17 IDENTIFYING LOCAL AND NON-LOCAL POTTERY IN THREE TOMBS AT UXBENKÁ, TOLEDO DISTRICT: RESULTS OF THIN SECTION ANALYSIS

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Southern Belize has received less archaeological attention than other areas due in large part to its remote location. However, the difficulty in accessing the area in recent times does not necessarily equate to isolation for the Classic Period Maya who lived in what is now the Toledo District. This paper discusses petrographic data collected on ceramic vessels recovered from burial contexts at Uxbenká, Belize. The partial and reconstructed whole vessels from these primary contexts include locally produced vessels that are stylistically and technologically unique to the southern Belize region and vessels produced elsewhere. We use these data to evaluate how local Uxbenká potters produced ceramic vessels for local consumption and to identify long-distance interaction networks between Uxbenká and other regions of the Maya Lowlands. Our data indicate that most of the pottery at Uxbenká was produced locally. However, elite tombs often include both local and non-local vessels. The elites of Uxbenká engaged in interaction with people living much farther afield in regions like the Belize River Valley and possibly Guatemala.

Introduction

Pottery production involves a series of choices from what clay to use, to how to process it, and what the final product should look like. Ceramic vessels are composed of clay and sometimes, but not always, temper, which is an added material used to modify the properties of natural clay. In Belize, temper is most often sand or some kind of crushed rock. This clay and rock mixture is shaped, fired, and sometimes slipped and painted to create different kinds of ceramic vessels that can be used to answer a variety of research questions including when it was made, where and how it was made, and what it was used for. The composition of the rock and mineral inclusions, either as temper or as part of the natural clay, provides important information on where pottery was produced. We use thin section petrography to identify the rock and mineral inclusions on eighteen vessels recovered from three tombs at Uxbenká (Group F, Group L, and Group I) to determine where potters procured clay and temper to (1) understand variability in pottery produced locally at Uxbenká, and (2) provide provenance information for vessels produced outside of southern Belize. Provenance designations for vessels produced at Uxbenká are based on comparisons to clay and rock samples collected near the site. Our data indicate that most of the Late Classic pottery produced at Uxbenká is remarkably similar. However, there are important differences in paste recipe indicating that potters created vessels in slightly different ways. Potters procured clay and temper in the immediate vicinity of the polity (<1 km), from the red, clay-rich sandy soils located in the southern portion of the settlement area. The sandy clay, with a wide variety of rock and mineral inclusions, was used by potters in three primary paste recipes. These recipes differ in how the clays were processed, both in terms of removing large inclusions to refine the natural clay and by adding (or not adding) temper, and where clay was procured. Vessels produced outside of southern Belize contain abundant calcium carbonate (e.g. limestone) not widely available in the region and volcanic ash. Provenance designations are tentative for the non-local vessels.

Evaluating Provenance

Natural resources suitable for pottery production (e.g. clay and temper) are widely available across the Maya lowlands and each polity could have produced ceramic vessels (Bartlett 2004; Bartlett et al. 2000; Becker 1973; Bruhns 1987; Freter 1996, 2004; Fry 1979; Hammond et al. 1976; Howie 2012; Iceland and Goldberg 1999; LeCount 2010; Lopez Varela et al. 2002; MacKinnon et al. 1999; Rands and Bishop 1980; Reents-Budet et al. 2000; Straight 2010). The bedrock of the much of the Maya lowlands is composed of marine limestones of varying ages and composition (e.g. Flores 1952). The bedrock where Uxbenká is located, and in much of the Toledo District, is composed of interbedded calcareous sandstones and siltstones

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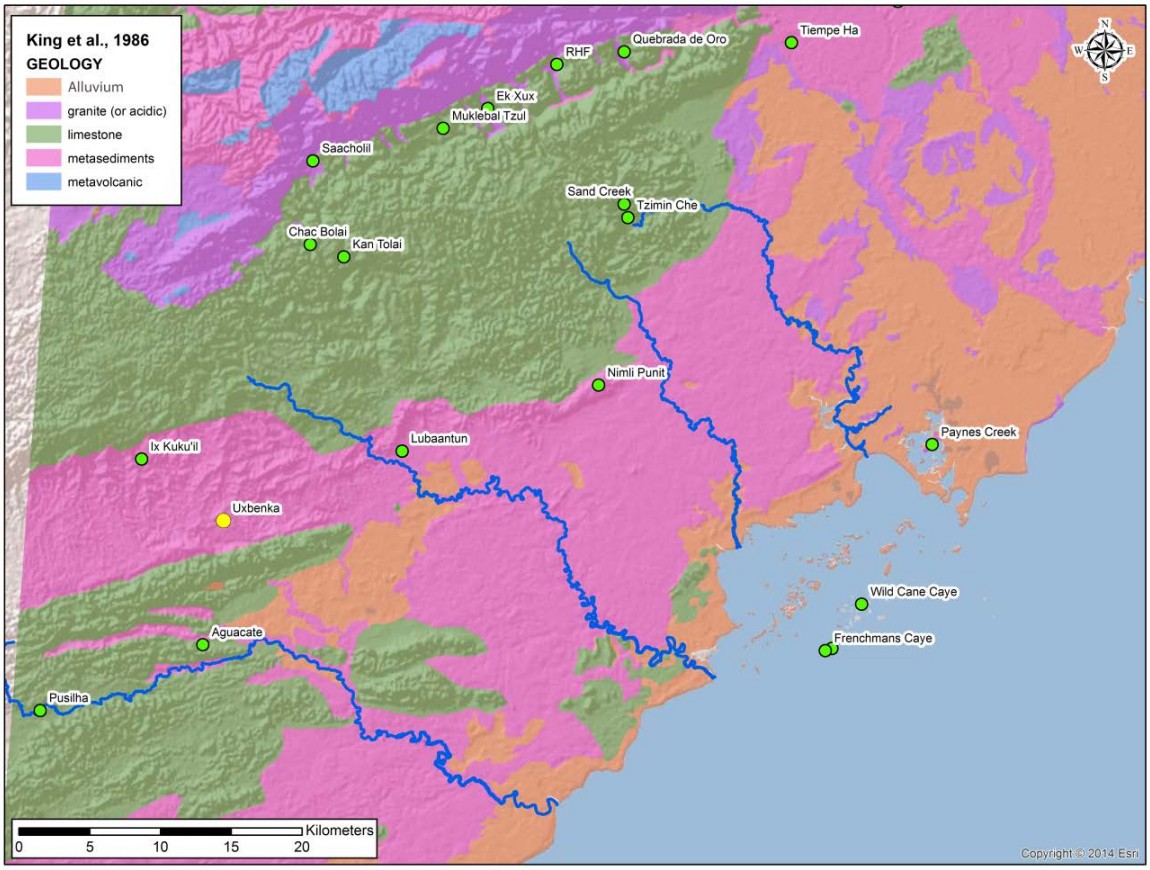

Figure 1. Major polities and Geologic Formations of the Southern Belize. Region (Map by A. E. Thompson after King et al. 1986).

(Schafhauser et al. 2003). These broad distinctions are useful in provenance studies; however, there is geologic variability in both the bedrock and clays within a given region. Most of the geologic literature for the Maya lowlands, particularly for sedimentary rocks that comprise the bedrock of most of the region, is lacking in detail so sampling is imperative. Studies in Belize that address resource acquisition by geologic testing indicate that clay sources are heterogeneous at the subregional level and that a careful consideration of the local landscape can aid in intraregional or site-specific studies of pottery production (Bartlett et al. 2000; Howie 2012; Jordan 2019; Sunahara 2003). While ethnographic data worldwide supports the assertion that potters use locally available resources (Arnold 1985), collecting and analyzing clay and temper material is the only way to understand variability and pottery production at the local level. Thin section petrography is not a commonly used analytical technique in the Maya lowlands so comparative information for provenance determinations for non-local vessels is limited (for some exceptions see Angelini 1998; Bartlett et al. 2000; Callaghan et al. 2018; Halperin et al. 2009; Howie 2012; Howie et al. 2014; Iceland and Goldberg 1999; Jones 1986; Rands and Bishop 1980; Sánchez Fortoul 2018; Sunahara 2003; Ting et al. 2015). We can determine which vessels in this study were not produced at Uxbenká but the specific provenance for most of the non-local vessels is either unknown or tentative pending further analysis.

Uxbenká

Uxbenká is located in the Toledo District of Belize near the modern Mopan Maya village of Santa Cruz (Figure 1). Southern Belize has received less archaeological attention than other regions of the Maya lowlands (Leventhal 1990,

Table 1. Descriptive Information for the Vessels Sampled for Petrography.

Sample #	Fabric Group	Ceramic Group	Vessel Form	Context	Vessel Number	Munsell Margin	Munsell Core
1	Sandstone A1	Saxche-Palmar Polychrome	Bowl	Tomb L2	Vessel 19	2.5YR-5/8	
2	Sandstone A1	Palmar Orange Polychrome	Cylindar Jar	Tomb L2	Vessel 30	2.5YR-4/8	
3	Sandstone A	Zacatal Cream Polychrome	Tripod Plate with Hollow Feet	Tomb L2	Vessel 15	2.5YR-4/8	2.5YR-4/3
4	Quartz A	Zacatal Cream Polychrome	Cylindar Jar	Tomb L2	Vessel 6	2.5YR-5/8	
5	Quartz A	Palmar Orange Polychrome	Bowl	Tomb L2	Vessel 13	2.5YR-5/8	5YR-3/2
6	Calcite B	Saxche-Palmar Polychrome	Bowl	Tomb L2	Vessel 21	5YR-5/8	5YR-2.5/1
7	Volcanic Glass A	Saxche-Palmar Polychrome	Bowl	Tomb L2	Vessel 28	5YR-6/8	
8	Quartz A	Palmar Orange Polychrome	Dish/Plate	Tomb L2	Vessel 12	2.5YR-5/8	5YR-4/1
9	Sandstone A2	Zacatal Cream Polychrome	Tripod Plate with Hollow Feet	Tomb L2	Vessel 1	2.5YR-4/8	5YR-5/2
10	Quartz A	Remate Red	Cylindar Jar	Tomb L2	Vessel 23	2.5YR-4/8	5YR-4/2
11	Quartz A	Saxche-Palmar Polychrome	Bowl	Tomb L2	Vessel 17	2.5YR-4/8	5YR-3/1
13	Quartz A	Saxche-Palmar Polychrome	Bowl	Tomb L2	Vessel 8	2.5YR-5/8	
14	Sandstone A	Zacatal Cream Polychrome	Tripod Plate with Hollow Rattle Feet	Tomb L2	Vessel 2	2.5YR-5/8	5YR-5/1
15	Sandstone B	Remate Red?	Bowl	Tomb L2	Vessel 27	2.5YR-5/8	
16	Quartz A	Remate Red	Bowl	Tomb L2	Vessel 7	2.5YR-5/8	5YR-4/2
17	Quartz A	Zacatal Cream Polychrome	Bowl	Tomb L2	Vessel 9	5YR-5/8	
21	Carbonate Sand A	Saxche-Palmar Polychrome	Bowl	Group I Tomb	Vessel 2	2.5YR-5/8	7.5 YR-2.5/1
24	Micrite A	Saxche-Palmar Polychrome	Bowl	Tomb F3	Vessel 1	5YR-7/6	

1992; Prufer et al. 2011). Uxbenká, one of the earliest occupied polities in the region, was established near the end of the Late Preclassic Period and abandoned around the beginning of the Terminal Classic Period. The Uxbenká site core consists of 9 groups of monumental architecture situated on modified hilltops. Household masonry structures are also limited to hilltops and are widely distributed across the landscape (See Prufer et al. 2017 and Thompson et al. 2018 for a more thorough discussion of the Uxbenká polity).

Geology

Uxbenká is located on the Toledo Beds (known as the Sepur Formation in Guatemala) which are composed of interbedded sandstones, siltstone, mudstones and conglomerates. The composition of the sandstone, and the clay used in pottery production, is related to the formation of the bedrock in the area. The collision of the North American Plate and the Caribbean Plate created a large foreland basin that subsequently infilled with material deriving from a wide range of source locations including the Maya

Mountains, Motagua Fault System, and older Cretaceous marine limestones (Schafhauser et al. 2003). To the south, in an area known locally as the "Rock Patch", there is a 250 m high karst composed of limestone. The clays around the site are red and sandy owing to the nature of the underlying sandstone. In general, the soils located to the north of the site are lower in clay content, are preferred for milpa farming, and were not used for pottery production by Santa Cruz potters in more recent times before the adoption of metal and plastic containers for cooking and storage. The soils located to the south, near the Rio Blanco, contain much more clay, are less productive for farming because they are slow to drain, and were preferred for pottery production (King et al. 1986).

The Pottery Sample and Methodology

The ceramic assemblage from Uxbenká is, as a whole, small, fragmentary, and poorly preserved. This is due in large part to the heavy rains in the Toledo District that erode ceramics and but also the tendency to dispose of garbage off of hilltops rather than incorporate them into building fill materials. This paper focuses on reconstructed whole and partial vessels recovered from three tombs in the Uxbenká site core. The vessels discussed in this study (n=18; Table 1) date to the Late Classic Period (CE 600-800) (Table 1). We use the ceramic group names defined by Hammond (1975) for Lubaantun (e.g. Remate Red and Turneffe Unslipped) except for the polychrome vessels. Polychrome vessels are assigned Petén terms as opposed to those used by Hammond for Lubaantun (e.g. Louisville Cream Polychrome). Sixteen of the vessels were recovered from a large tomb (Tomb L2) in Group L that likely functioned as an elite residential group (Trask et al. 2013). The sampled vessels include Palmar Orange Polychrome (n=3), Saxche-Palmar Polychrome (n=5), Zacatel Cream Polychrome (n=5), and Remate Red (n=3) serving vessels. The other two vessels in this study include a Saxche-Palmar bowl from a tomb in Group I (Reith et al. 2011) and a Saxche-Palmar bowl from a tomb in Group F (Thompson and Trask 2012).

Petrographic analysis was conducted using a Leica DM750P polarizing light microscope and follows the descriptive system developed by Whitbread (1989, 1995: 365-396; 2017) specifically for the examination and characterization of ceramic fabrics (see Howie 2012 and Jordan 2019 for applications in Belize). The descriptive system is a qualitative method that combines aspects of sedimentary petrography and soil micromorphology, in addition to rock and mineral identification. We consider resource acquisition and raw materials processing, as part of a paste recipe, because these attributes can be reliably evaluated using petrographic analysis and they provide information on how potters interacted with their landscape and how pottery production differed both at the local level and between different regions. The data presented here are part of a larger study (n=97) of ceramics recovered from both site core and household contexts. The petrographic data are summarized in this paper but see Jordan (2019) for the full fabric descriptions.

Results

Clay and Rock Samples

All of the clay samples (n=8) are sandy clays, but they exhibit considerable variability. Inclusions in all samples are rounded to sub-angular but they differ in both size and composition. The samples contain varying frequencies of the minerals and rocks including: monocrystalline quartz (zoned and undulose), polycrystalline quartz, polycrystalline quartz, chert, chalcedony, bioclastic limestone, plagioclase feldspar (often zoned), muscovite, biotite (often chloritized), igneous rock fragments, sandstone rock fragments, and zircon. The size, quantity, and habit of these inclusions differs between the samples. While some clay samples contain an abundance of a particular rock or mineral relative to other samples, there is no discernable pattern concerning their location on the landscape around Uxbenká. For example, some clays contain more mica (muscovite and biotite) than any other samples but they are located near mica-poor samples. The clay samples provide important information on local clays that aid in evaluating how these clays were processed for use in pottery production at Uxbenká. However, additional sampling is

Table 2. Summary of Ceramic Fabric Groups.

Fabric Group	Temper	Inclusions (in order of abundance)	Defining Characteristics	Provenance
Sandstone A	Calcareous sandstone	Monocrystalline quartz, muscovite, calcareous sandstone, plagioclase feldspar, calcareous mudstone, biotite, quartzite, chert, chalcedony, polycrystalline quartz, igneous rock fragments, zircon	Highly birefringent calcareous sandstone temper; various naturally ocurring rock and mineral inclusions	Local
Sandstone B	Rhombic Carbonate	Monocrystalline quartz, muscovite, rhombic carbonate, sandstone, chert, mudstone, quartzite, plagioclase feldspar, biotite, igneous rock fragments, zircon	Naturally ocurring sandstone (not birefringent); angular carbonate temper; various naturally ocurring rock and mineral inclusions; more abundant chert than in Sandstone A; golden brown micromass (XPL)	Local
Quartz A	None	Monocrystalline quartz, polycrystalline quartz, quartzite, chert, chalcedony, plagioclase feldspar, muscovite, biotite, igneous rock fragments, sandstone, zircon	No carbonate (either as temper or naturally ocurring); unimodal size distribution; generally smaller inclusions; absence of large rock and mineral inclusions	Local
Carbonate Sand A	None	Carbonate sand, calcite terminal grades, micrite, moncrystalline quartz, sparry calcite	Predominant (>80%) carbonate sand (mode size: .05mm); optically inactive matrix (high fired); unimodal size distribution	Non-Local (Coastal?)
Calcite B	Limetone	Calcite terminal grades, carbonate sand, monocrystalline quartz, dolomite, polycrystalline quartz, micrite, sparry calcite	Carbonate rich clay (dusty appearance); abundant terminal grade calcite (mode size: .1mm); tempered with various types of limestone (sparry calcite and micrite)	Non-Local (Belize Valley)
Micrite A	None	Micrite, monocrytalline quartz, polycrystalline quartz, chert, muscovite, igneous rock fragments	Fine micritic clay; angular quartz inclusions; volcanic rock inclusions; unimodal size distribution	Non-Local (Peten?)
Volcanic Glass A	None	Tuff, volcanic glass, monocrystalline quartz, biotite, muscovite, plagioclase feldspar, micrite	Predominance of volcanic inclusions (<90%)	Non-Local (Unknown)

required to better understand where potters were procuring clays on the landscape.

Pottery

Petrographic analyses revealed 7 distinct fabric groups representing both non-local and local pottery (Table 2). The descriptive names of the fabric groups (e.g. Sandstone A) relate to the most common inclusions. The pottery produced locally at Uxbenká is remarkably similar macroscopically because potters were using the red, sandy clays of the Toledo Beds (Aguacate and Manfredi soils). The paste is coarse, sandy, very friable, and red (2.5YR-4/8; 2.5YR-5/8; 5YR-5/8). Polychrome vessels (see Figure 2) generally have a finer and harder paste than the paste for Remate Red and Turneffe Unslipped vessels. These macroscopic characteristics are useful in assigning basic provenance distinctions (e.g. local versus non-local) in the field laboratory. The petrographic data provides information that allows us to identify different ways that potters made pottery during the Late Classic Period at Uxbenká. The locally produced vessels in this study were produced in three ways: (1) tempered with calcareous sandstone (Sandstone A fabric group), (2) tempered with minimal calcium carbonate (Sandstone B fabric group), and (3) untempered (Quartz A fabric group).

The Sandstone A (n=5) fabric group is a moderately sorted, sandy clay containing monocrystalline quartz, calcareous sandstone, plagioclase feldspar, calcareous mudstone, quartzite, chert, chalcedony, polycrystalline quartz, igneous (mostly extrusive) rock fragments, muscovite, and zircon. The fabric is tempered with calcareous sandstone (Figure 3a). It is unevenly distributed; however, it is not angular. The rounded habit would be expected if collecting soft, calcareous bedrock (*nib*). The size, sorting, and composition of the other mineral and rock inclusions are consistent with locally derived clays. This fabric group was used in the production of Zacatel Cream, Saxche-Palmar Orange, and Palmar Orange polychrome vessels in a variety of forms including bowls,

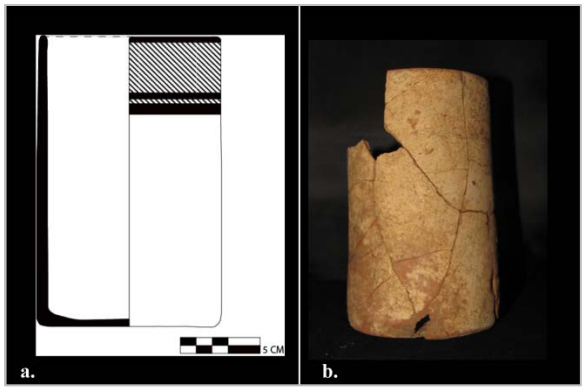

Figure 2. Zacatel Cream Cylinder Jar (Sample 6, Quartz A): a. Drawing; b. Photograph.

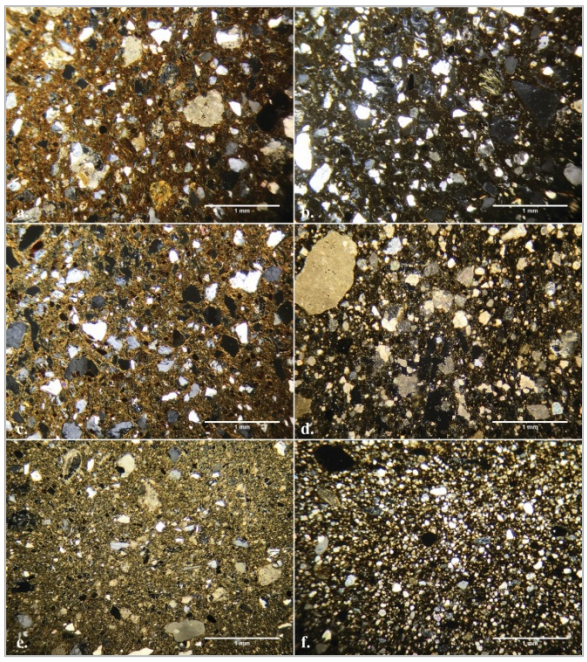

Figure 3. Ceramic Groups Micrographs (all in XPL): a. Sandstone A; b. Sandstone B; c. Quartz A; d. Calcite B; e. Micrite A; f. Carbonate Sand A.

cylinder jars, and tripod plates with both hollow feet and hollow rattle feet (Table 1; Figure 4).

The Sandstone B fabric group is the primary fabric group used to produce Late to Terminal Classic vessels at Uxbenká. In this study, the Sandstone B fabric group is represented by a single Remate Red bowl recovered from Tomb L2 but it is used in the production of 97% of the household assemblage (Jordan 2019). This fabric is a moderately to poorly sorted, sandy clay containing sandstone and the same inclusions described above but is not tempered with calcareous sandstone. Rather, this fabric is tempered with angular, rhombic carbonate (Figure 3b). There are two possible sources for the calcite temper: limestones interbedded with clastic deposits as part of the Toledo Formation or the Cretaceous limestone "rock patch" located to the south of the Uxbenká polity. The crystalline calcite temper does not appear to be necessary for vessel construction as sometimes there are only one or two inclusions. However, nearly all locally produced Early Classic vessels from Uxbenká are composed of abundant crystalline calcite that was likely procured from the rock patch limestone outcrop. We hypothesize that the use of limited amounts of calcite temper in Late Classic is either a continuation of practice, albeit more limited, from an earlier time period or an attempt to include aspects of the ritually important rock patch, where numerous caves, including Kayuko Cave, are located.

The *Quartz A* Fabric Group (n=8) is nearly identical to the Sandstone B Fabric Group except for an almost complete lack of rock content and limestone temper (Figure 3c). The unimodal size distribution indicates that no temper of any kind was added. The mineralogy, sorting, and size of the sand inclusions is consistent with geology descriptions of the Toledo formation and comparable to natural clay samples indicative of a local provenance. This fabric group is present primarily in thinner-walled, Saxche-Palmar Orange bowls and Zacatel Cream polychrome serving vessels including bowl/dishes and cylinder jars (Figure 4).

The locally produced vessels stylistically date to the same time period and all three locally produced fabrics are represented in Tomb L2 suggesting that the differences are likely not the result of changing pottery production practice over time. To date, pottery tempered with calcareous sandstone (Sandstone A) has only been identified in vessels recovered from the Tomb L2 context and from a lip-to-lip cache from the nearby site of Ix'Kukuil. This fabric may represent specialized production for ritual purposes although a larger sample size is required to confirm. The fabric differences between Sandstone B and Quartz A are likely the result of different pottery production practice for thinner, walled vessels serving vessels (Quartz

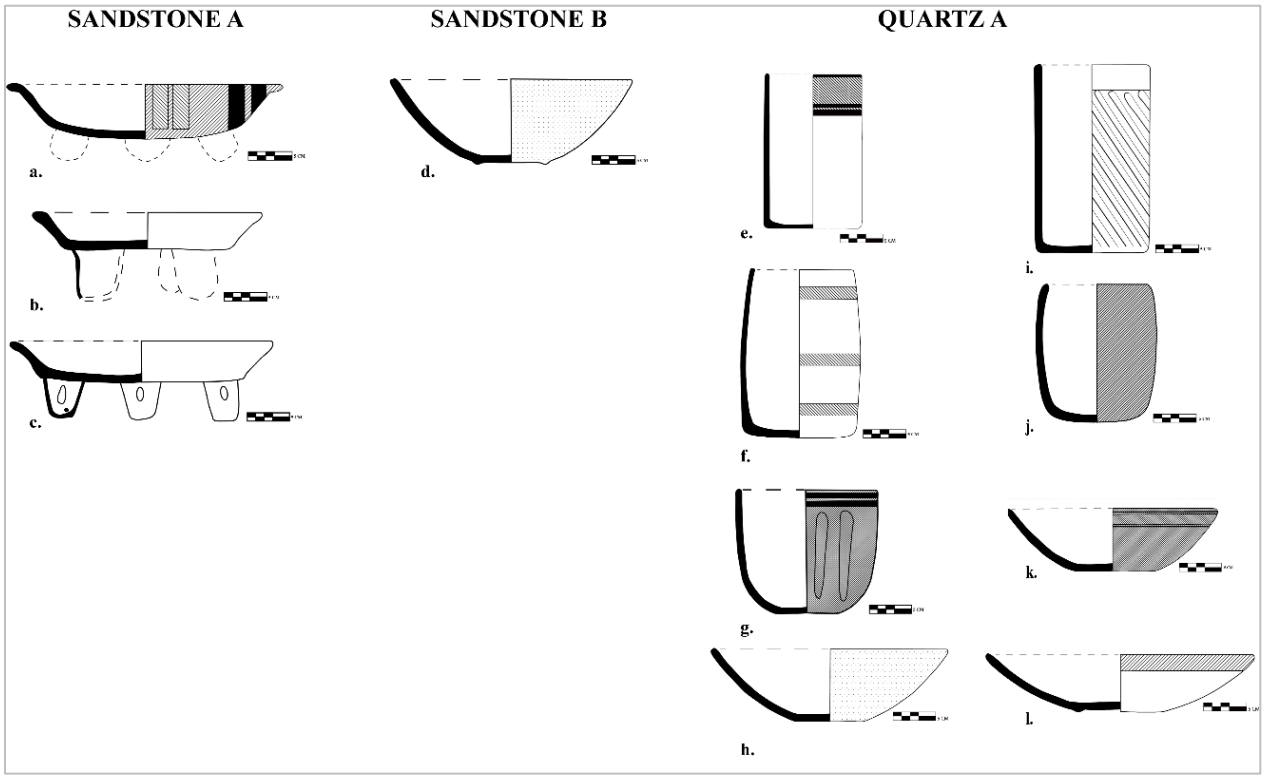

Figure 4. Vessel Profiles for Tomb L2 by Fabric Group: a. Sample 3 (Vessel 15); b. Sample 9 (Vessel 1); c. Sample 13 (Vessel 2); d. Sample 15; (Vessel 27); e. Sample 4 (Vessel 6); f. Sample 17 (Vessel 9); g. Sample 13 (Vessel 8); h. Sample 16 (Vessel 7); i. Sample 10 (Vessel 23); j. Sample 11 (Vessel 17); k. Sample 5 (Vessel 13); j. Sample 8 (Vessel 12).

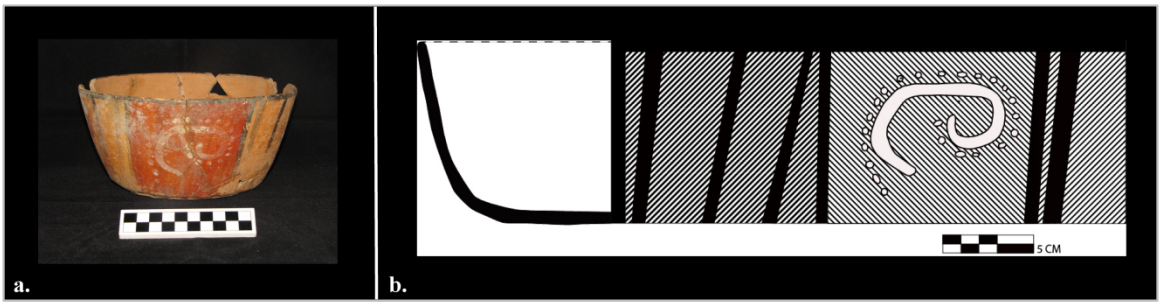

Figure 5. Saxche-Palmar Orange Polychrome (Sample 24, Micrite A): a. Photograph; b. Drawing.

A) versus thicker, walled serving vessels and jars (Sandstone B).

Non-Local Ceramic Vessels

Four non-local fabrics were identified: Calcite B, Volcanic Glass A, Micrite A, and Carbonate Sand A. The lack of detailed petrographic studies in many regions of the Maya lowlands precludes definitive provenance assessment for most of the non-local samples with the exception of Calcite B (Sample 6) which was likely produced in the Belize River Valley (Figure 3d). This fabric group is characterized by an abundance of fine to medium calcite terminal grades that were likely added as temper. They are unevenly distributed and are slightly larger than inclusions that were part of the natural clay. Other large carbonate inclusions were likely also temper added as part of crushed limestone (micrite, sparry calcite, and dolomite). The presence of dolomite indicates the temper was part of a dolomitic limestone or dolomitized calcite. The defining characteristic of this group is the abundance of fine to medium sized

terminal grade calcite, the dusty appearance of the fabric due to the abundance of calcite in the fine fraction, and the golden brown color of the micromass. The calcite terminal grade inclusions are likely the result of well processed (i.e. crushed) limestone temper. Provenance for this vessel is based on comparison to the petrographic analyses that Jordan conducted on an assemblage from Baking Pot as part of her dissertation.

The Micrite A fabric group (Sample 24; Figure 5) is tentatively assigned to the Petén region of Guatemala based on stylistic attributes and geologic characteristics appropriate for the region. This fabric group can be characterized as a micritic clay with a unimodal distribution. The angular, uneven monocrystalline quartz grains may have been added as temper but it is difficult to tell as they are the same size as all of the other inclusions but are angular. The defining characteristics of this fabric group are the fine, micritic clay with small, angular quartz inclusions and rounded igneous rock fragments. The Micrite A fabric does not appear to have been produced in the Belize Valley based on comparative data but additional work may prove otherwise (Figure 3e). The Carbonate Sand A fabric may have been produced somewhere along the Caribbean Coast where sand composed of carbonate is abundant although the exact location is unknown (Figure 3f). This fabric group is characterized by the predominance of discrete, rounded grains of carbonate sand composed of both crystalline calcite and micrite. The unimodal size distribution along with the abundance of carbonate sand and its even distribution suggest that this fabric group represented an untempered clay composed predominantly of carbonate sand. The defining characteristics of this group are the predominance of very fine carbonate sand and an optically inactive matrix. The volcanic glass fabric is similar to the Volcanic Glass A fabric defined by Howie (2012) at Lamanai except that biotite is more abundant and the fabric lacks crystalline calcite. The provenance for this vessel is unknown. These data provide information primarily on elite interactions with other regions and indicate that Uxbenká had political and/or economic ties to the north with the Belize River Valley and possibly west into Guatemala. An Early Classic orange polychrome from the Belize Valley was recovered from a cache in Group F indicating interaction with this region in the earlier periods of occupation at Uxbenká (Jordan 2019).

Conclusion

Elite tombs at Uxbenká contain both locally produced and non-local vessels. The pottery produced at Uxbenká can be distinguished from pottery produced elsewhere based on the use of clays and temper derived from the Toledo beds that are comprised of interbedded calcareous sandstones and siltstones. By comparing the ceramic fabrics to clay and rock samples, we were able to determine that vessels from Uxbenká were produced in three primary ways that differ in terms of what temper was added (or not) and the different clays used in pottery production. In general, the paste technology for locally produced pottery is remarkably similar with slight differences related to technological considerations and perhaps for special purpose vessels and ritual or symbolic reasons. We would like to have definitive answers as to where non-local vessels were made but it is likely that they are from the Belize Valley and possibly coastal Belize and the Petén region of Guatemala.

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