8

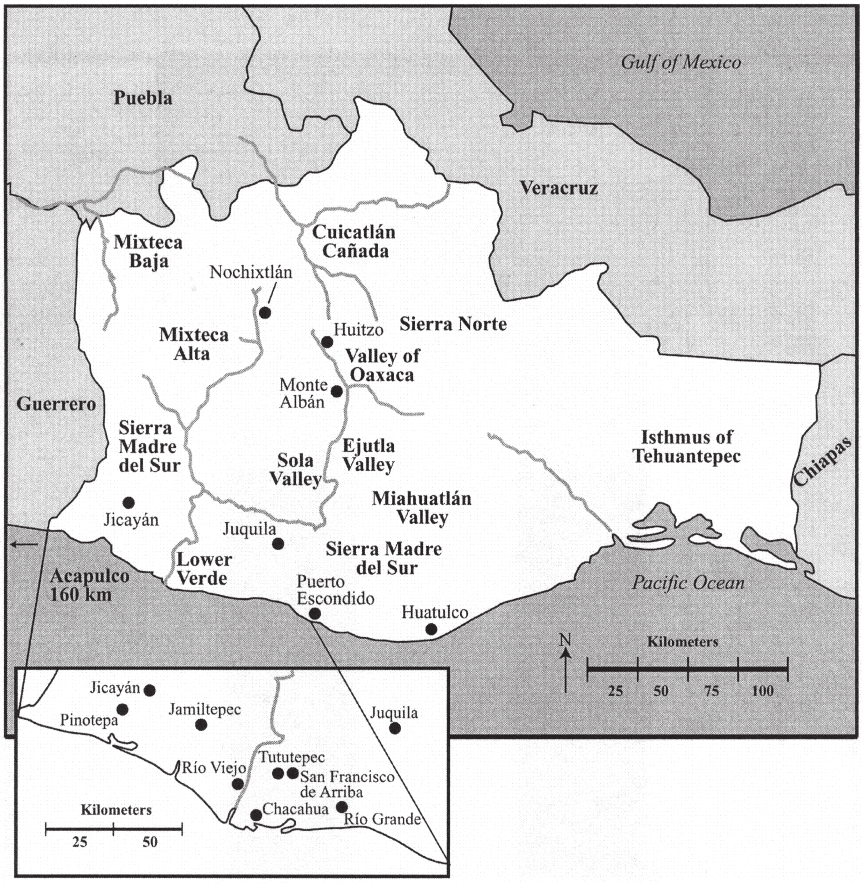
Stacie M. King

Interregional Networks of the Oaxacan Early Postclassic

CONNECTING THE COAST AND THE HIGHLANDS

INTRODUCTION

Rulers of successful highland Mesoamerican cities, such as Teotihuacan and Monte Albán, had good reason for establishing and maintaining ties with coastal Oaxacan communities during the prehispanic era. The climatological and ecological regime of coastal Oaxaca made it a highly valuable and politically important region throughout prehispanic and early Colonial Mesoamerica. The raw material for many desirable Mesoamerican luxury goods, such as feathers, marine shell, *pupura* dye, cacao, and cotton were abundantly available in coastal Oaxaca, as were salt and palm products (e.g., oils and fibers) (Byland and Pohl 1994; Feinman and Nicholas 1992; Monaghan 1994; Spores 1993). The lower Río Verde Valley, in particular, has extremely fertile agricultural land owing in part to the alluvial deposition of eroded topsoil from the highlands along the coastal plain (Figure 8.1) (Joyce and Mueller 1992, 1997). The lower Verde site of Río Viejo grew to its largest size and maintained control over a vast coastal area during most of the Classic period (250–800 CE) (Joyce and King 2001; Joyce and Workinger 1996) in part because of the wealth and power generated from managing the export of coastal resources to the highlands.



8.1 Map of Oaxaca, showing regions, sites, and towns mentioned in the text.

Based on ethnohistoric documents, we know that exchange networks between the coast and the highlands were important during the Late Postclassic and early Colonial periods. Mixtec Lord 8 Deer Jaguar Claw's choice to establish operations at Tututepec in the twelfth century CE can be viewed as a strategic decision to build his political power and reputation prior to his return to the highlands (Byland and Pohl 1994; Joyce et al. 2004; Smith 1973; Spores 1993). In addition, a coastal ally no doubt ensured highland Mixtec a steady supply of raw materials for elite luxury goods. This chapter addresses the evidence for the continuity and discontinuity in trade relationships between the Classic and Late Postclassic, or following the "collapse" of the Classic period state around 800 CE and prior to Mixtec entry into the coast between 1000 and 1200 CE (see Chapters 1 and 7). I argue for the presence of strong interregional connections between the Oaxaca Coast and the Mixteca Alta

during the Early Postclassic and examine the evidence for interregional connections between Early Postclassic coastal Oaxaca and neighboring regions, both within and beyond the borders of contemporary Oaxaca.

Excavations at the coastal site of Río Viejo revealed a vibrant Early Postclassic community that was connected to multiple networks of exchange. Coastal residents were specialists in the production of cotton thread and cloth, which they likely exchanged for obsidian, an important and heavily used highland commodity. I argue that the primary interregional exchange routes used for trade and communication during the Early Postclassic connected the coast to the highlands, and specifically the lower Verde to the Mixteca Alta and beyond to include Cholula and Tula. The coast-highland trade route through the Mixteca Alta was more heavily used than was a transcoastal exchange network or a direct trade relationship with the Valley of Oaxaca.

This discussion is based primarily on an analysis of the domestic artifact assemblage recovered in excavations at Early Postclassic Río Viejo, located along the lower reaches of the Río Verde drainage on the coast of Oaxaca, Mexico. The clustered residences in two neighborhoods of Río Viejo yielded ample evidence of domestic activities, including food preparation, spinning and weaving, ceramic manufacture, and stone tool use and production (Joyce and King 2001; King 2003). The data show that residents of Río Viejo were well connected to multiple networks of interregional exchange through which obsidian was imported, manufacturing and stylistic conventions of ceramic production were shared, and cotton cloth was exported. However, residents lacked access to copper bells produced or distributed by people in other regions of Mesoamerica. Based on this evidence, I suggest that residents of Río Viejo were either distanced from some networks of exchange or were selective about the exchange networks they supported and supplied.

RÍO VIEJO DURING THE EARLY POSTCLASSIC

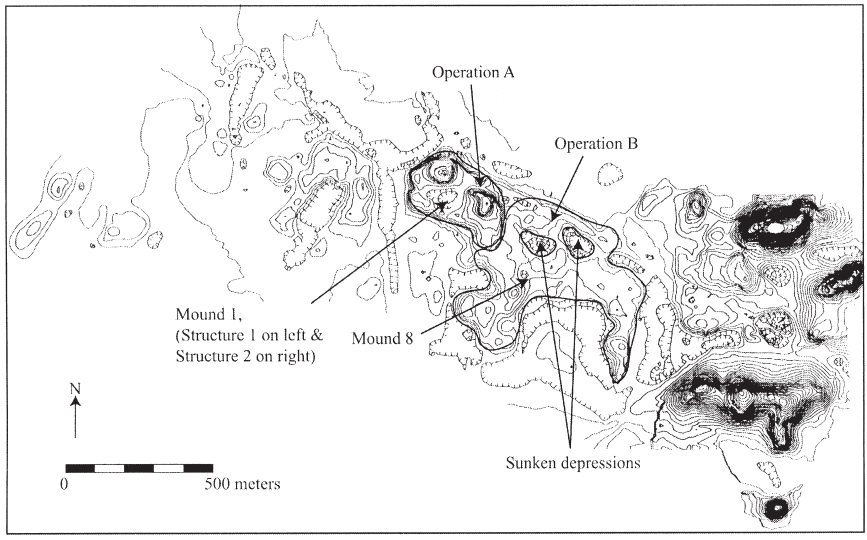
The cumulative results of work at Río Viejo show that the site was first occupied during the late Middle Formative (500–400 BCE) and grew dramatically during the Terminal Formative (150 BCE–250 CE). During the Late Classic (500–800 CE), Río Viejo reached 250 to 300 hectares, its largest size of any period of occupation, larger than any other site in the region (see Chapter 7 for an extensive discussion of settlement distribution in the lower Verde from the Classic to the Postclassic). Joyce and colleagues (2001) have proposed that Río Viejo was the capital of a state polity during the Late Classic. Seventeen plain and pecked monoliths, carved stone monuments (stelae), and standing three-dimensional stone sculptures have been recorded at Río Viejo, which date to the Classic period (Urcid and Joyce 1999). Four of the carved stones depict elite personages with elaborate headdresses accompanied by

glyphs, which presumably represent the calendrical names of these rulers and suggest the presence of a ruling dynasty at Río Viejo during the Late Classic. The ceremonial center of the site was the acropolis, which measured 350 meters by 200 meters, supported several large structures and was elevated up to 15 meters above the floodplain (Joyce and Workinger 1996).

Although it was once presumed that Río Viejo was gradually abandoned following the Late Classic, the results of the 2000 field season show that Río Viejo was reduced to only about half the size, or 140 hectares, during the Early Postclassic (see Chapter 7; Joyce et al. 2001). However, large mound construction and carved stone production ceased by the Early Postclassic, and the once-ruling political regime was no longer in power. Instead, the entire Early Postclassic community of Río Viejo consisted of rather humble residences built on top of Late Classic period platforms and mounds (Joyce and King 2001; King et al. 2000). Joyce and colleagues (2001) have proposed that the Early Postclassic occupants at Río Viejo were commoners who actively resisted Late Classic period elites by restructuring political ideologies and reshaping their community during the Early Postclassic in the heart of the once-sacred ceremonial precinct.

Lower Río Verde Valley sites during the Early Postclassic lacked many of the features commonly associated with political and economic centralization. Ceremonial centers and monumental architecture were absent at all sites, and excavation data showed that socioeconomic status was not sharply differentiated. However, Río Viejo residents were still very much part of the greater Mesoamerican world and had access to ideas and goods from distant regions. Within this period of occupation (most likely between 975 and 1220 CE based on calibrated AMS dates[1]), numerous people and families cycled through the buildings at Río Viejo. Archaeological evidence reveals a rich and varied set of domestic activities, including house construction, food preparation and eating, spinning and weaving cloth, figurine and ceramic production, and performing religious rituals.

The Río Viejo Residence Project was designed in collaboration with Arthur Joyce to investigate the form and nature of Early Postclassic household social organization and included excavations in two separate Early Postclassic residential neighborhoods (Figure 8.2). In all, portions of twelve houses and associated exterior spaces were excavated in both of these Early Postclassic neighborhoods. Large horizontal exposures revealed architectural features, burials, and items used in domestic activities. The artifacts and architecture uncovered in both areas suggested few differences in social roles and status, based on the lack of differentiation in luxury goods and the standardization of domestic assemblages and architecture. Residents of both neighborhoods lived in highly uniform, modest, single-roomed rectangular houses, which were organized into dense barrios with no discernible site center or specialized ceremonial plaza.

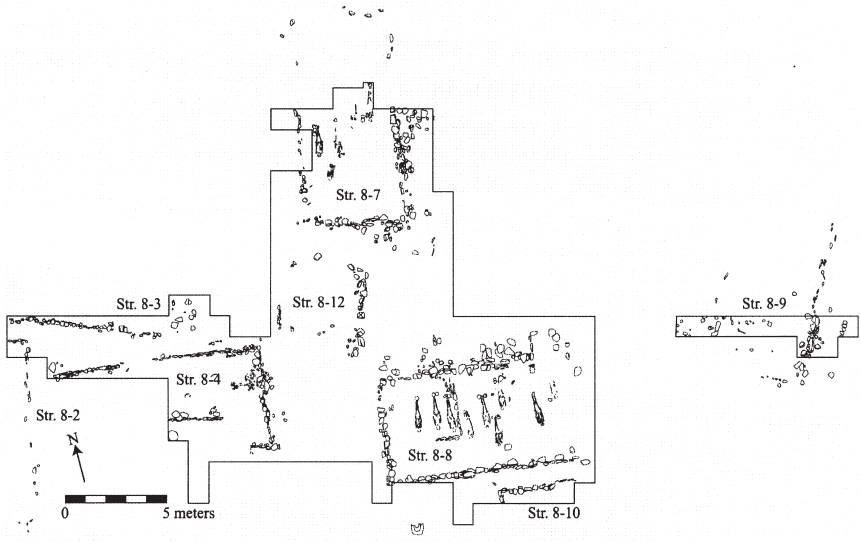


8.2. Map of Río Viejo. Adapted from Joyce et al. 2001.

The Operation B neighborhood of Río Viejo (the subject of this chapter) lies on a low broad platform elevated about five meters above the floodplain. Here, surface visible foundation walls mark the presence of several dozen structures. A total of 284 square meters was excavated in Operation B, including two complete structures, over half of two others, and small portions of another three (Figure 8.3; Joyce and King 2001). This neighborhood encompasses two phases of occupation, three major stages of construction events, and numerous smaller-scale discrete activities (King 2003). Exterior work areas appear to have been relatively limited, especially since even the presumed "patio" space contained remains of yet another structure. The structures all measure roughly five meters by eleven meters and consist of a single room delimited by stone foundation walls. These foundations likely supported perishable superstructures covered in daub, fragments of which were found in the post-abandonment rubble. Four small burn features located in Structures 8-4 and 8-8 show some repetitive use of small fires inside houses. Several buildings were occupied, constructed, and renovated at different times during the Early Postclassic, as is evident from fill deposits in the houses. The data used in this chapter are drawn from the Operation B excavations, which I directed.

OBSIDIAN ASSEMBLAGE OF EARLY POSTCLASSIC RÍO VIEJO

The primary imported material at Early Postclassic Río Viejo was obsidian. Residents likely had easy access to the material and its interregional exchange networks based



8.3 Operation B plan, Río Viejo.

on the abundance of non-local obsidian in domestic debris. The chipped stone assemblage recovered in Operation B was primarily composed of obsidian blades, small pressure flakes, and chert projectile points. The blades were probably used for a wide variety of cutting purposes since their patterns of discard did not correlate with any defined set of artifacts, and the wear patterns on the blades were not consistent with any specific defined task. The obsidian assemblage is largely composed of finished prismatic blade tools (75.8 percent), which exhibit wear patterns ranging from none to heavy, with a few examples of extensive retouch. Of the total number of obsidian artifacts (n=1058), 77.0 percent were finished tools, 22.9 percent were flakes, and 0.1 percent was a possible core fragment.

Obsidian found in lower Verde sites was either imported in the form of prepared cores and prismatic blades were manufactured locally, or it was directly imported in the form of prismatic blades. Joyce and colleagues (1995) proposed that starting in the Classic period, obsidian was imported to the lower Verde in the form of prefinished prismatic blades since prismatic blades overwhelmingly dominated the Classic period obsidian assemblage from test pits excavated in and around Río Viejo. However, given the presence of a few possible primary series blades and one possible spent core, the obsidian at Early Postclassic Río Viejo could have arrived in the lower Verde in the form of prepared polyhedral cores (Santley et al. 1986). The somewhat larger flakes and chunks in the Operation B assemblage could have resulted from corrections of manufacturing errors during blade tool produc-

tion, and non-blade obsidian debitage was present, indicating that some amount of manufacture took place on site. Workinger (2002:134) also tentatively concluded that obsidian arrived to the nearby lower Verde site of San Francisco de Arriba in the form of polyhedral cores during the Early Classic.

The density of obsidian found at Early Postclassic Río Viejo averaged 18.2 pieces of obsidian per cubic meter. This exceeds the 9.6 per cubic meter site average calculated by Workinger (2002) for San Francisco de Arriba, located sixteen kilometers away. The difference in the average obsidian densities likely reflects an overall increase in obsidian utilization during the Postclassic (Healan et al. 1983; Rice 1987).

Manufacture, use, and disposal occurred throughout the Operation B residential neighborhood. Early Postclassic lithic debitage was distributed throughout fill deposits, occupation debris, and middens, without apparent concern for treading on sharp objects. Workinger has argued that blades were probably produced from cores in distinct locations at the site of San Francisco de Arriba, since a lithic dumpsite contained high density manufacturing and consumption debris (48.3 per cubic meter) (Workinger 2002:135). None of the excavated contexts at Early Postclassic Río Viejo suggests a specialized obsidian refuse dump, and obsidian debris was mixed with many other kinds of household trash.

Although both chert and obsidian were imported resources, Río Viejo residents relied more heavily on imported obsidian at a ratio of 18:1. This pattern is similar to San Francisco de Arriba, where obsidian comprised 97 percent of the overall lithic assemblage (dating from the Middle Formative to Late Postclassic) (Workinger 2002:295). Obsidian and chert raw materials were used most often to fashion distinct types of tools. The choice of raw material primarily reflects structural differences in mineralogy, hardness, and workability of both materials. However, the use of both obsidian and chert for projectile points shows that some crossover in application existed. Of the fifty-nine chert artifacts found in Early Postclassic contexts, finished tools comprised 33.9 percent of the assemblage, 50.8 percent were utilized and unutilized flakes, and 15.3 percent were cores/chunks. Projectile points were the most common type of chert tool, comprising 25.4 percent of the chert artifacts, with an additional drill, side scraper, and two perforators. In addition, the color of the chert raw material varied and included white, orange, brown, gray, and red varieties, which were often streaked with two or more of these colors. Although specific sources for the chert raw materials are unknown, chert is present throughout the Sierra Madre del Sur range and in the Oaxaca highlands. The Río Viejo chert may have been acquired opportunistically while traveling or trading, or perhaps the swift waters of the Río Verde carried small cobbles of chert downstream, which were then recovered for local use from secondary lag deposits. The presence of large chunks and unutilized flakes with cortex suggest that chert tools were sometimes manufactured

on site from start to finish. Nonetheless, the amount of obsidian far exceeded chert in the Early Postclassic chipped stone assemblage.

Joyce and colleagues (1995) suggest that obsidian prismatic blades were luxury items in the lower Verde during the Classic period, since they were possibly manufactured by specialists elsewhere and imported over long distances. The high density of imported obsidian at Early Postclassic Río Viejo, in contrast, suggests that obsidian was relatively inexpensive and readily available, in spite of the long distance it had to travel. The composition of the obsidian assemblage, with large numbers of used and worn blades, shows that Río Viejo residents were major consumers of blades and did not necessarily control the distribution of obsidian to other Early Postclassic communities in the lower Verde. Most blades showed some degree of wear (81.1 percent), although only a few (1.6 percent) exhibited retouch. The relatively low number of retouched blades further supports the interpretation that obsidian was easy to acquire; as blades were worn down through use, they were apparently discarded rather than retouched to extend their use-life.

Studies of Postclassic period obsidian utilization in the Valley of Oaxaca are based largely on surface artifacts recovered during survey projects, which could not reliably separate Postclassic deposits into distinct Early and Late components (e.g., Appel 1982; Blanton 1978; Feinman and Nicholas 2004; Parry 1990). Nonetheless, Valley of Oaxaca studies show increased amounts of obsidian during the Postclassic as a whole (Parry 1990).

Obsidian at Río Viejo was imported from multiple sources. Of the 810 obsidian blade fragments pertaining to Early Postclassic contexts, clear and green obsidian together comprise greater than 50 percent of the assemblage. Transparent gray, opaque black, and opaque gray obsidian are also represented (Table 8.1). Of the 1,058 fragments of all obsidian from Early Postclassic contexts at Río Viejo, 30 percent were clear, 21.7 percent were green, 20 percent were transparent gray, 20 percent were black, and 8.1 percent were opaque gray. Workinger (2002:339) conducted obsidian source analysis using Instrumental Neutron Activation Analysis (INAA) on excavated material from the coastal site of San Francisco de Arriba. Workinger found that visual identification of green and clear/streaked obsidian correctly identified the Pachuca, Hidalgo, and Pico de Orizaba sources, respectively (see also Braswell et al. 2000). The remaining three kinds of obsidian (blacks and grays) could have been derived from a number of sources, which cannot be reliably identified based on visual inspection but could include the Guadalupe Victoria, Otumba, Ucaréo, and Zaragoza sources, identified by INAA in Workinger's study.

If the visual sourcing of green and clear obsidian is accurate, Río Viejo residents were importing obsidian from the Pachuca, Hidalgo, and Pico de Orizaba sources, located on the border between Puebla and Veracruz. Further, if the visual identification of at least five distinct colors of obsidian can be used as a proxy for different

Table 8.1 Early Postclassic obsidian blade fragment color varieties

Obsidian Color	*Blade Fragments (n)*	*%*
Clear	238	29.4
Green	213	26.3
Transparent gray	147	18.1
Opaque black	143	17.7
Opaque gray	69	8.5
Total	810	100

parent materials, then Early Postclassic residents acquired obsidian from a number of different sources, which might have entailed forging and/or maintaining connections with multiple highland exchange partners.

R. Zeitlin's (1982) study of Early Postclassic obsidian utilization on the southern Isthmus of Tehuantepec, which relies on chemical sourcing, showed that 52 percent of the obsidian was imported from Pico de Orizaba, followed by smaller percentages from a variety of Puebla/Veracruz, Basin of Mexico, and Guatemalan sources. Pico de Orizaba is the nearest obsidian source to the southern Isthmus (385 kilometers) (as it is for the lower Verde at 325 kilometers) and proximity, he argued, may in part explain its heavy utilization. Although no one knows for sure who was mining the Pico de Orizaba obsidian, Mixteca-Puebla ceramics have been found in the Cotaxtla region near the Pico de Orizaba source. Based on the presence of these wares, Daneels (1997) has hypothesized that Postclassic utilization of Pico de Orizaba obsidian might be linked to increasing demand from Cholula. Also, in the nearby Mixtequilla region of Veracruz, 87 percent of the obsidian in contexts dating from 1200 to 1350 CE has been sourced to Pico de Orizaba (Heller and Stark 1998). During the Early Postclassic, increased production at the Pachuca source was possibly linked to demand for obsidian at Tula (Braswell 2003; Healan 1993). The presence of Pico de Orizaba obsidian from both the Puebla/Veracruz region and Pachuca obsidian from Hidalgo in coastal assemblages, therefore, could suggest that coastal residents had connections to the same market networks that supplied the Early Postclassic centers of Cholula and Tula. The variety of obsidian sources used in both the lower Verde and the Isthmus demonstrates that more than one region, center, or trade network likely controlled the Early Postclassic obsidian trade (R. Zeitlin 1982). Lower Verde traders might have been able to negotiate independently with multiple highland Mexican communities or merchants to acquire obsidian from a diverse set of sources. Feinman and Nicholas (2004) report a similar degree of independence in obsidian acquisition in the Tlacolula region of the Valley of Oaxaca during the Classic and Postclassic periods.

In the Operation B obsidian assemblage, most obsidian blade striking platforms exhibited ground surfaces. Large, ground platforms on polyhedral cores were an

invention of the Middle Classic that allowed for more efficient production of larger blades (Santley et al. 1986). Tolstoy (1971:274) notes that ground platforms were more common during the Postclassic period than earlier. In this assemblage, among the blades where ground platforms were present (n=93), 59.1 percent were made from clear obsidian and only 1.1 percent were green obsidian. Conversely, among the examples made from cores with flat, mirror-like platforms (n=30), 66.7 percent were manufactured from green obsidian, and only one fragment (3.3 percent) was clear. This suggests that the green and clear obsidian cores were made with different production techniques. Since the majority of blades date to the Early Postclassic, specialists in the source regions were likely employing distinct technologies for processing cores around the same time. The technological differences further support a scenario of multiple exchange partners and trade networks.

By the Late Postclassic, the amount of Pachuca obsidian on the Southern Isthmus accounts for almost half of the overall assemblage, which R. Zeitlin (1982) associates with Aztec expansion and control over the Pachuca source, as well as increased traffic along the Gulf Coast / Veracruz / Soconusco corridor to which the Isthmus was tied (Chapter 12). However, Orizaba obsidian was also still heavily used during the Late Postclassic, accounting for another 45 percent of the sample. Workinger (2002), too, notes the heavy use of both Orizaba and Pachuca obsidian during the Late Postclassic (at 50 percent and 35 percent, respectively) and proposes that Late Postclassic residents of San Francisco de Arriba were probably tapping into the Gulf Coast / Veracruz / Soconusco network of trade via the Isthmus. I argue below that Early Postclassic trade was most likely conducted via the Mixteca Alta, and it is likely that obsidian also traveled along these networks. If true, then Late Postclassic lower Verde communities would have likely been able to access materials using long-standing Mixteca Alta routes.

CERAMICS OF THE COASTAL EARLY POSTCLASSIC

Ceramic ties to Cholula and the Mixteca Alta corroborate a coastal / Mixteca Alta / Cholula connection during the Early Postclassic, even though the ceramic industry itself involved local manufacture and local ceramic tradition (Chapter 1). Serving vessels shift from gray and orange conical bowls with incised designs during the Late Classic to fine-paste bowls with painted decoration during the Early Postclassic (Joyce et al. 2001). However, other features of Early Postclassic vessels (e.g., effigy supports) exhibit stylistic continuities with Late Classic ceramics of the lower Río Verde Valley. Utilitarian wares of coarse brown paste were produced during both the Late Classic and Early Postclassic, supporting the argument of cultural continuity, and are thus poor indicators of a transition between the Classic and Postclassic.

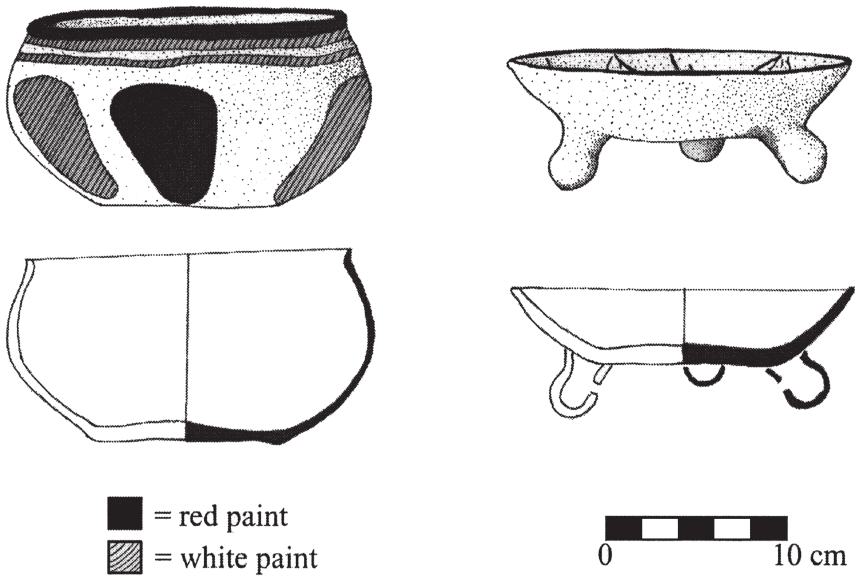
Table 8.2 Analyzed sample of Early Postclassic ceramic assemblage (16.3 percent, or n=115 contexts)

	Bowls	*Tecomates*	*Jars*	*Comales*	*Other/ Undefined*	*Body Sherds*	*Total*
Total Count	1,906	12	79	67	1,628	36,941	40,633
Total Weight (g)	23,035.1	128.6	3,285.1	1,427.7	9,563.4	222,080.7	259,520.6
Percentage by Count	4.7	0.0	0.2	0.2	4.0	90.9	
Percentage by Weight	8.9	0.0	1.3	0.6	3.7	85.6	
Identified forms:							
Percentage by Count	92.3	0.6	3.8	3.2			2,064
Percentage by Weight	82.6	0.5	11.8	5.1			27,876.5

An analysis of twenty-nine complete or nearly complete ceramic vessels found during the course of Operation B excavations suggests some degree of connection between lowland and highland Oaxaca. The majority (n=21) were found in primary depositional contexts as offerings in Early Postclassic burials. Additionally, three large fragments were found within Early Postclassic architectural fill between Burials 34 and 35 beneath the floor of Structure 8-8b and fragments of another five vessels were found in primary context within the Early Postclassic midden located in the narrow path between two Early Postclassic house structures (Structure 8-8b and 8-10; see Figure 8.3).

An analyzed sample of the overall ceramic assemblage from Early Postclassic contexts (n=115, or 16.3 percent, including 40,633 vessel fragments) shows that fine-paste serving vessels, such as those represented in the complete vessel sample, make up the largest portion of the Early Postclassic ceramic assemblage (Table 8.2). Coarse pastes were more often used in the manufacture of utilitarian cooking and storage vessels (jars and *comales*). Utilitarian vessels make up a far smaller part of the overall ceramic assemblage (3.8 and 3.2 percent by count, and 11.8 and 5.1 percent by weight) and are not represented in the complete vessel sample used in this study.

The similarities in vessel shape and design are perhaps the best indicators of near contemporaneity of the sub-floor burial events and provide us with complete examples to compare to the broken pottery found throughout the architectural fill and occupational debris associated with the Early Postclassic occupation of the platform. All of the vessels are thin-walled, averaging 5.2 millimeters thick, and are made with a fine paste that when fired appears gray or orange. Controlling the firing conditions creates the color variation between the interior and exterior sides of the vessels, or between the exterior base, wall, and rim. In the latter case, the rim of



8.4 High-walled and low-walled hemispherical bowls.

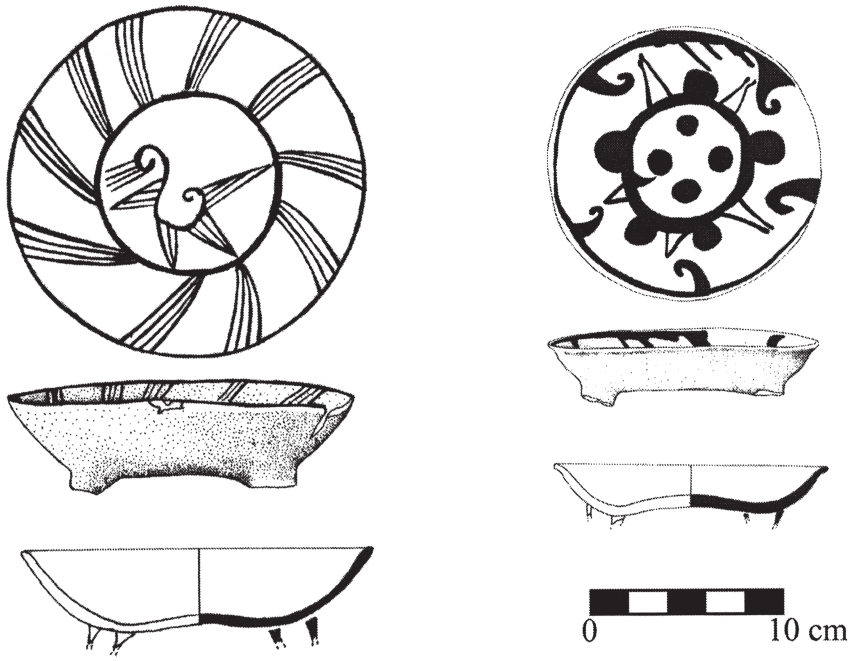
the vessel was likely placed upside down into the earth during firing to create thin bands of gray along the rim, and vessels were stacked upside down on top of one another during the firing process, creating thick bands of oxidized orange circling the circumference of the higher walled bowls. This method also left the rim and vessel interior, as well as the exterior base (and sometimes the feet) of the bowls, gray in color.

Differential firing was the means by which these Early Postclassic vessels were made to appear polychrome. Differential firing also occurs on Natividad phase (1000 to 1520 CE) fine creamwares from the Mixteca Alta, as described by Spores (1972:27), where rim-body and interior-exterior "contrast patterns" make up much of the decoration. Although only red and white paints were used to decorate the Río Viejo vessels, the skilled use of differential firing creates the effect of five different colors: white (paint), red (paint on oxidized surface), orange (oxidized area), gray (unoxidized area), and a dark brown/black, which is created by applying the red paint to a surface that is left unoxidized during firing.

High-walled and low-walled varieties of hemispherical bowls are the vessel forms found with Early Postclassic burials (Figure 8.4). Seventeen of twenty-nine examples (58.6 percent) are low-walled tripod hemispherical bowls. The low-walled bowls average 3.9 centimeters in height and are always tripod, making the overall height average 6.6 centimeters. The supports are either bulbous or rounded, or are molded into the form of the head of an unidentifiable animal. The animal-head effigy

8.5 Vessel supports.

supports typically have narrow hollow interiors, whereas the bulbous and rounded supports are wider with clay pellet rattles in the feet (Figure 8.5). Two low-walled bowls were originally tripod, but the supports were broken prior to placement with



8.6 Tripod bowls with broken supports.

the deceased (Figure 8.6). The scars where the supports would have been attached are still visible but highly eroded, suggesting that the breakage occurred well before placement as a burial offering. The different vessel supports are found in roughly equal frequencies, with eight examples of hollow supports with rattles and five examples with solid animal-head supports.

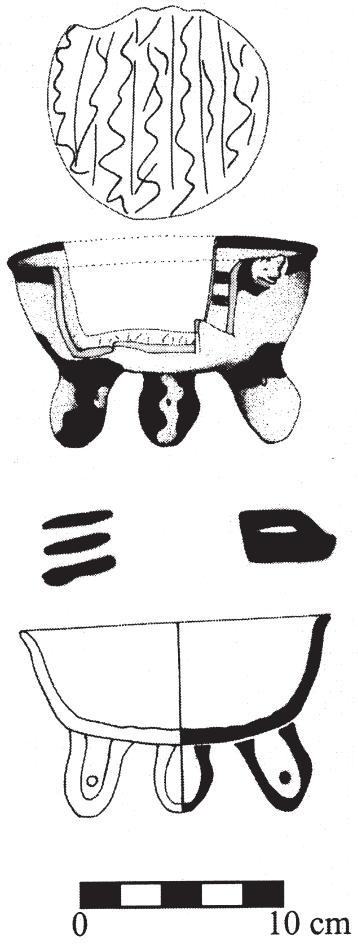
The low-walled bowls were often decorated on the interior with painted geometric or zoomorphic designs using red and white paint (Figure 8.7). The vessels average 17.5 centimeters in diameter with outcurving or slightly outcurving rims and flat or slightly convex bases, providing broad interior surfaces for elaboration. Designs were painted on both the interior walls and interior bases of the low-walled bowls and include birds, stars, scorpions, bar/dot patterns, and unidentifiable animals, possibly monkeys.

Four of the low-walled tripod vessels are *molcajetes*, which were scored with crosshatched or squiggly lines in the interior base of the bowl for grinding. These incised lines, in all cases, show light to moderate wear, indicating that the vessels had been used prior to interment with the deceased. Two additional hemispherical bowls have higher walls (6.5 to 7.5 centimeters) with tripod supports. One molcajete had three small animal-head appliqués applied to the exterior lip of the

8.7 Painted designs on Early Postclassic bowls.

rim (Figure 8.8). This decorative technique is used in some examples of modern pottery from Atzompa, Oaxaca, but is, to my knowledge, unattested archaeologically. The major differences between the two kinds of ceramic serving vessels are, thus, interior versus exterior decoration and tripod supports versus no supports.

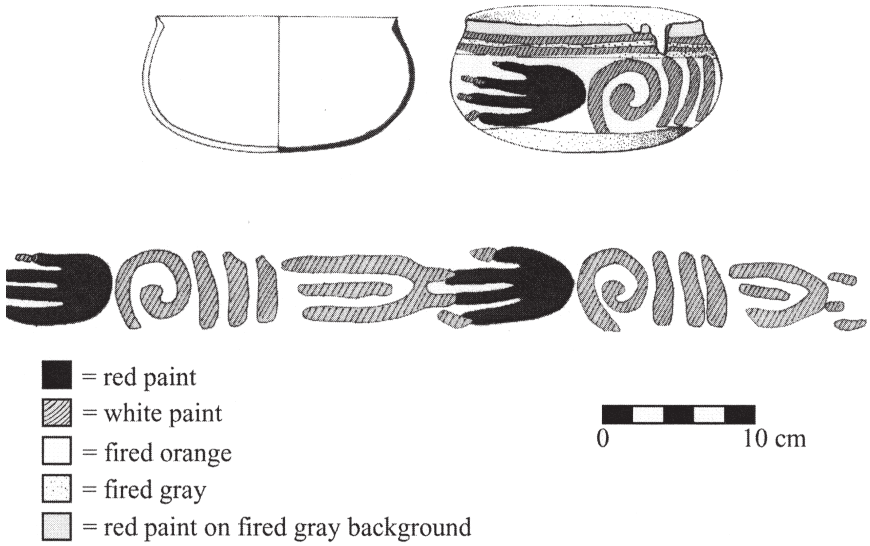
The eight non-tripod higher-walled semispherical bowls average 7.2 centimeters tall and reach their maximum diameters halfway up the wall of the bowl before they begin to curve inward. The rims of the bowls are high, narrowed, and finished with some slight outcurving, a form that has been described as "superhemispherical" (G. McCafferty 2001:24, fig. 3.1) or "convergent incurving walled" (Joyce et al. 2001:376) bowls. The average maximum diameter of these vessels is 18 centimeters and the average rim diameter is 16.7 centimeter. The base of these vessels was generally flattened or raised slightly concave to provide a flat surface to keep the bowls from rolling.



8.8 Molcajete, with animal head appliqué on rim.

The high-walled hemispherical bowls were decorated along the exterior circumference of the vessel and the rim. In these cases, the oxidized band often served as the border for the painted designs, creating images that are skillfully framed by the unoxidized rim and base. The most striking design that occurs in two different vessels is a hand motif (Figure 8.9). The hand is depicted palm-side down with fingernails in white, which in both cases is repeated twice around the perimeter. These higher-walled bowls include our finest examples of Early Postclassic vessel design.

Although no clear pattern exists for explaining how these two kinds of bowls were distributed as burial offerings, it does seem to be the case that high-walled bowls were always accompanied by one or more low-walled bowls and never by themselves. Although no obvious contents were visible in the base of the bowls, sediment samples taken from the interior of the vessels for microanalysis contained (in at least one case) maize phytoliths, as well as somewhat higher pH levels indica-



8.9 High-walled hemispherical bowl with hand motif.

tive of ash, showing that burned organics or prepared food was placed in the vessels (King 2003).

Along the coast of Oaxaca, somewhat similar ceramics are found at Río Grande, located twenty kilometers east of Río Viejo (Zárate Morán 1995). Considerably further east, at the site of Carrizal, located about twenty kilometers west of Salina Cruz on the Isthmus (and 270 kilometers east of Río Viejo), Brockington (1974:28, fig. 8) illustrates a vessel that closely resembles the Early Postclassic Río Viejo tripod bowls. He describes this vessel as a rare type in the Isthmus region, a statement that is confirmed through comparisons with published reports of roughly contemporaneous archaeological deposits from Puerto Escondido to the Isthmus of Tehuantepec (Delgado 1965; Fernández Dávila and Gómez Serafín 1988; Long 1974; J. Zeitlin 1978).

Similarly, west of Río Viejo, Early Postclassic ceramics bear little resemblance to wares found in Acapulco and coastal Guerrero (Brush 1969). Ceramic similarities in design motifs and vessel forms with more distant highland regions, however, are clearer. Design motifs were shared between Río Viejo ceramics and highland Mixteca Alta, Valley of Oaxaca, and materials found at the sites of Tula and Cholula. For example, the hand motif, which on the coast is represented realistically, is depicted more abstractly on Huitzo Polished Cream vessels of the Valley of Oaxaca (Paddock 1966:208, fig. 260), on vessels from a tomb in Loma Yutendahue in Suchilquitongo, Valley of Oaxaca (Winter and Guevara Hernández 2000), and

vessels from Tula (Cobean 1990:309, plate 153). The hemispherical bowl form is also shared among coastal Oaxaca, Puebla, the Mixteca Alta, northern Guerrero, and the northwestern Valley of Oaxaca, as are many of the decorative motifs employed on their interior and exterior surfaces. Geometric designs, parallel lines, spirals, and volutes are found on Natividad phase fine creamwares of the Nochixtlán Valley and Mixteca Alta (Lind 1987:33–40; Spores 1972:32–33, figs. 4–5), as well as on various Early Postclassic wares from Cholula, including Cocoyotla Black-on-Natural, Ocotlán Red Rim (Lind's [1994] Catalina), and Torre Red and Orange on White (Lind's [1994] Albina) (Lind 1994:82, fig. 3d, 84, fig. 9a; G. McCafferty 1994:65, fig. 15; 1996:309, fig. 10; 2001:55–58). Bird motifs, which are common images represented on the interior of the coastal *cajetes* (bowls), are also commonly represented in the Mixteca Alta Comiyuchi variety of Yanhuitlán Red-on-Creamwares, which are most similar to Huitzo Polished Cream vessels (Lind 1987:35).

Tripod bowls with effigy head supports are found throughout highland Mesoamerica during the Early Postclassic, and some of the closest formal resemblances occur between coastal Oaxaca, the Soconusco region, and highland Guatemala (Voorhies and Gasco 2004:fig. 6.12; Wauchope 1941:fig. 68; Woodbury and Trik 1953:159, 409, fig. 245). Somewhat similar examples have also been found in Morelos at the site of Tetla (Norr 1987b:528, fig. 1.2) and in Michoacan (Chadwick 1971:686, fig. 24). Short, unpainted bat effigy supports are principal diagnostics of the Late Classic period lower Río Verde Valley (Joyce et al. 2001:365, fig. 11), and the Early Postclassic version seems to be a muted, less carefully modeled version of the earlier variety. These effigy supports differ markedly from the elongated painted Late Postclassic serpent head supports common in Late Postclassic Mixteca-Puebla pottery, which are found throughout a wide area of Oaxaca and beyond (Caso et al. 1967:plate 19).

Hollow rounded or elongated supports containing clay pellet rattles are also common during the Early Postclassic across Mesoamerica from Michoacán to Guatemala (e.g., Chadwick 1971:686; Markman 1981:94; Shepard 1948:12; Wauchope 1941:222). We located 142 loose clay balls during the excavations, and complete vessels with intact rattle supports indicate that a primary use of these pellets was in supports for noisemaking. This differs from the common interpretation of clay balls as "blowgun pellets," although the difference in interpretation may be based on the diameter of the clay balls, with larger balls more often interpreted as blowgun pellets. The Operation B sample includes primarily small-diameter pellets with unimodal clustering for both weight and diameter. The mean diameter of the clay pellet rattles is 11.5 millimeters (standard deviation 3.11) and mean weight is 1.41 grams (standard deviation 1.32).

Some of the Río Viejo Early Postclassic vessels have incised interior bases typical of molcajetes. These too are a common marker of the Early Postclassic across

wider regions of Mesoamerica. Río Viejo molcajete bases are incised with designs similar to the burnished designs on the bases of conical bowls illustrated by Caso et al. (1967:391, fig. 322) and Martínez López et al. (2000: Lam. 13, fig. 14), which are attributed to the Late Classic period (Xoo phase) of Monte Albán (see Chapter 2). Late Classic period Valley of Oaxaca motifs may have influenced the design of Río Viejo Early Postclassic molcajetes, demonstrating a continuity of ideas across regions and through time.

Stylistic comparisons, then, hint that coastal Río Viejo communicated more closely with highland Oaxacan communities than it did with coastal communities to the east or to the west, although shared ideas spread even farther from and to coastal and highland Guatemala and northern Guerrero and Michoacán. Río Viejo was likely connected to this communication network through the Mixteca Alta, given the shared stylistic traits and the position of the Mixteca Alta with respect to neighboring highland Mexican communities that had an obvious influence on coastal ceramic design. Mixteca Alta Yanhuitlán Red-on-Creamwares, which are stylistically more closely connected to coastal ceramics, were uncommon in the Valley of Oaxaca (Paddock 1983). This indicates that Mixteca Alta communities might have had more direct contact with the Oaxaca Coast than with communities in the Valley of Oaxaca during the Early Postclassic. However, it is important to note that a conceptual difference between polychrome ceramics and differentially fired "polychromes" likely existed.

Absent from the Río Viejo ceramics samples are plumbate wares (see Chapter 1). Plumbate pottery was traded throughout Mesoamerica during the Early Postclassic, beginning around 900 CE and ending rather abruptly around 1250 CE (Neff and Bishop 1988), making it a useful marker of the Early Postclassic across regions. Plumbates are also rare in the Valley of Oaxaca but have been found on the Isthmus of Tehuantepec (Chapter 12; Cortés Vilchis and Winter 2006; Delgado 1965:33), perhaps showing that the Isthmus was in some way involved in a network of exchange extending eastward along the coast. Río Viejo residents did not participate in a coastal network of exchange for plumbate pottery (or for other Isthmus goods, for that matter), suggesting that either this connection was not well established or that plumbate pottery was not a desired commodity of Río Viejo residents.

SPINNING AND WEAVING AT RÍO VIEJO

Whereas obsidian was the primary imported material recovered in coastal Oaxacan archaeological collections, cotton thread and finished cloth were the primary Early Postclassic exports. This industry depended on the productivity of coyuche cotton plants native to the region and is widely attested in ethnohistoric documents (see

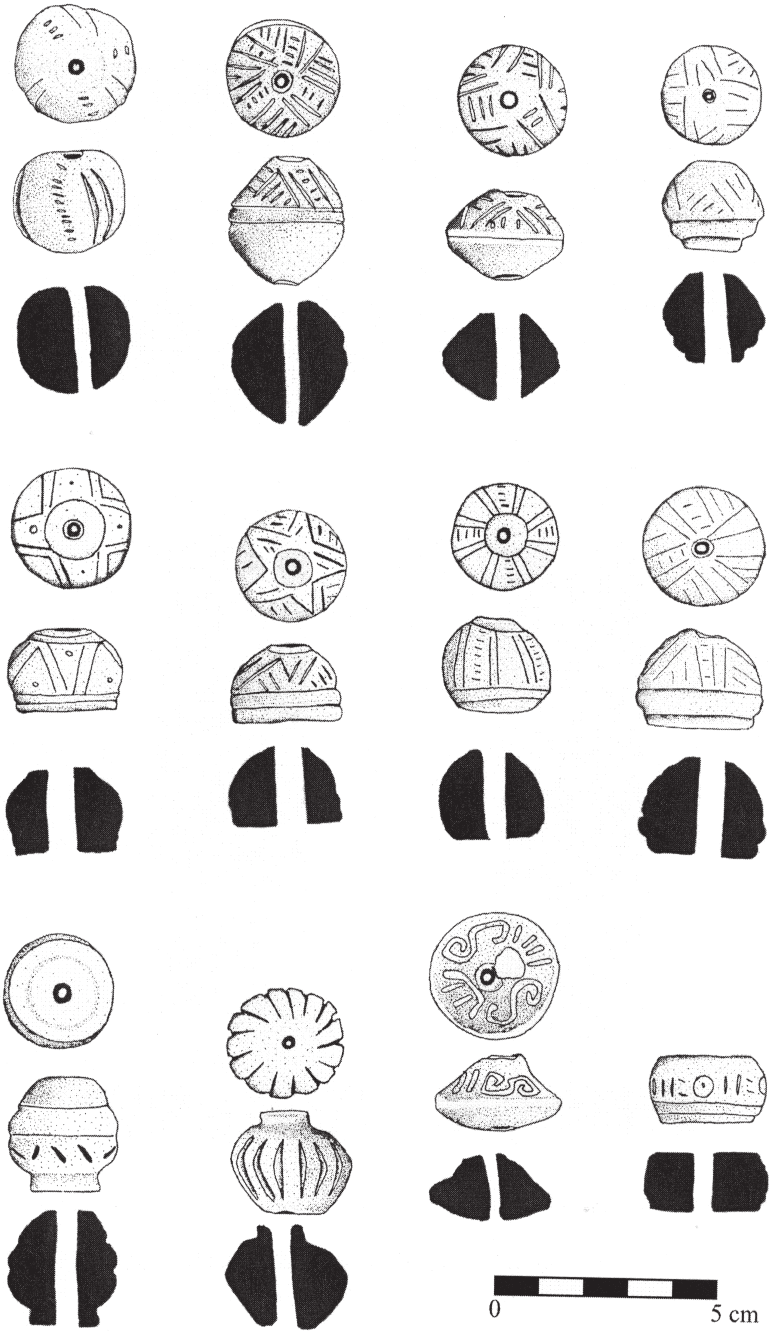
Table 8.3 Spindle whorls from the Operation B neighborhood, Río Viejo (n=86)

	Diameter (mm)	*Height (mm)*	*Weight (g)*	*Hole Diameter (mm)*	*Shape Index (diameter/height)*
Type A	25.8	16.7	10.3	4.9	0.65
n=22, 26.5%	(20.2–30.3)	(11.3–21.3)	(5.0–17.0)	(3.8–6.4)	(0.43–0.81)
Hemispherical, trapezoidal, flat					
Type B	24.1	20.9	9.9	4.7	0.86
n=48, 57.8%	(16.3–27.3)	(11.7–26.6)	(3–16)	(3.5–7.0)	(0.72–1.01)
Spherical, circular					
Type C	25.8	23.1	13.0	4.9	0.90
n=13, 15.7%	(22.5–29.3)	(18.3–30.9)	(6.0–18.0)	(4.2–6.4)	(0.72–1.37)
Globular					
Totals	24.9	20.0	10.5	4.8	0.80
n complete	80	78	75	86	75
Std. Dev.	2.37	3.56	3.49	0.68	0.14
Range	(16.3–30.3)	(11.3–30.9)	(3.0–18.3)	(3.5–7.0)	(0.43–1.37)

below). Evidence for spinning and weaving is based on eighty-six spindle whorls and approximately ten bone needle fragments recovered in Early Postclassic deposits in the Operation B neighborhood at Río Viejo.

The Río Viejo whorls were distributed relatively evenly across the excavated area in Early Postclassic architectural fill, occupation debris, and midden contexts (King 2003). Many of these whorls (n=71, 82 percent) were decorated with incised geometric designs that repeat around the circumference of the whorl. The abundance of whorls in the artifact assemblage shows that spinning thread was a common activity at Río Viejo and was important to the economy and social life of this coastal community. Made of coarse orange and fine orange pastes in 77.6 percent (n=60) of the cases, the spindle whorls average 20 millimeters in height and 25 millimeters in diameter, and weigh about 10.5 grams (Table 8.3). The holes of these whorls average 4.8 millimeters in diameter. Three principal shapes are present, which correspond to three "types": (1) hemispherical, trapezoidal, or flat; (2) spherical or circular; and (3) globular (Figure 8.10).

A few similar whorls were found in surface collection contexts at the site of Río Grande, east of the lower Verde (Zárate Morán 1995:29). Coastal whorls, however, are markedly different from highland Oaxacan whorls in both size and shape, where they were often flatter and undecorated, conical, or informally manufactured using broken ceramic sherds (Caso 1969:159; Caso et al. 1967:465; Feinman et al. 2002a; Spores 1972:72). The reported number of whorls in most highland Oaxacan artifact assemblages is lower than Río Viejo (Caso 1969:157–158; Caso et al. 1967:465; Finsten 1995; Spores 1972:70). The sites of Ejutla and El Palmillo,



8.10 Spindle whorls.

located in highland Oaxaca, are exceptions. At the site of Ejutla were found around fifty Classic period cotton fiber whorls, which were probably used to spin cotton imported from the eastern coast of Oaxaca (Feinman and Nicholas 2000; Feinman et al. 1994). Feinman and colleagues (2002a, 2002b) further argue for a Classic period maguey fiber spinning industry at the site of El Palmillo, based in part on the presence of approximately thirty-five whorls.

The formal differences observed in spindle whorls are closely related to both the kind of fiber being spun and the quality of the resultant thread (Brumfiel 1996). McCafferty and McCafferty (2000:46) note that in the coastal community of Jamiltepec, Oaxaca, modern weavers use whorls that are as tall or taller than they are wide, averaging 24 millimeters in diameter, 25 millimeters in height, a 7-millimeter hole size, and 12 grams in weight to support-spin brown (coyuche) and white cotton. The same weavers use a slightly heavier (15 grams) and slightly taller (31-millimeter) whorl to ply two threads of cotton together with a tighter twist. The whorls at Río Viejo more closely match these modern Jamiltepec whorls in all dimensions than they do any of the other whorl dimensions presented in published whorl analyses, indicating that the thread produced by modern coastal Oaxacan weavers may be similar in kind and quality to the thread produced by Río Viejo residents during the Early Postclassic (see Brumfiel 1996; Feinman et al. 2002a; S. McCafferty and McCafferty 2000; Nichols et al. 2000; Norr 1987b; Parsons 1972; Smith and Hirth 1988; Stark et al. 1998).

The number and density of whorls in the Operation B artifact assemblage is suggestive of household-level specialization in cotton fiber production (King 2003, 2004). As mentioned above, Río Viejo yielded a high number of whorls compared to other Classic and Postclassic period Oaxacan sites. In comparison with sites where intensive fiber production industries have been proposed, Río Viejo deposits have yielded some of the densest reported deposits, with one whorl per 3.6 square meters.[2] This far exceeds the density whorls at El Palmillo (one whorl per 18.9 square meters) (Feinman et al. 2002a, 2002b), is close to the density recorded at Classic period Ejutla (one whorl per 3.8 square meters) (Feinman et al. 1994), but is still below the whorl density at Early Postclassic Cholula (one whorl per 1.5 square meters) (McCafferty, personal communication, 2004). The thread and cloth production in coastal Oaxaca would have been of sufficient intensity to supply Río Viejo residents with surplus cloth to export to the highlands.

Based on comparisons of whorl dimensions with cotton and maguey whorls from highland Mexican sites, Río Viejo residents likely produced a kind of thread that was different from the thread spun in highland Mexico. The tight clustering in all whorl dimensions suggests that the Río Viejo whorls were manufactured specifically for the production of a particular kind of thread, with relatively minor variation in quality, thickness, and tightness. The coastal cotton thread was thicker than

the cotton thread being spun in many communities in the highlands, perhaps two-ply, and was also more tightly woven. Therefore, the unique thread, most likely spun from indigenous coyuche cotton, and the finished woven cloth produced at Río Viejo might have had its own market niche in the highland communities.

CERAMIC BELLS

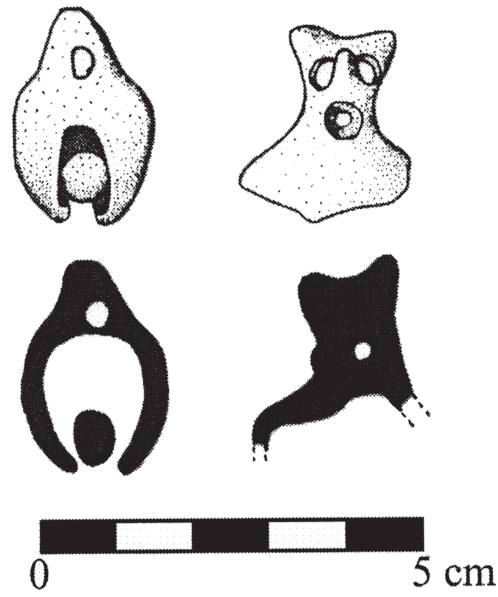
The ceramic bells present a different scenario of interregional interaction. The twelve bells found in Operation B are unique, since bells have not been found in any other archaeological collection of the lower Verde. Bells from Operation B have hand-modeled looped handles for hanging. The walls of the bell chambers are thin, averaging 2.93 millimeters thick. One complete and still functioning example of a bell was recovered with the molded clay pellet rattle still inside the chamber. The overall dimensions of this example are 28.7 millimeters tall (length) and 20.8 millimeters in diameter (across the chamber) (Figure 8.11). Two examples have molded bird heads forming the handle.

These bells are similar in design to the elongated copper bells that are some of the earliest bell forms found in West Mexico, which have parallels in coastal South America (Chapter 1; Hosler 1994:fig 3.5, Type 11a; Pendergast 1962a:527, fig. 7; 1962b:378, Type ICIa). Copper bells were traded to neighboring regions during the Early Postclassic, moving west to east. During the Late Postclassic, new forms of bells were manufactured across Mesoamerica. Metallurgy was first introduced to West Mexico around 800 CE, and copper objects are found archaeologically throughout the West Mexican region from Sinaloa to northwestern Guerrero prior to 1200 CE (Hosler 1994; Mountjoy 1969; Pendergast 1962a). However, after 1200 CE, copper and metal alloy implements and decorative ornaments are found more widely across highland Mesoamerica, including highland Oaxaca (e.g., Batres 1902:fig. 26; Caso 1965, 1969:339).

On the Pacific Coast, we have archaeological evidence for copper materials from Río Grande (Zárate Morán 1995) as well as from archaeological sites in Acapulco and west along the Costa Grande in Guerrero where the elongated bell was a common form (Lister 1971:628), as well as in the vicinity of Puerto Escondido (personal observation). In recent excavations, copper was recovered at Tututepec (Levine 2006). These collections likely postdate 1200 CE, when metallurgy was present in many regions of Mesoamerica, and thus the absence of copper bells at Río Viejo might be explained based on chronology. But we should also consider that even though copper bells were not widely produced and traded during the Early Postclassic, coastal artisans likely had knowledge of the bells manufactured farther west. Although Hosler (1994:122) suggests that bells made from clay predate the introduction of metallurgy to Mexico, the only dated examples of clay bells are

from Terminal Classic and Early Postclassic contexts in coastal Guatemala (Shook 1965:192), highland Morelos (Smith 1996: 90; 2002) and Early Postclas-sic Río Viejo (King 2003), which are contemporaneous with early West Mexican copper bell manufacture.

The collection of bells from Río Viejo is small but perhaps indicative of the character of interregional connections between the Oaxaca Coast and the highlands. Trade for obsidian was well established and coastal residents likely traded cotton thread or finished textiles northward in exchange for this obsidian. Ideas about ceramic stylistic motifs and manufacture circulated along these networks, although the actual pottery did not. Coastal residents did not or could not access networks of copper trade but probably had knowledge about the bells being produced farther west. Without access to these goods, they fashioned their own versions of copper bells using clay, as did rural artisans elsewhere in Mesoamerica. This break suggests that coastal Río Viejo was to a certain degree distanced from some exchange networks, whether by choice or by circumstance.



8.11 Clay bells.

CONNECTING HIGHLAND AND LOWLAND OAXACA

Trade routes connecting diverse regions of Mesoamerica were established as early as the Early Formative period (1300–900 BCE). Highland Oaxaca actively participated in these networks from their inception, and interaction among the Valley of Oaxaca, Mixteca Alta, Gulf Coast, and Central Mexico is demonstrated throughout the Formative period. The lower Verde was a participant in long-distance exchange by the Late Formative period, when Monte Albán was first established in the highlands of Oaxaca (Joyce 1993). Trade routes between the coast and highland valleys bridged differing geographical and ecological zones, and coastal resources—such as shells, cotton, cacao, and feathers—were likely exchanged for highland products, including maguey, pulque, and obsidian (Monaghan 1994; Spores 1967:5–7).

From the Late Formative to Classic period, residents of the coast were involved in exchange with both highland Oaxaca and Central Mexico (Brockington 1973; Feinman and Nicholas 1993; Joyce 1993; R. Zeitlin 1993).

Once Teotihuacan was well established, residents of the western coast of Oaxaca may have traded more directly with Teotihuacan for some products (primarily for obsidian) (Joyce 2003). Trade routes connecting the western coast with Central Mexico, which remained in place into the Late Postclassic, could have traveled through the modern state of Guerrero and the Mixteca Alta (Whitecotton 1992). At the same time, the eastern coast (Pochutla/Huatulco to the Isthmus) was probably connected to trade networks that traveled through Monte Albán or traversed the lowland Veracruz Gulf Coast and crossed the Isthmus, thereby bypassing highland Oaxaca altogether (R. Zeitlin 1978). Eastern coastal Oaxacan communities were more tied into trade networks linking the lowland Maya region and Soconusco coast with the rest of western Mesoamerica (Fernández Dávila and Gómez Serafín 1988; Whitecotton 1992).

Ball and Brockington (1978) argued that three exchange systems were in place in Oaxaca at the time of conquest: (1) an Aztec tribute collection network in the highlands and Isthmus, (2) a northwest-southeast coastal network focusing on luxury goods, and (3) a highland-lowland network linking diverse ecological zones that also further connected the two previous networks. The Aztec tribute collection network did not directly affect the west coast but instead involved the Oaxaca highlands, the Sierra, and the Isthmus of Tehuantepec. Along the coastal route, copper and bronze objects and tropical luxury goods were likely exchanged from as far west as the Tarascan Empire to the Chiapanec kingdom, Soconusco coast, and Nicaragua beyond. Miahuatlán may have linked the highland Valley of Oaxaca with the coastal trade networks, as shell from the Pacific Coast is found at some Miahuatlán and Ejutla sites (Brockington 1973; see also Feinman and Nicholas 1992). However, Ball and Brockington (1978) suggest that in the Late Postclassic, Tututepec was vying with Miahuatlán for control of highland-lowland trade. After allying with the Aztecs, occupants of Miahuatlán successfully defended themselves from conquest by Tututepec, and Tututepec also successfully resisted any Aztec incursion until the arrival of the Spanish (Davies 1968; Gerhard 1972).

The ceramic data suggest that, following the decline of Classic period centers, we should look for increasingly stronger connections between the western coast and the Mixteca Alta. Although coastal products are well represented in Classic period assemblages from sites in the Ejutla and Miahuatlán valleys (which are stopovers on the Valley of Oaxaca–Pochutla route) (Brockington 1973; Feinman and Nicholas 1992, 1993), different regions along the coast may have been linked to highland communities via numerous lowland-highland footpaths. That coastal

Early Postclassic ceramics at Río Viejo show some similarity to highland Oaxaca ceramics may indicate some continued travel along the Río Verde drainage.

Early Postclassic material from Sipolite (Pochutla area), Huatulco, and east to the Isthmus is quite different from that of Río Grande and Río Viejo (Brockington 1982; Brockington et al. 1974; Fernández Dávila and Gómez Serafín 1988; Zárate Morán 1995; J. Zeitlin 1978; R. Zeitlin 1979). Instead, the Río Viejo ceramics look more like the ceramics of the Mixteca Alta. By the Late Postclassic the connections between the lower Verde and Mixteca Alta were much deeper, when most of western Oaxaca fell under the authority of Mixtec nobility (see Chapter 1). The Mixteca Alta at this time was a clear center of political and commercial activity. During the Late Postclassic, highland Mixtecs likely controlled trade and tribute collection from subject communities up and down the west coast through Jicayan, Putla, and even Tututepec (Spores 1984, 1993).

Río Viejo's trade connections, thus, may have shifted during the Early Postclassic to include increased interaction with residents of the Mixteca Alta. Notably, however, coastal Oaxacans were *not* connected to some Early Postclassic period trade networks. For example, we found no Tohil Plumbate pottery at Río Viejo, and residents did not venture along a coastal route to access the West Mexico copper network. This could suggest that Río Viejo's residents opted out of particular trade networks. Another scenario is that Río Viejo was not directly connected to the network of elites that shared ideas, symbolism, and luxury objects. In spite of the lack of access, obsidian from Central Mexico was readily available to Río Viejo's occupants. The most appropriate place to look for comparative data on the Early Postclassic may thus be in highland Mixtec and intermediary regions, which is the most obvious route connecting the western coast and Central Mexico.

DISCUSSION AND CONCLUSION

The tierra caliente (hot lands) of the lower Verde were renowned for their richness and fertility, in spite of the difficulties caused by heat and insect life. In the sixteenth century, chroniclers reported that the lands of the lower Verde provided cacao, cane, cotton, fish, salts, and ample space for cattle (Paso y Troncoso 1905b:247, 301). Most of the communities up and down the coast of Oaxaca were required to provide tribute to the Crown in the form of cotton, finished weavings, cacao, and cane, in addition to many pesos worth of gold dust ("*oro en polvo*") (Paso y Troncoso 1905a). Salt is listed as a product of Tututepec in the *suma de visitas* (Paso y Troncoso 1905b:247), and presumably the salt flats present along the lagoons and estuaries of the coastline could have been used during the Early Postclassic. According to the documents, the lower Verde and nearby western Oaxaca Coast regions also supplied cotton and cloth to Nochixtlán, in

the Mixteca Alta, and the northwestern Valley of Oaxaca community of Huitzo (Paso y Troncoso 1905a).

Coastal peoples produced and supplied the highlands with a variety of agricultural products, exotic tropical goods, and marine resources, including cotton, salt, marine shell, and feathers. Coastal products were likely exchanged for highland products, such as maguey, pulque, and obsidian. Maguey, pulque, feathers, salt, cotton, and fish are organic products that are obviously difficult to recover in the archaeological record. Spindle whorls, often made of better-preserved fired clay, provide an indirect material means of examining cotton thread production. Salt flats used in the historic period are present in the lower Verde region, but as yet they have not been associated with Early Postclassic activity. Further, the faunal assemblage from Operation B contains only a small proportion of fish remains (King 2003). Even acknowledging the preservation issues related to fish bones as compared to larger animals, the underrepresentation of fish, along with the terrestrial and agricultural focus of Río Viejo throughout its history, suggests that fishing and drying fish were not substantial components of Río Viejo's export economy. Feathers or jaguar pelts, although possibilities as export products, are more difficult to trace and are not attested in these excavations. Macrobotanical remains of cotton were not identified in the paleoethnobotanical analysis conducted for Operation B Río Viejo (King 2003). Nonetheless, the fertile lands, agricultural productivity, access to marine resources, and success of cotton were keys to the lower Verde's long-standing preeminence and success.

Given the evidence from excavations at Early Postclassic Río Viejo, I argue that lower Verde residents were not well connected to coastal exchange networks. Indeed, I have doubts that a strong littoral network of interaction was in place during the Early Postclassic, as Ball and Brockington (1978) propose for the Late Postclassic. The evidence so far from Río Viejo suggests that for all time periods prior to the Late Postclassic, coastal routes were never heavily utilized for long-distance exchange purposes, whether accessed overland or by sea. Río Viejo itself is not a good candidate as a stop in a seafaring model of coastal exchange, given its inland location (Ball and Brockington 1978:108) and what seems to be a continuing orientation toward agriculture and a dependence on terrestrial resources established centuries earlier (Joyce 1991). The overland route is heavily bisected by large and at times impassable rivers flowing to the ocean. Further study along the coast of Oaxaca and Guerrero would help to clarify the existence and magnitude of coastal trade relationships.

Río Viejo residents preferentially forged trade relationships with highland Mexican trade partners or retained preexisting highland relations, primarily through the Mixteca Alta. In exchange for obsidian, Río Viejo residents produced a kind of cloth that was different from that available from other cloth-producing

communities, and residents may have chosen to produce surplus amounts of this cloth in response to an active Early Postclassic long-distance market demand for their goods. But these networks only allowed them to acquire certain kinds of materials. Residents manufactured clay bells that elsewhere were manufactured in copper. They may have chosen to make them at home out of local materials because the cost of access was too great or because those trade networks did not yet exist. The skill of Río Viejo artisans in producing intricately designed costume ornaments may have influenced the choice to add small bells to their productive repertoire, and the distance and independence of coastal Río Viejo, in spite of its highland connections, might help to explain why local social practices and social organization in this region were in some ways unique (King 2003). Río Viejo, with its well-dated Early Postclassic occupation from 1000 to 1200 CE, gives us a clear example of the form of socioeconomic organization in Early Postclassic Oaxaca and provides us with the possibility to interpret the relationships between the Early Postclassic communities of Oaxaca in new ways.

ACKNOWLEDGMENTS

The field excavations associated with the Río Viejo Residence Project were generously supported by the Foundation for the Advancement of Mesoamerican Studies, Inc., Grant #99012 (with Arthur Joyce); the Stahl Endowment of the Archaeological Research Facility, University of California, Berkeley; and the Lowie-Olson Fund of the Department of Anthropology, University of California, Berkeley. In addition, National Science Foundation Doctoral Dissertation Improvement Grant #0122226 supported some of the laboratory analysis discussed in this study. This chapter is a topic addressed in my dissertation and, as such, has benefited from the comments and suggestions provided by Rosemary Joyce, Christine Hastorf, and Harvey Doner. I also thank the editor of this volume and outside reviewers for insightful comments on earlier drafts of this chapter, and the session organizers and fellow participants for sharing their ideas.

NOTES

1. This is based on three published dates: 1022 CE (975–1161 CE calibrated, AA37669, reported in Joyce et al. 2001) and 1035 CE (1035–1187 CE calibrated, AA40040, reported in King 2003) from Early Postclassic middens in each of the neighborhoods at Río Viejo, and 1051 CE (1026–1220 CE calibrated, AA40034, reported in Joyce et al. 2001) from a final phase floor surface.

2. Density measures for spindle whorls are rarely calculated based on volume of excavated deposits and rarely are both the number of whorls and the total volume of excavated

deposits reported in publication. In addition, many spindle whorl studies are based in whole or in part on surface collected whorls. Another widely used method, calculating density as a ratio of whorls to overall ceramic assemblage, is pending completed ceramic analysis. Here I have calculated density based on the number of whorls and the total area excavated / surface collected, if reported (see King 2003 for further discussion).

REFERENCES

Appel, Jill

1982 Political and Economic Organization in the Late Postclassic Valley of Oaxaca, Mexico. Unpublished Ph.D. Dissertation, Department of Sociology and Anthropology, Purdue University. West Lafayette, Indiana.

Ball, Hugh G., and Donald L. Brockington

1978 Trade and Travel in Prehispanic Oaxaca. In *Mesoamerican Communication Routes and Cultural Contacts*, edited by T. Lee Jr. and C. Nararrete, pp. 107–114. Papers of the New World Archaeological Foundation, No. 40. Brigham Young University, Provo, Utah.

Batres, Leopoldo

1902 *Exploraciones de Monte Albán*. Casa Editorial Gante, Mexico City.

Blanton, Richard E.

1978 *Monte Albán: Settlement Patterns at the Ancient Zapotec Capital*. Academic Press, New York.

Braswell, Geoffrey E.

2003 Obsidian Exchange Spheres. In *The Postclassic Mesoamerica World*, edited by M. Smith and F. Berdan, pp. 131–158. University of Utah Press, Salt Lake City.

Braswell, Geoffrey E., John E. Clark, Kazuo Aoyama, Heather I. McKillop, and Michael D. Glascock

2000 Determining the Geological Provenance of Obsidian Artifacts from the Maya Region: A Test of the Efficacy of Visual Sourcing. *Latin American Antiquity* 11(3):269–282.

Brockington, Donald L.

1973 *Archaeological Investigations at Miahuatlan, Oaxaca*. Vanderbilt University Publications in Anthropology, No. 7. Nashville, Tennessee.

1974 Reconnaissance from the Río Tonameca to Salina Cruz. In *The Oaxaca Coast Project Reports: Part II*, edited by D. Brockington and J. Long, pp. 3–33. Vanderbilt University Publications in Anthropology, No. 9. Nashville, Tennessee.

1982 Spatial and Temporal Variations of the Mixtec-Style Ceramics in Southern Oaxaca. In *Aspects of the Mixteca-Puebla Style and Mixtec and Central Mexican Culture in Southern Mesoamerica*, edited by D. Stone, pp. 7–14. Middle American Research Institute Occasional Paper, No. 4. Tulane University, New Orleans.

Brockington, Donald L., María Jorrín, and J. Robert Long
1974 *The Oaxaca Coast Project Reports: Part I*. Vanderbilt University Publications in Anthropology, No. 8. Nashville, Tennessee.

Brumfiel, Elizabeth M.
1996 The Quality of Tribute Cloth: The Place of Evidence in Archaeological Argument. *American Antiquity* 61(3):453–462.

Brush, Charles
1969 A Contribution to the Archaeology of Coastal Guerrero, Mexico. Unpublished Ph.D. Dissertation, Department of Anthropology, Columbia University, New York.

Byland, Bruce E., and John M.D. Pohl
1994 *In the Realm of 8 Deer: The Archaeology of the Mixtec Codices*. University of Oklahoma Press, Norman.

Caso, Alfonso
1965 Lapidary Work, Goldwork, and Copperwork from Oaxaca. In *Handbook of Middle American Indians,* Vol. 3: *Archaeology of Southern Mesoamerica,* Part 2, edited by R. Wauchope and G. Willey, pp. 896–930. University of Texas Press, Austin.
1969 *El tesoro de Monte Albán*. Memorias del Instituto Nacional de Antropología e Historia, No. 3. INAH, Mexico City.

Caso, Alfonso, Ignacio Bernal, and Jorge R. Acosta
1967 *La cerámica de Monte Albán*. Memorias del Instituto Nacional de Antropología e Historia, No. 13. INAH, Mexico City.

Chadwick, Robert
1971 Archaeological Synthesis of Michoacan and Adjacent Regions. In *Handbook of Middle American Indians,* Vol. 11: *Archaeology of Northern Mesoamerica,* Part 2, edited by R. Wauchope, G. Ekholm, and I. Bernal, pp. 657–693. University of Texas Press, Austin.

Cobean, Robert H.
1990 *La cerámica de Tula, Hidalgo*. Estudios sobre Tula 2. Instituto Nacional de Antropología e Historia, Mexico City.

Cortés Vilchis, Marisol Yadira, and Marcus Winter
2006 El Posclásico del Valle de Jalapa del Marques, Región del Istmo, Oaxaca. Paper presented at the 71st Annual Meeting of the Society for American Archaeology, San Juan, Puerto Rico.

Daneels, Anick
1997 Settlement History in the Lower Cotaxtla Basin. In *Olmec to Aztec: Settlement Patterns in the Ancient Gulf Lowlands*, edited by B. Stark and P. Arnold III, pp. 206–252. University of Arizona Press, Tucson.

Davies, Nigel
1968 *Los señorios independientes del imperio Azteca*. Serie Historia XIX. Instituto Nacional de Antropología e Historia, Mexico City.

Delgado, Agustin
1965 *Archaeological Reconnaissance in the Region of Tehuantepec, Oaxaca, Mexico*. Papers of the New World Archaeological Foundation, No. 18. Brigham Young University, Provo, Utah.

Feinman, Gary M., and Linda M. Nicholas
1992 Pre-Hispanic Interregional Interaction in Southern Mexico: The Valley of Oaxaca and the Ejutla Valley. In *Resources, Power, and Interregional Interaction*, edited by E. Schortman and P. Urban, pp. 75–116. Plenum Publishers, New York.
1993 Shell-Ornament Production in Ejutla: Implications for Highland-Coastal Interaction in Ancient Oaxaca. *Ancient Mesoamerica* 4(1):103–119.
2000 High-Intensity Household-Scale Production in Ancient Mesoamerica: A Perspective from Ejutla, Oaxaca. In *Cultural Evolution: Contemporary Viewpoints*, edited by G. Feinman and L. Manzanilla, pp. 119–142. Kluwer Academic / Plenum Publishers, New York.
2004 *Hilltop Terrace Sites of Oaxaca, Mexico: Intensive Surface Survey at Guirún, El Palmillo and the Mitla Fortress*. Fieldiana, Anthropology New Series, No. 37. Field Museum of Natural History, Chicago.

Feinman, Gary M., Linda M. Nicholas, and Helen R. Haines
2002a Houses on a Hill: Classic Period Life at El Palmillo, Oaxaca, Mexico. *Latin American Antiquity* 13(3):251–278.
2002b Mexico's Wonder Plant. *Archaeology* 55(5):32–35.

Feinman, Gary M., Linda M. Nicholas, and William D. Middleton
1994 Craft Activities at the Prehispanic Ejutla Site, Oaxaca, Mexico. *Mexicon* 15(2):33–41.

Fernández Dávila, Enrique, and Susana Gómez Serafín
1988 *Arqueología de Huatulco, Oaxaca: Memoria de la primera temporada de campo del proyecto arqueológico Bahías de Huatulco*. Colección Científica, No. 171. Instituto Nacional de Antropología e Historia, Mexico City.

Finsten, Laura
1995 *Jalieza, Oaxaca: Activity Specialization at a Hilltop Center*. Vanderbilt University Publications in Anthropology, No. 48. Nashville, Tennessee.

Gerhard, Peter
1972 *A Guide to the Historical Geography of New Spain*. Cambridge University Press, New York.

Healan, Dan M.
1993 Local Versus Non-local Obsidian Exchange at Tula and Its Implications for Post-Formative Mesoamerica. *World Archaeology* 24:449–466.

Healan, Dan M., Janet M. Kerley, and George J. Bey III
1983 Excavation and Preliminary Analysis of an Obsidian Workshop in Tula, Hidalgo, Mexico. *Journal of Field Archaeology* 10:127–145.

Heller, Lynette, and Barbara L. Stark
1998 Classic and Postclassic Obsidian Tool Production and Consumption: A Regional Perspective from the Mixtequilla, Veracruz. *Mexicon* 20:119–128.

Hosler, Dorothy
1994 *The Sounds and Colors of Power: The Sacred Metallurgical Technology of Ancient West Mexico*. MIT Press, Cambridge, Massachusetts.

Joyce, Arthur A.
1991 Formative Period Social Change in the Lower Río Verde Valley, Oaxaca, Mexico. *Latin American Antiquity* 2(1):126–150.
1993 Interregional Interaction and Social Development on the Oaxaca Coast. *Ancient Mesoamerica* 4(1):67–84.
2003 Imperialism in Pre-Aztec Mesoamerica: Monte Albán, Teotihuacan, and the Lower Río Verde Valley. In *Warfare and Conflict in Ancient Mesoamerica*, edited by M. Brown and T. Stanton, pp. 49–72. Altamira Press, Walnut Creek, California.

Joyce, Arthur A., Laura Arnaud Bustamante, and Marc N. Levine
2001 Commoner Power: A Case Study from the Classic Period Collapse on the Oaxaca Coast. *Journal of Archaeological Method and Theory* 8(4):343–385.

Joyce, Arthur A., J. Michael Elam, Michael D. Glascock, Hector Neff, and Marcus Winter
1995 Exchange Implications of Obsidian Source Analysis from the Lower Río Verde Valley, Oaxaca, Mexico. *Latin American Antiquity* 6(1):3–15.

Joyce, Arthur A., and Stacie M. King
2001 Household Archaeology in Coastal Oaxaca, México. Report on file with the Foundation for the Advancement of Mesoamerican Studies, Crystal River, Florida.

Joyce, Arthur A., and Raymond G. Mueller
1992 The Social Impact of Anthropogenic Landscape Modification in the Río Verde Drainage Basin, Oaxaca, Mexico. *Geoarchaeology* 7(6):503–526.
1997 Prehispanic Human Ecology of the Río Verde Drainage Basin. *World Archaeology* 29(1):74–96.

Joyce, Arthur A., and Andrew G. Workinger
1996 Río Viejo: A Prehispanic Urban Center on the Oaxaca Coast. Paper presented at the 61st Annual Meeting of the Society for American Archaeology, New Orleans.

Joyce, Arthur A., Andrew G. Workinger, Byron E. Hamann, Peter Kröfges, Maxine Oland, and Stacie M. King
2004 Lord 8 Deer "Jaguar Claw" and the Land of the Sky: The Archaeology and History of Tututepec. *Latin American Antiquity* 15(3):273–297.

King, Stacie M.
2003 Social Practices and Social Organization in Ancient Coastal Oaxacan Households. Unpublished Ph.D. Dissertation, Department of Anthropology, University of California, Berkeley.
2004 Spinning and Weaving in Early Postclassic Coastal Oaxaca. Paper presented at the 69th Annual Meeting of the Society for American Archaeology, Montreal.

King, Stacie M., Arthur A. Joyce, and Laura Arnaud Bustamante
2000 Investigaciones recientes en la región del Río Verde inferior: Resultados preliminares de las excavaciones en unidades domésticas del postclásico temprano en Río Viejo. Paper presented at the 4th Biennial Symposium of Oaxacan Studies, Oaxaca.

Levine, Marc N.
2006 Preliminary Findings from Residential Excavations at Tututepec, a Late Postclassic Mixtec Capital on the Coast of Oaxaca. Paper presented at the 71st Annual Meeting of the Society for American Archaeology, San Juan, Puerto Rico.

Lind, Michael D.
1987 *The Sociocultural Dimensions of Mixtecs Ceramics*. Vanderbilt University Publications in Anthropology, No. 33. Nashville, Tennessee.
1994 Cholula and Mixteca Polychromes: Two Mixteca-Puebla Regional Substyles. In *Mixteca-Puebla: Discoveries and Research in Mesoamerican Art and Archaeology*, edited by H. Nicholson and E. Quiñones Keber, pp. 79–99. Labyrinthos, Culver City, California.

Lister, Robert H.
1971 Archaeological Synthesis of Guerrero. In *Handbook of Middle American Indians,* Vol. 11: *Archaeology of Northern Mesoamerica,* Part 2, edited by R. Wauchope, G. Ekholm, and I. Bernal, pp. 619–631. University of Texas Press, Austin.

Long, J. Robert
1974 The Late Classic and Early Postclassic Ceramics from the Eastern Portion of the Coast. In *The Oaxaca Coast Project Reports: Part II*, edited by D. Brockington and J. Long, pp. 39–98. Vanderbilt University Publications in Anthropology, No. 9. Nashville, Tennessee.

Markman, Charles W.
1981 *Prehispanic Settlement Dynamics in Central Oaxaca, Mexico: A View from the Miahuatlan Valley*. Vanderbilt University Publications in Anthropology, No. 26. Nashville, Tennessee.

Martínez López, Cira, Robert Markens, Marcus Winter, and Michael D. Lind
2000 *Cerámica de la Fase Xoo (Monte Albán IIIB–IV) del Valle de Oaxaca*. Proyecto Especial Monte Alban 1992–1994, Contribución No. 8. Centro INAH Oaxaca, Oaxaca.

McCafferty, Geoffrey G.
1994 The Mixteca-Puebla Stylistic Tradition at Early Postclassic Cholula. In *Mixteca-Puebla: Discoveries and Research in Mesoamerican Art and Archaeology*, edited

by H. Nicholson and E. Quiñones Keber, pp. 53–77. Labyrinthos, Culver City, California.

2001 *Ceramics of Postclassic Cholula, Mexico: Typology and Seriation of Pottery from the UA-1 Domestic Compound*. Cotsen Institute of Archaeology, Monograph 43. University of California, Los Angeles.

McCafferty, Sharisse D., and Geoffrey G. McCafferty

2000 Textile Production in Postclassic Cholula, Mexico. *Ancient Mesoamerica* 11(1): 39–54.

Monaghan, John

1994 Irrigation and Ecological Complementarity in Mixtec Cacicazgos. In *Caciques and Their People: A Volume in Honor of Ronald Spores*, edited by J. Marcus and J. Zeitlin, pp. 143–161. Anthropological Papers, No. 89. Museum of Anthropology, University of Michigan, Ann Arbor.

Mountjoy, Joseph B.

1969 On the Origin of West Mexican Metallurgy. In *Pre-Columbian Contact within Nuclear America*, edited by J. Kelley and C. Riley, pp. 26–42. Mesoamerican Studies, No. 4. University Museum, Southern Illinois University, Carbondale.

Neff, Hector, and Ronald L. Bishop

1988 Plumbate Origins and Development. *American Antiquity* 53(3):505–522.

Nichols, Deborah L., Mary Jane McLaughlin, and Maura Benton

2000 Production Intensification and Regional Specialization: Maguey Fibers and Textiles in the Aztec City-State of Otumba. *Ancient Mesoamerica* 11(2):267–291.

Norr, Lynette

1987a The Excavation of a Postclassic House at Tetla. In *Ancient Chalcatzingo*, edited by D. Grove, pp. 400–408. University of Texas Press, Austin.

1987b Postclassic Artifacts from Tetla. In *Ancient Chalcatzingo*, edited by D. Grove, pp. 525–546. University of Texas Press, Austin.

Paddock, John

1983 Mixtec Impact on the Postclassic Valley of Oaxaca. In *The Cloud People: Divergent Evolution of the Zapotec and Mixtec Civilizations*, edited by K. Flannery and J. Marcus, pp. 272–277. Academic Press, New York.

Paddock, John (editor)

1966 *Ancient Oaxaca: Discoveries in Mexican Archeology and History*. Stanford University Press, Stanford, California.

Parry, William J.

1990 Postclassic Chipped Stone Tools from the Valley of Oaxaca, Mexico: Indications of Differential Access to Obsidian. In *Nuevos enfoques en el estudio de la lítica*, edited by M. de los Dolores Soto de Arechavaleta, pp. 331–345. Universidad Autónoma de México, Mexico City.

Parsons, Mary Hrones
1972 Spindle Whorls from the Teotihuacan Valley, Mexico. In *Miscellaneous Studies in Mexican Prehistory*, edited by M. Spence, J. Parsons, and M. Parsons, pp. 45–69. Anthropological Papers, No. 45. Museum of Anthropology, University of Michigan, Ann Arbor.

Paso y Troncoso, Francisco del
1905a *Relaciones Geográficas de la Diócesis de Oaxaca*. Papeles de Nueva España, Geografía y Estadística, Vol. 4. Est. Tipográfico Sucesores de Rivadeneyra, Madrid.
1905b *Suma de Visitas de Pueblos por Orden Alfabético*. Papeles de Nueva España, Geografía y Estadística, Vol. 1. Est. Tipográfico Sucesores de Rivadeneyra, Madrid.

Pendergast, David M.
1962a Metal Artifacts from Amapa, Nayarit, Mexico. *American Antiquity* 27(3):370–379.
1962b Metal Artifacts in Prehispanic Mesoamerica. *American Antiquity* 27(4):520–544.

Rice, Prudence M.
1987 Economic Change in the Lowland Maya Late Classic Period. In *Specialization, Exchange, and Complex Societies*, edited by E. Brumfiel and T. Earle, pp. 76–85. Cambridge University Press, New York.

Santley, Robert S., J. Kerley, and Ronald R. Kneebone
1986 Obsidian Working, Long-Distance Exchange, and the Politico-Economic Organization of Early State in Central Mexico. In *Economic Aspects of Prehispanic Highland Mexico*, edited by B. Isaac, pp. 101–132. Research in Economic Anthropology, Supplement 2. JAI Press, Greenwich, Connecticut.

Shepard, Anna O.
1948 *Plumbate, a Mesoamerican Trade Ware*. Publication 573. Carnegie Institution of Washington, Washington, DC.

Shook, Edwin M.
1965 Archaeological Survey of the Pacific Coast of Guatemala. In *Handbook of Middle American Indians,* Vol. 2: *Archaeology of Southern Mesoamerica,* Part 1, edited by R. Wauchope and G. Willey, pp. 180–194. University of Texas Press, Austin.

Smith, Mary Elizabeth
1973 *Picture Writing from Ancient Southern Mexico: Mixtec Place Signs and Maps*. University of Oklahoma Press, Norman.

Smith, Michael E.
1996 *The Aztecs*. Blackwell Publishing, Malden, Massachusetts.
2002 Domestic Ritual at Aztec Provincial Sites in Morelos. In *Domestic Ritual in Ancient Mesoamerica*, edited by P. Plunket, pp. 93–114. Cotsen Institute of Archaeology, Monograph 46. University of California, Los Angeles.

Smith, Michael E., and Kenneth G. Hirth
1988 The Development of Prehispanic Cotton-Spinning Technology in Western Morelos, Mexico. *Journal of Field Archaeology* 15:349–358.

Spores, Ronald
1967 *The Mixtec Kings and Their People*. University of Oklahoma Press, Norman.
1972 *An Archaeological Settlement Survey of the Nochixtlán Valley, Oaxaca*. Vanderbilt University Publications in Anthropology, No. 1. Nashville, Tennessee.
1984 *The Mixtecs in Ancient and Colonial Times*. University of Oklahoma Press, Norman.
1993 Tututepec: A Postclassic Period Mixtec Conquest State. *Ancient Mesoamerica* 4(1):167–174.

Stark, Barbara L., Lynette Heller, and Michael A. Ohnersorgen
1998 People with Cloth: Mesoamerican Economic Change from the Perspective of Cotton in South-Central Veracruz. *Latin American Antiquity* 9(1):7–36.

Tolstoy, Paul
1971 Utilitarian Artifacts of Central Mexico. In *Handbook of Middle American Indians,* Vol. 10: *Archaeology of Northern Mesoamerica,* Part 1, edited by R. Wauchope, G. Ekholm, and I. Bernal, pp. 270–296. University of Texas Press, Austin.

Urcid, Javier, and Arthur A. Joyce
1999 Monumentos grabados y nombres calendáricos: Los antiguos gobernantes de Río Viejo, Oaxaca. *Arqueología* 22:17–39.

Voorhies, Barbara, and Janine Gasco
2004 *Postclassic Soconusco Society: The Late Prehistory of the Coast of Chiapas, Mexico*. Institute for Mesoamerican Studies, Publication 14. State University of New York at Albany, Albany.

Wauchope, Robert
1941 Effigy Head Vessel Supports from Zacualpa, Guatemala. In *Los Mayas Antiguos*, edited by C. Lizardo Ramos, pp. 211–232. El Colegio de México, Mexico City.

Whitecotton, Joseph W.
1992 Culture and Exchange in Postclassic Oaxaca: A World-System Perspective. In *Resource, Power, and Interregional Interaction*, edited by E. Schortman and P. Urban, pp. 51–74. Plenum Publishers, New York.

Winter, Marcus, and Jorge Guevara Hernández
2000 Apéndice E: Una tumba postclasica (Tumba 1986-1) de Loma Yutendahue, Santiago Suchilquitongo, Etla, Oaxaca. In *Ceramica de la Fase Xoo (Epoca Monte Alban IIIB–IV) del Valle de Oaxaca*, by Cira Martínez López, Robert Markens, Marcus Winter and Michael D. Lind, pp. 287–297. Proyecto Especial Monte Alban 1992–1994, Contribución No. 8. Centro INAH Oaxaca, Oaxaca.

Woodbury, Richard B., and Aubrey S. Trik
1953 *The Ruins of Zaculeu, Guatemala, Vol. 1*. United Fruit Company, New York.

Workinger, Andrew G.
2002 Coastal/Highland Interaction in Prehispanic Oaxaca, Mexico: The Perspective from San Francisco de Arriba. Unpublished Ph.D. Dissertation, Department of Anthropology, Vanderbilt University. Nashville, Tennessee.

Zárate Morán, Roberto
1995 El Corozal, un sitio arqueológico en la costa del Pacífico de Oaxaca. *Cuadernos del Sur* 10:10–36.

Zeitlin, Judith F.
1978 Community Distribution and Local Economy on the Southern Isthmus of Tehuantepec: An Archaeological and Ethnohistorical Investigation. Unpublished Ph.D. Dissertation, Department of Anthropology, Yale University. New Haven, Connecticut.

Zeitlin, Robert N.
1978 Long-Distance Exchange and the Growth of a Regional Center on the Southern Isthmus of Tehuantepec, Mexico. In *Prehistoric Coastal Adaptations: The Economy and Ecology of Maritime Middle America*, edited by B. Stark and B. Voorhies, pp. 183–210. Academic Press, New York.
1979 Prehistoric Long-Distance Exchange on the Southern Isthmus of Tehuantepec. Unpublished Ph.D. Dissertation, Department of Anthropology, Yale University. New Haven, Connecticut.
1982 Toward a More Comprehensive Model of Interregional Commodity Distribution: Political Variables and Prehistoric Obsidian Procurement in Mesoamerica. *American Antiquity* 47(2):260–275.
1993 Pacific Coastal Laguna Zope: A Regional Center in the Terminal Formative Hinterlands of Monte Albán. *Ancient Mesoamerica* 4(1):85–101.