

LONG DISTANCE CERAMIC EXCHANGE INCOTZUMALGUAPA: RESULTS OF NEUTRON ACTIVATION ANALYSIS

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Since the XIX century, Cotzumalguapa has been focus of attention due to the seemingly intense relationships it maintained with other parts of Mesoamerica, initially perceptible in sculptural art. As a result of the investigations conducted in recent years, Cotzumalguapa has revealed itself like a large urban center that includes several groups of monumental architecture and wide settlements integrated through a system of causeways and bridges.

During the extraordinary boom it experienced in the Late Classic period, Cotzumalguapa represented one of the main cities in southern Mesoamerica, seat of an important political organization, and a generating center of cultural innovations that were echoed in a wide region of the Altiplano and the Pacific Coast of Guatemala. It does not come as a surprise that this city had maintained commercial relationships with other Mesoamerican regions, though this aspect has not been much investigated so far. The iconography of sculptures reveals the full participation of Cotzumalguapa in the cultural fabric of Mesoamerica, but it is only through field archaeology that the external contacts of the inhabitants of this city will be revealed, by examining the long distance exchange of artifacts.

In his pioneer investigations, Eric Thompson (1948) and Lee A. Parsons (1967) reported small assemblages of foreign materials at El Baul and Bilbao. The recent efforts of the Cotzumalguapa Archaeological Project have produced new collections of imported artifacts, some of which were accurately identified through visual observation and comparisons with materials from other regions. The method of Instrumental Neutron Activation Analysis (INAA) was used, in an attempt to identify the origin of a set of materials with a style that suggested a stylistic affiliation with the pottery of the Maya Lowlands, but whose poor preservation did not allow for their full identification through visual methods. This article describes the results of the study of imported ceramic materials in Cotzumalguapa, including macroscopic observations and stylistic comparisons, as well as the results of the chemical analysis of pastes.

PREVIOUS STUDIES

In his pioneer study of pottery from El Baul, Thompson (1948: 47-48, Fig. 57), reported some apparently imported sherds, with two pieces characterized as corresponding to the "*Peten-British Honduras type*", and several examples he associated with materials documented at the sites of Chuitinamit and Zacualpa, in the Western Altiplano. Thompson acknowledged that his characterizations were necessarily of a tentative nature, considering the doubtful documentation of the local materials. He was also the first to report the significant presence of Plumbate pottery, which was of use to him as an important chronological marker. However, he made no comment on the foreign origin of this type of pottery.

Curiously, Parsons (1967: 153-155) also described the Plumbate ceramic among the local ceramic types, though he noted that the distribution center of this material was located in the border region between Mexico and Guatemala. Plumbate ceramic was not frequent in his excavations, which produced only 61 sherds of the 17,000 that integrated his total sample. Among the foreign materials of the Late Classic Santa Lucia phase, he also reported two Ulua Polychrome sherds from El Salvador or Honduras; four fragments of bowls or polychrome vases probably from Peten or Alta Verapaz; and six fragments of cream on brown cylindrical vases, all from a same context, that he associated with the "Mikado cream on brown" pottery of Alta Verapaz (Parsons 1967: 155-156; Smith 1952, Figs. 14 and 15).

The problem of the provenience of Plumbate ceramic has been considerably clarified thanks to the works of Hector Neff (1991a, 1991b, 2002; Neff and Bishop 1988). Through chemical analysis of pastes in samples of Plumbate ceramics and clays of the Pacific littoral between Guatemala and Mexico, Neff has shown that the centers of production of the San Juan Plumbate pottery were located at the mouth of the Naranjo River in Guatemala, while the Tohil Plumbate region was to be found at the mouth of the Cahuacan River, in Chiapas. As part of a project for sampling of materials and clay sources in the South Coast of Guatemala, Neff also conducted analysis on samples of 11 Plumbate sherds originated at El Castillo, in the Cotzumalguapa Nuclear Zone. Through the INAA, ten of these sherds were chemically characterized as San Juan Plumbate, while only one of them was chemically characterized as Tohil Plumbate (Hector Neff, personal communication 1995).

Macroscopic analysis made it possible to identify with certainty the presence of two ceramic types of foreign origin in the samples of the Cotzumalguapa Archaeological Project: San Juan Plumbate and Bulux Red Incised.

SAN JUAN PLUMBATE

Plumbate ceramic is ubiquitous in Cotzumalguapa, where most Late Classic contexts contain small amounts of these sherds. In a set of lots recently examined the

concentration of Plumbates ranged from 0.65% to 2.65% of the total sherds. In one section of the Gavarrete causeway, on the east side of the Santiago River, the concentration represented 2.65% with respect to the total 1773 sherds tested, a number that climbed to 5.05% when considering only the fine types of the Late Classic period (931 sherds, of the types Perdido, Tiquisate, Congo, Cueros, San Andrés, San Juan Plumbate, Reforma, and others with a brown-black slip). The maximum concentration was documented in a garbage dump located south of El Castillo, where Plumbate ceramics topped 9.7% (62 sherds of a total of 639 sherds analyzed; Chinchilla 1996a:147).

San Juan Plumbate is also one of the most frequent types deposited as offerings (Figure 1). Interestingly, none of the vessels in the offerings corresponds to the style "*Tohil Fine*" ("*Tohil Lujoso*") (Neff 1991b:305), characterized by its large variety of forms and decorations, extensively exchanged during the Early Postclassic period throughout Mesoamerica. The only clear example of Tohil Fine in Cotzumalguapa is a fragment of an effigy vessel reported by Parsons (1967:160). Except for this fragment, all the Plumbate pottery documented in Cotzumalguapa corresponds to that which Neff calls "*substance tradition*", consisting in composite silhouette vessels, globular bowls and cylindrical vases, with a development that precedes temporally that of Tohil Fine. The absence of Tohil Fine, combined with the established dating for most of the archaeological contexts in Cotzumalguapa (Chinchilla et al., n.d.) allowed us to date the substantial imports of Plumbate pottery to the Late Classic period.



Figure 1. Plumbate Vase with a globular form, deposited as an offering in the parapet of the Gavarrete causeway, south of El Baul (operation VA11D).

Plumbate ceramic is the most abundant imported material present in Cotzumalguapa. It is not possible to quantify the consumption level, although its constant presence suggests that the demand of this material was substantial. This may have important

implications, not only for local archaeology but also for the understanding of the technological development of this type of ceramic and its extraordinary trading at a Mesoamerican level during the Early Postclassic period. Neff (1991b) has suggested that the development of Tohil Fine responded to the foreign demand of glamorous objects, thus encouraging the potters of the producer zone to introduce a number of changes in the form and decoration of their products, so as to destine them to the external market. These innovations were possible because prior to the introduction of Tohil Fine, an interest already existed for the aesthetic qualities of Plumbate ceramics, particularly because of the shiny surfaces they presented. Neff (1991b:304) suggests that *“the local tradition of ceramic manufacture (vg. the substance tradition), was pre-adapted for the exploitation of an open niche with the advent of commercial relationships with foreigners”*. We should ask ourselves whether the consumption of Plumbate ceramics in Cotzumalguapa during the Late Classic period may have been an important factor in the pre-adaptation of potters and merchants, and their eventual orientation to the outer market.

During the Late Classic period, Plumbate ceramics of the “substance tradition” were distributed along the coast of Chiapas and Guatemala, down to El Salvador. Cotzumalguapa must have occupied a significant place in this distribution network, considering that it was the main city of southern Guatemala during the Late Classic, and a consumer center of Plumbate ceramics. Located 125 km away, from a bird’s eye view, of the producer zone in the mouth of the Naranjo River, Cotzumalguapa was an important market in a relatively accessible place from the producer centers. The presence of this market may have been one of the factors that stimulated the long distance distribution of Plumbate ceramics of the substance tradition during the Late Classic period. Consequently, this market may have provided part of the initial impulse for a production with an external-market orientation, one that took place after Cotzumalguapa collapsed, with the introduction of Tohil Fine.

BULUX RED

Bulux Red is the most frequent ceramic type in the site of Agua Tibia, Totonicapan, where it represents 78.89% of the ceramics examined by Ciudad Ruiz (1984: 141-161). Chronologically, it corresponds to the Totonicapan phase, between 700 and 1000 AD, contemporary to the flourishing of Cotzumalguapa during the Pantaleon phase (650-1000 AD; Ciudad Ruiz 1984:322; Chinchilla et al., n.d.). The presence of the Bulux group in Cotzumalguapa was initially identified by Sonia Medrano. It is uncertain whether there are other producer centers closer to the coast, but the Cotzumalguapa materials are essentially identical to those reported by Ciudad Ruiz in Agua Tibia. In addition to its paste and the predominantly brown red or coffee slip, sherds may be recognized with certainty thanks to their distinctive decorations, particularly those of the varieties Bulux Red Incised Polished and Bulux Red Impressed Instrument (Figure 2). It is possible to consider the presence of examples of the Bulux Red Plain type, with no incised or impressed decoration, but it would be extremely difficult to have them differentiated in the sample.



Figure 2. Sample of Bulux Red sherds recovered from different excavations at the Cotzumalguapa Nuclear Zone.

The concentration of Bulux Red in Cotzumalguapa is limited. In the investigations conducted in 1997 and to this day, less than 40 sherds were identified with certainty, which nevertheless, were distributed in different sectors of the Cotzumalguapa Nuclear Zone (Figure 3). Its presence was also verified in the secondary site Finca San Cristobal, located approximately 3 km west of Bilbao (Chinchilla 1996a). This distribution seems to indicate that the Bulux Red pottery was imported with some frequency, although in small amounts.

How could we explain the import of this essentially utilitarian material, which according to Ciudad Ruiz (1984:141) “*is characterized for having an almost exclusive culinary function*”? As opposed to Plumbate ceramics, Bulux Red presents no particularly attractive aesthetic qualities. From Totonicapan to Cotzumalguapa there is a distance of 73 km, from a bird’s eye view, which may exceed 100 km depending on the routes used. How efficient the transportation of purely utilitarian vessels to such a distance may have been, in terms of costs and profits? We should presume that the consumption of Bulux ceramics in Cotzumalguapa was conditioned by something more than its utilitarian value, which was not superior to the local types, or its aesthetic value, which was no competition to other local and imported types. The possibility remains that it may have had some special culinary use, or that its mere exoticism may have been a motivation enough to create a small local demand.

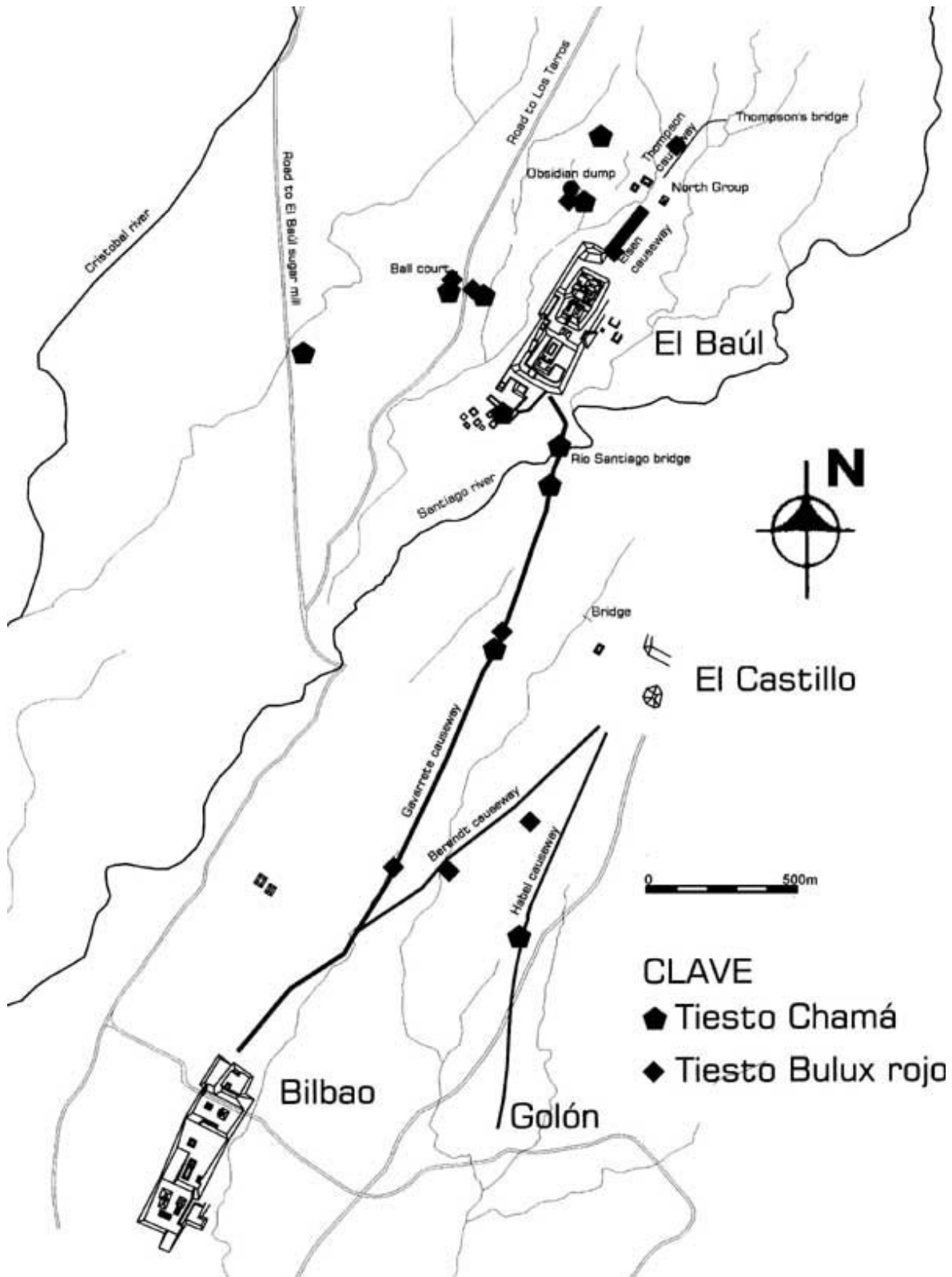


Figure 3. Map of the Cotzumalguapa Nuclear Zone, showing the locations where Bulux Red and Chama sherds were found.

PASTE COMPOSITIONAL ANALYSIS

Paste compositional analysis using Instrumental Neutron Activation (INAA) made it possible to identify one important assemblage of imported sherds corresponding to the Chama style from Alta Verapaz, and it as well made it possible to identify a group of sherds initially presumed to be of a foreign origin, like the coastal materials, probably of the Postclassic period. The analysis was conducted at the Neutron Activation laboratory of the Smithsonian Institution, still located in the premises of the National Institute of Standards and Technology, Gaithersburg, Maryland.

The INAA method has been widely used to study ceramic exchange in different regions with the objective of establishing its origin and studying the circulation mechanisms (Zedeño et al. 2003). The principles of this method have been described in several publications (Bishop et al. 1982; Neff 1992). In the Pacific Coast of Guatemala, Hector Neff and Frederick Bove have applied the method to characterize clay sources and their changing exploitation throughout time by local potters (Neff 1995; Neff and Bove 1999). In this work, we have analyzed the paste composition of a 48-sherds sample which had been visually characterized as foreign materials, some of them with stylistic traits associated to the polychrome ceramic of the Maya Lowlands. These sherds remained classified simply as “imported polychromes”, as their poor preservation allowed for no accurate identification through visual observation. To compare the results of paste analysis, we used a database developed by the Maya Polychrome Ceramic Project (Bishop et al. 1985; Reents et al. 1994; Reents and Bishop 2003), which comprises thousand of samples from the Lowlands and other regions.

Based on the analysis of 23 chemical elements, an average linkage cluster analysis was conducted on a matrix of Euclidian distances. In the resulting dendrogram, the following patterns can be observed:

- There are two primary clusters: (a) Cluster 1, which comprises samples SLC037 to SLC043 (in their order of appearance in the dendrogram); (b) Cluster 2, which comprises samples SLC022 to SLC007.
- Samples SLC049 and SLC050 are relatively close, but separated from the rest of Cluster 1. As we shall see, they are associated with sample SLC048, shown in isolation in the lower portion of the dendrogram.
- Samples SLC012, 023 and 046 form a small cluster, associated with Cluster 1 but relatively distant from it.
- Sample SLC038 is isolated from the others because of the elevated values of Scandium and Iron shown.

For a profounder study of the sample behaviour, an analysis of primary components was carried out, of which three components were extracted, with an *Eigen value*>1, which explained 81% of the variability present in the sample. Two main groups are

observed, corresponding to Clusters 1 and 2, with several dispersed dots towards the upper left part of the chart. The observations of painting styles and the comparison with the Maya Polychrome Ceramic Project database made it possible for us to identify Cluster 1 as a ceramic of local origin, while Cluster 2 proved to contain an interesting sample of Chama ceramics imported from Alta Verapaz.

POSTCLASSIC CERAMIC OF THE PACIFIC COAST

The samples included in Cluster 1 share many compositional characteristics with ceramic samples from the Pacific Coast previously analyzed. Like a point of comparison, 348 samples previously collected from materials of the Pacific Coast were used and individually compared with the samples of Cluster 1. At the time of examining once more the macroscopic traits of the sherds that integrate Cluster 1, it was made evident that several of them presented designs painted with red and black lines. Similar designs are present in Postclassic materials recovered in Cotzumalguapa and other regions of Escuintla. Backed up by the results of the paste compositional analysis, it is our belief that Cluster 1 contains mainly Postclassic coastal ceramic, although it is not possible to define its origin with a greater precision. These sherds were not correctly identified in the past due to the relative paucity of Postclassic materials in the archaeological contexts of Cotzumalguapa.

It has also been observed that samples SLC048, 049 and 050 form a closely related assemblage, while the dendrogram associates the latter two with Cluster 1. Significantly, both these samples come from the site of Palo Verde, an important center located approximately 10 km north of Cotzumalguapa (Chinchilla et al. 2001). The red and black on buff paint suggests that SLC048 and 049 could also represent Postclassic materials. The differences in paste composition with regard to Cluster 1 could probably be explained as the result of local distinctions in the composition of clays within the Palo Verde area, whose vicinity with the Fuego volcano could cause variations in the presence of chemical elements in the soil.

CHAMA CERAMIC

Cluster 2 is distinguished as a closely related group, in terms of paste composition. The composition of this group is characterized by high levels of Chromium, typical of the regions of Alta and Baja Verapaz and the slopes of the Motagua and Chixoy rivers. All sherds in this cluster are painted with designs closely linked with the Maya art of the Lowlands and the Northern Altiplano. However, their small size and poor preservation did not allow for a satisfactory visual identification.

A new set of polychrome sherds, identified after the samples for INAA were collected, came to facilitate the interpretation of Cluster 2. This group includes larger and better preserved sherds, which were visually identified as corresponding to the Chama style for its typical orange slip, with red, white and black bands around the rim and base. Typical of this style is the very thick black stroke applied to delineate often repetitive complex iconographic representations and hieroglyphic texts (Reents et al. 1994: 188-

197). The comparison of the Cotzumalguapa sherds with examples of Chama ceramics in the collection of the Popol Vuh Museum helped to confirm their stylistic affinity (Figure 4). Although the chemical composition of their pastes is not known so far, the good preservation of these sherds made it possible to confirm the occurrence of Chama ceramics at Cotzumalguapa. Once this was rectified, we were able to return once more to the initial sample and detect with a greater certainty some traits compatible with the Chama style. The orange paint is present in many of the sherds included in the sample, while the red, white and black bands delineated with thick lines were detected in samples SLC021, 028, 045 and 047.



Figure 4. Chama style sherd from Cotzumalguapa, photographed jointly with a Chama style vase of the Popol Vuh Museum collection. Note the similarities of the red and white bands with black lines near the rim, and the hieroglyphic signs with a similar appearance.

Taking the above considerations into account, we compared the paste composition of Cluster 2 with a group of 45 samples of Chama ceramics from the Maya Polychrome Ceramic Project database. These include objects characterized as Chama style,

present in the collections of the National Museum of Archaeology and Ethnology of Guatemala, and the Pennsylvania University Museum. An analysis of primary components in the combined sample was carried out. In terms of paste composition, the sherds of Cluster 2 seem to maintain a very close association with one another. The distribution of Cluster 2 partially overlaps with that of the comparative samples of Chama ceramics, although these have a wider distribution. However, the comparative sample presents no overlap with Cluster 1, previously identified as a locally manufactured pottery.

We should point out that not all the sherds of Cluster 2 may be stylistically identified as Chama. In particular, sample SLC013 seems different, as it displays designs executed with red lines on a buff background. However, it is located at the center of the distribution of Cluster 2, and the fact that they could share an identical origin cannot be ruled out.

In short, the sample that forms Cluster 2 is compatible in terms of paste composition with the samples previously documented of Chama ceramics, and it is also close to it, in terms of style. The import of Chama style ceramics in Cotzumalguapa was confirmed thanks to the materials identified after the sampling of pastes was completed. In total, our investigations have revealed 24 sherds that may be visually identified as corresponding to the Chama style. The number seems to be short, but its meaning becomes important when observing the distribution of these materials in the Cotzumalguapa Nuclear Zone (Figure 3). Just like Bulux, the Chama sherds are scattered along the ancient city, suggesting a pattern of extensive consumption. It does not seem to be the case of a single importation event, neither of an imported material for the exclusive use of some restricted group. The distribution of Chama ceramics in Cotzumalguapa suggests that the material was much appreciated and consumed in the entire city, and that there was a procurement system efficient enough to satisfy such need. Significantly, a sherd was also recovered, compatible with the style and the Chama paste composition at the site of Palo Verde (sample SLC040), suggesting that its consumption extended to the peripheral centers of Cotzumalguapa.

According to the results of the Maya Polychrome Ceramic Project, Chama was a localized style produced within a restricted temporal and geographic context, although the chemical variability observed suggests that there were several workshops that exploited different clay sources in the Chama region (Bishop et al. 1985; Reents et al. 1994: 188-197). The results of this work contradict the notion that this beautiful ware was not widely distributed beyond the immediate area (Reents et al. 1994: 188). Chama vessels were attractive enough to make their transportation to Cotzumalguapa, 146 km away from a bird's eye view, worthwhile, in cost/efficiency terms. Real distances probably were much larger, but it is not possible to establish with certainty which were the transportation routes used. Hypothetically, the material may have been taken straight down through the region of the Chixoy River to Salama or Rabinal, to proceed to San Martín Jilotepeque or the Guatemala valley, descending towards the coast through the routes of Ancient Guatemala or Escuintla. Alternatively, it may have travelled down across the Tactic valley to the Motagua valley, to thereafter climb to the Guatemala valley and then descend to the South Coast.

It is not possible at this time to ascertain whether this commerce was directly carried out or whether the objects changed hands “along the line”. The consistent pattern of paste composition in the tested sample suggests that it could have originated in just a few workshops, thus supporting the idea that there was a direct connection between Cotzumalguapa and the far away producer centers.

Significantly, Chama is the only type of polychrome ceramic that is consistently present in the Cotzumalguapa sample, although several isolated sherds could represent styles imported from other regions. If the polychrome materials would have arrived in Cotzumalguapa “along the line”, a greater variability would be expected in the styles of polychrome ceramics than that observed so far. The current pattern suggests that there was a preference for the consumption of this style of polychrome pottery, or either a link of exchange that favored the import of Chama pottery in detriment of other styles.

CONCLUSIONS

In short, we have identified with certainty three types of imported wares in Cotzumalguapa that originated in the Southwestern Coast, the Western Altiplano, and Verapaz. Like we said above, Lee Parsons reported two Ulua Polychrome sherds that were probably imported from Honduras or El Salvador (Figure 5). Most probably, small amounts of materials were imported from other regions, but Plumbates, Bulux and Chama are the only ones that have consistently occurred in our samples. This suggests that pottery exchange did not take place by pure chance, but rather, that there were well established nexuses with specific producer centers.

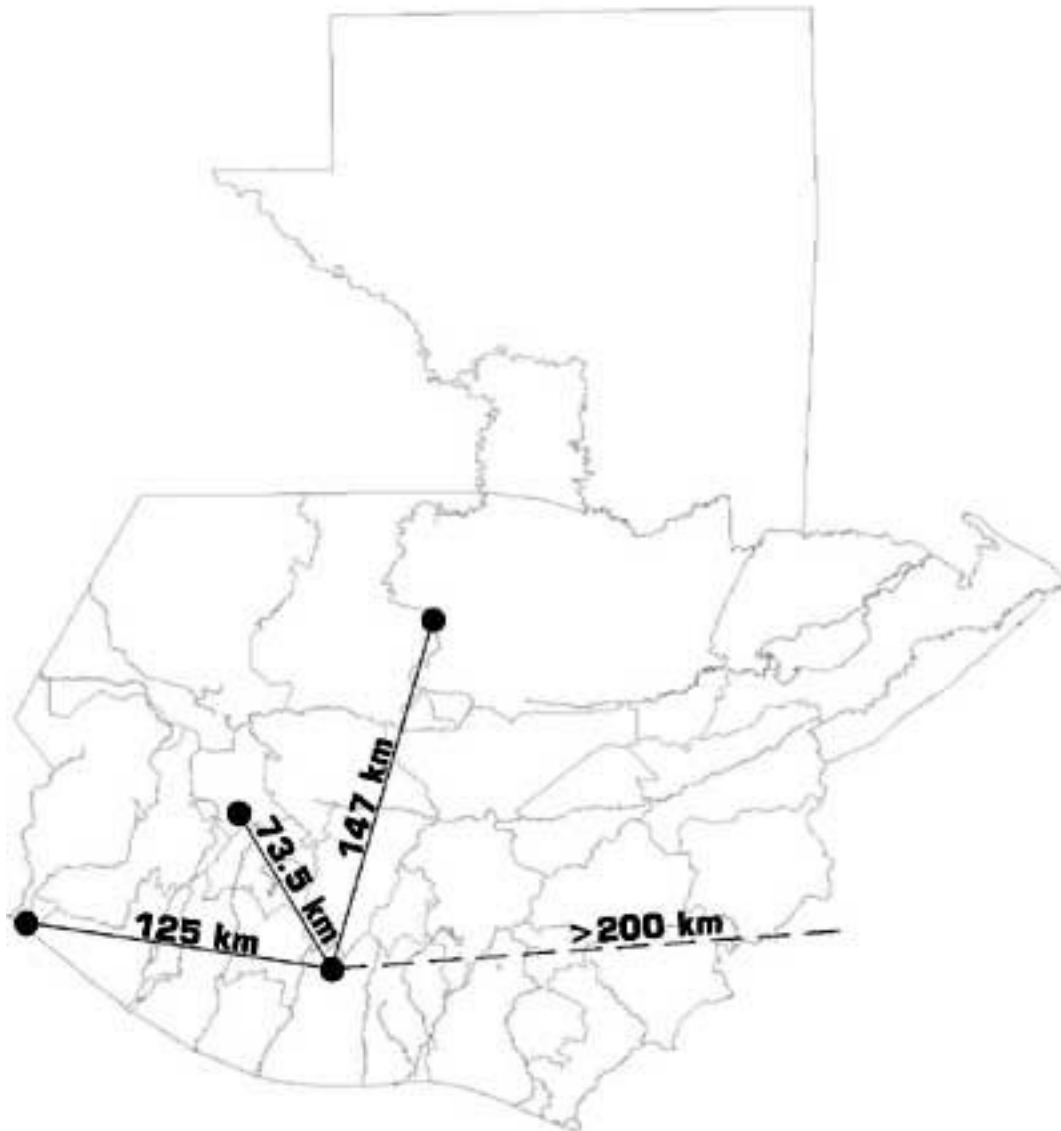


Figure 5. Map of Guatemala showing the lineal distances between Cotzumalguapa and the producer centers of Plumbate, Bulux Red and Chama pottery. Also, and based on Parsons' work (1967), we have indicated the possible import of Uluá polychrome sherds from Honduras or El Salvador.

We could now briefly speculate about the mechanisms through which this exchange was carried out. Plumbate ceramic is the most abundant one, and its occurrence in all contexts of the Late Classic period suggests that distribution was accomplished through market mechanisms that allowed for a relatively uniform provision. The aesthetic qualities of Plumbate wares and the relative closeness to the producer centers, most probably explain their large scale importation. Chama is the only type of polychrome pottery consistently present in the Cotzumalguapa sample, although several isolated sherds could represent imports from other regions. The aesthetic quality of this ceramic style explains adequately why it was imported to Cotzumalguapa, though we should ask ourselves about the reasons why other styles of polychrome ceramics were absent. The

simplest explanation is that Chama was the more accessible producer center of polychromes from the South Coast. As observed, the paste composition in our sample does not reflect the total range of variability that has been documented in the Chama style pottery, but instead, it presents a very compact distribution. This suggests that the material was originated in closely related workshops, and this comes to reinforce the notion that there in fact existed direct connections between Cotzumalguapa and a small group of producers of Chama pottery. It is little probable that the material arrived to Cotzumalguapa.

The import of Bulux Red is harder to account for, as this is a ceramic type which does not feature particularly attractive qualities. Again, there seems to be very specific preferences that conditioned the import of this material, in detriment of other materials that could have been subjects of importation.

Finally, we still should ask ourselves whether there were ceramic materials that were exported from Cotzumalguapa to other regions. The presence of Classic pottery of Escuintla in other parts of Guatemala, particularly in the Motagua valley is a known fact, but it would be impossible to establish at this time where exactly it was produced, or if the cultural and political ascendancy of Cotzumalguapa may have had an influence on its distribution. We may only expect that future investigations will produce a larger amount and variety of imported materials in Cotzumalguapa, and of materials exported from there to other regions, perhaps with the help of Neutron Activation and other methods for paste analysis. This will redound in a better comprehension of the complex picture of economic relationships of the Late Classic period in southern Guatemala.

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- Figure 1 Plumbate globular vase, deposited as an offering in the parapet of the Gavarrete causeway, south of El Baul (operation VA11D)
- Figure 2 Sample of Bulux Red sherds recovered from different excavations at the Cotzumalguapa Nuclear Zone.
- Figure 3 Map of the Cotzumalguapa Nuclear Zone, showing localities where Bulux Red and Chama sherds were found.
- Figure 4 Chama style sherd originated in Cotzumalguapa, photographed together with a Chama style vase from the Popol Vuh Museum collection. Note the similarities of the red and white bands with black lines in the edge, and the hieroglyphic signs with a similar appearance.
- Figure 5 Map of Guatemala showing the linear distance between Cotzumalguapa and the producer centers of Plumbate, Bulux Red and Chama pottery. Also, and based on Parsons' work (1967), we have indicated the possible import of Ulua polychrome sherds from Honduras or El Salvador.