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RANCHOAPAN:
THE "NEW OBSIDIAN" CITY OF THE TUXTLAS?

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ABSTRACT

The origin of cities is a subject of major interest to geographers, economic historians, and archaeologists. One view of their development stipulates that cities are built on a rural economic base. In other words, the process is from the bottom up, with centers ultimately emerging to provide a variety of goods and services to a population of rural consumers distributed around them. An alternative view is that the development was from the top down. Centers emerged for any number of social and political, but once present nascient craft specialists manipulated the economic environment, making the rural countryside increasingly dependent on their goods. This paper utilizes information from the Tuxtla Mountains in southern Veracruz, Mexico, as a basis for looking at early city development. In particular, evidence on obsidian working from the archaeological site of Ranchoapan is applied to evaluate the “countryside first” and “city first” hypotheses. In the Tuxtla Region it appears that the specialized obsidian working arose from a substratum involving the generalized manufacture of tools by households situated at small sites. The countryside first hypothesis thus has greater explanatory utility in the Tuxtla than its conceptual alternative. Other crafts such as ceramics production, however, show a better fit to the city first model.
The origin of urban centers is a subject of major interest to geographers, economic historians, and archaeologists. One view assumes that cities are built on a rural economic base. In other words, the process is from the bottom up, with cities emerging to provide a variety of goods and services to a population of rural consumers distributed around them (Childe 1936; Sanders and Price 1968; Rathje 1971; Hassig 1985). V. Gordon Childe, for one, argued that the great surplus from irrigation agriculture laid the foundation for city development and the emergence of craft specialists who produced goods that were originally manufactured by farming households. An alternative view is that development was from the top down (Jacobs 1969; Lloyd and Dicken 1972; Johnson 1973; Santley 1986). The rise of centers changed the way goods were produced, the kinds goods upon which the rural economic base relied, and the physical location of farming settlements. A quick perusal of the recent literature on city development demonstrates that these perspectives still underlie much archaeological thought (Sanders et al. 1979; Sanders and Santley 1983; Blanton et al. 1981; Santley and Alexander 1996; Marcus and Flannery 1996; Wenke 1999; Scarre and Fagan 2003). In Mesoamerica only rarely have these views been appraised using data on craft specialization from both the center and countryside, especially with reference to lithics working.

These views can be distilled down to the following exploratory or hypothetical sketches. The "rural economy first" hypothesis stipulates that cities are built on an agricultural economy in which farmers produce most of the goods necessary for their survival and when there are craft specialists they are very much part time. Finely made stone knives, for example, cannot be made by everyone, but because of the skill involved, some specialization would be expected for that reason. With the agglomeration of population in early centers skilled workers become concentrated at places where they can produce goods on a fuller time basis. A result of this specialization is the subtraction of work from the rural economy, with occupational specialists now producing goods that were originally made by farmers as part of their normal domestic routine. The outcome of this process is the creation of more work, its aggregation in the nascient center, additional rural to urban migration, and ultimately a growing dependency of the countryside on city-produced goods.

The "city first" hypothesis takes the opposite view. The heart of this argument is that the city creates new work and this increases rural dependency. The process essentially is from the top down, though the population aggregation development often requires a productive agrarian base. Here a center can form for any number of reasons. For instance, elites may attract economic clients and their families, nucleation may confer defensive advantage, or topographic irregularity may favor population concentration. The beginning of this process resembles the sequence expected under the rural economy first hypothesis. Urban craftsmen expropriate work originally undertaken in the countryside, again making the agrarian base more dependent upon them. New work, however, is now created as qualitatively different industries begin to develop producing the same or innovative goods in different ways that the countryside needs. This growth may be the result of new processing technology, changes in the organization of production, more efficient transport of commodities from the city to its hinterland, or restriction of access to critical or better raw materials. The ultimate result of this process also is greater rural dependency, but because
farmers use more of the good per capita, there is an expansion in the market to which the commodity is distributed and the area over which the good is sent. Workshops and factories where craft specialists work thus evolve first in these central places, not in smaller settlement in the countryside.

Obsidian is the primary medium in lithic assemblages at archaeological sites from many regions of Mesoamerica: for example, Central Mexico, West Mexico, Highland Guatemala, Honduras, El Salvador, and the Gulf Coast of Mexico (Figure 1) (Gaxiola and Clark 1989). From the Classic period onwards the main tool produced in obsidian was the prismatic blade, but obsidian also was utilized to make bifacially flaked knives, unifaces, scrapers, projectile points, and other chipped stone tools. Studies of lithic assemblage variation often emphasize how the tools were manufactured (Aoyama 1999, 2001; Clark 1986; Clark and Bryant 1997; Hirth and Andrews 2002a; Santley et al. 1986), while others deal with the uses to which the tools were put (Burleson 1999; Lewenstein 1987). Still other studies reconstruct ancient exchange because the sources of material can be determined through trace elemental analysis (Cobean et al. 1991; Santley and Pool 1993; Stark et al. 1992). Most obsidian studies rely on material from excavated contexts where there is good chronological control. Very rare are studies using assemblages from surface survey.

This paper presents information from an archaeological survey of the site of Ranchoapan, a prehispanic center that had obsidian tool production as its major craft specialization. In particular, I am interested in testing the rural economy-first and city-first hypotheses using information on the history of obsidian working in the Tuxtla Mountains of southern Veracruz, Mexico. My evaluation of this evidence is in several parts. First, I discuss the methods employed to collect and analyze the archaeological data. Next, I reconstruct the spatial structure of the Ranchoapan site, outlining major patterns of occupation through time and across space. I then discuss the distribution of obsidian artifacts at the site and delineate major trends in assemblage content. I close by placing the materials from Ranchoapan in historical context and compare the development of the obsidian industry to other specialized crafts in the Tuxtlas region.

FIELD WORK AND ANALYTIC METHODS

The archaeological site of Ranchoapan is located in the Tuxtla Mountains of southern Veracruz, Mexico (Figure 2). The prehispanic occupation today occurs directly to the south of the modern community of San Andres Tuxtla and may extend under it. The site consists of a dense scatter of pottery, obsidian, and other artifacts distributed over an area of at least 91.6 ha. Surrounding this concentration is an area of lower density prehistoric occupation that may represent the site’s suburbs. Local informants report that the downtown part of the site contained a complex of public building that had been destroyed by the time of the survey. Ranchoapan was discovered in 1991 during an extensive archaeological survey of the region and revisited the following year to collect additional information on the distribution, date, and character of the surviving archaeological remains.

Survey data from Ranchoapan were collected in two stages. The first was an extensive reconnaissance of the site and its immediate environs. The survey methodology employed
was the same as that used in the reconnaissance at other sites in the Tuxtlas (Santley and Arnold 1996). Teams of five to six archaeologists and workmen walking 40 m apart initially determined the boundaries of prehistoric occupation by plotting variations in the density of surface materials on 1:5000 aerial photographs. The crews also mapped the location, size, and configuration of all mounded architecture and collected artifacts to date the occupation. Surface collecting involved the retrieval of artifacts from areas approximately 20 by 20 m. These collections were "uncontrolled"; not all artifacts were retrieved from collection loci, and due to time constraints the surface vegetation was not removed to enhance surface visibility.

Following this extensive reconnaissance an intensive survey was conducted to collect information on the precise distribution of archaeological remains. After the establishment of a primary datum, base point of 0:0 on the site grid, a set of transects was laid across the site at 40-75 m and 3 by 3 m controlled surface collections obtained at 13 m intervals along each transect. The provenience of all squares was tied to the primary datum, and after vegetation removal all artifacts from each unit were collected for later analysis. Each surface unit was not screened though ever attempt was made to retrieve small lithic artifacts. This survey provided detailed information on site configuration, function, chronology, and internal spatial variation. The intensive survey at Ranchoapan produced 1,549 surface collections involving 23,517 artifacts from an area 1.25 sq km in size. The total area collected amounted to 13,941 sq m or a sampling intensity of 1.1%. Except for Matacapan this was the largest number of surface samples retrieved from any site surveyed in the Tuxtlas to date (Santley 1994a).

All artifacts were classified using the system previously established at Matacapan and other sites in the Tuxtlas (Santley 1994a; Santley and Arnold 1996; Santley et al. 1989; Pool and Britt 2000; Arnold 2003). Special attention was paid to lithic material. The obsidian artifacts retrieved from the survey were analyzed using the typology developed by Healan and Kerley at Tula (Healan et al. 1983). This classification involved specification of the form in which different classes of material were imported, intermediate forms produced during the process of reduction, final tool types, and kinds of debitage generated during each stage of lithic working (Santley et al. 1986). A total of 63 lithic artifact types were consequently defined during the analysis of the assemblages, first from Matacapan, later from Ranchoapan, and finally for sites throughout the Tuxtlas region. There were three major types of obsidian that reflected the import of material from different sources: black obsidian from Zaragoza, clear obsidian from Guadalupe Victoria, and green obsidian from Pachuca. Obsidian "color" is a good indicator of source utilization in the Tuxtlas, and when combined with raw material quality it is an excellent gauge of source reliance (Santley et al. 2001). High quality material from all three sources was typically relied upon for prismatic blades, while lower quality obsidian was the preferred medium for bifaces, unifaces, and other flaked tools. Several additional sources were represented in very nominal amounts. These are not discussed here.

Definition of internal site structure was the major objective of the site survey. Site structure refers to patterning in the distribution of archaeological remains. Such patterning is often spatially discrete; that is, it reflects activities that occurred at different places within
a site. In other cases the patterning is much less variable, mirroring behavior common in all contexts such as food preparation and consumption. There are a variety of methods for investigating patterning across a landscape. Some rely on techniques that produce statistics summarizing patterns (e.g., nearest neighbor analysis), while others produce graphical results.

This study utilized the computer-assisted plotting program, SURFER, to generate isopleth maps showing the surface distribution of different classes of archaeological remains. When using computer programs of this type, the analyst has many interpolation algorithms from which to draw. In this study Kriging was the interpolation method chosen because it assumes that the array of points is distributed across a landscape in a systematic manner. Thus, unless there is good reason to the contrary, it will draw maps with lines that sometimes extend off the plot. All interpolations were computed based on calculations to the nearest 10 surface collections. Each isopleth map was produced using the same interpolation method and boundaries, although the plotted “contour” interval was allowed to vary from one map to the next depending on the range in frequency of archaeological materials plotted in each.

SITE STRUCTURE

Ranchoapan is one of the largest archaeological sites from any time period known from the Tuxtlas. It dates primarily to the Middle and Late Classic periods (A.C. 450-1000), although modern trenching has exposed deposits dating to the Middle Formative period (1000-400 B.C.). Surface occupation from all time periods covers about 91.6 ha, but the site may have been twice that size at its peak if areas of nearby suburban occupation are included in the final tally (Figure 3). Within this area are parts of the site that contain substantial quantities of archaeological remains, while elsewhere there is little or no material, suggesting the presence of clear areas that separated small neighborhoods of more densely nucleated occupation where the ancient population physically resided and dumped its trash. Several of these hotspots are situated around a large clear area that may have been the site’s main plaza. Interspersed throughout the area of low-density accumulation are small zones of sherd buildup that were probably also produced by nearby households. The comparatively empty areas may have been used as small gardens or infields if the house lot was the basic unit of household residence in Classic times. The size of that population is difficult to measure accurately, although an estimate of 2700-5000 seems quite reasonable using the Basin of Mexico methodology (Sanders et al. 1979).

The major occupations at Ranchoapan date to three time periods: the early Middle Classic (A.C. 450-550), late Middle Classic (A.C. 550-650), and Late Classic (A.C. 650-1000). Throughout its history the Classic period site contains several hotspots or areas with substantial archaeological remains. The largest hotspot is located in the northern part of the site, henceforth termed the North Barrio; however, there are several other smaller zones of high-density occupation to the east, south, and west. Zones that are largely devoid of archaeological remains separate these areas of surface buildup from one another. The hotspots contain material from all three periods, indicating considerable residential continuity over the time frame under consideration. Some of the pottery types recovered
during excavations and survey at Classic period sites in the Tuxtlas cannot be assigned to a specific phase with any certainty. A review of the archaeological ceramics from the Ranchoapan hotspots indicates that all contain the full range of wares and vessel forms in common usage during the Classic. Present as well are figurines, obsidian, fired earth, and occasionally ground stone. These results suggest that each hotspot was the product of a group of basic domestic units likely organized on the nuclear or extended family household level. The fact that there is significant continuity of occupation over several centuries of time further implies the presence of residential units that reckoned ancestry back more than 3 generations (e.g., lineages). Supra-familial kinship connections today in the Tuxtlas are certainly major factors determining long-term residence at the same place, and I suspect that they also were a primary concern in the past.

Maps of the distribution of the remains of the early Middle Classic (EMC), late Middle Classic (LMC), and Late Classic (LC) occupations are presented in Figures 4-6. The EMC site covers 44.4 ha, the LMC site 27.7 ha, and the LC site 64.2 ha. The area occupied by these components generally overlaps, as do the areas of high, moderate, and, low-density occupation. High density is defined as any part of the site with 19 or more sherds per collection, based on my previous work at Matacapan and other sites in the Tuxtlas (Santley 1994a, 1994b; Santley and Arnold 1996; Santley et al. 1997). During the EMC high-density occupation covers 1.5 ha; it later decreases to 0.4 ha in the LMC but rises to a peak of 2 ha in the LC. Moderate-density occupation is defined as any collection with 6-18 sherds. These samples are distributed over an area 2.3, 5.3, and 14 ha in size during the EMC, LMC, and LC periods respectively. Expectably the zone of low-density occupation, or any part of the site with 1-5 sherds per collection, covers the largest area of all: 40.6, 22, and 48.2 ha respectively.

Throughout its history Ranchoapan was a low-density site. Its dispersed ancient population produced dumps that only rarely contained much material and hardly ever were concentrated in the same spot. This conclusion does not apply to special sites such as Matacapan, Comoapan, and El Salado. There the density of hard refuse in certain contexts was much greater because its production was by specialists who sometimes worked in or were attached to large-scale industries that generated ceramic garbage in big volume (Santley 1994b; Santley et al. 1989).

**SPECIALIZED LITHIC WORKING AND USE**

Ranchoapan was chosen for intensive surface survey partly because one sector of the site, the North Barrio, contained a large quantity of chipped stone. The lithic medium preferred was obsidian. Because the closest obsidian sources in central Veracruz are approximately 250 km distant, all of this lithic material was obtained by long-distance exchange. INAA indicates that most material came from the Zaragoza source, though obsidian from other Gulf Coast sources such as Guadalupe Victoria and Pico de Orizaba and deposits in Central Mexico and Guatemala is present as well (Figure 7) (Santley et al. 2001). Almost all of the Zaragoza obsidian is black in “color.” There is also clear obsidian from Guadalupe Victoria but very little green material from Pachuca, the major deposit in Central Mexico dominated by Teotihuacan during the Classic period. Green obsidian is fairly
common at large centers such as Matacapan and Teotepec during the Middle Classic. Even though Ranchoapan is only 5 km west of Matacapan and occupied at the same time, it was apparently left out of this distributional loop.

The obsidian assemblage consists of material from two industries: core-blade and flake tool. The core-blade industry was the major one. Although blocks, fluted cores, and blades also were traded from the source regions, the core-blade industry at Ranchoapan, as well as at many other sites in the Tuxtlas, mainly involved the import of macro-cores that were subsequently reduced to prismatic blades (Santley and Barrett 2002). The second industry was devoted to the production of flaked tools such as knives, points, engravers, and scrapers. Most prehistoric sites in the Tuxtlas contain some obsidian, indicating that lithic tool production and use were routine activities that were carried out in a variety of contexts, many domestic but others highly specialized. At Matacapan the density of obsidian is about 0.02 per sq m, an amount that is fairly typical for most sites. Ranchoapan, however, is unusual because the majority of the obsidian assemblage there occurs in only one of the site's neighborhoods, the North Barrio. Moreover, the average density of material at Ranchoapan is greater: 0.12 per sq m. There is even more lithic material within hotspot in the northern part of the site: 0.11-1.44 per sq m. These findings strongly suggest the presence of specialized knappers who manufactured obsidian tools and may have used the implements as well in some obsidian-consuming task.

Figure 8 plots of the distribution of obsidian at Ranchoapan. As is readily apparent, the material is primarily confined to the North Barrio. The surface obsidian cannot be micro-phased, but based on ceramic associations the lithic assemblage probably dates mainly to the latter half of the first millennium A.C. The areas where obsidian and pottery are common closely coincide, indicating that they are from the same dumps. The middens therefore contain both general household refuse and obsidian material. The area where the obsidian is concentrated covers approximately 3.5 ha, making it the largest discovered thus far at any site in the Tuxtlas (Figure 9). This concentration contains macro-debitage, percussion blades, prismatic blades, errors incurred during blade removal, exhausted fluted cores, and flaked tools and flakes from their production. The density of obsidian in this concentration, 1-13 pieces per collection, is also among the highest recorded at any site in the region. This figure compares very favorably with densities reported at obsidian workshops at centers in Central Mexico like Tula (Healan et al. 1983) and Teotihuacan (Spence 1981). For example, at Tula there was a 2 sq km area devoted to obsidian working. The Tula example is further instructive because the craft at Ranchoapan may have been organized very similarly. At Tula production was by a household industry situated near the boundary of the settlement, and the specialists were probably part time since some household subsistence was also gained from weaving or embroidery and in all likelihood agriculture as well.

Most of the obsidian assemblage from Ranchoapan is composed of prismatic blades from the Zaragoza source. Many of these blades are fine prisms. Their ridges and lateral edges are completely straight and parallel to one another. The presence of debitage from macro-core and subsequent fluted core reduction indicates that the obsidian blades were produced on site; however, many blades also have moderate-to-heavy damage from use-wear on their edges, indicating utilization in some obsidian-consuming activity. Exactly
what this task was is difficult to say. One possibility is the butchering of meat. Use-wear studies of prismatic blades from Isla Cilvituk and the Copan Valley, both in the Maya region, come to the same conclusion (Aoyama 1999; Burleson 1999). The pattern of alternate lateral scarring on the ventral and dorsal sides of the use edges on many of these prismatic blades is consistent with this interpretation, but present data from Ranchoapan are insufficient to resolve the question. The data also indicate that many blades are missing; in other words, they are not present in the number one would expect in an assemblage where most tools were ultimately discarded at the primary use site (Santley and Barrett 2002). Many of these prismatic blades were likely thrown away off site, and as a result settlements like Ranchoapan are probably surrounded by a great number of low-density scatters of spent blades.

Another possible usage is textile production, specifically the cutting of thread and woven cloth. Many of the blades from Ranchoapan exhibit very little evidence of use. This does not mean that the blades were not utilized for some purpose, only that there is no wear that is observable using a 10X hand lens. Prismatic blades from Kaminaljuyu and Isla Cilvituk, for example, were also frequently "unused," but they have edge damage that is readily visible with scanning electron microscopy (Hay 1978; Burleson 1999). Interestingly, cutting thread and cotton cloth are activities that should produce very little, easily noticeable edge damage. Three other lines of evidence suggest that this idea is a very feasible proposition. First, the Tuxtla was a cotton production region at the time of the Spanish conquest, sending tribute in cotton and likely also textiles to the Aztec capital of Tenochtitlan (Stark 1978). Second, the obsidian production hotspot produced many of the few spindle whorls recovered from the surface survey. Spindle whorls are very rare artifacts in any surface assemblage from the Tuxtla; however, seven were retrieved from the Ranchoapan hotspot. Almost all are quite small in size, implying use in the spinning of cotton thread (Hall 1997). Finally, there is a major change in the themes represented on clay figurines from the Classic period. EMC figurines are very grotesque, depicting monsters, gargoyles, anthropomorphic and animal hybrids, and other supernatural creatures. In the LMC and ELC, in contrast, many figurines show human females holding bolts of cloth and spinning gear, which indicates the growing importance of textiles in the local economy (Santley, unpublished data).

Many of these blades have worn lateral edges and were obviously used in some heavy-duty obsidian-consuming activity. The amount of wear varies considerably, however. Some specimens have little visible damage, others are heavily worn, and the remainder are somewhere in between. Obviously, the obsidian was put to a variety of tasks, some of which produced significant wear and others much less damage. This pattern of use is not confined to Ranchoapan; rather, it is evident at all sites that have produced any sample of obsidian of reasonable size. This variation is difficult to explain because since obsidian is an exotic medium, the blades should have been routed through a task sequence until complete exhaustion. Thus, once fine cutting was no longer possible, it still should have been used in some coarser cutting activity, and when that task was no longer feasible, the material should have been used in some final heavily-duty cutting task. All blades consequently should have been employed in the activity stream until they were rendered totally unserviceable. This is definitely not the case at Ranchoapan, Matacapan, and other
Tuxtla sites. A second possibility is that different activities required different implements. If this were the case, then there should be a strong association between amount of wear and morphologically different kinds of blades. Data from Ranchoapan do not meet this expectation as well.

My position is that this variation is mainly a function of changes in the ease of access to the long-distance exchange network that furnished the exotic material. For example, during times when access to the system of inter-regional exchange was interrupted, obsidian would have been in short supply and conservation of the material expected for that reason. This situation should produce an assemblage containing a large number of completely exhausted blades. On the other hand, when the amount of material needed was unimpeded, there should be little recycling, and blades with evidence of only nominal use also should be present in the assemblage, perhaps in significant numbers. Both elites and non-elites could therefore afford to be affluent, discarding blades before their edges were completely worn out and consequently limiting the quantity of tools routed into heavier duty tasks. Many situations probably fell in between these two extremes, and the assemblage produced over a time frame equivalent to an archaeological phase ought to contain tools illustrating the complete range of variation in extent of usage.

The second industry at Ranchoapan consists of material from biface manufacture. This industry contains both large and small percussion flakes, small pressure flakes, and biface thinning flakes, some of which were produced using the bipolar technique. Many of these tools were in black obsidian from the Zaragoza source; however, not uncommon was utilization of lesser quality clear material from Guadalupe Victoria. Based on the larger sample from Matacapan the tools produced were probably knives, scrapers, projectile points, and engravers: that is, implements associated with hunting and the later processing of meat. While it is possible that the knappers themselves were the hunters, I suspect that the bifaces were exchanged to a clientele of farmers who hunted the game periodically for their own subsistence. Except for the occasional transport of the whole carcass back to a specialized or residential site, the game was probably butchered at the kill location and the tools that broke during the butchering process were likely also left at that same site. As with prismatic blades, what residential sites are probably also encircled by very low-density scatters of broken kill and meat processing tools.

Were the craft production entities at Ranchoapan specialized? Available evidence indicates that they were. Craft specialists are producers who derive some if not all of their income from the manufacture of goods for exchange beyond the production locus. Because lithic working requires a subtractive technology involving the removal of unwanted masses of material to make implements, the production process should result in the formation of dumps rich in debitage produced during tool manufacture. Also present might be the manufacturing tools themselves as well as unintended results of the production process, for example manufacturing errors and attempts to recover the medium being reduced. The ultimate outcome of lithics specialization should be the accumulation of greater amounts of chipped stone in archaeological deposits than would normally be expected if production did not involve specialized knappers. Put another way, there will be more detritus, material that should be archaeologically visible in terms of absolute number (more artifacts) and density.
(more material per unit of area). If there were specialization in some obsidian-consuming task, on the other hand, a greater quantity of spent tools than would normally be expected should comprise the archaeological assemblage that consequently formed.

Both artifact frequency and density are variables that can be measured using conventional archaeological techniques. The Matacapan survey, which involved 5,707 controlled surface collections, produced 1,404 obsidian artifacts. The Ranchoapan sample, in contrast, includes a sample of greater size: 1604 artifacts from 1549 surface collections. The density of obsidian at Matacapan is about 0.03 pieces per sq m, whereas the mean at Ranchoapan is 0.12 per sq m. The average from the high-density scatter from the main hotspot at Ranchoapan is even higher; it amounts minimally to one artifact per collection, and the density may be as high as 13 per collection in certain parts of the hotspot. In some units from downtown Matacapan the density of obsidian is sometimes greater than 60 artifacts per collection, but these scatters are small in area and never remotely approach the size of the 3.5 ha production zone at Ranchoapan. The Ranchoapan production sector also contains debitage from all stages in the core-blade reduction process: macro-core reduction, striking platform preparation, and prismatic blade removal, and many of the prismatic blades recovered were also used in some obsidian-consuming task. These lines of evidence qualify the hotspots at La Joya as a specialized production zones. Production at La Joya, however, appears to have been generalized; all zones contain the same kinds of material: artifacts indicative of macro-core and pressure core reduction and biface manufacture.

WHAT KIND OF OBSIDIAN CITY WAS RANCHOAPAN?

In her book *The Economy of Cities* Jane Jacobs (1969) describes the growth of development of urban centers, a process that she views as one primarily involving the creation of work. Two kinds of work are germane here: more work and new work. More work refers increases in the number of the same sources of employment: in other words, more of the same jobs. Thus, urbanization and attendant population agglomeration create more specialists of the same type as existed before, knappers for example. New work, in contrast, involves the addition of qualitatively different jobs, sources of employment that did not exist earlier which places the population of small sites in a position of increased dependence on specialists in central places. For example, blade tools, which were not used before, may replace bifaces as the principal cutting implements used by households of consumers. Production of these tools may have required new specialized knowledge, greater skill, or access to better sources of raw material. These new jobs in turn may have been the result of changes in basic production technology, the organization of production, or the structure of exchange, developments that should occur in the region’s major center in accordance with the city first hypothesis.

Many archaeologists might consider development along this line as an apt description of the history of ceramics manufacture in the Tuxtlas region. It is in my opinion. During the Formative period, a time when the Tuxtlas contained little population, pottery production was a domestic endeavor, likely undertaken by many unspecialized households. The wares produced were handmade and primarily open-fired. On the other hand, by the Middle Classic period household industries appeared at Matacapan and other sites in its hinterland
The development of more complex production entities culminated in the LMC and LC when Fine Gray pottery was manufactured in workshops in southern Matacapan and Coarse Orange was produced in manufactories in Area 199 and at Comoapan, both suburbs of Matacapan. These production locations, which were not present earlier, made specific types of pottery for distribution to a market of great regional size. Moreover, manufacture involved a shift from open firing to the use of kilns. Their emergence did not result in the replacement of household industries; this level of production continued not only at Matacapan but also at other sites in the countryside. Rather, it involved the growth of qualitatively new levels of manufacture capable of more effectively producing very large quantities of pottery for distribution throughout the Tuxtlas and to regions beyond. Thus, in the Tuxtlas specialized ceramics production saw first the creation of more work and then new work, developments that occurred when population had grown to a maximum and that happened primarily in the region’s top-ranking center.

Jacobs calls her nascent urban center New Obsidian, and consequently she expects that similar developments should characterize the history of lithics working. The archaeological site she has in mind is Catal Huyuk, an early Neolithic settlement in southeastern Turkey where highly crafted obsidian tools were produced. Is Ranchoapan an example of this kind of community? I think not, for several reasons. First, there are no major developments in obsidian technology from Formative to Classic times. Formative obsidian assemblages from the South Gulf Coast are dominated by a flake industry. In some cases the flakes themselves are the tools, but in many others they represent detritus from biface manufacture. The same technology is employed during the later Classic period, but the tools were produced in lesser quantities. The Formative period assemblages also contain a core-blade industry devoted to the making of prismatic blades. This industry is not numerically predominant early; however, it is present nonetheless. The core-blade industry becomes the principal representative of the assemblages from Classic times until the Spanish conquest not only in the Tuxtlas but also about Mesoamerica at large (Clark 1986, 1987; Clark and Bryant 1997; Santley et al. 1986; Stark et al. 1992; Aoyama 1999; Hirth and Andrews 2002). As near as I can tell, the manufacture of both types of tools took place at centers and smaller sites alike during both time periods. Therefore, what occurred is simply a change in the intensity of making different kinds of tools, not a technological development involving the replacement of one production method by another, as might be expected if the production system created truly new work involving a more efficient manufacturing process. In addition, the Classic period shift in production emphasis did not involve any new special knowledge or skill. It took place using the same technology of reduction throughout the Tuxtlas at sites where there were specialists and at many others where there were not.

Second, there is little evidence that there were major changes in the organization of lithics production. As we have seen, most Formative period ceramics manufacture involved production by small-scale household industries; specialists working in workshops and manufactories later augmented and ultimately began to replace these household producers. This development does not characterize prismatic blade production. Manufacturing efficiency can be increased if production is staged; in other words, if knapping involved groups of lithic workers who made tools on an assembly line basis, with each contributing to only one phase of the reduction process at the same time as the others (e.g., macro-core
reduction, striking platform preparation, blade removal, and waste disposal). Production entities of this type should generate spatially segregated dumps that contain only certain classes of material. This is not the case at Ranchoapan or at any other site in the Tuxtlas. The middens from all households are very similar, and they are very generalized, containing all classes of material produced during the manufacturing process. Moreover, the dumps contain large quantities of domestic trash, which would be expected only if production were small-scale and primarily occurred in household contexts. Jacobs also states that rural economies are built on city economies and city work. This “city first” hypothesis is not supported by the evidence from the Tuxtlas which clearly shows that specialization at Ranchoapan emerged from a Formative period substratum involving the domestic mode of production. Production in Classic times did involve specialists; however, there was still a significant amount of blade and flake tool production at many rural sites. Moreover, the specialization did not require any advance in knapping technology that would have selected for increased complexity in the organization of production.

Finally, there are no changes in source reliance that involved the replacement of one group with another from Formative to Classic times, as would be expected if producers manipulated or monopolized access to obsidian from deposits with better material. Clear obsidian from Guadalupe Victoria, a source of less quality material, was consistently relied on in the Formative and Classic periods as the primary source for biface material, whereas black obsidian from Zaragoza was the preferred medium brought in for prismatic blades throughout the sequence. Although there are changes in the degree of source reliance, these are mainly a function of shifts in the contribution of each industry to the content of the assemblage. Jacobs’ model of urbanization expects that city formation is a process accompanied by the creation of new work. This is a process that might require replacements in the obsidian sources relied upon. This is an expectation that the assemblages from different time periods in the Tuxtlas do not meet. What occurs is a shift in production emphasis and not the replacement of one technology by another. Put a different way, the same tools were manufactured throughout the sequence but at changing levels of intensity.

Ranchoapan is not the only site in the Tuxtlas Mountains that specialized in obsidian working. The best evidence comes from La Joya, a Formative period site located directly to the southwest of Matacapan (Santley et al. 1997) (Figure 10). Although the site was also occupied in Early and Middle Formative times (1,400-400 B.C.), its most substantial occupation dates to the Late Formative period (400 B.C.-A.C. 100). The obsidian assemblage from La Joya is dominated by clear obsidian from Guadalupe Victoria, though black material from Zaragoza is present as well. Most of the obsidian consists of small flakes and percussion flakes that were produced using a bipolar technology. While we originally thought that these flakes were bits in manioc graters, it now appears very likely that they are debitage from biface manufacture. The density of obsidian at La Joya is the highest of any Formative period site in the Tuxtlas and compares very favorably to the concentration in the North Barrio at Ranchoapan. Moreover, the high-density scatter occurs throughout the occupation zone, implying a site-wide specialization. This material is mixed with domestic trash; pottery, figurines, ground stone, and food remains are present in great amounts in the same middens, a finding that suggests that the obsidian tools were produced in household contexts and not in workshops. As at Ranchoapan, there are very few bifaces
in the assemblages, and since most of these tools were likely hunting implements, they therefore were probably discarded off site where game was killed and the meat butchered. The same lithic assemblage occurs at most other Formative period sites, indicating that production at La Joya involved more of the same kind of work, not the new kind of work that would be expected under the city first hypothesis. In addition, this specialization occurred in a village and not an urban central place.

El Salado is prehispanic settlement that had a different specialized function: salt making (Santley 1994b, 2004) (Figure 11). The site has two principal occupations. During the Early Formative period (1400-1000 B.C.) salt production was small scale and involved two production methods: solar evaporation (sal solar) and brine reduction in cooking vessels (sal cocida). Salt production using the boiling method in pottery appears to have taken place near domestic residences, but its manufacture by solar evaporation was restricted to locations adjacent to a nearby salt spring. This Early Formative specialization likely was part time. The Late Classic occupation (A.C. 650-1000) at El Salado was much more substantial and the salt making probably full time. The site can now be divided into two major zones of occupation: an area of high-density refuse accumulation where most of the salt was produced using the boiling method, and a lower-density area where the salt makers physically resided and some salt was made. The high-density workshop area was segregated from the habitation zone probably because the volume of trash the salt making process produced was exceedingly great; literally tens of thousands of vessels were broken during the brine-to-loaf reduction process, and the salt makers resided in a spatially separated location for that reason. This more intensive production is associated with a dramatic increase in regional population. It also took place at the resource deposit and not at a nearby urban center because transport of the basic raw material, salt water, to the nearest central place would have been exceedingly expensive given the prevailing very costly foot mode of transit that integrated the region.

I suspect that Jacobs is on the right track when she submits that new work will put rural sites in a position of greater dependency on urban crafts. This is a process that characterizes the history of pottery production in the Tuxtlas. The city first model therefore clearly has merit as far as ceramics manufacture is concerned. However, the hypothesis does not characterize the history of obsidian working. Specialized production there apparently involved only the creation of more of the same kind of old work. Here the rural economy first hypothesis probably has greater explanatory import. The history of salt making in the Tuxtlas resembles that for ceramics production: the development of a site specialization as would be expected under the city first hypothesis. This specialized production, however, did not occur at a major center but at a small rural village, El Salado. The same may be said for La Joya, a village south of Matacapan that specialized in obsidian biface production during the Late Formative. Other specializations such as ground stone and ceramic figurine manufacture may fall in between. Different specializations in the Tuxtlas therefore had variable histories because they operated under different constraints. Some conform to the city first hypothesis while others apparently behaved quite differently, with some involving site-wide village specialization in the countryside.

SUMMARY AND CONCLUDING REMARKS
Situated only 5 km west of the main center of Matacapan, Ranchoapan is the second largest archaeological site discovered thus far in the Tuxtlas. The main occupation zone covers 91.6 ha, but the area occupied during any specific phase is smaller in size and the density of occupation much less. The site, however, does contain several hotspots where surface artifacts are concentrated, the likely result of nearby population aggregates. One of these zones of artifact buildup also contains a dense concentration of obsidian, suggesting the presence of a specialized lithic working area. The material present includes obsidian that was reduced to prismatic blades. Also there are the blades themselves, many of which exhibit evidence of use, and material from biface manufacture, tools produced for use off site where they were probably often discarded. The suite of activities represented in the obsidian working area was therefore quite generalized despite the fact that production and use were by specialists. The same activities also took place in unspecialized domestic sites occupied mainly by farmers throughout the Tuxtlas, indicating that the specialization at Ranchoapan primarily involved the creation of more work using existing technologies and not the generation of new work that would have made the countryside more dependent on the economy of urban centers. Exactly what this work was is difficult to say, but I suspect the butchering of animal game and the subsequent sale of meat to a clientele of both urban and rural consumers. Farmers living in the rural hinterland probably hunted game for their own consumption as well. Another possibility is textile production. It is also possible households at Ranchoapan were jacks of all three trades, making blades, hunting game, and weaving cloth.

Ranchoapan and the greater Tuxtlas region thus exhibit only a partial fit to the models of economy often described by urban geographers and central place theorists who conform to the city first hypothesis. Production at Ranchoapan was simply a bigger version of the economy exhibited at small sites. As a result, both kinds of settlements were occupied not by specialists but mainly farmers who cultivated the landscape and subsisted on its produce. I feel that this is a good characterization of the economy of prehispanic societies in many parts of the New World. Control of land rather than domination of emergent craft specialization therefore probably played a much greater role in the rise and subsequent configuration of early complex societies. This is not a new idea, but it is one that available data from the Tuxtlas very much support. To be sure, increasing complexity creates specialization and economic stratification, but the craft specialists often are disenfranchised peasants, persons who change their livelihood because they do not have access to a sufficient amount of agricultural land to meet their subsistence needs. In addition, when specialized production is small scale, the craftsmen are rarely controlled by elites because they gain too little from their management. Interestingly, this is a process that can occur at any level in the settlement hierarchy. This may be the reason why craft specialization in the Tuxtlas took place not only at major urban places but also at small villages. Ranchoapan had its obsidian workers, Matacapan had its potters, El Salado had its salt makers, and La Joya had its flake tool knappers. Some of these craftsmen were full time and others part time. Yet other Classic period sites probably specialized in the manufacture of ground stone and ceramic figurines. Further still are a number of small Classic sites with “unusual” concentrations of surface artifacts whose specialties and function in the regional system are currently unknown. A more complete characterization of the role that specialization played
in the history of the regional economy of the Tuxtlas consequently must remain a problem for future research.

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Figure 1: Map of Mesoamerica.
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Figure 4

The map shows the RANCHOAPAN area within the context of THE TUNITLAS region. The map is based on 5,307 sherds from 1,549 surface collections. The vertical scale is in sherd's per collection square, and the lateral scale is in meters. North Barrio and Possible Plaza are indicated on the map.
Figure 6

NORTHING

LOWLAND PLAIN

POSSIBLE PLAZA

NORTH BARRIO

THE TUXTLAS

VERTICAL SCALE IN SHERDS PER COLLECTION SQUARE

MAP BASED ON 6,505 SHERDS FROM 1,549 SURFACE COLLECTIONS

LATERAL SCALE IN METERS
Figure 3

Map of RANCHOAPAN in the TUXTLAS region. The map is based on 1,604 artifacts from 1,549 surface collections. The vertical scale in artifacts per collection square is shown. The lateral scale is in meters.
Figure 10

LA JOYA

NORTH BARRIO

WEST BARRIO

SOUTH BARRIO

SOUTHERN SUBURB

EASTERN SUBURB

NORTHING

VERTICAL SCALE IN SHERDS PER COLLECTION SQUARE

LATERAL SCALE IN METERS

MAP BASED ON 14,074 SHERDS FROM 589 SURFACE COLLECTIONS

THE TUXTLAS
Figure 11

EL SALADO

LOWER-DENSITY SALT-MAKING AND HABITATION ZONE

THE TUXTLAS

HIGHER-DENSITY SALT-MAKING ZONE

MAP BASED ON 39,845 ARTIFACTS FROM 144 SURFACE COLLECTIONS

LATERNAL SCALE IN METERS

VERTICAL SCALE IN SHERDS PER COLLECTION SQUARE
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