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CONSPICUOUS PRODUCTION OF EXOTICS AMONG THE MAYA: THE ORGANIZATION OF OBSIDIAN PROCUREMENT, PRODUCTION, AND DISTRIBUTION AT EL PILAR

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For early civilizations such as the Maya, the basis of the economy was derived from agriculture. Because agriculture is a fundamental component of such economies, it is crucial to comprehend the manner in which the subsistence base was manipulated to support development of hierarchies in early complex civilizations. The strategies by which these societies created cohesiveness among their diverse constituents are, nevertheless, a critical line of inquiry. Archaeological examples of complex societies provide excellent testing ground that can be used to identify settlement hierarchies and to isolate the mechanisms of social and political hierarchical organization and social integration. This is so because wealth in these societies is ultimately tied to the productive potential of land and the control of labor.

The distributions of exotic and sumptuary items play a significant role in the maintenance of the complex hierarchies. The production of exotics and sumptuary items has been assumed by archaeologists to be centralized and managed by the elite hierarchy (Brumfield and Earle 1987). Yet evidence for this production can be illusive. This paper examines the complex hierarchical relations of the ancient Maya in the central Maya lowlands (Figure 1) considering first the patterns of settlement that evoke a centrifugal force based on scattered and dispersed agricultural resources, and second, the distribution of exotics, specifically obsidian, that suggest a centripetal and centralizing force of integration. I explore how regional patterns and local variations, as determined by the aspects of resources, were expressions of both the subsistence and political economies. Maya obsidian blade production and distribution patterns from the El Pilar Belize River Area are used to accomplish this objective.

1. The Central Maya Lowlands with Major Sites.

Regional Resources and Settlement Patterns of the Ancient Maya

The central Maya lowlands are situated over a shelf of Cretaceous to Eocene limestone more than 64 million years old. Soil forms directly over the limestone bedrock today, much as they did in prehistory. This base today supports a deciduous hardwood forest whose natural canopy height ranges from under 10 to over 50 meters, varying based on drainage and parent materials. Annual rainfall in the region fluctuates from as little as 1000 mm to as much as 3000 mm annually, the majority of which occurs from June to January. The rainy period is divided by local farmers into a stage of warm precipitation from the eastern Caribbean that generally accompanies the hurricane season of

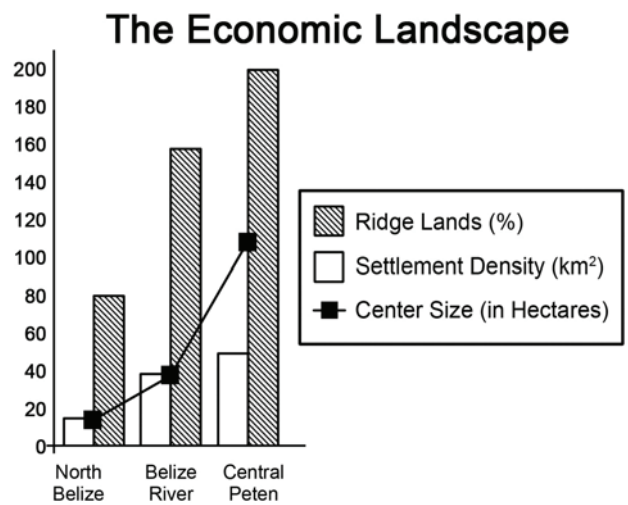
June to October and a stage of cool precipitation that is influenced by the northern winters from November to January. The drought-like dry-season runs from March to June typically marked by little or no rainfall particularly evident in April. Local subsistence and production activities are impacted by this wet/dry sequence.

Broadly speaking, there are four basic land resources that together form the range of geographic variation in the central Maya lowlands (Fedick and Ford 1990; see also Fedick 1996, Ford 1991a). This resource mosaic was utilized by the ancient Maya and continues to be exploited by modern populations today. These resource zones are:

1. Well-drained Ridgelands: Primary Agricultural Resources
2. Slow-Drained Lowlands: Secondary Agricultural Resources
3. Riverine-Associated Swamps: Secondary Agricultural Resources
4. Closed Depression Swamps: Non-Agricultural Resources

While the composite mosaic of land resources is important at the local level, the defining characteristics used to make regional distinctions in the Maya area is the proportion of well-drained ridgelands, which are the primary agricultural resource zones used by the prehistoric and modern day Maya (Fedick 1989). Characterized by fertile, but shallow soils, ridgelands dominate the rolling limestone topography of the region (Turner 1978). These soils are, however, atypical of the majority of tropical soils. Rather than weathered, leached, and low in fertility, as found in the Amazon, these well drained ridgeland soils of the Maya forest are qualitatively excellent. They represent, however, only 1% of the world's tropics. Recent research on land use patterns have demonstrated that geographic factors of soil, slope and drainage together have predictive value for Maya sites (Ford et al. 2009). At least 80% of Maya farming sites can be predicted in less than 25% of the landscape. These are the same lands that are preferred today by local farmers (Ford 2008). It is understandable why the pioneering Maya selected these zones.

These well-drained ridgelands most preferred by the Maya for farming are unevenly distributed in the lowland Maya region (Fedick and Ford 1990; Ford et al. 2009). They comprise less than one-sixth of the area of Northern Belize, but nearly half of the interior central Petén area of Tikal. There is a distinct relationship between the availability of ridgelands, settlement density, and the prehistoric regional Maya hierarchy (Figure 2). Comparison of these variables demonstrates that regional settlement distribution and density are interconnected with the proportion of available primary agricultural lands. Simultaneously, the scale of monumental public architecture at administrative centers appears to be directly related to settlement densities and corresponding labor potential. Understanding the regional patterns and the importance of agriculture to farming settlements tells us much about the forces that underwrite the land use patterns. These patterns, however, do not help to reveal the integrative mechanisms involved.



2. The Economic Landscape of the Central Maya Lowlands.

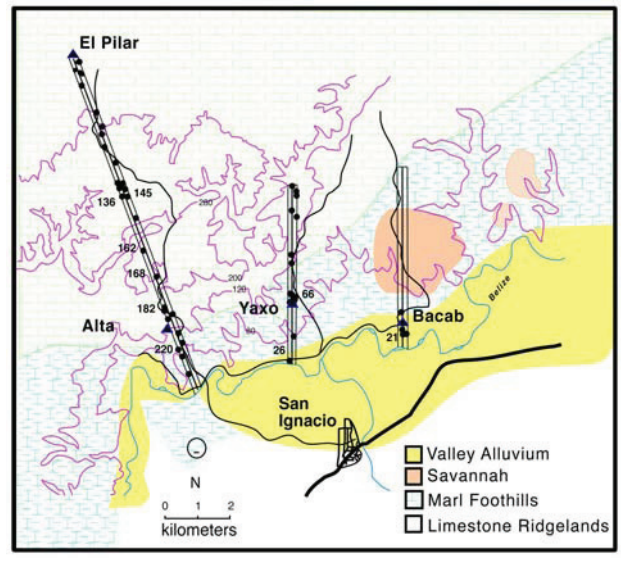
Local Community Patterns in the Maya Lowlands

Just as regional patterns of settlement in the Maya lowlands were strongly influenced by the availability of primary agricultural resources, this base also affected the local distributions of settlements. At the local level, the important agricultural resources of the Maya lowlands are not concentrated in any contiguous zone and are unlike those found in the river valleys of coastal Peru, the Nile of Egypt, and the Indus of South Asia. These resources are distributed in patches throughout the region and are strongly related to the distribution of parent materials in the local area. The dispersed nature of the surface limestone bedrock is associated with the primary agricultural resources of the well-drained ridgelands. These zones of the Maya area were a dispersing force on farming populations, pushing farming settlements out into the patches best suited for agriculture. These small and large patches of ridgelands spread Maya farmers out into correspondingly sized communities over the landscape (Ford et al. 2009).

Elite residential units were present in all the zones with primary resources, regardless of the size of the area (Ford 1991b). The large patches of primary resources were all associated with civic centers and always had densities of c. 200 structures (str)/sq km. Small patches of primary resources had settlement densities from 100-200 str/sq. km. (Ford 1986, 1996). None of these small areas were connected with civic centers and the largest elite residential units were smaller than those in areas of centers (Ford 1986:85-87, 1990). Settlement densities in secondary agricultural areas were significantly lower, under 50 str/sq. km. No settlements have been recorded in areas of closed depression swamps which are associated with deep, acidic, clayey soils that lack the drainage typical of areas found on limestone ridges.

The proportion and distribution pattern of primary resources in the El Pilar area played a major role in the dispersion of settlements and communities and are comparable to the settlement pattern found in the central Petén (Fedick 1988, 1989, 1995, Fedick and Ford 1990, Ford and Fedick 1992; Ford et al. 2009). The majority of primary agricultural resources in the Belize River area are located in the ridgelands found in proximity to El Pilar. Small and large pockets of primary resources supported high settlement densities, equivalent to those found in the Tikal area, and were associated with elite residences. As in the Tikal area, the community and settlement hierarchy is consistent with the distribution of agricultural resources (Ford et al. 2009). The largest center in the area, El Pilar, is located within a substantial concentration of primary resources (Ford 1990; 1993; 2004).

The Belize River area of El Pilar (Figure 3) shares much in common with the core area of Tikal located 50 km to the east. Both areas contain a large proportion of ridgelands supporting farming settlements (see Fedick and Ford 1990, Ford

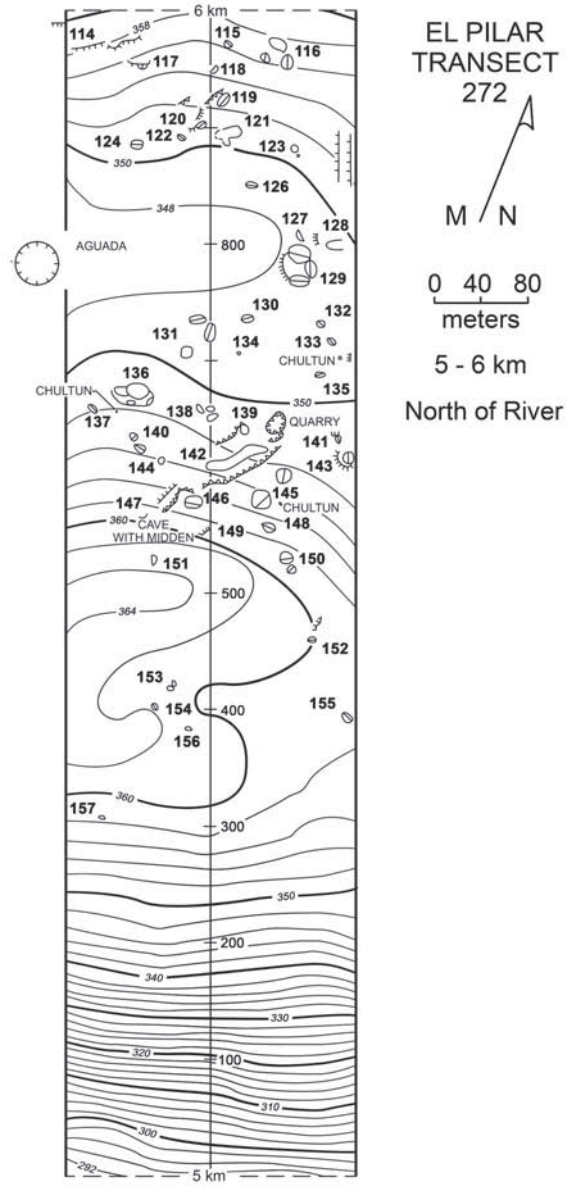


3. The Belize River Area with BRASS Transects and El Pilar Indicated.

1990, 1991b, Ford et al. 2009). Areas with centers, such as El Pilar, support the high settlement densities of 200 str/sq. km while primary resource zones without centers have settlement densities from 100-200 str/sq. km. These primary resource zones that make up only 24% of the El Pilar area are the concentration of 82% of the residential settlement (Ford et al. 2009:13). The secondary resource zones, dominating the foothills that rise from the valley to the ridges, composed the greatest proportion of the local area but only 18% of the total settlement.

Communities located in small patches of primary resources were found throughout the El Pilar ridgelands. High settlement density and the presence of elite residential units were the exhibited patterns. One recorded example of these patterns was the settlement concentration labeled Latón (Figure 4) located 4.5 km south of El Pilar in the Belize River area (Ford 1984, 2004, Olson 1994; Hintzman 2000). This ancient Maya community, largely dating to the Late Classic (AD 600-900), included the entire gamut of residential units ranging from small, single structures to large imposing groups, comparable to the community patterns recognized in the central Petén area. Indeed, at Latón there is a small "temple," with 2 rooms that once supported corbelled roofs, and probably served administrative and ceremonial functions. Latón is also the location of the first, and to this date only, known obsidian blade production site. Its distant location from the major center of El Pilar is in contrast to the connection with its elite Maya hierarchy.

The Latón production site, 272-136, is part of a residential unit that was large and would have housed the more affluent component of the community. In the testing phase of the project in 1984, the midden areas of this site revealed more than 1000 pieces of obsidian per cubic meter. In the



4. The Laton Settlement of the 4-5 Km North of the River.

full-scale excavation phase of the project this site produced contexts with tens of thousands of pieces of obsidian. The staggering quantities of obsidian set this site apart. Distant from the major center of El Pilar, but clearly linked to the surrounding political hierarchy, the community of Latón had privileged access to exotic, obsidian. At the same time, given its location in primary agricultural lands, the majority of activities conducted by the community were devoted to subsistence.

Here is an example of a community that emerged based on the economics of subsistence but was integrated into the Classic Maya society based on economics of politics.

At Latón, how did the subsistence and political economies articulate? With its excellent agricultural setting, how does the obsidian blade production at the local community level relate to the major center? If subsistence independence was feasible, what were the political incentives to participate? And how does the presence of the conspicuous production of obsidian provide clues to these questions?

Obsidian Blade Production and the Maya

A detailed example of the kind of links that may have existed among disersed communities and the powerful civic centers is evident in the examination of obsidian at the community settlement of Latón (see Figure 3 & 4). Ridgeland communities of the El Pilar area as a whole exhibit a significant amount of economic heterogeneity and diversity that is largely due to the fact that the majority of the settlement of area is found in the ridgeland zone (Ford 1991a). This concentration of settlement represents the contrast between the haves and have-nots, the administrative units vs. farming households, and established homes vs. temporary field houses (Figure 4). Residential unit size and composition of the settlements at Latón represents considerable investment and would clearly have been permanent in design. Nevertheless, small units, some composed of only single structures, suggest varied uses of storage and out buildings, also found elsewhere in the Maya area (Culbert and Rice 1990).

Patterns of land use favor farming (Fedick 1988, 1989; Ford et al. 2009) and the households of Latón are clearly characterized by access to good agricultural lands. On the average, each residential unit has c. 0.4 ha surrounding the unit, consistent with home gardens and infields of subsistence farmers world wide (Fedick 1992). Additionally, we would expect service and production specialties existed within the area. Production specialists would divide into entrepreneurial specialties that would be involved in the production of generally available products and patronized production that would be coordinated and sponsored by the elite (cf. Brumfiel and Earle 1987).

Small communities, such as Latón, with limited administrative components, and typically lacking the labor to construct the visually massive major public monuments, were left with a visual void. This void is exactly where control of exotic commodities, like obsidian, and their patronized production would serve a cohesive role to link dispersed communities into the hierarchy. Without major temples to evoke power in communities such as Latón, the local community elite would seek other strategies to assert their authority. The presence of special services and products, such as obsidian in the case of Latón, could have provided a means whereby local community elite could demonstrate their ability and distinction, as well as their relationship to the higher central elite hierarchy. The use of conspicuous obsidian blade production would evoke a subtle form of power connection that could demonstrate local authority.

While the overall quantities of obsidian recovered at lowland Maya sites are not voluminous, the procurement, production, and distribution of this material have been the focus of significant investigative interest and attention (Aoyama 2008; Brown et al. 2004; Ford et al. 1997, Hammond 1981, Masson 2000; McKillop 1989; Moholy-Nagy et al. 1984, Nelson 1989, Rice 1984, Rice et. al 1985; Sidrys 1976). This

is primarily because, in the case of the Maya region, this material comes from no less that 300-air km away. Obsidian procurement is thought to be centralized and coordinated as a long-distance trade item by major centers.

The predominant obsidian artifact that is recovered at lowland Maya sites is the prismatic blade, an efficient cutting tool that rivals even today's honed steel (Sheets 1975). Obsidian prismatic blade production has been demonstrated to be a specialty requiring apprenticeship and would have required specialized training and practice (Aoyama 2005; Brown et al. 2004; Clark 1988; Clark and Bryant 1997; Hintzman 1997, 2000; Crabtree 1968; Hutson and Stanton 2007; McAnany and Harrison 2004; Moholy-Nagy 2003; Sheets 1977; Torrence 1986). Yet even with all this attention to, and acknowledgement of, obsidian blade production and exchange by the Maya, there has been no identification or documentation of obsidian blade production areas before the discovery of the site at Latón in the El Pilar area.

Throughout the Maya lowlands, the obsidian prismatic blade is scarce when compared to chert cutting implements, but it is present, if in minimal quantities, even at small residential units (e.g., Hutson and Stanton 2007). Not surprisingly, obsidian blades are found in significantly greater quantities among elite residences and, of course, civic centers (Olson 1994). While the product, the obsidian blade, is widely recovered in archaeological contexts, it is the in situ by-product of obsidian prismatic blade production, the debitage that has been so elusive in the archaeological record of the Maya area. Curiously, it is the by-products of obsidian blade production that have the most restricted distribution.

There is a differential distribution of obsidian artifacts in the Maya area based on the cultural context. Prismatic blades make up the majority of recovered obsidian artifact collections, while specialized knives and "eccentrics" are rare outside major centers and are restricted to elite contexts (Moholy-Nagy 1984). Obsidian blades, on the other hand, are ubiquitous in that they occur in almost every context, from private residential middens to public ceremonial caches. The obsidian blade has an almost universal distribution among the Maya. Despite this ubiquity, the quantity of obsidian recovered, particularly in the residential component, appears to be related to hierarchical status. Consequently, obsidian has been deemed as an indicator of wealth, even though obsidian is recovered at the most humble houses, belying its utilitarian functions (see Smith 1987).

At major centers, such as El Pilar or Tikal, the elite are the consumers of both the final product of obsidian blade production as well as the by-product, as evidenced by materials excavated at these centers (Coe 1990; Moholy-Nagy 2003; Olson 1994). Public monuments of centers (stela, temples, ball courts, acropolis) are the vivid symbols of power and amply demonstrate resource and labor control. These are the contexts from which abundant exotics, including obsidian, have been recovered. In contrast, small communities with little claim to power or access to exotic materials have less investment in public architecture and less evidence of the consumption of exotic items. While the finished product distribution matches expectations of wealth and status, the distribution of the by-product or debitage does not. The limits of obsidian blade production loci are reflected in the nature of the distribution of the by-product. Among the obsidian artifacts deposited in special contexts in the powerful temples at centers, we find volumes of obsidian debitage, the waste material from the production of obsidian blades (Table 1).

Table 1. Example Obsidian Contexts at Tikal (from Coe 1990)

Context	Description
Cache 37 sealed	1,224 pieces of mixed obsidian debitage, 12 obsidian eccentrics platform ballast
Cache 62,	1,718 pieces of obsidian debitage, 3 eccentrics. 4 cores sealed staircase
Burial 200, fill	c. 2,273 pieces of obsidian debitage, 10 eccentrics associated with crypt
Burial 10 in fill	3,200 pieces of obsidian debitage, 79 cores, 15 eccentrics
Burial 116 (Ruler A),	Estimated ¼ ton of obsidian debitage (not completely excavated) fill atop capstones

While finished prismatic blades were widely distributed among the Maya and have been recovered in nearly every archaeological context, it appears that is was the deposition of the by-products of obsidian blade production that was restricted. Obsidian blade production by-products, the waste pieces or debitage, and the used and exhausted cores, have been regularly recovered within the most ritualized contexts at Maya civic centers. Contexts for the deposition of obsidian blade production by-products within ceremonial centers include building and stair foundations, sub-stela caches, and burials (Olson 1994:42 see Table 1; e.g., Tikal: Coe 1959, 1962, 1965, 1990; Moholy-Nagy p.c.1976, 1997, Moholy-Nagy et al. 1984; Belize centers: Pendergast p.c., 1979, 1981). There are undoubtedly more sites where obsidian blades would have been produced, but have yet to be recorded. These widely distributed community productions sites, if they follow the Latón pattern, presumably are part the network connected to these elite rituals at centers.

Remarkably, the extensive volume of excavations that have been conducted throughout the Maya lowlands over the past century, principally focused at civic centers and to some extent their associated residential units, have failed to identify any definitive obsidian blade production loci. Certainly, the presence of actual debitage and cores within ritual settings at these centers indicates that indeed production occurred somewhere, and that it was, to some degree, under the control of the central elite. Given the presence of production debris in highly ritualized depositional contexts at civic centers, it has been assumed that it was produced locally, yet where? Production loci for obsidian items are not to be found where excavations have typically taken place: at the major centers, in plazas, around monuments, or at residential units that are adjacent to the centers. Other than the highly ritualized deposition of obsidian by-products, the lack of obsidian blade production loci has impeded efforts to fully understand the place of obsidian production in the ancient Maya world.

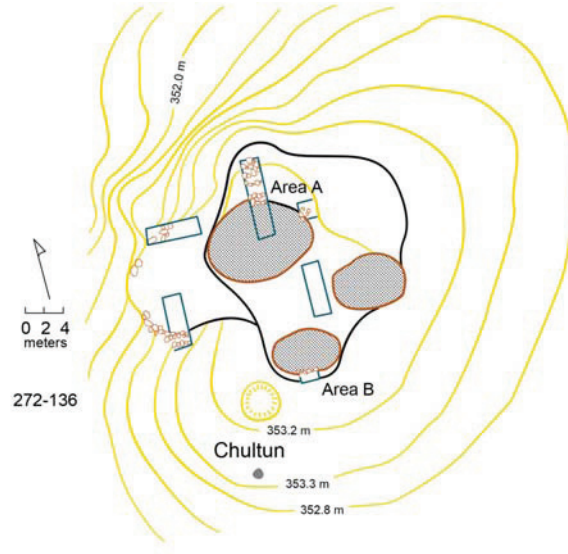
Obsidian at Latón

Investigations in 1984 by the Belize River Archaeological Settlement Survey (BRASS) mapped the rural community of Latón (Figure 4). Initial mapping, surface collections, and excavations at Laton revealed that one of its large, elite residential units, designated as 272-136, was heavily involved in an obsidian prismatic

Table 2. Obsidian Densities from Regional Test Excavations

Sites listed by land type in spatial sequence			
Site	obs/m^3	Site	obs/m^3
Ridgelands		Foothills	
272025	10.1	272179	2.2
272032	1.1	272182	1.0
272046	5.2	272198	3.2
272071	1.7	272210	4.2
272108	1.3	278055	3.4
		278077	0.6
El Latón Community		Valley	
272129	39.3	278026	1.3
272130	4.1	278031	3.5
272136	1445.9	281021	5.3
272140	6.3	281024	2.4
272145	23.2	281027	4.6
272162	3.3	281033	3.0
		281034	1.7

blade production industry (Ford 1984, 2004; Hinzman 2000; Olson 1994). Later mapped in detail in 1992, this residential unit was composed of three main structures that surrounded an open courtyard with a terrace on its west side (Figure 5). This residential site was outstanding in the testing phase, with c. 1446 pieces of obsidian debitage per m3 (Table 2). As with most excavations of the Maya area, obsidian artifacts and debitage were present at most sites, however the 272-136 site was unique representing prismatic blade reduction comparable to sites adjacent to source materials (Figure 6). Situated in a patch of good agricultural lands, this ridgeland community located 4.5 km south of the major center of El Pilar, had high settlement density, over 200 str/sq km, and a distinct presence of elite residential units. Following analyses of data from the Maya area in general, it is expected that the elite of the ridgelands had preferred access to obsidian. Even excluding the obsidian blade production site, 272-136, the greatest abundance of obsidian at residential sites



5. The Obsidian Production Site 272-136 with Areas Shown.

was in the ridgelands of El Pilar, the location of the majority of the elite of the Belize River area.

Sourcing of obsidian provides the wider base for understanding the relationships of the lowland Maya consumers and their highland providers. The obsidian from the BRASS excavations was sourced exclusively using NAA conducted by Michael Glascock of MURR at the Univer-

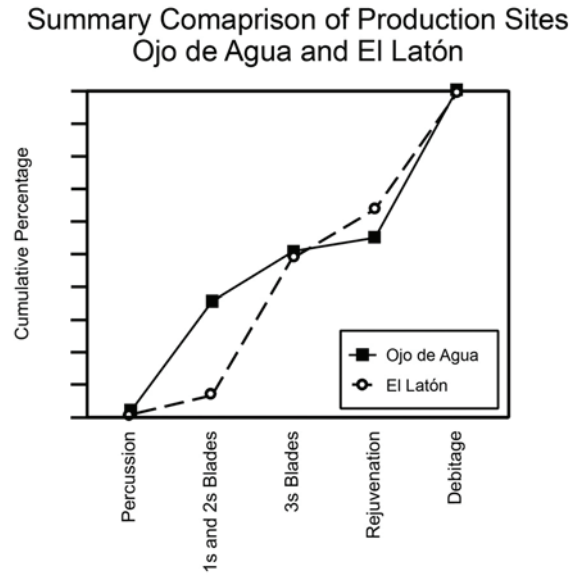
Table 3. Obsidian Densities by Residential Site Size from Regional Test Excavations

(272-136 excluded) and Percentage of Obsidian Sources					
Residential Size	**(n)**	**Mean obs/m3**	**El Chayal**	**Ixtepeque**	**Other**
large	6	22.9	78%	22%	1M*
medium	10	3.4	79%	8%	13
small	8	2.1	80%	13%	7

*M=Mexico, otherwise Other=San Martin Jilotepeque

sity of Missouri (Table 3). As with other areas of the Maya lowlands, most of the obsidian analyzed is of Guatemalan origin and is either from El Chayal or Ixtepeque, while a small percentage is from San Martin, Jilotepeque (Brown et al. 2004; Ford et al. 1997; Moholy-Nagy 2003). Some obsidian from Michoacan and Otumba, Mexico, as well as green obsidian from Pachuca, Mexico, was also found through analysis of the BRASS samples. Studies have shown that El Chayal and Ixtepeque obsidian is found most frequently throughout the lowlands in Late Classic contexts, while San Martin Jilotepeque obsidian has been associated with the Late Preclassic. Mexican obsidian is largely restricted to elite ritual contexts throughout the Maya florescence (Classic); in this study of the Belize River area it is only found at centers and elite residential units in the ridgelands of El Pilar.

Given the remarkable presence of obsidian blade production debitage (Figure 6), Latón was targeted for further investigation. Full-scale excavations at the obsidian blade production residential unit of 272-136 were launched in 1992. These excavations focused on defined open areas of plazas, terraces, and platforms in an effort to identify the nature and scope of the obsidian blade production activities. The excavations revealed heretofore-unseen concentrations of obsidian blade production by-products in every excavation. All contexts yielded voluminous quantities of obsidian pieces (Table 4).



6. Obsidian Debitage distribution comparison Laton-Ojo de Agua (Clark 1987).

While plaza areas, surrounding midden zones, and structure margins all contained evidence of obsidian debitage, two noteworthy excavations particularly stand out as areas where extremely dense evidence of production debitage were uncovered. A deposit located at the large northern structure margin revealed a small dense area of blade production debitage. This concentration, perhaps within a perishable container, enclosed over 23,000 pieces of obsidian (Hintzman 2000); a density equal to 1.7 million pieces of obsidians/m3 (Area A Figure 5 and Figure 7). Another deposit behind the small southeastern structure wall contained 39 complete but exhausted prismatic blade cores (Area B Figure 5, and Figure 8). These deposits are unique in the Maya area. There are no reports of any clear blade

Table 4. Assemblage composition: 272-136

	Plazuela n=1028	Structure 1 n=2267
Blade failures	50%	42%
Debitage/cores	35%	41%
Rejuvenation	15%	13%
Percussion	0	4%
TOTAL %	**100%**	**100%**

7. An Example of Debitage from the Obsidian Production site.

8. An Example of Cores from the Obsidian Production site.

production loci in the lowlands, no deposits of debitage are known outside centers, and never has there been a site with so much by-product material recovered so distant from the known sources.

Debitage and modified cores, such as those from the Latón site, are materials found in dedicatory deposits at centers, such as Tikal (see Table 1). These deposits often include enormous quantities and volumes of the debitage. It has been logically assumed that the blade production by-products found in these deposits are created during local production activities presumably from areas adjacent to the ceremonial center. But how nearby and to what purpose?

What if the exotic production areas, like that of obsidian, were managed as a relationship between the central elite and their dispersed constituent elite? Suppose that the participation in the production of exotic products and the conservation of the by-products served as one in the same elite political and administrative purpose? If the raw materials were distributed out from centers and the by-products were gathered in based on reciprocal relations among the elite, the by-products would come from a wider collection zone. One could imagine the status gained at the community level, where the elite patronization of obsidian blade production took place, would increase local prestige in the political economy. Moreover production materials by-products from the dispersed community elite might well be integrated into the central dedication events, therefore cementing linkages among elite.

Turning back to the two deposits of the Latón production site, their contexts suggest provisional discard areas were used to stage, or "stash," obsidian by-products (Olson 1994). Clearly these stashes were the result of blade production (Hintzman 2000) and the contents, unlike the lithic blades themselves, were not intended to be put into service. These provi-

sional stashes could have been destined for rituals at the major centers.

At the Latón site, the type of debitage and the careful reworking of the cores are both evidence of material conservation (Hintzman 2000), even though the recovered cores might have been able to be extended in use, they were not. Instead these cores were "stashed" for future consideration. As for the debitage, their potential utility was clear. These obsidian fragments were the waste of blade production and were not useful for anything more complex than blood letting, as excavations and subsequent cleaning, and cataloging have demonstrated.

Based on the findings at site 272-136 (Table 4), there was a point after which the obsidian materials, the blade failures and cores, were deemed exhausted, and thence accumulated together for the "stash." This process of gathering of materials itself is noteworthy. Stashing materials implies future plans; in other words, the stashing and storage of materials indicates that the components of these collections were intended to be used in a secondary manner and at a later date. In light of the distinct distribution of such obsidian debitage in ritual contexts at major centers, it seems very likely that these obsidian "stashes" were destined for these special purposes at civic centers.

The obsidian assemblage from the Latón community residential unit is exceptional in the Maya world. Despite the decades of research in the Maya area and the many contexts of the excavations, there have been no such collections reported from any other lowland Maya context. In fact, this site, 272-136, in the El Pilar area, is the first obsidian blade production site uncovered to date from the central Maya lowlands. This remarkable fact may be largely attributed to an emphasis by archaeologists on excavations involving monumental structures as opposed to residential areas as well as the minimal number of studies that have concentrated on sites beyond the central civic core of habitation.

Production loci are distinct in assemblage composition (Clark p.c. 1987). The proportions of blade by-product debitage, the evidence of production failures, and the presence of exhausted cores are all significant in the definition of a lithic production site The Latón community production site clearly includes these components. What is curious, however, is that even though this site is more than 300 km from the nearest obsidian source, the debitage and other obsidian by-products collected at the Latón community production site are materially equivalent to production debris assemblages recorder at well-documented sites located much closer to obsidian sources in highland Guatemala and Mexico (Santley 1984; Clark 1986; Healan 1995; see also Gaxiola and Clark 1989). The standards for production are borne out despite the distance.

Turning to the nature of the Latón site, the obsidian concentrations themselves are extraordinary. Concentration of obsidian materials, similar to those recovered at the Latón production site, have otherwise only been found in highly ritualized contexts at centers such as caches and burials (Olson 1994). These are clearly specialty deposits, as the production debris in such deposits is disassociated and unrelated to actual production loci. Special ritual deposits numbering in the several thousands of pieces of debitage (see Table 1) would be able to be assembled from the Latón debitage stash at least 10 times. On the other hand, Burial 116 at Tikal (see Table 1), with a deposit of ¼ ton, would need the participation of some 30 deposits of production by-products, such as those recovered from Latón, to fulfill the apparent objective of covering the tomb.

The ritual deposits of obsidian cores at

Tikal follow the same pattern as that for the Latón site's debitage. One example, Cache 62, has only 4 cores and thus the stash of Latón cores could fulfill the quota for this type of deposit about 10 times as well. The case of Burial 10, however, with 79 cores, is more than twice that recovered at the Latón site and would therefore require at least two production sites to match the total number of cores. These examples demonstrate that potential complexity of relationships among the wide distribution of patronized elite producers and the elite hierarchy officiating at ritual events of civic centers (see Table 1).

Connecting the obsidian blade production stashes of the Latón site to the rituals uncovered at centers, such as Tikal, begins to reveal the links that may have functioned within the elite political economy. Long distance trade would have been concentrated with the high level elite of the civic centers. The commodities, in this case obsidian, would have been redistributed to elite patrons who would have been privileged to be conspicuous producers of the widely used but costly product: the obsidian prismatic blade. In exchange for the privilege to patronize the obsidian blade production, the elite patron-clients were expected to store a standard by-product of the blade production for use by the central hierarchy officiating specific rituals.

This scenario of elite hierarchical relations helps to account for the evidence of obsidian production at the dispersed community of Latón and the presence of obsidian debitage in ritual deposits at centers. This system interconnects the elite political hierarchy in a way that depends on exotic materials that are scarce and valued by the society. The proposed integration of lower level elite with the higher central elite would work especially well if the specialist producers were located in dispersed farming communities from which agricultural resources were extracted. This would help to explain not only settlement patterns based on farming but also elite integration based on obsidian blade production and distribution. At the same time, such a a system would provide a tangible reason for the dispersed farming communities, where production sites were located, to participate in rituals performed at the centers. If the elite of dispersed farming communities were involved with the obsidian blade production for conspicuous display and access for their community constituents, and the production by-products were destined for ritual display in centralized civic events, then one can begin to imagine how the community to center integration would work.

Obsidian Procurement, Production, and Distribution

While procurement of obsidian into the Maya region may well have been centralized, obsidian production apparently was not. Production of obsidian items appears to have been controlled in elite hands, however, it was a decentralized system. Obsidian blade production was dispersed to the elite of farming communities within the orbit of civic centers and were the mainstay of the production system. The example of Latón suggests that the elite of dispersed communities were strategic in this political-economic endeavor. If centers were the hub of raw materials and resources for the local area and trade nodes for the region, then the centralized leadership was in the position of primary distributor of imports, such as obsidian. Yet to accomplish their elite goals regarding the management of the political economy, the elite required the engagement of the subsistence sector of the dispersed farming communities.

The elite were the most likely distributors of exotic materials, commodities, and wealth goods, as well as the redistributors

of local products of subsistence. One possibility is that the elite leadership at centers apportioned various trade and exchange materials as a means to consolidate the allegiance of their constituents, the dispersed farming communities of the local area. Exotics would be particularly useful as such a commodity because of their known scarcity and tangible visibility. The dispersed communities, in turn, would realize community prestige for their ability to acquire exotics and, as in the case of Latón, provide privileged access to the exotic products (see Table 2). This system would strengthen the local community elite position vis-à-vis their community, and would support the redistribution of subsistence products to the civic centers.

Obsidian is a conspicuous exotic in the Maya area (Rathje 1971, Tourtellot and Sabloff 1972, P.M. Rice 1984, Gaxiola and Clark 1989; Sidrys 1976). While there are ample quantities of chert that can easily be used easily for cutting, the obsidian blade was obviously an important and valued component of the household inventory (Ford 1991a). Obsidian blade production is a craft specialization that would take investment in time and support to become proficient. As a patronized elite specialty, obsidian could cut multiple ways with conspicuous status recognition within the community and demonstrative ties to the greater Maya hierarchy. Elites patronizing obsidian blade production within communities would clearly have links to the long distance exchange networks that were centralized among the highest elite at centers. Receipt of this exotic commodity would represent a connection of the community elite to greater elite political economy. Community elites who would use obsidian, and other exotics, as an obvious display of their political and economic connection, a potential that could be strengthened with the ritual use of the by-products at centers.

The elite support of obsidian blade production specialists within the community would provide a powerful and conspicuous activity. Obsidian blade production would be a visual validation of power by virtue of its presence and in the privileged access the community would have to obsidian prismatic blades. The curation of the by-products destined for important rituals of civic centers would solidify the dispersed elite's position in the political and economic hierarchy. In this way, the elite control of the complete sequence of obsidian prismatic blade production, from raw material to debitage, would simultaneously accrue local power with immediate community constituents as it would demonstrate full participation in the aristocratic hierarchy of the civic centers. The local consolidation of power would serve the local elite as they stashed the by-products for ritual events at the major center and would guarantee allegiance of the subsistence sector.

This interpretation views the community as the basic social component of the ancient Maya hierarchy. The patchy distribution of agricultural resources within the Maya lowlands pushed farmers into dispersed locales, creating a centrifugal force against hierarchical centralization. To resolve the problem of integration without nucleation, communities, both near and far from the civic centers, would be subject to coordination by an elite management and administrative hierarchy. This is reflected locally, as well as regionally, in the settlement patterns of the lowlands and in the distribution and use of obsidian. Beyond primary agricultural resources, elites would need to focus on several key arenas: control of production and distribution of exotics—as with obsidian, but possibly other resources such as jade, maintenance of ceremonial sites, administration at the community and local levels, and interaction at the regional

level.

Community leadership provided the critical organizational bridge between the community farmers and the major centers. Dispersed communities of the ancient Maya of the greater Petén area, including the Belize River area, had the potential for self -sufficiency in the realm of the subsistence economy. This would have enabled them to challenge cohesion by exerting independence. But such autonomy appears to have been forsaken for hierarchical coexistence with the major regional civic centers. This suggests the existence of a balance of power between dispersed community leadership and centralized control that operated exclusively within the political economy. Visible control of production of exotic luxuries, such as obsidian at Latón, could be just the type of dual-purpose "currency" that would have been useful in reinforcing daily political activities at the community level while cementing ties to regional centers.

Interpretation

The regional settlement patterns examined here demonstrate most dramatically the dimensional importance of agriculture for the Maya. This is reflected in settlement density and scale of public architecture. This relationship suggests that the larger the proportions of primary agricultural resources, the higher the settlement densities, and the more extensive the civic centers. In essence, the more people you have within a given area, the more labor can be directed towards that areas public works—whether in the form of open plazas for all to see or as inaccessible, private, regal domains. The same relationship between settlement and resources exhibited at the regional scale is repeated, on a smaller scale, at the local and community levels. Local community diversity and the degree of investment in elite and public architecture are proportionate to the local resources.

The relative extent of primary agricultural resources provides a base for community patterns (cf. Stone 1991; Wilk 1989). The size of a community is dependent on it subsistence resources. The greater the area of subsistence resources, the higher the settlement density and, thus, more people and greater investment in the public arenas. This system facilitates an explanation of the variable distribution of centers and the hierarchical distribution of elite across the Maya landscape. Elite at the major centers, with the greatest resource base, were able to garner more labor for their elite ends. Elite of the dispersed resource areas, with direct control over the immediate resources of the community, would not have equivalent labor availability when compared with the elite of civic centers. This tiered settlement pattern is not dissimilar to Bullard's (1960, 1964) view of ancient Maya settlement where hamlets are comparable to dispersed communities, districts are equivalent to local minor centers, and zones would be equated to the major regional centers.

This tiered settlement hierarchy distributes elite administrators across the landscape. The presence of a settlements hierarchy reveals how land use and the administrative process linked centers to dispersed communities. It does not, however, address the administrative links from dispersed communities to centers. Rather, this process is reflected in household activities at the community level, and more specifically the activities patronized by the elite. Self-sufficiency in terms of the subsistence economy may have been an option for dispersed communities of the Maya lowlands as these communities were the closest to subsistence production. Consequently, the activation of the hierarchical links among community elite de-

pended primarily upon interdependence of constituent elite within the region's political economy.

The links within the political economy would necessarily fall outside of the utilitarian or subsistence realm and into the realm of exotics and luxuries (Brumfiel and Earle 1987). Exotics and luxuries would not be a requisite to sustain life, but would be requisite for participation in the elite political economy of the ancient Maya. Many restricted items could fall into the category luxuries and most would be derived from long-distance trade. Obsidian has long been recognized as an enigmatic product in the Maya lowlands. Curiously, the location of production areas for obsidian items has remained one of the mysteries of the Maya. Data show that by-products of obsidian blade production occurred in only flamboyantly ritualized deposits at centers. And, despite the extensive excavations throughout the lowland Maya region, production by-products had never been recovered in a situation clearly related to in situ blade production in either ceremonial precincts or residences at centers.

Examination of settlement and community patterns of the El Pilar Belize River area has finally yielded the first major obsidian blade production site in the central Maya lowlands. Interestingly, this production site was located within a dispersed community where little imposing public civic architecture was present. This would be precisely the type of area where conspicuous production could be fully appreciated. These low-level elite could employ devices as visible as obsidian blade production to bolster their image within the rural community as part of the larger network of the elite political economy (see Vogt 1970). These same elite could rigidly control the production by-products, which were highly restricted, to forge their political links with higher-level elites at civic centers. In conserving and curating obsidian production debris, these elite could literally spend this "political capital" in important elite sponsored ritual events at centers, thus participating in elite activity such as prominent funerals, ground breakings for buildings, or the erection of stela. Through these devices, the administrative hierarchy of the ancient Maya was able to mobilize dispersed community production and expand the range of community integration.

From this analysis, a striking picture of the Maya elite hierarchy, manifest in the settlement patterns of the region, begins to emerge. The settlements are concentrated in the most productive agricultural zones, even though these zones are widely distributed across the landscape. Despite obvious obstacles to centralization created by this patchy network of prime agricultural resources and land, the Maya civilization flourished, demonstrating the flexibility of an essentially fixed hierarchically organized administrative system. This was true, at least, until the period of collapse.

The archaeological research of the Maya area has developed a considerable database that has identified the hierarchy that incorporated the household, community, and the administrative center. These divisions appear to be clear and sufficient evidence of the multiple tiers of administration hierarchy evident for the Late Classic Maya. Still, the mechanisms linking together these tiers in the hierarchy are not well understood. To understand the relationships between communities and centers, research needs to be oriented more to the signatures of the political economy, where substantial power resides. Therein lies the basis for the mobilization of subsistence production at the community level and the integration of communities at the local level. For the Maya, as with all agrarian civilizations, resource mobilization and community integration

provided the fundamental building block and the wherewithal to negotiate regional interaction.

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