18. Middle Formative Lithic Industries at Chalcatzingo

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At a site such as Chalcatzingo, with a complex and lengthy depositional history, it is often difficult to establish basic functional interpretations for specific site areas. Yet such interpretations are needed as a foundation for higher-level socio-economic inferences. With this problem in mind, the Chalcatzingo chipped stone analysis was undertaken not only to provide basic descriptive information but also to explore the possible usefulness of lithic data in supporting and amplifying intrasite functional interpretations. The analysis presented here is of an exploratory nature. It is explicitly designed as a rapid survey of selected features of the chipped stone collection. The results, it is hoped, will indicate the general value of such data at this kind of site.

The chapter is divided into two parts. The first is a description of the classes of lithic artifacts present in the collection. The second is the analysis of the artifacts in terms of intrasite functional variability. Supplementary data on the lithic artifacts are contained in Appendix G.

DESCRIPTION OF THE GENERAL LITHIC COLLECTION

Selection of the Sample

Selected chipped stone materials were analyzed to provide basic descriptive information regarding the Middle Formative lithic industries at Chalcatzingo. Selection of a statistically controlled sample of lithic specimens from the very large quantity of material recovered during the excavations at Chalcatzingo was not feasible and, given the limited aims of this study, did not seem necessary. Instead, a purposive sample was selected from areas where functional and chronological inferences were available based on other types of data. The first basis for sample selection was an association with ceramics dated to the Cantera phase. Within this context, materials were selected from several functionally distinct situations. One Barranca phase sample from T-9B was included for its comparative value.

Unfortunately, the Chalcatzingo excavations seldom yielded clearly definable house floors; however, a number of probable domestic structures were excavated, and possible floor levels and associated activity areas were identified. The analyzed lithic collections from Terraces 9A, 9B, 11, 23, and 24 were derived from such loci. Specifically, the collections from T-9A, T-9B, and T-23 are from possible floor levels within domestic structures. The T-11 collection came from a possible interior floor level and outside activity areas immediately adjacent to the structure on that terrace. Materials from T-24 came from an activity area and trash deposit probably associated with the domestic structure.

Samples were also drawn from more specialized areas. Materials were selected from the levels associated with the construction and use of the stone altar on T-25 and from the probable elite house structure, PC Structure 1. The PC Structure 1 sample came from the upper levels, which included the subfloor burials, and from the crypt burials and trash deposits.

The remaining analyzed collections represent less easily characterized areas. Materials from two features on T-37 were analyzed. The first of these, the concentration of obsidian workshop debris (T-37ob), is the subject of Chapter 19; however, description of tools from the concentration will be included here. The second collection (T-37fea) was derived from a presumed outside activity area evidenced by a line of three postholes cut into the floor of a bedrock depression. Materials were also selected from the possible ceramic manufacturing area on S-39 (see Chapter 16). The analyzed S-39 sample came from an activity area (possible house floor) and trash areas in the vicinity of the large lime deposit on that terrace.

Analytical Methods

The analysis of the lithic sample, which was carried out entirely on the macroscopic level, combined a basic descriptive classification with the recording of a small series of tool attributes selected for their potential functional significance. For each provenience unit, the chipped stone materials were initially divided on the basis of raw material type, obsidian vs. chert. Within each of these raw material categories, the assemblages were sorted into a series of general morphological classes: blades, flakes, cores, other debris (including chunks, chips), and modified pieces. Cores were further subdivided into a series of morphological subclasses linked with different technological approaches to flake/blade production. Certain specialized blade and flake types (i.e., crested blades, core recovery flakes, core platform rejuvenation flakes) directly related to reduction of obsidian blade cores were also identified as special subclasses. (See Chapter 19 for definitions of these types.)

Modified pieces are defined as lithic items showing macroscopic evidence of modification (i.e., chipping, grinding, crushing, and battering) through use as tools and/or through intentional retouch. The more cumbersome term "modified piece" is used here rather than the simpler "tool" because the analyzed sample includes large quantities of unmodified obsidian blades. The blade industry here and throughout Mesoamerican prehistory was a highly developed technological process which yielded a very high proportion of usable cutting edges as a direct product of core reduction. The vast majority of the blade fragments in the Chalcatzingo collection show no macroscopic evidence of use, but all have or at least once had extremely sharp cutting edges and thus may have functioned as tools or parts of tools. Blades used on soft materials which did not cause obvious damage to the working edges would show no direct evidence of use as tools. It is important then to realize that the class "modified pieces" probably includes only a fraction of the actual "tools" present in the Chalcatzingo lithic sample.

Modified pieces were divided into two major subclasses identified as "shaped" and "edge-modified." Shaped pieces have been retouched extensively enough that the overall outline of the original tool blank (blade, flake, core fragment, etc.) has been modified. Virtually all the shaped pieces in the analyzed Chalcatzingo collection show some attempt at a finished product with bilateral symmetry. However, it is the extent of retouching and shaping, rather than the occurrence of bilateral symmetry, which defines this subclass. Edge-modified pieces are chipped stone items which have not undergone overall shaping of the basic tool blank. Instead, the blank in large part retains its original form, and only an individual edge or edges have been worked. Edge modification on these pieces may be entirely the result of use or may involve intentional retouching designed to shape or sharpen the working edge. Within these two major subclasses, shaped and edge-modified, the analyzed pieces were further divided into a series of general morphological categories based on the extent, positioning, and general nature of the modification.

Edge-modified pieces were divided into a series of categories on the basis of tool blank type (i.e., blade, flake, chunk, core). Each of these was then further divided into subcategories on the basis of certain working edge characteristics: (1) utilization, (2) retouch, (3) grinding, and (4) battering. An individual edge-modified piece might have several working edges, and these edges might fall into different subcategories. Each working edge was analyzed independently. See Appendix G for a more detailed description of these categories.

Seven categories of shaped modified pieces were found to be useful in the analysis of the Chalcatzingo lithic sample: projectile points, drill-like pieces, wedge-shaped pieces, coarsely shaped pieces, finely retouched blades, other shaped blades, and unidentifiable shaped pieces. In general, an effort was made to avoid functional labels for these categories, although two which seem meaningful (projectile points and drill-like pieces) were used. The defining characteristics of each of these categories are outlined in Appendix G.

In addition to the morphological classification, a number of individual attributes were recorded for each modified piece. The attributes, all assumed to have functional significance, related to the working edges and included edge angle (measured in 5° intervals), edge shape, type of modification, and depth of chipping. These data are summarized in Appendix G.

Discussion

Grey obsidian, often with dark banding, is the dominant lithic raw material in the chipped stone collection analyzed from Chalcatzingo (see Chapter 23 for source analysis data). The principal products of the obsidian industry were prismatic blades, which occur in substantial quantities in all areas sampled (see Appendix G).

Obsidian flakes also occur throughout the site, both as debitage and as modified pieces; however, no obsidian flake cores were identified in the collection.This suggests that rather than being a primary product of core reduction, the entire obsidian flake assemblage was the result of blade core preforming and trimming. Excluding the T-37 obsidian concentration which is the subject of a separate discussion, some 20 percent of the flake debitage in the collection consists of flake types (core platform rejuvenation flakes and core recovery flakes) which are clear products of blade core trimming. The remaining 80 percent presumably includes waste from core preforming and possibly additional unidentified trimming flakes.

Although not universally present, obsidian blade cores occur in many areas of the site, and the analyzed obsidian collection includes a wide variety of modified tools. A more detailed discussion of these cores and artifacts is found in Appendix G. Table 18.1 provides data on distribution of obsidian blades, cores, and flakes. Distributional data for the modified obsidian artifacts are given in Table 18.2 (edge-modified pieces) and Table 18.3 (shaped pieces).

Although nowhere abundant, chert cores, debitage, and tools occur in all areas of Chalcatzingo included in the analyzed lithic sample (see Table 18.4). The raw material involved is variable, ranging in texture from coarse, quartzitic types to very fine, lustrous examples. Color is also variable, including dark to light grey, white, grey-blue, pink, dark red, and occasional yellows, oranges, and browns. The most common materials are light grey to white with a smooth but lusterless surface texture. It is presumed that this chert was obtained locally, although the total sample may not derive from the chert source in the southern valley (Chapters 21, 23; Appendix H, RAS-108).

Although not universally present, chert flake cores occur in most areas of the site and, in fact, are almost as numerous as obsidian blade cores. Excluding the special situation of T-37ob, the analyzed collection includes thirty-nine obsidian blade cores and fragments (twenty discarded and nineteen used as tools), while there are thirty-six chert flake cores. However, despite the relative frequency of chert cores, chert debitage and tools make up a much smaller proportion of the entire collection than do their obsidian counterparts. Of the total cores in the collection ($N = 75$), 48 percent are chert, but only seventeen percent of the total debitage ($N = 4{,}652$) and eleven percent of the modified pieces ($N = 858$) are chert. Although other factors such as patterns of core disposal may be involved, the different core-to-debitage ratios indicated here clearly reflect the more efficient use of raw material inherent in blade production.

The distribution of modified chert pieces is given in Table 18.5 for both edge-modified and shaped artifacts. Shaped chert tools are rare in the analyzed Chalcatzingo collection, and only three of the seven categories defined for obsidian artifacts are represented in chert.

The two chipped stone industries at Chalcatzingo are obviously very different in magnitude. Although the numbers of obsidian and chert cores in the analyzed collection are remarkably similar, in all other aspects obsidian is overwhelmingly dominant. Specifically, excluding the T-37 obsidian concentration, some 2,513 obsidian blades and 1,328 pieces of debitage compare with only 811 items of chert debitage. Among modified pieces, including those from T-37ob, edge-modified obsidian items number 610 with a total of 977 working edges, while there are only 84 chert pieces with just 98 working edges. The

Table 18.1. Obsidian Cores, Blades, and Debitage in the Analyzed Lithic Collection from Chalcatzingo[a]

Provenience	Blade Cores	Blades	Crested Blades	Core Platform Rejuvenation Flakes	Core Recovery Flakes	Other Flakes	Other Debris (Chunks)	Totals
PC Str. 1	5	942	3	18	46	226	40	1,280
T-9A	1	30	1	1	0	11	1	45
T-9B	0	46	0	3	5	10	4	68
T-11	0	20	0	1	1	4	3	29
T-23	1	176	1	14	14	63	9	278
T-24	12	1,060	3	49	47	541	34	1,746
T-25	1	133	2	7	10	34	9	196
T-37fea	0	24	0	1	5	9	1	40
S-39	0	82	0	13	12	67	5	179
Totals	20	2,513	10	107	140	965	106	3,861

[a]T-37 obsidian concentration not included.

Table 18.2. Distribution of Edge-Modified Obsidian Pieces by Working Edges in the Analyzed Lithic Collection from Chalcatzingo

	Working Edges on Blades				Working Edges on Flakes				Working Edges on Chunks			Working Edges on Blade Cores			
Provenience	U	R	G	Subtotals	U	R	G	Subtotals	U	R	Subtotals	R	B	Subtotals	Totals
PC Str. 1	114	0	8	122	38	19	3	60	0	3	3	0	7	7	192
T-9A	43	0	0	43	0	0	0	0	0	0	0	0	0	0	43
T-9B	43	0	0	43	10	2	0	12	0	0	0	0	0	0	55
T-11	24	3	3	30	1	0	0	1	0	0	0	0	0	0	31
T-23	117	1	7	125	12	7	0	19	1	1	2	0	0	0	146
T-24	12	0	1	13	9	14	0	23	0	0	0	0	0	0	36
T-25	140	4	6	150	45	7	3	55	0	0	0	1	1	2	207
T-37fea	5	0	0	5	0	1	0	1	0	0	0	0	0	0	6
T-37ob	25	2	0	27	9	5	0	14	0	0	0	0	0	0	41
S-39	92	2	89	183	20	6	11	37	0	0	0	0	0	0	220
Totals	615	12	114	741	144	61	17	222	1	4	5	1	8	9	977

U = utilized; R = retouched; G = ground; B = battered.

Table 18.3. Distribution of Shaped Obsidian Tools in the Analyzed Lithic Collection from Chalcatzingo

					Finely Retouched Blades				
Provenience	Projectile Points	Drill-like Pieces	Wedge-Shaped Pieces	Coarsely Shaped Pieces	Bi-Pointed	Constricted	Other Shaped Blades	Unidentifiable Shaped Pieces	Totals
PC Str. 1	20	2	5	19	3	1	10	4	64
T-9A	1	0	0	1	0	0	0	0	2
T-9B	2	0	0	2	0	0	0	0	4
T-11	1	0	0	4	0	0	1	0	6
T-23	0	0	1	13	1	2	1	3	21
T-24	8	2	3	5	2	2	7	2	31
T-25	5	1	3	11	4	0	1	0	25
T-37fea	0	0	0	1	0	0	0	0	1
T-37ob	2	3	1	6	0	1	3	3	19
S-39	0	2	0	20	1	6	2	1	32
Totals	39	10	13	82	11	12	25	13	205

***Table 18.4.* Chert Cores and Debitage in the Analyzed Lithic Collection from Chalcatzingo**[a]

Provenience	*Blocky Flake Cores*	*Prepared Flake Cores*	*Flakes*	*Chunks*	*Totals*
PC Str. 1	5	3	235	59	302
T-9A	0	0	41	5	46
T-9B	1	3	20	4	28
T-11	0	0	22	30	52
T-23	0	0	40	10	50
T-24	9	1	154	33	197
T-25	1	1	14	6	22
T-37fea	1	0	26	4	31
S-39	11	0	91	17	119
Totals	28	8	643	168	847

[a]T-37 obsidian concentration not included.

***Table 18.5.* Distribution of Modified Chert Pieces in the Analyzed Lithic Collection from Chalcatzingo**

	Edge-Modified Pieces (Number of Working Edges)								*Shaped Pieces*			
	Flakes				*Chunks*							
Provenience	*U*	*R*	*G*	*Subtotals*	*U*	*R*	*Subtotals*	*Totals*	*PP*	*CS*	*US*	*Totals*
PC Str. 1	7	7	0	14	0	2	2	16	1	0	1	2
T-9A	2	1	0	3	1	0	1	4	0	0	0	0
T-9B	2	4	0	6	0	0	0	6	0	0	0	0
T-11	4	1	0	5	0	0	0	5	0	0	0	0
T-23	2	1	0	3	0	0	0	3	0	1	0	1
T-24	8	6	0	14	0	1	1	15	1	0	2	3
T-25	7	2	0	9	0	0	0	9	1	0	0	1
T-37fea	2	0	0	2	0	1	1	3	0	0	0	0
T-37ob	1	1	0	2	0	1	1	3	0	0	1	1
S-39	10	11	13	34	0	0	0	34	0	4	0	4
Totals	45	34	13	92	1	5	6	98	3	5	4	12

U = utilized; R = retouched; G = ground; PP = projectile points; CS = coarsely shaped pieces; US = unidentifiable shaped pieces.

contrast in shaped pieces is similar, with 205 obsidian items as opposed to only 12 chert tools.

Unmodified obsidian blades are by far the largest component in the analyzed lithic collection, outnumbering the next most frequent lithic category (i.e., all obsidian flakes) by nearly two to one. They clearly were the principal available source of useful working edges, and it is assumed that many or most of the apparently unmodified specimens were, in fact, used as tools. The importance of blades as tools is also evident in the fact that they are the dominant blanks for both edge-modified and shaped tools.

The dominant modified tool form is the edge-modified item with utilized working edge. There are 760 such edges on obsidian blanks and 46 in chert for a total of 806 utilized edges. Edge-modified items with a ground edge are next in importance, with 131 obsidian and 13 chert or a total of 144 edges. Although the least frequent of the edge-modified pieces, items with a retouched edge still outnumber any of the categories of shaped tools. There are a total of 117 retouched edges, including 78 obsidian and 39 chert. (Note: The figures cited here refer to working edges. Many of the 694 edge-modified pieces have more than one such edge.)

Among the 217 shaped tools, coarsely shaped pieces ($N = 87$) are decidedly the most frequent items, accounting for 40 percent of the total. Projectile points ($N = 42$) make up 19 percent of the shaped pieces, and the remaining categories vary from 12 percent to 5 percent of the total. Among the latter, finely retouched blades ($N = 23$) and other shaped blades ($N = 25$) are the most substantial categories. With the exception of tool categories requiring blades as tool blanks, chert and obsidian seem to have been used in the same general manner for shaped tools although chert was obviously of very minor importance.

ANALYSIS OF THE SAMPLE LITHIC ASSEMBLAGES

The analyzed lithic collection was selected from a series of terrace areas which appear to fall into several functionally distinct categories. As stated previously, with one exception, all were drawn from Cantera phase contexts in order to hold constant possible temporal variability in the chipped stone materials. The exception, the T-9B sample, is derived from a Barranca phase residential structure and was included for comparative purposes. Preliminary functional assignments for the selected loci were based upon observations, primarily of architectural and ceramic data, made during excavation and laboratory analyses.

Using these functional assignments as a starting point, the present analysis begins by outlining certain logical possibilities or expectations regarding the lithic tool kits from the sampled loci. The overall contents of the various assemblages are then compared, and the results are related back to the expectations outlined here.

Expected Tool Kit Characteristics

Five of the sampled loci, T-9A, T-9B, T-11, T-23, and T-24, were identified as common residential areas on agricultural terraces (specifically, house floors and adjacent outside activity areas). A wide variety of activities would be expected for such loci, including, for example, food processing and preparation, manufacture and maintenance of clothing and household furnishings, maintenance and possibly some manufacture of agricultural implements and other household tools, and so on. It is expected that this range of activities would be reflected in the lithic assemblages in the following manner:

1. Relatively diverse assemblages. This is the logical adjunct of the wide variety of activities expected for these loci.

2. Emphasis on general-purpose tools. The wide variety of tasks to be performed should encourage the use of general-purpose items such as coarsely shaped tools and edge-modified blades and flakes with simple utilized working edges. More highly specialized items suited to single tasks may be present but are not likely to occur in quantity.

3. Debitage and possibly flake cores in moderate quantity. Obsidian blade manufacture was almost certainly a specialized activity which did not take place on the individual household level; however, other aspects of tool manufacture, hafting, and maintenance (resharpening, reshaping) may very well have taken place at these loci.

The other sampled loci are presumed to have been devoted to more specialized activities. PC Structure 1 is defined as an elite residence, the altar area of T-25 is an apparent ceremonial location, the obsidian concentration on T-37 (T-37ob) has been identified as a trash deposit from a blade manufacturing workshop, and S-39 may have been a ceramic manufacturing area. Although no specific function could be assigned to it, the posthole feature on T-37 (T-37fea) has no clear connection with a domestic structure and thus is grouped with the special-activity loci. The narrower range of activities expected at these locations would be reflected in the lithic assemblages as follows:

1. More restricted assemblages. This is the logical adjunct of the supposition that each of these loci was devoted to a delimited ceremonial, craft, or other activity or closely related set of activities.

2. Potential emphasis on special-purpose tools. The need for special-purpose tools would, of course, be dependent on the actual activity being carried out; however, such tools (e.g., finely retouched blades, edge-modified pieces with ground edges) are more likely in specialized assemblages.

3. Debitage potentially either very important or very scarce. Once again the actual activity being performed is crucial here. Lithic manufacturing areas should show very high proportions of debitage, but there should be other areas where tool manufacture is very unlikely (e.g., elite residences, ceremonial loci) and debitage is only a very minor component of the assemblage.

On the basis of the expectations outlined for common residential and special-activity tool kits, it is presumed that the two sets of assemblages will be significantly different. It is also expected that the residential collections will tend to share the same generalized tool kit. On the other hand, unless closely related activities are involved, the special-activity assemblages are expected to differ from each other as well as from the common residential materials.

Comparison of Assemblages

The ten lithic assemblages included in the chipped stone sample are evaluated here on the basis of a series of twelve general variables. First, the assemblages are compared on an individual variable-by-variable basis, and then a summary of these results is used to produce groupings of like assemblages.

As an initial analytical step, for each assemblage the relative proportions of each attribute state defined for a given variable were calculated, and the results were plotted as a simple line graph. Percentages rather than absolute frequencies were used because assemblage size varies so widely. The array of graphs illustrating the attributes of a particular variable for the ten assemblages were then visually compared, and assemblages which showed similar overall profiles were grouped together. The graphic comparisons for each of the twelve variables are outlined below. The basic data upon which the graphs are based are provided in Appendix G (Tables G.8–G.19).

Variable 1: Raw Material

Two attribute states are defined for the first variable, obsidian and chert, and all analyzed lithic items are included in the tabulations. The resulting graphs tend to form a continuum but may be divided into three classes (Fig. 18.1). In the first class, obsidian is highly dominant (over 80 percent): PC Str. 1, T-23, T-24, T-25, T-37ob. In the second, obsidian is still dominant but more moderately so (ca. 70 percent): T-9B, S-39. In the third class, the two raw material types are close to being equal in importance: T-9A, T-11, T-37fea.

Variable 2: General Assemblage Composition, Obsidian

The three attribute states defined for Variable 2 are modified pieces (including all edge-modified and shaped tools), unmodified blades, and debitage and cores. Again, three classes are observed (Fig. 18.2). In the first class, unmodified blades are clearly the most important feature of the assemblages: PC Str. 1, T-23, T-24, T-37ob, T-37fea. In the second, unmodified blades and modified pieces are roughly equal in importance, and both are more significant than cores and debitage: T-9A, T-9B, T-11, T-25. In the third, modified pieces are the dominant category with blades and debitage of lesser and roughly equal importance: S-39.

Variable 3: General Assemblage Composition, Chert

Variable 3, the chert complement of Variable 2, includes two attribute states, modified pieces and debitage/cores. There is very little variation among assemblages, but two classes are indicated (Fig. 18.3). In the first, the proportion of modified pieces is very low (15 percent or less): PC Str. 1, T-9A, T-9B, T-11, T-23, T-24, T-37ob, T-37fea. In the second, modified pieces are more significant (20–30 percent): T-25, S-39.

Variable 4: Lithic Workshop Identifiers

The six attribute states defined for Variable 4 include: unmodified obsidian

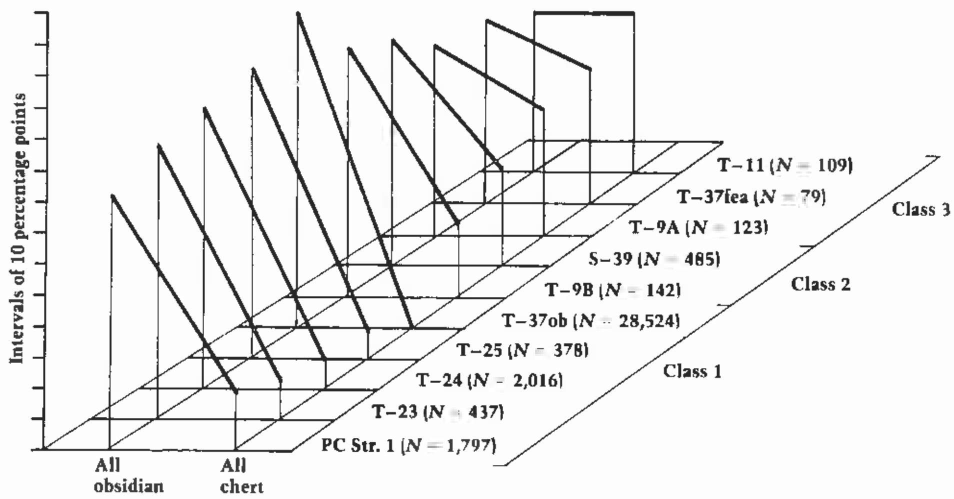

Figure 18.1. Comparison of Chalcatzingo lithic assemblages for Variable 1, raw material.

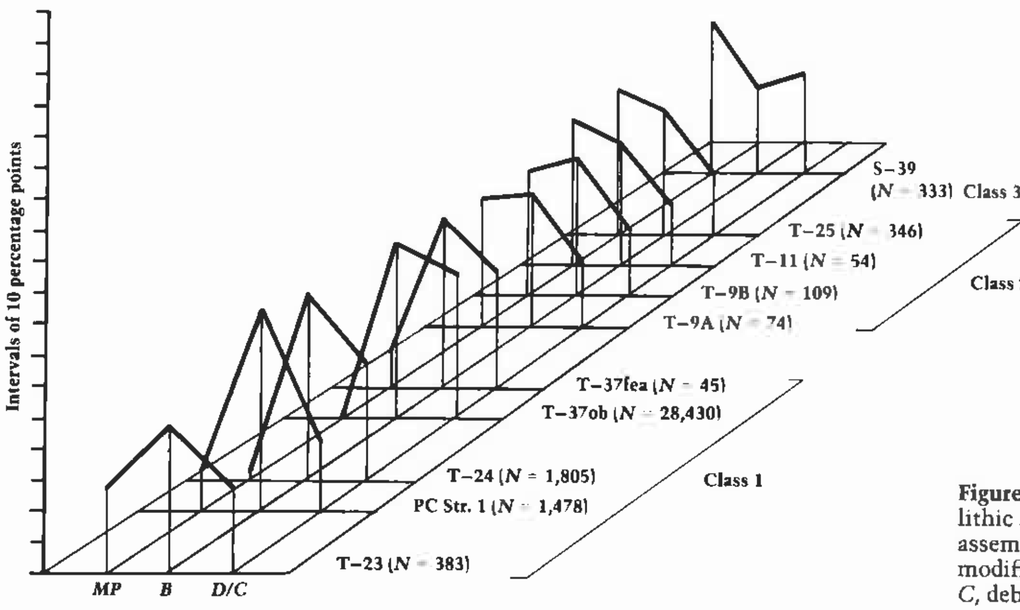

Figure 18.2. Comparison of Chalcatzingo lithic assemblages for Variable 2, general assemblage composition, obsidian: *MP*, all modified pieces; *B*, unmodified blades; *D/C*, debitage and cores.

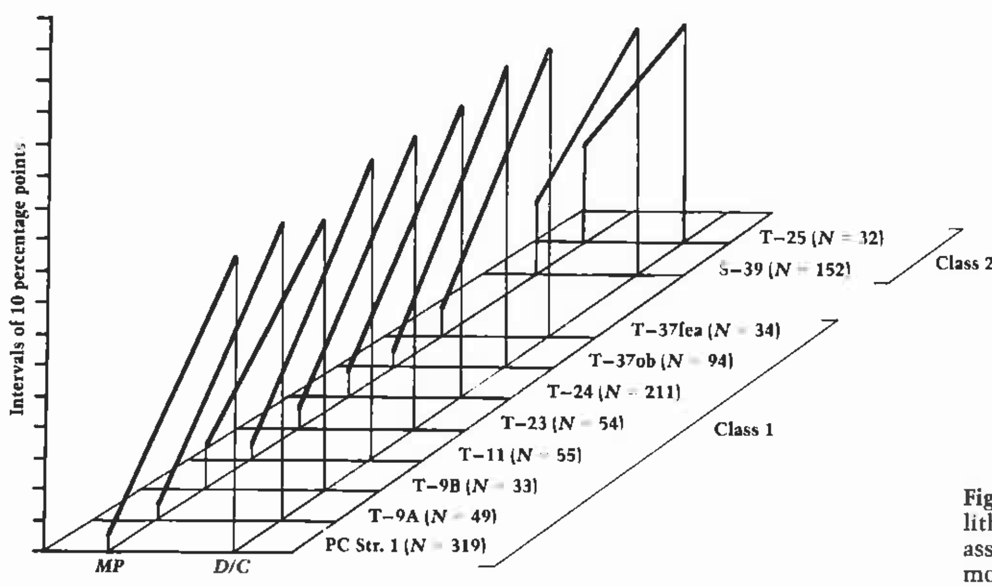

Figure 18.3. Comparison of Chalcatzingo lithic assemblages for Variable 3, general assemblage composition, chert: *MP*, all modified pieces; *D/C*, debitage and cores.

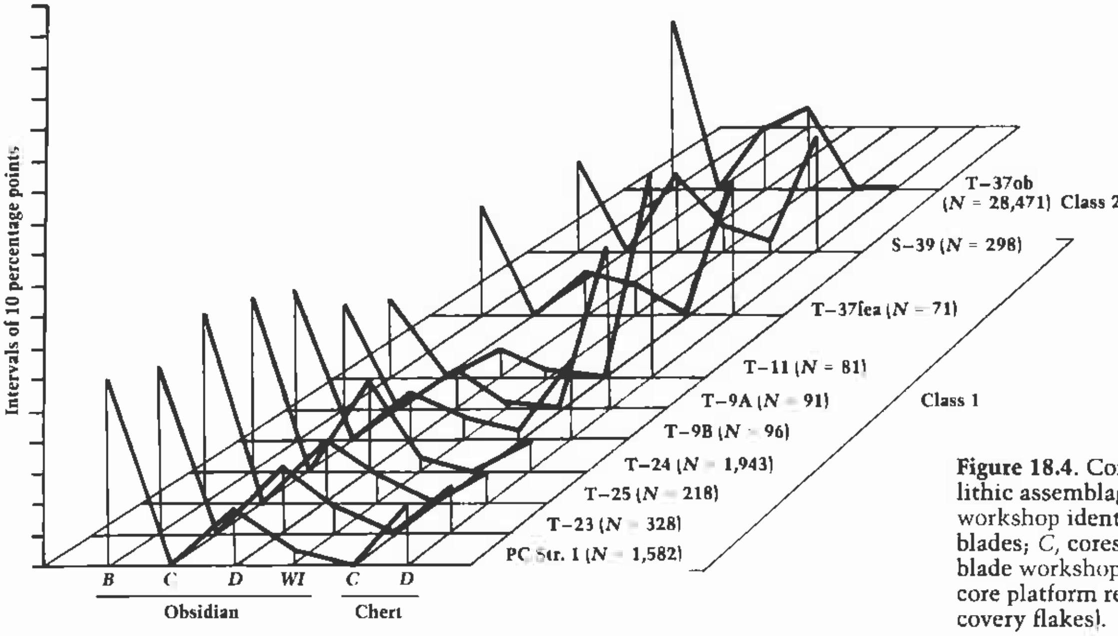

Figure 18.4. Comparison of Chalcatzingo lithic assemblages for Variable 4, lithic workshop identifiers: *B*, unmodified blades; *C*, cores; *D*, general debitage; *WI*, blade workshop identifiers (crested blades, core platform rejuvenation flakes, core recovery flakes).

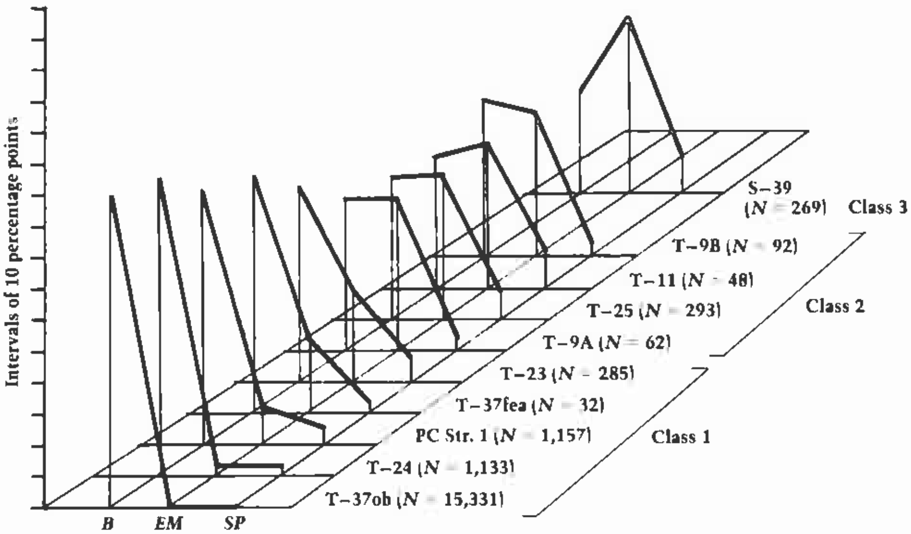

Figure 18.5. Comparison of Chalcatzingo lithic assemblages for Variable 5, general tool classes: *B*, unmodified blades; *EM*, edge-modified pieces; *SP*, shaped modified pieces.

blades, obsidian cores, general obsidian debitage, obsidian debitage directly relatable to blade manufacture (i.e., crested blades, core platform rejuvenation flakes, and core recovery flakes), chert cores, and chert debitage. The relative importance of obsidian cores, blade manufacturing debitage, and chert cores are the significant features here. Since the overall distribution of obsidian and chert has already been examined (Variable 1), variability on that level is not considered here.

Only two classes are indicated by the graphs for Variable 4 (Fig. 18.4). For all sampled areas other than T-37ob, various workshop identifiers are an insignificant feature of the overall lithic assemblage. In contrast, although cores continue to be unimportant, obsidian debitage directly relatable to blade manufacture accounts for a substantial portion of the T-37ob assemblage.

The importance of blade workshop identifiers in the T-37 obsidian concentration will be discussed in some detail in Chapter 19. Variable 4 was included in the comparative analysis as a means of separating out other lithic manufacturing loci should they exist in the areas sampled.

Variable 5: General Tool Classes

The fifth variable contrasts unmodified blades with the two general modified tool classes. The three attribute states are unmodified blades, edge-modified pieces (including blades, flakes, chunks, and cores), and shaped modified pieces. Both raw material types are included in these figures. All unmodified blades are regarded as possible tools although the actual fact of their utilization cannot be established.

Comparison of the graphs for Variable 5 indicates three classes of assemblages (Fig. 18.5). In the first class, unmodified obsidian blades are clearly the dominant feature (over 60 percent), with both edge-modified and shaped pieces of little importance: PC Str. 1, T-23, T-24, T-37ob, T-37fea. In the second class, unmodified blades and edge-modified pieces are of roughly equal significance with shaped tools still a minor element: T-9A, T-9B, T-11, T-25. In the third class, although unmodified blades are an important feature of the assemblage, edge-modified pieces are the dominant tool class: S-39. Although still the smallest tool class in the S-39 collection, shaped pieces are slightly more important than elsewhere.

Variable 6: Modified Tool Classes

The sixth variable eliminates the unmodified blades to provide a closer look at the general modified tool classes. The three attribute states for Variable 6 are edge-modified blades, other edge-modified pieces (flakes, chunks, cores), and shaped modified pieces.

The graphs for this variable are summarized in five assemblage classes (Fig. 18.6). In the first class, edge-modified blades are clearly the dominant tool class with both other edge-modified pieces and shaped tools of minor importance: T-9A, T-11, T-23. Graphs for the second class show an almost straight downward progression from edge-modified pieces to shaped pieces: T-9B, T-25, S-39. In the third class, the graphs approximate a straight horizontal line with all three modified tool classes roughly equal: PC Str. 1, T-37ob. In the fourth class, the progression seen in the second group is essentially reversed. In this case the near straight-line progression moves upward from edge-modified blades to the dominant class, shaped pieces: T-24. In the fifth class, edge-modified blades and other edge-modified pieces are roughly equal in importance while the proportion of shaped pieces is very low: T-37fea. It should be noted that the sample size for T-37fea is very low (N = 8) making its evaluation here somewhat uncertain.

Variable 7: Shaped Tool Categories

The attribute states for Variable 7 are the seven shaped tool categories defined for the Chalcatzingo lithic sample: (1) projectile points, (2) drill-like pieces, (3) wedge-shaped pieces, (4) coarsely shaped pieces, (5) finely retouched blades, (6) other shaped blades, and (7) unidentifiable shaped pieces. The resulting graphs are summarized in three assemblage classes (Fig. 18.7). In the first class, although projectile points have some prom-

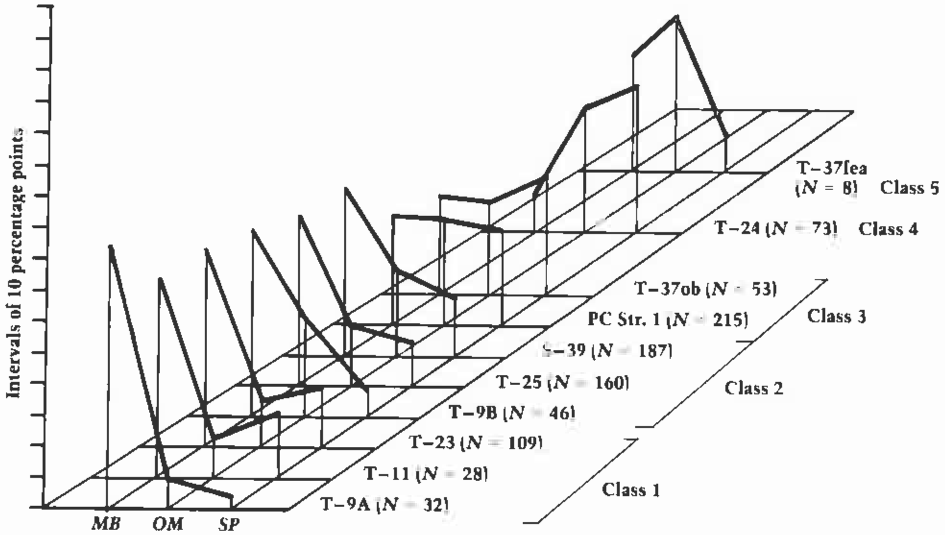

Figure 18.6. Comparison of Chalcatzingo lithic assemblages for Variable 6, modified tool classes: *MB*, edge-modified blades; *OM*, other edge-modified pieces (flakes, chunks, cores); *SP*, shaped modified pieces.

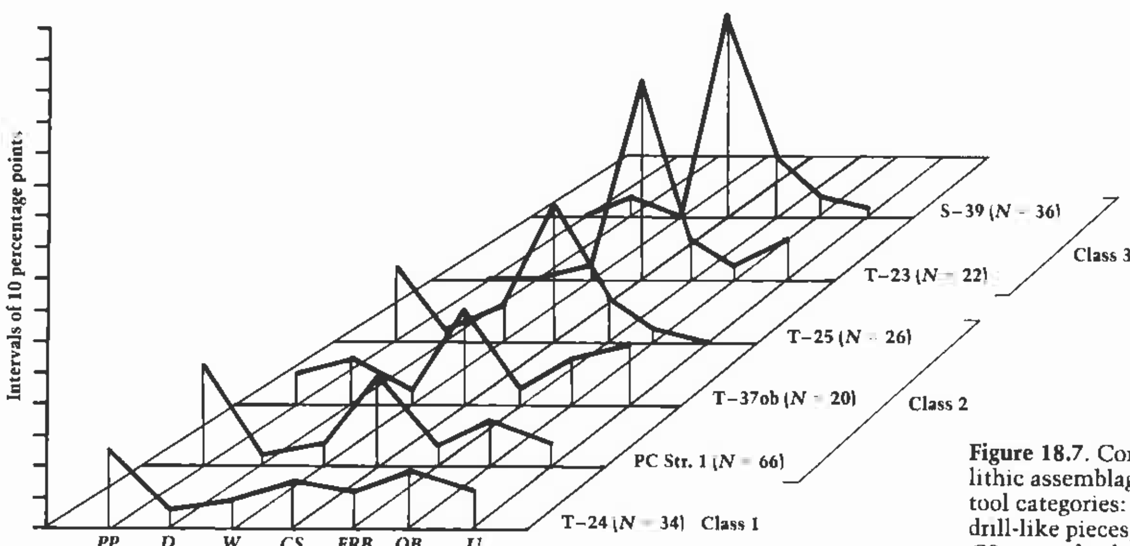

Figure 18.7. Comparison of Chalcatzingo lithic assemblages for Variable 7, shaped tool categories: *PP*, projectile points; *D*, drill-like pieces; *W*, wedge-shaped pieces; *CS*, coarsely shaped pieces; *FRB*, finely retouched blades; *OB*, other shaped blades; *U*, other unidentifiable shaped pieces. T-9A, T-9B, T-11, and T-37fea excluded because of small sample size.

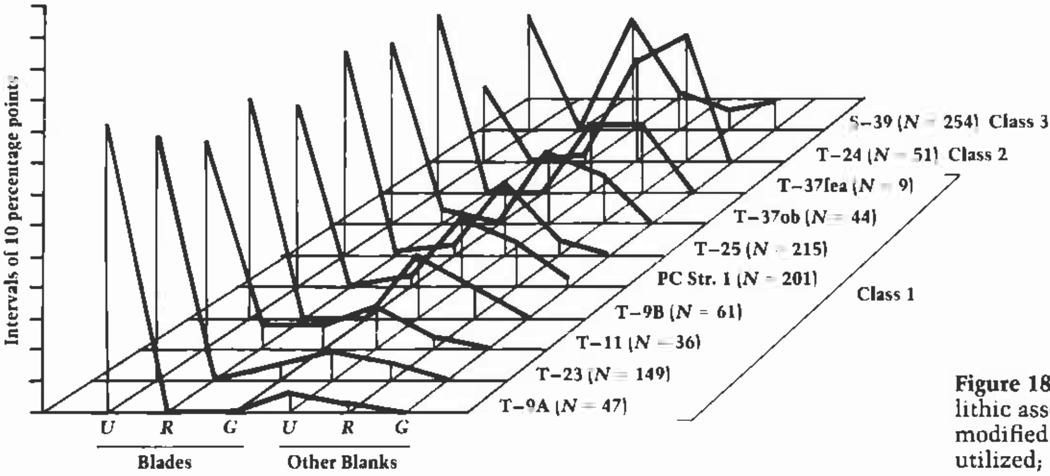

Figure 18.8. Comparison of Chalcatzingo lithic assemblages for Variable 8, edge-modified pieces, working edge types: *U*, utilized; *R*, retouched; *G*, ground.

inence, the graph approaches a horizontal line with all tool categories roughly equal in importance: T-24. In the second, coarsely shaped pieces and a second category (either projectile points or unidentified pieces) are of roughly equal importance with all others low: PC Str. 1, T-25, T-37ob. In the third class, coarsely shaped pieces make up the bulk of the sample (over 60 percent) with all other tool categories low: T-23, S-39. In four instances the shaped tool collections were too small to provide meaningful comparative data: T-9A (*N* = 2), T-9B (*N* = 4), T-11 (*N* = 6), T-37fea (*N* = 1).

Variable 8: Edge-Modified Pieces, Working Edge Types

The various working edge types defined for edge-modified pieces form the basis for Variable 8. The six attribute states used for comparison of assemblages include (1) utilized blade edges, (2) retouched blade edges, (3) ground blade edges, (4) utilized edges on other blanks (i.e., flakes, chunks, cores), (5) retouched edges on other blanks, and (6) ground edges on other blanks. Edges on blades were separated from edges on other types of pieces in order to get a fuller picture of assemblage composition. In order to avoid simply comparing relative proportions of blades and other pieces (see Variable 6), the definitions of assemblage classes for Variable 8 treat these two tool groups individually.

Three assemblage classes result from comparison of the graphs for Variable 8 (Fig. 18.8). The first class, which includes PC Str. 1, T-9A, T-9B, T-11, T-23, T-25, T-37ob, and T-37fea, is characterized as follows: (1) utilized blade edges are very important while the frequency of both retouched and ground blade edges is very low; (2) edge types on other pieces show a downhill progression from utilized to retouched to ground. The small size of the T-37fea collection (*N* = 9) makes it difficult to evaluate, and its inclusion in this class must be regarded as tentative.

The second class, which includes a single assemblage, T-24, differs only slightly from the first class: (1) blade edge distribution is like that of the first class; (2) on other types of pieces, retouched edges are slightly more important than utilized edges, while ground edges are again the least important type.

The third class also includes only a single assemblage, S-39; however, its characteristics are more markedly different than those of the other two classes: (1) ground blade edges equal utilized edges in importance while retouched blade edges are very scarce; (2) on other types of blanks, ground edges again nearly equal utilized edges while retouched edges are of minor importance.

Variable 9: Edge-Modified Pieces, Placement of Chipping

The four attribute states defined for Variable 9 include unifacial chipping on blades, bifacial chipping on blades, unifacial chipping on other blanks, and bifacial chipping on other blanks. Figures for utilized and retouched edges are combined in the examination of Variable 9. Again, the two major tool blank groups (blades and other types of pieces) are examined separately in the definition of assemblage classes.

Two classes result from the comparison of the graphs for this variable (Fig. 18.9). In the first, bifacial and unifacial chipping are of generally equal importance on blade edges while on other types of pieces unifacial chipping is the dominant variety: PC Str. 1, T-24, T-37ob, T-37fea, S-39. In the second, bifacial chipping occurs on the great majority of blade edges while on other types of pieces unifacial and bifacial chipping are roughly equal in importance: T-9A, T-9B, T-11, T-23, T-25.

Variable 10: Edge-Modified Pieces, Working Edge Angles

The five edge angle classes which serve as attribute states for Variable 10 were defined after examining the overall distribution of edge angles (measured in 5° intervals) for the collection of edge-modified pieces. Although utilized blade edges tended to have a unimodal distribution, there was sufficient suggestion of bimodality to justify the definition of two classes of angles. Angles of retouched blade edges and both utilized and retouched edges on other tool blanks showed a fairly clear trimodal distribution. The five attribute states for Variable 10 are thus defined as (1) utilized blade edges, 30–55°; (2) utilized blade edges, 60–95°; (3) all other utilized and retouched edges, 30–55°; (4) all other utilized and retouched edges, 60–80°; and (5) all other utilized and retouched edges, 85–105°.

Variation in the edge angles of utilized blades appears to be the only clear differentiating factor among the graphs for this variable (Fig. 18.10). Two assemblage classes are defined on this basis. In the first class, higher edge angle blades are equal to or more important than lower angle blades: PC Str. 1, T-24, T-37ob. In the second class, lower angle blades are

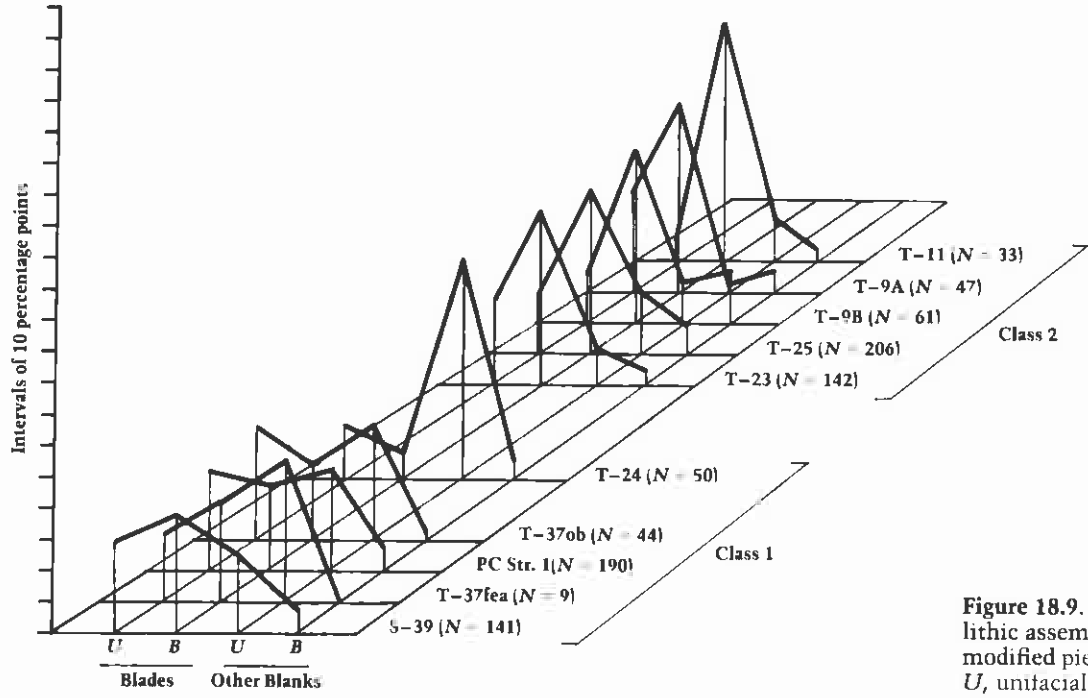

Figure 18.9. Comparison of Chalcatzingo lithic assemblages for Variable 9, edge-modified pieces, placement of chipping: *U*, unifacial; *B*, bifacial.

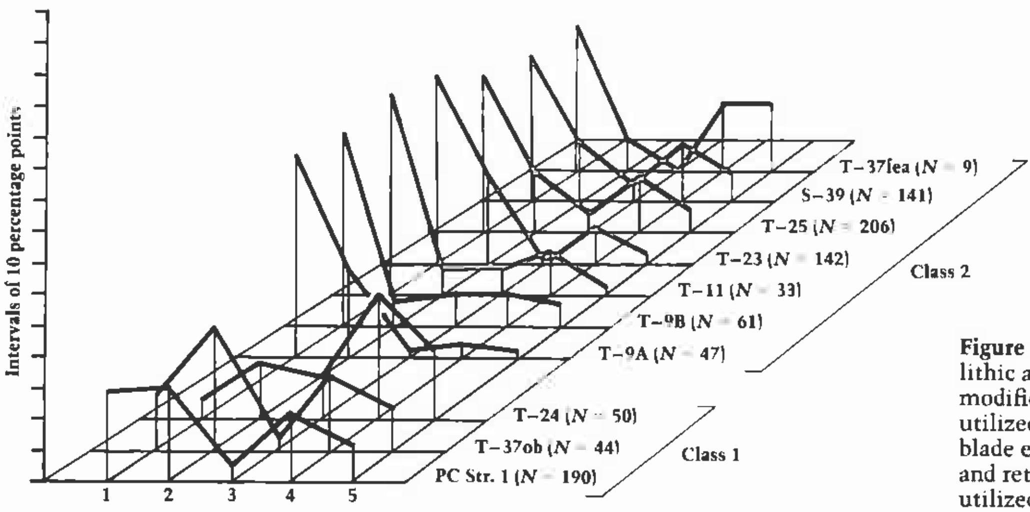

Figure 18.10. Comparison of Chalcatzingo lithic assemblages for Variable 10, edge-modified pieces, working edge angles: 1, utilized blade edges, 30–55°; 2, utilized blade edges, 60–95°; 3, all other utilized and retouched edges, 30–55°; 4, all other utilized and retouched edges, 60–80°; 5, all other utilized and retouched edges, 85–105°.

clearly the dominant category: T-9A, T-9B, T-11, T-23, T-25, T-37fea, S-39.

In virtually all cases, the edge angles on retouched blades and other utilized and retouched pieces show a pattern, with the intermediate edge angle category the most significant of the three. In two instances (T-9B and T-37fea), the intermediate category is equaled by either the high or low category, but the variation here is not sufficient to demand definition of separate classes for these two assemblages.

Variables 11–12: Edge-Modified Pieces, Working Edge Shapes

Variables 11 and 12 are essentially complementary. Variable 11 involves shapes of all utilized and retouched working edges on edge-modified blades. Variable 12 involves the same attribute states for utilized and retouched edges on other tool blanks. The attribute states for both variables are straight edges, convex edges, concave edges, and other shapes. Several additional edge shapes were recorded, but all are rare and so are simply combined as "other shapes."

On the basis of the graphs for blade edges (Variable 11), two assemblage classes are defined (Fig. 18.11). As would be expected, given the basic morphology of all blades, straight edges are by far the most significant category for all assemblages. Therefore, variations in the other categories are the source of class definitions. In the first class, the convex, concave, and other shape categories are all low and roughly equal: T-9A, T-9B, T-11, T-23, T-24, T-25, S-39. In the case of T-24, the concave category appears significantly lower than the other two;

however, the sample size here ($N = 12$) is relatively small and thus does not warrant definition as a separate class. In the second class, although still low, the concave category is somewhat more important than the convex and other shape categories: PC Str. 1, T-37ob. Sample size for T-37fea ($N = 5$) was too small to allow its inclusion in the Variable 11 analysis.

Three classes are indicated by the graphs for working edges on other tool blanks (Variable 12; Fig. 18.12). Most of the blanks in this group are flakes, and as would be expected on the basis of general flake morphology, convex edges tend to be the dominant form. In the first class, convex edges are clearly the most important category with all others relatively low: PC Str. 1, T-24, T-25, S-39. In the second class, although still the most frequent, convex edges are almost equaled by straight edges: T-9B, T-23. In the third class, concave edges are clearly the dominant category: T-37ob. Three assemblages were excluded from this comparison on the basis of small sample size: T-9A ($N = 4$), T-11 ($N = 6$), T-37fea ($N = 4$).

Summary

The variable-by-variable comparison of assemblages is summarized here in the form of a matrix specifically arranged to maximize the clustering of high values (Fig. 18.13). Each cell in the matrix indicates the number of variables for which the two indicated assemblages fall into the same class. A pair of assemblages identical on all variables would thus receive a score of 12 in the matrix. The cells along the lower diagonal of the matrix indicate the number of unique occurrences for each assemblage (i.e., the number of instances in which the assemblage was the only member of its class).

The summary matrix essentially provides a quick index to the overall similarity between assemblages. A general inspection indicates that there is a good deal of variability in the levels at which assemblages resemble or fail to resemble each other. Although no two collections are exactly alike, six pairs agree on eight to ten variables out of the twelve possible. On the other hand, while there are no complete misses, sixteen pairs agree on only one to three variables.

On another, more interesting level, two distinct groups of assemblages are evident in the matrix as clusters of high values. In both cases the groupings have good internal consistency, and even more significantly the two assemblage sets are clearly mutually exclusive. Specifically, internal consistency is evident in the fact that all possible assemblage pairs in a given cluster show relatively high scores. The exclusiveness of the two

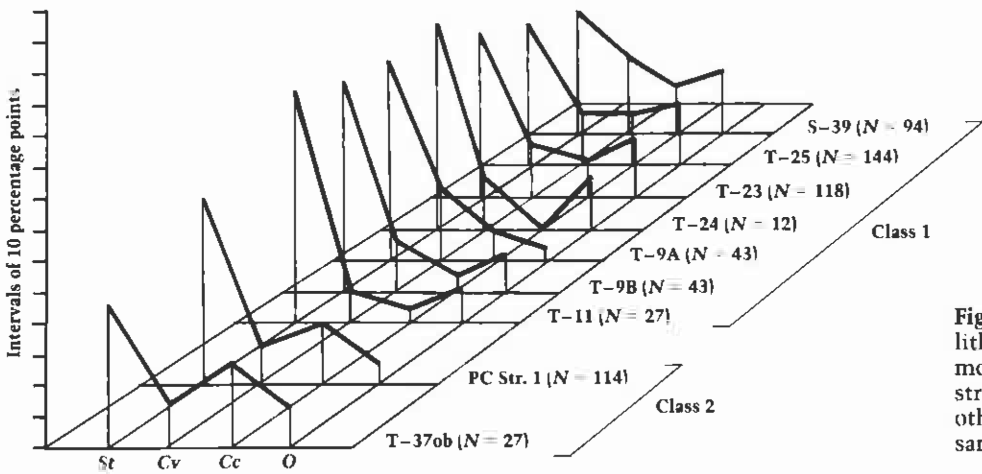

Figure 18.11. Comparison of Chalcatzingo lithic assemblages for Variable 11, edge-modified blades, working edge shapes: *St*, straight; *Cv*, convex; *Cc*, concave; *O*, other. T-37fea excluded because of small sample size.

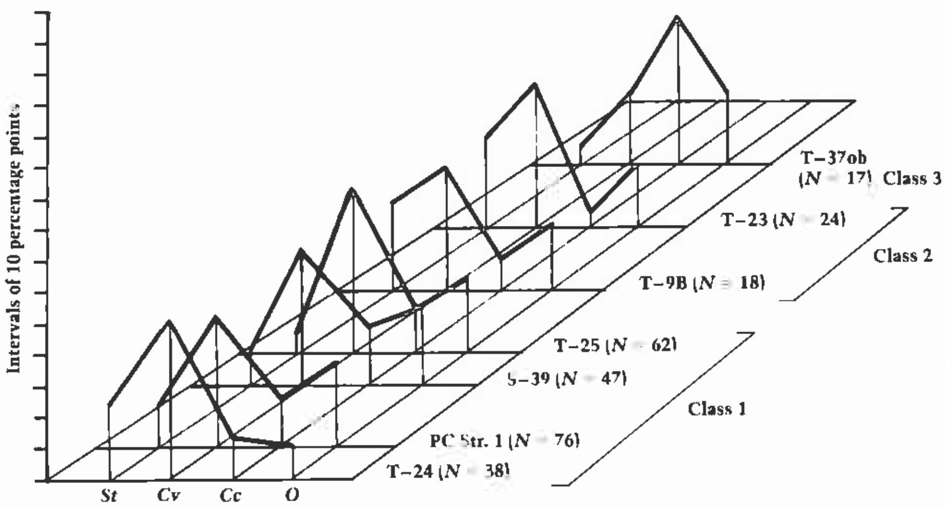

Figure 18.12.. Comparison of Chalcatzingo lithic assemblages for Variable 12, other edge-modified pieces (flakes, chunks, cores), working edge shapes: *St*, straight; *Cv*, convex; *Cc*, concave; *O*, other. T-9A, T-11, and T-37fea excluded because of small sample size.

groups is demonstrated by the fact that all assemblage pairs combining members of opposing groups have low scores.

These two groups of assemblages do not entirely correspond to the expected functional differentiation of lithic tool kits outlined at the start of this analysis. Both groups include common residential areas and more specialized loci. Group A consists of three residential samples (T-9A, T-9B, T-11) and the supposed ceremonial area (T-25), while Group B includes the elite residence (PC Str. 1), the blade workshop trash deposit (T-37ob), and a common residence (T-24).

Among the three assemblages which fall outside Groups A and B, the other domestic area, T-23, resembles all other assemblages on a moderate level (i.e., scores for all possible pairings range from 4 to 7) and thus holds an intermediate position between the two groups while tending slightly toward Group A. T-37fea also falls in a position between the groups but tends to have a greater affinity with Group B. The generally low scores for pairings with S-39 separate this assemblage out as the one real loner in the collection. The greatest affinities of S-39 are with T-25 and T-9B, both members of Group A, but there is very little similarity between S-39 and the other two members of that group.

	T-37ob	PC-1	T-24	T-37fea	T-23	T-25	T-9B	T-9A	T-11	S-39
T-37ob	2*	10	6	5	5	3	2	2	2	1
PC Str. 1	Group B	0*	8	6	6	5	3	3	3	3
T-24			3*	5	6	4	3	3	3	4
T-37fea				1*	6	3	4	5	5	3
T-23					0*	6	7	7	7	4
T-25						0*	8	7	7	6
T-9B						Group A	0*	8	8	5
T-9A								0*	10	3
T-11									0*	3
S-39										3*

Figure 18.13. Matrix summarizing the variable-by-variable comparison of the ten sample lithic assemblages. Each cell indicates the number of variables for which the two indicated assemblages fall into the same class. Cells along the lower diagonal (*) indicate the number of unique occurrences for each assemblage. The matrix is specifically arranged to maximize the clustering of high values. Clusters of high values are indicated as Groups A and B.

Discussion

The variable analysis shows that there is some diversity among the ten assemblages making up the sample. Although the expected pattern of functional differentiation is not entirely borne out, there is a tendency for the assemblages from common residential areas to be similar. Three of the five residential collections cluster in Group A, while a fourth (T-23) shares many features with this group. Among the residential loci, only T-24, which falls into Group B, has a distinctive assemblage.

As was expected, the specialized loci, with the exception of T-25, tend to differ from the common residential areas; however, they do not differ as strongly from each other as was expected. Somewhat surprisingly, PC Str. 1, T-37ob, and T-37fea are all quite similar to S-39, the only really distinctive assemblage from a specialized area. In order to better understand the functional variability suggested by the analysis, the results are reviewed here with emphasis placed on the similarities and differences between both assemblages and assemblage groups.

Beginning on the most general level, the ten analyzed assemblages tend to share a number of characteristics providing a background against which the individual collections can be viewed. These shared characteristics present a basic pattern dominated by rapidly produced, multifunctional items such as unmodified blades, simple utilized blades, and coarsely shaped tools. The nature of this underlying pattern suggests that the generalized tool kit expected for residential areas actually forms some part of every assemblage.

The specific characteristics shared by the majority of assemblages include such basic elements as raw material types and general assemblage composition as well as some of the more detailed attributes related to tool form. Although the relative proportions vary, both local chert and imported obsidian are present at all loci. The great bulk of the chert tends to be debitage with both edge-modified and shaped tools quite rare. Within the obsidian component, unmodified blades are a major element of almost all assemblages. Unmodified blades are best regarded as potential tools. They may, in fact, include (1) actual tools briefly utilized in a manner leaving no macroscopic evidence, (2) potentially usable tool blanks, or the least likely possibility, (3) discarded workshop waste unsuitable for tool use.

Several more detailed attributes related to tool form are also almost universally shared. The majority of these characteristics suggest that beyond initial blank production only very limited effort was put into tool manufacture and maintenance. Shaped tools, in either obsidian or chert, form an insignificant part of all assemblages. Among the shaped items that do occur, the dominant form tends to be coarsely shaped pieces which are not refined for any specialized function. Edge-modified blades are generally the most important tool class, but this is hardly unexpected, given the overall importance of blades in the collections in general. Among all edge-modified pieces (i.e., blades, flakes, chunks, cores) utilization is a good deal more important than retouching or grinding; however, the relative proportions of unifacial and bifacial edges are variable. Finally, several widely shared characteristics of the edge-modified tool samples are essentially direct expressions of basic tool blank morphology. Specifically, working edges of edge-modified blades tend to be straight and to be worked at low angles (30–55°). Conversely, working edges on flakes and other blanks tend to be convex, and to be worked at moderate angles (60–80°).

On a more specific level, the various traits typical of Group A and the related collection from T-23 seem to support and possibly even to amplify the tendency of all assemblages toward an unspecialized tool kit. Generally, these collections, which are largely from common residential loci, involve diversity in raw material and very limited variety in modified pieces.

Among the Group A assemblages, both raw material types tend to be of significance and in some cases are actually of equal importance (T-9A, T-11). Exceptions occur, however, with the bulk of both the T-23 (88 percent) and T-25 (92 percent) collections made up of obsidian. Dominance of obsidian is typical of the Group B assemblages.

The significance of the relative obsidian-chert proportions is open to more than one interpretation. Chert, which was available nearby, was a "cheaper" raw material; thus its presence in quantity may reflect a lower economic status for a particular area. On the other hand, a mix of obsidian and chert may simply result from a lesser need for the special tool blank characteristics of obsidian blades. Both of these factors may have been operative in the sense that if the more specialized product is also the more "expensive," then it probably will not be obtained unless its particular properties are needed. Although chert is significant in several Group A assemblages, it is largely present as debitage showing no macroscopic signs of utilization; therefore, its real functional importance is difficult to ascertain.

The modified portions of the Group A assemblages share certain interesting characteristics. In most cases edge-modified pieces and unmodified blades are of equal importance; however, T-23 is again the exception with blades much more numerous than edge-modified tools. Although other types of utilized pieces achieve a secondary significance in two of the assemblages (T-9B, T-25), the great bulk of edge-modified tools in the Group A collections consists of utilized blades. Bifacial working edges with low edge angles and edge shapes concomitant with basic blank morphology (i.e., straight for blades and convex for others) are additional attributes typical of Group A tool kits.

Shaped tools occur in such low numbers in most of the Group A samples (T-9A, T-9B, T-11) that the relative importance of the various defined types cannot be assessed. Coarsely shaped pieces are the dominant shaped tools in the T-23 and T-25 assemblages.

The characteristics outlined for the modified portion of the Group A assemblages provide a basis for several generalizations. The utilized tools, which are such an important feature of these assemblages, must be the result of fairly heavy, and possibly repeated, activity sufficient to produce clearly visible edge damage. The low angle bifacial edges indicate cutting as the primary tool function. In general there seems to have been little need for specially shaped working edges (retouched) or purposefully shaped tools.

The inclusion of the T-9B assemblage as a typical member of Group A is of particular interest since this sample from a Barranca phase house (T-9B Str. 1) was included in the analysis for comparative purposes. While this structure cannot be considered as definitely representative of Barranca phase non-elite residences at Chalcatzingo, the fact that it is not significantly different from the Cantera phase Group A structures in its lithic assemblage suggests that there may have been no major changes in household tool kits and use patterns during the Middle Formative at the site.

The strong association within Group A of the T-25 assemblage with materials from common residential loci also has interesting implications. When the T-25 sample was chosen for analysis, it was assumed to be reflective of activities which took place in a ceremonial precinct around the table-top altar, Monument 22. If this assumption is retained, then the activities involved apparently were much like those which took place in ordinary households (food preparation, maintenance of tools and household goods, and so on). Alternatively, the basic assumption of a direct association between the altar and the lithic collection may be invalid, and the assemblage may actually reflect activities at a residential locus. Prior to altar construction, T-25 was the location of a Barranca phase residence; later it was the site of a post-altar platform mound (T-25 Str. 2) which may have been the substructure for an elite residence. The long, complex occupational history of this terrace (see Chapter 7) makes functional evaluation of the lithic assemblage difficult.

The general impression given by the Group B assemblages is in large degree the opposite of that given by the residential collections of Group A. Specifically, raw material is less diverse while modified pieces show greater variability.

Obsidian is clearly the dominant raw material (over 80 percent) among Group B assemblages. The largest portion of this obsidian consists of unmodified blades, which greatly outweigh modified pieces in importance. This abundance of blades points to a probable need for the sharp cutting edges provided by such tool blanks. The little chert present in Group B collections again occurs largely in the form of simple debitage.

In the Group B assemblages, utilized blades do not hold the same dominant position they occupy in the modified portion of the Group A collections. Not only blades but also types of blanks other than blades (i.e., flakes, chunks, cores) are of some significance among edge-modified pieces, and shaped tools actually equal or surpass edge-modified blades in importance.

Although utilization is generally the most frequent working edge form on edge-modified tools, here again variability is greater than it is in Group A assemblages. Among working edge characteristics for edge-modified pieces, unifacial chipping is generally more important than bifacial, preference is for moderate rather than low edge angles, and edge shapes are again largely those dictated by basic blank morphology. Among the shaped tools there is a tendency for at least two categories (i.e., coarsely shaped pieces and either projectile points or unidentified shaped pieces) to be of importance in most assemblages, and in the case of T-24 all defined types are virtually equal in significance.

In general, the modified portion of the Group B collections suggests a greater emphasis on matching tool characteristics to a fairly wide variety of specific functions. Tools which have been extensively shaped to meet functional requirements (i.e., shaped modified pieces) are more numerous in these assemblages and occur in a greater variety of forms. Among edge-modified pieces, both the variety of blanks used and the mix of working edge types suggest that rather than utilize any readily available piece, people selected tool characteristics to meet specific functional needs.

PC Structure 1 can be described as having the most "normal" of the Group B assemblages. It fits well with both the general pattern for all assemblages and the specific pattern for Group B areas and does not appear to have any special distinguishing features. It does show a slightly greater proportion of concave edges on edge-modified pieces than is usual, but this does not really serve to set it apart. The variable analysis certainly did not highlight any unusual tool types or combination of attributes identifiable as possible elite items.

It is at least logically possible that the "average" character of the PC Structure 1 assemblage is the combined product of numerous burial offerings of lithic items associated with normal everyday activities; however, during excavation, lithic items were almost never noted as intentional grave goods. It seems much more likely that the lithic materials from the upper levels of the structure and adjacent trash deposit reflect a variety of activities which took place in this general portion of the Plaza Central. The characteristics which are part of the general pattern possibly relate to basic household tasks, while the greater specificity in tool function seen in this and other Group B areas presumably relates to the performance of more specialized tasks or crafts.

Because of the special nature of the deposit (see Chapter 19), the strong affinities of the T-37 obsidian concentration with the other Group B loci come as something of a surprise. Within the context of the variable analysis, T-37ob clearly shares in both the general pattern defined for all assemblages and the more specific pattern pertinent to the Group B assemblages; however, it also has certain unique characteristics.

The first characteristic unique to T-37ob is, of course, the basic feature which links the deposit with the manufacture of obsidian blades, or, specifically, the very significant proportion of workshop debitage in the assemblage. This particular type of debitage occurs throughout the site, but only in this sample collection is it more than an extremely minor element.

The second unique feature of the T-37ob assemblage is an unusual frequency of concave edges on both edge-modified blades and other edge-modified blanks. This edge shape suggests possible wood- or bone-working activities, and it is intriguing, if highly speculative, to see a possible link between this and preparation of the pressure tools and clamps required for blade manufacture.

The remarkable density of the T-37ob deposit is another unique characteristic of this assemblage but one which is really not considered within the context of the variable analysis. Since the analysis focuses only on the relative proportions of materials within individual assemblages, it does not provide information on variability in the overall density of artifacts. Comparisons on this level are certainly of possible interest, but unfortunately the necessary data were not recorded for all sampled loci.

T-24 is the only common residential locus included in Group B. Its assemblage shares in the general pattern and in the pattern specific to Group B areas but also exhibits several unique characteristics. All these unusual features involve the modified portion of the assemblage. First, this is the only collection in which both edge-modified tools on non-blade blanks and shaped tools are more numerous than edge-modified blades. Second, retouching, rather than utilization, is the dominant working edge type on the unusually abundant edge-modified tools on non-blade blanks. Third, all seven of the shaped tool categories are significant.

The emphasis in the T-24 assemblage on retouched edges and on a diversity of shaped tools seems to be an extension of the greater specificity in tool function seen to some degree in Group B assemblages in general. The apparent importance of edge and overall tool shaping and the unusual variety among the shaped tools may actually point to T-24 as a specialized locus of tool manufacture.

Like the T-23 sample, the T-37fea assemblage falls in an intermediate position between Groups A and B. The T-37fea collection is small and as a result rather difficult to evaluate. Because of its inadequate size, it was not included in the analysis of several variables. It appears to share in the general pattern for all assemblages and in part in the pattern specific to Group B. However, lack of data on certain aspects of the modified portion of the collection (i.e., shaped tools and edge shapes for edge-modified pieces) makes it impossible to establish whether or not the tendency of Group B assemblages toward more specialized tool forms is actually present here.

In the summary matrix, the S-39 collection displays such an unusual combination of characteristics that it appears not to belong with any of the other analyzed samples. Closer inspection indicates, however, that its special situation is largely an artifact of analytical procedures rather than a true characteristic of the assemblage.

The S-39 sample includes a remarkable abundance of one particular lithic item which presumably reflects a special activity peculiar to that locus. This unique item, a kind of tool (edge-modified piece with ground working edges) influences the evaluation of several variables, and as a result, its importance in the overall analysis is somewhat inflated. Specifically, it appears not only as an unusual abundance of ground edges (i.e., nearly half of the working edges on edge-modified blades and a third of those on other tool blanks) but also as an unusual frequency of tools in general.

The ground edges which are such an important feature of the S-39 assemblage appear to be a direct product of tool utilization. In some cases, use chipping is partially smoothed over by subsequent grinding, but in many instances raw blade and flake edges have simply been ground down through use. The sharp corners of blade sections as well as their edges are often ground as a result of having been drawn across an abrasive surface. The probable source of these ground working edges, incising or engraving activities, could be related to the ceramic manufacturing believed to have taken place in this area (see Chapter 16).

If edge-modified pieces with ground working edges are set aside and the remainder of the S-39 assemblage examined, the results conform with the general pattern for all assemblages and show a mix of the more specific patterns for Groups A and B. As in most Group A areas, the raw materials used at S-39 include a significant proportion of chert, primarily in the form of debitage. Also as in these collections, modified pieces and unmodified blades are of equal significance in the obsidian portion of the assemblage. As in Group B areas, on the other hand, within the modified portion of the collection edge-modified blades, edge-modified pieces on other blanks, and shaped tools are equal in importance. Specific tool characteristics show a mix of Group A and B traits. Among the edge-modified pieces bifacial and unifacial chipping occur at about the same frequency, low angle working edges are the most common form, and edge shapes tend to conform with basic blank morphology. Coarsely shaped pieces are the only important shaped tool category.

Detailed evaluation of the S-39 assemblage thus suggests that, like the Group B loci, this area supported normal household tasks as well as some sort of specialized craft activity. This area differs from the other specialized loci in that its special function is reflected in the abundance of a single unique tool type, edge-ground pieces. Elsewhere, specialized activities are reflected in an overall tendency toward a greater variety of tools chosen or prepared to meet specific functional requirements.

Conclusions

On the basis of the foregoing discussion, it is evident that the preliminary functional interpretations for the ten sample areas are generally supported by the variable analysis. As was expected, the common residential areas and the specialized areas tend to separate into distinct groups with definite indications of general-purpose tool kits at the former and more specialized tool kits at the latter. In two cases a functional re-evaluation is indicated by the analytical results. The supposed specialized assemblage from T-25 actually seems to reflect ordinary household activities while the collection from T-24 is more specialized than expected for a non-elite residence.

Although the general dichotomy between common residential and specialized loci is supported, the more detailed expectations outlined at the beginning of the analysis are not entirely in accord with the final results. The general-purpose character of common residential tool kits was expected to be manifested in a variety of unspecialized tools occurring in small quantities accompanied by moderate quantities of debitage. The actual analytical results indicate that debitage in moderate quantities is present in virtually all the assemblages and, thus, is not a distinguishing feature of residential collections. In addition, instead of a variety of simple tools, the residential assemblages are dominated by a single generalized tool type, the bifacial utilized blade.

In opposition to the diversity proposed for residential assemblages, it was expected that the specialized collections would be much more restricted. These loci were envisioned as special-activity areas devoted to a single task or a closely related group of tasks. Such specialized activities were expected to call for only a small variety of lithic items, and at least some of these items were expected to be selected and/or prepared to meet very specific functional requirements.

The actual analytical results again seem to be the reverse of those expected. Generally, the specialized assemblages share a basic generalized tool kit much like that of the residential loci, but in addition to this, they share a certain emphasis on a variety of slightly more complex prepared working edges and/or tools. The expected tendency toward tool specialization is, thus, present, but the proposed emphasis on a strictly limited variety of tools is not. The S-39 assemblage with its one abundant unique tool type is actually the only collection which approximates the highly restricted special-activity-area tool kit outlined in the original expectations.

In general, although the basic functional dichotomy proposed prior to analysis is supported by the results, the more detailed tool kit expectations appear to provide an inaccurate model. Specialized loci apparently supported activities requiring more specialized tools than did common residential areas. However, these loci also supported activities much like those typical of ordinary household areas. Thus, the original model of intense, localized specialization occurring to the exclusion of all other activities is not supported.

To conclude briefly, detailed examination of the sample assemblages has revealed variability in the chipped stone collection with significance for general problems concerning site structure. Preliminary functional interpretations of specific loci have been either confirmed or revised, and for some loci suggestions relating to the specific activities involved have been advanced. The lack of evidence for intense localized craft activities carried out in isolation from more generalized household tasks suggests that full-time specialization, at least as evidenced by lithic tools, was not a feature of the late Middle Formative economic organization at Chalcatzingo.

RESUMEN DEL CAPÍTULO 18

Con objeto de obtener la información descriptiva básica y explorar la variación dentro del sitio de las actividades asociadas con las herramientas de piedra se emprendió el análisis de las esquirlas de artefactos de piedra. Se formó una muestra de artefactos intencionada (no al azar), proveniente de las áreas de los pisos de las casas elíticas y no elíticas de las residencias Barranca y Cantera, así como de algunas áreas más especializadas, tales como el altar T-25, la concentración de obsidiana en T-37, y el posible centro de manufactura de cerámica en S-39. El muestreo así reunido se clasificó de acuerdo con el material empleado (obsidiana o cuarzo), y después se dividió en clases morfológicas. También se hicieron las observaciones correspondientes a las características de la forma de trabajo de los filos.

El material lítico predominante es la obsidiana gris, y el producto principal del trabajo de la obsidiana son las hojas prismáticas, las cuales ocurren en cantidades importantes en todas las áreas donde se llevó al cabo el muestreo y fueron usadas como herramientas y como bases para hacer herramientas modificadas. La pedacería, herramientas, y centros de cuarzo también ocurren en todas las áreas de muestreo, pero en mucho menor cantidad.

Se espera que diferentes actividades requieran una variedad de herramientas de piedra para labrar, y que la distribución de los tipos de herramienta, a través del sitio, refleje las actividades realizadas. Las actividades relacionadas con el mantenimiento general de una casa habitación se presume necesitaban de un surtido de piedra que se caracteriza por la diversidad, con énfasis en las herramientas de uso general, una moderada cantidad de pedacería sobrante. Las actividades más especializadas, por otra parte, tales como la manufactura o las demostraciones público-rituales, pudieron caracterizarse por su surtido más reducido, con énfasis en las herramientas de utilidad especial, y restos sobrantes ya sean abun-

dantes o escasos, de acuerdo con la actividad de cada caso.

Estas situaciones ideales que conciernen a las herramientas asociadas a las áreas de actividad residencial común en oposición a las de actividad especial, se aplicaron al análisis comparativo de los artefactos al través del sitio. Se utilizaron doce variables como base para comparar las diferentes áreas de donde se obtuvo la muestra lítica, habiéndose comparado variable por variable en cada muestreo, se sumaron después todas en la forma de una matriz. Aun cuando existe bastante variabilidad entre los muestreos provenientes de cada terraza, la matriz revela la existencia de dos grupos distintos cuyas variables líticas parecen aglutinarse. Resulta de interés, el hecho de que los dos grupos de muestreo no correspondan completamente con las situaciones ideales propuestas para oponer los juegos de herramientas de residencia común a los de función especial, y el que ambos grupos incluyan los esperados restos residenciales y de lugares especializados.

El grupo A consiste en tres muestreos residenciales (T-9A, T-9B, T-11) y la supuesta área ceremonial (T-25). Estas colecciones líticas reflejan generalmente la existencia de un juego de herramientas no especializado, y presentan pocos ejemplos de herramientas con filo hecho a propósito o con los filos de trabajo retocados. El cuarzo constituye una materia prima de importancia además de la obsidiana. T-9B es una residencia de la fase Barranca, y el hecho de haberse incluido en el grupo A sugiere que haya habido poco o ningún cambio en los juegos de herramientas generales entre las fases Cantera y Barranca.

El grupo B está compuesto por la residencia elítica (PC Str. 1), el depósito de basura del taller de hojas en T-37, y una residencia común en T-24. Este grupo se caracteriza por mostrar menos diversidad en las materias primas, con el cuarzo casi ausente, y una mayor diversidad en las herramientas modificadas. Parece ser que aquí se dio mayor énfasis a emparejar las características de la herramienta con una aceptable variedad de funciones específicas. Aun cuando S-39 no cae dentro del grupo B, también parece ser un área que incluía las actividades normales de una unidad habitacional al mismo tiempo que alguna clase de actividades de trabajo especializado.

Aun cuando la situación esperada de que los juegos de herramientas se separen claramente en dos grupos, generales y especializados, a través de todo el sitio parece comprobarse, el hecho de asignar áreas a priori a uno de los dos grupos resultó ser falso en algunos casos, y no todas las situaciones específicas esperadas pudieron ser comprobadas. La pedacería de desecho se encuentra presente, en cantidades moderadas, en cada uno de las muestras ensambladas por lo que no resultó ser un rasgo distintivo de uno u otro juego de herramientas. Las muestras residenciales no se caracterizan por una diversidad de herramientas sino por la existencia de un solo tipo de herramienta de uso general, la hoja bifacial utilitaria. Al revés, las actividades especializadas que se presumía necesitaran tipos de herramienta más restringidos resultaron tener mayor diversidad que la esperada, mostrando una variedad de filos de trabajo preparados con mayor complejidad. Finalmente, el modelo original de que el localizar la especialización intensiva trajera consigo la exclusión de las otras actividades, más generales, correspondientes a las de unidad habitacional no fue confirmado por los datos.