.23	35–100	73.20	13.21
Ground flake edges (N = 17)	1–6	2.75	1.36		NA[b]	
Retouched chunk edges (N = 4)	7–17	11.00	4.24	55–75	65.00	7.07

[a] A 20 percent random sample of the 615 recorded utilized blade edges.
[b] Because of the rounding created by grinding, edge angle is not accurately measurable.

(1). Three of the utilized edges have small graver tips in addition to the general use chipping.

Retouched blade edges. Only 12 retouched blade edges occur in the analyzed collection. Seven are bifacially worked while the unifacial specimens include 4 worked on the dorsal surface and 1 worked on the ventral surface. Most chipping is irregular (10 specimens), and 2 edges show some crushing. Edge outlines are variable including convex (4), straight (3), concave (2), concave-convex (2), and denticulate (1).

Ground blade edges. This subcategory includes 114 working edges. Among these specimens 89 show utilization chipping as well as grinding while 25 show grinding alone. In 30 cases grinding occurs all along the working edge while in 84 cases only part of the edge is ground.

Among the chipped edges, 51 are bifacial and 38 unifacial (29 dorsal and 9 ventral). Again, most of the chipping is irregular (83 specimens). Edge outlines for all ground edges, both chipped and unchipped, include convex (48), straight (36), concave-convex (10), concave (9), rectangular (1), and sinuous/irregular (10).

Edge-Modified Flakes: This category includes 163 flakes and flake fragments with a total of 222 working edges. Dimensions of the 48 complete flakes included in this collection are summarized in Table G.3. Included among the unshaped modified flakes are 22 core recovery flakes and 9 platform rejuvenation flakes. Data concerning maximum depth of chipping along individual working edges and edge angles are summarized in Table G.4.

Utilized flake edges. This subcategory includes 144 edges showing simple utilization chipping. Unifacial chipping is dominant, with 63 worked on the dorsal surface, 24 on the ventral surface, 8 on alternate faces, and 3 unidentifiable. Chipping on 46 edges is bifacial. Irregular chipping again predominates (106 specimens), and crushing continues to be rare (3 specimens). Edge outlines include convex (70), concave (25), straight (25), concave-convex (10), pointed (6), denticulate (3), sinuous/irregular (5). One edge includes a small graver tip.

Retouched flake edges. There are a total of 61 retouched flake edges in the collection. Again unifacial chipping predominates with 38 worked dorsally, 9 ventrally, and 1 unidentifiable. Chipping on 13 edges is bifacial. Although still far from dominant, even chipping is more common in this subcategory (17 even specimens and 44 irregular). Crushing of the working edge is also somewhat more common (11 specimens). Edge outlines include convex (31), straight (9), concave (8), denticulate (4), concave-convex (3), pointed (3), rectangular (2), sinuous/irregular (1). Four edges include small graver tips. Although the majority of specimens in this subcategory do not fit into traditional tool types, a few specimens might be identified as scrapers, gouges, and spokeshaves.

Ground flake edges. This subcategory includes 17 ground edges. Of these 12 are chipped as well as ground while 5 show grinding alone. In 11 cases grinding occurs all along the working edge while in 6 cases only part of the edge is ground. Among the chipped edges, 7 are unifacially chipped (5 dorsal, 1 ventral, 1 alternate faces), and 5 are bifacial. Again, irregular chipping is dominant (10 specimens). Edge outlines for all specimens include convex (10), straight (3), concave-convex (2), concave (1), sinuous/irregular (1).

Edge-Modified Chunks: This small category includes 4 chunks with a total of 5 working edges. Chunks are defined as blocky bits of lithic manufacturing debris. Dimensions of the 4 specimens are summarized in Table G.3.

The single utilized working edge is bifacial, irregularly chipped, and straight in outline. Maximum depth of chipping is 4 mm and edge angle is 75°.

The 4 retouched edges are all unifacial. Irregular chipping predominates, but the retouch along one edge is even. Edge outlines include 2 denticulate specimens and 2 convex. Other edge characteristics are summarized in Table G.4.

Edge-Modified Blade Cores: This category includes 2 complete cores and 7 fragments. On all but one of these specimens tool use is indicated by battering of the distal end. No use chipping or retouch was noted on any of the battered specimens. The 2 complete cores with battered distal ends measured respectively: (1) length, 88 mm; maximum width, 23 mm; weight, 44 gm; and (2) length, 45 mm; maximum width, 25 mm; weight, 29 gm. (Note: These 2 cores are among the 9 which form the sample for Table G.1.) Dimensions of the battered distal fragments are summarized in Table G.3.

The single retouched specimen is a blade core midsection with a convex working edge. Chipping is unifacial and irregular. Maximum depth of chipping from the working edge is 11 mm, and the edge angle is 90°. This fragment is 23 mm long, 19 mm wide, 11 mm thick, and weighs 7 gm.

Shaped Modified Pieces

Projectile Points: This category includes extensively shaped, bilaterally symmetrical artifacts with a pointed tip and some sort of hafting element at the opposite end. They presumably served as dart and arrow points.

The obsidian collection includes 12 complete specimens, 12 basal end fragments, and 15 blade area fragments. In most cases (30), the original tool blank is not identifiable; however, 6 are recognizable as blades and 3 as flakes. Extensive retouch around the entire margin of these pieces is typical. While most of the specimens are bifacially worked, 2 exhibit unifacial retouch on the dorsal side, 1 on the ventral side, and 1 on alternate faces. Even retouch dominates, but the flaking on about one-third of the specimens is irregular. Two of the complete specimens have serrated blade edges, and 1 complete point shows some grinding along the stem edges. Nearly half of the points (17) are retouched across the entire face of the blank; maximum depth of chipping along the edges of the remaining pieces varies from 3 to 13 mm.

Specimens with basal area intact show a variety of stem forms; the majority (15) are contracting, 2 are expanding-contracting, 2 are expanding-parallel, and 1 is expanding. One complete specimen was stemless. The 12 complete specimens also show some variety in blade shape; 6 are excurvate or ovate, 3 are triangular or straight-sided, and 3 are incurvate. (See Table G.5 for a summary of point dimensions.)

Drill-like Pieces: This category includes 10 shaped tools which share an overall morphology suggestive of a perforating function. The majority have a roughly rectangular stem or basal section which abruptly constricts to a narrow, pointed blade section. One specimen lacks the abrupt shift from basal section to blade section and instead gradually narrows from basal edge to pointed end.

A variety of blanks were used including 2 blades, 2 core recovery flakes, and 4 other flakes; 2 blanks are unidentifiable. Retouch generally occurs along the entire length of both lateral edges and varies from even (5 specimens) to irregular (5 specimens). One specimen shows

Table G.5. **Measured Dimensions of Shaped Obsidian Tools in the Analyzed Lithic Collection from Chalcatzingo**[a]

Artifact Category and Dimension	N	*Range*	*Mean*	*SD*
Projectile points				
Complete length (mm)	12	29–39	33.92	3.86
Stem length (mm)	11	4–14	7.91	2.91
Max. width (mm)	12	14–29	19.00	4.90
Max. thickness (mm)	12	3–9	4.67	1.49
Weight (gm)	12	1–5	2.75	1.30
Blade edge angle[b]	39	45–90	70.77	11.01
Drill-like pieces				
Basal section length (mm)	7	17–54	29.00	12.47
Max. basal sec. width (mm)	7	14–39	22.86	8.48
Max. blade width (mm)	9	7–20	10.11	5.30
Max. tool thickness (mm)	10	3–14	8.50	3.32
Blade edge angle[b]	10	65–95	86.00	8.89
Wedge-shaped pieces				
Length (mm)	12	17–50	31.92	10.82
Max. width (mm)	12	12–27	19.92	4.59
Max. thickness (mm)	12	4–20	11.17	4.34
Weight (gm)	12	1–25	9.33	7.79
Working edge angle[b]	13	50–105	81.15	14.70
Coarsely shaped pieces				
Length (mm)	31	21–104	42.90	18.29
Max. width (mm)	31	9–55	28.81	10.46
Max. thickness (mm)	31	4–22	11.55	4.37
Weight (gm)	31	1–86	16.65	16.25
Edge angle[b]	76	40–105	77.30	12.50
Finely retouched blades: bipointed				
Max. width (mm)	11	3–6	4.36	0.77
Max. thickness (mm)	11	1–3	2.09	0.67
Edge angle[b]	11	50–90	75.45	9.88
Finely retouched blades: constricted outline				
Basal section length (mm)	7	19–25	21.86	2.17
Max. basal sec. width (mm)	12	6–15	10.08	2.66
Max. blade width (mm)	7	5–9	6.71	1.28
Max. tool thickness (mm)	12	2–5	3.50	1.89
Blade edge angle[b]	12	50–85	67.50	11.46
Other shaped blades:				
Pointed specimens				
Edge angle[b]	17	40–95	64.12	14.78
Other fragments:				
Edge angle[b]	6	45–85	70.00	13.84
Unidentifiable shaped pieces:				
Fragments on flake blanks				
Edge angle[b]	7	60–90	77.14	9.95
Unidentified blank type				
Edge angle[b]	5	40–85	76.00	16.25

[a] All measurements represent aspects of complete tools. For fragmentary specimens, only the dimensions judged complete are included.

[b] Edge angle measured in 5° intervals.

some crushing of the edges and grinding on the tool face. On the blade blanks, retouch was carried out unifacially on the ventral surface only. The specimens on flakes and unidentified blanks show both bifacial (4) and unifacial (4) flaking. In 2 cases the unifacial retouch along the lateral edges occurs on opposing faces. Maximum depth of chipping along the retouched edges of individual tools ranges from 3 mm to examples where the entire face of the blank has been altered.

Only 2 complete specimens are included in this collection. The first of these, the unique specimen with gradually converging lateral edges, is 53 mm long, has a maximum width of the basal edge of 30 mm, is 10 mm thick, and weighs 10 gm. The second complete drill is a large specimen with the constricted outline typical of this category. It is 91 mm long with a 54 mm long stem or basal section and a 37 mm blade section. Maximum basal width for this second specimen is 27 mm, maximum blade width 17 mm, maximum tool thickness 11 mm, and tool weight is 20 gm. Measurable dimensions for the drill category in general are summarized in Table G.5.

Wedge-Shaped Pieces: This category involves a group of 13 rather crude, coarsely shaped tools (12 complete, 1 fragment), most of which are made on sections of blade cores. One small specimen is made on a flake, and 2 others are so extensively modified that the nature of the original blank can no longer be determined. Coarse, irregular retouch has been used to thin the tool blanks at both ends; however, in most cases more careful and extensive thinning of one end suggests that it was the actual working edge. In virtually all cases the thinning of both ends was accomplished bifacially; however, the small specimen made on a flake blank shows only unifacial retouch on the dorsal surface.

In plan view these tools are either rectangular (9) or trapezoidal (4) with the working edge the longer of the two parallel sides. In cross-section they tend to be wedge-shaped. Battering, often quite heavy, occurs on the working edges and/or distal ends of all but one specimen. One of the battered specimens also has a ground area on one face. Maximum depth of chipping along the retouched edges of individual tools ranges from only 6 mm to examples where the entire face of the blank shows retouching. These shaped pieces may be functionally similar to the

edge-modified blade cores with battered distal ends.

Coarsely Shaped Pieces: This largest category of shaped tools includes a wider variety of implements than is typical of the other categories. However, the 82 specimens included here do share a number of basic traits. In each case, the tool blank (usually a flake) has been shaped by irregular and rather coarse retouch around all or nearly all of its margin. Bifacial retouch dominates, and the bulk of the coarsely shaped specimens fall within the general morphological class usually identified functionally as knives and/or preforms.

Tool blanks for the coarsely shaped pieces include 3 blades, 4 platform rejuvenation flakes, 5 core recovery flakes, 39 other flakes, and 31 unidentifiable. Bifacial retouch was used to shape the majority of the specimens (66); the unifacial examples include 8 with the ventral surface worked, 3 with the dorsal surface altered, and 5 with retouch on alternate faces. The edges of 28 specimens show some battering and/or crushing, and 1 specimen is ground along a single edge. Maximum depth of chipping along the retouched edges of individual tools ranges from 7 mm to many examples (32) where the entire face of the blank shows retouching.

Thirty-one of the items in this category appear to be whole, and these display a variety of overall outlines. Specifically, 16 are ovate, 10 are rectangular, 3 are triangular, 1 is bipointed or roughly diamond-shaped, and 1 is amorphous. Where the overall outline can be estimated, fragmentary specimens show the same variety of shapes. The single exception is a fragment of a stemmed specimen which may be a projectile point preform or possibly a crude finished point.

Finely Retouched Blades: This category includes 23 prismatic blades which have been shaped with careful, even pressure retouch along both lateral edges. Two basic shapes occur and will be treated as separate subcategories. They include (1) bipointed specimens and (2) specimens with rectangular stem or basal section which constricts abruptly to a narrow, pointed blade section. The apparent fragility of these blades and the evident care with which they were shaped has prompted the suggestion that they may have had a ceremonial rather than utilitarian function.

Bipointed. The 11 bipointed specimens are particularly slender and delicate. Four are bifacially retouched, and the remainder are unifacially flaked on the ventral surface. On the unifacial specimens, one of the dorsal ridges which was a feature of the original blank runs down the center of the unworked face. In the majority of cases, tiny pressure flake scars cover the entire retouched face; however, in 2 instances a narrow unaltered strip remains on the center of the worked face. In these latter cases, maximum depth of retouch from the worked edges is measurable as 3 mm.

Only 2 of the 11 bipointed specimens are complete. Their overall dimensions are as follows: (1) length, 57 mm; maximum width, 5 mm; maximum thickness, 3 mm; weight, 1 gm; and (2) length, 44 mm; maximum width, 4 mm; maximum thickness, 3 mm; weight, less than 1 gm. General measurable dimensions for all bipointed finely retouched blades are summarized in Table G.5.

Constricted outline. The delicacy and precision of their retouching and their smaller, lighter size separate the 12 finely retouched blades with constricted outlines from the similarly shaped pieces identified as drill-like tools. The majority of these blades (10) are retouched unifacially on the ventral surface. One specimen is unifacially worked on the dorsal surface, and 1 is bifacially shaped. Again flaking normally covers the entire worked face; the 2 exceptions have a maximum depth of chipping measurable at 3 mm and 5 mm respectively. The single complete specimen is 32 mm long with a 19 mm long stem or basal section and a 13 mm blade section. Maximum basal width is 12 mm, maximum blade width 7 mm, maximum tool thickness 3 mm, and tool weight is 1 gm. General measurable dimensions for the finely retouched blades with constricted outline are summarized in Table G.5.

Other Shaped Blades: This is a residual category of 25 shaped blades, largely tool fragments, which could not be definitely identified with any of the previously defined categories. Many are fragments which may be parts of projectile points, drill-like pieces, and/or coarsely shaped pieces. A few are unusual complete specimens. The extensive, careful pressure flaking typical of finely retouched blades does not occur in this category.

The majority of the shaped blades (17), including 2 complete examples, are bilaterally retouched to form a point. Ten of these pointed blades are bifacially retouched, while the 7 unifacial specimens include 3 worked on the ventral surface, 1 on the dorsal surface, and 3 on alternate faces. Chipping tends to be irregular, and its maximum depth along the worked edges ranges from 3 to 8 mm. Two specimens show some grinding along one edge. Dimensions of the 2 complete specimens are as follows: (1) length, 45 mm; maximum width, 13 mm; maximum thickness, 3 mm; weight, 2 gm; and (2) length, 39 mm; maximum width, 12 mm; maximum thickness, 3 mm; weight, 2 gm. (See Table G.5 for edge angle data.)

Included among the other shaped blades are 2 basal end pieces from tools with a constricted outline and 3 parallel-sided pieces, all of which may be fragments of drill-like tools. A sixth shaped blade fragment has an amorphous shape. All 6 are retouched along both lateral edges; 3 are worked bifacially, 2 unifacially on the ventral surface, and 1 unifacially on alternate faces. Chipping varies from irregular to even. In 4 instances maximum depth of chipping along the worked edges is only 3–4 mm, but in the other 2 instances the entire face of the blank shows retouching. (See Table G.5 for edge angle data.)

The 2 remaining specimens in this category are similar in size and shape but are differently worked. Both are complete and are rectangular in overall outline. The first specimen is shaped by irregular retouch around the entire margin of the piece. Retouch extends across the entire face of the tool, and the edges show some crushing. This specimen measures as follows: edge angle, 60°; length, 25 mm; maximum width, 14 mm; maximum thickness, 4 mm; weight, 1 gm.

The second rectangular specimen is not retouched at all but instead is shaped by grinding around the entire margin. It is possible that this item should be included with the edge-modified blades with ground edges; however, the overall symmetry created by the extensive grinding led to its classification as a shaped piece. The dimensions of the ground specimen are: length, 29 mm; maximum width, 18 mm; maximum thickness, 5 mm; weight, 3 gm.

Unidentifiable Shaped Pieces: This final residual category includes specimens, other than shaped blades, which could not be definitely identified. Most are fragments which may be parts of projectile points, drill-like pieces, and/or coarsely shaped pieces.

Eight of the 13 unidentifiable specimens are made on flakes. The only complete shaped flake is unifacially retouched on alternate faces and has a roughly triangular outline. The chipping is irregular and reaches a maximum depth of 12 mm along the worked edges. Overall dimensions of this specimen are: edge angle, 80°; length, 74 mm; maximum width, 38 mm; maximum thickness, 25 mm; weight, 36 gm.

The fragmentary shaped flakes include 5 with unidentifiable or amorphous outlines, 1 pointed piece, and 1 basal end section from a tool with a constricted outline. Retouch on these fragments varies from irregular to even and includes 1 bifacially worked specimen, 3 unifacially worked on the dorsal side, and 3 unifacially worked on alternate faces. Maximum depth of chipping along the retouched edges of individual pieces ranges from 4 mm to examples where the entire face of the blank is worked.

In 5 instances in this category, the type of tool blank could not be determined. All are bifacially retouched tool fragments. Chipping varies from irregular to even and has a maximum depth from the worked edges ranging from 5 mm to examples where the entire face shows retouching. Overall shapes of the original tools could not be determined. (See Table G.5 for edge angle data.)

Chert Industry

Edge-Modified Pieces

Edge-Modified Flakes: This category includes 78 flakes and flake fragments with a total of 92 working edges. Dimensions of the 37 complete flakes included in this collection are presented in Table G.6, and certain working edge characteristics are summarized in Table G.7.

Utilized flake edges. This subcategory includes 45 edges showing simple utilization chipping. Unifacial chipping is dominant, with 24 worked on the dorsal surface, 7 on the ventral surface, 3 on alternate faces, and 2 unidentifiable. Chipping on 9 edges is bifacial. Irregular chiping predominates (30 edges), but one-third are evenly chipped (15 edges). Only 5 edges show any crushing. Edge outlines include convex (14), concave (11), straight (6), pointed (5), concave-convex (4), denticulate (3), and sinuous/irregular (2).

Retouched flake edges. There are a total of 34 retouched flake edges in the collection. Again unifacial chipping dominates with 30 worked dorsally, 1

Table G.6. **Measurable Dimensions of Modified Chert Pieces in the Analyzed Lithic Collection from Chalcatzingo**

Artifact Category and Dimension	*Range*	*Mean*	*SD*
Edge-modified pieces:			
Complete flakes (N = 37)			
Length (mm)	21–73	41.14	13.40
Max. width (mm)	11–117	36.22	17.77
Max. thickness (mm)	2–31	12.16	6.27
Weight (gm)	2–101	22.65	26.28
Chunks (N = 6)			
Length (mm)	24–67	49.00	14.26
Max. width (mm)	18–62	37.00	12.91
Max. thickness (mm)	16–28	20.67	5.02
Weight (gm)	9–145	45.67	45.38
Shaped pieces:			
Projectile points (N = 3)			
Blade edge angle[a]	55–80	65.00	10.80
Coarsely shaped pieces (N = 5)			
Edge angle[a]	60–110	83.75	19.80
Unidentifiable shaped pieces (N = 4)			
Edge angle[a]	75–90	82.50	7.50

[a]Edge angle measured in 5° intervals.

Table G.7. **Characteristics of Working Edges for Edge-Modified Chert Pieces in the Analyzed Lithic Collection from Chalcatzingo**

	Maximum Depth of Chipping (mm)			*Edge Angle (5° intervals)*		
Artifact Subcategory	*Range*	*Mean*	*SD*	*Range*	*Mean*	*SD*
Utilized flake edges (N = 45)	1–4	2.56	1.09	35–100	74.00	14.20
Retouched flake edges (N = 32)	5–22	8.03	3.75	60–105	83.82	10.44
Ground flake edges (N = 13)	1–10	3.83	2.67		NA[a]	
Retouched chunk edges (N = 5)	6–18	10.60	4.96	60–95	85.00	12.65

[a]Because of the rounding created by grinding, edge angle is not accurately measurable.

ventrally, 1 on alternate faces, and 1 unidentifiable. One edge is bifacially worked. Chipping is generally irregular (28 edges) with only 6 edges exhibiting even chipping. Crushing was noted on 4 of the retouched edges. Edge outlines include convex (16), concave (5), denticulate (5), concave-convex (3), pointed (3), straight (1), and sinuous/irregular (1). One edge includes a small graver tip. As was the case with retouched obsidian flakes, a few specimens included in the subcategory might be identified as scrapers and gouges.

Ground flake edges. This subcategory includes 13 ground edges. Of these, 12 are chipped as well as ground while only 1 shows grinding alone. In 12 cases grinding occurs on only part of the working edge while in 1 instance the entire edge is ground. Among the chipped edges, 1 is bifacial and 11 are unifacial (2 dorsal, 3 ventral, 6 alternate faces). Again, irregular chipping is dominant (11 specimens). Edge outlines include convex (5), concave (4), pointed (2), concave-convex (1), and straight (1).

Edge-Modified Chunks: This category includes 6 chunks with a total of 6 working edges. Dimensions of the 6 specimens are summarized in Table G.6.

The single utilized working edge is bifacial, irregularly chipped, and convex in outline. Maximum depth of chipping is 3 mm, and edge angle is 70°.

Among the 5 retouched edges, 4 are unifacial and 1 bifacial. All exhibit irregular chipping. Edge outlines include rectangular (2), pointed (1), convex (1), and concave-convex (1). Other working edge characteristics are summarized in Table G.7. The convex and concave-convex specimens could easily be included as scrapers in a traditional classificatory system.

Shaped Modified Pieces

Only 3 of the 7 categories of shaped pieces are represented in chert: projectile points, coarsely shaped pieces, and unidentifiable shaped pieces. Edge angles for the various categories are summarized in Table G.6.

Projectile Points: This category includes 3 fragmentary specimens. The tool blank is not identifiable for any of the items. All 3 show even, bifacial retouch which extends across the entire face of the tool. The single fragment with basal area intact has a contracting stem.

Coarsely Shaped Pieces: This category includes 5 specimens, 3 fragmentary and 2 complete. All have flake blanks. Retouch, which is generally irregular, is bifacial in 2 cases, unifacial on the dorsal side in 2 cases, and unifacial on the ventral side in 1 case. One specimen shows some crushing of the edges. Maximum depth of chipping along the retouched edges of individual tools ranges from 9 mm to a single example where the entire face of the blank is altered. Both complete specimens are ovate in overall outline. Dimensions of these 2 specimens are as follows: (1) length, 37 mm; maximum width, 33 mm; maximum thickness, 10 mm; weight, 15 gm; and (2) length, 49 mm; maximum width, 31 mm; maximum thickness, 22 mm; weight, 30 gm.

Unidentifiable Shaped Pieces: This residual category includes 4 specimens, 3 complete and 1 fragmentary. All are made on flakes with both irregular and even retouch occurring. Three are worked unifacially, 1 on the ventral side, 1 on the dorsal side, and 1 on alternate faces. The fourth specimen is bifacial. Maximum depth of chipping along the retouched edges of individual pieces ranges from 4 to 17 mm. One of the complete specimens is ovate in overall outline, and the others are triangular. The ovate specimen measures 40 mm long, 38 mm in maximum width, and 17 mm in maximum thickness, and weighs 32 gm. Dimensions of the two triangular specimens are summarized as follows: (1) length, 29 mm; maximum width, 10 mm; maximum thickness, 7 mm; weight, 2 gm; and (2) length, 29 mm; maximum width, 12 mm; maximum thickness, 7 mm; weight, 2 gm.

PART 2. BASIC DATA USED IN THE VARIABLE-BY-VARIABLE COMPARISON OF SAMPLE LITHIC ASSEMBLAGES

***Table G.8.* Variable 1: Raw Material**

	All Obsidian		*All Chert*		*Total*
Assemblage	N	%	N	%	N
PC Str. 1	1,478	82	319	18	1,797
T-9A	74	60	49	40	123
T-9B	109	77	33	23	142
T-11	54	50	55	50	109
T-23	383	88	54	12	437
T-24	1,805	90	211	10	2,016
T-25	346	92	32	8	378
T-37ob	28,430	100	94	0	28,524
T-37fea	45	57	34	43	79
S-39	333	69	152	31	485

***Table G.9.* Variable 2: General Assemblage Composition, Obsidian**

	All Modified Pieces		*Unmodified Blades*		*Debitage and Cores*		*Total*
Assemblage	N	%	N	%	N	%	N
PC Str. 1	198	13	942	64	338	23	1,478
T-9A	29	39	30	41	15	20	74
T-9B	41	38	46	42	22	20	109
T-11	25	46	20	37	9	17	54
T-23	105	27	176	46	102	27	383
T-24	59	3	1,060	59	686	38	1,805
T-25	150	43	133	38	63	18	346
T-37ob	49	0	15,121	53	13,260	47	28,430
T-37fea	5	11	24	53	16	36	45
S-39	154	46	82	25	97	29	333

Table G.10. **Variable 3: General Assemblage Composition, Chert**

	All Modified Pieces		*Debitage and Cores*		*Total*
Assemblage	N	%	N	%	N
PC Str. 1	17	5	302	95	319
T-9A	3	6	46	94	49
T-9B	5	15	28	85	33
T-11	3	5	52	95	55
T-23	4	7	50	93	54
T-24	14	7	197	93	211
T-25	10	31	22	69	32
T-37ob	4	4	90	96	94
T-37fea	3	9	31	91	34
S-39	33	22	119	78	152

Table G.11. **Variable 4: Lithic Workshop Identifiers**

	Obsidian								*Chert*				
	Unmodified Blades		*Cores*		*General Debitage*		*Blade Workshop Identifiers*[a]		*Cores*		*Debitage*		*Total*
Assemblage	N	%	N	%	N	%	N	%	N	%	N	%	N
PC Str. 1	942	60	5	0	266	17	67	4	8	0	294	19	1,582
T-9A	30	33	1	1	12	13	2	2	0	0	46	51	91
T-9B	46	48	0	0	14	15	8	8	4	4	24	25	96
T-11	20	25	0	0	7	9	2	2	0	0	52	64	81
T-23	176	54	1	0	72	22	29	9	0	0	50	15	328
T-24	1,060	55	12	0	575	30	99	5	10	0	187	10	1,943
T-25	133	61	1	0	43	20	19	9	2	1	20	9	218
T-37ob	15,121	53	13	0	5,716	20	7,531	26	6	0	84	1	28,471
T-37fea	24	34	0	0	10	14	6	9	1	1	30	42	71
S-39	82	28	0	0	72	24	25	8	11	4	108	36	298

[a]Crested blades, core platform rejuvenation flakes, core recovery flakes.

Table G.12. **Variable 5: General Tool Classes**

	Unmodified Blades		*Edge-Modified Pieces*		*Shaped Modified Pieces*		*Total*
Assemblage	N	%	N	%	N	%	N
PC Str. 1	942	81	149	13	66	6	1,157
T-9A	30	48	30	48	2	3	62
T-9B	46	50	42	46	4	4	92
T-11	20	42	22	46	6	13	48
T-23	176	62	87	31	22	8	285
T-24	1,060	94	39	3	34	3	1,133
T-25	133	45	134	46	26	9	293
T-37ob	15,121	100	33	0	20	0	15,174
T-37fea	24	75	7	22	1	3	32
S-39	82	30	151	56	36	13	269

Table G.13. **Variable 6: Modified Tool Classes**

	Edge-Modified Blades		*Other Edge-Modified Pieces*[a]		*Shaped Modified Pieces*		*Total*
Assemblage	N	%	N	%	N	%	N
PC Str. 1	75	35	74	34	66	31	215
T-9A	27	84	3	9	2	6	32
T-9B	27	59	15	33	4	9	46
T-11	18	64	4	14	6	21	28
T-23	70	64	17	16	22	20	109
T-24	9	12	30	41	34	47	73
T-25	87	54	47	29	26	16	160
T-37ob	17	32	16	30	20	38	53
T-37fea	3	38	4	50	1	13	8
S-39	101	54	50	27	36	19	187

[a]Flakes, chunks, cores.

Table G.14. **Variable 7: Shaped Tool Categories**

Assemblage	Projectile Points		Drill-like Pieces		Wedge-shaped Pieces		Coarsely Shaped Pieces		Finely Retouched Blades		Other Shaped Blades		Other Unidentifiable Shaped Pieces		Total
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N
PC Str. 1	21	32	2	3	5	8	19	29	4	6	10	15	5	8	66
T-9A[a]	1	—	0	—	0	—	1	—	0	—	0	—	0	—	2
T-9B[a]	2	—	0	—	0	—	2	—	0	—	0	—	0	—	4
T-11[a]	1	—	0	—	0	—	4	—	0	—	1	—	0	—	6
T-23	0	0	0	0	1	5	14	64	3	14	1	5	3	14	22
T-24	9	26	2	6	3	9	5	15	4	12	7	21	4	12	34
T-25	6	23	1	4	3	12	11	42	4	15	1	4	0	0	26
T-37ob	2	10	3	15	1	5	6	30	1	5	3	15	4	20	20
T-37fea	0	—	0	—	0	—	1	—	0	—	0	—	0	—	1
S-39	0	0	2	6	0	0	24	67	7	19	2	6	1	3	36

[a]Percentages omitted because of small sample size.

Table G.15. **Variable 8: Edge-Modified Pieces, Working Edge Types**

Assemblage	Edge-Modified Blades						Other Edge-Modified Pieces[a]						Total
	Utilized		Retouched		Ground		Utilized		Retouched		Ground		
	N	%	N	%	N	%	N	%	N	%	N	%	N
PC Str. 1	114	57	0	0	8	4	45	22	31	15	3	1	201
T-9A	43	91	0	0	0	0	3	6	1	2	0	0	47
T-9B	43	70	0	0	0	0	12	20	6	10	0	0	61
T-11	24	67	3	8	3	8	5	14	1	3	0	0	36
T-23	117	79	1	1	7	5	15	10	9	6	0	0	149
T-24	12	24	0	0	1	2	17	33	21	41	0	0	51
T-25	140	65	4	2	6	3	52	24	10	5	3	1	215
T-37ob	25	57	2	5	0	0	10	23	7	16	0	0	44
T-37fea	5	56	0	0	0	0	2	22	2	22	0	0	9
S-39	92	36	2	1	89	35	30	12	17	7	24	9	254

[a]Flakes, chunks, cores.

Table G.16. **Variable 9: Edge-Modified Pieces, Placement of Chipping**

Assemblage	Edge-Modified Blades				Other Edge-Modified Pieces				Total
	Unifacial		Bifacial		Unifacial		Bifacial		
	N	%	N	%	N	%	N	%	N
PC Str. 1	60	32	54	28	62	33	14	7	190
T-9A	15	32	28	60	1	2	3	6	47
T-9B	9	15	34	56	8	13	10	16	61
T-11	2	6	25	76	5	15	1	3	33
T-23	39	27	79	56	17	12	7	5	142
T-24	8	16	4	8	35	70	3	6	50
T-25	38	18	106	51	41	20	21	10	206
T-37ob	16	36	11	25	16	36	1	2	44
T-37fea	2	22	3	33	4	44	0	0	9
S-39	41	29	53	38	35	25	12	9	141

Table G.17. **Variable 10: Edge-Modified Pieces, Working Edge Angles**

	Utilized Blades				*All Other Utilized and Retouched Edge-Modified Pieces*						
	30–55°		*60–95°*		*30–55°*		*60–80°*		*85–105°*		*Total*
Assemblage	N	%	N	%	N	%	N	%	N	%	N
PC Str. 1	55	29	59	31	10	5	43	23	23	12	190
T-9A	30	64	13	28	1	2	2	4	1	2	47
T-9B	38	62	5	8	7	11	7	11	4	7	61
T-11	21	64	3	9	3	9	5	15	1	3	33
T-23	77	54	40	28	1	1	19	13	5	4	142
T-24	3	6	9	18	7	14	20	40	11	22	50
T-25	101	49	39	19	15	7	36	17	15	7	206
T-37ob	8	18	17	39	2	5	11	25	6	14	44
T-37fea	4	44	1	11	0	0	2	22	2	22	9
S-39	65	46	27	19	9	6	26	19	14	10	141

Table G.18. **Variable 11: Edge-Modified Blades, Working Edge Shapes**

	Straight		*Convex*		*Concave*		*Other*		*Total*
Assemblage	N	%	N	%	N	%	N	%	N
PC Str. 1	68	60	15	13	23	20	8	7	114
T-9A	27	63	10	23	4	19	2	5	43
T-9B	29	67	7	16	2	5	5	12	43
T-11	20	74	3	11	1	4	3	11	27
T-23	61	52	20	17	16	14	21	18	118
T-24	8	67	2	17	0	0	2	17	12
T-25	66	46	24	17	25	17	29	20	144
T-37ob	12	44	4	15	7	26	4	15	27
T-37fea[a]	3	—	1	—	1	—	0	—	5
S-39	37	39	23	24	15	16	19	20	94

[a]Percentages omitted because of small sample size.

Table G.19. **Variable 12: Other Edge-Modified Pieces,[a] Working Edge Shapes**

	Straight		*Convex*		*Concave*		*Other*		*Total*
Assemblage	N	%	N	%	N	%	N	%	N
PC Str. 1	10	13	33	43	12	16	21	28	76
T-9A[b]	0	—	2	—	0	—	2	—	4
T-9B	5	28	7	39	2	11	4	22	18
T-11[b]	1	—	2	—	2	—	1	—	6
T-23	7	29	11	46	1	4	5	21	24
T-24	9	24	20	53	5	13	4	11	38
T-25	4	6	34	55	9	15	15	24	62
T-37ob	1	6	4	24	8	47	4	24	17
T-37fea	0	—	2	—	1	—	1	—	4
S-39	5	11	21	45	9	19	12	26	47

[a]Flakes, chunks, cores.
[b]Percentages omitted because of small sample size.