

THE OBSIDIAN INDUSTRY OF TEOTIHUACÁN

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ABSTRACT

Several areas with extensive obsidian-working debris on the surface have been found in Teotihuacán. These date from the Late Preclassic, Classic, and Postclassic periods. During the Late Preclassic and Classic periods there seems to have been a continuous expansion of the city's obsidian industry, accompanied by an increasing trend toward specialization in certain of its aspects. It is probable that the introduction of some new markets, for example the Mayan area, into the Teotihuacán economy was one factor involved in this expansion. Another probable factor was the growth of population within the Valley of Teotihuacán itself, which in these periods depended upon the city's workshops for its supply of obsidian.

TO DATE, some 150 sites in the ancient city of Teotihuacán, in the Valley of Mexico, have produced an unusually heavy obsidian cover. Many of these obsidian sites are clustered in groups, while others are isolated. Due to time and the preliminary nature of the obsidian typology, many of the obsidian sites have not yet been satisfactorily studied. Only those that are better known will be discussed here. Even these require more extensive examination, so the conclusions presented in this paper must be considered highly tentative.

Preliminary determination of when a given obsidian area was used for obsidian working is based on the dating suggested by surface ceramics, by comparison of the obsidian artifact forms with published and unpublished sources, and in some cases by ceramics recovered from floors partially destroyed by looters and erosion. Within any one obsidian area it is difficult, sometimes impossible, to say which sites actually contained workshops and which merely represent obsidian-working debris carried from elsewhere by erosion or by post-workshop occupants as fill for construction. The level of the terrain, the amount and nature of erosion, and the proportions and distributions of obsidian debris and structural evidence must all be carefully considered. In most of the areas to be discussed below, the number and location of actual workshop sites within an obsidian area can only be suggested.

It is hoped eventually to produce a typology of the city's obsidian, perhaps adapted to a suitable existing typology, and to produce a reasonably complete picture of the obsidian industry — of its expansion and the factors possibly

responsible for this expansion; of the intensity and nature of specialization *within* the industry; insofar as possible, of the identity of, and social and economic relationships through time among, those who obtained the material, those who worked it, and those who used the products. Thus sources, workshops, and markets will be studied and interrelated as thoroughly as possible. Also, some information may be obtained on the social relationships among those involved in obsidian production, and on their relative status in the social system of the city as a whole.

The obsidian areas are discussed below in chronological order. Their sizes and locations are noted, and some of the typical artifacts found in each are presented. These artifacts, in all cases except that of the square base knife, are not diagnostic of any one area or phase within the ancient city. They are here associated with a particular area or areas because they seem to be most common there and, consequently, in the time period that area or those areas seem to represent. Some of these artifact forms, however, extend, in lower proportions, through much or all of the city's history.

DATA

Obsidian area No. 1 has been well dated to the Tzacualli phase (Teotihuacán I, IA) by surface ceramics, by artifact types, and by some material recovered from a partially destroyed floor. It is very near the north-central edge of Tzacualli phase Teotihuacán and consists of 10 obsidian sites (Fig. 1, No. 1). There seem to have been at least three actual workshop sites within the area. Each site reveals the full range of items — blades, scrapers, knives, projectile points, etc. However, no zoomorphic eccentrics were found. This, plus their absence in the tunnels of the Sun Pyramid, suggests that these forms are post-Tzacualli. The material used in the Tzacualli area is almost entirely grey obsidian. Even the polyhedral core blades (as opposed to the cruder flake blades) show a proportion of about 70% grey obsidian to 30% green obsidian.

One typical item in this area is a knife characterized by a pointed base and varying in width from 33 to 50 mm. (Fig. 2 *a-b*). It forms about 16% of the total knives from this area.

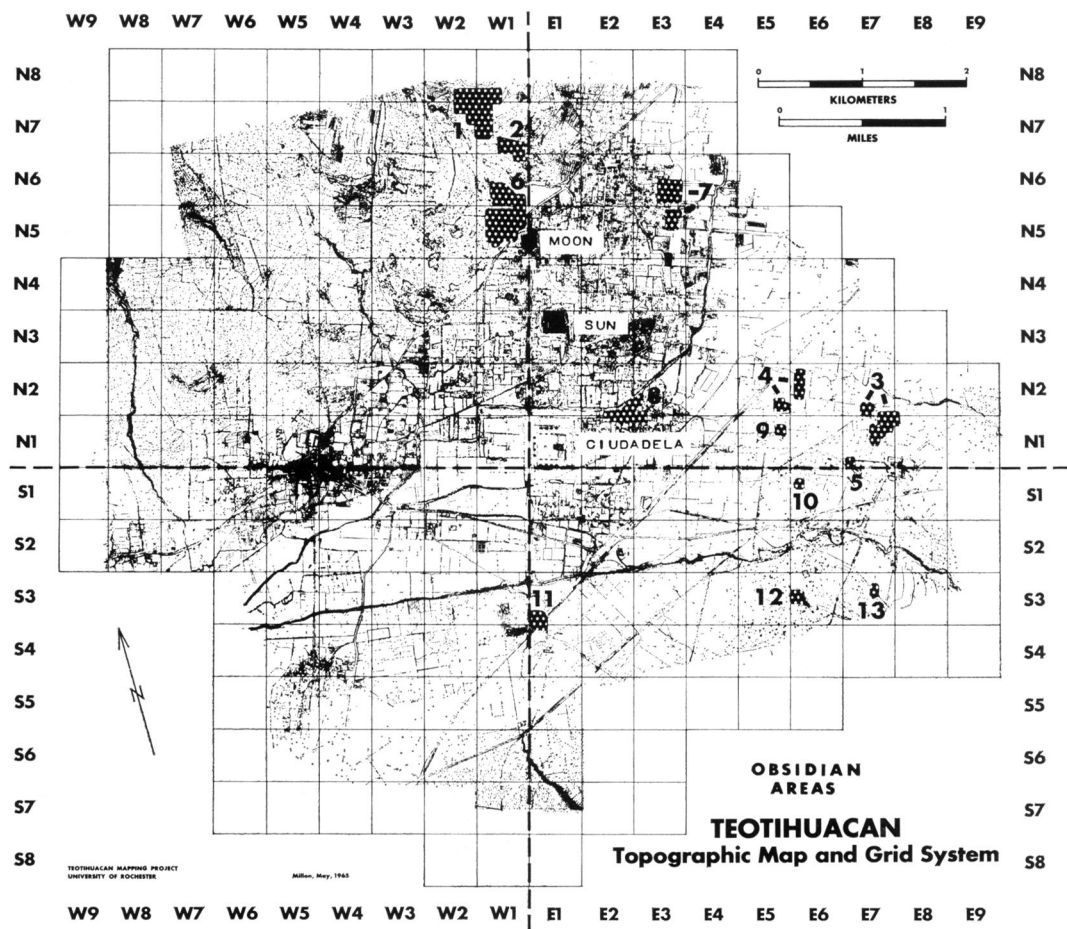


FIG. 1. Distribution of obsidian sites in Teotihuacán.

Another frequent item is a relatively narrow knife or drill with parallel or slightly contracting sides and a straight to convex base (Fig. 2 *h-j*). It has a lenticular cross section and ranges in width from 10 to 28 mm. The chipping varies from fine to relatively crude. Also common in the Tzacualli area is a small end scraper, 26 to 50 mm. long, with a handle which sometimes shades into, and at other times is clearly distinguished from, the head (Fig. 3 *a-b*). In general form these resemble what have been called "maguey scrapers," but their small size would make them rather inefficient as such.

Two projectile point forms are commonly found in the Tzacualli area. One is a diamond-shaped point, often thick and crudely worked (Fig. 3 *e-f*). Muller places it in her type 1 (Muller 1965). The present writer's data suggest that,

though it might well have a long history, it was most common within the ancient city in the Tzacualli phase. Another common Tzacualli projectile point form is a short, broad point with straight to barbed shoulders and a wide, round-based, and relatively short stem (Fig. 3 *c-d*). Muller places this form in her type 6, and dates it as strong in Late Tzacualli and as lasting into the Tlamimilolpa phase (Muller 1965). A number of specimens are known from the Sun Pyramid (Noguera 1935, Lam XXII, row 1, No. 8; row 2, No. 8; row 3, Nos. 1-3).

Finally, one anthropomorphic obsidian figurine is known from the Tzacualli phase. It was discovered during recent excavations in the Sun Pyramid. As pointed out by its discoverers, it differs from later specimens in some details (Millon, Drewitt, and Bennyhoff 1965: 24, 26,

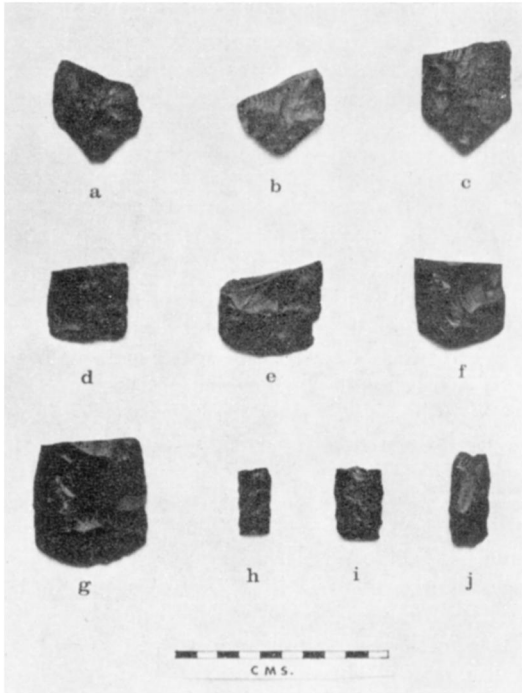


FIG. 2. Knives and narrow knives or drills from Teotihuacán obsidian sites. Scale in cm.

Fig. 93). The Tzacualli figurine has a less angular form about the shoulders and thighs, and rather short arms separated in part from the trunk.

The next obsidian area is just slightly south-east of the Tzacualli area, separated from it by a small zone lacking a good obsidian cover (Fig. 1, No. 2). It has only recently been discovered and has not as yet been satisfactorily studied. To date, it seems to consist of seven sites, at least one of which was a workshop. The preliminary examination of the obsidian artifacts and surface ceramics suggests that the area was used for obsidian working early in the Miccaotli phase (Teotihuacán II). It is on the north edge of the Miccaotli city. Smaller and poorer than the Tzacualli area, it was probably relatively short-lived.

Again, grey obsidian forms the great majority of non-blade material (points, knives, scrapers, etc.), although the proportion of green obsidian in core blades has risen to 60%. The narrow knife or drill commonly found in the Tzacualli area continues, though it is less frequent. It is, though, a common feature of the Miccaotli ofrenda in the Adosada of the Sun Pyramid

(Noguera 1935, Lam. XXIV, row 1; Millon, Drewitt, and Bennyhoff 1965, Fig. 94, row 1). The pointed-base knife of Tzacualli seems to drop sharply in frequency, and zoomorphic eccentrics appear. An unfinished "serpent" eccentric from this area (Fig. 3 g) closely resembles those of the Miccaotli phase ofrendas in the Adosada of the Sun Pyramid (Noguera 1935, Lam XXIV, bottom two rows; Millon, Drewitt, and Bennyhoff 1965, Fig. 94, bottom two rows) and in Ofrenda 1 of the structure called "Quetzalcoatl Viejo" (Borbolla 1947: 69, Fig. 9, row 3). Also found in area No. 2 was a thick disk of grey obsidian (Fig. 3 h) like that from the Adosada of the Sun Pyramid (Noguera 1935, Lam XXIII, row 1, far right). A new projectile point form appears, a corner-notched point of somewhat variable form, which becomes more common in areas 3 and 4.

Two obsidian areas appear on the east edge of the Miccaotli phase city, and they seem to date from the latter part of the Miccaotli phase, towards the end of the Preclassic period. One

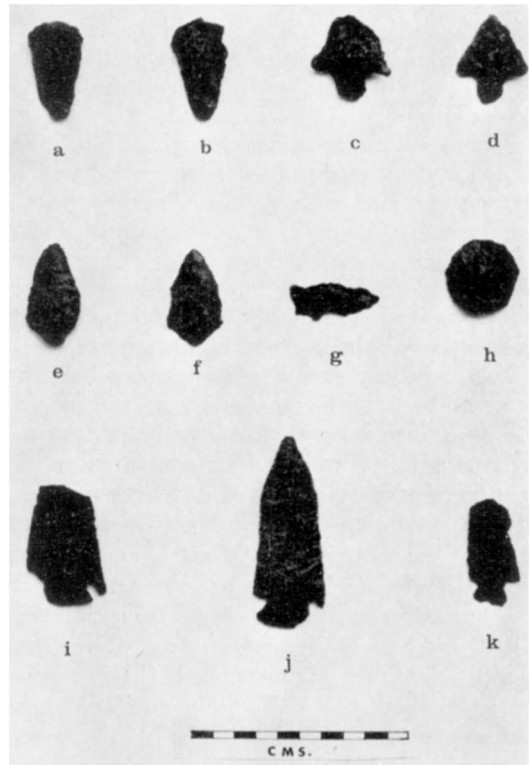


FIG. 3. Scrapers, projectile points, serpent eccentric, and disk from Teotihuacán obsidian sites. Scale in cm.

is a single large area (Fig. 1, No. 3) consisting of 12 sites, of which 3 give evidence of being workshops. The other area (Fig. 1, No. 4) includes two small sections, separated only by 90 m., and appears to consist of two sites, one of which was a workshop, in each section. In comparison with the earlier Miccaotli phase area, these two areas have a denser obsidian cover and a larger number of sites, suggesting longer or more intensive use.

Though grey obsidian was still used for the great majority of knives, points, and scrapers, some 83% of the core blades were now made of green obsidian. A new knife form appears, marked by a straight to slightly convex base (Fig. 2 *d-g*). The width ranges from 37 to 45 mm. This knife form seems restricted within the ancient city to these two areas, and thus to the latter part of the Miccaotli phase. It forms 69% of the knives from these two areas. The corner-notched points, which first appeared in area no. 2, seem to increase in frequency (Fig. 3 *i-k*). Tolstoy places corner-notched points largely in the Late Preclassic period, which agrees well with the evidence from the city (Tolstoy 1961: 16). A number of the examples from areas 3 and 4 are characterized by relatively long blades, deep corner notches, and convex bases (Fig. 3 *i-j*), and are similar to the Marcos type (Tolstoy 1961: 16, Fig. 2, *p*).

About 290 m. southwest of the edge of area No. 3 is a single site of the same period which, though yielding a few knives and projectile points, shows a very high proportion of blades (Fig. 1, No. 5). This is the first sign of specialization *within* the obsidian industry. The evidence, while scanty, suggests that, in the latter part of the Miccaotli phase, some craftsmen separated from the larger areas and concentrated on the production of cores and blades.

The following areas, to judge by surface ceramics, artifact forms, and some material recovered from partially destroyed floors, seem largely to have begun to be used as obsidian-working areas in the Tlamimilolpa phase (Teotihuacán II A, II A-III). Many seem to have continued as such into the Xolalpan phase (Teotihuacán III, III A) and possibly even to the fall of the ancient city in the Metepec phase (Teotihuacán IV). To date, it is difficult in many of these areas to separate the obsidian by phases, so the areas will here be discussed together.

Area No. 6 is a large one, consisting of 28 sites divided into 2 sections, just northwest of the

Moon Pyramid (Fig. 1, No. 6). In the south section there are 19 sites. Six of these, located in an almost flat area, were possibly workshops. This flat area seems to have been a zone without structures between a long east-west wall to the northwest of the Moon Pyramid and another wall directly north of Group 5¹. The majority of sites in the south section yield all classes of implements, although two of the possible workshop sites lack blades.

The north section, partially set off by a narrow zone with a much lighter obsidian cover, includes nine sites. Two of these seem to have been workshops. This northern section produced only blades, thus strongly suggesting an intensification of the division which began in the latter part of the Miccaotli phase.

Area No. 7 consists of six sites in two sections at the northeast edge of the Tlamimilolpa phase city (Fig. 1, No. 7). The density of obsidian in the larger section, which includes four sites, suggests the presence of at least one workshop. There was possibly another in the northern part of the nearby smaller section. The area as a whole yielded the full range of obsidian implements.

Another large obsidian area, apparently used in the Tlamimilolpa phase and later, is strung out along the south side of the barranca of the Río San Juan (Fig. 1, No. 8). It seems to be just outside a complex of structures and plazas to the northeast of, and probably associated with, the Ciudadela. There are, to date, 23 sites in the area, of which at least 5 seem to have been workshops. Most of the sites show no signs of specialization. However, two of the possible workshops yielded blades, almost entirely. These blade sites are separated from each other and seem to have both been integral parts of the area as a whole; that is, they do not seem to have formed a separate section as in area No. 6.

A single site, more than a kilometer to the east of area No. 8 and probably of the Tlamimilolpa phase, to judge by the surface ceramics, yielded a larger number of waterworn nodules of grey obsidian (Fig. 1, No. 9). Perhaps it was a raw material source for other Tlamimilolpa phase workshops, as well as being a workshop itself. Another single site, a workshop, is on the east edge of the Tlamimilolpa phase city (Fig. 1, No. 10). It yielded the full range of obsidian products. The final area discovered to date, which apparently began to be used during the Tlamimilolpa phase, is in the southern part of

the city, on the east side of the "Street of the Dead" and possibly oriented commercially to traffic on the Street (Fig. 1, No. 11). It includes three sites, one of which seems to have been a workshop. The material recovered consists almost entirely of blades.

Two partially destroyed floors in area No. 6 yielded a large amount of material which can reasonably be considered to belong to the Tlamimilolpa phase, with little or no later mixture. Thus some data seem to exist for the Tlamimilolpa phase obsidian, as opposed to mixed or later collections. About 84% of the Tlamimilolpa core blades are made of green obsidian. This is almost the same proportion as in the latter part of the Miccaotli phase. Now, however, a significantly greater, though still minor, proportion of knives, points, and scrapers are also made of green obsidian. This, plus the greater number of obsidian sites (most of the 62 post-Miccaotli phase sites mentioned above seem to have workshop debris from the Tlamimilolpa phase), suggests that an increased supply of green obsidian was available in the Tlamimilolpa phase, with the additional green obsidian being funneled into knife, point, and scraper production.

The square base knife of the latter part of the Miccaotli phase does not appear in Tlamimilolpa and later collections. A very frequent item, however, is a large pointed-base knife (Fig. 2 c). In width, it ranges from 34 to 49 mm. Its dimensions and form, beyond the base, suggest that it is a functional replacement for the square base knife. This is supported by the fact that it forms 70% of the knives in Tlamimilolpa collections, while the square base knife formed 69% of the knives in collections from the latter part of the Miccaotli phase. Without large samples it is very difficult to distinguish the Tlamimilolpa phase specimens from the Tzacualli phase pointed-base knives.

Early Postclassic obsidian sites are as yet unidentified in the city. There are three Aztec obsidian sites, probably all workshops, in the southeast part of the city (Fig. 1, Nos. 12, 13). All were evidently specialized in blade production, and only green obsidian was used. The cores are large and usually have the dull granular striking platform (ground?) noted by Tolstoy as characteristic of Postclassic period cores (Tolstoy 1961: 7). It should be noted here that many of the Aztec points from the city (though not from workshop sites) are similar to the Har-

rell and Texcoco types (Tolstoy 1961: 19, Fig. 3 o, p); they are, for the most part, of grey obsidian. This is perhaps because of the proximity of Aztec mines of grey obsidian in the Otumba area, at the eastern end of the Valley of Teotihuacán (cf. Sanders 1965: 190).

SUMMARY AND CONCLUSIONS

By the end of the Tzacualli phase (Teotihuacán I A), specialization in obsidian working seems to have been well developed. The industry at this time has a number of distinctive characteristics. A large proportion of the blades, and almost all other implements, are of grey obsidian. Also, most of the blades are the comparatively crude flake blades, rather than the finer core blades. Diamond-shaped points and short, wide, stemmed points are common, as are the narrow knives or drills and the small-handled end scrapers. There is, compared to later assemblages, a dearth of ceremonial and decorative items.

The industry in the Miccaotli phase retains a number of these features. The narrow knives or drills, for example, continue. Most of the knives, projectile points, and scrapers are still of grey obsidian. A number of aspects, however, show change toward the city's Classic period assemblage. For example, there is a developing specialization in core-blade production and, probably as a result, a higher proportion of core to flake blades. Also, more green obsidian is used in blade production (though grey obsidian sources are closer to Teotihuacán, green obsidian is easier to work and thus may have been considered more desirable). There is a higher proportion of nonutilitarian items, of ceremonial and decorative objects—eccentrics, figurines, and sequins (pierced small thin disks, possibly for adornment), among others.

The Tlamimilolpa phase assemblage is characterized by a sharp drop in some of the earlier projectile point forms, and the introduction or increase of other point forms. There is a higher proportion of core to flake blades (cf. Tolstoy 1961, Table 1), probably because specialization in blade production had become strongly entrenched. Green obsidian was used not only for most blades, but also for a significant, though still minor, proportion of the knives, projectile points, and scrapers. Ceremonial and decorative objects are comparatively more common.

Several of these changes in the city's obsidian industry from the Preclassic to the Classic pe-

riod are probably functions of the expanding size and influence of the city. The increasing proportion of core blades, as previously stated, is probably the result of increasing specialization in blade production, which in turn might be a response to the growing size and demands of markets for blades. The increasing use of green obsidian might be a result of the growing trade of Teotihuacán, or even of increased control over the sources used.

It is quite possible that a number of the criteria differentiating Preclassic from Classic period obsidian assemblages within the city will prove to have a wider validity. Some forms characteristic of Preclassic period Teotihuacán are found in Preclassic period contexts beyond the Valley of Teotihuacán. The diamond-shaped points and the short, broad, stemmed points of the Tzacualli phase appear also at Tlatilco, for example (Lorenzo 1965, Fig. 24, 33), while the Marcos-like point of Miccaotli occurs also at Tlapacoya and Ticoman (Tolstoy 1961: 16, Table 2 ff. 14; Vaillant 1931, Pl. 86, row 3, Nos. 9-10). The present writer recently examined, near Tulancingo, an obsidian workshop of an as yet uncertain date where square base knives and corner-notched points, like those of the late Miccaotli phase Teotihuacán workshops, were present.

Certainly in the periods when the city's workshops were supplying all of the Valley of Teotihuacán with obsidian (Late Preclassic and Classic periods?), the obsidian found in other parts of the Valley of Teotihuacán will reflect that worked in the city itself. The extensive trade and other contacts that characterize part of Teotihuacán's history might even have resulted in extension, beyond the Valley of Mexico, of some characteristic aspects of the city's obsidian assemblages. It might thus be possible to define assemblages and mannerisms characteristic of the Preclassic versus the Classic period obsidian industry within the city, to equate these with economic and social conditions there during these periods, and to identify some of these characteristic customs beyond the city, thereby allowing a general characterization of Preclassic versus Classic period obsidian assemblages for a considerably wider area. The presence of such characteristic customs in the wider area would probably be due to the diffusion of ideas and material from the city itself, rather than to the presence of similar economic and social conditions beyond the city causing a parallel but

independent development of the obsidian industry.

All of the city's green obsidian, from the Tzacualli phase on, shows natural rather than waterworn surfaces. It must thus have been mined or collected from natural sources, rather than collected from watercourses. Heizer has identified Pachuca green obsidian in Teotihuacán, though the time period of the sample is not stated (Heizer, Williams, and Graham 1965: 96). It is quite possible that the Pachuca area was the source for green obsidian throughout the city's history, though much more investigation will be necessary to establish this. In Aztec times, as Holmes (1900: 416) has indicated, the mines around the Cerro de las Navajas, in the state of Hidalgo, produced some of the green obsidian used by the Aztecs. Dr. Jeffrey Parsons, of the University of Michigan, and the present writer recently visited this area and found evidence of extensive Aztec mining operations, probably the same ones that Holmes reported. A Classic period sherd was also found in the refuse of one of these mines. This, plus the presence of some Classic period sherds of Teotihuacán style on a few nearby workshops, suggests that the obsidian deposits of this area might have supplied part of Teotihuacán's green obsidian. Another possible source for mined green obsidian used by the city is near Tulancingo, where Muller found mines with ceramics of the Huapalcalco period, a Classic period phase showing extensive Teotihuacán influence (Muller 1957: 134).

The Tzacualli phase grey obsidian seems to have been largely in the form of waterworn nodules, though there are some natural surfaces too. In the Miccaotli and later phases there are many natural surfaces, suggesting more extensive mining or source-collecting operations. Waterworn material, however, was still frequently used, as seen by the large number of nodules on the Tlamimilolpa phase site mentioned above (Fig. 1, No. 9). In the Barranca de Ixtetes, in the eastern part of the Valley of Teotihuacán, between Otumba and Axapusco, a large number of waterworn nodules are eroding out of a layer exposed in the barranca side. The nearby fields are covered by nodules, but they show no evidence of construction or workshop activity. Ceramics found there suggest that the area was known to, and probably collected by, people who made pottery of the Tlamimilolpa, Xolalpan, Mazapán, and Aztec phases.

Another nodule source for the city might have been, as Holmes suggests, the Río San Juan within the ancient city (Holmes 1900: 406–07). The Otumba area reveals natural grey obsidian in a number of places and seems a likely location for Teotihuacán mining operations, but as yet there is no evidence of Preclassic or Classic period mining there.

The city's obsidian industry seems to have grown quickly. The 10 Tzacualli phase obsidian sites increase to 24 in the Miccaotli phase (adding areas No. 2, 3, and 4). To date, 62 Classic period sites are known, and probably over 50 of these were in use as obsidian-working areas in the Tlamimilolpa phase. No workshops of the Preclassic or Classic periods have been found elsewhere in the Valley of Teotihuacán (W. T. Sanders, personal communication). The city's obsidian industry, from the Tzacualli phase to the fall of the city, probably had not only Teotihuacán itself but also the entire Valley of Teotihuacán as a market for its products. The city itself, however, would have been the primary market, because in this timespan most of the Valley's population was concentrated in the city (Sanders 1965: 101–02, 120–1). Nodules and cores, and even occasional unfinished knives and points, are found on sites that show no other signs of working, suggesting that many people could, and sometimes did, produce blades and possibly some other objects for their own consumption. Most of the implements used, however, must have come from the city's workshops. As the city's population expanded, so did the obsidian industry.

The large number of workshops of Tlamimilolpa and later phases, however, seems disproportionate to the needs of the local market. Available evidence does not suggest that the population increased this much from the Miccaotli to the Tlamimilolpa phases (Millon 1966a). It is possible that more distant markets opened, increasing the demand for, and thus stimulating the production of, obsidian. Heizer has recently identified Pachuca green obsidian in Kaminaljuyu (Esperanza phase), Uaxactún, Zacualpa, and in the cenote of Chichén Itzá (personal communication to René Millon). This suggests a wide time range for the Mayan use of Pachuca green obsidian, beginning in the Early Classic period. Teotihuacán contacts are strongly evident with Esperanza phase Kaminaljuyu (Kidder, Jennings, and Shook 1946: 250, 253, 255–6). A Tzakol phase sherd was

found under the bottom floor of Room 16 at the Tlamimilolpa site (Linné 1942: 178, Figs. 328, 329). This level of construction seems to be datable to Late Tlamimilolpa times, Teotihuacán II A-III (Millon 1966b). This and other evidence suggests that Teotihuacán–Maya contacts began late in the Tlamimilolpa phase and continued strongly in the early part of the Xolalpan phase. It is quite possible that during this period Teotihuacán was the agent supplying the Mayan area with Pachuca green obsidian. It has been suggested that the large quantities of green obsidian present in Tikal at this time were directly or indirectly imported, largely as finished objects, from Teotihuacán (Coe 1965: 36). This could be one factor involved in the industry's expansion in the Tlamimilolpa phase and in its continued large extent thereafter. The increased use of green obsidian in Teotihuacán workshops at this time, as well as the increased number of workshops, seems to reflect the demands of new markets, Mayan and possibly others, and also suggests an increased control over the sources of green obsidian (possibly through expanding influence, or even political or economic control, in the Central Mexican area).

In the Tzacualli and Miccaotli phases, workshops were situated at the city's edge. In the Tlamimilolpa and later phases, however, large areas of obsidian-working appear in the center of the city, one near the Moon Pyramid and another near the Ciudadela (Fig. 1, Nos. 6, 8). It is possible that these centers of obsidian industry were producing for marketplaces in the city where exchanges drawing on a wide area took place (cf. Sanders 1956: 124–5; Sanders 1965: 102). Concentrations of obsidian were noted in one place very near the Moon Pyramid and in another within the Great Compound just west of the Ciudadela. However, it is not as yet known whether these represent workshops, market stalls, or merely structural fill taken from workshops elsewhere.

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