50 left feet: The manufacture and meaning of effigy censers from Lamanai, Belize

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Abstract - Elaborate human effigy censers are widely distributed at sites across the Maya lowlands in the Late Postclassic period (ca. 1250-1540 AD). These censers represent people dressed in costumes, combining martial and supernatural elements. They may have been broken at various sites as part of rituals associated with pilgrimage, but details of their production, movement across the landscape, and meaning remain unclear. A stylistically varied assemblage of fragmented censers of this type has been recovered from Lamanai, Belize, and has been subjected to detailed stylistic, iconographic, and petrographic examination. The results of this study have revealed a higher level of variability in visual and compositional characteristics than has been recognised previously, demonstrating connections to both local and foreign producers, and to several geographically distant production localities. These results have important implications for the current understanding of the nature and meaning of these vessels, specifically as concerns associated patterns of production and deposition.

A central focus of our paper is to discuss methodological issues relating to the integration of extensive data sets characterising compositional and stylistic/iconographic attributes, including the interplay of variability in technological and provenance characteristics and style. We also explore the significance of such integrated approaches to understanding Maya interregional interaction just prior to the Spanish conquest.

1. Introduction

Effigy censers stylistically similar to those that are the focus of this paper (Fig. 1) are best known from the site of Mayapan in northern Yucatan, Mexico, where they have been given the type name Chen Mul Modeled (of the Unslipped Panaba Group of Mayapan Unslipped Ware) in the type-variety system of pottery classification used to delineate the ceramic sequences at most ancient Maya sites (Smith 1971, 210-2). At Mayapan, Chen Mul Modeled sherds represented 49.5% of the ceramic samples from the Tases ceramic complex (1250/1300-1450 AD) (Milbrath *et al.* 2008, 105), and are thought to have emerged as a particular censer style as early as 1300 AD (Milbrath 2007, 2). This style of censer can best be described as a large pedestal-based vase with a modelled humanoid figure attached to its side. The individuals wear elaborate costumes with widely varying costume elements, and some are thought to represent gods or people dressed as deities. The figures occasionally hold items in one outstretched hand (or both hands), which have been interpreted as balls of maize dough, beehives, lumps of incense, and other unidentified objects (see e.g., Smith 1971, Fig. 32). Of the 65 censers from Mayapan reported by Smith (1971), no two were identical (see also Sidrys 1983, 245). The censers were well-preserved in the relatively dry environment of Mayapan, and their polychrome painted stucco surfaces often survived.

Effigy censers that resemble the Mayapan examples occur at sites across the Yucatan peninsula and beyond, and have often been given the *type name* Chen Mul Modeled, despite stylistic differences. Aimers (2009) (see also Milbrath *et al.* 2008) has suggested, however, that censers at other sites that display variations not characteristic of the Mayapan examples should be placed in the Chen Mul Modeled *system*, a more general type-variety category than *type*, but that they should also be given their own type name, as has been done with Kol Modeled censers from Santa Rita (Chase 1984), Patojo Modeled and Idolos Modeled at Macanche (Rice 1987), and Maculis Modeled: Human Effigy Variety at Altar de Sacrificios (Adams 1971).

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Figure 1. Chen Mul system censers and censer fragments; a) censer from Mayapan (www.famsi.org); b) reconstructed censer from Lamanai; c) censer fragments and feet recovered from structure P8-35 at Lamanai.

Origin, regional variation and archaeological contexts

Effigy censers have a long history in the Maya area (Rice 1999), but the origin of the Chen Mul style is unclear. Proposals include: 1) the east coast of Yucatan (Smith 1971, 205, 256); 2) the Peten region of Guatemala (Smith 1971, 205); 3) the Gulf Coast of Tabasco and Campeche (Masson 2003, 197); 4) sites such as Cacaxtla and Cholula which were associated with the hybrid Mixteca-Puebla tradition; 5) Mayapan itself in Hoal Modeled of the pre-Tases Hocaba Phase (1100-1250/1300 AD) (Smith 1971, 135-6); 6) the widely traded Tohil Plumbate effigy forms produced on the Pacific coast of present-day Mexico and Guatemala (Milbrath and Peraza Lope 2003b, 7); and even 7) Lamanai itself (Pendergast 1981, 53). At Mayapan, this particular style of censer is closely associated with the Cocom, an Itza Maya group who claimed descent from the god Kukulkan and built architecture reminiscent of the earlier Itza centre of Chichen Itza (see Masson 2000, 261; Milbrath and Peraza Lope, 2003b, 40-1).

The Chen Mul style censers that occur at sites in the Maya lowlands show substantial stylistic variability (Milbrath *et al.* 2008; Milbrath and Peraza Lope 2013). There are differences in iconography (for example, costume elements which refer to Central Mexican deities are more common on censers from Mayapan than at other sites), style (e.g., presence or absence of nails when representing toes and fingers; differences in sandal styles), as well as the size of censers and the overall quality of execution. The style and iconography of individual censers could be considered a form of *costumbre*, or 'custom', a term which is sometimes used to refer to the well-documented regional stylistic variation among living Maya groups in terms of their clothing and adornments. Investigation of this issue, however, is complicated by the fact that even at individual sites, the style and iconography of the censers often vary.

The contexts within which Chen Mul style censers occur are also varied (Milbrath *et al.* 2008, 106; Milbrath and Peraza Lope, 2013), but, to our knowledge, the contexts of full or partial censers are always ritual in nature. Censers or censer fragments are found in burials, middens and caches associated with ceremonial structures, and with altars. In domestic contexts, they occur in burials. Isolated fragments are, however, found in domestic middens. This may suggest that fragments were retained by participants involved in rituals and ceremonies in which the censers were used and broken.

Manufacture

Little has been written about the manufacture of Chen Mul style censers. However, the humanoid figures appear to comprise a combination of hand-modelled (e.g., hands) and mould-made (e.g., face) components. Once fired, the censers were often stuccoed and painted. While there are numerous ethnohistoric accounts of the confiscation of effigy censers by colonial authorities, as well as their widespread use in rituals (see Chuchiak 2009 and Tozzer 1941), descriptions relating to their manufacture are very rare. Particularly noteworthy is an account written in 1588 by Captain Martin Ruiz de Arze, who, with the commission of the Bishop and governor, had confiscated and destroyed a great quantity of effigy censers. Ruiz de Arze wrote: "The idols were broken by Your Lordships fiscal and their dust and ashes were thrown into to a near-by cenote so that the Indians could not make new ones out of their dust and leaven like they used to do in the past . . . " (1588, as cited and translated in Chuchiak 2009, 146). In this passage, "dust and leaven" undoubtedly refers to crushed pottery, or grog. The account, therefore, is describing the practice of tempering new censers with grog deriving from censers used in previous rituals.

The widespread geographic distribution of effigy censers as documented in both the ethnohistoric and the archae-

ological record suggests that they were likely produced at multiple locations. The only compositional study conducted to date (Bishop *et al.* 2006) indicates that censers from Champoton are chemically similar to clays from the Rio Candelaria region, and consequently that they were manufactured locally.

Use

Incense was burned in the containers to which the effigy figures were attached, and supernatural symbols and icons were incorporated into the iconography of the figures, an aspect which reflects the vessels' ritual association. Their close association with ritual practices is also indicated by the contexts in which they tend to occur. Milbrath (see Milbrath and Peraza Lope, 2003b; Milbrath, 2007, 3; Milbrath *et al.* 2008) and Thompson (1957, 601) have used the term 'idol' to describe Chen Mul style censers, but 'idol' was a term introduced by the Spaniards to discredit Maya representations as false spirits and gods and hence demonic (Graham 2011, 263-284). Therefore, employing such a term is highly problematic. Did the images represent local or regional deities, or ancestors, or spirits? This is certainly possible, and there is compelling evidence at some sites (e.g, a nearly intact Monkey Scribe effigy from Mayapan [Milbrath and Peraza Lope 2003a]) that Chen Mul style censers were the focus of calendrical ceremonies related to the new year or *katun* endings (see also Chase 1982; Chase and Chase 1988).

Pilgrimage (i.e., intentional visits to sacred places) has also been evoked to explain the widespread distribution of deposits of smashed censers on ruined buildings, and such journeys may have also fostered or facilitated trade and economic interaction (see discussion in Milbrath *et al.* 2008, 108-9). In fact, Freidel and Sabloff (1984, 185) suggest that 'traders' might be more rightly thought of as a particular group of 'pilgrims', since they travelled between villages and cities under divine sanction and with the express purpose of participating in festivals, visiting shrines and performing appropriate rituals, perhaps involving effigy censers, during their stay in different communities. It has also been suggested that, in some cases, the censers may have been smashed in one place and some of their fragments carried to and deposited at other locations, perhaps as part of a processional ritual programme (Milbrath 2007; Smith 1971, 111-2; Chase and Chase 1988). Certainly at Lamanai, we could reconstruct so few complete censers that it seems likely that some fragments were removed from the site where they were smashed.

2. Effigy censer deposits at Lamanai

Lamanai, ca. 3.5 km^2, is a medium-sized Maya city centre situated on the New River Lagoon in northern Belize (Fig. 2). The site is perhaps best known for its lengthy and continuous history of occupation, which extends from the Middle Preclassic through to the Spanish Colonial period (roughly 600 BC - 1700 AD) (Pendergast 1981; 1985; 1986; 1990; Loten 1985; Graham 1987; 2004; 2006). It is also one of the few Maya settlements for which the ancient name is recorded, appearing on early maps and in early Spanish documents regarding the mission community that was established there in the 16th century (Graham *et al.* 1989; Pendergast 1981; 1988; Pendergast *et al.* 1993).

During the time period when Chen Mul style censers were being produced (as early as 1350 AD to as late as 1700 AD), Lamanai appears to have been a thriving centre oriented toward the lagoon and presumably riverine traffic and trade. The Late Postclassic (1350 - 1544 AD) ceremonial building or temple that was razed in the construction of the first Spanish church was situated on a rise overlooking the lagoon, as were buildings associated with it that were also destroyed. Residences in the area of the church settlement zone show continuity of occupation from earlier times, and it is clear that the community extended well beyond this specific sector of the settlement, as indicated by the scattered evidence of Late Postclassic and Spanish Colonial occupation in other areas of the site (Graham 2011; Pendergast 1981, 42; 1986, 226).

As with most other Maya sites that were occupied during the Late Postclassic period, a conspicuous characteristic of the material record at Lamanai is the occurrence of deposits that can best be described as 'surface scatters', consisting almost entirely of fragments of Chen Mul style censers. The extent of these deposits, which are generally unstratified, ranges from a handful to hundreds of fragments, most often of multiple vessels that cannot be reconstructed owing to the absence of often substantial portions of the vessel. At Lamanai, fragments of effigy censers have been recovered from a range of archaeological contexts, and include individual fragments deposited in refuse heaps and burials; small, isolated surface scatters associated with residential structures and altars; and large surface scatters associated with renewed activity in the vicinity of previously abandoned ceremonial structures (Pendergast 1982; 1984).

3. Research questions and methodology

A central objective of our study of the Chen Mul style censer assemblage from Lamanai was to investigate the extent, nature, and meaning, in behavioural terms, of the stylistic and compositional variation and their inter-relationship. Our approach combines stylistic analysis using the type-variety method with a petrological analysis of compositional variation. In addition to characterising the range of observed variation with regard to these two indices of similarity and difference, the study sought to answer the following questions:

1. Where were the censers manufactured, and were the majority made locally, as Bishop *et al.* (2006) have shown for effigy censers at Champonton?
2. Are the Lamanai censers grog tempered, as Captain Ruiz de Arze's (1588) account suggests?
3. Do stylistic similarities and differences relate to provenance, thereby reflecting regional or local preferences and tastes?
4. What new insight can be gained into effigy censer deposits through the use of multiple techniques of analysis to investigate different aspects of ceramic variation?

Stylistic analysis

Type-variety is the most common method of pottery classification in the Maya area (see Smith *et al.* 1960). The type-variety method organises ceramics hierarchically into wares, groups, types, and varieties based on combinations of attributes of surface treatment (e.g., slipped or unslipped, modelled, etc.) and paste at the macroscopic

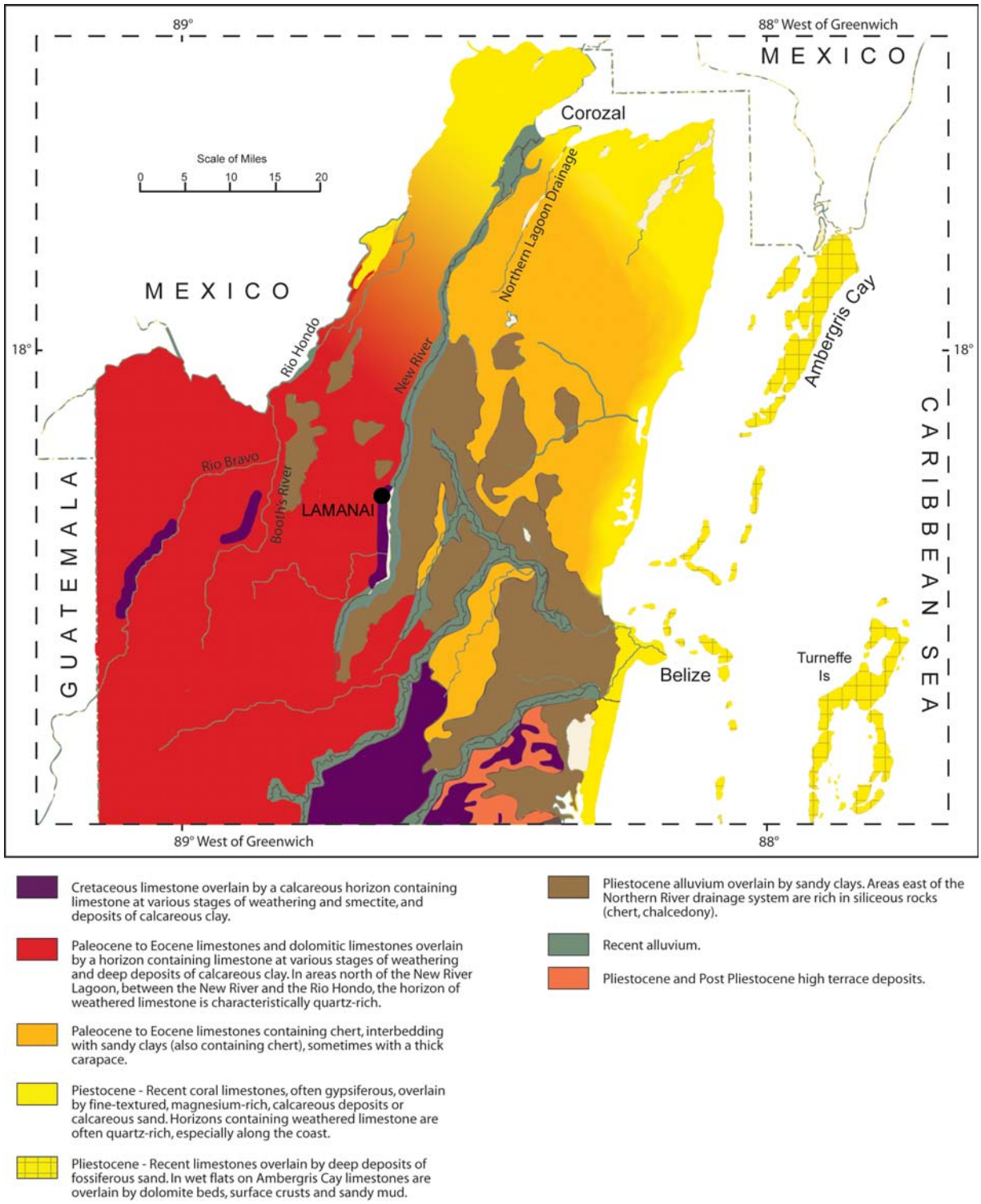


Figure 2. Geological map of northern Belize, following Howie (2006, 136-61; 2012, 69-85), showing the location of Lamanai.

level (e.g., carbonate tempered). Information on shape is sometimes subsumed within type descriptions (e.g., types include jar and bowl forms) or treated in a separate modal classification (e.g., incurving bowls are found in types X, Y, and Z). The system works well to organise the great variation of Maya ceramics into named taxa which facilitate communication among analysts. It follows that inter-analyst inconsistency in the criteria used to designate wares, groups, types, and varieties is critical. 'Chen Mul Modeled' has served analysts well as a designation of a particular range of Late Postclassic effigy censers that share certain stylistic features, as described above, but the

designation also masks substantial variation, and this has hindered our ability to address questions related to their production and distribution. *Systems* assignments, as suggested by Aimers (2009), recognise ambiguity in new samples while detailed analysis progresses. The analysis presented here also attempts to address the problem of the great variation in ceramics that have been called Chen Mul Modeled (type), through the integration of compositional and stylistic evidence of similarity and difference.

Petrological analysis

The censer assemblage at Lamanai comprises 1637 fragments and three partial censers (Fig. 1). To assess stylistic variation, the fragments were separated into groups according to the vessel part of the anatomical part of the effigy. The result was that one pair of feet and 42 individual (unpaired) feet displayed a distinctive, and thus unique, constellation of morphological, decorative and macroscopic paste/fabric attributes. Since the feet constituted the only fragment type for which it was possible to distinguish different vessels with an acceptable level of certainty, these were the fragments that were selected to investigate compositional variability at the microscopic level, within the censer assemblage. Samples were taken from 43 feet, including all individual feet and one foot from the pair that was identified. Thin sections were prepared from these samples according to standard procedures, and were analysed under a polarising microscope at various magnifications to examine similarities and differences in textural, mineralogical, and a range of other geological and compositional characteristics, and to discriminate vessel bodies made using different sets of raw material ingredients.

Although thin section petrography is well-established as an effective means of investigating compositional variation among ceramic vessels and of differentiating and characterising them according to the geological characteristics of the raw materials used in their production (e.g., Shepard 1956; Peacock 1970; Bishop *et al.* 1982; Freestone 1991; Whitbread 1995), its application in Maya ceramic studies has been comparatively rare. Only a handful of published ceramic studies have incorporated this method of analysis as an independent means of examining the nature and meaning of ceramic variation (e.g., Shepard 1948; Jones 1986; Iceland and Goldberg 1999; Bartlett and McAnany 2000; Bartlett *et al.* 2000; Howie 2006; 2012). The more common application of this method has been to provide supplementary information regarding the general mineralogy or temper found in specific stylistic types that have already been defined according to type-variety criteria or through chemical compositional analysis (particularly NAA) (e.g., Rands and Bishop 1980; Rice 1987; Kepecs 1998; Bishop 1994; 2003).

The current paucity of problem-oriented petrographic studies of compositional variability is at least partly due to the on-going misconception that the geological homogeneity of much of the lowland area, being underlain by limestone, precludes the differentiation of fabrics/pastes based on their microscopic compositional characteristics, particularly as concerns their mineralogy (e.g., Bishop 1991). However, recent studies (e.g., Bartlett *et al.* 2000; Howie 2006; 2012) have demonstrated for northern Belize that considerable observable compositional variation does exist among the soils and rock formations that characterise particular regions or localities, even between clays separated vertically by as little as one metre (see Howie 2006, 136-61). Once this geological variation is delineated and understood, it can provide a basis for differentiating fabrics/pastes that share the same general mineralogy.

Our on-going research on microscopic compositional variation in the pottery assemblage from Lamanai has sought to overcome the inherent limitations of the 'mineralogy-centred' approach that has dominated petrographic studies of Maya pottery in two fundamental ways. First, our study of local patterns of ceramic production and consumption has incorporated a detailed systematic study of raw material resources available for pottery manufacture in the area surrounding the site. Secondly, we have employed the system of petrographic analysis and description developed by Whitbread (1989; 1995; 1996) specifically for ceramic thin sections, which takes into consideration a broad range of features and characteristics of ceramic fabrics. An important advantage of this approach is that it permits investigation of not only geological but technological characteristics, such as the treatment of raw materials, paste recipes, forming techniques, and firing methods (Whitbread 1989; 1995; 1996; Freestone 1991; Tomkins *et al.* 2004). Such information tells us not only about production methods, but also variation in technical practices, providing an additional basis for differentiating ceramic fabrics on technological grounds. Another advantage is that it permits examination of the association of minerals (e.g., whether they are associated with the clay component of a fabric or an added constituent, such as crushed rock temper) and, as a visual technique, textural criteria, enabling fabrics to be subdivided or discriminated even when they are mineralogically similar.

The comparative geological baseline developed for Lamanai, which includes over 40 clays from different geological and environmental contexts and over 20 mineral, rock, and sand samples, has enabled: 1) discrimination of pottery manufactured using local raw materials from pottery produced elsewhere; 2) discrimination of local pottery produced using different sets of raw material ingredients; and 3) the identification and characterisation of local traditions of pottery manufacture, particularly as concerns their first appearance within the ceramic sequence and their developmental history, which in some cases spans several, temporally specific, stylistic complexes. Our definition of what we identify as 'local' pottery includes pottery with fabrics that are consistent with and can be linked geologically to raw material resources that occur in the local area, based on multiple shared compositional features and characteristics. Our conceptualisation of 'local', therefore, reflects a demonstrable geological connection to raw material resources that occur within a defined geographic area surrounding the site, which in this case is within 3 km of the site's epicentre. We acknowledge that this geographic definition of 'local' does not consider ancient potters' own perceptions of their social connection to the community at Lamanai, whether they lived in the near vicinity or not. Nor does it consider the relationship, real or perceived, of the person or people who left the pottery behind at Lamanai, or whether the Late Postclassic Maya cared about differences in origin of manufacture. It does, however, allow us to study the movement of pottery vessels across the landscape, from the area in which

they were manufactured to their final resting place in different contexts at Lamanai, which is the central objective of this study.

4. Modal variation

As noted above in reference to shape, modal classification in the Maya area is typically an aspect of type-variety classification. Whereas wares, groups, types, and varieties are typically based on combinations of attributes, modes usually refer to single attributes of form (e.g., outflaring lip), surface treatment (e.g., slip colour, incision), or macroscopic attributes of paste (e.g., presence of calcite inclusions). In the sample of effigy censer fragments discussed here, we examined the following modes: 1) presence/absence of paint; 2) presence/absence of footwear; 3) sandal style; 4) presence/absence of an ankle adornment; 5) style of the ankle adornment; and 6) presence/absence of toe nails.

This comparative study of the stylistic characteristics of the foot fragments revealed that there were no easily discernible modal patterns in our sample. Chen Mul Modeled censers at Mayapan are typically stuccoed and painted. While we do have a few sherds with remnants of stucco and paint at Lamanai, the vast majority have no traces of either. Given the wet environment of Lamanai and the fact that the fragments derive from exposed surface scatters, this may be due to poor preservation. Feet typically showed evidence of sandals, which varied in style. Ankle adornments, when present, also varied, as did toenails (presence, absence, style of execution) (Fig. 1). Comparison of the patterning of these attributes within and among the different archaeological contexts examined revealed no appreciable differences among the foot fragments comprising different deposits.

5. Compositional variation

Geological context

The geology of northern Belize, extending into adjacent inland and coastal areas of the Yucatan Peninsula, is characterised by a series of limestone formations and associated deposits that decrease in age from the Cretaceous formations of dense marine limestone that occur immediately to the north of the Maya Mountains and at a few specific locations in the central part of the region, to the Pleistocene-Holocene formations of the northeast coast and off-shore cayes (Fig. 2). Apart from the specific localities where these Cretaceous Formations occur, the central part of the northern region is underlain by Early Tertiary (Palaeocene to Eocene) limestones of the Cayo and Dubloon Bank Groups (Flores 1952; Wright *et al.* 1959; King *et al.* 1992). The older Cayo group contains limestone and dolomite, and this is the common rock type found in areas west of the New River drainage system. The bedrock in these areas, whether Cretaceous or Tertiary in age, is overlain by a horizon containing limestone at various stages of weathering, and often by deep deposits of calcareous clays (King *et al.* 1992, 222). The Dubloon Bank group, which contains limestone with chert, is more typical of the areas adjacent to the coast in the eastern part of the region. The overlying sandy clays characteristically contain a substantial amount of chert (King *et al.* 1992, 28, 244-7). The younger Pleistocene-Recent limestones and dolomitic limestones that are found around the northern coast and on Ambergris Caye are dense coral limestones (Flores 1952; King *et al.* 1992, 29). In the vicinity of Chetumal Bay, these limestones are often gypsiferous and weathered (King *et al.* 1992, 213). The mainland limestones are overlain by shallow fine-textured calcareous deposits that are characterised by high levels of sodium and magnesium (King *et al.* 1992, 188), or calcareous sands, which mainly consist of cryptocrystalline grains composed dominantly of micrite (Pusey 1975; Reid *et al.* 1992). The Pleistocene limestones of the offshore cayes are overlain by deep deposits of fossiliferous sand in most cases.

Associated with the mainland limestone formations are unconsolidated calcareous deposits, commonly referred to as *sascab*, which were formed through *in situ* weathering of limestone (Darch 1981; Darch and Furley 1983). The compositional characteristics of the deposits that occur in different geographic areas reflect those of the underlying limestone.

Scattered throughout the northern landscape are alluvial deposits comprising siliceous sand that consists mainly of quartz. In most cases, these deposits appear to constitute reworked and redeposited old alluvium that was transported during the late Pliocene to mid-Pleistocene (Wright *et al.* 1959; King *et al.* 1992). The parent material is thought to originate in the quartz-rich crystalline or metasedimentary rocks of the Maya Mountains. Chert and chalcedony are more prevalent in the deposits situated east of the New River drainage and derive from the chert-rich underlying limestone that occurs in this area.

The ages, characteristics, and approximate geographic distribution of the deposits and formations that occur in northern Belize are summarised in Figure 2, which serves to highlight the regional differences in mineralogical composition and character. Such variability provides a basis for differentiating fabric types according to their raw material ingredients, and enables the linking of fabric types to particular geological zones.

The archaeological specimens

Petrographic analysis revealed a high level of compositional variability among the 43 censer feet, with 21 fabric types differentiated on the basis of their distinctive compositional, textural, and mineralogical characteristics and features. Half of the fabric types (N = 11) are represented by a single foot. Despite the inherent variation in fabrics, six general temper types were distinguished: 1) grog (crushed pottery); 2) coarsely crystalline calcite; 3) limestone geologically consistent with formations that occur in the immediate vicinity of Lamanai; 4) limestone geologically consistent with formations that occur in inland areas of the western part of northern Belize; 5) fossiliferous limestone deriving from formations that occur along the Caribbean coast; and 6) *sascab* geologically consistent with deposits of weathering limestone that occur in northeastern northern Belize and in association with fossiliferous limestone. The interpretation of these inclusion components as representing constituents intentionally added to a base clay by the potter was based on the following criteria: 1) the bimodal size distribution of inclusions with one or specific inclusion type(s) predominating in the upper mode and rare to absent in the lower mode; 2) the

roundness of these inclusions (predominantly subangular to very angular); 3) the occurrence of carbonate aggregates and mosaics along with their terminal grades and spar fragments (all angular), often with an uneven distribution of terminal grades in the groundmass; and 4) the occurrence of non-naturally occurring aplastic inclusions - e.g., pottery fragments (see Whitbread's [1986] criteria for identifying grog). With the exception of the fabrics containing local limestone temper, which correspond to a known local fabric type previously documented for Lamanai (Table 1; Howie 2006; 2012), all of the temper types identified were found to occur in at least two to several compositionally distinct fabric types (Table 2). Distinctions among fabric types containing the same kind of tempering material relate to differences in the geological and textural characteristics of the clay component, including the composition and nature of naturally-occurring aplastic inclusions and amorphous and textural concentration features, and clay matrix properties. In many cases, fundamental mineralogical differences among fabrics types containing the same tempering material indicate different and, quite likely, geographically separated clay sources, and, thus, different production localities. Comparison of the fabric types that occur in the different censer deposits revealed no appreciable differences among deposits.

Local fabric types

Of the 21 fabric types that were distinguished based on their compositional characteristics and features, three are geologically consistent with raw material resources available in the immediate vicinity of Lamanai, which suggests that the associated censers were produced by potters working within the settlement or in the surrounding area. The characteristics of these local fabric types, which are characterised by the presence of either grog, crystalline calcite, or local limestone temper, as well as a range of other distinguishing attributes, are summarised in Table 1. Since these fabric types correspond to local fabric groups identified and described by Howie (2006; 2012) in her study of the Terminal Classic to Early Postclassic pottery assemblage at Lamanai (geological connections to specific raw material resources are discussed in detail in that study), a local provenance for these fabric types is proposed. In fact, in many cases, the fabrics observed in the censer feet are virtually indistinguishable from examples deriving from a range of ceramic forms, including table wares and utilitarian vessels, that date to earlier time periods. Accordingly, other research has shown that the production of effigy censers at Lamanai is connected with three different traditions of pottery manufacture, as reflected in the long-term use of particular and distinctive sets of raw material ingredients. In the case of the crystalline calcite and limestone tempered fabric types, their occurrence in pottery spanning the Preclassic to Spanish Colonial period (at least 300 BC - 1641 AD) documents the persistence of these paste recipes for more than a thousand years. Although not as long-lived, the grog tempered fabric type reflects an approach that first emerged during the Terminal Classic period (773-962 AD), roughly 400 years before the production of Chen Mul style censers began. Another interesting characteristic is that censer production occurred within manufacturing traditions in which both serving wares (e.g., grog tempered tradition) and utilitarian vessels such as storage jars (e.g., crystalline calcite tempered tradition) were produced.

Local fabric types were found to occur in 11 feet, or 25% of the sample set. The majority of the feet exhibit either limestone tempered or grog tempered fabrics (Table 1). The comparatively small quantity of locally made vessels represented in the censer assemblage is unusual for Lamanai. Within most other depositional contexts at the site, including burials and middens dating to the Late Postclassic to Spanish Colonial period, locally manufactured ceramics dominate the assemblage and represent between 85 and 90 per cent of the vessels analysed (Howie 2006; 2012; Wiewall and Howie 2010). The comparatively low frequency of locally made vessels in deposits consisting exclusively of fragmented effigy censers, therefore, points to a significant difference in the provenance patterns associated with the censer deposits and other types of pottery deposits at the site.

Non-local fabric types

Several fabric types can be linked geologically to raw material resources (clayey soils and rock formations) that occur in other geographic areas, most often at some distance from Lamanai. These non-local fabrics are also geologically incompatible with rock and clay resources that occur in the immediate vicinity of the site, most often with respect to several compositional attributes. The distinguishing characteristics of the non-local fabric types are presented in Table 2, along with their suggested provenance associations and the geological criteria upon which these judgments were based. As can be observed, the non-local censer feet derive exclusively from manufacturing areas situated within northern Belize and the Yucatan Peninsula of Mexico. Geological linkages to production localities situated within both coastal and inland areas are indicated, and inland areas include: 1) the interior region of northern Belize bordering and west of the New River drainage system underlain by Eocene limestone; 2) areas adjacent to the Caribbean coast to the east of Lamanai where formations and deposits are characterised by a prevalence of chert and chalcedony; 3) areas adjacent to the coast in north-eastern northern Belize, underlain by dolomite and dolomitic limestone; and, possibly, 4) interior regions of Yucatan. The provenance of fabric types tentatively linked to interior regions of Yucatan remains to be confirmed through comparison with clay samples from this area. Our attribution to this particular area is based on geological similarities to fabrics that occur in distinctive stylistic types of earlier time periods (e.g., slate ware), which are known to have been manufactured in this geographic area.

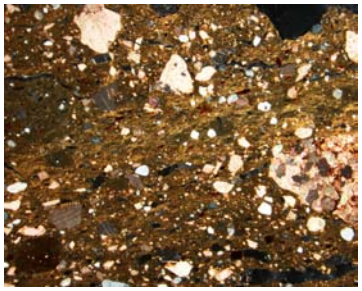
Several of the non-local fabric types are linked geologically to coastal areas of north-eastern northern Belize and the southern portion of Yucatan. This is suggested by the presence either of fragments of fossiliferous limestone, which occurs exclusively along the coast; carbonate sand, as indicated by a prevalence of rounded to well-rounded inclusions of microcrystalline calcite and calcite spar; or both. Coastal fabrics comprise nearly half of the sample set, occurring in 19 of the 43 feet that were analysed; seven different fabric types were identified. Since each of these is petrographically distinctive, we suggest that they represent different and, quite possibly, geographically separated

Table 1. Petrographic, technological and provenance characteristics of local fabric types previously identified at Lamanai. Connections to specific Soil Suites and Soil Sub-Suites, are based on descriptions in King et al. (1992). Abbreviations used refer to: abundance - R = rare; VR = very rare; calcite modifiers (following Folk, 1974) - cc = coarsely-crystalline; fc = finely-crystalline; mc = mycrocrystalline: inclusions - pqtz = polycrystalline quartz; frags = fragments

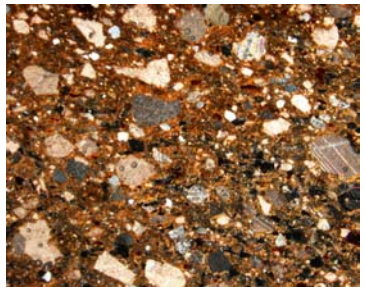
Fabric Group	Inclusions (in order of abundance)	Distinguishing Features	Paste Technology	Associated Provenance
Coarsely Crystalline Calcite Tempered (Calcite A in Howie 2006; 2012)	calcite, quartz, cc-fc calcite mosaics R-VR = - micrite, pqtz, chalcedony, chert	- angular, rhombic to irregular-shaped fragments of calcite - rare to very rare micrite and calcite mosaics	a calcareous clay, containing few siliceous inclusions tempered with colourless, coarsely crystalline calcite	similarities to clays that form directly below the ground's surface at Lamanai
Limestone Tempered (Calcite C in Howie 2006; 2012)	calcite, fc-cc calcite mosaics, qtz, micrite VR = pqtz, chal, chert	-bimodal (calcite predominates lower mode) - grainy appearance (discrete calcite grains dominate the matrix) - common mosaics of finely to coarsely crystalline calcite Very few to rare micrite lumps	a calcareous clay containing discrete calcite grains, and lesser quantities of other minerals, tempered with and finely to coarsely crystalline calcite	similarities to clays at the site that are associated with weathering limestone
Grog-Tempered (Grog-Mixed Carbonate Class in Howie 2006; 2012)	micrte, quartz, cc-fc calcite mosaics, pquartz, chalcedony, chert, limestone frags. VR = feldspar, amphibole, shell	- common grog inclusions - co-occurrence of grog lumps of micrite and fragments and mosaics of crystalline calcite - comparatively fine-textured - distinctive firing horizons and commonly optically inactive to slightly active	a calcareous clay tempered with grog and varying amounts of sascab and crystalline calcite. The comparatively fine texture of the groundmass indicates a careful or more rigorous processing of raw materials.	connections to Yalbac clays, both those that form directly below the ground's surface and those associated with horizons of weathering limestone, as well as Filipe Subsuite clayey soils associated with wash deposits of Pleistocene alluvium situated on the north side of the site

Table 2. Non-local fabric types (x25), their distinguishing characteristics and their provenance associations (Prov) organized by class, as differentiated based on tempering materials. Field of view: 3mm.

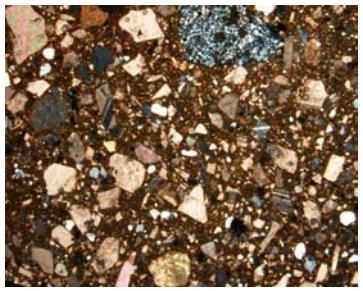
Crystalline Calcite Tempered Fabrics (N = 4)



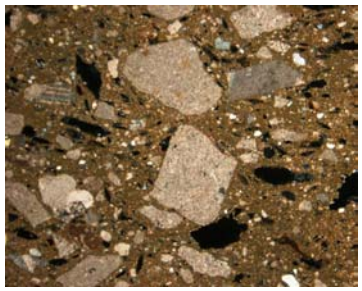
medium crystalline calcite temper
Prov: Inland Yucatan?



medium crystalline calcite temper
Prov: Inland Yucatan?



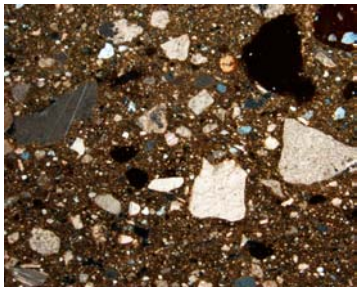
coarsely crystalline calcite temper, clay containing few chert, chalcedony
Prov: NE northern Belize



finely crystalline calcite temper; highly calcareous clay containing few rounded quartz inclusions
Prov: NW northern Belize

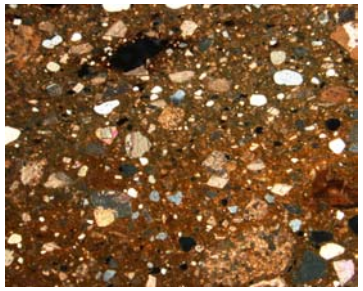
Inland Limestone Tempered Fabrics (N = 2): The limestone fragments predominant in the coarse fraction are geologically consistent with Paleocene to Ecocene formations that occur in inland areas of northern Belize west of the Northern River drainage system. Mineralogical and other compositional characteristics of the fine fractions (clay component) of these fabrics indicate links to different sources within these specific region.

Sascab Tempered Fabrics (N = 7): Provenance associations are based primarily on the compositional characteristics of the sascab temper, which indicate links to the specific areas indicated.

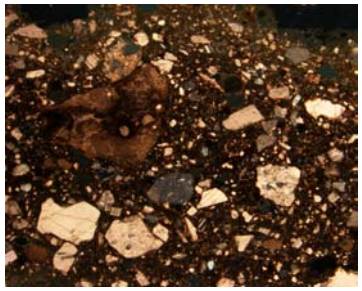


limestone (cemented by sparite) temper; clay containing predominant fine crystalline calcite inclusions and common FeMn nodules
Prov: NW northern Belize

limestone (micrite matrix) temper; highly calcareous clay containing common rounded quartz includions
Prov: NW northern Belize



fossiliferous sascab containing dolomite inclusions and mosaics; clay containing common rounded quartz and carbonate inclusions
Prov: coastal areas of NE

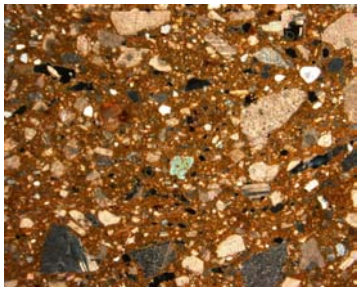
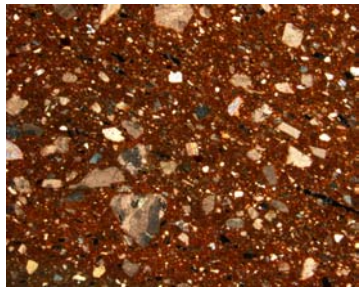
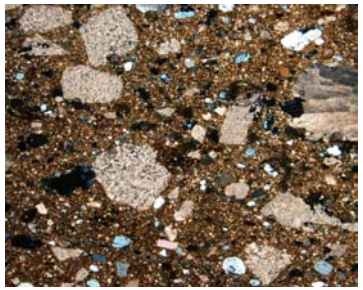
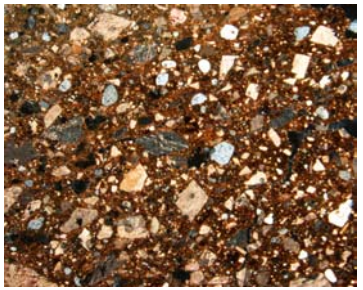


micritic sascab containing crystalline calcite grains; calcareous clay containing rare quartz inclusions
Prov: inland areas of NW northern Belize (west of New River drainage)

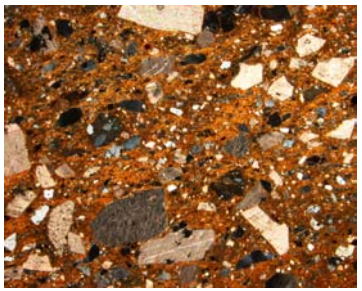
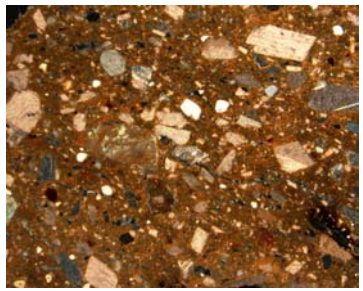
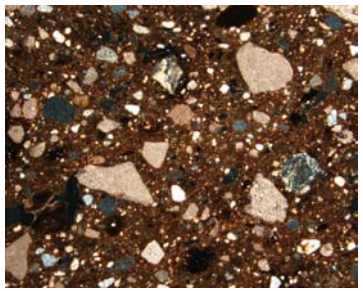
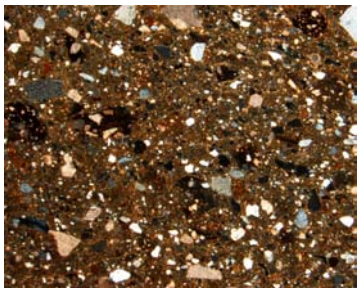
(*Continued*)

Table 2. (*continued*)

Fossiliferous Limestone Tempered Fabrics (N = 13): Bioclasts and fiberous calcite indicate a limestone formed through reef-building processes, linking the coarse fraction (temper) of these fabrics to Pleistocene to Recent formations that occur exclusively along the Caribbean coast of northern Belize and extending northward. Mineralogical and other compositional differences in the fine fraction (clay component) indicate links to more specific areas within this region.

			
clay containing carbonate sand and very rare rounded anhydrite. Prov: coastal areas of NE northern Belize and Yucatan?	clay containing predominant angular quartz and common fine iron nodules. Prov: inland areas adjacent to coast in northern Yucatan?	highly calcareous clay containing predominant fine calcite grains and rounded quartz inclusions Prov: coastal area different from other fabrics in this class	Unimodal size distribution of inclusions, high inclusion content, dominant angular crystalline calcite including fragments and mosaics(possibly added), rounded common quartz inclusions Prov: areas adjacent to coast

Grog Tempered Fabrics (N = 6)

			
tempered with grog (common) and coarsely crystalline calcite Prov: inland areas of NE northern Belize?	tempered with grog (rare) and fossiliferous limestone Prov: coastal areas of NE Belize and Yucatan?	rare grog temper; fossiliferous limestone fragments (possibly added); clay containing carbonate sand, chert and chalcedony Prov: coastal areas with mineralogical links to eastern northern Belize	Common grog temper; fossiliferous limestone fragments (possibly added); unimodal size distribution of inclusions; clay containing angular quartz inclusions and common iron nodules Prov: inland Yucatan?

production localities within this broad geological coastal zone. The majority of the coastal fabrics occur within two specific types. One of these types, which was found to occur in five of the feet, can be characterised as a clay containing carbonate sand that was tempered with fossiliferous limestone temper. The other type, represented by seven samples, comprises a sandy clay tempered with *sascab* which contains grains of dolomite. This fabric type also contains fragments of fossiliferous limestone. Basic mineralogical differences between these two fabric types suggest that they represent geographically separated production localities within the coastal zone.

6. Conclusion

Based on the results of the stylistic and petrographic analyses of censer feet at Lamanai, several statements can be made regarding the questions posed at the beginning of this paper.

Are Chen Mul style effigy censers grog tempered, as is implied by ethnohistoric sources? The answer is 'not always', and in fact only a minority of the censers at Lamanai are grog tempered. Considering the high level of compositional variation that exists within the censer assemblage, it is significant that grog constitutes only one of several temper types that were observed. Furthermore, less than one quarter (N = 9) of the feet were found to contain grog. Clearly paste technologies and approaches to paste-making varied to a greater extent among Postclassic Maya potters than has been previously recognised. Ethnohistoric descriptions of technical practices deriving from specific situational contexts (e.g., a specific community) must also be used with caution.

Where were the censers manufactured? The majority (ca. 75%) were manufactured elsewhere. Clay and temper constituents derived from multiple production localities in different inland and coastal areas of northern Belize and Yucatan. Comparatively few censers were manufactured by potters working at Lamanai or in the surrounding area, and the evidence suggests that potters who habitually used different sets of raw material ingredients and who also made other kinds of pottery made these vessels. These findings are significant considering that Bishop *et al.* (2006) found that the majority of Chen Mul system censers at Champoton were manufactured locally. The obvious implication is that patterns distinguished at one site cannot be assumed to apply to other sites where censer deposits occur. Differences in the activities associated with censer deposition are a critical factor and represent an important avenue of inquiry which needs to be followed in future research.

What is the relationship between style and provenance? The assemblage is characterised by a high level of stylistic and compositional variation, with no significant differences between the deposits of censers that were analysed. In addition, stylistic differences cross-cut compositional differences, so that there are no direct relationships between stylistic characteristics and fabric types. This evidence suggests that stylistic variation in the censer assemblage does not relate to the preferences or conventions of potters working within different manufacturing traditions or at different production localities. The lack of correlation between style and composition could be interpreted as reflecting a pan-regional sharing of certain cultural conventions with regard to the rendering of figures and their iconography (which could symbolise group identity or represent historical, ancestral, or supernatural figures), but with local variation in both production and aspects of execution.

Our study has introduced new information on the Chen Mul system of censers based on their occurrences at Lamanai. One result is the emergence of a question which we cannot answer based on the data at hand: Does the presence of Chen Mul system censers at Lamanai reflect the movement of pots, with some censers made in the vicinity but many others imported? Or does the presence of Chen Mul censers at Lamanai reflect the movement across the landscape of pilgrims who brought their censers with them? To discover whether the Lamanai contexts reflect either pilgrimage or the widespread circulation of censers through trade, market systems, or some mechanism of exchange awaits a better understanding of the scale and frequency of the ritual acts that led to the accumulation of large deposits of censer fragments. We also need to know how the patterns at Lamanai compare with the patterns distinguished at other sites.

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