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Neutrons, Markets, Cities, and Empires: A 1000-Year Perspective on Ceramic Production and Distribution in the Postclassic Basin of Mexico

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We use instrumental neutron activation analysis (INAA) of ceramics from three centers, Cerro Portezuelo, Chalco, and Xaltocan, in the Basin of Mexico, whose occupations span the Postclassic to examine the changing role of markets and evaluate models of political economy. Our results suggest that production and distribution of Epiclassic serving wares was highly localized conforming closely to a solar market model. Ceramic exchange within the Basin increased during the Early and Middle Postclassic, in some cases paralleling political alliance networks. The Late Postclassic marketing pattern incorporated both increased regionalism and increased exchange between hinterlands and imperial cities. These patterns are probably not unique to the Basin of Mexico. INAA is a fruitful means to explore the development of preindustrial markets related to fluctuating economic, demographic, and political processes.

The relationships of urbanism, markets, and political centralization remain important issues in the study of preindustrial civilizations. Mesoamerica is one of the regions where these interrelated developments can be examined (Fig. 1). A notable

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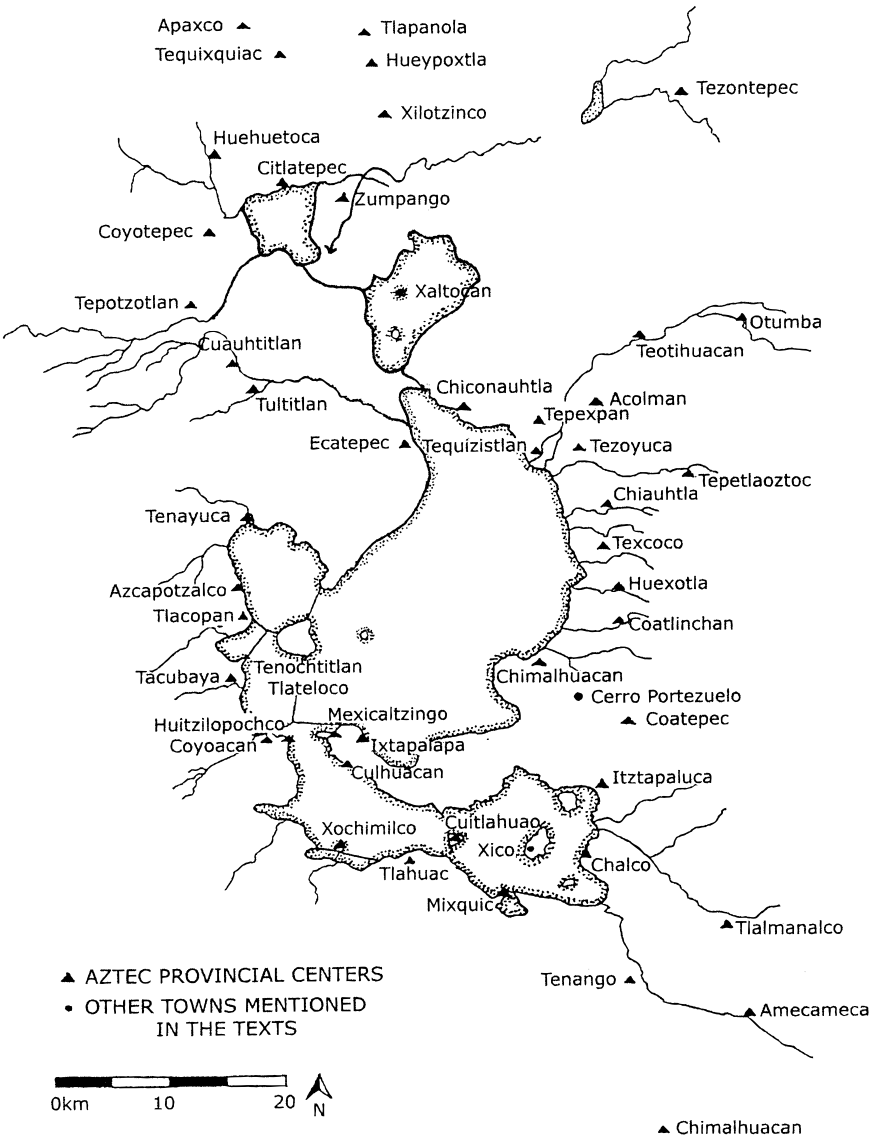

FIG. 1. Postclassic centers in the Basin of Mexico.

aspect of central Mexico's prehispanic urban history was the periodic growth of cities of unusual size. These included Teotihuacan (125,000–150,000 persons), Postclassic Cholula (30,000–40,000 persons), the Toltec city of Tula / Tollan (60,000 to 80,000 persons), and the Aztec capitals of Tenochtitlan–Tlatelolco (150,000 to 200,000 persons) and Texcoco (40,000 persons) (Calnek 1972, 1976:288; Charlton and Nichols 1997:173–174; Cowgill 1997:129; Diehl 1983:48–49; Healan and Stoutamire 1989:235; Sanders et al. 1979:154; Sanders and Webster 1988a:535–537, 1988b; Whitmore 1991:466).

Documentary sources from the 16th century describe a well-developed system of periodic marketplaces in central Mexico.

The largest was located in Tlatelolco, adjacent to Tenochtitlan, where 20,000 to 25,000 people each day bought and sold goods from all over Mesoamerica (Berdan 1975:42; Díaz 1956:232–235; Hassig 1982, 1985:75; Hicks 1987:98). In smaller cities and towns, markets operated weekly (once every 5 days).[1,*] Producers sold their wares in the marketplace along with itinerant traders who moved goods between markets within the region and professional merchants (*pochteca*) who conducted long-distance trade (Berdan 1975:31–35; Hassig 1985:117; Hicks 1987:98). Even the highest level tribute-receiving capitals of Tenochtitlan–Tlatelolco and Texcoco relied heavily on the market system to obtain basic commodities and luxury goods (Blanton 1996:47–48; Parsons 1976; Sanders and Santley 1983:273). Hirth (2000:182) argues that "the marketplace was the central integrating feature of the prehispanic economy."

A long-standing issue in Aztec studies is how the organization of the market system changed over time and the causes of those changes (for recent summaries, see Charlton and Nichols 1997:198–204; Hodge 1998; Hodge and Smith 1994; Smith and Hodge 1994). These questions relate to a broader theoretical question of how important market factors were in the evolution and history of prehispanic states and cities. Much of the recent research on the relationship of market development to urbanism and political centralization has focused on the Aztec empire and the period immediately preceding it. Emphasizing comparisons between the Middle (1150/1200–1350 A.D.) and Late Postclassic (ca. 1350±50–1519 A.D.), however, may attribute to the formation and expansion of the Aztec empire changes that, in fact, resulted from longer term processes (Charlton and Nichols 1997; Marcus 1992, 1998:71–74; Smith 1992).

The late Mary Hodge pioneered the use of geochemical source data from instrumental neutron activation analysis (INAA) of both raw clays and ceramics to look at Aztec market exchange in the Basin of Mexico (Hodge 1992; Hodge et al. 1992, 1993). Just before her death in 1996, Hodge and Hector Neff completed a study of pottery from Chalco that extended to the Epiclassic (Neff and Hodge in press). In this article we compare ceramic source data from Chalco with two other Postclassic city-state centers that also have unusually long occupations, Cerro Portezuelo and Xaltocan (Table 1). C. Portezuelo was founded in the Classic, Chalco's first substantial occupation occurred in the Epiclassic and after a possible hiatus in the Early Postclassic, it was reoccupied. Xaltocan was established in the Early Postclassic. All three sites also have Middle and Late Postclassic and Early Colonial components. With settlement histories that cover nearly a 1000-year span from 650 to ca. 1620 A.D., comparison of ceramic source data from C. Portezuelo, Chalco, and Xaltocan allows us to propose changing patterns of market exchange and to evaluate from a longer longitudinal perspective developmental models of the Postclassic market system and to test the widely held view that both market exchange and the integration of the market system intensified in the Late Postclassic under the Aztec empire.

ECONOMY AND POLITY IN THE POSTCLASSIC PERIOD

The decline of Teotihuacan as a supraregional center at ca. 650 A.D. initiated a period of political fragmentation. The Basin's population was redistributed into settlement clusters, with each cluster constituting a city-state. With a population of 40,000, Teotihuacan remained the largest city. New centers, such as Chalco, were founded, and some small existing regional centers, such as C. Portezuelo, grew. The settlement clusters were highly urbanized, of unequal size, and separated by unoccupied lands, suggesting competitive and perhaps hostile po-

*See Notes at end of article for all footnotes.

TABLE 1
Postclassic Chronology and Associated Ceramics

Basin of Mexico (Sanders et al. 1979)	Teotihuacan (Cowgill 1996; Nichols and Charlton 1996)	C. Portezuelo[a]	Chalco (Parsons et al. 1996)	Xaltocan
Epiclassic 750–950 A.D. Coyotlatelc	Coyotlatelco 650–800+ A.D.	Coyotlatelco, Coyotlatelco R/B, R/C, Monochrome Tan Stamped	Epiclassic 600–800 A.D. (?) Coyotlatelco R/B, R/C	
Early Postclassic 950–1150 A.D. Mazapan 950–1050 A.D. Atlatongo 1050?–1150 A.D.	Mazapan and Atlatongo 800–1000?/1200 A.D. Aztec I 950/1000–1200+ A.D.	Mazapan, Wavy-Line, Wide-Band, and Toltec R/B Atlatongo, Toltec Orange Ware, Cream-slipped Ware, Scalloped Wide-Band R/B, Plumbate	?[b] Aztec I ±1000–1200+ A.D., Aztec I B/O, Chalco Polychrome	Phase 1 900–1100 A.D., Wide Band R/B Aztec I B/O, Chalco Polychrome
Middle Postclassic 1150–1350 A.D. Aztec I and Aztec II	Aztec II 1200–1400/1450 A.D.	Aztec II, Aztec II B/O, Early Aztec Red Ware	Aztec I & Aztec II B/O date? Aztec II 1270–1450 A.D., Aztec II B/O, Early Aztec Red Ware, Chalco Polychrome	Phase 2 1100–1300 A.D., Aztec I & Aztec II B/O, Chalco Poly, Cane-Incised B/R, Graphite B/R Phase 3 1300–1430 A.D., Aztec II B/O, numerous Red Wares, B & W/R
Late Postclassic 1350–1521 A.D. Aztec III and Aztec III–IV	Aztec III 1350±50–1521 A.D.	Aztec III, Aztec III, III–IV B/O, Late Aztec Red Ware	Aztec III 1450?–1521 A.D., Aztec III B/O, Late Aztec Red Ware, Chalco Polychrome	Phase 4 1430–1521 A.D., Aztec III B/O, Late Aztec Red Ware
Early Colonial 1521–1600/1620 A.D.	Early Colonial 1521–1600/1620 A.D.	Aztec IV, Aztec IV B/O	Early Colonial 1521–1600/1620 A.D., Aztec IV B/O	Early Colonial 1521–1600/1620 A.D., Aztec IV B/O

[a]No radiocarbon dates from C. Portezuelo are available; dates for ceramic types are based on cross-dating to the general Basin of Mexico sequence and also the Teotihuacan Valley sequence (Hicks and Nicholson 1962).

[b]There appears to be a hiatus in the occupation of Chalco during the Early Postclassic. However, the degree of chronological overlap between Mazapan/Early Toltec and Aztec I and Aztec I and II ceramics is unclear (Parsons et al. 1996, Sanders et al. 1979:473, Whalen and Parsons 1982:437).

litical relations and / or a need for access to agricultural land with supplemental moisture (Charlton and Nichols 1997:190–194; Cowgill 1996:329; Diehl 1989:16; Rattray 1996; Sanders et al. 1979:129–137). Epiclassic centers in the Basin shared a distinctive Coyotlatelco ceramic complex (Cowgill 1996:329; Cobean 1990:174–175; Cobean and Mastache 1989:38; Cyphers 2000; Hirth 1998:459; Hirth and Cyphers 1988:150; Mastache and Cobean 1989; Rattray 1996:214; Sanders 1986:370–371).

Around 950 A.D., Tula, to the north of the Basin of Mexico, expanded rapidly, although the extent of Tula's political control, which only lasted until 1150 / 1200 A.D., remains unclear (Charlton and Nichols 1997:194–197; Diehl 1983:140–157; Sanders et al. 1979:146–149; Smith and Heath-Smith 1980). In the Basin, settlement was very rural and most people lived in hamlets and small villages. However, as many as eight regional centers, of 4000–6000 people each, existed within the Basin, including Xaltocan (Sanders et al. 1979:137–149). The relationship of these centers to Tula in the northwest and Cholula in the southeast is not well defined.[2]

Middle Postclassic

Following the breakup of the Toltec state ca. 1150 / 1200 A.D., competitive small states or city-states dominated the political landscape of central Mexico (Charlton and Nichols 1997; Hodge 1997). It has been argued that these city-states were associated with solar markets with the marketplace for each city-state located in its capital town / city (Charlton and Nichols 1997:199–202; Hassig 1985:73; Hicks 1987:93; Smith 1979). Solar market systems lack a central place market hierarchy, and because of political controls, rural consumers have limited choice of markets. Although the Middle Postclassic solar markets would not have been integrated into a Basinwide regional market system, obsidian and ceramic data suggest that some goods moved between city-state markets. Hicks (personal communication, 2000) notes that exchange between city-states is not entirely at odds with a solar market model as goods move between market centers but not between dependent communities. (Charlton et al. 2000; Charlton and Nichols 1997).

Charlton and Spence (1983:68–70) suggested that the wide distribution of Pachuca obsidian across political boundaries in the Basin indicates the existence of an economic mechanism that superseded the politically divided market system. Stylistic and compositional studies suggest that Aztec I and II Black / Orange vessels moved between market areas in adjacent city-states within the Basin's subregions (Hodge 1992; Hodge et al. 1992; Hodge and Minc 1990, 1991; Minc et al. 1994). In Hodge and Minc's view this ceramic-exchange pattern does not fit the expectations of either an integrated Basinwide market network or a solar market model, and they suggested the existence of multiple Middle Postclassic subregional market systems that coincided with the political boundaries of city-state confederations. Minc's study of Middle Postclassic Red Wares (Minc 1994:252–253) and Blanton's (1996:57–67) central place analysis of Middle Postclassic settlement supports their model.

Blanton found that centers in the southern and western Basin were arranged along transportation routes in a $K = 4$, "transport principle" pattern. This suggests that the growth of centers was dependent on goods flowing both within and between market regions. Blanton also observed a tendency toward bifurcation in the Middle Postclassic settlement pattern. The eastern and western sides of the Basin constituted independent economic zones served by separate transportation networks. The break between the eastern and western zones fell in the southeast corner of the Basin, along the political boundary that separated the Chalca and the Acolhua city-state confederations.

Late Postclassic

A major issue in Aztec studies is the extent to which the Mexica domination of the political-military organization of the Triple Alliance or Aztec empire was paralleled by centralization of the Basin's economy. Some models stress the increasing economic power wielded by urban-based imperial elites with their increasing tribute wealth. Beginning with results of her research at Huexotla, Brumfiel has argued (1980, 1983) that the increased flow of tribute into the imperial capital of Tenochtitlan–Tlatelolco, and to a lesser degree Texcoco, encouraged the economies of other city-states to emphasize agricultural production over nonagricultural crafts. Brumfiel (1987a, 1991) suggests that peasants living in prime agricultural areas sold food surpluses in the marketplace in exchange for the cloth and cacao that they needed to meet their tribute payments. The cities were places where full-time craft specialization was oriented mostly toward elite consumption. Urban specialists produced goods and services for elites because tribute provided elites with regular surplus income and that income was little affected by annual variations in local agricultural production (Brumfiel 1998). Because full-time specialists need reliable food supplies and large consumer/client populations, full-time craft specialization was largely restricted to luxury goods production in the imperial capitals primarily for elites (e.g., Brumfiel 1987a, 1998; Sanders and Santley 1983:273). However, in Hassig's (1985:130–133) core-periphery model the imperial cities were also centers of production for utilitarian goods used by commoners throughout the Basin.

Others envision less economic centralization and less political control of the economy on the one hand, because of the retention of greater regionalism or, on the other hand, because of the presence of a strong integrated regional market system. Charlton and Nichols agree with Brumfiel and Hassig that the growth of Tenochtitlan, and to a lesser degree Texcoco, led to restructuring of city-state economies in the core of the Basin, but the retention of substantial regionalism is indicated by the abundant evidence of elite and utilitarian craft production at Otumba in the northeastern Basin (Charlton 1994; Charlton and Nichols 1997:202–203; Charlton et al. 1991, 2000; Minc et al. 1994; see also Spence 1985). This position is also supported by the frequent presence of light, highly localized concentrations of debris from utilitarian crafts at other Late Postclassic sites in the Basin (e.g., Brumfiel 1980, 1986, 1987a, Brumfiel and Hodge 1996; Spence 1985). Stylistic and compositional analyses of Aztec III ceramics suggested to Hodge and Minc that regionalism persisted in that political boundaries continued to constrain market exchange between city-state confederations (Hodge 1992; Hodge and Minc 1990; Hodge et al. 1993; Minc et al. 1994).

Alternatively, other archaeologists argue that imperial domination of the economy was limited by the strong integration of a regional market system. The growth of the market system and increasing commercialization are cited as key components of the change from the large states of the Classic period to the dominance of city-states in Postclassic (e.g., Blanton 1983, 1996, Blanton et al. 1993:210–214; Blanton et al. 1996; Hirth 1998:452). Building on the work of Carol Smith (1976:50–51), Blanton et al. (1993:156, 213) argue that the break up of Teotihuacan and other large Classic period states and cities reduced political dominance of the economy and permitted the development of strong commercial institutions involving increased market exchange and increased integration, which eventually led to a more politically autonomous market system during the Postclassic.

Central place analyses by Smith (1979, 1980; cf. Evans 1980) and Blanton (1996) suggest that the Late Postclassic market was a complex interlocking market system where rural buyers and sellers had access to multiple marketplaces and administrative control over markets was limited to maintaining an orderly marketplace and the unrestricted movement of goods and people within the region. “Thus the Aztec system, more than any other previous valley economy, approached something like ‘full commercialization’” (Blanton et al. 1993:152). In such a market system, imperial domination of the economy would have been balanced by the strong lateral flows of goods between subregions that occur in such fully integrated systems. Blanton (1996:80) points out that lateral integration is indicated by the pattern of early colonial roads that not only run to and from imperial capitals but also bypass capitals on their way to hinterland centers.

ARCHAEOLOGICAL CORRELATES OF CERAMIC MANUFACTURING AND DISTRIBUTION

Ceramics are well represented in the archeological record. Postclassic ceramics included pottery for preparing, cooking, serving, and storing foods; incense burners and figurines for religious rituals; musical instruments such as flutes and whistles; smoking pipes; spindle whorls for spinning thread; and jewelry. Some serving vessels may have been exchanged through gift giving associated with feasting, and minor amounts of pottery moved through the tribute system, but documentary sources indicate that most Aztec pottery was traded through the market system (Brumfiel 1987b, 1999; Hodge and Minc 1990:417, footnote 1; Hodge et al. 1993:132). Thus, ceramics provide a means of examining market exchange in the archaeological record.

Ideally, we would like to know exactly where each ceramic artifact was made and the context where it was found; however, identifying ceramic manufacturing locations in the archaeological record is complicated. Clay sources suitable for making ceramics are widely distributed in the Basin; indeed their broad distribution, along with the high cost of transporting “utilitarian” pottery by human portage on foot (canoe transport over the lakes in the central Basin would have lowered these costs), led Sanders and Santley (1983:225) to argue that the prehispanic production and exchange of pottery always was decentralized.[3] Documentary sources list six centers of prehispanic pottery manufacturing in the Basin (Azcapotzalco, Cuauhtitlan, Huitzilopocho, Texcoco, Tlatelolco, and Xochimilco) but provide few details (Gibson 1964:350–351; Hodge et al. 1992:207; Hodge et al. 1993:132–134; Rendón 1950). The *Anales de Cuauhtitlan* recounts how in the 1300s A.D. potters fled Culhuacan to Cuauhtitlan, implying that Culhuacan had also been a manufacturing locale (Branstetter-Hardesty 1978:27). Rice (1987:177–178; 1996a) and Stark (1985) have presented archaeological criteria for identifying manufacturing locales at varying levels of geographic precision, ranging from kilns to manufacturing zones (Table 2).

Kilns and Firing Areas

The presence of kilns or firing areas is the most precise indicator of a ceramic manufacturing locale; however, to the best of our knowledge no Postclassic kilns have been identified in the Basin of Mexico. [Early Postclassic kilns have been reported at Tula (Healan et al. 1989:246; Hernández et al. 1999) and see Hopkins (1995:149–150) for a summary of firing areas of Teotihuacan.] The small number of prehispanic kilns and firing areas reported from the Basin reflects difficulties in identifying such features from surface survey and the fact that until recently archaeologists often did not extensively excavate areas outside of houses where remains of such features are most likely to occur (see Rice 1996b:175; Stark 1985).

TABLE 2
Rice's (1987:177) Criteria to Infer Locations of Ancient Pottery Production

1.	Proximity to high-quality clay resources
2.	Location near modern potting communities
3.	Presence of kilns
4.	Presence of burned soil features (red soil, ash deposits, and thermally altered rock)
5.	Presence of kiln furniture (stilts, props, saggars, etc.)
6.	Presence of firing wasters
7.	Presence of pottery-making tools (wheels, molds, and polishing stones)
8.	Stashes of raw materials (clay and temper)
9.	Quantities of unfired vessels
10.	Quantities of identical vessels
11.	High frequency of locally made vessels
12.	High frequency of different types of vessels

Manufacturing Debris and Workshop Loci

Other strong archaeological indicators of ceramic workshop locales and specialized manufacturing include the presence of raw materials such as unfired clay wasters; manufacturing tools; unfired ceramics; and large quantities of locally made ceramics (Rice 1987:177–178). At the Epiclassic site of Cerro Tenayo on the western shore of Lake Texcoco, Rattray recovered large quantities of Coyotlatelco ceramics: "In the remains of the houses were spalled and blackened sherds suggestive of potters' workshops" [1996:219; for summaries of Classic workshops at Teotihuacan see Hopkins (1995: 143–155); Manzanilla (1999:105)]. Workshops for Early Postclassic pottery have been recorded at Tula and at sites near Cerro Xicuco (Hernández et al. 1999; Moncayo O. 1999:107).

Aztec ceramic workshops have been extensively documented at Otumba, a city-state capital in the northeastern Basin (Charlton et al. 1991, 2000; Nichols 1994; Otis Charlton et al. 1993). There, production debris, such molds for incense burners, figurines, and spindle whorls, unfired, malformed, and misfired artifacts mark locations where manufacturing occurred during the Late Postclassic and Early Colonial periods (Charlton et al. 2000; Charlton and Otis Charlton 1994; Nichols and Charlton 1996; Nichols et al. 2000; Otis Charlton 1994). Other workshops in the town made obsidian core-blades, ornaments of obsidian and rare stones, and basalt grinding tools while workshops in rural villages produced bifaces from the local Otumba obsidian (Biskowski 2000; Otis Charlton 1993; Parry 2001).

RECENT COMPOSITIONAL STUDIES OF AZTEC POTTERY

In the 1980s Mary Hodge and Leah Minc began a long-term study of Aztec ceramic production in order to define the impact of politics on economic networks. They analyzed both the geographic distribution of decorative styles and motifs on serving vessels (Black / Orange Wares, Red Wares, and polychromes) and the chemical composition of ceramics and clays (Hodge 1992; Hodge and Minc 1990; Hodge et al. 1992, 1993; Minc et al. 1994). Hodge and Minc found that certain Early and Late Aztec decorative motifs and styles had spatially restricted distributions in the southern and eastern Basin of Mexico (the focus of their studies). They then compared the geographic distributions of ceramic styles with the results of instrumental neutron activation analysis (INAA) of pottery pastes. Certain styles of serving wares correlated with variations in the chemical composition of the pottery (pastes). These results pointed to the existence of at least three composition groups in the southern and eastern Basin: Chalco, Tenochtitlan / Culhuacan (previously referred to as Ixtapalapa), and Texcoco.

The presence of distinctive serving wares that are abundant at Chalco (e.g., Chalco Aztec I Black / Orange and Chalco Polychrome), similar in paste composition and largely restricted to the Chalco area, suggested that the site of Chalco was a manufacturing center for Aztec I and II Black/Orange and polychrome pottery (Minc et al. 1994:140–145). To test this idea, the chemical composition of raw clay samples from the vicinity of Chalco was determined using INAA (Neff and Hodge, in press). This analysis also indicated that Chalco Aztec Black/Orange and Chalco Polychrome were made from clays at or near the site of Chalco. The number and precise locations of manufacturing loci represented by the Chalco, Tenochtitlan/Culhuacan, and Texcoco composition groups are not known.

INSTRUMENTAL NEUTRON ACTIVATION ANALYSIS

The raw clays sampled from the Basin and ceramics discussed in this study were analyzed at the Missouri University Research Reactor (MURR) using standard procedures. Clays were mixed with deionized water, pressed into petri dish molds, and then fired to 700°C for 1 h in air before being prepared for analysis. Aliquots of both sherds and test tiles were prepared for INAA by crushing several hundred milligrams in an agate mortar to yield a fine powder. The powdered samples were oven-dried at 100°C for 24 hs. Portions of approximately 150 mg were weighed and placed in small polyvials used for short irradiations. At the same time, 200 mg of each sample was weighed into high-purity quartz vials to be used for long irradiations. Along with the unknown samples, reference standards of SRM-1633a (coal fly ash) and SRM-688 (basalt rock) were similarly prepared, as were quality control samples (i.e., standards treated as unknowns) of SRM-278 (obsidian rock) and Ohio Red Clay.

INAA of ceramics at MURR, which consists of two irradiations and a total of three gamma counts on high-purity germanium detectors, constitutes a superset of the procedures used at most other laboratories (Glascock 1992; Neff 2000). A 5-s irradiation through a pneumatic tube system, which is followed by a 720-s count, yields gamma spectra containing peaks for the short-lived elements aluminum (Al), barium (Ba), calcium (Ca), dysprosium (Dy), potassium (K), manganese (Mn), sodium (Na), titanium (Ti), and vanadium (V). A 24-h irradiation is followed by a 7-day decay, then a 2000-s gamma count (the "middle count"), then an additional 3-F or 4-week decay, and finally a count of 9000 s. The middle count yields determinations of 7 medium-halflife elements, namely arsenic (As), lanthanum (La), lutetium (Lu), neodymium (Nd), samarium (Sm), uranium (U), and ytterbium (Yb), and the final (long) count yields measurements of 17 long-halflife elements, namely cerium (Ce), cobalt (Co), chromium (Cr), cesium (Cs), europium (Eu), iron (Fe), hafnium (Hf), nickel (Ni), rubidium (Rb), antimony (Sb), scandium (Sc), strontium (Sr), tantalum (Ta), terbium (Tb), thorium (Th), zinc (Zn), and zirconium (Zr).

It usually has not been feasible to sample all clay sources intensively enough to encompass all the relevant variation, and as a result boundaries between "sources" either on the ground or in terms of chemical composition are not distinct. Consequently, chemical source attribution is usually to subareas in large regions such as the Basin, in the absence of other lines of archaeological evidence of manufacturing (Bishop 1992). Inferring specific geographical sources from chemical compositions is further complicated by the complex ways that potters mix ceramic raw materials and modify pastes, by potters from nearby settlements using overlapping resource areas, and by temporal changes in the use of raw materials (Arnold 1999:63; Druc 2000; Tite 1999:199–200). These factors, along with the fact that clay sources are usually not tightly bounded and tend to vary in their chemical composition along a continuum, complicate the identification of discrete manufacturing loci based on chemical patterning. INAA does not identify "clay sources"; rather, it distinguishes where potters obtain the clay component of their ceramics “from a relatively small resource area near their settlements. The clay component may consist of a mixture of several clays and temper with a clay fraction” (Arnold et al. 1999:82). Thus, to identify the exact location of ceramic workshops in a complex drainage region such as the Basin, where there is considerable mixing / transport of soils and volcanic parent material, requires other archaeological data (Charlton et al. 1999, 2000; Neff et al. 2000).

Basin of Mexico Ceramic Composition Groups

As an interior drainage basin that continually receives sediments from surrounding volcanic terrain, the Basin of Mexico is a challenging setting in which to conduct chemistry-based ceramic provenance investigations. Compositional differences between the various geographic subdivisions within the Basin are subtle at best. Nonetheless, results obtained by Hodge, Blackman, and their collaborators (e.g., Hodge et al. 1992, 1993) indicated that source determination on a geographic scale useful for answering questions about Aztec interaction patterns was a realistic goal. In particular, the initial analysis of the INAA data suggested a tripartite compositional division into Texcoco, Ixtapalapa, and Chalco composition groups. Between 1993 and 1997, additional INAA studies were undertaken on samples from Xaltocan (Brumfiel and Hodge 1996; Hodge and Neff in press), Otumba (Neff et al. 2000), Chalco (Neff and Hodge in press), and other sites. The additional analyses suggested that five distinct Middle and Late Postclassic composition groups could be recognized, Tenochtitlan / Culhuacan, Chalco, Texcoco, Otumba, and Cuauhtitlan (Neff et al. 2000). In addition, several smaller groups were identified in the sample from a trade route survey to the northeast of the Teotihuacan Valley and in the sample from Xaltocan (Neff et al. 2000; Hodge and Neff in press.).

Charlton, Otis Charlton, and Nichols, in collaboration with Neff and Glascock (Neff et al. 2000) initiated INAA studies of ceramics from the city-states of Otumba, Tepeapulco, and Tulancingo, as well as obsidian from lapidary workshops at Otumba (Otis Charlton 1993). Based partly on the encouraging INAA results, Charlton, Nichols, and their collaborators undertook a project to significantly expand the source analysis of Aztec ceramics from the north and northeastern Basin of Mexico. They obtained and analyzed 129 raw clay specimens from the Cuauhtitlan, Texcoco, Temascalapa, Teotihuacan Valley, and Trade Route survey areas (Charlton et al. 1999; Neff et al. 2000). Other projects have collected raw clay samples from other parts of the Basin. Currently, there are approximately 185 clay samples for comparison with the ceramic compositional groups (Fig. 2). The northeast Basin is represented quite heavily in the raw material sample, while other parts of the Basin, particularly the southwest (the location of modern Mexico City) and the northwest are underrepresented. Representation of regions adjacent to the Basin of Mexico is also variable, comparatively the region to the northeast, around Tepeapulco and Tulancingo is represented well. Although the unevenness of the raw material sample makes it less-than-ideal for assessing provenance, some very clear results emerge for some of the ceramic compositional groups.

Individual specimens can be attributed to groups of varying geographical specificity: some can be assigned to relatively localized composition groups, such as the five groups previously discussed; others can be assigned to broader groups, such as the southern Basin; still others are outliers for which a secure zonal affiliation cannot be suggested (Neff and Glascock 2000). Five main composition groups have been recognized in the Aztec sample. Three—Texcoco, Chalco, and Tenochtitlan / Culhuacan—

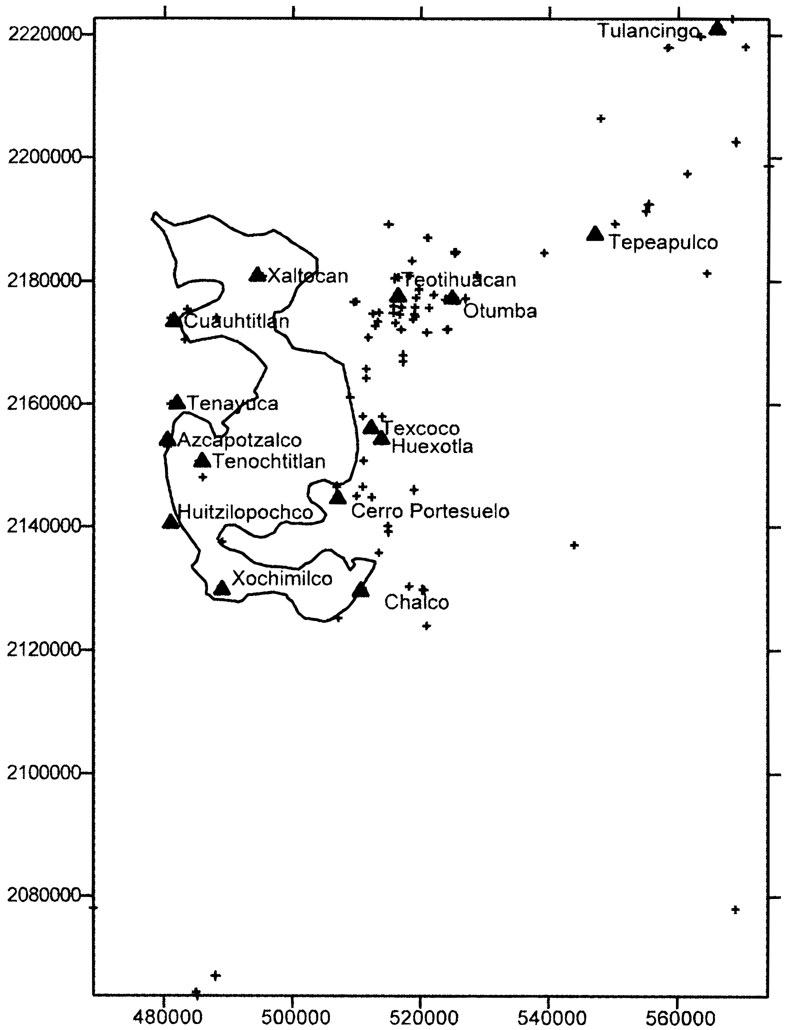

FIG. 2. Location of raw clay samples from the Basin of Mexico.

were previously defined from the research of Hodge and her colleagues (Hodge et al. 1992, 1993). Analysis of ceramics from Xaltocan led to the initial definition of a Cuauhtitlan group (Hodge and Neff, in press), which has been substantiated with additional research. The Otumba-Core group has been recognized from analysis of a large sample of ceramics, including specimens made in workshops at Otumba, and clay raw materials (Charlton et al. 1999; Neff et al. 2000).

A canonical discriminant analysis of the five well-defined groups captures major dimensions of geographic variation in ceramic materials from the Basin. The first two discriminant axes produced by this analysis are used in the following discussion to summarize patterns of source utilization at C. Portezuelo, Chalco, and Xaltocan. It should be borne in mind that these plots (Figs. 3–5) do not depict details of group assignments, which are given in Tables 3–6.

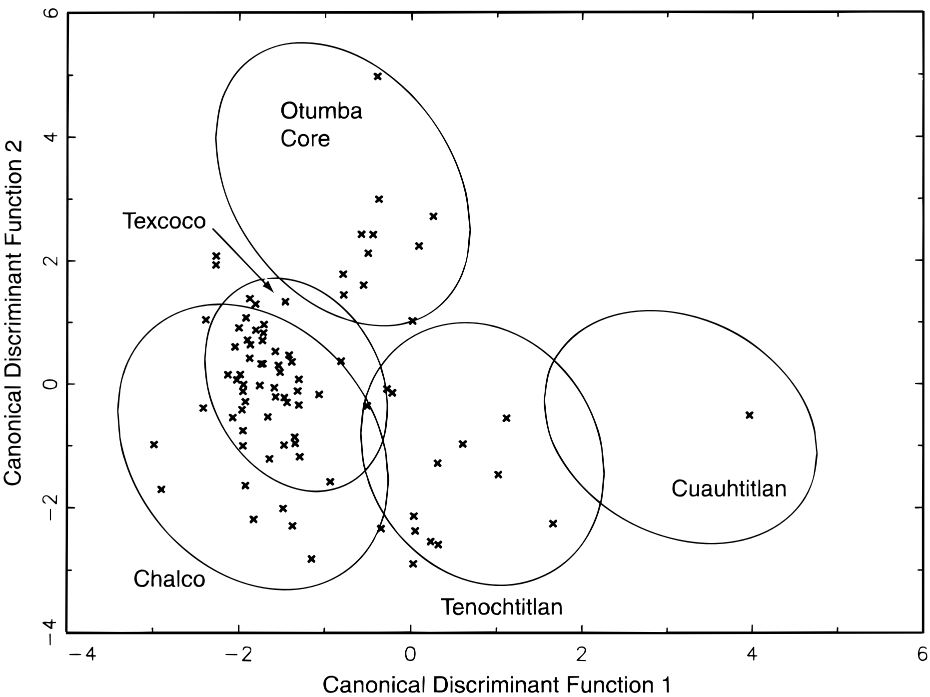

FIG. 3. Ceramics from Cerro Portezuelo projected onto the first two discriminant function axes derived from a canonical discriminant analysis of the five main Basin reference groups.

On the basis of analyses of clays and ceramics from the site of C. Portezuelo, Neff and Glascock (2000) recently defined a sixth main composition group, C. Portezuelo. Barbara Branstetter-Hardesty (1978:182–183) had proposed from an early application of INAA that C. Portezuelo was a pottery-making center from the Classic through the Late Postclassic. Drawing on a larger database of analyzed clay raw materials and ceramics from the Basin, the C. Portezuelo group defined by Neff and Glascock is part of the eastern Basin compositional continuum that also includes Otumba, Texcoco, and Chalco. It is distinct from these groups in multivariate space, although it completely overlaps Texcoco and Chalco on the first two canonical discriminant axes and on other two-dimensional projections of the data.

A series of smaller ceramic composition groups have also been recognized (Neff and Glascock 2000). Xaltocan-1, -2, and -3 are ceramics sampled from Xaltocan that have compositions outside the ranges of variation of the main Basin groups. Xaltocan-1 and Xaltocan-2 are very similar except that the Xaltocan-2 specimens encompass a wider range of variation on most elements while the four specimens in Xaltocan-3 contain concentrations of calcium that are unusually low compared to most other Basin ceramics and could be due to leaching of these specimens during diagenesis. The predominance of ceramics from the site of Xaltocan suggests that these groups are made of ceramics from clay sources somewhere in the northern Basin. Comparison of raw materials to the Xaltocan-1 group supports this hypothesis, although sampled clays from the site of Xaltocan suggest that it was not a source of clays for local pottery. Clay might have been obtained from the mainland shoreline

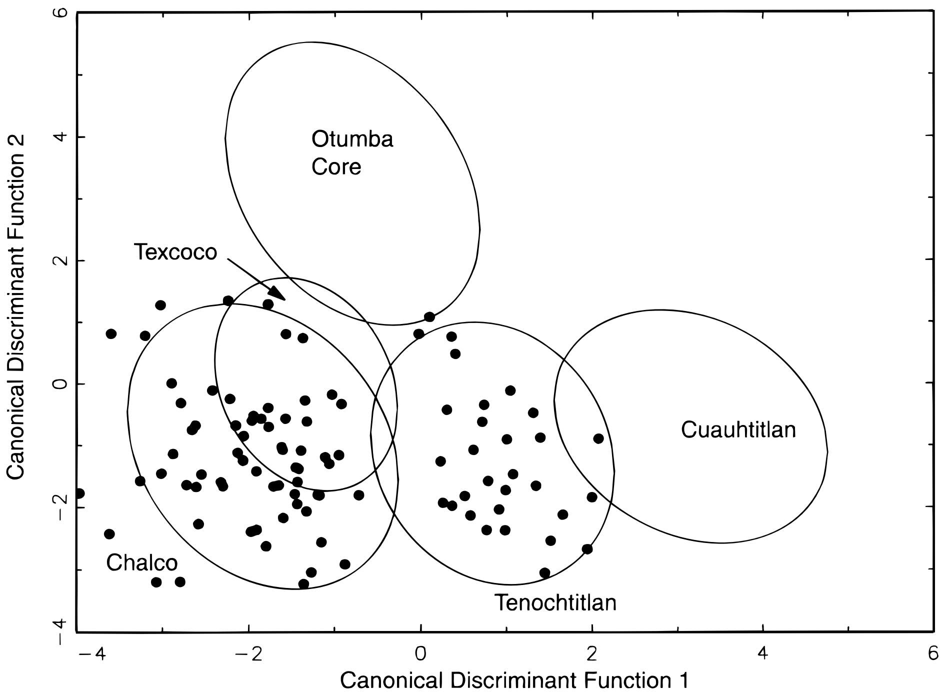

FIG. 4. Ceramics from Chalco projected onto the first two discriminant function axes derived from a canonical discriminant analysis of the five main Basin reference groups.

since it could easily have been transported by canoe, but this hypothesis requires additional testing of clay sources. The overlap of Xaltocan-1 and Xaltocan-2 on most data projections suggests that Xaltocan-2 is comprised of ceramics made from clays in the northern Basin, around Lake Xaltocan. The sample for Xaltocan-3 is too small to suggest possible source locations.

Southern Basin-1, Southern Basin-2, and Southern Basin-3 contain ceramics that cannot be placed in either of the southern Basin composition groups, Chalco or Tenochtitlan / Culhuacan, but were probably made from clays procured somewhere in the southern Basin. Many ceramics in the Southern Basin-1 group have high probabilities of membership in the Chalco and Tenochtitlan / Culhuacan groups and in some cases the C. Portezuelo group. Others are statistical outliers that have relatively high transition-metal profiles characteristic of parent materials of southern Basin ceramics. Southern Basin-1 almost completely overlaps the Chalco group on transition metals and its members may be Chalco group outliers or ceramics made from clays in the area between the Chalco and Tenochtitlan / Culhuacan composition groups. Southern Basin-2 exhibits very high cobalt concentrations, similar to three raw material samples from Huexoculco in the foothills east of Chalco. (Ceramics in the Chalco group were not made from Huexoculco clays.) Although Southern Basin-3 partially overlaps the Chalco composition group on many data projections, it generally has higher chromium concentrations. Chromium concentrations follow a north–south trend, suggesting that these ceramics might have been made from clays in the mountains south of Chalco, but none can be linked to previously defined Puebla or Morelos composition groups (Neff et al.

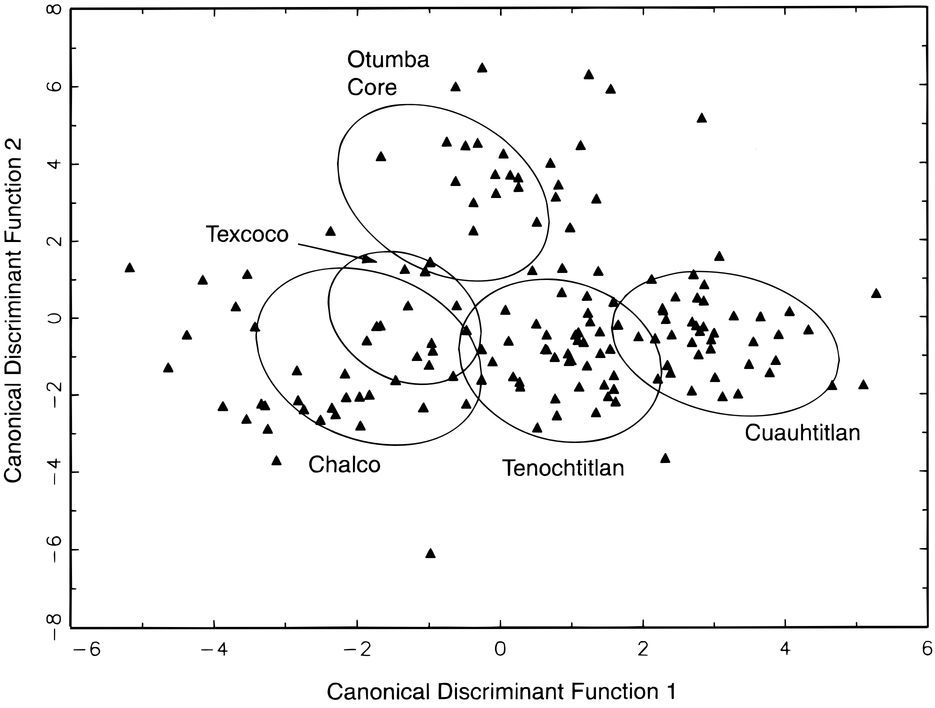

FIG. 5. Ceramics from Xaltocan projected onto the first two discriminant function axes derived from a canonical discriminant analysis of the five main Basin reference groups.

1994). Ceramics and clay from the Aztec market center at Amecameca should be sampled as a possible composition group.

Otumba-Macro consists of specimens that probably derive from clays in the northeast Basin but are not included in the Texcoco or Otumba-Core groups. Although the continuum of clay raw materials in the northeastern and eastern Basin can be divided into relatively discrete units, i.e., the C. Portezuelo, Otumba-Core, and Texcoco composition groups, many specimens fall in the compositional space between these groups. These specimens most likely derive from clay resource areas located between C. Portezuelo and Otumba.

Teotihuacan-2 and Teotihuacan-4 each differ from the Otumba-Core group. Teotihuacan-2 exhibits high concentrations of cesium and several other elements compared to the Otumba-Core group, while Teotihuacan-4 is low in cobalt as well as other transition metals and rare earth elements. Although the Teotihuacan-4 group is primarily composed of ceramics found in the Teotihuacan Valley, it is most similar to raw materials from Cuauhtitlan, Tenayuca, and Tlatelolco and is dominated by Aztec IV / Colonial ceramics.

Unassigned specimens consist mostly of ceramics that are outliers to all the main groups and also do not seem to be related to any of the smaller groups. Some unassigned specimens have a high probability of belonging to more than one main group. Looking at the Basin as a ceramic compositional continuum, most unassigned specimens fall along this continuum but cannot be attributed to a particular division of it. The continuous nature of compositional variation in the Basin implies that composition groups blur into one another at the

TABLE 3
Cerro Portezuelo Ceramic Sample and Chemical Composition Groups

	Chalco	C. Portezuelo	Cuauhtitlan	Otumba Core	Tenochtitlan / Culhuacan	Texcoco	Otumba Macro	So. Basin 1	So. Basin 3	Unassigned	*n*
Teotihuacan	0.0	0.0	0.0	0.0	50.0 (1)	0.0	0.0	0.0	0.0	50.0 (1)	2
Coyotlatelco	0.0	64.3 (9)	0.0	0.0	0.0	0.0	7.1 (1)	14.3 (2)	0.0	14.3 (2)	14
Mazapan	25.0 (6)	29.2 (7)	0.0	4.2 (1)	0.0	0.0	29.2 (7)	0.0	0.0	12.5 (3)	24
Aztec II	28.6 (4)	21.4 (3)	0.0	0.0	0.0	14.3 (2)	0.0	21.4 (3)	7.1 (1)	7.1 (1)	14
Aztec III	3.7 (1)	55.6 (15)	0.0	0.0	14.8 (4)	14.8 (4)	7.4 (2)	0.0	0.0	3.7 (1)	27
Aztec IV	0.0	20.0 (1)	0.0	0.0	0.0	80.0 (4)	0.0	0.0	0.0	0.0	5

TABLE 4
Chalco Ceramic Sample and Chemical Composition Groups

	Chalco	C. Portezuelo Zone	Cuauhtitlan Core	Otumba	Tenochtitlan / Culhuacan	Texoco	So. Basin 1	So. Basin 2	So. Basin 3	Puebla /	Unassigned Morelos	*n*
Coyotlatelco	52.0 (13)	0.0	0.0	0.0	0.0	0.0	8.0 (2)	0.0	16.0 (4)	24.0 (6)	0.0	25
Aztec I	88.2 (15)	0.0	0.0	0.0	0.0	0.0	0.0	11.8 (2)	0.0	0.0	0.00	17
Aztec II	5.6 (1)	0.0	0.0	0.0	88.9 (16)	0.0	5.6 (1)	1.9 (1)	0.0	0.0	0.0	18
Early Aztec Chalco Polychrome	95.0 (19)	0.0	0.0	0.0	0.0	0.0	5.0 (1)	0.0	0.0	0.0	0.0	20
Aztec III	0.0	5.9 (1)	0.0	0.0	23.5 (4)	0.0	11.8 (2)	58.8 (10)	0.0	0.0	0.0	17
Aztec IV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0 (1)	0.0	0.0	0.0	1

TABLE 5
Xaltocan Ceramic Sample and Chemical Composition Groups

	Chalco Zone	C. Portezuelo	Cuauh-titlan	Otumba Core	Tenoch-titlan / Culhuacan	Texcoco Zone	Otumba Macro	So. Basin 1	So. Basin 2	So. Basin 3	Puebla / Morelos	Xalto-can 1	Xalto-can 2	Xalto-can 3	Unassigned	*n*
Teotihuacan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0 (1)	1
Mazapan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.0 (3)	40.0 (2)	0.0	0.0	0.0	0.0	0.0	5
Mazapan?	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0 (1)	1
Early Aztec	7.1 (1)	0.0	14.3 (2)	0.0	28.6 (4)	0.0	0.0	7.1 (1)	0.0	0.0	0.0	35.7 (5)	0.0	0.0	7.1 (1)	14
Aztec I	7.7 (1)	0.0	0.0	0.0	7.7 (1)	0.0	0.0	0.0	0.0	7.7 (1)	0.0	61.5 (8)	15.4 (2)	0.0	0.0	13
Aztec II, I	9.1 (3)	0.0	6.1 (2)	0.0	24.2 (8)	0.0	0.0	3.0 (1)	0.0	27.3 (9)	3.0 (1)	9.1 (3)	12.1 (4)	3.0 (1)	3.0 (1)	33
Aztec II, I?	100.0 (1)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1
Aztec II	0.0	0.0	28.1 (9)	0.0	6.3 (2)	0.0	3.1 (1)	12.5 (4)	0.0	9.4 (3)	0.0	15.6 (5)	15.6 (5)	6.3 (2)	3.1 (1)	32
Aztec II mix	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7 (2)	0.0	33.3 (4)	0.0	41.7 (5)	0.0	0.0	8.3 (1)	12
Aztec II-III	0.0	0.0	0.0	0.0	100.0 (1)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1
Aztec III	0.0	0.0	19.2 (5)	0.0	34.6 (9)	0.0	3.8 (1)	3.8 (1)	0.0	3.8 (1)	0.0	11.5 (3)	15.4 (4)	0.0	7.7 (2)	26
Aztec III-IV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3 (3)	44.4 (4)	0.0	22.2 (2)	9
Aztec IV	0.0	0.0	60.0 (3)	0.0	0.0	20.0 (1)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0 (1)	5

edges. Assignment of individual specimens to one group or another is statistical, and there are certainly misassignments. Consequently, it is the broad pattern of changes over time that is important in the following discussion.

CERRO PORTEZUELO

The site of Cerro Portezuelo is located 5 km southeast of Chimalhuacan in the southeastern Basin of Mexico along the north flank of a series of east–west trending ridges that, at the time of the Spanish conquest, divided the Acolhuacan and Chalco confederations. It was one of the largest city-state centers in the eastern Basin of Mexico during the Epiclassic and Early Postclassic.

Background

George Brainerd began archaeological investigations at the site in 1954 to investigate the Classic-to-Postclassic transition. His project excavated test pits across the site area and also conducted excavations of a civic-ceremonial area and residential architecture (Hicks and Nicholson 1962; Nicholson and Hicks 1961).[4] Jeffrey Parsons (1971:75) surveyed C. Portezuelo as part of his study of settlement patterns in the Texcoco region. He found Early Classic pottery scattered over an area of 60 ha, the largest Early Classic occupation in the Texcoco region (Parsons 1971:61). In the Epiclassic, C. Portezuelo grew to cover 400 ha, with 22 "civic-ceremonial" mounds as well as low residential mounds and additional dense concentrations of rock rubble and artifacts. Clusters of several ceremonial-civic structures grouped around small plazas appear to "represent barrio- or calpolli like socio-political divisions within the community" (Parsons 1971:75). Parsons estimated that C. Portezuelo had an Epiclassic population of 12,000 people having grown from a small Classic-period provincial center. This popu-

TABLE 6
Ceramic Descriptions[a]

Id No.	Site	Provenience	Composition Group	Period	Description[b]
AZC001	C. Portezuelo	PTS 93J1SE	Tenochtitlan	Aztec III	Bl/O Dish E-1 (D)
AZC002	C. Portezuelo	PTS 35B	C. Portezuelo	Aztec III	Bl/O Dish E-1 (D)
AZC003	C. Portezuelo	PTS 81B	Texcoco	Aztec III	Bl/O Molcajete D-3 (D)
AZC004	C. Portezuelo	PTS 96C8A	Tenochtitlan	Aztec III	Bl/O Molcajete D-1 (D)
AZC005	C. Portezuelo	PTS 52B	Texcoco	Aztec III	Bl/O Dish D-1 (D-4)
AZC006	C. Portezuelo	PTS 93KSNWD	Tenochtitlan	Aztec III	Bl/O Bowl E? (D)
AZC007	C. Portezuelo	PTS 3596C	C. Portezuelo	Aztec III	Bl/O Miniature Dish D
AZC008	C. Portezuelo	PTS 81B	Texcoco	Aztec III	Bl/O Dish D-2 (D-1)
AZC009	C. Portezuelo	PTS J1SEB	C. Portezuelo	Aztec III	Bl/O Dish D-1 (D-3)
AZC010	C. Portezuelo	PTS 96L9E	Chalco	Aztec II	Bl/O Dish B-1 (B)
AZC011	C. Portezuelo	PTS 96K6B	C. Portezuelo	Aztec II	Bl/O Dish A-1g (B)
AZC012	C. Portezuelo	PTS 27D/F	Texcoco	Aztec II	Bl/O Molcajete B-1 (B)
AZC013	C. Portezuelo	PTS 0607A	Chalco	Aztec II	Bl/O Dish A-2g (B)
AZC014	C. Portezuelo	PTS 35B	Southern Basin 1	Aztec II	Bl/O Plate B-1 (B)
AZC015	C. Portezuelo	PTS N7B	Chalco	Aztec II	Bl/O Dish A-1g (A)
AZC016	C. Portezuelo	PTS 96C/22(?)N7D	Texcoco	Aztec II	Bl/O Molcajete A-1c (A)
AZC017	C. Portezuelo	PTS M6B	Chalco	Aztec II	Bl/O Dish A-3c (A)
AZC018	C. Portezuelo	PTS 29B	Unassigned	Aztec II	Bl/O Dish A-3g (A)
AZC019	C. Portezuelo	PTS 96MEB	Texcoco	Aztec IV	Bl/O Molcajete H (H)
AZC020	C. Portezuelo	PTS 93C	Texcoco	Aztec IV	Bl/O Dish F (F)
AZC021	C. Portezuelo	PTS 908A	Texcoco	Aztec IV	Bl/O Molcajete H (H)
AZC022	C. Portezuelo	PTS 93J2NW/	Texcoco	Aztec IV	Bl/O Dish F
AZC023	C. Portezuelo	PTS 93H3NEC	C. Portezuelo	Aztec IV	Bl/O slab support F
AZC024	C. Portezuelo	PTS 9607C	Southern Basin 3	Aztec II	Bl&Wh/Red Bowl E-2/AW (A)
AZC025	C. Portezuelo	PTS ? #35	C. Portezuelo	Aztec III	Bl&Wh/Red Bowl E-3
AZC026	C. Portezuelo	PTS Surface #34	Otumba-Macro	Aztec III	Bl&Wh/Red Bowl ? (B)

AZC027	C. Portezuelo	PTS ? 328	C. Portezuelo	Aztec III	Bl&Wh/Red Bowl C-1
AZC028	C. Portezuelo	PTS 96R9C #29	C. Portezuelo	Aztec II	Bl&Wh/Red Bowl B-1
AZC029	C. Portezuelo	PTS 27D	Southern Basin 1	Aztec II	Bl&Wh/Red Bowl B-2
AZC030	C. Portezuelo	PTS 9607B	C. Portezuelo	Aztec III	Bl/Red Bowl C-1 (comb dec)
AZC031	C. Portezuelo	PTS 27B	Unassigned	Aztec III	Bl/Red Bowl C-1 (comb dec)
AZC032	C. Portezuelo	PTS 93J1EB	C. Portezuelo	Aztec II	Bl/Red Bowl D-3 (D)
AZC033	C. Portezuelo	PTS 27E	C. Portezuelo	Aztec III	Bl/Red Bowl C-2 (C)
AZC034	C. Portezuelo	PTS 98WE	Tenochtitlan	Aztec III	Bl/Red Bowl C-2 (C)
AZC035	C. Portezuelo	PTS 35B	C. Portezuelo	Aztec III	Bl/Red Bowl C-2 (comb dec)
AZC036	C. Portezuelo	PTS 35B	Southern Basin 1	Aztec II	Bl/Red Bowl D-3 (D)
AZC037	C. Portezuelo	PTS J1SEB	C. Portezuelo	Aztec II	Bl/Red Bowl D (D)
AZC038	C. Portezuelo	PTS 41B	C. Portezuelo	Aztec III	Bl/Red Bowl C-1 (comb dec)
AZC039	C. Portezuelo	PTS 93N3SEC	Texcoco	Aztec III	Bl&Wh/Red Bowl C-1
AZC040	C. Portezuelo	PTS 96L7B	C. Portezuelo	Aztec III	Bl/Red Bowl C-1 (C-1)
AZC041	C. Portezuelo	PTS 27D	Chalco	Aztec III	Bl/Red Bowl C-1 (C-1)
AZC042	C. Portezuelo	PTS 93L45EA	C. Portezuelo	Aztec III	Figurine I- foot
AZC043	C. Portezuelo	PTS 64A	Otumba-Macro	Aztec III	Figurine I-
AZC044	C. Portezuelo	PTS 96KAC	Otumba-Macro	E. Postclassic	Wavy-Line R/B Bowl
AZC045	C. Portezuelo	PTS 96L70	Chalco	E. Postclassic	Toltec R/B Bowl
AZC046	C. Portezuelo	PTS 96K7D	C. Portezuelo	E. Postclassic	Wavy-Line R/B Bowl
AZC047	C. Portezuelo	PTS 96N8D	Otumba-Macro	E. Postclassic	Wavy-Line R/B Bowl
AZC048	C. Portezuelo	PTS 96L7B	Otumba Core	E. Postclassic	Wavy-Line R/B Bowl
AZC049	C. Portezuelo	PTS 96M6G(?)	Unassigned	E. Postclassic	Wavy-Line R/B Bowl
AZC050	C. Portezuelo	PTS 96M8D	Otumba-Macro	E. Postclassic	Wavy-Line R/B Bowl
AZC051	C. Portezuelo	PTS 96N6D	Otumba-Macro	E. Postclassic	Wavy-Line R/B Bowl
AZC052	C. Portezuelo	PTS 96L8D	C. Portezuelo	E. Postclassic	Wavy-Line R/B Bowl
AZC053	C. Portezuelo	PTS 96O7D	C. Portezuelo	Epiclassic	Coyotlatelco R/B Bowl
AZC054	C. Portezuelo	PTS 19A	C. Portezuelo	Epiclassic	Coyotlatelco R/B Bowl
AZC055	C. Portezuelo	PTS 19A	C. Portezuelo	Epiclassic	Coyotlatelco R/B Bowl
AZC056	C. Portezuelo	PTS 44D	Otumba-Macro	Epiclassic	Coyotlatelco R/B Bowl

AZC057	C. Portezuelo	PTS 96M7A	C. Portezuelo	Epiclassic	Coyotlatelco R/B Bowl
AZC058	C. Portezuelo	PTS 96L(?)7B	Unassigned	Epiclassic	Coyotlatelco R/B Jar
AZC059	C. Portezuelo	PTS 10A	Unassigned	Epiclassic	Coyotlatelco R/B Bowl
AZC060	C. Portezuelo	PTS ? #9	C. Portezuelo	Epiclassic	Coyotlatelco R/B Bowl
AZC061	C. Portezuelo	PTS 29D	Chalco	E. Postclassic	Toltec R/B Bowl
AZC062	C. Portezuelo	PTS 96K7B	C. Portezuelo	E. Postclassic	Toltec R/B Bowl
AZC063	C. Portezuelo	PTS 16F	C. Portezuelo	E. Postclassic	Toltec R/B Bowl
AZC064	C. Portezuelo	PTS 9E(?)J4WC	Unassigned	E. Postclassic	Toltec R/B Bowl
AZC065	C. Portezuelo	PTS X3D	C. Portezuelo	E. Postclassic	Toltec R/B Bowl
AZC066	C. Portezuelo	PTS 98G4SFA	Chalco	E. Postclassic	Toltec R/B Censer
AZC067	C. Portezuelo	PTS ?	C. Portezuelo	E. Postclassic	Toltec R/B Censer
AZC068	C. Portezuelo	PTS 9607D	C. Portezuelo	Aztec III	Plain Orange Censer
AZC069	C. Portezuelo	PTS 98C	C. Portezuelo	Aztec III	Plain Orange Censer
AZC070	C. Portezuelo	PTS 3M8D	Otumba-Macro	E. Postclassic	Toltec R/B Effigy Support
AZC071	C. Portezuelo	PTS 24A	C. Portezuelo	Aztec III	Texcoco Molded Censer
AZC072	C. Portezuelo	PTS 96L6C	Otumba-Macro	E. Postclassic	Toltec Cream-Slipped Bowl
AZC073	C. Portezuelo	PTS 96KTA	C. Portezuelo	E. Postclassic	Toltec Cream-Slipped Bowl
AZC074	C. Portezuelo	PTS 96K7B	Chalco	E. Postclassic	Toltec Cream-Slipped Bowl
AZC075	C. Portezuelo	PTS A(?)96N7B	Chalco	E. Postclassic	Toltec Cream-Slipped Bowl
AZC076	C. Portezuelo	PTS 96I-3NEC	Otumba-Macro	E. Postclassic	Toltec R/B Hollow Support
AZC077	C. Portezuelo	PTS S98J1SED	Unassigned	Teotihuacan	Granular Ware Jar
AZC078	C. Portezuelo	PTS 43R(?)	Tenochtitlan	Teotihuacan	Dk Br ("Gray') Inc Fl-bot bowl
AZC079	C. Portezuelo	PTS J3NEB	C. Portezuelo	Epiclassic	Coyotlatelco R/B Bowl
AZC080	C. Portezuelo	PTS 97C	C. Portezuelo	Epiclassic	Mono Tan Stamped Bowl
AZC081	C. Portezuelo	PTS 15C	C. Portezuelo	Epiclassic	Mono Tan Stamped Bowl
AZC082	C. Portezuelo	PTS 968MSD	C. Portezuelo	Epiclassic	Mono Tan Stamped Bowl
AZC083	C. Portezuelo	PTS 32E	Southern Basin 1	Epiclassic	Mono Tan Stamped Bowl
AZC084	C. Portezuelo	PTS 98(?)K2NED	Southern Basin 1	Epiclassic	Mono Tan Stamped Bowl
AZC085	C. Portezuelo	PTS ?	Unassigned	E. Postclassic	Wide-Band R/B Molcajete
AZC086	C. Portezuelo	PTS 96K6D	Chalco	E. Postclassic	Wide-Band R/B Bowl

AZP008	Chalco		Chalco	Aztec I	Chalco Bl/O
AZP052	Chalco		Chalco	Aztec II	Az II Calligraphic Bl/O
AZP053	Chalco		Southern Basin 1	Aztec II	Az II Calligraphic Bl/O
AZP069	Chalco		Chalco	Aztec I	Chalco Bl/O
AZP266	Chalco	Md. 65	Southern Basin 1	Epiclassic	Coyotlatelco R/B
AZP267	Chalco	Md. 65	Puebla/Morelos	Epiclassic	Coyotlatelco R/B
AZP268	Chalco	Md. 65	Southern Basin 3	Epiclassic	Coyotlatelco R/B
AZP269	Chalco	Md. 65	Puebla/Morelos	Epiclassic	Coyotlatelco R/B
AZP270	Chalco	Md. 65	Puebla/Morelos	Epiclassic	Coyotlatelco R/B
AZP271	Chalco	Md. 65	Chalco	Epiclassic	Coyotlatelco R/B
AZP272	Chalco	Md. 65	Southern Basin 1	Epiclassic	Coyotlatelco R/B
AZP273	Chalco	Md. 65	Chalco	Epiclassic	Coyotlatelco R/B
AZP274	Chalco	Md. 65	Chalco	Epiclassic	Coyotlatelco R/B
AZP275	Chalco	Md. 65	Puebla/Morelos	Epiclassic	Coyotlatelco R/B
AZP276	Chalco	Md. 65	Chalco	Epiclassic	Coyotlatelco R/B
AZP277	Chalco	Md. 65	Southern Basin 3	Epiclassic	Coyotlatelco R/B
AZP278	Chalco	Md. 65	Puebla/Morelos	Epiclassic	Coyotlatelco R/B
AZP279	Chalco	Md. 65	Chalco	Epiclassic	Coyotlatelco R/B
AZP280	Chalco	Md. 65	Chalco	Epiclassic	Coyotlatelco R/B
AZP281	Chalco	Md. 65	Chalco	Epiclassic	Coyotlatelco R/B
AZP282	Chalco	Md. 65	Southern Basin 3	Epiclassic	Coyotlatelco R/B
AZP283	Chalco	Md. 65	Chalco	Epiclassic	Coyotlatelco R/B
AZP284	Chalco	Md. 65	Southern Basin 3	Epiclassic	Coyotlatelco R/B
AZP285	Chalco	Md. 65	Chalco	Epiclassic	Coyotlatelco R/B
AZP286	Chalco	Md. 65	Chalco	Epiclassic	Coyotlatelco R/Cr
AZP287	Chalco	Md. 65	Chalco	Epiclassic	Coyotlatelco R/Cr
AZP288	Chalco	Md. 65	Chalco	Epiclassic	Coyotlatelco R/Cr
AZP289	Chalco	Md. 65	Chalco	Epiclassic	Coyotlatelco R/Cr
AZP290	Chalco	Md. 65	Puebla/Morelos	Epiclassic	Coyotlatelco R/Cr
AZP291	Chalco	Md. 65	Chalco	Early Aztec	Chalco Polychrome

AZP292	Chalco	Md. 65	Chalco	Early Aztec	Chalco Polychrome
AZP293	Chalco	Md. 65	Chalco	Early Aztec	Chalco Polychrome
AZP294	Chalco	Md. 65	Chalco	Early Aztec	Chalco Polychrome
AZP295	Chalco	Md. 65	Chalco	Early Aztec	Chalco Polychrome
AZP296	Chalco	Md. 65	Chalco	Early Aztec	Chalco Polychrome
AZP297	Chalco	Md. 65	Chalco	Early Aztec	Chalco Polychrome
AZP298	Chalco	Md. 65	Chalco	Early Aztec	Chalco Polychrome
AZP299	Chalco	Md. 65	Southern Basin 1	Early Aztec	Chalco Polychrome
AZP300	Chalco	Md. 65	Chalco	Early Aztec	Chalco Polychrome
AZP301	Chalco	Md. 65	Chalco	Early Aztec	Chalco Polychrome
AZP302	Chalco	Md. 65	Chalco	Early Aztec	Chalco Polychrome
AZP303	Chalco	Md. 65	Chalco	Early Aztec	Chalco Polychrome
AZP304	Chalco	Md. 65	Chalco	Early Aztec	Chalco Polychrome
AZP305	Chalco	Md. 65	Chalco	Early Aztec	Chalco Polychrome
AZP306	Chalco	Md. 65	Chalco	Early Aztec	Chalco Polychrome
AZP307	Chalco	Md. 65	Chalco	Early Aztec	Chalco Polychrome
AZP308	Chalco	Md. 65	Chalco	Early Aztec	Chalco Polychrome
AZP309	Chalco	Md. 65	Chalco	Early Aztec	Chalco Polychrome
AZP310	Chalco	Md. 65	Chalco	Early Aztec	Chalco Polychrome
AZP322	Chalco		Southern Basin 2	Aztec III	Cholula Polychrome dish
AZP323	Chalco		Southern Basin 1	Aztec III	Cholula Polychrome dish
AZP324	Chalco		Tenochtitlan	Aztec III	Az III Bl/O plate E-3
AZP325	Chalco		Southern Basin 2	Aztec III	Az III Bl/O bowl G
AZP326	Chalco		Tenochtitlan	Aztec III	Az III Bl/O Molcajete E of F
AZP327	Chalco		Southern Basin 2	Aztec III	Az III Bl/O Dish E
AZP328	Chalco		Southern Basin 2	Aztec III	Az III Bl/O Dish E
AZP329	Chalco		Southern Basin 2	Aztec III	Az III Bl/O Dish E
AZP330	Chalco		Southern Basin 2	Aztec III	Az III Bl/O Min. Dish D-2
AZP331	Chalco		Southern Basin 2	Aztec III	Az III Bl/O Plate D/E
AZP332	Chalco		Tenochtitlan	Aztec III	Az III Bl/O Plate E

AZP333	Chalco		Southern Basin 1	Aztec III	Az III Bl/O Dish E
AZP334	Chalco		Tenochtitlan	Aztec III	Az III Bl/O Dish D-2
AZP335	Chalco		Southern Basin 2	Aztec III	Az III Bl/O Dish E-3
AZP336	Chalco		Southern Basin 2	Aztec III	Az III Bl/O Dish E
AZP337	Chalco		Southern Basin 2	Aztec III	Az III Bl/O Dish E-1
AZP338	Chalco		C. Portezuelo	Aztec III	Az III Bl/O Min Dish E
AZP339	Chalco		Southern Basin 2	Aztec I	Chalco Bl/O Dish
AZP340	Chalco		Chalco	Aztec I	Chalco Bl/O Dish
AZP341	Chalco		Chalco	Aztec I	Chalco Bl/O Dish
AZP342	Chalco		Chalco	Aztec I	Chalco Bl/O Dish
AZP343	Chalco		Chalco	Aztec I	Chalco Bl/O Dish
AZP344	Chalco		Chalco	Aztec I	Chalco Bl/O Dish
AZP345	Chalco		Chalco	Aztec I	Chalco Bl/O Dish
AZP346	Chalco		Chalco	Aztec I	Chalco Bl/O Dish
AZP347	Chalco		Chalco	Aztec I	Chalco Bl/O Dish
AZP348	Chalco		Southern Basin 2	Aztec I	Chalco Bl/O Dish
AZP349	Chalco		Chalco	Aztec I	Chalco Bl/O Dish
AZP350	Chalco		Chalco	Aztec I	Chalco Bl/O Dish
AZP351	Chalco		Chalco	Aztec I	Culhuacan Bl/O Grater Dish
AZP352	Chalco		Chalco	Aztec I	Culhuacan Bl/O Dish
AZP353	Chalco		Chalco	Aztec I	Chalco Bl/O Dish
AZP354	Chalco		Tenochtitlan	Aztec II	Az II Bl/O Dish A-1c
AZP355	Chalco		Tenochtitlan	Aztec II	Az II Bl/O Dish A-1c
AZP356	Chalco		Tenochtitlan	Aztec II	Az II Bl/O Dish A-2c
AZP357	Chalco		Tenochtitlan	Aztec II	Az II Bl/O Dish A-3
AZP358	Chalco		Tenochtitlan	Aztec II	Az II Bl/O Hemi. Dish A-2c
AZP359	Chalco		Tenochtitlan	Aztec II	Az II Bl/O Dish A-3
AZP360	Chalco		Tenochtitlan	Aztec II	Az II Bl/O Hemi. Dish A-2c
AZP361	Chalco		Tenochtitlan	Aztec II	Az II Bl/O Dish A-2c
AZP362	Chalco		Tenochtitlan	Aztec II	Az II Bl/O Dish A-2c

AZX006	Xaltocan	Op. D, L. 25	Southern Basin 3	Phase 2	Bl/R-Incised
AZX007	Xaltocan	Op. F, L. 4	Xaltocan-1	Phase 3	Bl&Wh/Red
AZX008	Xaltocan	Op. F, L. 4	Xaltocan-2	Phase 3	Bl&Wh/Red
AZX009	Xaltocan	Op. F, L. 5	Southern Basin 3	Phase 3	Bl&Wh/Red
AZX010	Xaltocan	Op. F, L. 5	Xaltocan-1	Phase 3	Bl&Wh/Red
AZX011	Xaltocan	Op. F, L. 5	Xaltocan-2	Phase 3	Bl/R
AZX012	Xaltocan	Op. F, L. 6	Southern Basin 3	Phase 3	Bl&Wh/Red
AZX013	Xaltocan	Op G 2, L. 7	Southern Basin 3	Phase 3	Bl&Wh/Red
AZX014	Xaltocan	Op. G 2, L. 8 F. 2	Xaltocan-1	Phase 3	Bl/R
AZX015	Xaltocan	Op. G 2, L. 8, F. 2	Xaltocan-1	Phase 3	Bl&Wh/Red
AZX016	Xaltocan	Op. G 2, L. 8, F. 2	Xaltocan-1	Phase 3	Bl&Wh/Red
AZX017	Xaltocan	Op. G 2, L. 9, F. 2	Southern Basin 3	Phase 3	Bl&Wh/Red
AZX018	Xaltocan	Op. G 2, L. 9, F. 2	Southern Basin 1	Phase 3	Bl&Wh/Red
AZX019	Xaltocan	Op. G 2, L. 9, F. 2	Xaltocan-1	Phase 3	Bl&Wh/Red
AZX020	Xaltocan	Op. G 2, L. 9, F. 2	Southern Basin 3	Phase 3	Red copa
AZX021	Xaltocan	Op. G 2, L. 9, F. 2	Unassigned	Phase 2	Wide Band R/B
AZX022	Xaltocan	Op. G 2, L. 10NE	Xaltocan-2	Phase 2	Graphite Bl/R
AZX023	Xaltocan	Op. G 2, L. 12W	Xaltocan-1	Phase 3	Bl/R
AZX024	Xaltocan	Op. G 2, L. 13Wa	Southern Basin 3	Phase 3	Red Copa
AZX025	Xaltocan	Op. G 2, L. 14Wa	Southern Basin 1	Phase 3	Bl&Wh/Red
AZX026	Xaltocan	Op. G 5, L. 17A	Southern Basin 3	Phase 1	Bl/R Incised
AZX027	Xaltocan	Op. G 5, L. 18A	Xaltocan-2	Phase 1	Red/Buff
AZX028	Xaltocan	Op. J, L. 8	Southern Basin 3	Phase 2	Bl/R-Incised
AZX029	Xaltocan	Op. J, L. 8	Unassigned	Phase 2	Red/Buff
AZX030	Xaltocan	Op. J, L. 8	Southern Basin 3	Phase 2	Bl/R-Incised
AZX031	Xaltocan	Op. J, L. 9	Puebla/Morelos	Phase 2	Bl/R-Incised
AZX032	Xaltocan	Op. K, L. 3	Xaltocan-1	Phase 4	Bl&Wh/Red
AZX033	Xaltocan	Op. K, L. 4	Xaltocan-2	Phase 4	Bl&Wh/Red
AZX034	Xaltocan	Op. K, L. 4	Unassigned	Phase 4	Bl&Wh/Red
AZX035	Xaltocan	Op. K, L. 9	Xaltocan-2	Phase 3	Bl&Wh/Red

AZP363	Chalco		Tenochtitlan	Aztec II	Az II Bl/O Hemi. Dish A-1c
AZP364	Chalco		Tenochtitlan	Aztec II	Az II Bl/O Plate A-2c
AZP365	Chalco		Tenochtitlan	Aztec II	Az II Bl/O Plate A-1c
AZP366	Chalco		Tenochtitlan	Aztec II	Az II Bl/O Plate A-2c
AZP367	Chalco		Tenochtitlan	Aztec II	Az II Bl/O Plate B-1
AZP368	Chalco		Tenochtitlan	Aztec II	Az II Bl/O Plate A-1c
AZP369	Chalco		Tenochtitlan	Aztec II	Az II Bl/O Plate A-1c
AZP376	Chalco		Southern Basin 2	Aztec IV	Az III/IV? Bl./O Dish
AZP219	Xaltocan	Op. I, L. 26	Xaltocan-1	Phase 1	Aztec I Bl/O
AZP220	Xaltocan	Op. T, L. 17	Tenochtitlan	Phase 1	Aztec I Bl/O
AZP221	Xaltocan	Op. K, L. 5	Tenochtitlan	Phase 4	Aztec III Bl/O
AZP222	Xaltocan	Op. K, L. 4	Tenochtitlan	Phase 4	Aztec III Bl/O
AZP223	Xaltocan	Op. S, L. 5	Tenochtitlan	Phase 4	Aztec III Bl/O
AZP224	Xaltocan	Op. R, L. 4	Tenochtitlan	Phase 4	Aztec III Bl/O
AZP225	Xaltocan	Op. P, L. 3	Tenochtitlan	Phase 4	Aztec III Bl/O
AZP226	Xaltocan	Op. K, L. 5	Tenochtitlan	Phase 4	Aztec III Bl/O
AZP227	Xaltocan	Op. K, L. 5	Otumba-Macro	Phase 4	Aztec III Bl/O
AZP228	Xaltocan	Op. S, L. 6	Xaltocan-2	Phase 4	Aztec III Bl/O
AZP229	Xaltocan	Op. R, L. 2	Cuauhtitlan	Phase 4	Aztec III Bl/O
AZP230	Xaltocan	Op. K, L. 10	Cuauhtitlan	Phase 4	Aztec III Bl/O
AZP231	Xaltocan	Op. S L. 5	Cuauhtitlan	Phase 4	Aztec III Bl/O
AZP232	Xaltocan	Op. T, L. 5c	Tenochtitlan	Phase 3	Aztec II Calligraphic Bl/O
AZP233	Xaltocan	Op. K, L. 8	Cuauhtitlan	Phase 3	Aztec II Calligraphic Bl/O
AZP234	Xaltocan	Op. M, L. 0	Cuauhtitlan	Phase 3	Aztec II Calligraphic Bl/O
AZP235	Xaltocan	Op. P, F. 1603	Cuauhtitlan	Phase 3	Aztec II Geometric Bl/O
AZP236	Xaltocan	Op. P, F. 1603	Cuauhtitlan	Phase 3	Aztec II Geometric Bl/O
AZP237	Xaltocan	Op. K, L. 11	Cuauhtitlan	Phase 3	Aztec II Geometric Bl/O
AZP238	Xaltocan	Op. M, L. 4	Cuauhtitlan	Phase 3	Aztec II Geometric Bl/O
AZP239	Xaltocan	Op. K, L. 9	Cuauhtitlan	Phase 3	Aztec II Geometric Bl/O
AZP240	Xaltocan	Op. P, F. 1603	Cuauhtitlan	Phase 3	Aztec II Geometric Bl/O

AZP241	Xaltocan	Op. M, Surface	Cuauhtitlan	Phase 3?	Aztec II Geometric Bl/O
AZP242	Xaltocan	Op. S, L. 6	Southern Basin 1	Phase 4	Aztec III Bl/O
AZP243	Xaltocan	Op. T, L. 4	Cuauhtitlan	Colonial	Aztec IV Bl/O
AZP244	Xaltocan	Op. S, L. 6	Cuauhtitlan	Colonial	Aztec IV Bl/O
AZP245	Xaltocan	Op. T, L. 4	Unassigned	Colonial	Aztec IV Bl/O
AZP246	Xaltocan	Op. T, L. 3	Cuauhtitlan	Colonial	Aztec IV Bl/O
AZP247	Xaltocan	Op. T, L. 2	Texcoco	Colonial	Aztec IV Bl/O
AZP248	Xaltocan	Op. S, L. 14	Tenochtitlan	Phase 3?	Aztec II Geometric Bl/O
AZP249	Xaltocan	Op. K, L. 1	Tenochtitlan	Phase 4	Aztec III Bl/O
AZP250	Xaltocan	Op. P, L. 6	Cuauhtitlan	Phase 3?	Aztec II Geometric Bl/O
AZP251	Xaltocan	Op. M, Surface	Cuauhtitlan	Phase 4?	Aztec III Bl/O
AZP252	Xaltocan	Op. M, L. 21	Tenochtitlan	Phase 1	Aztec I Bl/O
AZP253	Xaltocan	Op. K, L. 12	Xaltocan-1	Phase 1 or 2	Aztec I Bl/O
AZP254	Xaltocan	Op. M, L. 21	Tenochtitlan	Phase 1	Aztec I Bl/O
AZP255	Xaltocan	Op. I, L. 29	Chalco	Phase 1	Aztec I Bl/O
AZP256	Xaltocan	Op. I, L. 21	Unassigned	Phase 1	Aztec I Bl/O
AZP257	Xaltocan	Op. I, L. 21	Cuauhtitlan	Phase 1	Aztec I Bl/O
AZP258	Xaltocan	Op. I, L. 16	Cuauhtitlan	Phase 1	Aztec I Bl/O
AZP259	Xaltocan	Op. S, L. 11	Xaltocan-1	Phase 1	Aztec I Bl/O
AZP260	Xaltocan	Op. M, L. 17	Tenochtitlan	Phase 2	Aztec I Bl/O
AZP261	Xaltocan	Op. M, L. 15	Xaltocan-1	Phase 2	Aztec I Bl/O
AZP262	Xaltocan	Op. I, L. 16	Xaltocan-1	Phase 1	Aztec I Bl/O
AZP263	Xaltocan	Op. M, Surface	Tenochtitlan	Colonial	Aztec IV Bl/O
AZP264	Xaltocan	Op. T, L. 12	Tenochtitlan	Phase 4	Aztec III Bl/O
AZP265	Xaltocan	Op. I, L. 38	Southern Basin 1	Phase 1	Aztec I Bl/O
AZX001	Xaltocan	Op. C, L. 5	Southern Basin 3	Phase 4	Bl&Wh/Red
AZX002	Xaltocan	Op. C, L. 5	Xaltocan-1	Phase 4	Bl&Wh/Red
AZX003	Xaltocan	Op. C, L. 6	Xaltocan-1	Phase 4	Bl&Wh/Red-Late Profile
AZX004	Xaltocan	Op. D, L. 16	Southern Basin 3	Phase 2	Bl/R Wide Band
AZX005	Xaltocan	Op. D, L. 16	Southern Basin 3	Phase 2	Bl&Wh/Red

AZX036	Xaltocan	Op. K, L. 10	Xaltocan-3	Phase 3	Red Bowl
AZX037	Xaltocan	Op. K, L. 10	Xaltocan-2	Phase 3	Bl/R
AZX038	Xaltocan	Op. K, L. 10	Southern Basin 1	Phase 3	Bl/R
AZX039	Xaltocan	Op. K, L. 10	Southern Basin 1	Phase 3	Bl&Wh/Red
AZX040	Xaltocan	Op. K, L. 10	Xaltocan-2	Phase 3	Bl&Wh/Red
AZX041	Xaltocan	Op. K, L. 10	Unassigned	Phase 3	Bl&Wh/Red
AZX042	Xaltocan	Op. K, L. 10	Xaltocan-1	Phase 3	Bl&Wh/Red
AZX043	Xaltocan	Op. L, L. 3	Southern Basin 3	Phase 3	Bl&Wh/Red
AZX044	Xaltocan	Op. M, L. 4	Southern Basin 1	Phase 3	Bl&Wh/Red
AZX045	Xaltocan	Op. M, L. 6	Otumba-Macro	Phase 3	Bl&Wh/Red
AZX046	Xaltocan	Op. M, L. 8	Xaltocan-3	Phase 3	Bl/R plate
AZX047	Xaltocan	Op. M, L. 12	Southern Basin 3	Phase 2	Bl&Wh/Red
AZX048	Xaltocan	Op. M, L. 15	Southern Basin 3	Phase 2	Bl/R-Incised
AZX049	Xaltocan	Op. M, L. 18	Southern Basin 3	Phase 2	Graphite Bl/R
AZX050	Xaltocan	Op. M, L. 18	Southern Basin 3	Phase 2	Graphite Bl/R
AZX051	Xaltocan	Op. M, L. 19	Southern Basin 3	Phase 1	Wide Band Red/Buff
AZX052	Xaltocan	Op. M, L. 21	Unassigned	Teotihuacan	Red/Brown Cylindrical Bowl
AZX053	Xaltocan	Op. N, L. 4	Tenochtitlan	Phase 3	Bl&Wh/Red
AZX054	Xaltocan	Op. P, L. 12	Southern Basin 1	Phase 3	Bl&Wh/Red
AZX055	Xaltocan	Op. R, L. 3	Xaltocan-2	Phase 4	Bl&Wh/Red
AZX056	Xaltocan	Op. R, L. 4	Xaltocan-1	Phase 4	Bl/R
AZX057	Xaltocan	Op. R, L. 6	Xaltocan-1	Phase 4	Bl&Wh/Red
AZX058	Xaltocan	Op. R, L. 7	Unassigned	Phase 4	Bl&Wh/Red
AZX059	Xaltocan	Op. R, L. 7	Unassigned	Phase 4	Black (or Red?) plate
AZX060	Xaltocan	Op. S, L. 5	Xaltocan-2	Phase 4	Bl/R
AZX061	Xaltocan	Op. S, L. 5	Unassigned	Phase 4	Bl&Wh/Red
AZX062	Xaltocan	Op. S, L. 5	Xaltocan-2	Phase 4	Bl&Wh/Red
AZX063	Xaltocan	Op. T, L. 4	Xaltocan-2	Phase 4	Aztec Polychrome
AZX064	Xaltocan	Op. T, L. 5	Xaltocan-2	Phase 4	Aztec Polychrome
AZX065	Xaltocan	Op. T, L. 14	Xaltocan-2	Phase 1	Red/Very Dark Brown

AZX066	Xaltocan	Op. T, L. 15	Xaltocan-2	Phase 1	Wide Band Red/Buff
AZX067	Xaltocan	Op. T, L. 17	Southern Basin 3	Phase 1	Graphite Black/Buff copa
AZX068	Xaltocan	Op. C, L. 4	Xaltocan-2	Phase 4	Standing Solid Female Figurine
AZX069	Xaltocan	Op. C, L. 8,	Xaltocan-1	Phase 4	Standing Hollow Female Figurine
AZX070	Xaltocan	Op. D, L. 14	Xaltocan-2	Phase 2	Standing Solid Male Figurine
AZX071	Xaltocan	Op. D, L. 19	Xaltocan-3	Phase 2	Mud Man-Head Figurine
AZX072	Xaltocan	Op. G, L. 10	Xaltocan-2	Phase 2	Dog Handle/lug
AZX073	Xaltocan	Op. G, L. 20	Xaltocan-1	Phase 1	Mud Man Full-Body Figurine
AZX074	Xaltocan	Op. G 4.	Xaltocan-1	Phase 2	Standing Solid Female Figurine
AZX075	Xaltocan	Op. G 5,	Xaltocan-1	Phase 1	Crude Punctuate Figurine
AZX076	Xaltocan	Op. K, L. 10	Xaltocan-1	Phase 3	Solid Head Figurine
AZX077	Xaltocan	Op. K, L. 10	Xaltocan-1	Phase 3	Kneeling Female Figurine
AZX078	Xaltocan	Op. D, L. 20	Tenochtitlan	Phase 2	Aztec I Bl/O
AZX079	Xaltocan	Op. D, L. 20	Chalco	Phase 2	Aztec I Bl/O
AZX080	Xaltocan	Op. D, L. 25	Southern Basin 1	Phase 2	Aztec II Calligraphic Bl/O
AZX081	Xaltocan	Op. D, L. 25	Xaltocan-2	Phase 2	Aztec II Geometric Bl/O
AZX082	Xaltocan	Op. D, L. 25	Unassigned	Phase 2	Aztec II Calligraphic Bl/O
AZX083	Xaltocan	Op. D, L. 25	Xaltocan-2	Phase 2	Aztec I Bl/O
AZX084	Xaltocan	Op. D, L. 25	Xaltocan-1	Phase 2	Aztec I Bl/O
AZX085	Xaltocan	Op. G 2, L. 7	Cuauhtitlan	Phase 3	Aztec II Calligraphic Bl/O
AZX086	Xaltocan	Op. G 2, L. 7	Cuauhtitlan	Phase 3	Aztec II Geometric Bl/O
AZX087	Xaltocan	Op. G 2, L. 9, F. 2	Chalco	Phase 2	Aztec II Bl/O
AZX088	Xaltocan	Op. G 2, L. 9, F. 2	Tenochtitlan	Phase 1 or 2	Aztec I Bl/O
AZX089	Xaltocan	Op. G 2, L. 9, F. 2	Xaltocan-1	Phase 1 or 2	Aztec I Bl/O
AZX090	Xaltocan	Op. G 2, L. 12W	Chalco	Phase 3	Aztec II Calligraphic Bl/O
AZX091	Xaltocan	Op. G 4, L. 7B	Tenochtitlan	Phase 2	Aztec II Calligraphic Bl/O
AZX092	Xaltocan	Op. G 4, L. 8h	Tenochtitlan	Phase 2	Aztec I Bl/O
AZX093	Xaltocan	Op. G 4, L. 11g	Xaltocan-1	Phase 1	Aztec I Bl/O
AZX094	Xaltocan	Op. G 4, L. 12h	Xaltocan-1	Phase 1	Aztec I Bl/O
AZX095	Xaltocan	Op. I, L. 6	Xaltocan-1	Phase 1	Aztec I Bl/O

AZX096	Xaltocan	Op. I, L. 11	Xaltocan-1	Phase 1	Aztec I Bl/O
AZX097	Xaltocan	Op. I, L. 11	Xaltocan-1	Phase 1	Aztec I Bl/O
AZX098	Xaltocan	Op. J, L. 9	Tenochtitlan	Phase 2	Aztec I Bl/O
AZX099	Xaltocan	Op. J, L. 10	Tenochtitlan	Phase 2	Aztec Geometric Bl/O
AZX100	Xaltocan	Op. J, L. 13	Tenochtitlan	Phase 2	Aztec I Bl/O
AZX101	Xaltocan	Op. J, L. 13	Tenochtitlan	Phase 2	Aztec I Bl/O
AZX102	Xaltocan	Op. M, L. 9	Cuauhtitlan	Phase 3	Aztec II Geometric Bl/O
AZX103	Xaltocan	Op. T, L. 13	Xaltocan-2	Phase 1	Aztec I Bl/O
AZX104	Xaltocan	Op. T, L. 15	Chalco	Phase 1	Aztec I Bl/O
AZX105	Xaltocan	Op. T, L. 17	Tenochtitlan	Phase 1	Aztec I Bl/O
AZX106	Xaltocan	Op. T, L. 17	Xaltocan-1	Phase 1	Aztec I Bl/O

[a]Information on the pottery analyzed from Chalco is based on Hodge et al. (1992, 1993) and Neff and Hodge (in press); the assignment of individual specimens to chemical composition groups is based on Neff and Glascock (2000).

[b]Classification of decorated Aztec pottery follows Hodge and Minc (1991) and Minc (1994); Charlton's identifications of the C. Portezuelo Aztec ceramics are based on his modification of Parsons' (1966) typology are shown in parentheses.

lation was tightly nucleated and isolated from other settlements (Sanders et al. 1979:132). Parsons' survey suggests that C. Portezuelo might have declined in size during the Early Postclassic; light-to-moderate concentrations of Early Postclassic pottery were noted over an area of ca. 125 ha. Light quantities of Middle and Late Postclassic pottery were also observed. By the Late Postclassic, C. Portezuelo was controlled by Chimalhuacan 5 km to the northwest, a subject of the Acolhua at Texcoco (Nicholson 1972:158–159).

Nichols selected a sample of 86 sherds from decorated serving vessels for INAA from the C. Portezuelo collection at UCLA, including Aztec II, III, and IV Orange Wares and Aztec Red Wares and censers (Tables 3 and 6). In addition to Aztec ceramics, Nichols also chose examples of Epiclassic (Coyotlatelco Red / Buff / Brown and Monochrome Tan Stamped) and Early Postclassic decorated serving wares (Wavy-Line Red / Buff, Toltec Red / Buff, and Wide Band Red / Buff), including scalloped Wide-Band Red / Buff ("Atlapulco" in the C. Portezuelo typology) and Toltec Cream-Slipped bowls that might belong to a later, Atlatongo subphase. Two Classic period sherds (one Granular ware, a foreign import and one incised Dark Brown flat-bottom bowl) were included in the sample. The sample was selected to include sherds from decorated serving wares with clear design motifs; however, it is not representative of the proportions of the different pottery types. The accessibility of the collections in 1997–1998 and the availability of provenience data also influenced the selection of particular specimens.

To compare chemical composition groups derived from ceramics with clay raw materials from the C. Portezuelo area, 19 samples of raw clays originally collected and analyzed by Branstetter-Hardesty (1978: 191–193) were submitted for INAA at MURR. Charlton, Neff, and Otis Charlton also sampled clays from several deposits in the vicinity of C. Portezuelo (Neff and Glascock 1998).

INAA Results from C. Portezuelo

Figure 3 shows the Cerro Portezuelo ceramic data projected onto the first two canonical discriminant axes for the five main Basin groups. An eastern-Basin orientation is clearly suggested, although there also appear to be some imports from the Tenochtitlan region. The details of changing source-usage patterns over time are discussed below.

Epiclassic

During the Epiclassic when C. Portezuelo grew to be a regional center and the capital of a tightly nucleated city-state, ceramic consumption was markedly local. The proportion of decorated serving wares assigned to the C. Portezuelo composition group in the INAA sample (64%) is the highest of any period in the Postclassic and includes both Coyotlatelco Red / Buff bowls and Monochrome Tan Stamped bowls (Fig. 6). Importation of ceramics apparently was limited to adjoining areas: two Monochrome Stamped bowls are assigned to the Southern Basin-1 group and one Coyotlatelco Red / Buff bowl is in the northeastern-eastern Basin, Otumba-Macro group. Two Coyotlatelco Red / Buff vessels with exterior decoration were unassigned.

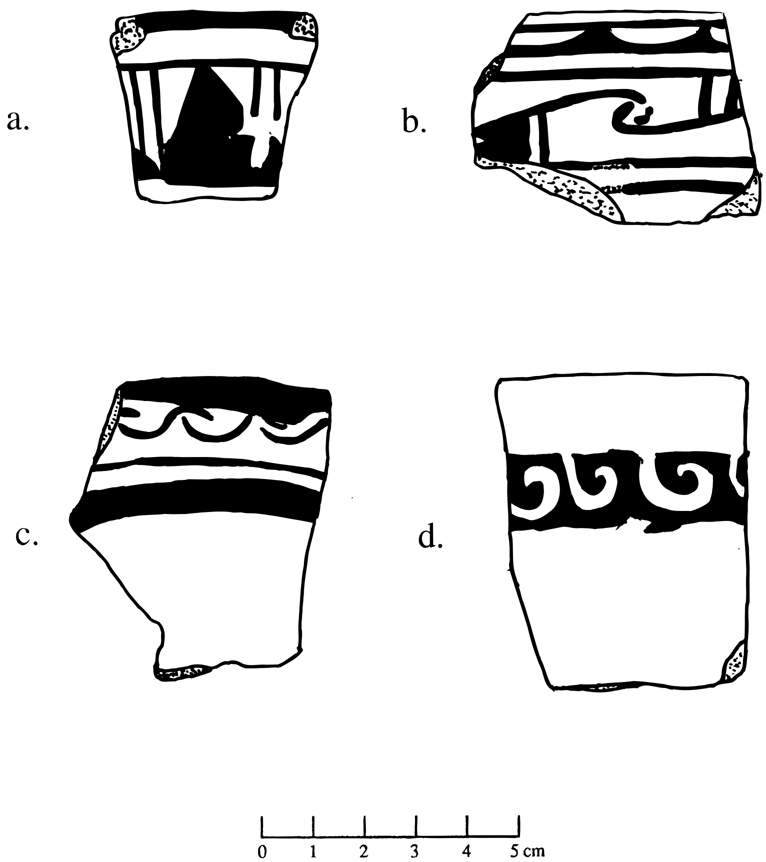

FIG. 6. Examples of Coyotlatelco decorated serving wares from C. Portezuelo, (a) Coyotlatelco R / B Jar, UCLA PTS96L7B (AZC058); (b) Coyotlatelco R / B bowl, UCLA PTS#9 (AZC060); (c) Coyotlatelco R / B bowl, (AZC063); and (d) Monochrome Tan Stamped bowl, UCLA PTS968MSD (AZC082).

Early Postclassic

Consumption of vessels from other composition groups expanded during the Early Postclassic, and the proportion of decorated serving wares assigned to the C. Portezuelo group correspondingly declined. The C. Portezuelo composition group for this period includes Wavy-Line Red/Buff bowls, Toltec Red/Buff bowls and censers, and Cream-Slipped bowls accounting for 29% of the INAA sample (Figs. 7 and 8). Ceram-

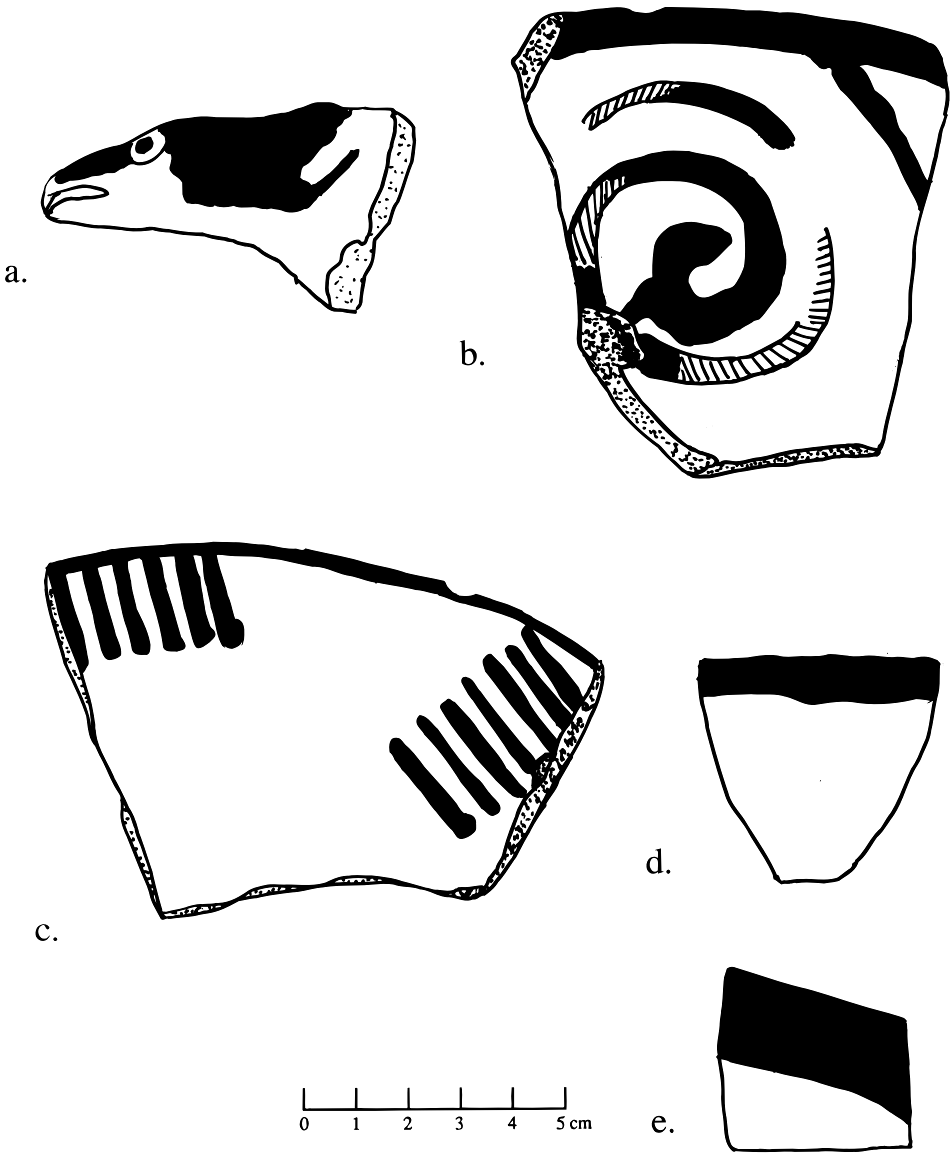

FIG. 7. Examples of Early Postclassic decorated serving wares from C. Portezuelo. (a) Toltec R/B Effigy support, UCLA PTS3M8D (AZC070); (b) Toltec R/B bowl UCLA PTS96L70 (AZC045); (c) Toltec Cream-Slipped bowl, UCLA PTS96K7B (AZC074); (d) Toltec Wide-Band R/B, scalloped rim, "Atlapulco," UCLA PTS96K6D (AZC086); and (e) Toltec Wide-Band R/B, UCLA PTS29D (AZC061).

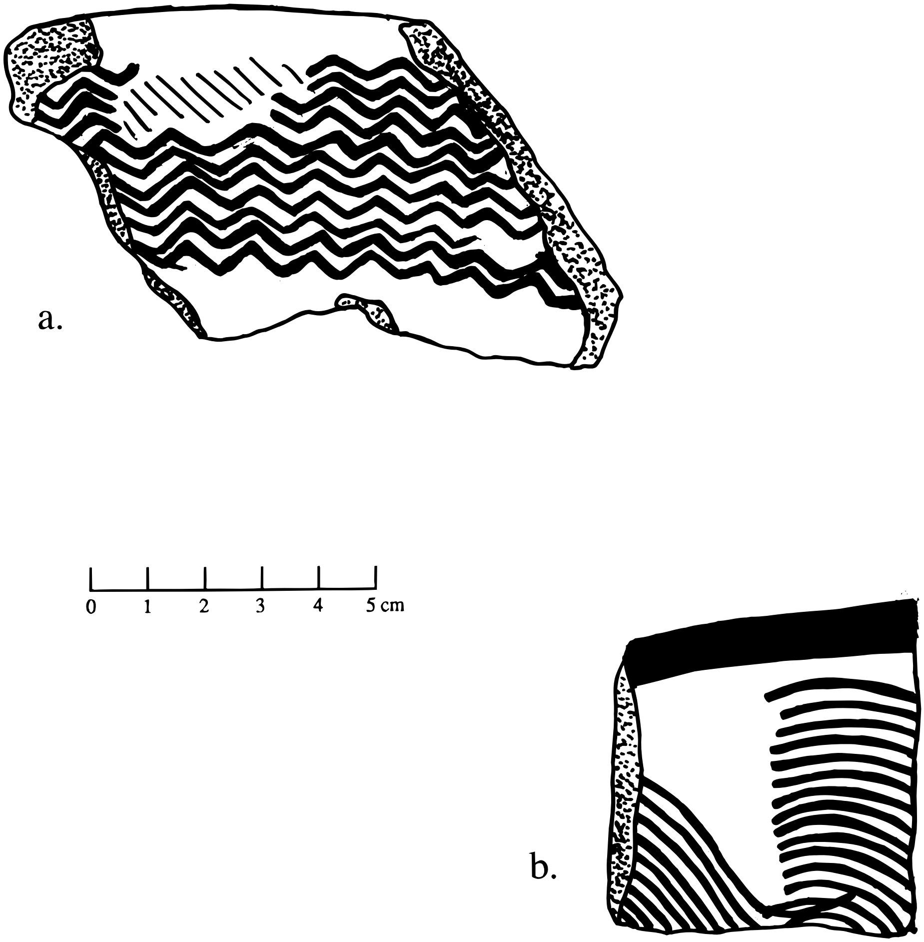

FIG. 8. Examples of Wavy-Line Red/Buff(Brown) from C. Portezuelo. (a) UCLA PTS96N8D (AZC047) and (b) UCLA PTS96KAC (AZC044).

ics assigned to the Chalco composition group to the south are present for the first time and include two Cream-slipped bowls, two Toltec Red/Buff bowls, one Toltec Red/Buff censer, and one scalloped ("Atlapulco") Wide Band Red/Buff bowl, but no examples of Wavy-Line Red/Buff.

The Otumba-Core group in the Teotihuacan Valley is also represented for the first time by one Wavy-Line Red/Buff bowl. The proportion of ceramics in the INAA sample (29%) assigned to the northeastern-eastern Basin, Otumba-Macro, composition group is the highest of any period. Cream-slipped wares and scalloped Wide-Band Red/Buff may date to the Atlatongo subphase proposed by Sanders (1986:372–373) for the Teotihuacan Valley as corresponding to the expansion of Tula's control into the eastern Basin. One Wavy-Line Red/Buff bowl, one Toltec Red/Buff bowl, and one scalloped Wide Band Red/Buff molcajete were unassigned.

A larger sample from C. Portezuelo would reveal additional exchange relations. Tohil Plumbate vessels from the Guatemala–Chiapas border area, a good Early Postclassic (Tollan phase) diagnostic at Tula (Cobean and Mastache 1989:44), is present in the C. Portezuelo collections, but none was analyzed for this study.

Middle Postclassic

In contrast to Chalco and Xaltocan, Aztec I pottery is very rare at C. Portezuelo, even though it lies near the border of the Acolhua and Chalca city-state confederations (Hicks and Nicholson 1962). Geometric Aztec II Black/Orange is common at C. Portezuelo, although Calligraphic Aztec II Black/Orange pottery is also present (Fig. 9; also, Anenberg 1995, Appendix 4:2, Erdman 1994).

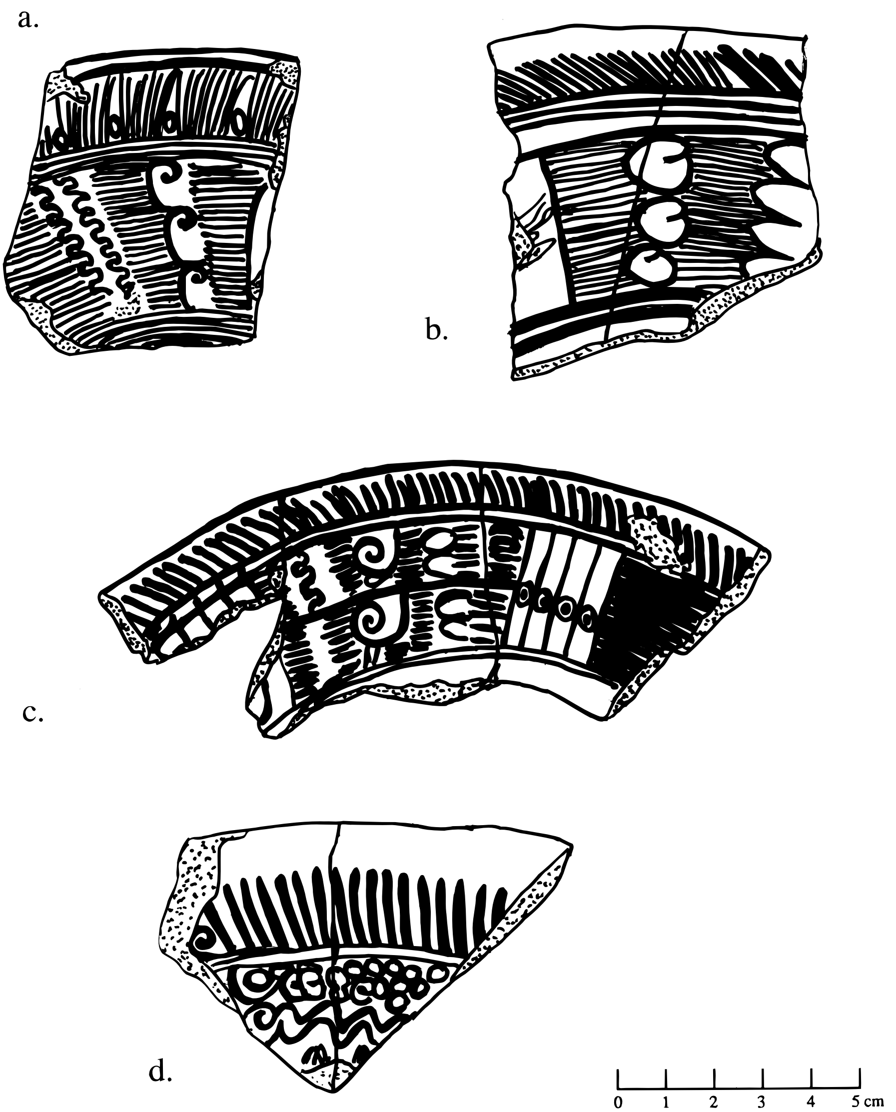

FIG. 9. Examples of Aztec II Black/Orange from C. Portezuelo. (a) Bl/O dish Aztec II Geometric, UCLA PTS0607A(AZC013); (b) Bl/O dish Aztec II Geometric, ULCA PTSN7B (AZC015); (c) Bl/O dish Aztec II Geometric, UCLA PTS96K6B (AZC011); and (d) Bl/O Molcajete, Aztec II Calligraphic UCLA PTS96C/22N7D (AZC016).

Similar to the preceding period, 21% of the Aztec II sherds in the INAA sample was assigned to the C. Portezuelo composition group, one Geometric Aztec II Black / Orange dish and two Black / Red bowls (both Variant D). The sample contains Aztec II Black / Orange vessels assigned to other groups, including four dishes from the Chalco composition group and a Black / Orange plate, a Black / Red bowl, and two Black & White / Red bowls from other southern Basin groups. The Texcoco composition group is represented for the first time by two Aztec II Black / Orange molcajetes. Also, for the first time, a few ceramics assigned to the C. Portezuelo composition group come from sites outside the C. Portezuelo area, including a Calligraphic Aztec II Black / Orange vessel found at Texcoco (Minc et al. 1994), suggesting that both Geometric and Calligraphic Aztec II Black / Orange pottery were made of clays from the C. Portezuelo composition group. One Geometric Aztec II Black / Orange dish was unassigned.

Late Postclassic

During the Late Postclassic consumption of vessels made of local clays intensified at C. Portezuelo as did the consumption of ceramics from the Tenochtitlan / Culhuacan composition group—an area that included the Mexica's imperial capital of Tenochtitlan-Tlatelolco. Ceramics assigned to the C. Portezuelo composition group include Aztec III Black / Orange dishes, Black / Red and Black & White / Red bowls, at least two varieties of censers, and a hollow ceramic figurine (Figs. 10 and 11). Black / Orange and Red Ware serving vessels are present in similar proportions (14.8%) from the Tenochtitlan / Culhuacan and Texcoco composition groups. A hollow figurine (probably from a workshop at Otumba) and a Black & White / Red bowl are assigned to the Otumba-Macro group. In contrast to the preceding period, only one Black / Red bowl was assigned to the Chalco composition group. This is consistent with Neff and Hodge's (in press) findings that the Chalco composition group largely ceased to export Black / Orange and polychrome vessels in the Late Postclassic.

Early Colonial

Although the sample of Aztec IV pottery is small, it nonetheless mirrors results of ceramic composition studies from other parts of the eastern Basin (e.g., Charlton et al. 1999). The Texcoco composition group dominates at C. Portezuelo (Fig. 10).

Discussion

The INAA of pottery by MURR supports Branstetter-Hardesty's suggestion that ceramics were manufactured in the C. Portezuelo area throughout the Postclassic, although we do not know where the workshops were located. In the Epiclassic, manufacturing and consumption of Coyotlatelco serving vessels appears highly localized, as suggested by stylistic studies, with limited trade between the Basin's composition groups (Cobean and Mastache 1989:38; Nichols and McCullough 1986:91; Rattray 1966). The widespread distribution of Coyotlatelco style ceramics was from emulation rather than centralized production.

C. Portezuelo's trade with other composition groups intensified in the Early Postclassic. This trend continued in the Middle Postclassic, which includes the greatest number for any period of different chemical composition groups in the INAA sample from C. Portezuelo. The trend apparently reversed in the Late Postclassic when over one-half of the INAA sample of Aztec III serving vessels is assigned to the C. Portezuelo composition group. Serving vessels were primarily imported from the composition groups that included the imperial capitals of Tenochtitlan–Tlatelolco and Texcoco. In the Early Colonial period,

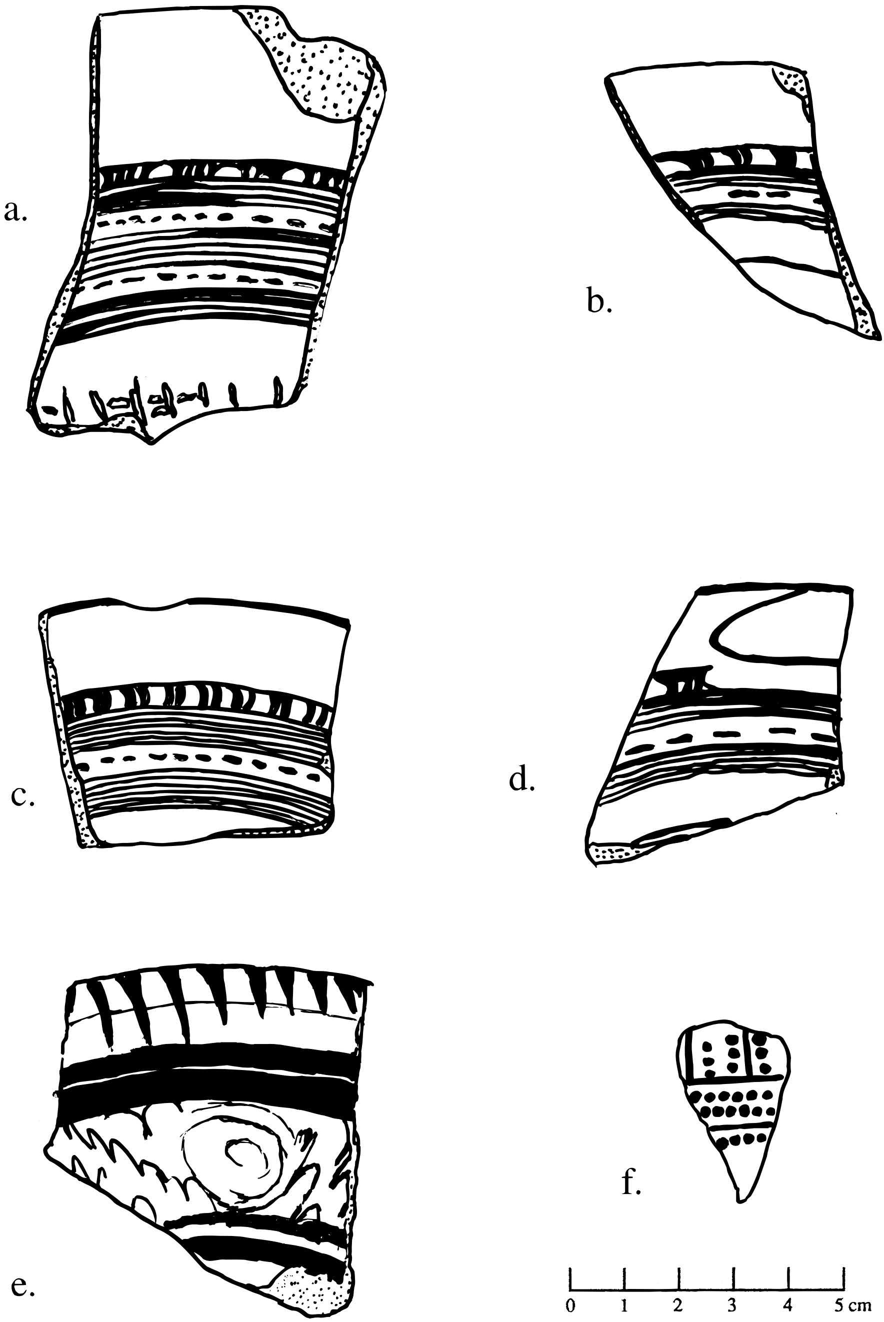

FIG. 10. Examples of Aztec III and Aztec IV Black/Orange and Censers from Cerro Portezuelo. (a) Aztec III Bl/O Molcajete, UCLA PTS96C8A (AZC004); (b) Aztec III Bl/O Dish, UCLA PTSJ1SEB (AZC009); (c) Aztec III Bl/O Dish, UCLA PTS52B (AZC005); (d) Aztec III Bl/O Dish, UCLA PTS81B (AZC008); (e) Aztec IV Bl/O Dish, UCLA PTS93J2NW/K2NED (AZC022); and (f) Texcoco Molded Censer, UCLA PTS24A (AZC071).

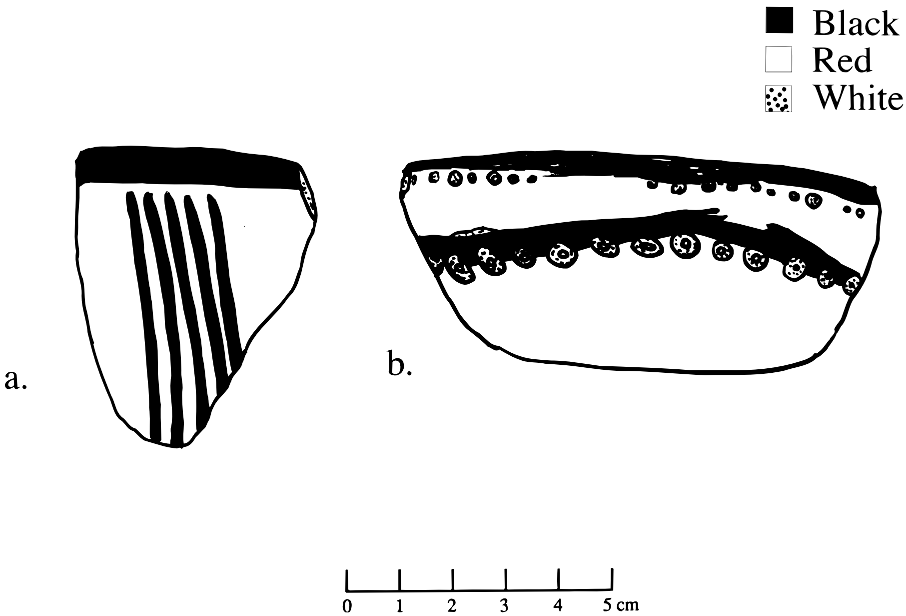

FIG. 11. Examples of Aztec Red Wares from Cerro Portezuelo. (a) Bl/Red Bowl, UCLA PTS96L7B (AZC040); and (b) Bl&Wh/R Bowl UCLA PTS9607C (AZC024).

local manufacturing declined and C. Portezuelo consumed Aztec IV Black/Orange serving vessels exclusively from the Texcoco composition group.

CHALCO

Chalco was an important Middle and Late Postclassic center in the southeastern Basin on the shore of Lake Chalco. Chalco was the center of the largest Middle Postclassic settlement cluster in the southern Basin, with an estimated population of 6250 people (Hodge 1997:220, Table 12.2; Parsons et al. 1982:192). According to native histories, settlement of the Chalca area occurred between 1150 and 1375 A.D. and involved four different ethnic groups (Chimalpahin 1965; Parsons et al. 1982:79–85; Schroeder 1991:61). Chalco is said to have had a marketplace and a group of professional merchants, *pochteca*. Through military, political, and marital alliances, Chalco became part of the Chalca confederation of city-states that dominated the southeastern Basin (Hodge 1984:40). After nearly a century of hostilities, the Chalca confederation was defeated and incorporated into the Aztec empire in 1465. A Mexica military governor and provincial hierarchy were imposed on the region, lands were confiscated for Mexica nobles, and Chalco with its rich lakebed chinampas became part of the "breadbasket" of Tenochtitlan (Parsons et al. 1982:79–91, 363–363; Hodge 1997:214).

Background

The archaeological site of Chalco is mostly covered by the modern town, but archaeological remains extend to the west and south of the town. In the 1950s, George O'Neill excavated a test pit into an elevated area on the north edge of the modern town and found occupational debris extending to a depth of 7 m. The lowest excavation levels contained a few possible Classic sherds;

two-thirds of the pit had only Aztec I pottery while Aztec II Black/Orange occurred about 2 m below the surface and Aztec III ceramics were confined to the top meter (O'Neill 1962; Parsons et al. 1996).

In 1992 Mary Hodge's excavations in a large mounded area (Mound 65) at the far edge of the site found stratified deposits with Coyotlatelco and Aztec ceramics, a platform associated with Coyotlatelco material, and a few Mazapan-style sherds in the upper levels of the platform (Parsons et al. 1996:219–221). Hodge's excavations of Mound 65 found a substantial chronological gap between the upper Coyotlatelco and Aztec I levels. Based on the stratigraphy and radiocarbon dates, Parsons et al. (1996) suggest that the Epiclassic occupation began by the early 600s A.D. (cf. Cowgill 1996). Unmixed Aztec I deposits possibly dating at least as early as 1000 A.D. predate Aztec II; Aztec I and II partially overlap at Chalco for an undetermined period of time (Cowgill 1996:327–328; Parsons et al. 1996:221–222). Calibrated radiocarbon dates from Mound 65 place Aztec II from 1270 to 1450 A.D. based on the intercept dates (Parsons et al. 1996:222).

INAA Results

Results of previous INAA of Aztec pottery from Chalco have been presented in a series of publications (Hodge 1992; Hodge and Minc 1990; Hodge et al. 1992, 1993; Minc 1994; Minc et al. 1994; Neff et al. 1994). In conjunction with Hodge's excavations in Mound 65, Neff and Hodge analyzed Coyotlatelco decorated vessels and additional Aztec Black/Orange and polychrome pottery types that Hodge's previous research suggested were made of clays from the Chalco composition group (Neff and Hodge, in press). We summarize the INAA results based on Neff and Glascock's (2000) most recent definition of the Basin of Mexico composition groups (Fig. 4; Tables 4 and 6).

Epiclassic

Fifty-two percent of the INAA sample of Coyotlatelco Red/Buff and Red/Cream bowls was assigned to the Chalco composition group. Other composition groups represented in the Coyotlatelco sample from Chalco include Southern Basin-1 (8%) and Southern Basin-3 (16%); however, the largest group of nonlocal Coyotlatelco bowls (24%) is from the Puebla/Morelos composition group.

The presence of Epiclassic pottery from the Puebla/Morelos composition group indicates that Chalco's ties to the warmer *tierra templada* of Morelos to the south and Puebla-Tlaxcala to the east were longstanding. Sanders et al. (1979:134–137) speculate that during the Epiclassic Cholula's economic and/or political influence extended into the southern Basin. During the Middle Postclassic, the Chalca confederation attempted to extend its control into Morelos, and even after its incorporation into the Aztec empire, the Chalco region provided a buffer between the Basin of Mexico and Puebla-Tlaxcala polities (Davies 1987:51–52; Hodge 1984:40).

Early and Middle Postclassic

The Early Postclassic Mazapan/Late Toltec ceramic complex is very rare at Chalco and Hodge found only a few Mazapan sherds in her Mound 65 excavations (Sanders et al. 1979:463). Recent research suggests some chronological overlap between Mazapan/Late Toltec ceramics and Aztec I, although the situation is not clear (Cowgill 1996; Parsons et al. 1996). As in the Epiclassic, most of the Aztec I vessels consumed at Chalco are assigned to the local, Chalco composition group (Neff and Hodge, in press). The sample of Aztec I pottery from Chalco includes the local Chalco Black/Orange variant and Culhuacan Black/Orange (Minc et al. 1994; Neff and Hodge, in press). All but two of the Chalco

Black / Orange vessels (and two Culhuacan Aztec I Black / Orange dishes) were made of clays assigned to the Chalco composition group. Two Chalco Black / Orange dishes are in the Southern Basin-2 group, indicating that they also were made in the southern Basin.

Nearly 90% of the analyzed Aztec II Black / Orange vessels from Chalco are from the Tenochtitlan / Culhuacan composition group. This agrees with earlier findings that Chalco imported most of its Aztec II Black / Orange pottery (Minc et al. 1994:148). Hodge and Minc suggest that Calligraphic Black / Orange was manufactured in the Culhuacan area (Hodge et al. 1992, 1993; Minc et al. 1994:148).

Chalco Polychrome was locally produced: 95% of the Middle Postclassic (Early Aztec) Chalco Polychromes in the INAA sample from Chalco was assigned to the Chalco composition group. An earlier study by Neff et al. (1994) suggested that the Chalco group also exported Chalco Polychrome, and this is also indicated by Hodge's stylistic analysis of survey collections from the eastern and southern Basin. Additional INAA is needed to determine the extent to which Polychromes were exported from the Chalco composition group (Neff and Hodge, in press).

Late Postclassic

In the Late Postclassic Black / Orange serving wares ceased to be made of clays from the Chalco composition group. Chalco obtained Aztec III Black / Orange pottery from the Tenochtitlan / Culhuacan composition group and the Southern Basin-2 group. Two Cholula Polychrome dishes were also assigned to southern Basin sources.

Colonial

The only analyzed Aztec IV example from Chalco is a Black / Orange dish assigned to the Southern Basin-2 group.

Discussion

The INAA results suggest that manufacture of decorated serving vessels using Chalco composition group clays extends back to the Epiclassic (see also Neff and Hodge, in press). Although most of the Coyotlatelco Red / Buff and Red / Cream bowls consumed at Chalco are from the Chalco group, Chalcans also used Coyotlatelco pottery from the Puebla / Morelos composition group. Teotihuacan was the largest Epiclassic settlement in the Basin, but there is no indication of Coyotlatelco bowls from any eastern Basin composition group at Chalco. Chalco's trade with Morelos / Puebla and perhaps its political connections / interests to the south began in the Epiclassic.

Chalco Aztec I Black / Orange and Chalco Polychrome were also made of Chalco composition group clays. Although Chalco Aztec I was mostly consumed within the Chalco region, some Chalco Aztec I is present at some sites outside the southeastern Basin (Minc et al. 1994; Neff and Hodge, in press). As in the Epiclassic, Chalco's market networks for decorated pottery focused on the southern and western Basin; this makes sense in terms of the logistics of transporting pottery by canoe between Chalco and other lake shore centers. The prevalence of Aztec I Black / Orange and Chalco Polychrome pottery suggests to Parsons et al. (1982:370–371) that Chalco and other parts of the southern Basin continued to have close ties to Puebla and Cholula.

Increased exchange of decorated pottery between composition groups in the Basin is evident at Chalco during the Middle Postclassic. Chalco consumed substantial amounts of Aztec II Black / Orange from the Tenochtitlan / Culhuacan group. Political tensions may have restricted exchange with the Texcoco region. Parsons found that the Aztec settlement density was extremely light in the borderland between the Acolhua and Chalca domains (1971:230).

According to the Codex Xolotl, in the early 15th century "the frontier with Chalco was guarded" (Dibble 1951:91; Parsons 1971:214).

Neff and Hodge (in press) have offered two explanations for the cessation of manufacturing Black/Orange vessels in the Chalco composition group by Aztec III times. First, they cite the extended hostilities between Chalco and city-states to the north. These conflicts might have restricted Chalco's access to markets and reduced its ability to export pottery. Second, they suggest that during the Epiclassic and Early Postclassic, city-state centers made most of the pottery and other goods to meet local needs. But, with increasing population and agricultural intensification, a process of "niche diversification" took place in which high-return activities were favored over low-return activities. People in areas of high agricultural productivity, such as the Chalco region, invested more in agriculture, while people in less productive agricultural areas more aggressively pursued other activities such as ceramic manufacturing. As Minc (1994:359) observes, the development of ridged fields (*chinampas*) in the Chalco region may have "decreased the incentives to engage in supplemental craft production and increased the ability to exchange agricultural produce for other goods desired" (also see Blanton 1996: 53–57; Neff and Hodge, in press).

XALTOCAN

Xaltocan is located in the northern Basin of Mexico, 50 km north of Mexico City. In prehispanic times, it was surrounded by the marsh and shallow waters of Lake Xaltocan. According to ethnohistoric sources, Xaltocan was settled in the 11th century, immediately after the fall of Tollan. During the 12th and 13th centuries, Xaltocan was an important regional center, the capital of Otomí-speaking peoples in southern Hidalgo and the northern Basin of Mexico. Its rulers were allied by marriage to the rulers of other major centers, including Tollan, Tenayuca, Huexotla, Chalco, and Azcapotzalco (Alva Ixtlilxóchitl 1975–1977 I:293, 423, II:17, 18, 51; *Anales de Cuauhtitlan* 1945:14; *Anales de Tlatelolco* 1948:28; Nazareo 1940:124; see Carrasco 1950).

In the mid-13th century, Xaltocan entered a lengthy war against neighboring Cuauhtitlan. In 1395, the armies of Cuauhtitlan overran Xaltocan, and the town was abandoned for more than 30 years (*Anales de Cuauhtitlan* 1945:50). In 1428, Xaltocan, now under Triple Alliance rule, was resettled by tribute-paying peasants sent by the rulers of Tenochtitlan and Tlatelolco (Hicks 1994). Xaltocan was governed by a military commander (*cuauhtlatoani*) sent from Tenochtitlan (Nazareo 1940:120). Hernán Cortés attacked and burned Xaltocan in 1521, bringing the prehispanic era to a close (Cortés 1971:118), but Xaltocan's 16th-century church and the presence of Majolica and Aztec IV Black/Orange pottery on the site provide evidence of Xaltocan's continued occupation during the colonial era and up to the present day (Rodríguez 2000).

Background

Xaltocan was briefly visited by Paul Tolstoy (1958) during his northern Basin survey, by Thomas Charlton and Charles Fletcher (Charlton 1966) during their Colonial survey of the Basin, and by Jeffrey Parsons during the Zumpango region survey (Sanders et al. 1979:62). Parsons recorded the presence of Aztec I, II, and III pottery over an area of 65 ha.

In 1990–1991, Brumfiel directed the excavation of 19 2×2 m test pits. These excavations were carried out to establish a more refined ceramic chronology for the site and to recover faunal and botanical remains that would provide information on lacustrine resource exploitation. Additional excavations in 1997 and 1999 focused on the excavation of an Early Postclassic house

(Brumfiel and Hodge 1996; Brumfiel, in press).

The excavations did produce a refined ceramic chronology. A multidimensional scaling analysis of excavation units based on their ceramic type frequencies permitted Brumfiel to define four phases of occupation at Xaltocan (Brumfiel, in press). Phase 1 was dominated by Aztec I Black / Orange and Chalco Polychrome. Four radiocarbon samples from Phase 1 units yielded calibrated dates of 880–990 A.D. In Phase 2, Aztec I Black / Orange and Chalco Polychrome continued, but they were joined by Aztec II Black / Orange with short, sparse *zacate* and spike *zacate* and a limited number of Aztec Red Ware ceramic types, including Cane-Incised Black-on-Red [Minc's (1994:490) Black / Red Variant C] and Graphite Black / Red bowls. Two radiocarbon samples from Phase 2 contexts produced calibrated dates of 1235 and 1300 A.D. Phase 3 was dominated by Aztec II Black / Orange ceramics and a profusion of Red Wares, especially Black & White / Red. Two radiocarbon samples from Phase 3 contexts gave calibrated dates of 1395 and 1425 A.D. Phase 4 assemblages were characterized by Aztec III Black / Orange ceramics and somewhat less Red Ware. A radiocarbon sample from a Phase 4 unit produced a calibrated date of 1421 A.D. (Parsons et al. 1996).[5]

Mary Hodge visited Xaltocan in 1991 and selected 47 Black / Orange sherds for INAA from Brumfiel's 1991 excavations (Operations K though T and Operation I levels 16–48). The goal of Hodge's analysis was to identify the production zones for the Black / Orange design motifs present at Xaltocan; therefore, her sample was constructed so that it included several examples of each stylistic variant, with common variants somewhat underrepresented and rare variants overrepresented. Also, since the focus was on linking stylistic variants with composition groups, sherds with clear design motifs were included in the sample, even when they did not come from securely dated contexts. Some sherds from the surface and some stylistically early sherds that were redeposited in later contexts were included in Hodge's sample (Figs. 12 and 13).

In 1997, Brumfiel selected a second sample of sherds for INAA. This sample included an additional 29 Black / Orange sherds, particularly Aztec I and Aztec II sherds from Phase 2 contexts, which was not well represented in Hodge's sample. The sample also included 67 Red Ware sherds from Xaltocan and 10 figurine fragments. Brumfiel intended to include 20 Red Ware sherds from each of the four phases of occupation at Xaltocan, but she fell short of this goal for Phases 1 and 2, when Red Ware was relatively rare (Figs. 14–16). Operation G2, a large pit (Feature 2), provided many sherds with clear design motifs, and 11 of these were included in the sample, despite the fact that this pit contained mixed Phase 1 and Phase 3 materials.

INAA Results from Xaltocan

Only one Classic period sherd was included in the study. It was part of a cylindrical vase or basin with dark red vertical lines outlined by thin incised lines on a blackened exterior. This sherd could not be assigned to a composition group (Tables 5 and 6).

Early Postclassic (Xaltocan Phase 1)

Early Postclassic ceramics at Xaltocan were dominated by Aztec I Black / Orange pottery, which comprised 78% of all decorated ceramics from the excavations. Nineteen Aztec I Black / Orange sherds from Phase 1 contexts were submitted for INAA, and they fell into seven composition groups. Eight sherds were assigned to Xaltocan-1, a presumed northern Basin source (quite possibly, Xaltocan, itself), and 1 was assigned to Xaltocan-2. The remaining 10

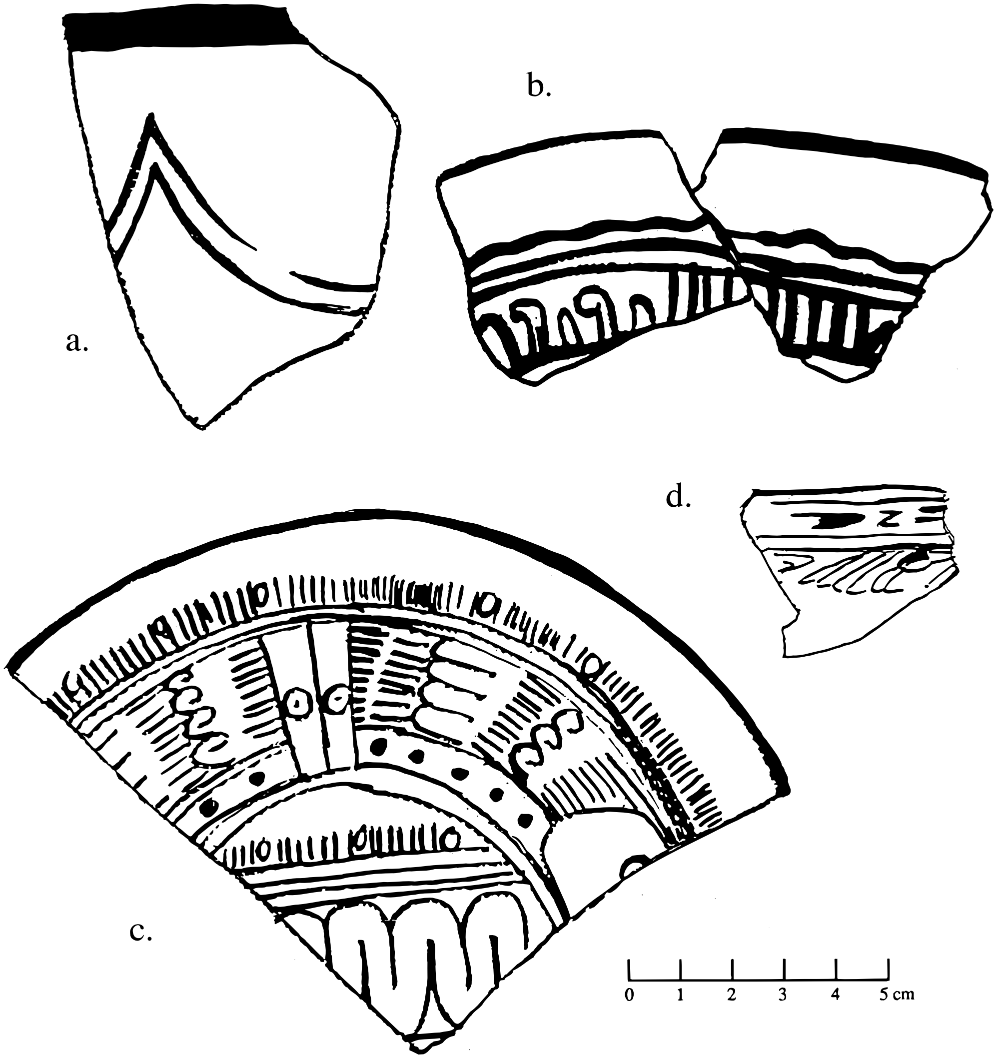

FIG. 12. Examples of Aztec I and Aztec II Black / Orange from Xaltocan. (a) Bl / O bowl, loop motif, Aztec I (AZX083); (b) Bl / O dish, Aztec I (AZX095); (c) Bl / O plate, Geometric Aztec II (AZX086); and (d) (Bl / O bowl, Calligraphic Aztec II (AZX082).

sherds came from a variety of composition groups: Cuauhtitlan, Tenochtitlan / Culhuacan, Chalco, and Southern Basin-1. One sherd could not be assigned to a composition group.

Some vessel types or design motifs were associated with specific composition groups. For example, all three examples of interior-decorated bowls with large loop motifs were assigned to the Xaltocan groups (Fig. 12). All four examples of interior-decorated bowls with a wavy line running around the top of the decorative band were from northern Basin composition groups: Xaltocan-1 or Cuauhtitlan. All four examples of exterior-decorated Aztec I bowls came from the Tenochtitlan / Culhuacan composition group.

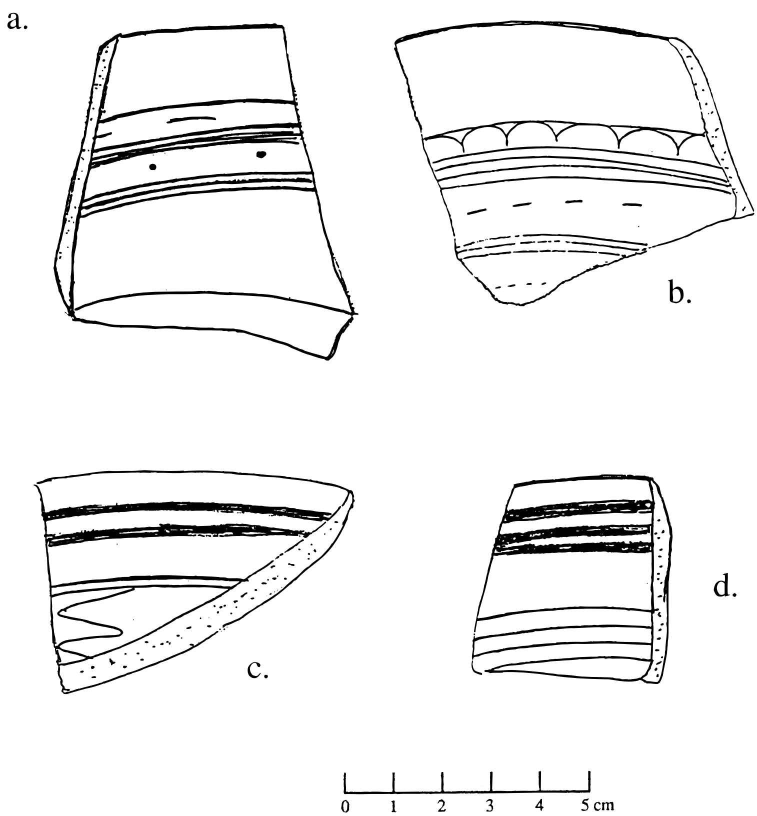

FIG. 13. Examples of Aztec III and Aztec IV Black / Orange from Xaltocan. (a) Bl / O dish, Aztec III (AZP222); (b) Bl / O molcajete, Aztec III (AZP228); (c) Bl / O molcajete, Aztec III-VI (AZP246); and (d) Bl / O dish, Aztec III-IV (AZP247).

In Phase 1 contexts, Red / Buff and Red Ware are very rare, comprising only 5% of all decorated ceramics. Three Wide-Band Red / Buff sherds were assigned to Xaltocan-2. Another Wide-Band Red / Buff sherd was assigned to the Southern Basin-3 composition group, as was a Black / Red Incised bowl with a cane motif and an anomalous very dark brown *copa* (goblet) with a broad band of graphite black paint encircling the waist of the vessel (Figs. 14 and 15). Black / Red Incised bowls with a cane motif and graphite black both are more common in the Phase 2 sample, where they are also assigned to Southern Basin-3. One Wide-Band Red / Buff vessel could not be assigned to a composition group.

Middle Postclassic (Xaltocan Phase 2)

In the Middle Postclassic, Aztec I Black / Orange was less common, comprising 39% of all decorated ceramics from the excavations. Aztec II Black / Orange was also present, accounting for another 10% of the decorated ceramics. Twelve Aztec I sherds and five Aztec II sherds from Phase 2 contexts were submitted for INAA.

Phase 2 Black / Orange pottery shows the same range of composition groups in about the same order of importance as Phase 1 Black / Orange pottery. As in Phase 1, the northern Basin was an important source of Aztec I pottery. Four Aztec I sherds from Phase 2 contexts were from the Xaltocan-1

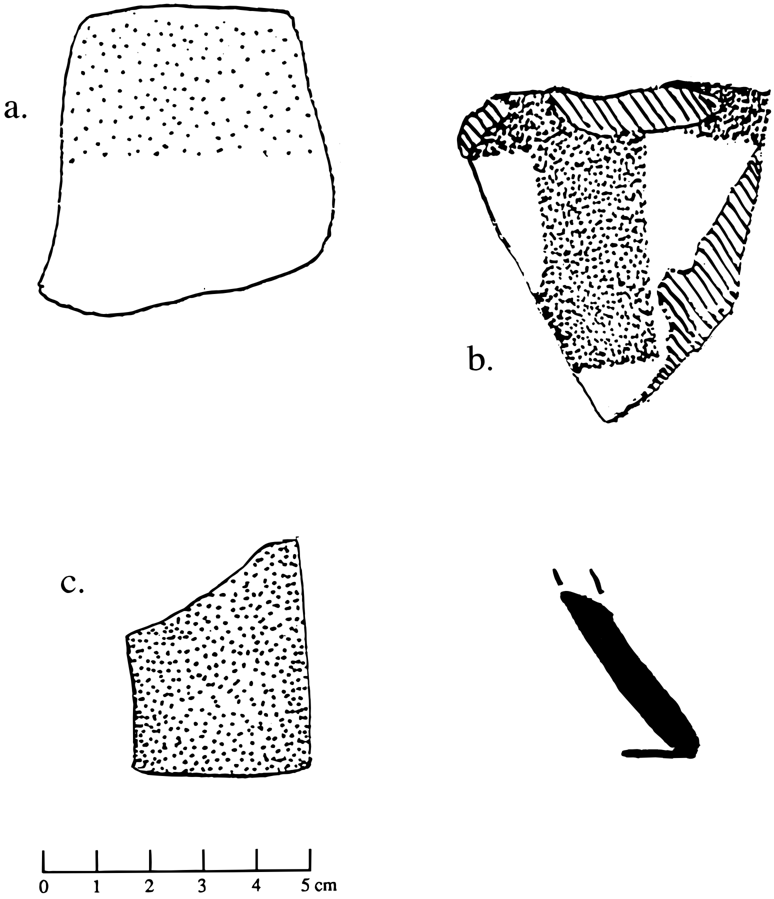

FIG. 14. Examples of Red Ware from Xaltocan. (a) Wide-Band Red/Buff bowl (AZX021), (b) Red/Buff flaring bowl (AZX027), and (c) Plain Red copa (AZX020).

composition group, and one was from Xaltocan-2. The Tenochtitlan/Culhuacan composition group was also an important source, represented by six Aztec I sherds. One Aztec I sherd was from the Chalco composition group. The Aztec II sherds showed a similar distribution. One was from Xaltocan-2, two were from Tenochtitlan/Culhuacan, one was from Southern Basin-1, and one was unassigned.

Red Ware is common in Phase 2 contexts, comprising 29% of all decorated ceramics from the excavations. Of the 12 Red Ware sherds submitted to INAA, most came from composition groups in the southern Basin of Mexico. An anomalous Red/Buff jar was unassigned.[6]

Middle-to-Late Postclassic (Xaltocan Phase 3)

The Middle-to-Late Postclassic at Xaltocan was marked by dramatic changes in pottery styles and sources. Black/Orange was much less popular than it had been in Phase 2; in Phase 3 it accounted for only 21% of decorated ceramics from the excavations. These were all Aztec II Black/Orange. The 17 Black/Orange sherds from Phase 3 contexts submitted for INAA came from only three composition groups.

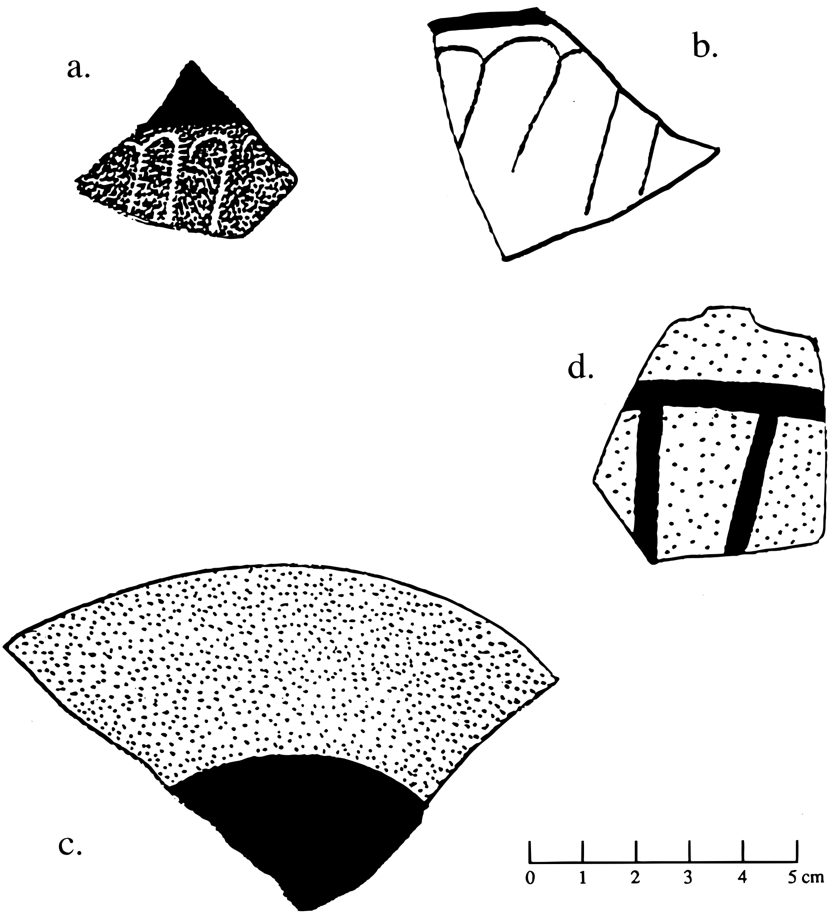

FIG. 15. Examples of Black/Red from Xaltocan. (a) Bl/R Incised bowl (AZX026), (b) Bl/R Incised bowl (AZX028), (c) Bl/R plate (AZX046), and (d) Bl/R bowl (AZX023).

Fourteen were from the Cuauhtitlan group, 2 from Tenochtitlan/Culhuacan group, and 1 from the Chalco group. The Cuauhtitlan composition group includes vessels with both calligraphic and geometric designs.

Red Wares reached their height of popularity at Xaltocan during Phase 3. Red Ware sherds accounted for 69% of all decorated pottery from the excavations. Thirty-two Red Ware sherds from Phase 3 contexts were submitted to INAA; they came from eight composition groups. Half of the sherds came from northern valley groups: Xaltocan-1, Xaltocan-2, and Xaltocan-3. The southern Basin continued to be an important source of Red Ware. Six sherds were assigned to Southern Basin-1, and 7 were assigned to Southern Basin-3. One sherd came from the Tenochtitlan/Culhuacan group, and 1 from the eastern Basin, Otumba-Macro composition group. One sherd was unassigned.[7]

Late Postclassic (Xaltocan Phase 4)

In the Late Postclassic, Black/Orange and Red Ware ceramics were about as popular as they had been in Phase 3. Aztec III Black/Orange accounts for 24% of deco-

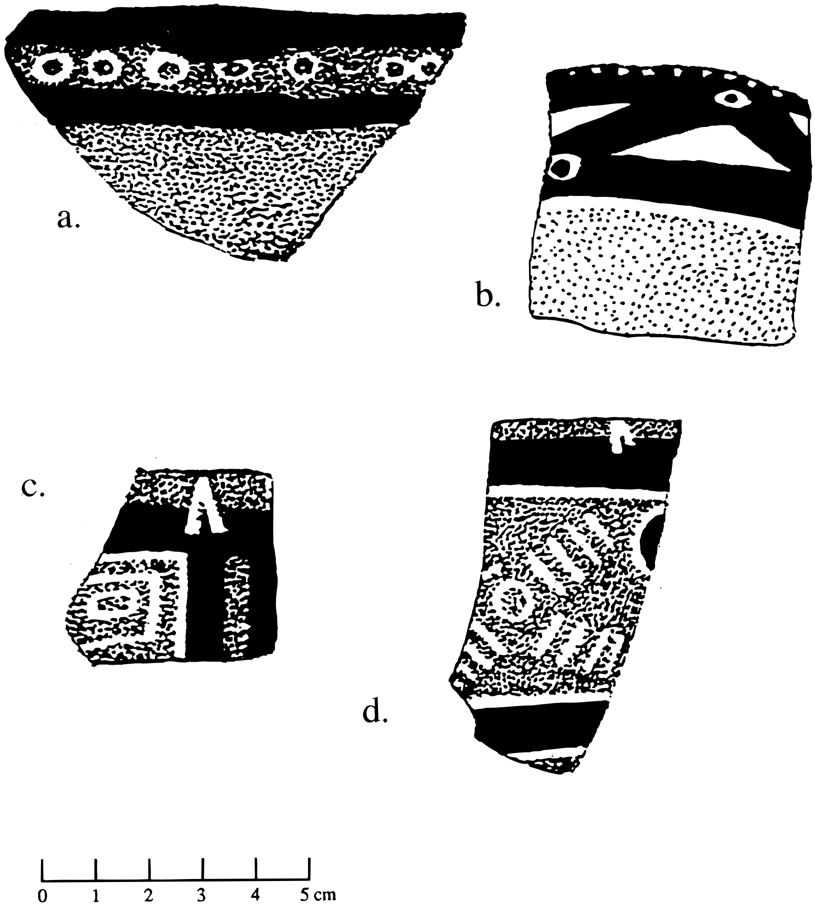

FIG. 16. Examples of Black & White / Red from Xaltocan. (a) Minc's Variant E-2 (AZX005), (b) Minc's Variant AW (AZX035), (c) Minc's Variant B (AZX018), and (d) Minc's Variant D (AZX042).

rated ceramics in Phase 4 excavation contexts, with Red Ware accounting for most of the remaining 76%. The sources of Black / Orange shifted radically. Whereas the Cuauhtitlan composition group had been the major source of Black / Orange in Phase 3, Tenochtitlan / Culhuacan became the dominant composition group in Phase 4. Of the 14 Black / Orange sherds from Phase 4 contexts submitted to INAA, 8 were from the Tenochtitlan / Culhuacan group, 3 were from the Cuauhtitlan group, and 1 each came from the Xaltocan-2, Otumba-Core, and Southern Basin-1 groups.

Red Ware pottery was dominated by local composition groups.[8] Of the 16 Red Ware sherds submitted to INAA, 5 were from Xaltocan-1, 6 were from Xaltocan-2, and 1 was from Southern Basin-3. Four Red Ware sherds were unassigned.

Early Colonial

Six Aztec IV Black / Orange sherds were submitted for INAA. Three were assigned to the Cuauhtitlan group, one to the Tenochtitlan / Culhuacan group, one to the Texcoco group, and one was not assigned to a composition group. For the first time in

Xaltocan's history, the popularity of Black / Orange composition groups was proportional to their distance from Xaltocan, perhaps indicating that marketing of decorated Aztec serving vessels had begun to follow a least effort principle. However, Majolica pottery is an important component of the colonial ceramic assemblage at Xaltocan. The early Majolicas at Xaltocan include both common grade pottery (Mexico City White Variant II, Blue on Cream, Green on Cream, and Green and Black on Cream) and fine-grade pottery (Mexico City White Variant I, San Luis Blue on White, and Tacuba Polychrome). Morisco ware is also present. These Majolicas were probably produced in Mexico City (Rodríguez 2000).

DISCUSSION

Following the decline of Teotihuacan as a macroregional center ca. 650 A.D., the Basin's political landscape was dominated by small competitive, and perhaps hostile, city-states. C. Portezuelo expanded significantly in size to become the capital of an independent small state, and Chalco was founded at this time. The manufacturing of Coyotlatelco decorated serving vessels during the Epiclassic was highly localized; little exchange occurred between composition groups. This same pattern is found in the Teotihuacan Valley where Coyotlatelco vessels from rural sites came predominantly from the Otumba-Core / Teotihuacan Valley composition group (results of a composition study of Coyotlatelco and Mazapan ceramics from rural sites undertaken by Nichols and Neff are reported separately). The Epiclassic distribution of decorated serving vessels conforms well to a solar marketing model. Although Teotihuacan was still the largest settlement in the Basin, by several orders of magnitude, little evidence suggests the export of Coyotlatelco serving vessels from the Teotihuacan Valley during the Epiclassic. Obsidian production and exchange also underwent major restructuring in the Epiclassic, including a truncation of Teotihuacan's dominance of those exchange networks (Charlton and Spence 1983:64–66; Healan et al. 1989:34; Rattray 1987, 1996).

During the succeeding Early Postclassic new centers, such as Xaltocan, were founded. We see a significant increase in the exchange of decorated serving vessels between composition groups in the Basin. C. Portezuelo consumed decorated serving vessels from the C. Portezuelo composition group but also imported them from the adjoining Chalco composition group and the eastern Basin. At Xaltocan, Aztec I ceramics were locally produced in the northern Basin, and they were imported from a variety of composition groups in the western and southern Basin. A large amount of pottery moved between the Basin's composition groups; the INAA results suggest that over one-half of Xaltocan's decorated ceramics were imports. The Tenochtitlan / Culhuacan composition group was the most important source of Black / Orange pottery, and the Chalco group presumably supplied the Chalco Polychrome pottery, as well as some of the Black / Orange present at Xaltocan. The economic importance of the Tenochtitlan / Culhuacan and Chalco composition groups seems to have paralleled the political importance of these two places in the Tula and post-Tula eras (Davies 1980:23–28, 248–250). Interestingly, not one of the 55 Early and Middle Postclassic sherds from Xaltocan submitted for analysis was assigned to composition groups in the eastern Basin. Thus, the division of the Basin of Mexico into east and west marketing zones postulated by Hassig (1985:142–144) for the Late Postclassic and by Blanton (1996:60) for the Middle Postclassic is visible as early as the Early Postclassic (also see Minc 1994:287–289). Chalco seems to have existed within its own sphere of trade. Aztec I Black / Orange from the Chalco composition group was consumed at other sites, but primarily in the southeastern Basin and in smaller amounts in the eastern Basin (Minc et al. 1994:155–156) and at Xaltocan, but Chalco imported Black / Orange only rarely. Stylistic analyses suggest that Chalco Polychrome was more widely distributed in the eastern Basin (Neff and Hodge, in press).

The INAA data suggest that the overlapping marketing pattern that Hodge and Minc identified for the Middle Postclassic was first established during the Early Postclassic. Subregional market systems may have coincided with the political boundaries of city-state confederations, as suggested by Hodge and Minc (1990), but considerable quantities of pottery also moved across the boundaries of city-state confederations, at least along the southern and western margins of the Basin. The INAA data confirm the importance of interregional exchange and the bifurcation of transportation routes, suggested by Blanton (1996:62–66) for the Middle Postclassic. The movement of decorated serving vessels through exchange networks into areas that already produced their own pottery implies that prestige value and local prestige competition were important components in the demand for imported vessels (Brumfiel 1987b, 1994, 1999, Charlton and Nichols 1992, Smith 1987b).

During the Middle Postclassic, exchange networks for Aztec ceramics became more complex. At C. Portezuelo for the first time imports from the Texcoco composition group are present. The suggested increase in ceramic exports from the Texcoco region can be associated with the rise of Acolhua dominance of the eastern Basin, and perhaps, the creation of new markets and a larger consumer population, as people moved out of the Tula area into the eastern Basin.

Xaltocan also maintained extensive exchange relations. The Cuauhtitlan composition group became a major supplier of Aztec II Black / Orange pottery, perhaps reflecting Cuauhtitlan's growing importance as a political and economic center. The Southern Basin-1 and Southern Basin-2 groups provided large quantities of Red Wares. Although the rulers of Xaltocan are said to have been allied in marriage to the rulers of Huexotla, and although the Texcoco composition group was a major producer of Aztec II Black / Orange pottery, there is little evidence of trade with the eastern Basin. Thus, the split between market spheres on the eastern and western sides of the Basin continued.

For the first time Chalco imported ceramics from outside its own area in the southern Basin. Ninety percent of the Aztec II Black / Orange specimens from Chalco were assigned to the Tenochtitlan / Culhuacan composition group. This may reflect Tenochtitlan's political dominance of the Chalco region in the late 14th and early 15th centuries, half a century prior to the Aztecs' famous victory over Chalco in 1465 (Parsons et al. 1982:83–85; Hodge 1984:51).

During the Late Postclassic several interrelated changes in the political economy are evident. Some polychrome pottery continued to be made in the Chalco region (Hodge et al. 1992), but Chalco consumers imported Black / Orange and Red Ware vessels from other composition groups in the southern Basin and the Tenochtitlan / Culhuacan group. Exports from the Chalco composition group decreased sharply. Aztec III Black / Orange pottery assigned to the Chalco composition group is so rare in other parts of the Basin that its absence could serve as a chronological marker. This decline in exports may have had political and / or economic causes. The long period of hostilities that began ca. 1375 A.D. and lasted for nearly a century (Davies 1973:46–47, 120–123) might have disrupted the distribution of pottery from the Chalco area, and the popularity of Chalco's pottery might have slipped as its power waned. In addition, the manufacture of decorated serving wares might have declined as the Chalco region began to produce food for the imperial cities. Between 1426 and 1467 A.D., state-sponsored swamp drainage and chinampa construction created a large area of rich agricultural land in the bed of Lakes Chalco-Xochimilco that became Tenochtitlan's "breadbasket" (Parsons et al. 1982:383–384). Although Chalco's tribute to the Aztec empire consisted primarily of agricultural products, most surplus from *chinampa* production moved into Tenochtitlan through the market system (Parsons 1976).

At C. Portezuelo and Xaltocan (see also Otumba; Charlton et al. 2000), the consumption of ceramics from the local composition group intensified. Several explanations could be offered for these increases. Local specialists may have expanded production because of an increase in market demand and, in some cases, to supplement falling incomes caused by increased land shortages (Williams 1989), tribute demands, or both (Smith 1996:146; Smith and Heath-Smith 1994:367–370). Local production may have substituted for the imports that no longer came from the southern Basin. The Tenochtitlan / Culhuacan and Texcoco composition groups dominated the regional trade in Aztec-style serving vessels. At C. Portezuelo, imported pottery primarily came from these two composition groups. As C. Portezuelo became firmly incorporated into the Acolhua domain and then the Aztec empire, its exchange networks were restructured accordingly. At Xaltocan, the Tenochtitlan / Culhuacan composition group dominated ceramic imports. Whereas the Cuauhtitlan group accounted for over 80% of the Black / Orange pottery in Middle-to-Late Postclassic contexts, the Tenochtitlan / Culhuacan group became the major supplier in Phase 4, accounting for almost 60% of the Black / Orange pottery in the Late Postclassic.

The dominance of the Tenochtitlan / Culhuacan and Texcoco composition groups in the regional ceramic trade may simply reflect the increasing economic influence of the imperial capitals in the regional economy. Tribute wealth and population growth at the imperial capitals attracted buyers and sellers from all over the Basin. The increases in Black / Orange pottery from the Tenochtitlan / Culhuacan and Texcoco groups in hinterland communities may record the prevailing flow of trade within the Late Postclassic Basin. In addition, the power and splendor of the Aztec empire might have enhanced the attractiveness of pottery coming from the imperial capitals in the eyes of prestige-conscious hinterland consumers (see Wattenmaker 1994).

The compositional analysis of Aztec IV Black / Orange pottery, even with a relatively small sample, suggests effects of the Spanish conquest on markets and ceramic manufacture (Charlton et al. 1999). The Spanish conquest of Tenochtitlan caused a massive loss of lives from warfare, disease, and the destruction of the city itself (Díaz 1956:405–407). No Aztec IV Black / Orange imports from the Tenochtitlan / Culhuacan composition group are present in the INAA sample from C. Portezuelo, and at Xaltocan the Tenochtitlan / Culhuacan composition group is represented by only a single Aztec IV specimen. Texcoco's rulers allied with the Spanish during the final conquest of Tenochtitlan–Tlatelolco, and in the eastern Basin the Texcoco composition group appears to have dominated the regional trade in Black / Orange pottery in the Early Colonial period. The Cuauhtitlan composition group reasserted itself as the major supplier of Black / Orange pottery at Xaltocan. However, the presence of 16th-century Majolica pottery at Xaltocan from the Mexico City area suggests that ceramic production and exchange in the Basin of Mexico continued to be influenced by the concentration of political and economic power and prestige in the regional capitals (Rodríguez 2000).

CONCLUSIONS

Prompted by the results of INAA of Coyotlatelco pottery from Chalco, Neff, and

Hodge (in press) proposed that significant aspects of the ethnic and commercial patterns known from the Late Postclassic were actually established during the Epiclassic in the aftermath of Teotihuacan's decline as a supraregional center. The compositional analysis of clay raw materials and ceramics from C. Portezuelo and Chalco strongly point to these composition groups as including loci of Epiclassic pottery manufacturing, although archaeological evidence of workshops has not been found in either case. These, and later composition groups, are remarkably stable through time.

Products of these composition groups were distributed to other areas of the Basin through exchange networks that varied significantly over time. For example, the production and distribution of Coyotlatelco serving wares during the Epiclassic was highly localized with little movement of wares between composition groups. This conforms closely to a solar market model. During the Early and Middle Postclassic, not only did the number of composition groups increase, as we might expect from the energetics of transport costs and the wide distribution of clay resources suitable for ceramics in the Basin, but the movement of ceramics between them significantly intensified.

In contrast to the Epiclassic situation where political fragmentation was associated with economic isolation, the Early and Middle Postclassic were marked by increased exchange of decorated ceramics across composition groups. Substantial amounts of pottery were exchanged through subregional and regional, as well as local, markets.[9] At Early Postclassic Xaltocan, for example, as much as 60% of the decorated serving wares came from other composition groups, despite the fact that very adequate Aztec I vessels were being manufactured locally. This horizontal movement of decorated pottery seems to have paralleled the horizontal networks of kinship, marriage, and political alliance that characterized social relationships in the Basin prior to Aztec rule (Brumfiel 1983, 1989).

During the Late Postclassic, when the entire Basin was incorporated into the Aztec empire, ceramic manufacturing continued to be multicentric, but with the emergence of Texcoco and later Tenochtitlan as centers of imperial power, marketing and production systems were restructured. Manufacturing in some composition groups, such as Chalco, declined. Production in other composition groups, such as Otumba-Core and Xaltocan-1 and Xaltocan-2, expanded to supply their local areas. In all areas of the Basin more pottery came from the Texcoco and Tenochtitlan/Culhuacan composition groups. Thus, the Late Postclassic market system incorporated both increased economic regionalism and increased exchange between the hinterlands and imperial capitals. While local manufacturing supplied many local needs, the concentration of wealth and power at Triple Alliance capitals gave composition groups containing these cities an advantage in the regional trade in decorated serving wares.

In summary, although composition groups show considerable stability over time, markets were organized in several different ways during the course of the Postclassic. Market organization did not follow a linear course of development culminating in a fully integrated regional market system. Market organization was flexible, shaped by its larger economic and political environment. When wealth, power, and prestige were concentrated in particular cities, then products from the composition groups that included such cities became more widely distributed. The geographic limits of the exchange of decorated ceramics may have been constrained by the prehispanic technology and ecology, but within these limits, the day-to-day decisions of buyers and sellers seems to have determined the actual exchange pattern.

The patterns we have proposed for the Basin of Mexico (an Epiclassic solar market pattern, an Early and Middle Postclassic pattern of subregional exchange within the Basin, and a Late Postclassic marketing pattern showing both increased economic regionalism and increased exchange between the imperial capitals in the core of the Basin and its hinterlands; see also Charlton 1986) are probably not unique. They likely will be identified in other regions of the world for periods where similar conditions prevail.

INAA analysis of decorated pottery from C. Portezuelo, Chalco, and Xaltocan has provided further time-depth regarding changes in Postclassic distribution and production systems. Additional study of larger and more representative samples and a greater variety of ceramics is needed to confirm and elaborate on the patterns suggested here. Archaeological evidence of manufacturing activities, such as that found by the Otumba Project, will define how ceramic production was organized over this long and dynamic time span. Our results suggest that a longitudinal perspective using results of instrumental neutron activation analysis is a fruitful means to better understand the development of preindustrial markets and the complex relationships of economics, politics, and urbanism.

NOTES

[1]The 20-day ritual markets might have been held only in the largest centers (e.g., Cholula, Cuauhnahuac, Huitzilopochco, Teotihuacan, Mexico City/Tenochtitlan–Tlatelolco, Toltec Tula, Tulancingo, and Tultitlan, while the 9- and 13-day ritual markets perhaps rotated among markets in a region (Hassig 1982:352–353).

[2]Geographic differences in ceramic styles became more pronounced and complex beginning in the Early Postclassic and warrant some discussion here. The ceramic complex used as a chronological diagnostic for the Early Postclassic in the eastern Basin includes three variants of Red/Buff serving wares. Toltec Red/Buff has red designs in the form of irregular splotches, sloppy concentric circles, and splashes of red paint, and it is distributed widely in the Basin and is also found at Tula (Parsons 1971:290; Sanders et al. 1979:464). Wavy-Line Red/Buff is characterized by sets of parallel lines, usually wavy, but sometimes straight, applied with a multiple brush technique to the interior of vessels. It was common in the Teotihuacan Valley and to a lesser degree in the Texcoco region but it is rare in the southern Basin and also in the northwestern Basin at Xaltocan. At Tula, however, Wavy-Line Red/Buff is rare and predates Tula's emergence as a major center (Cobean and Mastache 1989:44); Jará Polished Orange dominated Postclassic ceramics during Tula's apogee (Cobean and Mastache 1989:44; Parsons et al. 1996; Sanders 1986; Sanders et al. 1979:465–466). Sanders et al. (1979:466) suggest that Wavy-Line Red/Buff and Toltec Red/Buff originated at Teotihuacan.

The third decorative style is called Wide-Band Red/Buff (Macana Red/Brown) with wide bands of red-painted or red slipped on the interior rim or wall of vessels, usually molcajetes, that have conical tripod supports often decorated with a circular blob of red paint on the exterior (Sanders et al. 1979:464–465). Wide-Band Red/Buff is widely distributed in the Basin and it also occurs at Tula where it was moldmade (Cobean and Mastache 1989:44; Parsons et al. 1982:436–437; Sanders et al. 1979:465).

Sanders (1986:525) suggests that the Early Postclassic (Late Toltec period) can be subdivided in the Teotihuacan Valley into a Mazapan subphase when Wavy-Line Red/Buff was present. At this time the Teotihuacan Valley was still politically independent and unified under Teotihuacan as a small but highly centralized state. Cowgill's (1996) recently revised population estimates for the Mazapan occupation suggest a population of ca. 30,000, making Teotihuacan the largest settlement in the Basin. Sanders has proposed that the introduction of Toltec orange and cream-slipped ceramic wares marked the incorporation of the Teotihuacan Valley (and perhaps other parts of the eastern Basin of Mexico) into the Toltec sphere that he defines as the Atlatongo subphase. Other defining characteristics of the Atlatongo subphase include a decline in frequency of Wavy-Line Red/Buff and the addition of rim scalloping to the Wide Band Red/Buff serving wares (Sanders 1986:372–373).

Further complicating the picture is the real possibility that, although Aztec orange ware ceramics became widespread in Central Mexico after 1150 A.D. during the Middle Postclassic, Coyotlatelco, Mazapan, Aztec I, and Aztec II might have chronologically overlapped to varying degrees in different areas (Cowgill 1996; Nichols and Charlton 1996; Parsons et al. 1996). Wavy-Line Red/Buff, one of the Early Postclassic Red/Buff variants, is most common in the Teotihuacan Valley and to a lesser extent in the Texcoco region and Cuauhtitlan and Temascalapa areas of the Basin but its distribution in the eastern Basin does not extend much past Cerro Portezuelo and it is rare in the Chalco-Xochimilco area (Sanders et al. 1979:463; Whalen and

Parsons 1982:437). Aztec I, however, is found in the southern Basin, primarily in the area around Lake Xochimilco-Chalco and in the northwest Basin at Xaltocan. A sparsely occupied zone separated the northern and southern Basin and Sanders et al. (1979:137–148) suggested that this might reflect a frontier between Tula to the north and the regional center of Cholula to the south in Puebla. If the Wavy-Line Red / Buff in the Basin predates the expansion of the Tula state, however, then its distribution might be related to a Teotihuacan sphere of influence during the early part of the Early Postclassic period.

[3]When the only means of transport is by walking, the ideal market in terms of supplying heavy staple foods is within a 1- or 2-day radius; Hassig (1985:40) estimated that transport of bulk commodities by human portage in central Mexico was limited to a radius of about 21 to 28 km. Professional Aztec burden bearers, *tameme*, traveled an average daily distance of 30 km and carried an average load of 23 kg (Sanders and Santley 1983:246). Canoe transport across the lakes in the Basin facilitated the movement of goods.

[4]Paul Tolstoy (1958) had previously made surface collections at C. Portezuelo, and it was on Tolstoy's recommendation that Brainerd selected C. Portezuelo for excavation. Brainerd's first field season in 1954 focused on excavating stratigraphic test pits dispersed across the site, mapping, and exploring the civic-ceremonial center. This work continued the following year, but attention shifted to architectural investigations (Nicholson and Hicks 1961). Brainerd began a ceramic analysis at the end of the first field season and defined over 100 tentative sorting categories as a preliminary step to a statistical analysis to discover cluster patterns that in turn were to lead to the final formulation of ceramic types. He deliberately ignored previous ceramic typologies and chose to develop his own. Brainerd died suddenly on February 14, 1956, and his only publication on the C. Portezuelo investigations was brief description that was published after his death (1956:441). Mayer-Oakes examined some of the excavated C. Portezuelo ceramics (Mayer-Oakes 1959:Table 9, 1960; cf. Nicholson and Hicks 1961). Henry Nicholson replaced Brainerd at UCLA in the fall 1956 and took over the project. The following summer Nicholson excavated an area adjoining one of Brainerd's principal excavations at C. Portezuelo, and in 1958 he excavated test pits in the nearby town of Chimalhuacan for comparative purposes. Fred Hicks undertook a reanalysis of the pottery at UCLA from C. Portezuelo. Based on ethnohistoric research, Nicholson (1972:179–196) proposed that C. Portezuelo might be the remains of Tlatzallan, a Toltec center that continued to be occupied after the fall of Tollan until it reportedly was abandoned in either 1298 or 1350 A.D. as the result of hostilities with Coatepec. Although Aztec IV Black / Orange pottery in the C. Portezuelo collections (Hicks and Nicholson 1962:502) indicates that occupation of the area continued into the Early Colonial period, by the Late Postclassic C. Portezuelo was much reduced in size, and it was no longer a city-state center. Thus, the presence of Early Colonial, Aztec IV, ceramics does not necessarily negate Nicholson's hypothesis.

[5]The absolute dates conventionally assigned to the Aztec I, Aztec II, and Aztec III ceramics in the Basin of Mexico are not appropriate for Xaltocan. The usual Middle Postclassic date of 1150–1350 A.D. for Aztec I is much too late for the Xaltocan materials. At Xaltocan, the oldest Aztec I Black / Orange ceramics date to at least 900 A.D. This means that at Xaltocan Aztec I Black / Orange began during the Early Postclassic and was contemporaneous with Toltec Red / Buff pottery (Parsons et al. 1996). In addition, the usual Middle Postclassic date of 1150–1350 A.D. for Aztec II is too early. Although a limited number of Aztec II Black / Orange variants are present at Xaltocan during Phase 2 (1100–1300 A.D.), a full array of Aztec II and Red Ware types occur at Xaltocan only after 1300 A.D., close to the conventional date for the beginning of the Late Postclassic. This implies that the starting date of 1350 A.D. for Aztec III Black / Orange at Xaltocan is also too early. Aztec III Black / Orange appears at Xaltocan sometime after 1400. Aztec III seems to coincide with the dates of Triple Alliance control over Xaltocan, 1428–1521. It remains to be seen whether the suggested dates for Black / Orange are valid for the Basin in general or whether they are unique to Xaltocan.

[6]The Southern Basin-1 source produced a range of early Red Ware variants including Wide Band Black / Red [Minc's (1994:460) B / R Variant A-1], Cane-Incised Black / Red [Minc's (1994:490) B / R Variant C], Graphite Black / Red bowls, and Black & White / Red with a narrow decorative band [Minc's (1994:499) B & W / R Variant E-2]. The Xaltocan-2 source produced a Graphite Black / Red bowl, and the Puebla / Morelos source contributed a Cane-Incised Black / Red bowl.

[7]Most composition groups made a number of different Red Ware variants. For example, Xaltocan-1 produced Black / Red bowls with evenly spaced vertical lines [Minc's (1994:461, 463) B / R Variants B and E] and many different Black & White / Red variants, including those featuring white-filled triangles [Minc's (1994:497) B & W / R Variant AW], white designs within a plain red panel [Minc's (1994:498) B & W / R Variant D], and designs organized by black vertical or slanted bands [Minc's (1994:497–498) B & W / R Variants B and C]. Many of these variants were also produced by Xaltocan-2 and the Southern Basin-1 source (Fig. 15). Minc's (1994:497) AW Black & White / Red bowls were the most widespread variant, being produced at six sources: Xaltocan-1, Xaltocan-2, Tenochtitlan / Culhuacan, Macro-Otumba, Southern Basin-1 and one unknown source. The Southern Basin-3 source

stands out as the source of several unusual Red Ware variants: Plain Red *copas*, Minc's (1994:497) AN Black & White/Red bowls, and Black & White/Red bowls featuring red triangles outlined by narrow white lines.

[8]Different design variants were associated with different sources. Six of the nine sherds from the middle and southern Basin (Tenochtitlan/Culhuacan, Southern Basin-1) had dashes replacing zacate at the top of the decorative band on dishes, plates, and molcajetes; five of five sherds from the northern Basin (Xaltocan-2, Cuauhtitlan, Otumba-Macro) featured open loops in place of *zacate* at the top of the decorative band. The ever-popular Black & White/Red variant featuring white-filled triangles continued to be produced in the Xaltocan-1 source area during Phase 4. But many new variants were added in Phase 4, including comb motif Black/Red bowls [Minc's (1994:462) B/R Variant C], wing motif Black/Red bowls [Minc's (1994:462) Late Profile Bowl Variant E], Black & White/Red bowls with a scalloped white border [Minc's (1994:498) B & W/R Variant C-2], and Black & White/Red bowls with a cable (*atl-tlachinolli*) motif (see Minc 1994:Figs. III.36.b and III.36.c).

[9]To get a rough sense of the scale of the Aztec pottery production in 1519 A.D., Sanders and Santley (1983:254) used a consumption figure of 20 vessels/family/year that with a total population in the Basin of 1.25 million persons (or ca. 175,000 families at an average family of seven) would have required the annual production of 3.5 million vessels—little wonder that Aztec pot sherds are ubiquitous in the Basin. According to their calculations, this demand would represent the manufacturing output of between 1500 and 3800 potters (using Sanders and Santley's figure that one potter can supply the equivalent of the needs of 46–117 families/year, depending on the type of vessel). More accurate analyses of consumption patterns and demand levels for different types of prehispanic pottery would be useful.

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