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Fluid Typologies.

A Critical Examination of Ceramic Methods

from Mai Adrasha, Ethiopia.

A dissertation submitted in partial satisfaction of the

requirements for the degree Doctor of Philosophy

in Archaeology

by

Rachel Moy

2019

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ABSTRACT OF THE DISSERTATION

Fluid Typologies.

A Critical Examination of Ceramic Methods

from Mai Adrasha, Ethiopia.

by

Rachel Moy

Doctor of Philosophy in Archaeology

University of California, Los Angeles 2019

Professor Willemina Z. Wendrich, Chair

Ceramics represent one of the largest data sets produced in excavations and thus have a large influence over archaeological interpretations. Archaeologists generally apply ceramic typologies to fulfill two main functions. The first is to allow specialists to communicate with each other, while the second is to answer wide-ranging questions about the past. The typologies archaeologists employ are often not consistently created and not conscientiously applied to specific archaeological questions. This dissertation undertakes a critical evaluation of typological methods to promote transparent and systematic practices in data recording and analysis. To compare these methods, I have constructed three distinct model typologies, each employing a different method. These typologies are all based on a single data set of about 1,500 ceramic sherds that the UCLA Shire Archaeological Project excavated from the site of Mai Adrasha in

northwestern Ethiopia during the 2015 and 2016 seasons. I argue that researchers can and should use a data set to create multiple typologies based on their research goals and questions, and that in disseminating results, they must be transparent about those questions and goals.

Previous archaeological projects conducted in Ethiopia relied heavily on ceramic analysis to identify site function, period, and culture, but have often not considered these questions directly when creating typologies. As more sites have recently been excavated in the Northern Horn of Africa, our knowledge of ceramics has increased dramatically. There is currently a need to compile this new knowledge and reevaluate previous conclusions. This dissertation aims to answer the question of what is the best way to compile these data to facilitate further study in the region. It introduces the digital data platform Northern Horn Ceramics (NHC), which allows researchers to easily record and compare data in the field, immediately share and discuss data online, and create custom typologies from raw data. It is also a powerful tool for the interpretation and analysis of large data sets. Modern archaeological projects produce more data than ever before, and archaeologists are now forced to grapple with enormous data sets. The NHC platform has the capability to store large amounts of artifactual data and, when employed in conjunction with multivariate statistical typological methods, can be particularly effective for analyzing extremely large data sets.

The dissertation of Rachel Moy is approved.

Steven D. Nelson

Michael Harrower

Hans Barnard

Charles S. Stanish

Willemina Z. Wendrich, Committee Chair

University of California, Los Angeles

2019

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VITA / BIOGRAPHICAL SKETCH

EDUCATION

2015 C.Phil in Archaeology, University of California, Los Angeles
2014 MA in Archaeology, University of California, Los Angeles
2009 BA in Classical Archaeology, University of Michigan, Ann Arbor
Ancient Civilizations and Biblical Studies, University of Michigan, Ann Arbor

GRANTS AND FELLOWSHIPS (abridged)

2016 Spatial Archaeometry Research Collaborations Award (SPARC), Co-PI: Willeke Wendrich
2013 Graduate Summer Research Mentorship, UCLA
2012 Graduate Research Mentorship, UCLA
2011 Eugene Cota-Robles Fellowship, UCLA

PUBLICATIONS (abridged)

In Press Moy, Rachel. "Excavations at Mai Adrasha: The 2015 UCLA Shire Archaeological Project", in *Lieux de culte et transferts culturels en Ethiopie antique,* Editors: Iwona Gadja and Anne Benoist.
2017 Moy, Rachel. "Archaeology and Metadata", *Backdirt* Annual Review of the Cotsen Institute of Archaeology, 98-99.
2017 Moy, Rachel. "Journey to Ethiopia", *Backdirt* Annual Review of the Cotsen Institute of Archaeology, 2016, 48-53.
2016 Sernicola, Luisa, Phillipson, Laurel, Fattovich, Rodolfo, Getaneh, Assefa, Capra, Diego, Giovannone, Gabriella, and Moy, Rachel. "Archaeological Expedition at Aksum, Ethiopia of the Università degli Studi di Napoli "L'Orientale" *2014 Field Season: Seglamen",* Newsletter di Archeologia CISA, Volume 7, 223-241.

PRESENTATIONS OF RESEARCH (abridged)

2018 Society of Africanist Archaeologists: Toronto, Ontario. "Northern Horn Ceramics, a Tool for Collaboration".
2017 Society for American Archaeology: Vancouver, British Columbia. "Mai Adrasha and Its Neighbors".
2016 The International Conference on the Archaeology of Ethiopia. Paris, France. "Excavations at Mai Adrasha: The 2015 UCLA Shire Project".
2014 The American Research Center in Egypt. Portland, Oregon. "Exploring Economic Movement in the Greco-Roman Fayum: Integrating Text and Archaeology".

PROFESSIONAL EXPERINCE (abridged)

2019-2016 Publications Assistant, Cotsen Institute of Archaeology Press, UCLA.
2016 Assistant Editor, *Backdirt Annual Review*, Cotsen Institute of Archaeology Press, UCLA.
2016 UCLA Representative, Metadata Central: Digital Scholarship and Outreach Workshop, Scholarly Innovation Lab, UCLA.
2013-2012 Data Manager, URU Fayum Project, Cotsen Institute of Archaeology, UCLA.

CHAPTER 1: INTRODUCTION

1.1 Introducing Fluid Typologies

Ceramic studies are at the center of archaeological research and make use of typologies to draw conclusions. A ceramic typology is an ordering of ceramic types, often in a relative dating sequence. Ancient material culture characteristics are often based on ceramic typologies and the names of distinct archaeological cultures are derived from type-sites, the first excavated sites at which a particular type of ceramics is found in abundance. As a result, a great deal of archaeological research is reliant on typologies, of ceramics and other artifact types, to establish a baseline framework. Typologies are used to formulate, approach, if not answer, wide ranging questions related to topics such as chronology, culture, social status, political structure, trade, and site function. There are, however, several problems with applying typologies so broadly. First, shortly after a typology is created and accepted, it is very difficult to change, and its structure has a strong influence on work that follows. As a result, typologies are often well-suited to answering specific research questions, but are not ideally suited to answer others. Second, while some details of how typologies are constructed are usually included in recent publications, the whole process is often not clarified. Older publications may not address method at all. As a result, how typologies are made is often incomprehensible to anyone but the ceramicist who created them. Another related problem is that types are assigned based on a variety of categories, with inconsistent, undefined, or fluid boundaries, making the conclusions they lead to problematic. While many archaeologists have called attention to these problems (Adams and Adams 1991; Read 2007; Shepard 1980), little identifiable consensus exists on the nature of types and the best methods for creating typologies.

Archaeology in Ethiopia is less well researched than neighboring region, and no regional ceramic typology has been published. When a regional typology is eventually published, it will have wide-ranging implications for future research. Thus, it is critical that we create the best typology possible. Previous archaeological projects conducted in Ethiopia relied heavily on ceramic analysis to identify site function, period, and culture. As more sites have been recently excavated in the Northern Horn of Africa, our knowledge of ceramics has markedly increased. There is currently a need to compile this new knowledge and reevaluate previous conclusions. This dissertation asks what the best way is to compile this information to facilitate further study in the region. Employing a data set of about 1,500 ceramic sherds excavated by the UCLA Shire Archaeological Project during the 2015 and 2016 seasons in Mai Adrasha (Ethiopia), I address these issues by identifying more precisely the problems related to typologies through a critical evaluation of four different typological methods. I evaluate the strengths and weakness of each method and compare the results. Since no broadly comprehensive typology exists for Ethiopia, this is arguably an ideal circumstance to test different approaches for creating typologies.

Combinations of the first three methods I employ are widely used and accepted on archaeological projects. The first is a traditional intuitive typology, which is based on the ceramics that happened to be found at a certain site. It is what Robert Dunnell (1971) would call grouping: a division of a particular corpus into types, usually created without using consistent criteria to discern these types. The second, and most common method, is based on a combination of typologies developed by previous studies in the region. Both of the typologies used in comparison (Fattovich 1980 and Wilding 1999) were at least partially based on already published types but also developed some new types intuitively. The third is based on multivariate statistical analysis of the ceramic assemblage from Mai Adrasha. For the fourth, I created a web application where ceramicists working in Ethiopia can view and discuss raw ceramic data. Any of the recorded aspects can be brought to the fore as the main classifying principle and existing typologies can be incorporated, by making their criteria for each type explicit. Users of the website can create and comment on variable typologies, thus facilitating discussion and comparison of ceramics over a wide geographic area and over a range of periods.

Finally, I evaluate the strengths and weaknesses of each method in terms of how completely it can describe the data and how it can be used to answer different types of research questions. I then compare the results. It becomes clear that the best method for creating typologies depends on the research goals of the ceramicist and the research community at large. Some methods are best for organizing and communicating in the field, while others are better suited to answering particular research questions. With more data these typological methods can address questions concerning chronology, culture, social status, political structure, trade, and site function. It also becomes clear that typologies cannot be fixed. As we learn more about the ceramics from ancient Ethiopia, new data needs to be incorporated, and our conclusions, stemming from typologies need to be reevaluated. This dissertation will lead to the development of a flexible diachronic regional typology and a platform to create variable typologies catered to specific research questions. This project lays essential groundwork for further archaeological study in Ethiopia and has wider reaching methodological implications for the discipline.

1.2 The Data Set

The data for this dissertation were collected from the site of Mai Adrasha just outside of the modern town of Shire/Inda Selassie in Tigray, Ethiopia (Figure 1.1). The assemblage from Mai Adrasha serves as good data for an evaluation of typological methods, since its ceramics were not the subject of intensive study until the beginning of the UCLA Shire Archaeological Project.

Thus, the results of the different typological methods will not be unduly influenced by previously established types. The UCLA Shire Archaeological Project has been studying Mai Adrasha and its surrounding area since 2014. Preliminary excavations at Mai Adrasha began in 2015 with subsequent excavations in 2016, 2017, and 2018. Most of the ceramic data was collected by a team of three ceramicists, Gabriella Giovannone, Haregwin Belete, and Rachel Moy. The majority of recovered ceramic artifacts were heavily fragmented. Thus, there were very few complete or nearly complete vessels in the assemblage. Ceramics were sampled from all seven trenches and most stratigraphic contexts. In some cases, during the 2015 season in particular, ceramic data was recorded on paper forms and then transferred to a digital format in the Northern Horn Ceramics Database (NHC), http://dal.ucla.edu/nhc/, in the Digital Lab in the Cotsen Institute of Archaeology, UCLA. In most cases, data was recorded directly in a digital format into the database in the field.

Figure 1.1 Map showing Tigray province and Inda Selassie/Inda Silasē. Map from Ethiopian Mapping Agency, edited by Hans Barnard.

Based on the radiocarbon dates the project has obtained thus far, the dating of the ceramics samples potentially ranges from 1300 BCE to 100 CE. Most of the samples come from two periods: the 1st century CE to the 3rd century BCE (with the majority of these samples coming from Trench 1) and the 6th century BCE to the 8th century BCE (with the majority of these samples coming from Trench 2). This places the first group of samples in the Early and Proto-Aksumite periods and the second group firmly in the Middle and Early Pre-Aksumite periods.

1.3 Order of Work

What follows are eight chapters. *Chapter 2* discusses historical background and is divided into four parts. It begins with a discussion of period names and durations. The second section is a brief description of archaeological study in Ethiopia focusing on late prehistoric and early historic periods. The third section gives a summary of archaeological work completed at the site of Mai Adrasha by the UCLA Shire Archaeological Project. The final section discusses ceramic study in Ethiopia.

Chapter 3 provides a historical overview of the study of archaeological ceramics and a theoretical framework with specific reference to classification and typology. This chapter discusses the history of the method and theory behind the archaeological type. In particular, it reviews the work of Anna Shepard (1980), William Adams and Ernest Adams (1991), and Dwight Read (2007).

Chapter 4 is the first of the typologies outlined in this dissertation. It covers the formation of the intuitive typology based on the ceramic assemblage from Mai Adrasha. I built this typology based on shape, which for me was the most clearly observable trait. This typology is organized into seven major shapes with twenty-seven subtypes.

Chapter 5 covers the development of my historical typology. In this chapter, I compare Rodolfo Fattovich's (1980) Pre-Aksumite typology based on the sites of Yeha, Hawelti, Matara, and Melazzo and Wilding's (1999) Early to Post-Aksumite typology based on the site of Aksum to the assemblage from Mai Adrasha. The final historical typology consists of seven classes. I align four classes with Fattovich's and three with Wilding's.

Chapter 6 covers the formation of my statistical typology. In this chapter, I first use exploratory data analysis to discuss my data set. I then use the multivariate technique of correspondence analysis in reference to ceramic attributes over the entire ceramic assemblage to order my types. In this typology, I created eighteen types.

Chapter 7 discusses the creation of, and the potential uses for the Northern Horn Ceramics website. This website has three major functions as a relational database, discussion forum, and a platform for typology creation and publication.

Chapter 8 compares the results of the typologies discussed in chapters 4 through 7. More specifically, I compare the different types each method produced particularly looking at which attributes were prioritized in building each type. I also consider whether certain methods are best for different types of archaeological problems. Additionally, I discuss how archaeologists can record, store, analyze, and disseminate large datasets. In this context, I make recommendations for moving forward.

CHAPTER 2: Ancient Ethiopia, A Historical Overview

2.1 A word on dating

Before I begin with the historical background, I will explain the dates and periods I have chosen to utilize in this dissertation. In the last century, several different dating schemas have been used in the Ethiopian highlands, and scholars continue to disagree over period lengths and designations. Before the 1960s, Aksumite history was only divided into the Christian and pre-Christian periods (Conti Rossini 1928). The pre-Christian period began with the rise of Aksum, which was estimated to be in the 1st or 2nd centuries CE and ended with the conversion of King Ezana in the 4th century CE. The succeeding Aksumite Christian period was thought to end with the beginning of the Zagwe dynasty in the 12th century. In the 1960s, Francis Anfray (1968) designated earlier periods, he called the time before Aksum, Pre-Aksumite, and subdivided it into the Ethio-Sabaean and Intermediate periods. In his 1974 survey, Joseph Michels (2005) maintained the Aksumite pre-Christian and Christian division, included Anfray's Pre-Aksumite period, and added a Post-Aksumite period. The Pre-Aksumite and Post-Aksumite periods were further divided into Early, Middle, and Late stages. Michels' periods and stages were created based on obsidian hydration dating and cluster analysis of ceramics.

Stemming from coins found in the excavations of Neville Chittick at Aksum, Stuart Munro-Hay (1989) subdivided the Aksumite to create a list of six stages that differed from Michels' two. Chittick and Munro-Hay's list is designated by number, Aksumite 1 through 6 (See Figure 2.1 for periods 1 through 5; period 6 covers the time post 650 CE). Their list focuses on coinage and historical sources; thus, the periods are divided based on the names of known Aksumite rulers their actions or perceived accomplishments. This chronology includes more minute divisions that are no longer employed by most scholars. Sutton further states in the report of Chittick's excavations in Aksum, published in 1989, that the Aksumite Empire likely ended earlier than the 10th or 11th century CE as previously believed. No coinage has been found minted after c. 630 CE. In the report of Chittick's excavations, published posthumously by Munro-Hay, their last chronological period (Period 6) dated to post 630 CE and is characterized by the decline of the empire that did not last for hundreds of years. Thus, compared with Rossini and others, a shorter chronology was adopted.

Period	Date AD	Kings	Archaeological features	Historical sources/events
1			Earliest platforms	
	100	Zoskales	Lower stele park levels	Periplus
			Platform A	
				Ptolemy
	150		First platform extension	
2	200	GDRT, BYGT		
				South Arabian inscriptions
		ʽDBH, GRMT		
		Sembrouthes		
	250		Nefas Mawcha, Walls M2, M5, M9	
		DTWNS, ZQRNS	Gudit and GA Stelae Fields	
			Gudit Tomb	
3		Endubis	Wall M1	Aksumite coinage begins
	300		Tunnel complex	
		Aphilas	First decorated stelae	
		Wazeba	Tomb of the Brick Arches	
		Ousanas	Brick Vaulted Structure	
4		Ezana	Mausoleum, Wall M'1	Ezana inscriptions
	350		Second platform extension	
		MHDYS	Shaft Tomb C	
		Ouazebas	Walls M7, M8	
	400		Fall of Stele 1	
			Kaleb I, IA buildings	Aksumite gold coins mostly found in Yemen
		Eon	Tomb of the False Door	
	450		IW building	
		Ebana		
		Nezool/Nezana		
	500	Ousas/Ousana(s)=Tazena		
				Kaleb's invasion of Yemen
		Kaleb		Justinian's embassies to Kaleb
5		Alla Amidas=Wazena?	Tombs of Kaleb and Gabra Masqal	Kaleb's inscription
		Ella Gabaz=WʽZB?		WʽZB inscription
	550	Ioel	Shaft Tomb A	
				Persians in Yemen
		Hataz=Iathlia?	Fill of ES building	
		Israel		
	600			
		Armah		Jerusalem falls to Persia
		Gersem		Egypt falls to Persia
				Aksum ceases to be capital
				Egypt conquered by Muslim Arabs
	650			

Figure 2.1 Aksumite Chronology (Periods 1-5) from Munro-Hay 1989:21.

For the next set of excavations at Aksum, Phillipson (2000) kept the short chronology and refined it into three periods: Early, Classic, and Late Aksumite. Phillipson's chronology was altered further with the addition of the Proto-Aksumite Period from the results of the excavations at Bieta Giyorgis (Fattovich and Bard 2001). The team from Bieta Giyorgis reassessed the years associated with periods through a number of artifact types (Bard et al. 2014). These artifacts include ceramics, imports, coins, and ^{14}C dates on charcoal based on Bayesian analysis. As this is the most recent dating schema and has been crosschecked with excavated ceramics, I will employ it in this project with only a few caveats.

Their schema relies heavily on ceramic seriation and radiocarbon. When two dates are indicated at the beginning or end of a period, they signify different radiocarbon dates. In this case, both samples may have been collected from the same context. The authors further assert that the above should not be considered clear cut chronological periods, but rather "chronological indicators" (Bard et al. 2014:307). The ambiguity signifies the slow cultural change between periods, which do not have clear cut boundaries nor exist in reality. The period designations are as follows:

Pre-Aksumite	(1000 BCE – 400/300 BCE)
– Early	(1000/900 – 800/700 BCE)
– Middle	(700/600 - 400 BCE)
– Late	(400/300 BCE)
Proto-Aksumite	(360 BC (?) – 120/40 BCE)
Aksumite	(120/40 BCE - 800/850 CE)
– Early	(120/40 BCE – 130/190 CE)
– Classic	(130/190–360/400 AD)

– Middle	(360/400–550/610 CE)
– Late	(550/610–800/850 CE)
Post-Aksumite	(800/850-1500 CE)

Table 2.1 Aksumite Chronology from Bard et al. 2014

Besides concern about period designations, these dates must be used with caution as they are only based on evidence from Aksum and its immediate surroundings. Some of these dates are already being questioned on a more regional scale. A number of current research projects have taken radiocarbon dates to supplement stratigraphic excavations. Many of these results have not yet been published, but when evaluated with other forms of evidence, will no doubt add to our understanding of chronology. It is already clear that revision is needed, particularly for the Pre-Aksumite period, as a few sites have already produced dates earlier than 1000 BCE (D'Andrea et al. 2011; Sernicola et al. 2017; Wendrich and Moy *in preparation;* Woldekiros and D'Andrea 2014).

2.2 Archaeology in Ethiopia

Ethiopia is home to some of the earliest known examples of material culture, in this case, physical objects manipulated by human hands or artifacts. These artifacts were discovered at the site of Gona in the Ethiopian section of the East African Rift Valley and date to about 2.6 and 1.6 million years ago (Semaw et al. 1997). Many anthropologists have arrived to study early human evolution in the Horn of Africa. The same attention has not been paid to later periods.

Figure 2.2 Map of Ethiopia from the Nations Online Project https://www.nationsonline.org/oneworld/map/ethiopia-political-map.htm.

At present, our knowledge of the late prehistoric populations of northern Ethiopia is limited. Few sites from this period have been discovered, leading some researchers to conclude that population groups must not have migrated to highland Ethiopia due to environmental conditions until the 2nd millennium BCE (Fattovich 2010). We know very little about populations in northern Ethiopia before the development of agriculture, but based on language reconstruction, it is clear that some groups spoke Cushitic languages, while others spoke Semitic

(Phillipson 2012). Previous theories held that Semitic language arrived with the migration of South Arabians to the northern Horn in the early 1st millennium BCE (Hetzron 1972). Now most scholars agree that this is not the case and in fact, support an African origin of the Afroasiatic language family of which Semitic is a member (Hudson 1978, 2000; McCall 1998). By the late Holocene, the inhabitants of the highlands supported themselves with agro-pastoralism; though exclusive hunting and gathering was also a food procurement strategy (Simoons 1960). While a few rock-shelter sites have been studied from the Aksum region and the Tembien district, their excavators mainly report on the morphology of the lithic artifacts, but do not address the function of these sites (Phillipson 1977; Negash 1997; Finneran et al. 2000a; 2000b; Beyin and Shea 2007).

Based on obsidian hydration dating of survey surface finds, Joseph Michels noted stone houses were grouped into villages from about 1500 BCE (Michels 2005:55). Excavations in the area of Asmara, Eritrea reveal stone-built settlements from the late 2nd millennium (Schmidt et al. 2008). Some recent excavations confirm the existence of settlements in Ethiopia in the second half of the 2nd millennium BCE (D'Andrea et al. 2011; Wendrich and Moy *in preparation;* Woldekiros and D'Andrea 2016). By this time, there is some evidence of contact with external regions such as Egypt and the Sudanic lowlands, but it is largely circumstantial (Phillipson 2012:16). In the first half of the 1st millennium BCE, the first examples of socio-political complexity emerged in the northern highlands. Scholars designate this period as the Pre-Aksumite (1000-400/300 BCE). One of its most notable features is its strong connections to the contemporary South Arabian kingdoms, particularly Saba (Gerlach 2012). Scholars have historically emphasized the connections with South Arabia, because Arabian elements are visible in examples of monumental architecture, elite material culture, and script. Until the 1980s, it was popularly held that groups from the Arabian Peninsula had colonized the Horn of Africa, bringing along their culture, religion, and political system (Conti-Rossini 1928). Though some continue to support a colonization model (Michels 1988; Gerlach 2012; Japp et al. 2011), other Ethiopianist scholars such as Rodolfo Fattovich and David Phillipson have since argued against this model and now emphasize indigenous development, rather than external influence, as an explanation of cultural and political change (Fattovich 1980; Phillipson 2009; Phillipson 2012), though they do not rule out the possibility that small groups may have immigrated. Current research both archaeological (Gerlach 2012; Japp et al. 2011) and epigraphic (Nebes 2010, 2011) convincingly show that South Arabians were present in northwest Ethiopia in at least small groups during the first half of the 1st millennium BCE, but since the presence of South Arabian style artifacts is limited to a few sites, large scale colonization seems unlikely.

In the Pre-Aksumite period, larger and more nucleated sites developed, such as Matara and Enda Gully near Yeha (Michels 2005:68). Monumental architecture at Yeha, Seglamen, and Maqaber Ga'ewa is dated to this period (Anfray 1972; Fattovich et al. 2012; Hiluf 2009). Writing emerges for the first time in the form of monumental inscriptions and graffiti in Ancient South Arabian (ASA) or Proto Ge'ez/Old Ethiopic (Drewes 1962; Phillipson 2012; Schneider 1976). Some scholars argue that all of these developments are evidence of the formation of a state in the northern highlands (Fattovich 2010). Inscriptions in ASA script exist naming a kingdom called D'MT. Niall Finneran (2007:118) has even suggested that the "Pre-Aksumite" label for this period be replaced with D'MT. This seems inappropriate, however, since evidence of D'MT comes exclusively from seven inscriptions, none of which were found *in situ* (Phillipson 2012:38). D'MT was likely a chiefdom, but its location and extent are unknown. The current prevailing opinion is that several political entities coexisted in the northern highlands at this time (Fattovich 2009, Phillipson 2009), though the cultural character and political organization of these entities remains to be seen.

At least 90 Pre-Aksumite sites have been identified (Fattovich 1990:3) though only a few have been the subject of intensive excavation. Yeha, is perhaps the most famous Pre-Aksumite site and the subject of the most thorough investigation. It is located to the northeast of Adwa and is characterized by two large monumental buildings and a cemetery of shaft tombs (Gerlach 2012). Yeha was first systematically excavated by a French mission in 1960 and 1970-72 led by Francis Anfray (1972). The French mission excavated the palatial or administrative structure of Grat Be'al Gebri, located northwest of the temple, and the elite tombs at Daro Mikael. Originally, Grat Be'al Gebri was a monumental building on a stepped podium fronted by pillars in South Arabian style. This building was destroyed by fire and replaced by a successor building with rough walls and possible Aksumite style "monkey-head" building techniques (Fattovich 2009:279). Evidence was found of occupation in the same area predating the building, but no structures were found (Anfray 1973). A few test pits were dug at Gual Edaga west of the temple; north and east of the temple; and southeast of Grat Be'al Gebri (referred to by the excavators as Grat Be'al Gebri 2). The pits at Gual Edaga and Grat Be'al Gebri show evidence for contemporary occupation with the 'pre-palace' phase and the first stage of construction at Grat Be'al Gebri. The pits north and east of the temple contained pottery dating to the Aksumite period (1st millennium CE). Seventeen tombs were excavated during the French excavations. Eight of these were dated to the 6th to 7th centuries BCE, two to the late 1st or early 2nd millennium CE, and six were empty, undated, shaft tombs. Nineteen fragmentary inscriptions were found in the form of stone slabs and altars. They are all in ASA script.

Joseph Michels (2005) conducted a broad survey of the area between Aksum Yeha in 1974. As part of his survey, he identified a large site (6 ha) Enda Gully near Yeha. Michels hypothesized that Enda Gully might be the habitation center paired with the religious center of Yeha and estimated a population of around 3,500 inhabitants (Michels 2005:69). More recently, the Southern Red Sea Archaeological Histories (SRSAH) Project has been surveying the region surrounding Yeha since 2009 and has discovered numerous Pre-Aksumite sites including the ancient town of Beta Samati (Harrower et al. in revision; Harrower et al. in review). Another project at Yeha was a French mission led by Christian Robin (Robin and de Maigret 1998) that focused on the architecture of the temple. Excavation of the temple revealed that it replaced an earlier smaller structure. Robin also noted that it was later reused as a Christian church. In 2009, the DAI (Deutsche Institut Archäologische) started a project at Yeha directed by Iris Gerlach (Gerlach 2014; Japp et al. 2011). In a survey, the German team uncovered another cemetery at 'Abiy 'Addi opposite the modern village of Yeha near the cemetery previously excavated by Anfray. Here, six burials were identified, and three were excavated (Gerlach 2012:222-223). The DAI team's current research is focused on elite domestic structures dating to the 8-6th century, which were uncovered while attempting to find a location for a new site museum, and on the restoration of Grat Be'al Gebri and the great temple.

Another notable Pre-Aksumite site, Seglamen, is the suspected site of a pre-Aksumite temple, as an inscription was found on the site in 1972, mentioning a king dedicating a temple (Bernard et al. 1991). The site of Seglamen is located approximately 15 km southwest of Aksum and is about 7 ha in area and includes a monumental center, village, and elite cemetery all dating to the Pre-Aksumite period. The site was partially excavated in the 1970s (Schneider, 1976;

Ricci and Fattovich, 1987; Bernard et al. 1991). Renewed Italian excavations, beginning in 2010, are ongoing at the site (Fattovich et al. 2012; Sernicola and Phillipson 2014).

Meqaber Ga‘ewa and Ziban Adi, located southwest of Wuqro, are the southernmost of all known pre-Aksumite sites. Meqaber Ga‘ewa was excavated by the DAI under the direction of Pawel Wolf in several seasons beginning in 2008 (Wolf and Nowotnick 2010). The main feature of the site is a stone temple dedicated to the god Almaqah, featuring a stone altar with a libation basin and a South Arabian inscription. The team also excavated the neighboring site of Ziban Adi from 2010-2015, located just south of Meqaber Ga‘ewa (Matthews and Büchner 2016). At Ziban Adi, a monumental structure was uncovered, a large altar of "Ethio-Sabaean" style, and three stone incense burners. The site is radiocarbon dated with charcoal from the 10th to the 5th centuries BCE, making it both earlier than and contemporary to nearby Meqaber Ga‘ewa.

The sites of Mezber and Ona Adi are located about 90km north of Mekelle. Mezber was discovered by the survey of the G-MAP Project (2005-2006). Surface collection indicated that the occupation of Mezber was limited to the pre-Aksumite period (D'Andrea et al. 2008). Investigations at the site were continued by the Eastern Tigray Archaeological Project (ETAP) from 2007-2012. Excavations revealed an occupational sequence dated to the mid-2nd millennium to the end of the 1st millennium BCE (D'Andrea et al. 2015:155; Woldekiros and D'Andrea 2016:4). Large domestic architecture was uncovered on the site suggesting the presence of elite individuals. In addition, the earliest remains of domesticated chickens in Africa have been found at the site dating to the early 1st millennium BCE. The site of Ona Adi or Etchmare was first discovered by Anfray (1973). Collagen from human remains found at Etchmare East was radiocarbon dated to 340 $\pm$ 50 BCE. The site is located about 2.5 km southwest of Mezber. Etchmare East is the subject of continuing investigation by ETAP, beginning in 2007. Proto-Aksumite remains have been identified at Etchmare East (D'Andrea et al. 2008, 2011) making it the first site identified east of Aksum with evidence of the Proto-Aksumite period. Ceramics from the site have been dated to the Proto, Middle, Late, and possibly post-Aksumite periods.

Beginning just before the 1st millennium BCE, settled communities sprang up in the southern half of Eritrea around the modern city of Asmara (Schmidt et al. 2008). Though these sites are mostly contemporary with the pre-Aksumite sites to the south, their excavators did not detect any South Arabian influence. Sites on the Asmara plateau show local origins as well as continuity in settlement, material culture, and subsistence practices over at least 400 years (Curtis 2008). This is similar to some contemporary sites in Ethiopia, Kidane Mehret (Site D), and likely also the sites of Etchmare, Mezber, and Mai Adrasha though further research is needed. To distinguish them from the pre-Aksumite sites that show more obvious South Arabian influence, the excavators refer to these Eritrean sites as Ancient Ona. The ancient Ona people lived in small towns with stone structures, and combined grain agriculture with pastoralism. They produced a number of stone bulls' heads, which were likely used in initiation rituals (Schmidt and Naty 2008).

In the period immediately preceding the rise of the Kingdom of Aksum, foreign elements virtually disappear from pre-Aksumite sites. Instead, the local tradition dominates material culture. Largely due to their work at the site of Beita Giyorgis, Rodolfo Fattovich and Kathryn Bard have seen this as signaling an end of the pre-Aksumite and the beginning of what they call the Proto-Aksumite phase (360-120/40 BCE). One of the most striking differences that appears at this time is the use of platforms with stelae marking pit-graves for elite burials (Fattovich and Bard 2001:20). Many scholars hypothesize that the Proto-Aksumite was a localized phenomenon, however Proto-Aksumite remains have been identified as far east as Gulo Makeda (D'Andrea et al. 2008) and as far west as Shire (Finneran 2005). More research must be performed before this period can be definitively characterized. It is clear, however, that during this time, a centralized power developed at the site of Beita Giyorgis, leading to the rise of Aksum.

In the 1st centuries CE, with the annexation of Egypt into the Roman Empire, trade in the Red Sea expanded, allowing the fledgling Aksumite kingdom to flourish. In the Early Aksumite period (120/40 BCE-130/190 CE), the rulers of Aksum resided on the hill of Bieta Giyorgis, where several monumental structures and a large elite cemetery with standing stelae have been found (Bard et al. 1997). In the succeeding Classic Aksumite period (130/190–360/400 CE), the kings moved down the hill to the site of Aksum itself. Shortly after, residential and funerary architecture reached its highest degree of monumentality. The majority of the monumental tombs in the Stela Park at Aksum were constructed at this time. Additionally, Aksumite territory expanded considerably to include the coast of the Red Sea, the Sudanese lowlands, and part of southern Arabia. At the height of Aksumite power in the 2nd half of the 3rd century CE, the kings of Aksum began minting their own coins, beginning with king Endybis (Phillipson 2012:182). In 333 CE, according to Ethiopian ecclesiastical tradition, king Ezana converted to Christianity, marking the end of the Classic period.

Though popular conversion to Christianity took around 200 years, Ezana's conversion signaled the end of the Classic Aksumite and the beginning of the Middle Aksumite (360/400-550/610 CE). Aksum was still at the height of its power and controlled much of the trade in and around the Red Sea. The kings of Aksum continued to campaign in South Arabia. The Late Aksumite period (550/610-800/850 CE) essentially begins with the Persian takeover of Red Sea trade. With the source of its wealth cut off, Aksum entered a period of economic recession. In the beginning of the Late Aksumite period, population in the capital had declined sharply. Shortly after this, Aksum was replaced by a new capital, Kubar, to the southeast. For the next several centuries, the capital was not geographically fixed but followed the ruler as he moved. At this time, Christianity was growing stronger, with many rock-cut churches built in eastern Tigray (Pankhurst 1982; Phillipson 2004). It is generally agreed that the final collapse of the Aksumite kingdom occurred at the end of the 7th century (Munro-Hay 1993). Notably, two major settlements, the harbor town Adulis and the inland town on the route to Aksum, Matara, were abandoned in the mid-7th century (Anfray 1972), and the minting of coinage stopped shortly thereafter.

The vast majority of archaeological data on the Aksumite period comes from the site of Aksum and its environs. Archaeological research began in the area in 1906 with a German team led by Enno Littmann (1913). Although the German team did not excavate extensively, they cleared and documented most visible structures and recorded a huge corpus of inscriptions. Most notable of these structures are the so-called palaces of Enda Mikael, Ta'akha Maryam, and Enda Semon. Several small-scale projects followed this. Notably, Anfray excavated the Dungur "palace" west of Aksum (Anfray 1972, Anfray et al. 2012).

Two large scale excavations have taken place in Aksum directed by the British Institute in Eastern Africa (BIEA). Neville Chittick led BIEA excavations from 1972-1974 (Munro-Hay 1989). The project concentrated mainly on the monumental mortuary remains of the Aksumites in the main Stelae field and the areas around it. The main goal of this research was the characterization and dating of stelae and associated graves. Chittick's investigations focused on several famous tombs in the area including the Tomb of the Brick Arches, GT II (an intact

Aksumite burial), Kaleb and Gabra Masqal, Nefas Mawcha, and the Tomb of the False Door. Unfortunately, this work was cut short due to political turmoil and the rise of communism in Ethiopia.

After the fall of the Derg (the communist junta) in 1987, the BIEA project continued led by David Phillipson from 1993-1997 (Phillipson et al. 2000). This project took a much wider approach though excavations did continue in the main Stelae field. There, in preparation for the return of Stela 2 from Italy, the area where the stela once stood was investigated. The team identified an Aksumite subterranean structure, likely the burial chamber associated with Stela 2. They also argue that the stela was intentionally toppled in Post Aksumite times. Phillipson continued Chittick's work in the tomb of the Brick Arches. He concluded that this tomb was not royal, but likely belonging to a member of the upper elite even though it is the richest Aksumite burial yet excavated. According to radiocarbon dates from bone and wood charcoal, pottery, and comparison with other Aksumite contexts, the tomb dates to the third quarter of the 4^{th} century CE. Phillipson also investigated two tombs associated with Stela 1. The Mausoleum and the East Tomb were set in a sunken court in front of the stela. The two tombs are probably mirror images of each other. Unfortunately, the East Tomb was too dangerous to excavate, but Phillipson speculated that it may have been unfinished. This can then be connected to the theory that Stela 1 may never have stood upright. From the finds in the Mausoleum, it is probable that Stela 1 and associated monuments date to half a century earlier than the Tomb of the Brick Arches. Based on ^{14}C dates, pottery, and architecture, they are dated to the mid-4^{th} century CE. In the early 2000s, Fattovich and Tekle Hagos led a systematic survey of Aksum and the surrounding area (Sernicola 2017).

Two other major Aksumite sites have also been the subject of intensive investigation, Adulis (Anfray 1974; Paribeni 1907; Peacock and Blue 2007) and Matara (Anfray 2012; Anfray and Annequin 1965). Adulis was the main Red Sea port of the Aksumites. The site has long been known and correlated to references in ancient literature. Early excavations took place in 1868 (Holland and Hozier 1870; Markham 1869), 1906 (Paribeni 1907), 1906 (Sundström 1907), and 1960-1962 (Anfray 1974, 1990). A British mission in 2005 preformed a noninvasive intensive survey of the site and the surrounding area with archaeological, geophysical, and topographic elements (Peacock and Blue 2007). They produced a detailed map of the site and found the full extent to be 20 ha. The British identified two anchorages central to trade at Adulis in different periods. They describe most of the site as contemporary with the Roman period with the latest occupation in 702 CE. Excavations at Adulis resumed in 2011 with the Eritrean-Italian archaeological project (Zazzaro et al. 2014). The latest project worked on several different parts of the site. It uncovered new material and re-excavated previously uncovered by the French mission. One trench (sector 1) was opened in the area of the earliest remains yet found at the site dating to the 1st-2nd centuries CE. Sector 3 was opened near a monumental basilica-like building that had been excavated by the British Museum in 1868. One interesting find was an Indian 'Gupta' style figurine, that on stylistic grounds was dated to the 4th to the 6th centuries CE, indicating contact and likely trade with India in this period. Sector 5 was opened at the very southern limit of the town near the River Haddas, an area that was previously unexplored. Here a continuous building sequence was dated from the 5th to the early 7th century CE. A manufacturing area was uncovered for the processing of mother of pearl, red coral, and ostrich shell. The presence of three ovens, also indicates food production. In this area, artifacts related to domestic use were found along with imported Egyptian and Nabatean pottery.

Matara was located along the route from Aksum to the coast and was another large trading center, which connected Adulis to Aksum. Anfray undertook large scale excavations of the site from 1959-1970 (Anfray 1963, 1966, 1967, 1990, 2012; Anfray and Annequin 1965). The excavations at Matara uncovered a variety of structures: elite residences, tombs, churches, and ordinary houses. A combination of ceramics, coins, and inscriptions date the majority of the site to the 7th and 6th centuries CE. Two elite buildings, designated A and C by Anfray, may date to slightly earlier, 4th to 5th centuries CE. The presence of Pre-Aksumite pottery in the tombs, monumental Sabaean inscriptions reused in later structures, pottery inscribed with proto-Ethiopic and Sabaean inscriptions, and evidence of clear underlying structures all pointed to earlier levels at the site. A 5-meter-deep sounding was dug near the funerary vault (structure D). After 2 meters of sterile soil, it yielded ceramic sherds that appeared to be pre-Aksumite in date (Anfray 2012:42). Numerous Ayla Amphorae (20 nearly complete), African red slipped vessels, and blue Sassanian glazed ware sherds were uncovered reinforcing that Matara was a major site along the trade route to the Red Sea Coast.

More recently several other Aksumite sites have been the subject of investigation. A team from the Centre National de la Recherché Scientifique (CNRS) in Paris has been excavating the site of Wakarida since 2010 (Gajda et al. 2011, 2014; Dugast and Gajda 2013). Wakarida is located 30km east of modern Edaga Hamus in a steep mountainous area about halfway between Aksum and the Red Sea. It was a small town, established in Aksumite times. Based on coins, ceramics, and radiocarbon samples, the site dates to the Classic to Middle Aksumite periods. Some ceramics that appear to be Pre-Aksumite were found under the buildings being excavated and in the survey (Gajda et al. 2016). Wakarida appears to be a site of some importance as two large stone buildings have been uncovered that can be compared to elite residences at Dungur and Matara (Gajda et al. 2016-).

The site of Beta Samati has been excavated by the Southern Red Sea Archaeological Histories (SRSAH) Project beginning in 2011 (Harrower et al. *in revision*). It is also located east of Aksum and just 7km north of the temple of Yeha. The site dates to the Pre-Aksumite to Late Aksumite periods based on radiocarbon assays on domesticated wheat and barley seeds. The site itself is a large tell, which includes domestic and public architecture. One building is identified as a basilica based on its characteristic tripartite layout, artifacts depicting crosses, and an inscription mentioning Christ (Harrower et al. *in revision*). At the highest point on the tell excavations uncovered a large stone building complex. Different types of evidence point to domestic and industrial activity in this area including food storage and preparation, as well as metal and glass production.

The site of Mifsas Bahri is a Late Aksumite community and church located in Southern Tigray near Lake Hashinge, excavated from 2013 to 2016 by Michela Gaudiello and Paul Yule (2017). The excavations focused on the church and center around its architecture. Gaudiello and Yule describe the construction of this space in facies, rather than phases, because in retrospect much of the architecture was built at the same time. The last use of the site is characterized by re-use of building materials and burials in the church grounds. The excavators date the construction of the church to the 7th century CE and estimate that it was in use for about a hundred years (Gaudiello and Yule 2017:272). The later graves date to the 11th to the 14th century CE. Artifacts from this site, notably ceramics, contrast sharply in style from those in the more comprehensively studied northern Tigray.

As the above summary illustrates, there is much we still do not know of Ethiopia's early history. There is a great deal of disagreement concerning time periods, rulers, and major events. Additionally, we also do not have clear ideas on how ordinary people lived their lives. Before larger theoretical or historical questions can be fully addressed, a material cultural baseline needs to be established for the Pre-Aksumite through Late Aksumite periods. A good place to start this analysis is with ceramics. Ceramics are often the most abundant artifact on Pre-Aksumite and Aksumite archaeological sites. They are used to identify cultures, date sites, and answer a much wider range of questions.

2.3 The Site of Mai Adrasha

This dissertation will focus on the ceramic assemblage from the site of Mai Adrasha collected during the 2015 and 2016 excavation seasons. I will begin with a short description of discoveries from the site so far and how they relate to wider trends in the archaeology and history of the Northern Horn of Africa.

The excavations at Mai Adrasha are part of the larger UCLA Shire Archaeological Project (2014-2018). This project follows the work of Niall Finneran and Jacke Phillips, who conducted a surface collection and test excavations at Mai Adrasha in 2002 and 2003 (Finneran 2005). According to the study of Finneran and Phillips, the surface remains at Mai Adrasha date from the Pre-Aksumite to the Late Aksumite periods. Additionally, their project collected a number of intriguing ceramic figurines, as well as complete vessels that appear to be Proto-Aksumite in date. In the decade following this initial research, some local populations have largely destroyed the site. They repurposed truckloads of ancient stone for modern building projects and mined the soil for naturally occurring gold. Viewing the destruction in 2014, a team from the Cotsen Institute of Archaeology at the University of California, Los Angeles began rescue excavations at the site in November 2015. Aside from halting the destruction, the project has several goals. The first is to establish the lay-out, development, and function of the site. The second is to increase our understanding of the Pre- and Proto-Aksumite period. The third is to explore the site's relationship with Aksum to the east and with populations occupying the territories even further west.

When Finneran and Phillips performed their survey in the early 2000s, there was already large-scale destruction of Mai Adrasha. Finneran and Phillips worked with the local government to construct a fence around an assumed perimeter of the site (Phillips 2005). Construction of the fence was completed in 2003. When the UCLA team first visited the site in 2014, the fence was almost completely dismantled. All that remained were the 6 stone pillars of the gates. In 2015, the UCLA team partnered with the local police force and the local government branches to keep looters off the site. To date about 200 square meters of the site is destroyed. For the 2015, 2016, and 2017 excavation season, trenches were placed on the border of the destroyed area to discourage further destruction. Due to extensive community efforts, destruction of the site has stopped.

The UCLA Shire Archaeological Project concession area is in the vicinity of the modern town of Inda Selassie also known as Shire in southwestern Tigray. Inda Selassie is located about 50 km west of the ancient capital of Aksum on the road to Gondar. The UCLA Project concession area is 100 square kilometers (Figure 2.3). The top right corner of the area is located slightly north east of Inda Sellassie and ends near Mezaber Adi Menaber directly south of Selekleka. Mai Adrasha sits immediately east of Shire south of the main road to Aksum and Adigrat. Though the survey has expanded to include other sites, the project has only excavated at

Mai Adrasha thus far. Most archaeological work in the Tigray has taken place in the eastern highlands, and the University of California, Los Angeles excavations represent the western most systematic excavations to date.

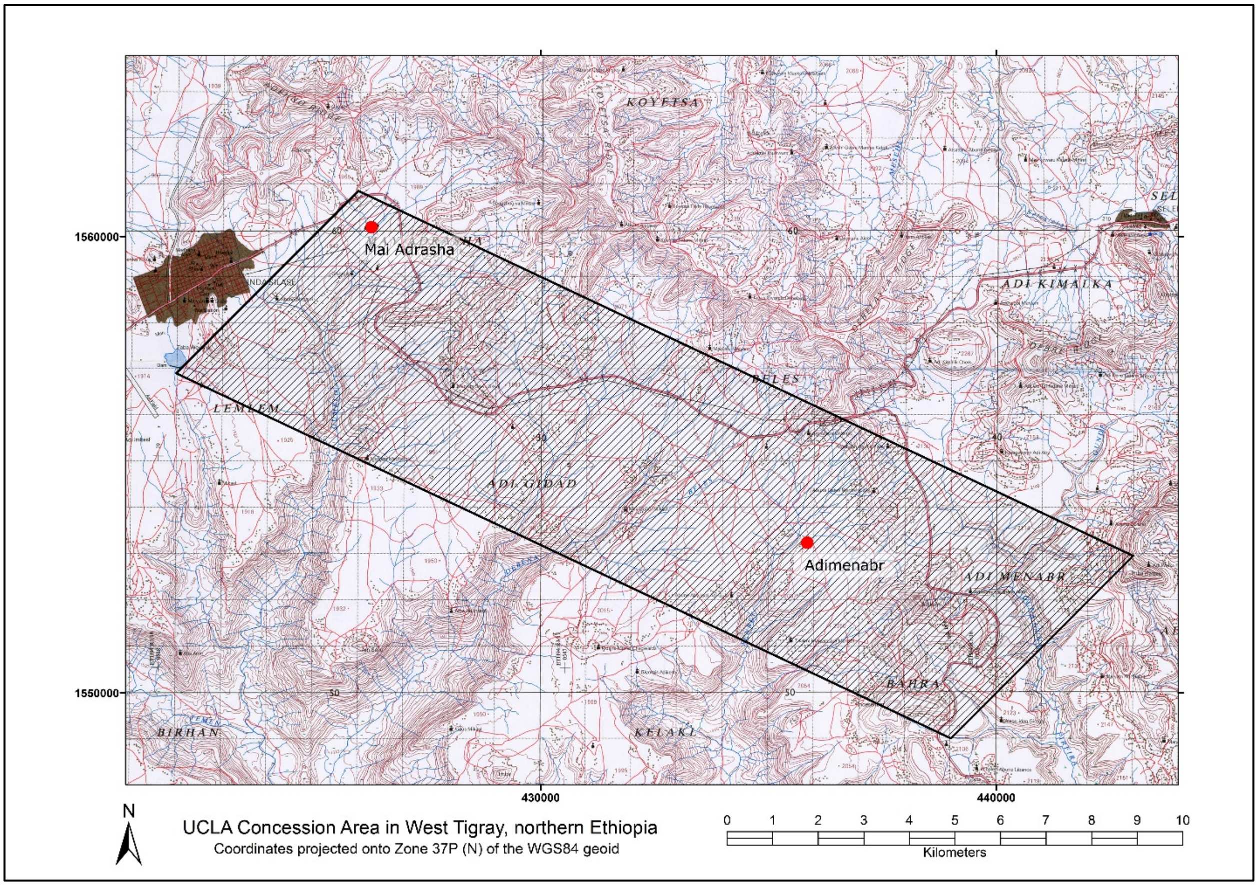


Figure 2.3. Concession Area of Shire Archaeological Project. Map created by Hans Barnard.

The area around Inda Selassie was opportunistically surveyed by Niall Finneran and Jacke Phillips in short visits from 1993-1997 and for a full season in 2001 (Finneran 2005; Finneran and Phillips 2003). Their concession area focused on Inda Selassie, its immediate vicinity, and areas east and northeast of the city. Work in the UCLA concession should complement Finneran and Phillips' work as it overlaps slightly with their concession area and extends further south and east. Though their work was never fully published, Finneran and

Phillips have graciously agreed to share their maps and notes with the UCLA team. In viewing the surface finds and conducting some small test excavations, Finneran and Phillips tentatively date Mai Adrasha to the Proto-Aksumite period, but with possible occupation until the Late Aksumite.

Main goals of the first excavation season in 2015 were to assess the damage at the site and determine whether enough secure contexts were still in existence to warrant continued excavation. In nearly all areas, substantial stone architecture was uncovered immediately below surface level, and it was clear the site still had much to offer.

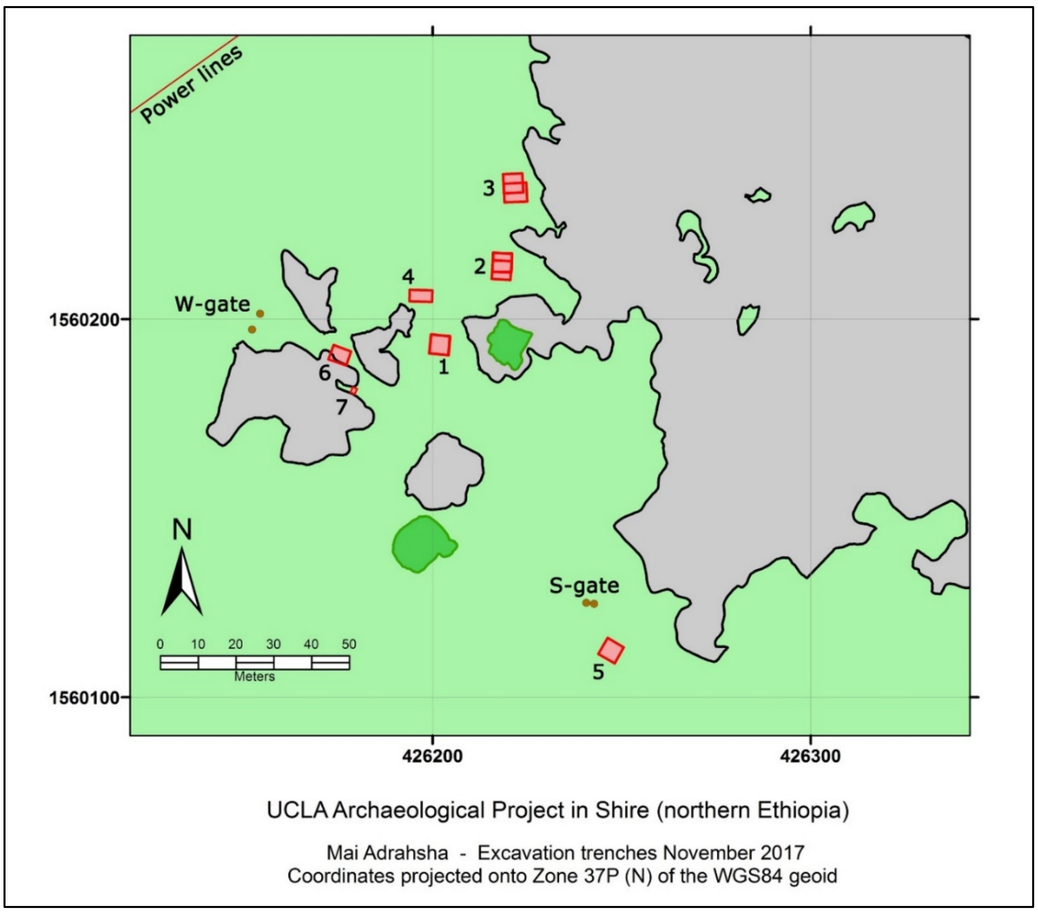


Figure 2.4 Location of trenches excavated by the the UCLA Shire Archaeological Project from the 2015 to 2017 seasons. Map created by Hans Barnard.

To date, we have opened seven trenches at the site, which vary in size from 1 x 1 m to 5 x 6 m (Figure 2.4). Trench 1 or MA 01 measures 5 x 5 m and has been excavated over three seasons (2015, 2016, and 2017). Already in the first season five intact stone walls were uncovered. A large south area, a slightly smaller north area, and a very small southeast area. Burn horizons were uncovered in both the south and north areas. It is possible that all the walls were plastered as burnt pieces of plaster have been found on two of the walls (0019 and 0028). In the north area, a pit was uncovered that contained metallurgical debris, including crucibles and slag. It is possible that Trench 1 and/or the area surrounding was used for metal production. Two clear periods are present from charcoal ^{14}C dates. The first is the 8th to the 5th centuries BCE. The latter is the 1st and 2nd centuries CE.

Trench 2 or MA 02 has also been excavated over three seasons (2015, 2016, and 2017). In 2015, it originally had an extent of 5 x 5 m, however because the soil is very compact and removing the topsoil was becoming quite time consuming, we reduced the trench dimensions to 5 x 3 m. In 2017, the trench was again extended to 5 x 5 m, but this time to the south in order to clarify the extension and the function of the space uncovered in 2015 and 2016. In trench two a central space, delineated by four walls with a central platform was uncovered. A large amount of cultural material was found including a number of large storage vessels, which may indicate domestic use of this space. To the south, a small area enclosed by four walls was uncovered. The trench supervisor during the 2016 and 2017 seasons, Dil Singh Basanti, hypothesizes in preliminary reports that this area was used for a staircase or an area to hold animals. The dates from Trench 2 begin in the 13th century BCE and continue to the 1st century CE from charcoal ^{14}C dates. The majority of dates and seemingly the major occupation of this area is around the 8th to 6th century BCE.

Trench 3 or MA 03 was excavated over two seasons (2015 and 2017). Like Trench 2, in 2015, Trench 3 was originally laid out as 5 x 5 m, but was reduced to 5 x 2.5 m, because the soil was sterile for the first 20 to 30 cm. Since we eventually came down of four walls and a stone pavement in 2015, we decided to extend the trench 1 meter to the east and 2.5 m to the south, creating a 5 x 6 m area. In general, the soil from Trench 3 was quite moist and compact and relatively fewer artifacts were uncovered. An occupational layer tops the pavement, which contained flakes of charcoal, pottery fragments, lithic material, and small metal pieces. Two Late Aksumite coins were found in the top layers of debris. The dates from Trench 3 range from the 10^{th} to the 6^{th} centuries BCE from charcoal ^{14}C dates. The dates of the coins are from the 7^{th} century CE, but since they were found in the upper levels of the trench, they were probably deposited after the building represented by the extant walls had gone out of use.

Trench 4 or MA 04 was excavated over a single season (2016). This trench was laid out as 6 x 3 m to incorporate a ridge feature between fields. Four stone walls were found delineating a room space. This space was topped by wall tumble and a reuse layer that consisted of a small pot stand made of five stones arranged in a circle along with a large number of ceramic and charcoal fragments. The top layers of this trench were clearly modern as they contained a pair of pants, a bullet, a razor blade, and plastic. One date for Trench 4 is in the 3^{rd} century BCE, while the other three are in the 6^{th} to 8^{th} centuries BCE. All dates are from charcoal.

Trench 5 or MA 05 was excavated over a single season (2017). Magnetometry survey in 2015 revealed a large circular anomaly about 5 m in diameter in shallow soil located at the southern border of the site. Trench 5 was opened with 5 x 5 m dimensions to investigate this anomaly. Trench 5 was located at a significantly lower elevation than the rest of the trenches, and it was clear that runoff from the site characterized much of the deposition. All the deposits from Trench 5 appear to be erosional in nature and only a few artifacts were found. Results from Trench 5 show magnetometry to be an ineffective method at Mai Adrasha, as no circular features possibly related to the anomaly were identified during excavation. No dates were taken from Trench 5.

Trench 6 or MA 06 measures 5 x 4 m and was excavated over a single season (2017). The 8 m long southern wall of a large structure was exposed during the course of illegal excavation. Trench 6 was opened to examine the purpose and occupation of this structure. Several use, reuse, and remodeling episodes were documented in the excavation of Trench 6. A number of intermural walls were uncovered. Within this area two plaster floors were uncovered along with a substantial burn event. One date was taken from the ash layer beneath the building, dating to the late 12th to the late 11th centuries BCE. The other dates were taken stratigraphically with earliest in the 8th century BCE and latest in the 1st century CE. All dates were taken from charcoal.

Trench 7 or MA 07 was a 1 x 1m sounding excavated over a single season (2018). The purpose of this trench is to establish a depth of deposit and to provide a stratigraphic sequence to compare to other units across the site. Trench 7 was located at the edge of the destroyed area southwest of trench 6. This area was chosen, because of the clear depth of deposit visible in profile with a clear ash lens about 2m beneath the surface. After excavation, it was clear that the trench represented a long-term trash dump capped by natural deposits and architectural collapse. The trench did not reach bedrock but surpassed all other trenches in maximum depth. It reached the ash lens mentioned above and found a pit that contained many large burnished and impressed black topped sherds. Three dates were taken from charcoal from Trench 7. The most recent was in the 3rd century, followed by a date around 600 BCE, and another around 700 BCE. Excavation continued in the 2018 season.

CHAPTER 3: Ceramic Studies and Archaeology: Classification and Typology

3.1 The History of the Ceramic Type

Ceramics are the most ubiquitous archaeological artifact on Aksumite sites. As such, they have the potential to present a wide range of information but are most often employed in questions of chronology, trade, function, culture, and status. How ceramics should be recorded, classified, and employed to answer questions about the past has long been a topic of debate among archaeologists. This dissertation seeks to resolve some of these issues by comparing four typological methods. To this end, I view types as a modern organization of traits that portray some part of an ancient cultural reality. While, a typology is a set of these types that are often period and region specific developed artificially by the ceramicist to communicate the composition of an assemblage and answer questions. To further explain and contextualize my position, I first discuss the history of debates on classification.

The value of studying pottery was recognized early in the discipline, though it was often limited to art historical study (i.e. Hamilton 1766). In the late nineteenth century and early twentieth century, that changed with Flinders Petrie's influential work on ceramic types and seriation (Petrie 1899). Using stratigraphy at the Neolithic site of Naqada, Egypt, Petrie creates ceramic types. He then uses seriation, or assembling defined types into a chronological sequence, to order different Neolithic sites chronologically. Petrie's work was shortly followed by work on seriation on stratified sites in American archaeology (Nelson 1916). From this point, ceramic types are organized to show development and employed mainly to answer chronological questions in stratigraphic excavations and, eventually, on surface scatters. This culture-historical line of thought becomes circular as types are used to identify periods and periods are used to identify types.

Following Petrie's pioneering work, archaeological research becomes heavily reliant on types for many of its interpretations. From the 1940s onward, there was a growing discomfort with this line of subjective 'typological' reasoning. Because of their frequent use of types, archaeologists seek to understand them better and create more systematic approaches to their study. It is around this time that a heated debate begins concerning the nature of the ceramic type. Some ceramicists view types simply as tools created solely by a scholar to aid in research, while others see them as the reflection of a cultural reality. On one side of the debate, James Ford (1938, 1953) and John Brew (1946) argue that pottery types are analytical constructs and that ceramicists should constantly form new classifications to suit different questions. On the other side, Albert Spaulding (1953a, 1953b), Walter Taylor (1948), and William Krieger (1944) believe types are real and inherent in every ceramic data set. For these scholars, types are discovered in the data not created. If types are discoverable cultural phenomena, archaeologists could employ them to justify a wide range of theories about the ideas and values of past societies. Therefore, the two above theoretical stances reinforce that our interpretations of ceramics and their meaning have very large and real consequences for our understanding of the past.

For Anna Shepard (1953), the type is an abstraction of the ceramicist, as it is based on a generalization of large numbers of ceramic fragments and is simply a tool of the researcher. Shepard warns of the danger in identifying ceramic types or traditions with cultural entities. Though many ceramicists agree that types are tools created by archaeologists, this is repeatedly forgotten in performing other analysis, where types are often employed as though they have deeper cultural meaning. For William Adams (1964), typologies are tools for the archaeologist, and types are indeed an abstraction. He argues, however, that ware, a broader category than type, should be employed when ceramics are used to answer larger questions. Adams states that wares, a broader category, are a result of both cultural significance and availability of raw materials (1964:128). In other words, they are created within the confines of a cultural tradition in a specific physical environment. Adam's ware-type method just appears to be a larger scale type-variety method, and it is unclear why wares should be more culturally significant than the smaller category of type.

In classifying Medieval Christian and Meroitic pottery from Sudan, Adams outlines the definition of ware and how to define different wares in a somewhat systematic fashion. Adams combines analysis and synthesis of sherds found (Adams 1962, 1964). He frames his study as a tool to aid in the identification and dating of sites for archaeologists, not as a comprehensive description of the ceramics of a culture (1964:126). His analysis is based on five categories of attributes: fabric, form, decorative style, surface colors, and surface treatment. Adams stresses that variation in each of these categories should be analyzed separately, but because fabric, form, and decorative style displayed the greatest variation in his corpus, they are emphasized in his typology. Adams' synthesis is looking for recurring combinations of all five of these factors. He calls broad categories of these combinations, "wares". Though wares had been described and employed by other researchers (Gifford 1960; Hargrave and Colton 1935; Wheat, Gifford, Wasley 1958), Adams seeks a systematic way to identify them. For him, a ware is a single fabric and decorative style appearing on a specific group of forms. Shepard and Adams support this more quantitative method of classification rather than the "look and feel" or intuitive method advocated by other scholars (Smith, Willey, and Gifford 1960), because of its systematic and reproducible nature. Many ceramicists continue to employ Adams' ware method (ex. Wilding 1989, Rice 2003).

A key question running through the debate on the nature of types is which ceramic attributes should be prioritized or utilized in the creation of types or wares. Adams (1964) utilizes basic features common to most ceramics, like fabric, form, decorative style, surface colors, and surface treatment and prioritizes the attributes that show the most variation in his assemblge. Brew (1944), on the other hand, argues that we must employ attributes that have cultural saliency. The difficulty, of course, is identifying those attributes that are of great cultural import to any individual group. Shepard (1953) advocates for the use of technology, which she believes can bring us closer to the lives of artisans themselves. Many others later agree (Costin 1991, Hegemon 1998, Rice 2003). For instance, Prudence Rice believes that emphasis on technology allows us to more easily make inferences about production, organization, location, and trade distributions (2003:287). Others (Redman 1979, Spaulding 1960) argue that co-variation of attributes may indicate their cultural import, and thus focus on simultaneous change in the creation of types.

Scholars discontented with the amount of subjectivity involved in creating types and choosing attributes have broadened and varied their approaches. In this endeavor, ethnoarchaeology is used to gain more complete understanding of ceramics (Arifin 1991; DeBoer and Lathrap 1979; Donnan and Clewlow 1974; Kramer 1985; Schiffer 1987). Researchers use modern folk classifications to gain new ways to consider ceramic creation and use in the past. These typologies group ceramics according to native systems and are usually divided by use, but also size and shape, rather than surface treatment, color, fabric, or decoration, which are parameters often employed in classifications devised by archaeologists. In native systems, modifiers are often added to the function of a vessel to create type names, and these usually have to do with the size and intended contents of the vessel. For instance, among the Motu of Papua New Guinea, *nau* designates a dish (Arifin 1991:381). A *nau bara* is a large dish typically used for serving or communal eating, and a *nau pore* is a medium-sized individual dish used for eating. These categories are often non-replicable to outsiders (Birmingham 1975; Pastron 1974; Rice 2003:279). Thus, archaeologists need to use caution in employing any given classification, especially when descendent communities are no longer present. Researchers should also be careful not to force an alignment between types from folk classifications and devised archaeological types when they may not have been immediately apparent and potentially significant differences.

Alongside the use of folk-typologies, the type-variety system of classification is an alternative to site specific subjective typological classifications. The type-variety method was first published by Joe Wheat, James Gifford, and William Wasley in 1958. It is the result of a meeting of American Southwest archaeologists to grapple with the great proliferation and lack of organization of types in 1957. There was, and still is, a tendency for researchers to individually classify material at each site without regard for any larger, regional classification, thus allowing for little or no comparison between sites and cultures. According to the type-variety system, each type should appear different, be restricted temporally, and bounded spatially. Ideally, a type should reflect some sort of community-wide standard. Varieties differ from the broader type in one or more minor attributes reflecting concepts and ideas specific to the artisan. A type with its varieties is called a “type cluster” that are then grouped into ceramic systems. Type clusters are often identified by two words. The first relates to where the type comes from or was first identified. The second often describes surface color, treatment, or decoration (e.g. Owens Valley

Brown). In 1960, Gifford identifies five key constructs of the system: variety, type, ware, sequence, and series. He attempts to link these constructs to aspects of the cultural system under study and the production process. From the 1960s onward, the type-variety system was very popular in new world archaeology, but never became quite as popular elsewhere. Wheat, Gifford, and Wasley focus on creating a regional framework for ceramic description, and their method has strength in its temporal and spatial specificity but lacks consistency in the way types are formed making the validity of broad comparison questionable.

In an attempt to understand the rapidly expanding field of ceramic studies, in 1956, Anna Shepard published the first major synthesis of approaches, which was followed by several others (Sinopoli 1991, Orton, Tyers, and Vince 1993; Rice 2003). In her preface, Shepard discusses how ceramic study expanded from relative dating to broader areas of cultural significance (Shepard 1956:iii). Still, Shepard focuses much of her book on classification and typology. In the 1980 edition, Shepard bemoans the lack of change in pottery classification. Sadly, this is still the case, as the most notable changes have come about because of advances in computing and statistical methods rather than any major theoretical change. Rice echoes this opinion again in 2003 (Rice 2003:288).

In her criticism of typologies, Shepard fixates on the ceramic “type” as presenting several problems. Shepard asserts that use of the “type” had become so intensive in ceramic study that it had avoided change and appraisal (Shepard 1956: 307-318). She criticizes ceramicists for overlooking technology and stresses the need to understand potters’ materials and methods when classifying pottery. Some other problems that persist for ceramicists stem from early work on classification that contain excessive splitting and modelling based on evolution. One issue is that a typology with excessive splitting is very difficult if not impossible to reproduce. The more specific the definition of a type is the more difficult it is to recreate the logic used to generate that type. Related splitting makes it much more difficult to compare types across archaeological cultures or sites. With modelling based on evolution, types are treated like species and their definitions and traits become inflexible. Along with types sometimes resembling biological species, the divisions between them are often arbitrary and decisions behind the divisions are usually not made clear. With the type, we focus on a single unit of analysis, and because this is the case, Shepard encourages scholars to adopt flexible definitions. Archaeologists are always working with incomplete data, and thus, our definitions should be constantly altered as new data become available.

A problem that Shepard points out, and still exists, is that when new material is published it usually is in reference to already established types rather than altering the definitions of those types. Some scholars believe that types and typologies should be changed or built from the ground up to tailor to particular research questions. Charles Redman (1978) is an early advocate of this method. He encourages using raw data to answer questions directly and warns that to be confined by typologies and specifically those that were made with only chronology in mind make us blind to other important patterns in the data. He encourages analysis of microvariation within sites, insisting that both intra and inter-site variability are the keys to understanding larger historic and social processes. Redman encourages intra-site comparison. He warns that when typologies are created to characterize a single site, important patterns within that site are lost. Already, Brew (1944) encourages the creation of many classification schema for a single data set.

Much like Redman, Shepard recommends focusing study on the features or attributes that undergo change. Rather than trying to merge disparate traits changing at different rates through time into single types and then comparing those types, Shepard encourages ceramicists to study the change in the traits themselves. Researchers can then contemplate the following questions:

- What is the nature of the change?
- How do persistent features compare with those that are new?
- Do new traits correlate with the adoption of new materials or methods?
- Is technical development followed by stylistic change, vice versa?
- What are the reasons for the change?
- Are other styles being imitated?

After Shepard’s seminal work, a remarkable expansion of the field of ceramic studies occurred. Clive Orton, Paul Tyers, and Alan Vince refer to Shepard’s synthesis and the time immediately following as the contextual phase of ceramic study (1993:13). As the range of scientific techniques increase ceramicists are able to study smaller and smaller units. Additionally, researchers begin to pay closer attention to contexts. For example, links between habitation and burial assemblages are discussed, and site formation processes are considered. It was at this time, that both technology and ethnoarchaeological studies, related to ceramics expand to almost every region. These changes in turn affect classification and typological study of ceramics.

Many important advances immediately following Shepard, in the 1960s, are due to the growing availability of computers, which allow archaeologists to apply more advanced statistical approaches to their classification methods. Branching away from subjective typological reasoning, many archaeologists take solace in more rigorous quantitative methodologies. Albert Spaulding (1960) first proposes that types should be defined by patterned combinations of attributes found through statistical analysis. He is soon followed by Jim Doran and Frank Hodson (1975) who use numerical taxonomic and multivariate statistical techniques to identify types, classes, or clusters. One form of multivariate analysis, cluster analysis, is popularly employed since many variables could be considered simultaneously. Other techniques, including association analysis, consider variables individually and seek to replicate the physical sorting archaeologists do in the field (Spaulding 1953). Recently, however, the use of statistics in ceramic study has moved away from direct work on classification and now often focuses on explaining the results of other scientific methods i.e. mass spectrometry and x-ray florescence (Cariati et al. 2003; Neff 2003).

Two major works have revolutionized typological studies in the last several decades and cannot be overlooked, William Adams and Ernest Adams 1991, *Archaeological Typology and Practical Reality: A Dialectical Approach to Artifact Classification and Sorting* and Dwight Read 2007, *Artifact Classification: A Conceptual and Methodological Approach.* These works represent opposite opinions in the typological and classification debates. For Adams and Adams, typology branches towards the realm of art rather than science. The authors reject quantitative methods in creating typologies in favor of a subjective approach. Read, on the other hand, relies nearly exclusively on quantitative methods to discover types that he believes exist in any data set.

To isolate types, Adams and Adams employ what they, and Rouse (1960) before them, call the "intuitive gestalt," which is the capacity of the human brain to find patterning. For any ceramicist, the more experience they have studying the artifacts in question, the easier patterns will be to find. The authors do, however, present some guidelines in the definition of types. Though they may be difficult to define, the authors insist that boundaries must be well specified.

Once these boundaries are established, the set of types must be exhaustive and mutually exclusive.

Adams and Adams believe that typologies are foremost a tool for an archaeologist and recognized that no single typology can apply to all questions and theories. In the same vein as Redman (1979), they promote the creation of multiple typologies to answer different questions. They state that finding and creating the right typology is essential, as typologies are a starting point in the development of theory (Adams and Adams 1991:313). To address this, they create a sort of typology of typologies where they list six different types. (1) Phenetic typologies focus on material properties. (2) Stylistic typologies focus on ethnic and cultural identification. (3) Chronological typologies emphasize seriation and have the goal of ordering the site. (4) Functional typologies focus on the use of objects through physical attributes as well as use-wear analysis and find context. (5) Emic typologies try to tap into the mind-set of the makers and users of the artifacts. (6) Cultural typologies aim to classify different cultural units. As is clear from this list, and as others have pointed out (i.e. Read 2007:72), Adams and Adams' typology list is not exhaustive and the categories are not mutually exclusive, nor are the methods to create each type clear. The authors assume that researchers will intuitively find patterns in materials and intention is most of what one needs to create one of the above typologies. Read criticizes the authors for assuming modern intuition can be imposed upon past groups (2007:73). He accuses the authors of "archaeological imperialism", since use of the gestalt principle makes it difficult for researchers to maintain cultural relativism and most cannot help imposing their own cultural reality onto the past.

In the creation of so many variable typologies, Adams and Adams clearly see them as tools manufactured by the archaeologists. They, however, do not believe types to be strictly artificial, but rather some blend of natural and artificial (Adams and Adams 1991:68). In fact, the authors state that some types, those identified purely with intuitive gestalt, display greater naturalness than others that were found employing different methods. In the creation of types, Adams and Adams favor stepwise differentiation. First, the researcher picks out types that clearly stand out from the others and then follows an increasingly more formal examination of individual features. In this way, the development of any type is a "continual feedback between induction and deduction" (Adams and Adams 1991:67), though induction and subjective reasoning are clearly favored.

Read acknowledges that some subjectivity is involved in creating classifications but believed that types can and should be discovered empirically. He takes issue with typologies created with chronological goals. Though ceramicists are often able to use these typologies to identify periods, Read believes that if a typology works to this end, it is not enough. He states that we must instead know *why* it works. In an effort to do so, Read outlines three specific ways to find types (2007:299-300). The first is object specific, and thus no reference population is needed. With this method, ceramicists divide a sample based on clearly observable attributes. The second is finding a bifurcated quantitative variable, which can be done with or without a reference population. The third needs a reference population and involves finding different modes of a single variable. These can be discovered through a variety of statistical techniques, i.e. clustering and scatter grams. All three methods describe observable changes in individual attributes over a sample. Read believes that change reveals cultural saliency and that a typology is only appropriate if it can tap into cultural reality. He claims changes represent cultural saliency, because they signify choices made by an artisan in the past. In this way, we can distinguish groups that have cultural meaning.

Throughout this discussion it is important to note whatever terminology we employ, whether it is ware, type, or prototype, we are recognizing some pattern in the archaeological record. Associating two or more attributes of ceramics, regardless of method, does represent some pattern in the behavior of ancient peoples (Hill and Evans 1972:261). Whether this pattern represents clear ancient cultural norms is another matter. My position in the typological debate is that a type can be both a reflection of modern priorities and cultural realities. Types are certainly tools developed by researchers. We develop them subjectively with different choices in attributes and how to prioritize them. What we as researchers decide to prioritize may not have been most important to a society, as ethnoarchaeology and folk typologies have shown. However, the attributes of types represent in some way a vestige of a cultural reality. Those features exist, and they are in some way a reflection of choices made by potters and consumers in the ancient world. Our task as archaeologists is to record, recognize, and organize those choices, so that we can identify change and continuity in the record. It is in this way that we will move closer to a more complete understanding of what life was like in that past. Thus, whatever, attributes a researcher decides to prioritize in creating types are a representation of ancient choices, and which choices we study, consciously or not, depends on how we create types. It is, thus, essential that scholars are explicit as possible about their methods.

One part of the discussion, often glaringly missing from many of the sources above is considering the purpose of types and typologies. Robert Dunnell (1980, 1982, 1986:153) identifies two schools of thought to this end, essentialism and materialism. Essentialists create types with the goal of organizing and describing an assemblage. Types are divided intuitively focusing on observed difference between objects. Essentialists do this in order to form chronologies and communicate with other specialists. In all regions, this is how classification began.

As theories of classification develop, some scholars question the goals of classification along with the nature of the type. These materialists create types with the goal of answering questions. They focus on change and variation in order to analyze not simply describe their assemblages. These two methods can also be described as classification and grouping (Dunnell 1971; Wendrich 1999). This division directly aligns with the nature of the type debate. If you believe types to be abstractions, you can use them to organize and communicate only, but if you believe types to represent some vestige of ancient cultural truth, then you can use them to answer questions about the past.

It is also possible to believe both, as I do. Types are still needed to organize and communicate, particularly when it comes to ceramics. Ceramic artifacts can be described as the sum of their attributes. For example, an object may be a shallow bowl with red fabric, large quartz inclusions, a horizontal strap handle on the exterior near the rim, a burnished exterior, and an incised concentric design of the interior base. While focusing in on a single attribute, say the distribution of the type of incised motif on the bowl to examine a question like trade, is often useful, details might be missed while not considering the entire object. After all, these pots were whole in the past with all of their many attributes. Say we find the same motif on a ceramic fragment from settlement A and another from settlement B. Without other information, we could conclude that these bowls were traded between settlements A and B, the two settlements belong to the same culture group, or somehow ideas were exchanged between the two. Which conclusion we would eventually settle on would require more information about the other attributes of the object, such as fabric, surface treatment, and shape. We cannot only look in terms of individual attributes but think about the whole objects as they were when they were produced.

Creating types is a simplified way to consider fragments and whole objects. Considering groups of attributes as whole shapes is a way to simplify and summarize the information in a large assemblage with many fragments. This allows the ceramicist to not only recognize some patterns in the field but easily communicate with other specialists.

The intuitive, historical, and statistical typologies in this dissertation are created primarily with summarizing data sets and communication within the scholarly community in mind. The goal is to describe Mai Adrasha's assemblage clearly to others and to develop a simple way to identify patterns while in the field. While, I have no doubt that the types made here are real patterns in the data, I cannot use them directly to answer questions about ancient behavior. In Chapters 6 and 8, however, I will discuss how with a larger data set some of these methods can be used both to generate new questions and answer questions directly.

3.2 Ceramic Study in Ethiopia

Across the board, there is little discussion of theory in Ethiopian ceramic studies, as many projects in Ethiopia have generally taken a culture history approach. Because archaeology is a relatively a young discipline in Ethiopia, few published ceramic typologies exist. For the most part, ceramic studies are associated with individual archaeological sites. For all periods, the only example of a typology created using multiple sites was published by Fattovich (1980). One other typology making use of multiple sites is expected to be published by Andrea Manzo focusing on the Pre-and Proto-Aksumite Periods.

Early excavations published photos or drawings of complete or nearly complete pots with brief descriptions of the pottery (de Contenson 1959; 1963a, 1963b). At Aksum, in his 1959 publication, Henri de Contenson associates black and red pottery with the Aksumite period and black and grey pottery with later periods (de Contenson 1959:33-34). At the site of Hawelti, de Contenson relates the ceramic finds to the pre-Christian period at Aksum, as well as, the other then known sites of Gobochela, Yeha, and Sobea. In his short report, however, his descriptions of the pottery are limited and mostly relate to describing whole vessels.

To my knowledge, the first publication devoted to pottery was *La Poterie de Matara* by Francis Anfray (1966). In this article, Anfray describes the ceramics at Matara as usually black or red with large mineral inclusions. He separates the ceramic assemblage into two levels. In Level I, red fabric is predominant, and a great variety of shapes are represented in this level, including, bowls, cups, jars, vases, and jugs. Here, Anfray proposes to separate the Aksumite period in two: Aksumite I (2nd to the 4th centuries CE) and Aksumite II (6th to the 8th centuries CE) (Anfray 1966:12). Within the Level I ceramics, Anfray recognizes two separate groups that may belong to Aksumite I. In Level I, Group I, black wares are the principle ware type, and crosses are rare. While, in Level I, Group II, red wares are more common often with a pink hue. Level II is dated to the Pre-Aksumite period (5th century BCE to the 2nd century CE) and presents less of a variety of forms. The most common were cups, plates, bowls, goblets, and tulip vases. The majority of pots have a red exterior and black interior, while red slip is common. Black pottery is more frequent in Level II. Anfray then compares the entire assemblage to other sites and regions. Anfray's preliminary descriptions of ceramics from both periods were used as a baseline for all studies that followed.

Anfray's work was continued by his student, Rodolfo Fattovich. As a young scholar, Fattovich published a few articles on the ceramics recovered at Yeha (Fattovich 1972, 1976, 1978). The first, published in 1972, discusses only artifacts recovered from sondages in the area of Grat Be'al Gebri. Pottery is sorted first by surface color and secondarily by surface treatment and decoration. Fattovich's observations focus solely on dating. He identifies two periods at Yeha, one dating to the pre-Aksumite (5th to 4th centuries BCE) and a second, immediately overlaying the first layer, dating to the Late Aksumite or early Post-Aksumite period. Fattovich also notes that the Pre-Aksumite pottery at Yeha is quite similar to that found at Matara (level IIa).

Shortly after, Fattovich published a preliminary chronology (Fattovich 1976) for the Pre-Aksumite periods at the site of Yeha based on the pottery and a more detailed description of the ceramic assemblage (Fattovich 1978). In these studies, categorization and description of vessels rely almost solely on surface color, temper, and treatment, though paste, modelling, and decoration are occasionally mentioned. Outlining his methodology in the beginning of his 1976 article, Fattovich says his analysis relies on three main factors: temper, surface color, and surface treatment. Unfortunately, what Fattovich exactly means by his surface color descriptions is often unclear. For example, what is the difference between reddish brown versus brick red? Without images, references to known pieces, or Munsell codes, his categories are not easily employed for further study.

Based on what Fattovich calls a pottery series, he identifies three principal phases of occupation related to three series of ceramics. The first is dated to before the construction of the large structure or 'palace' at Grat Be'al Gebri. The second phase is contemporary with the construction of the building. The third phase is contemporary with renovations to the building.

Fattovich then uses a combination of his chronological phases and pottery series to compare Yeha to other known pre-Aksumite sites. He concludes that Sefra Abun and Sefra Turkei are similar to the first phase at Yeha. Kaskase, Ona Hatchel, and Matara all have similarities to the second phase. Hawelti has similarities to the second phase in its 'south deposit' and third phase in the area of the small temples. Lastly, there are no clear parallels with Sobea.

Fattovich synthesizes his ideas further in *Materiali per Lo Studio della Ceramica Pre-Aksumita Etiopica* (1980). As in his earlier publications, different groups of ware are distinguished based on the macroscopic observation of fabric, surface treatment, and color (Fattovich 1980: 9-34). Fattovich makes an effort to reference most of the known Pre-Aksumite sites in the 1970s but focuses on Yeha, Matara, Hawlti, and Melazzo. His descriptions often lack illustrations and are difficult to piece together. Conclusions and comparisons are often based on a few examples rather than a whole assemblage. That being said, Fattovich selects several characteristics that are still upheld for Pre-Aksumite ceramics. This includes black fine ware that is thin and highly burnished on inner and outer surfaces, blacktopped red ware, and orange ware with a grey rim. Fattovich eventually concludes that the ceramics can be divided into two groups: west Tigray and east Tigray/Eritrea.

The next major publication on Ethiopian ceramics was by Richard Wilding with contributions by Stuart Munro-Hay in 1989. Wilding was the main ceramicist for the excavations at Aksum directed by Neville Chittick from 1972 to 1974. Chittick's excavations focus on Aksum's two most well-known cemeteries: the stela park and the Gudit stela field with additional work at the tombs of Kaleb and Gebra Masqal. Thus, the ceramics analyzed by Wilding come almost exclusively from funerary contexts, which were often elite in nature. Wilding's work focuses on two main assemblages: one from the Tomb of the Brick Arches and the other from GT II tomb, from the Gudit stela field, the only one found intact by the expedition. The Tomb of the Brick Arches dates to the 4th century CE and the GT II tomb dates to the 3rd century CE both are in the Classic Aksumite period. Wilding's work remains the most detailed and influential publication on Aksumite ceramics. His typology is first based on fabric and then on form and shape, but with some emphasis on decoration and surface treatment. Wilding divides the ceramics into 5 different wares: Red Aksumite, Brown Aksumite, Grey Aksumite, Black Aksumite, and Brown Tigrinyan. The first four of these categories fall into distinct geographic and chronological groupings. Within each ware, Wilding divides the ceramics by form. Types seem to be split over very small details. There are over 60 types in Red Aksumite alone. Wilding's publication is comprehensive. He includes detailed descriptions of every complete or nearly complete vessel and sizable diagnostic sherd. This attention to detail has remained invaluable in further ceramic study. This typology serves as the main model for studies that followed.

Jacke Phillips authored the next major publication on Aksumite ceramics as part of David Phillipson's two volume publication of the British in Eastern Africa excavations at Aksum from 1993 to 1997 (Phillipson et. al 2000). Phillips work relies heavily on Wilding's typology, which was generated from the same site. These excavated materials at Aksum, however, cover periods which Wilding did not concentrate on in the early seventies, most notably the Pre-Aksumite period. Phillips published in depth ceramic reports for all the major areas excavated by Phillipson's project: the Tomb of the Brick Arches, the Mausoleum, the K site at Maleke, and the D site Kidane Mehret. Unlike Wilding, Phillips first considers each assemblage separately and then synthesizes the results from all the excavated areas in a section entitled "Overview of Pottery Development".

The Tomb of the Brick Arches represents a large assemblage with many complete or nearly complete specimens. In this section, Phillips notes that she uses Wilding's typology to create her own with some editions and corrections and makes use of part of Wilding's assemblage for her analysis. This is based on 351 vessels: 71 excavated in 1974 and 280 excavated from 1993-1996. In this report, Phillips calls greater attention to use ware and decoration in relation to context. For example, in the Tomb off the Brick Arches, she finds no evidence for use of the ceramics before being deposited in the tomb, the exception being two cauldrons and one brazier. In the Mausoleum, as opposed to the Tomb of the Brick Arches, much of the material was mixed and fragmentary. Because of this, Phillips bases much of her analysis of the Mausoleum material and specifically her decorative classification on the material from the Tomb of the Brick Arches.

Analysis of these funerary contexts is followed by a study of two habitation sites: the D site at Kidane Mehret and the K site at Maleke. The D site represents the first reported Pre-Aksumite assemblage in the Aksum area. Phillips notes that ceramics from D site are very different from Pre-Aksumite religious and burial contexts known from elsewhere in Tigray. To analyze the material from the D site, Phillips makes only some reference to work done on pre-Aksumite ceramics as the contexts are different (Anfray 1966; Fattovich 1976, 1978, 1980). Phillips immediately notes a higher standard of firing and manufacture than is usual for ceramics from later periods. Late Aksumite levels are also present at the D site and for this material, Phillips continues to make use of Wilding's typology. The second habitation site, K, is dated to the late 5th century CE. Here, she uses forms and types already established from the Tomb of the Brick Arches and the D site. Analysis and discussion of this site focuses heavily on comparison with the D site, in which the K site yields a much greater number of vessels fired under poor or uncontrolled conditions.

In her synthesis, Phillips separates the entire assemblage into ten phases divided between 6 periods: the Pre-Aksumite, Proto-Aksumite, Early Aksumite, Middle Aksumite, Late Aksumite, and Post-Aksumite periods. Phillips notes cautiously that this amalgamation should be considered in relation to the different contexts: materials excavated from 1993-1997 come from varied socio-economic classes and both burial and habitation sites. She makes general observations in each phase concerning technology, function, fabric, inclusions, surface, treatment, decoration, and form. Phillips improves on Wildings work through her attention to context, function, issues of preservation, and recovery rates. Phillips' work, however, is divided within the publication by excavation site within Aksum. Thus, it lacks the cohesiveness and coherence of other typologies. Partly as a result of this, many researchers still turn first to Wilding's 1989 publication.

The publication of the excavations at Mifsas Bahri are largely concerned with ceramic description and analysis as the lead editor, Michela Gaudiello, is specialized in Ethiopian pottery (Gaudiello and Yule 2017). Gaudiello's pottery classification rests on comparison with previous studies in Tigray, primarily from the area of Aksum. Ware types form the framework of her typology. She further divides ware types into fabrics which are well-defined in terms of color, hardness, texture, temper, coarseness, and surface treatment. Throughout the assemblage red and brown wares are the most common. Following division by ware and fabric, Gaudiello names her types by shape and includes Tigrinyan terms for traditional present-day ceramics, when she perceives similarities. The assemblage from Mifsas Bahri is dated to the Late, Post-Aksumite, and modern periods. Gaudiello treats various attributes as diagnostic of Late Aksumite. These include the association of brown, red-brown, and grey-black wares, black carinated pots, and applied oval bosses. Despite employing the metrics from studies in the area of Aksum, the author states that this assemblage differs significantly from others in Northern Tigray. Some elements Gaudiello cites as particularly common for the Late Aksumite at Mifsas Bahri. These include black burnished surface treatment, carinated or necked bottles, plastic pattern decoration, incisions under the rim, and punctures and incisions near the carination. Based on the presence of incense burners, fine versus coarse wares, and the presence of burning on exterior surfaces, the author describes the excavation spaces as cultic, ceremonial, votive, cooking, or eating spaces. Based on the presence of Purple Painted Aksumite ware and Aqaba ware, Gaudiello believes that there is a strong connection with the city of Aksum and concludes that it must be "an important southernmost outpost of Aksumite kingdom during the Late Aksumite Period" (Gaudiello 2017:149). Throughout this work, Gaudiello make frequent reference to the Aksumite area. The great distance to Aksum (around 300 km) presents an obvious problem that the author is well aware of. It is clear that further studies in the area of southern Tigray and careful comparative research is needed before forming definite conclusions.

Though these studies have given researchers today general guidelines to follow in examining assemblages from survey and excavation, much remains to be done. The only study presented as a complete typology is Wilding 1989. His publication remains the standard for the Aksumite period while Fattovich 1980 is the only option for the Pre-Aksumite. Though foundational, both need to be updated. Widespread use of Wilding's publication is problematic as it focuses on material from a single site and elite context. With the recent excavation of a number of Aksumite sites, there is a greater opportunity to compile and compare new ceramic data allowing for a greater regional and chronological understanding. Similar collaborative efforts are needed for pre-Aksumite sites. The next question is how we can best synthesize, analyze, and present these data. In the following chapters, I will suggest several ways we can approach this problem using both traditional and new methods.

3.3 Methods for Creating Typologies

In this dissertation I address some of the issues raised by Shepard (1980:iii, 307), Redman (1978:160), and Rice (2003:279, 288). I consider four typological methods. I create three typologies in which the same data set is used, but a different method is employed. In this way, I assess the strengths and weaknesses of each method and consider their efficacy to potentially answer particular archaeological research questions.

The data set I employ in this dissertation was collected over two seasons, 2015 and 2016, from the site of Mai Adrasha, Tigray, Ethiopia. The excavators collected the ceramics in one- or two-gallon size bags by stratigraphic unit and carried them back to the dig house. The ceramics were first brought into the registry, where the registrar entered them into the excavation database. The registrar provided two new tags with barcodes and registry ID numbers for each bag, one for diagnostics and one for nondiagnostics. They were then washed and dried in the courtyard of the dig house. I then sorted them into diagnostic and nondiagnostic sherds and provided each bag with the appropriate tag. I define nondiagnostic sherds as those that can only give information about fabric and surface treatment. For these sherds, I was not able to define, which part of the vessel they originally came from. On the other hand, I define diagnostic sherds as those that can give more information about the overall vessel in terms of shape or decoration. These include rims, bases, decorated pieces, handles, etc. Once sorted, nondiagnostic sherds were sorted by fabric types. Once sorted, each fabric group was counted and weighed.

Ceramic processing forms either paper or digital were completed for individual or groups of diagnostic sherds by myself, Haregwin Belete, and Gabriella Giovannone. Sherds were recorded as a group when it was clear that multiple sherds had originally come from the same vessel. Information was recorded in eight categories, including, General Information, Dating, Context, Metrics, Fabric, Morphology, Decoration, and Surface Treatment. All studied diagnostic sherds were photographed, sometimes additional photographs were taken with the small finds. Select diagnostic sherds were drawn, especially those that were well preserved.

Below is a description of the data entry page in Northern Horn Ceramics (NHC), the database I use to store and create most of the data points (see Chapter 7). The data record page contains many attributes the ceramicist can chose to record. Choosing which details to record in the field is a balancing act. Of course, researchers want to record as much information as possible, but in the interest of time, have to choose whether to record more artifacts or more attributes. As such, in most cases, I have not recorded every attribute on the page, choosing those that I believed to be most salient. I note where I have done so below. Also, some attributes were not initially included in the analysis, and thus, may not be recorded in earlier seasons at Mai Adrasha.

The first category on the data record page is General Information, which includes a unique title. I began this title with the year the sherd was collected followed by a hyphen, the bag number, and the sherd number, beginning with 1 for each bag. This unique title/name differs in format for the other researchers that have added records to the database from different sites. General Information includes a place to upload any images of the artifact along with scans of paper forms or drawing. There is also a place for general notes that do not fit into the categories included on the data record page. Just below notes, there is a place to enter information about the date of the artifact, including images of radiocarbon calibration curves. Dating information is only available for a few stratigraphic units at Mai Adrasha. The information we do have has not been added to the database yet, but we plan to add it in the near future.

Dating is followed by Context. In this category the site, recorder, and date excavated are entered. Excavation context information should be added. This includes trench, unit, excavation registry number, and unit classification (ex. domestic fill, trash deposit). This is not yet included in NHC. We are currently working to connect Mai Adrasha's excavation database directly to NHC. We then should be able to auto-populate this category.

Context is followed by Metrics. This includes diameter, percentage of circumference, thickness, height, width, weight, and sherd count. Diameter and percentage of circumference was only recorded when the sherd was large enough for the recorder to have some confidence in the measurement.

The next category is Morphology. This category includes data type (i.e. diagnostic, non-diagnostic, or nearly complete). This is followed by tentative shape (ex. jar, bowl). The next attribute is fragment type (ex. base, rim, body). If the fragment is a rim, the researcher may add the rim type (ex. everted, flattened, ledge). For this controlled vocabulary, multiple options can be selected. If the fragment is a base, the base type can be added (ex. ring, flat). If the fragment is a handle, the recorder can add whether the fragment is a grip or a handle, and then whether it is vertical or horizontal. If the fragment is a handle, the recorder can choose strap or round. These last three variables were not regularly recorded in 2015, but this information was sometimes added in the notes. The last attribute is angle. Here, the recorder can upload a sketch of a rim or base piece.

Morphology is followed by Fabric. The first attribute is ware. The ware categories I employ were provided to me, while working on the UNO Project at Seglamen. The list was first created by Michela Gaudiello (2014). I added a few categories after working at Mai Adrasha and adding other sites' data to NHC. These are based only on surface color and the texture of the fabric. Thus, they may not align with actual fabric groups, making dating based on this parameter alone suspect. The interior surface, exterior surface, and core were all recorded with Munsell colors. I have chosen not to record these consistently. All ancient vessels made at Mai Adrasha were produced with an open firing method. As such, the potter had little control over of firing atmosphere and temperature. This often results in a single vessel displaying a range of colors on the surface. Thus, which colors are recorded are highly dependent on which part of the vessel is preserved, which may not give the researcher the correct impression of the appearance of the entire vessel. Following the Munsell colors, more details on the color can be added under notes. I have added here a controlled vocabulary of inclusions based on petrography of ceramic sherds from Mai Adrasha (Moy and Fischer *forthcoming*). The categories include quartz, iron oxide, rock fragments, feldspar, mica, and organics. After adding the inclusion type, the recorder is prompted to add subjective relative frequency and size. More precise frequencies and sizes requires petrographic work. Again, the recorder can add more detailed notes about the inclusions below this.

Fabric is followed by Decoration. The first attribute is decoration type (ex. molding, incising). This is followed by decorative motif. This category was added only recently as it was recorded at another site added to NHC. As such, I have added some of these motifs for the sherds from Mai Adrasha after field recording from photos and sketches. I chose not to record this attribute initially, because in many examples the pieces are so fragmentary that I was not able to get a good idea of what the original motif might be. Motif is followed by a quick sketch of the decoration.

Decoration is followed by Surface treatment. This includes the type of surface treatment (ex. burnishing, slipping), intensity, and location on the exterior or interior of the vessel. The recorder can also add if there is sooting and/or finishing marks, as well as their location. The variables, sooting and finishing marks were also added to the data record very late. Thus, they are not included in most of the entries from Mai Adrasha. Once collected, much of this data was used to create the typologies.

The first method is a traditional typology based on the intuitive patterns observed in the data. This method is clearly subjective and extremely dependent on the experience of the researcher. Intuitive typologies often rely heavily on complete or nearly complete vessels uncovered in excavation. Since in these examples as opposed to fragments, it is easier for the ceramicist to understand which attributes can be grouped together. Relying on complete vessels presents obvious issues, as it is unlikely most types will have well preserved examples. It further relies on the researcher observing patterns during analysis, introducing modern and individual biases. Examples of this method have been discussed in Chapter 2 and include Anfray 1966, Fattovich 1980, and Wilding 1989.

The second method is a typology based on previous studies performed on the ceramic assemblages from sites near Mai Adrasha. This method involves looking for the traits of previously published types in the new assemblage. An example of this method cited above is Phillips 2000. For my typology, I compare my data set two the two most well-known typologies from the Aksumite area, Fattovich 1980 and Wilding 1989.

The third method is a typology based on statistical analysis. For this method, I will predominately follow the work of Charles Redman (1978) as well as incorporate similar methods employed by a variety of other authors (i.e. Doran and Hodson 1975, Dunnell 1971, Read 2007, Peeples and Schachner 2012). In a chapter entitled, *Multivariate Artifact Analysis: A Basis for Multidimensional Interpretations*, Redman set out to create a reproducible method that is holistic and that analyzes multiple variables from multiple perspectives. He uses two ceramic assemblages from the sites of Qsar es-Seghir, Morocco and Cibola, New Mexico as his test groups. His method is straight forward and reproducible. Redman began by dividing attributes into inessential, essential, and key attributes following David Clarke (1968:71). Inessential attributes show the least amount of variation both across the site and through time. Essential attributes vary with respect to at least one interpretive dimension of the assemblage (i.e. time, locus, area). Key attributes are two or more essential attributes that are found to covary in some way. Redman then performs cluster analysis on key attributes.

In this method, the first step is exploratory data analysis though statistical methods (EDA). I rely heavily on visualizations of my data to assess variability and identify essential attributes. The essential attributes are then distilled into key attributes. They are identified through cross-tabulation of nominal attributes and scatterplots of continuous numerical attributes. Once key attributes are identified, rather than cluster analysis, I employ correspondence analysis (CA). Besides creating groups, CA has the added benefit of identify, which attributes are responsible for the most variance/similarity within the assemblage. Combinations of related attributes identified with this method will result in the creation of individual types.

A theoretical fourth method is also presented, a typology based on collective analysis. In order to achieve this, I created a web application where ceramicists working in Ethiopia can view and discuss raw ceramic data. The first goal of the site is to establish a standardized terminology. Steps towards this goal have already been taken at The International Conference on the Archaeology of Ancient Ethiopia held in Paris April 2016. Results of that conference are used on the website, and users can work together to standardize the terminology further. Users of the site can also create and comment on types. These types will also lead to the creation of variable typologies, thus facilitating discussion and comparison of ceramics over a wide geographic area and different periods. Ultimately, this will hopefully lead to the creation of a diachronic regional typology.

Finally, I compare the types created by the various methods. This process allows me to identify problems with the individual methods. The identification of these problems also permits me to evaluate whether a certain method are best suited to addressing different archaeological problems. Once the problems are known, archaeologists will be left with a more rigorous method for the creation of ceramic typologies and be able to identify bias associated with each method. This will potentially lead to less-biased, more explicit and more precise examination of a wide range of archaeological topics in the future.

CHAPTER 4: Creating an Intuitive Typology for Mai Adrasha

Introduction 4.1

Intuitive typologies are certainly the earliest and most common method of ceramic classification. Employing this typology, ceramicists use instinct and prior experience to divide ceramics as they see fit. Initial identifications are based on whole or nearly complete vessels as these are examples where the ceramist can clearly see different attributes being grouped together. If we have whole examples, we know that those attributes occurred together at least once in reality. While fragments may not be large enough or well preserved enough to show all attributes that occurred together. Creating an intuitive typology is purely subjective. Organization is based on how the ceramicist sees fit to divide groups. Attributes are prioritized based on what is most readily identifiable for the ceramicist. The goal of typologies of this type has historically been to understand chronologies at a specific site or region. This kind of typology is also useful for summarizing assemblages and communicating with other scholars.

Intuitive typologies have been used widely in Ethiopia. Examples include, Francis Anfray 1966, Rodolfo Fattovich 1980, and Richard Wilding 1989. Anfray created his typology with the single purpose of chronologically ordering contexts at Yeha. Fattovich initially created the site typologies for chronological reasons, but then, employed them to find cultural groups on a regional scale in an effort to better understand the pre-Aksumite period. Wilding's typology focuses most on chronology but takes context under much greater consideration than his predecessors. All three of these scholars first use surface color to divide their ceramic assemblages. Anfray and Wilding follow this with shape, while Fattovich follows surface color with the texture of the paste and type of inclusions.

As discussed in Chapter 3, all of these scholars must have been heavily influenced by ceramic work they had done previously. I, of course, am no exception and will describe here field work I have done associated with ceramics. In 2014, I worked as an assistant ceramicist on the URU Fayum Project in northwestern Egypt. In particular, I analyzed Greco-Roman ceramics from the site of Karanis dating to the middle of the third century BCE to the early sixth century CE. The majority of the ceramics I was exposed to were early Roman in date. In that same year, I served as a ceramicist on the UNO at Seglamen dating to and located just southwest of Aksum. I was exposed to other ancient Ethiopian ceramics while working as an area supervisor at Beta Samati.

4.2 Classifying Mai Adrasha's Assemblage

The surface color of the majority of sherds from Mai Adrasha can be described as ranging from orange to red to brown with no obvious division between them. There are some black and grey sherds, but they make up a very small part of the assemblage (8.6%). Thus, for this data set, it makes little sense to first divide by color, as all three scholars above had done. It should also be noted that archaeological ceramics from this region were likely open fired. As such, there was little control of firing temperature and atmosphere. As a result, surface color on a single vessel can vary dramatically (ex. from light orange to black). Thus, it makes little sense to divide by surface colors or take the time to record Munsell colors. Fattovich used paste as his second dividing attribute. In terms of paste, there is not an obvious distinction between a finer group and coarser group among the sherds from Mai Adrasha. Fine examples are easily differentiated but are very few in number (16.8%). Macroscopically most sherds can be characterized as medium-coarse. Mica, feldspar, and quartz are major inclusions in the Mai Adrasha assemblage. They feature in most sherds in varying frequencies. Extremely micaceous sherds are obvious, but often also contain feldspar and usually also quartz. Organic inclusions are extremely rare. In fact, when they are found in thin sections, they often seem to be unintentional. No clear paste groups are visible to the naked eye. Considering the above factors, I decided to begin my divisions with the attribute shape.

The most common shapes include bowls, cups, jars, and basins. Some other shapes in the assemblage include dishes and cylindrical vessels. Bowls are by far the most common shape (80.1% of all tentatively identified shapes). It, however, should be noted that most rim fragments were tentatively identified as bowls, but it is also possible they come from jars, pots, basins, or even the base rim of an unknown shape. For the types identified here, I limit myself to complete or nearly complete examples in order to avoid bias and assumptions from working on other assemblages. I define bowls as any open rounded vessel that has some depth. I separate these first by base type. Bowls with rounded and ring bases are both fairly common on the site. Round base bowls clearly appear in all four trenches. They vary in diameter from 19 to 32 cm. Ledge rims occur on some round base bowls with diameters of 25 to 30 cm. A few examples have molded parallel groves topping the rim. Others have an incised zig-zag design on the top of the ledge rim. All ledge rim examples have an orange or brown surface color, though one example appears to have a black exterior and orange interior. Rounded rims occur on round base bowls of all sizes (21-32 cm in diameter). They are either direct or lightly everted. One example (2016-AB-11, Figure 4.1) with a diameter of 21 cm also has a small horizontal molded decoration on the exterior. Some others have combed straight or wavy lines just under the rim interior. There are both shallow and deep varieties. All round base examples have an orange or brown surface color. A few have orange exteriors and black interiors. Two examples (2016-A-1 and 2016-P-2), have red slip on both surfaces. All round base bowls are coarse to medium-coarse in fabric texture. Burnishing rarely occurs and can appear on either surface or both.

Figure 4.1. 2016-AB-11. Bowl with a rounded base and rounded rim.

Figure 4.2. 2016-AN-1. Bowl with a ring base and vertical strap handle.

Ring base bowls also appear frequently in the assemblage. Though they only occur in trenches MA1 and MA4. They have diameters of 11 to 18 cm. These bowls all have rounded rims. They also appear to have a vertical strap handle on the exterior upper body and a horizontal molded decoration on the same location on the opposite side, usually in the form of a raised boss or an applied horizontal strip (ex. 2016-AN-1, Figure 4.2). All clear examples have an orange surface color which ranges from brownish to reddish and are red slipped on both surfaces.

Cups appear in MA1 and MA2. I define cups as small vessels with diameters 10 cm or less. Five varieties are present. The first occurs only in MA2. It has orange surface color and is stick burnished on the exterior as well as red slipped. The rim flares out slightly, and it has a rounded base. The diameter is about 10 cm. The second also only occurs in MA2. Its diameter is also about 10 cm. It has a flaring rim with impressions directly topping it. Bands of vertical incised decoration are on the exterior. The fabric is a coarse orange. The third example only occurs in MA1. It has a smaller diameter of around 5 cm. It seems like a miniature of a small shallow bowl with a simple rounded rim. It has a black topped orange fabric. The fourth variety likely functioned as a crucible and also only occurs in MA1 [ex. 2015-CN-1, 2015-BU-1 (Figure 4.3)]. It is conical in shape with a very coarse grey fabric. Their diameters are 4 or 5 cm. The fifth is the only closed example. It occurs as only one example from MA1. It has fine grey fabric with incised line decoration as four circles around the rim, which is rounded and curves upward. The diameter is about 10 cm.

Figure 4.3. 2015-BU-1 Crucible fragment, base and body.

Figure 4.4. 2016-J-12. Neckless jar fragment.

Jars occur in all trenches. I separate them into necked and neckless varieties. Unfortunately, most examples are not preserved enough to allow us to understand the shape of the body and base. Only one necked variety is clearly present with the only unambiguously identifiable example in MA1, which has a vertical walled neck, vertical strap handle attaching the mid-neck to the shoulder, orange fabric, and red slipped exterior. Three neckless varieties are present. The largest has a diameter of 19 cm and is present in MA1 (2016-J-12, Figure 4.4). It is very similar to examples of large storage jars that are numerous in this assemblage. It has an orange surface color. Its rim is rounded and flares outward slightly. The next largest has a diameter of 14 cm and is present in MA4 (2016-AU-8). This example is black topped orange with a marl fabric. It has a rounded rim with a lip that flares out slightly. The last example has a diameter of 8 cm and occurs in MA2 (2016-AG-8). The rim is flattened with impressed decoration on top. The fabric is light brown. Two other examples are jars, but it is not clear if they are necked or not. One from MA1 is quite large and might be considered a large storage jar (2016-AK-1). It has a black surface color and has impressed dot decoration on the exterior of the neck. The neck is everted and lightly rounded. The second is from MA3 (2015-AE-1). It has orange fabric and vertical walls. It is lightly slipped on the exterior.

Large jars, likely for storage appear in MA1 and MA2. Most examples are from MA2 (ex. 2016-AH-1, Figure 4.5). No complete example is preserved, but inferring from remaining fragments the height of some jars must be at least 100 cm, but may be closer to 130-150 cm. The form is essentially a large ring based jar that likely had a storage function as they could not be easily moved. Both the rim and base flare out slightly and are usually rounded. Most have orange or coarse orange fabric. Three jars have molding on the exterior shoulder. All three examples, have an upside-down u or v shape. One example (2016-AJ-1), also has a short molded vertical line on the opposite side of the u. The diameters range from 27 to 40 cm in diameter. All the examples with molded decoration have relatively large diameters of 40, 37, and 34 cm.

Figure 4.5. 2016-AH-1 Rim of a large storage jar.

Figure 4.6. 2016-AS-1 Rim of a basin.

Basins appear in MA1 and MA3. I define basins as open vessels with some depth with diameters larger than 35 cm. Basins from Mai Adrasha have diameters of 36 to 40 cm. They have rounded or flattened rims that are either simple, everted or ledge. Most are orange to brownish orange on the surface though one example has brown micaceous fabric (2016-AS-1, Figure 4.6). The vessel with brown micaceous fabric also has combed wavy line decoration right below the rim interior which flares out slightly. In one example (2015-AY-2), the ledge rim is grooved with rounded molded decoration on the top of the rim. Basins are most commonly simply smoothed on the surface but can also be slipped or scrapped. Unfortunately, no clear basin bases are preserved.

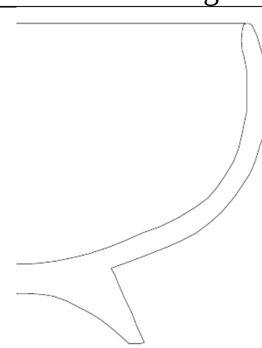
There are two examples of cylindrical vessels sometimes called vases. One is from MA1 (2016-J-13). It has vertical walls and a ring base. The diameter is about 13 cm. It has an orange smoothed surface. The other is from MA2 (2015-BV-1, Figure 4.7). It has vertical walls and a flat base. Its diameter is about 16 cm.

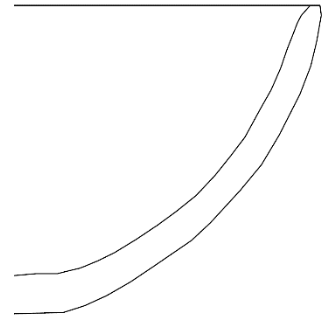
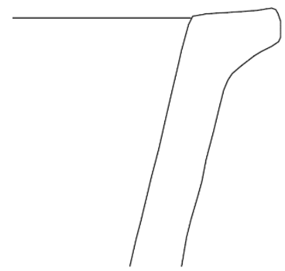
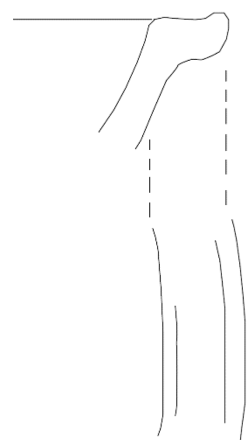
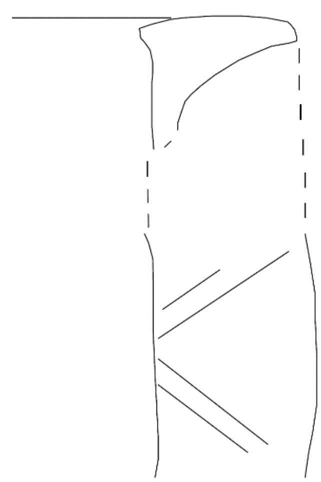
Figure 4.7. 2015-BV-1 Nearly complete cylindrical vessel

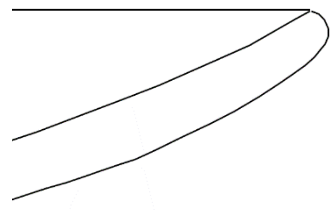
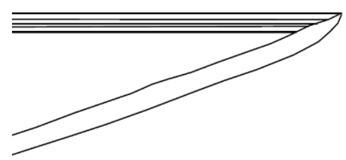
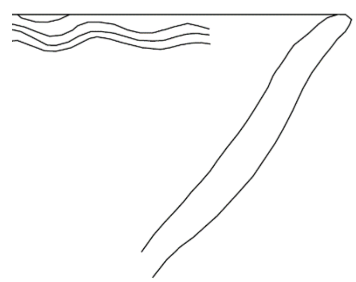
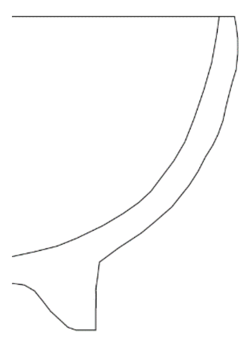
Figure 4.8. 2016-C-7 Rim of a dish.

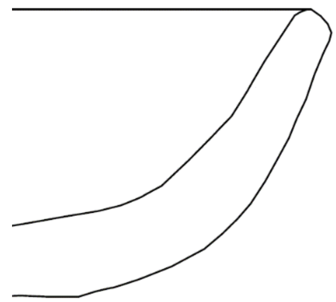
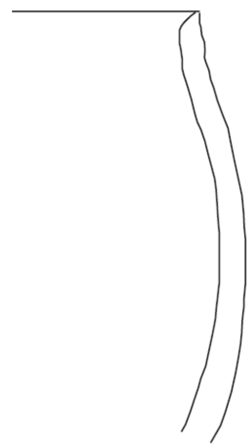
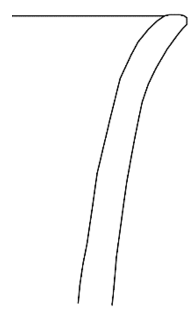
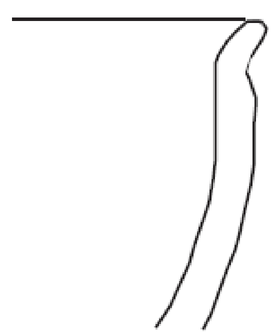
There are only three clear examples of dishes or large shallow vessels in the assemblage. They come from MA1 [2015-G-4,5 and 2016-C-7 (Figure 4.8)] and MA3 (2015-Z-1). Other fragments in the form of small sherds may possibly be originally from dishes. Each of the clear examples is very different from the others. The first example from MA1 is very large with a diameter around 57 cm and a thickness of 13.2 mm. It has a relatively flat base and rounded rim. The interior has decoration in the form of a molded line. The fabric is orange to pink. The second example from MA1 has a 28 cm diameter and a thickness of 7.8 mm. It has a rounded base with a slightly pointed rim. Its fabric is coarse brown. The example from MA3 not as large as the first example, but still sizable with a diameter of 37 cm and a thickness of 14.2 mm. Its fabric is a coarse grey that is rough on the exterior but smoothed on the interior. The rim flares out slightly and is indented.

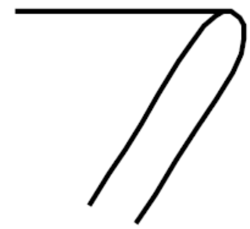
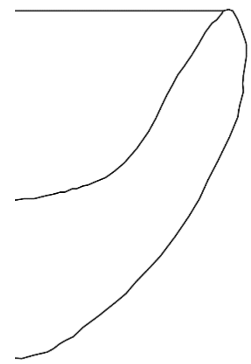
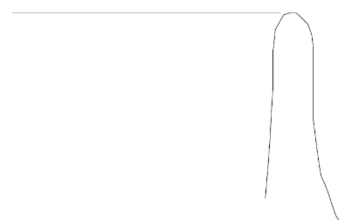
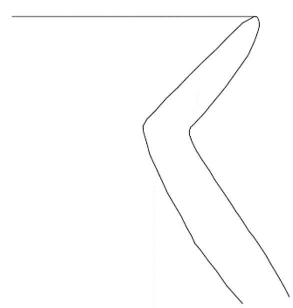
These types are summarized in the table below. The associated sketches are portions of drawings taken from examples at Mai Adrasha. I chose to only show a part of these drawings with the type descriptions, since the complete forms may include some features not included in the type definitions. For each type, I include a few examples of individual artifacts from Mai Adrasha. These are not an exhaustive list but can be considered representative of each of the types.

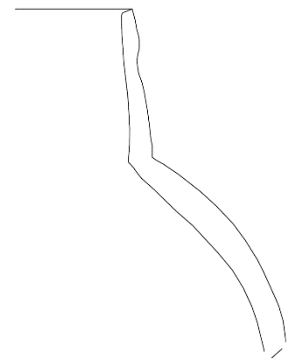
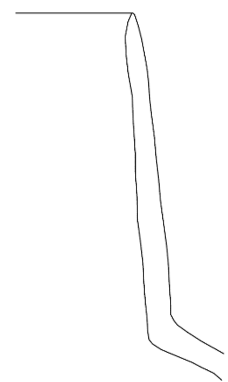
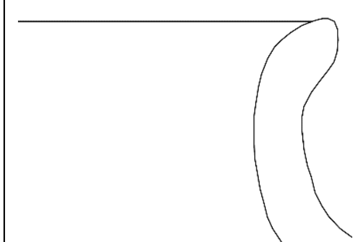
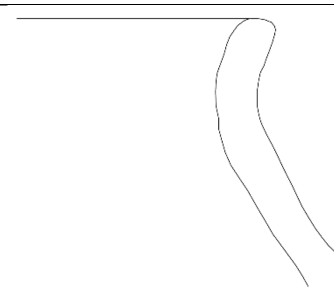
Type	Name	Description	Example	Sketch/Image
1.	Bowl	Open rounded vessel with some depth.	2017-CS-6, 2016-BA-1	

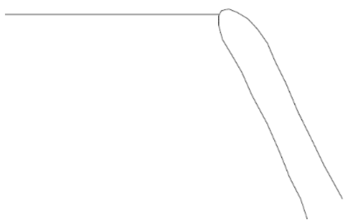
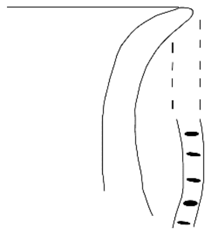
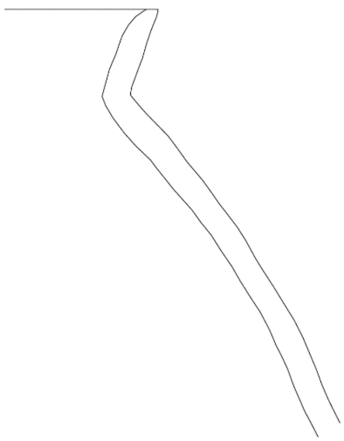
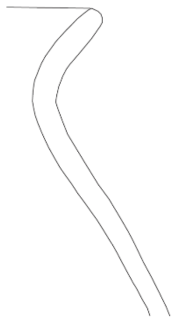
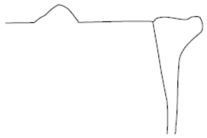
1.a.	Rounded Base Bowl	Rounded base with diameters 19 to 32cm.	2016-AB-11, 2016-O-26, 2016-CM-9	
1.a.1.	Rounded Base Bowl with Ledge Rim	Ledge rim with diameter from 25 to 30cm. Surface color is orange or brown.	2016-T-7, 2015-AO-3	
1.a.1.a	Rounded Base Bowl with Ledge Rim and Grooving	Parallel grooving topping the rim.	2016-P-1	
1.a.1.b	Rounded Base Bowl with Ledge Rim and Incising	Incised zig-zag pattern topping the rim.	2015-AV-6, 2016-T-13, 2016-K-1	

1.a.2.	Rounded Base Bowl with Rounded Rim	Rounded rim with diameter from 21 to 32cm. The rim is direct or lightly everted. Surface color is orange or brown. Fabric is coarse to medium coarse. The exterior is rarely burnished.	2016-O-26 2015-BM-1	
1.a.2.a	Rounded Base Bowl with Rounded Rim and Combed or Incised Lines	Combed parallel lines just below the interior rim.	2016-AY-5, 2015-BA-14	
1.a.2.b	Rounded Base Bowl with Rounded Rim and Combed Waves	Combed wavy lines just below the interior rim.	2015-BQ-1, 2015-AK-10, 2016-BY-13 2016-AS-1 2015-BS-2	
1.b.	Ring Base Bowl	Ring base with diameters from 11 to 18cm. The rim is rounded. It has a vertical strap handle. The exterior surface has molded decoration and orange color.	2016-AN-1, 2016-AP-1, 2016-AO-1	

2.	Cup	Small Vessels with diameters of 10cm or less.	2016-X-10 2016-K-3 2016-Z-12	
2.a.	Open Cup	Open vessel with a diameter of 10cm or less.	2016-K-4, 2016-CM-2	
2.a.1	Open Cup with Red Slip	Red slipped exterior slip with an orange fabric. The rim flares slightly. Rounded base. Diameters of about 10cm.	2017-CS-12, 2015-AX-2	
2.a.2	Open Cup with Vertical Bands of Incising	Vertical bands of incised decoration on the exterior. Impressions on top of the flaring rim. The fabric is orange coarse ware. Diameters of about 10cm.	2015-S-15	

2.a.3	Open Cup in Black Topped Ware	Cup with black topped orange ware. Diameters of about 5cm. Rounded simple rim.	2016-AZ-13, 2016-G-1	
2.a.4	Open Cup with Tapered Base or Crucible	Tapered base. The fabric is grey coarse ware. Direct rim with diameters of 4 to 5 cm.	2015-CN-1, 2016-CF-1,	
2.b.	Closed Cup	Closed vessel with a diameter of 10cm or less.	2016-AM-9, 2016-AZ-13	
2.b.1	Closed Cup with Incising	Incising on the exterior just below the rim. The fabric is grey fine ware. Diameters of about 10cm.	2016-G-1	
3	Jar	Vessel with constricted mouth.	2016-BA-2, 2016-O-9	

3.a.	Necked Jar	Necks with vertical walls.	2016-CH-8, 2016-AY-1	
3.a.1.	Necked Jar with Red Slip	Exterior red slip. Fabric is orange ware. Vertical strap handle.	2016-AD-1	
3.b.	Neckless Jar or Pot	Jar that lacks a neck often with a flaring rim.	2016-BB-6, 2016-H-5	
3.b.1.	Neckless Jar in Orange Ware	Fabric is orange ware. Rounded rim. Diameters of about 19cm. Rim flares outward.	2016-J-12	

3.b.2	Neckless Jar in Black Topped Orange Ware	Fabric is marl in black topped orange ware. Rounded rim with lip flaring slightly outward. Diameters of about 14cm.	2016-AU-8	
3.b.3	Neckless Jar with Impressing	Fabric is light brown ware. Flattened rim with impressing on the top. Diameters of about 8cm.	2016-AG-8	
4.	Large Jar	Diameters from 27 to 40cm. Top and bottom rims flare. Ring base. Fabric in orange or orange coarse ware.	2017-CW-1, 2016-CM-8, 2016-AF-1	
4.a.	Large Jar with Exterior Molding	Molding on the exterior shoulder. Diameters from 34 to 40cm.	2015-AG-1, 2015-BS-7	
5.	Basin	Deep vessel with diameters from 38 to 40cm. Rounded or flattened rim.	2016-AS-1, 2015-AY-2	

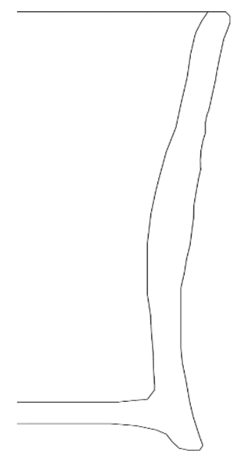
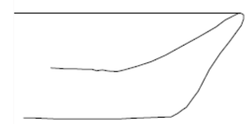
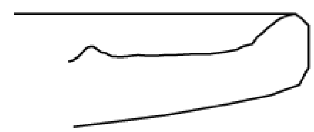
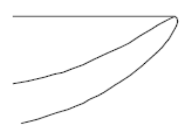
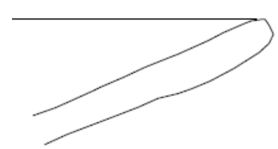
6.	Vase	Vertical wall cylindrical vessel with a ring base. Fabric is orange ware. Diameters are about 13cm.	2016-J-14	
7.	Dish	Very shallow vessel sometimes nearly flat.	2016-AX-2	
7.a.	Dish with Flat Base	Flat base with rounded rim. Molded lines on the interior rim. Fabrics in orange or pink ware. Thick walls of about 13mm. Diameters are about 55cm.	2015-G-4,5	
7.b.	Dish with Round Base	Dish with a slightly raised pointed rim with a diameter of about 28cm. The fabric is coarse brown.	2016-C-7	
7.c.	Dish in Coarse Grey Ware	Fabric is coarse grey ware. The exterior is rough. The interior is smoothed. The rim flares slightly.	2016-O-7	

Table 4.1 Summary of Intuitive Types

The typology summarized in Table 4.1 consists of seven main types and twenty-five subtypes. This is a very short example of a typology, especially in comparison to those that I discuss in Chapter 5. This is due to there being very few complete or nearly complete vessels in the Mai Adrasha assemblage. I have chosen not to extrapolate to complete forms, when they are not present, due to the large potential for introducing error. As such, this typology has limited functionality. It is useful, in that it summarizes some of the finds from this particular excavation. It can also simplify description and comparison of different excavation units and areas at Mai Adrasha. Like all typologies, intuitive typologies are subject to what survives in the record, which may not be a true representation of life in the past. Intuitive typologies, however, are also more affected by the bias of whoever creates them. Keeping these biases in mind and because this typology was not created with a particular research question in mind, its application should be limited to description and not used for analysis.

CHAPTER 5: CREATING A HISTORICAL TYPOLOGY FOR MAI ADRASHA

5.1 Introduction

I use the term historical typology to refer to a typology that builds on previous work of archaeologists in Ethiopia. As indicated in Chapter 4, most scholars rely on knowledge of ceramic shapes through familiarity with complete vessels. Of the ceramic typologies created thus far, two stand out as the most influential: Rodolfo Fattovich's (1980) and Richard Wilding's (1989). Each publication represents the first major work on their respective periods, Pre-Aksumite and Aksumite. Every work published on ceramics in the Northern Horn since has been based on these two publications to some extent. To build a historic typology, I will compare artifacts from Mai Adrasha to the types published in both of these works, since they both overlap with Mai Adrasha in time (Pre-Aksumite and Early Aksumite).

As discussed in Chapter 3, Fattovich's typology is based primarily on surface color, temper, and treatment, and partially on paste, modelling, and decoration. The data used to create this typology comes mainly from Yeha, but also Matara, Hawelti, and Melazzo. The artifacts come from a range of contexts. These include tombs, domestic spaces, and monumental buildings. The publication has only a few images, making it difficult to match descriptions to physical objects. Details like Munsell color codes were not recorded. This is understandable as this was not the standard for the time, but it often makes interpretations of color descriptions difficult. Especially, since most of his groupings rely heavily on surface colors. Type descriptions are often general but are accompanied by a number of examples. Despite these difficulties, no other Pre-Aksumite typology that compares multiple sites has been written since, and his work remains a key tool to in approaching the Pre-Aksumite period.

In contrast to Fattovich, Wilding in many cases is very specific in his type definitions. He splits types into very small categories and gives specific examples, but details that unite these examples in the definition of these types are sometimes lacking. Wilding first divides his types based on fabric and then on form and shape, and then incorporates some information on decoration and surface treatment. His typology covers the Early Aksumite to Post Aksumite periods. The data from his typology is taken solely from Aksum and its immediate environs. From these data, he focuses on artifacts from the Tomb of the Brick Arches, the GT II tomb, and the Gudit stela field, the only one found intact by the expedition, making most of the contexts Wilding is studying funerary.

5.2 Fattovich 1980

Fattovich's types are given a first number to indicate the temper type, a letter to indicate whether the surface is slipped or not, and a second number to indicate the ware type (based mainly on surface color). Dividing first by temper type is an approach that is not often employed. This method could be viable, since different types of temper effect the behavior of the clay, and thus can give insight into the function of vessels. Minerals included in the temper are difficult and sometimes impossible to identify with the naked eye. Without additional petrographic research, this is an unreliable way to divide a data set. Fattovich, however, only sometimes bases his divisions on mineral type, rather he tends to focus on coarseness. Identifying the level of fineness and coarseness is subjective but can be more readily identified with the naked eye or a hand lens. Another problematic variable is surface color. Surface color is determined by three main variables: the composition of the clay, the temperature of firing, and exposure to oxygen during firing. Modern ethnographic examples show that the last two variables are not well controlled (Arthur 2006). Two vessels could be virtually identical until firing renders them different colors. Slipping, on the other hand, is an intentional step taken by the potter, and has functional and aesthetic implications. Using this variable may more accurately align with how artisans and consumers considered these objects in the past.

5.2.1 Group 1

Group 1 comprises of ceramics with abundant and large mineral inclusions. Group 1.A contains pots without slip. Group 1.A.1 is red orange ware (Fattovich 1980:21). Group 1.A.1 has fabric that contains large white mineral inclusions. The section can have a uniform color, a dark center, or internal and middle layers of blue to grey. Fattovich describes the thickness of the walls as ranging from thin to medium. What this means in terms of actual measurements is unclear. The surface is either polished, burnished, or, more rarely, rough. The exterior color varies from light orange to more vibrant red orange. Some forms have flared rims with cylindrical handles or flat grips. The bases can be ring or rounded. Incised or molded decoration are common, and impressing is rare. Cording in relief shows thick transverse marks.

This group is present in the Mai Adrasha assemblage. Two examples given by Fattovich (Tavola XXVIII 14, XXIX 1) are large open bowls with diameters of 19 cm. There are at least six examples of open bowls of a similar ware from the Mai Adrasha assemblage with impressing or incising and diameters of 21cm to 24 cm (2015-AX-7, 2015-G-9 (Figure 5.1), 2016-Z-10, 2016-AL-13).

Figure 5.1 Example of a bowl rim from Group 1.A.1. Interior View of 2015-G-9 from Mai Adrasha.

Another example is the rim of a jar or pot with a slightly flared rim (Tavola XXVIII 15). Many similar examples exist in the Mai Adrasha collection (i.e. 2016-AZ-3, 2016-AX-5, 2016-AU-3 (Figure 5.3), 2016-AK-2, 2016-N-4, 2015-AL-4). One such example is a jar with a slightly flared flattened rim (Tavola XXVIII 13) and a smaller jar rim 8 cm (Tavola XXIX 4). There is only one example similar to each of these from the Mai Adrasha collection 2016-AU-3 and 2016-AC-4 with a diameter of 11 cm. Examples of decorated sherds of this ware from the Mai Adrasha collection are similar to examples given by Fattovich (1980:22). These include rows of impressed dots (ex. 2015-AL-8, 2016-A-15, 2015-BQ-11), molded circles (ex. 2015-AX-20, 2015-BD-1, 2016-AM-2), and wave combing on the body exterior (ex. 2016-BC-3, 2016-AT-19, 2015-AP-4).

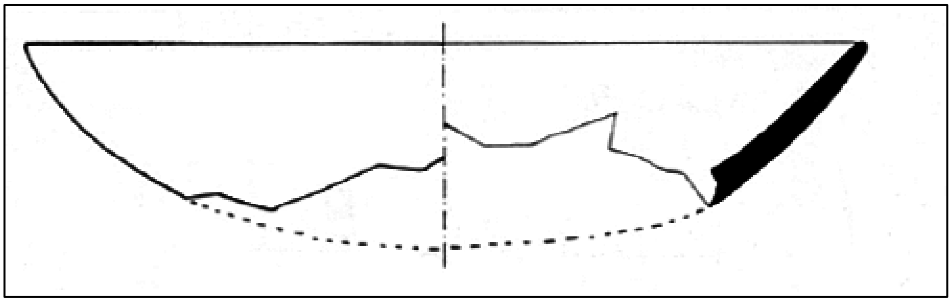


Figure 5.2 Example of a bowl from Group 1.A.1 from Yeha Tomb 1 (Fattovich 1980:Tavola XXVIII.14).

Figure 5.3 Example of jar rim from Group 1.A.1. Exterior view of 2016-AU-3 from Mai Adrasha.

Group 1.A.2 is red ware (Fattovich 1980:22). The fabric is generally of a uniform red to brown color. The exterior surface is dark red tending towards brown. Generally, the exterior is burnished and sometimes slipped. Large mineral inclusions are common. The walls are thick with a porous structure. The forms are large jars with straight rims or lightly faring. The decoration is usually incised, occasionally impressed, and rarely molded. The only example from Group 1.A.2 from Mai Adrasha is similar to Fattovich's examples (1980:23). 2016-G-13 is a large jar with a flaring rim and a diameter of 46 cm.

Group 1.B contains slipped pots. Group 1.B.1 is black ware (Fattovich 1980:23). The fabric is dark grey with numerous white mineral inclusions. The walls are medium to thick with a porous structure. The exterior has a bright black slip, which also occurs on the interior of bowls. Forms include jars or bowls. If decoration occurs, it is incised with deep furrows or molded with simple geometric motifs. The group is not present in the assemblage from Mai Adrasha.

5.1.3 Group 2

Group 2 consists of vessels with few fine mineral inclusions. Group 2.A has vessels without slip. Group 2.A.1 is red orange ware (Fattovich 1980:24). The fabric is darkish orange in color. In section, the paste presents as a uniform layer or an internal grey layer. The walls are thin to medium thickness. The external surface is smoothed and usually burnished. The internal surface is always smoothed. Forms include cups, bowls, and jars. The decoration is incised, impressed, molded, or rarely painted red. Motifs are usually geometric.

Several examples of vessels similar to the examples given by Fattovich are found in the Mai Adrasha assemblage. One example given by Fattovich (Figure 5.5) is a cup with a direct rim and straight walls (Tavola XVII 5). It is 8 cm in height and has a 6 cm diameter. There are four similar examples from Mai Adrasha though most do not have straight walls (2015-AI-3 with 9 cm diameter (Figure 5.4), 2016-X-10 with 10 cm diameter, 2016-K-3 with 10 cm diameter, 2016-K-3 with 10 cm diameter).

Figure 5.4. Example from group 2.A.1. Exterior view of 2016-AI-3 from Mai Adrasha.

Another example from Fattovich is a closed bowl with a diameter of 19 cm (Tavola XX 6). There are two similar examples from Mai Adrasha. 2016-AM-25 has a diameter of 20 cm and 2016-C-13 has a diameter of 19 cm. Fattovich also cites as examples several jars with combed or incised decoration on the exterior. Only one example is clearly similar to one from Mai Adrasha. The example from Tavola XXI 1 has a small rounded molded decoration in the middle of a combed horizontal line with a wavy line below. It is similar to 2015-AI-1, which has molded decoration in the middle of a combed horizontal line. Many examples have a combed horizontal line paired with a wavy horizontal line, but with no molding (i.e. 2016-A-13, 2016-AZ-1, 2016-AT-15).

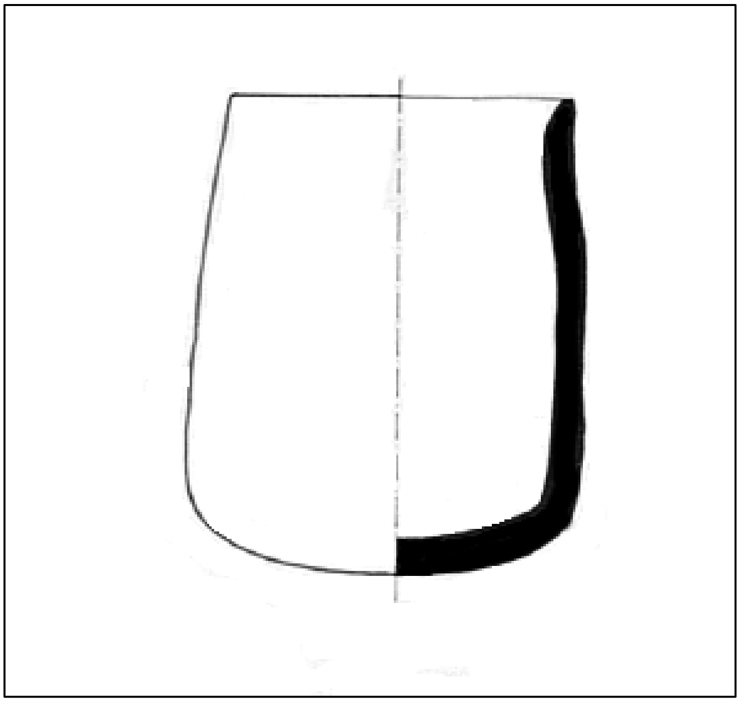


Figure 5.5. Example from Group 2.A.1 from Fattovich (1980:Tavola XVII.5).

Group 2.A.2 is orange ware with a grey rim (Fattovich 1980:24). The fabric is very compact with numerous white mineral inclusions. The external surface is burnished and often has a red slip. Forms included cups and bowls with straight rims. Decoration is rare and generally incised. This ware type is not present in the assemblage from Mai Adrasha.

Group 2.A.3 is reddish brown ware (Fattovich 1980:25). The fabric has a uniform color. The walls are thin with fine white mineral inclusions. Both surfaces are smoothed or burnished. It frequently occurs with cups with conical feet but also with other cups and bowls. The decoration is generally painted in white and limited to the upper portions of the vessel and the feet. Open cups are painted on their entire surface with some painted in white with bottom black or red. Some cups with conical feet are painted white with I or Y molded in relief. This ware type is not present at Mai Adrasha.

Group 2.A.4 is grey ware (Fattovich 1980:26). This ware is uniform in color and compact. It always has thin walls. They are externally burnished and smoothed internally. They always have incised decoration. This ware type is not present at Mai Adrasha.

Group 2.B has vessels with slip. Group 2.B.1 is light red ware (Fattovich 1980:26). The ware is uniform in color, some with an internal grey layer. The temper resembles fine white powder. The walls are compact with medium thickness. The vessels are smoothed internally. Forms are jars, "pomegranate" shaped vessels, cups with hemispherical feet, and "caskets". Decoration is infrequent. This type is not present at Mai Adrasha.

Group 2.B.2 is dark red ware (Fattovich 1980:27). The paste is uniform in color with exterior covered with a dark red slip. These are well burnished on the exterior surface. Common forms are spherical bottles with cylindrical necks and tulip shaped pottery. Decoration is usually impressed and rarely incised or molded.

One sherd from Mai Adrasha could potentially match with Fattovich's twelfth example. His example is jars or jugs from Yeha tombs 9, 11, and 12 with flaring rims, cylindrical necks, and diameters of 17 cm. 2016-CH-3 could be a jar or bowl and has an everted rim, but so little is preserved that we do not know the full shape or the shape of the neck. This sherd is also in red ware, not dark red ware.

Group 2.B.3 is red and black ware (Fattovich 1980:28). It is red slipped on the exterior with a black exterior rim and interior. The most common forms are cups or bowls with rounded bottoms some are very large in form with walls 6 mm to 8 mm thick. Other common forms are spheroidal jars with vertical handles with globular bodies with cylindrical necks with slightly flared rims.

A few sherds from Fattovich's ninth group of examples are similar to artifacts from Mai Adrasha, but do not match its ware type exactly. These are bowls from tomb 4 at Yeha. The first 9.g is 10 cm tall with a diameter of 21 cm. The second 9.h (Figure 5.6) is 10 cm tall with a diameter of 22 cm.

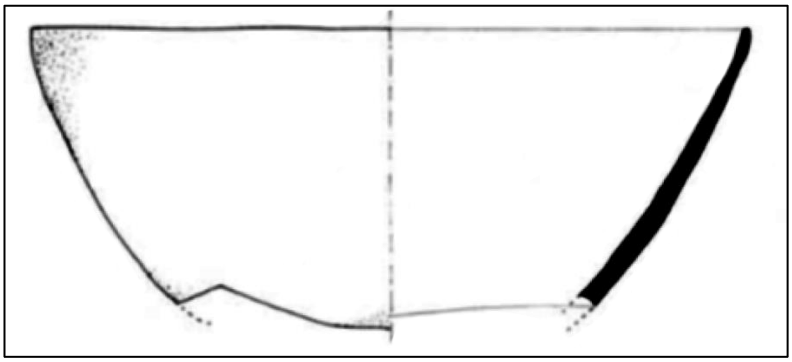


Figure 5.6. Example of a bowl from Group 2.B.3. Excavated from tomb 4 at Yeha (Fattovich 1980:29, 9h).

The third 9.i is 10 cm tall with a diameter of 25.5 cm. The fourth 9.j is 11 cm tall with a diameter of 22.5 cm. The fifth 9.k is 12 cm tall with a diameter of 21 cm. These are similar to 2017-CS-11 (Figure 5.7), which has a diameter of 25 cm and a thickness of 7 mm. It, however, was categorized as blacktopped brown, rather than blacktopped red ware; though this categorization is based on surface color, and the actual clay composition may be very similar.

Figure 5.7 Example from Group 2.B.3. Exterior view of 2017-CS-11 from Mai Adrasha.

They are also similar to 2016-AY-18, which has a diameter of 26 cm and 7.3 mm thick. This is also not blacktopped red, but blacktopped orange, again surface color might not say anything about differences in clay composition.

One other example from Mai Adrasha, 2016-O-2, is similar to 9.b, 9.d, and 9.e. Example 9.b is from tomb 12 at Yeha. It is described as a cup 5.5 cm in height with a diameter of 19 cm. 9.d is also from tomb 12. It is a cup 7 cm in height with a diameter of 17 cm. 9.e was found in tomb 4 and tomb 17. It is a cup with a diameter of 17 cm. 2016-O-2 has a diameter of 18 cm with a thickness of 6.5 mm. This example is in blacktopped brown fine ware, rather than blacktopped red ware.

Group 2.B.4 is reddish brown ware (Fattovich 1980:29). The fabric is grey with miniscule white mineral inclusions. The exterior and sometimes the interior is finished with a bright slip. The most common forms are cups and bowls. The decoration is incised and/or painted with the incisions generally filled with a white paste. This ware type is not present at Mai Adrasha.

Group 2.B.5 is black ware (Fattovich 1980:30). The external surface is slipped with a bright black glaze. The interior is polished and rarely slipped. The most common forms are hemispherical cups and bowls, bottles, carinated vases, and globular pots with vertical ribbing. The decoration is always incised and often filled with white paste. This ware type is not present at Mai Adrasha.

5.2.3 Group 3

Group 3 consists of vessels with few mineral inclusions and/or other temper. Impressions of vegetal inclusions are sometimes visible. This group generally does not have slipping on either surface. Group 3.A has vessels without slip. Group 3.A.1 is orange ware (Fattovich 1980:31). The fabric is uniform in color with a porous structure. The average wall thickness is 10-20 mm. The surface is smoothed or burnished. The common forms are large fat jars with cording parallel to the rim. They sometimes have ellipsoidal ear grips. The decoration is occasionally in the form of a molded chain.

Large jars in orange ware are fairly common in the assemblage from Mai Adrasha. It is, however, unlikely that most examples are exactly the same shape as the examples Fattovich gave for Matara. Either the base is not preserved, or these shapes are shown with rounded or flattened bases. It is likely that most of the examples from Mai Adrasha had ring bases though whole vessels are not preserved. One possible example that might be similar to those from Matara is 2016-K-7. This sherd represents the neck and shoulder of a jar. The wall, however, is slightly less thick, 8.6mm.

Group 3.A.2 is orange cream ware (Fattovich 1980:31). The fabric is a uniform color. The core of the fabric is usually uniform in color and more rarely has a middle grey layer. The fabric has a compact structure. Some quartz temper is visible. Visible marks are left by straw on the exterior. The external surface is burnished sometimes with a reddish color. Amphora are common in this fabric. Jars also occur in a coarser more porous version with walls of about 20mm thickness. No examples have decoration.

Here Fattovich gives several examples of what he calls amphora from Yeha. I have labelled similar vessels with restricted necks and flaring rims from Mai Adrasha as jars. Forms that appear similar are found in my assemblage but have much larger diameters (i.e. 2015-BS-6 with a diameter of 37 cm).

Group 3.A.3 is red ware (Fattovich 1980:32). The fabric is uniform red in color and sometimes has a middle grey layer. The frequent quartz temper is clearly visible. Bowls are the most common form. Vessels from this group are occasionally decorated with incising or impressing.

It is unclear whether the color of the artifacts from Mai Adrasha matches Fattovich's redware, however they are similar in form, size, and decoration but with what I perceive to be an orange or orange/red surface color. 2016-J-12 (Figure 5.9) is a necked jar with a rounded rim with a wall thickness of 9.1 mm and a diameter of 19 cm. This is similar to Fattovich's 3a (Figure 5.8), a jar with a diameter of 18 cm from Yeha.

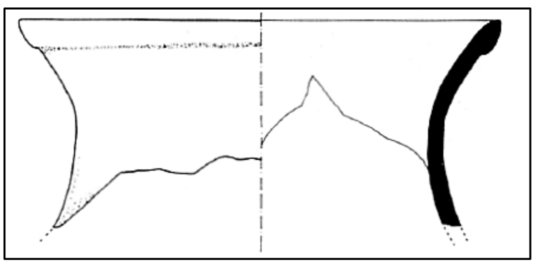


Figure 5.8. Example of Group 3.A.3 from Fattovich (1980:Tavola XXXI.2)

Figure 5.9. Exterior of 2016-J-12 from Mai Adrasha.

Group 3.A.4 is light brown ware (Fattovich 1980:32). The fabric is very light tending toward yellow-orange. The external surface is always burnished. Some examples are compact with thin walls about 3-4mm, and others are slightly thicker about 10mm with coarse fabric. The only form is cups. The decoration is incised.

Only one example from Mai Adrasha could possibly be assigned to this type, 2017-BW-18. This is a cup, which is light orange in color (7.5YR 6/6 exterior surface). It has a diameter of 10 cm and a wall thickness of 6 mm. It has light burnishing on both its exterior and interior surfaces.

Group 3.A.5 is brown ware (Fattovich 1980:32). The fabric is uniform brown in color. It has less mineral temper. The surface is smoothed and sometimes burnished. The decoration is incised and rarely molded. The forms are thin walled bowls, plates, lids, and jars with walls of 20 mm thickness.

On example from Mai Adrasha is a rim of a bowl, jar, or pot that may match this ware type. 2016-AZ-9 has a diameter of 8 cm and a thickness of 6.5 mm. Some examples that Fattovich gives from Yeha and Hawelti (10) have a very distinctive combed and impressed decoration of columns of impressed marks bordered by combed horizontal lines. This decorative motif appears at Mai Adrasha usually on fragments of an orange fine ware. One fragment, however, 2016-AR-9 was recorded in a brown fine ware with a thickness of 3.5mm.

Group 3.A.6 is brick red ware (Fattovich 1980:33). The fabric is uniform in color rarely with a middle grey layer. There are few white mineral inclusions. The exterior surface is burnished and smoothed internally. Sometimes either or both surfaces are red slipped. The forms are jars with varying dimensions. The decoration is incised. Burnished sherds and clear red wares are uncommon in the assemblage from Mai Adrasha. There are no clear examples matching this ware type.

Group 3.B has vessels with slip. Group 3.B.1 is reddish grey ware (Fattovich 1980:34). The fabric is uniform in color with few mineral inclusions. The external surface is covered with a bright slip. The forms are cups and bowls. The decorated motif is wolf teeth or fish spine decoration sometimes over the entire surface. There are no examples from Mai Adrasha with clear reddish grey color and bright slip. One possibility of a similar example, 2016-CM-9 is in a red ware, but with a slipped surface and a diameter similar to the example of the cup from Matara.

5.3 Wilding 1989

Richard Wilding first divides his assemblage by ware. Wares are subjective groups created by Wilding. These groupings are based on in order of descending importance: surface color, fabric composition, surface treatment, and decoration. He sometimes refers to these large groups as units or types. The units/types are then divided by shape to form classes. Classes are further divided into sub-groups based on surface treatment and decoration.

5.3.1 Red Aksumite Ware

The first group is **Red Aksumite ware** (RA), which Wilding claims to last from the second to the fifth centuries CE (Wilding 1989:236). This fabric is levigated and usually tempered with crushed limestone or decayed basalt. Heavier examples are sometimes tempered with quartz and mica, though mica is rare. Wilding divides Red Aksumite into fine and coarse varieties. There are examples of beakers, bowls, and cylinder neck pots, stoves, models, statuettes, foot washer basins, water pots and pedestal and cylinder-plinth bowls in RA. Most examples appear to be coil built.

Beakers are defined by Wilding (1989:240) as vessels with vertical or near-vertical walls. They usually have straight rims. Their heights are greater than but no more than twice their width with a maximum diameter of 15 cm. The interior is finished with a slip or burnish, potentially to hold liquid. Some examples are fine and thin with walls only 2 mm to 3 mm thick. At Mai Adrasha there are very few examples preserved to their full height or nearly full height. Thus, it is difficult to determine whether examples of beakers are present.

Beakers with painted decoration are the first example from the class beaker. These have painted decoration on the exterior of white, red, and black over a white wash. No painted sherds have yet been found from Mai Adrasha.

Plain beakers make up only a small group of this class. They have rim diameters of about 10 cm. They do not have grooving or impressed dots. They sometimes have a single or double incised line just below the exterior rim. Some examples have a small vertical strap handle. At Mai Adrasha, one possible example is 2016-K-4, though the base is not preserved. 2016-K-4 has a diameter of 10 cm. It has slip on the interior. There was possibly slip on the exterior that has now worn away.

Beakers with Classical Aksumite decoration were found in miniature and conventional sizes. They are decorated with close-set vertical grooves along the exterior. They sometimes have groups of small vertical impressions occasionally enclosed by vertical incised lines. Some examples have concave bases. Most have either a single or multiple incised lines below the exterior rim. Grooved decoration is very rare in the assemblage from Mai Adrasha, and there are no examples from this group.

Everted rim beaker. Wilding (1989:241) gives only one example from this group, which he describes as from a very late context. It has a flat base and everted rounded rim. This type does not appear at Mai Adrasha.

Squat beaker. Wilding (1989:243) also only gives one example from this group. It was found in Shaft Tomb A in the Stela Field. He describes it as, “wider and lower than usual”. This type does not appear at Mai Adrasha.

Miniatures. At Aksum, these were vessels with diameters around 5mm or less. All examples were found in tombs in the Stela Field. At least two examples have been found on the surface at Mai Adrasha, but there are no examples from excavation.

Beakers from tomb contexts. Wilding adds this as a separate category despite many of the above examples also being from tombs. In this class, he focuses of beakers from tombs GT II and DA I dating to the third and fourth centuries CE. Most of these have Classical Aksumite decoration with very elaborate examples from DA I. Examples from this group are not present at Mai Adrasha.

Bowls and basins. Bowls are described as being less in height than width. The maximum rim diameters are around 25 cm. Wilding (1989:244) describes the range of bowls as being very great at Aksum.

Open round-base bowls. One group consists of plain straight-rim bowls with a simple slip. These sometimes have vertical strap handles and/or molded decoration in the form of circles and bars.

A distinct group has a bluish-green glaze. These examples sometimes have an incised line below the exterior just below the rim. A few of these examples have slightly everted rims. Some later examples have slightly rebated interior rims. Another group that appears later in the assemblage has a slightly beaded lip usually with a molded vertical strap handle just below the exterior rim. These are slightly thicker and have slightly larger diameters than other examples. Many bowls likely carried painted decoration that has now worn away. The commonest decoration, however, is Classical Aksumite in style. This includes vertical grooving, vertical bands of small oval impressions, and bands of incised chevrons. A unique pattern that appears at Aksum is molded ovals covering the exterior. Wilding believes that this motif does not appear at any other Aksumite site.

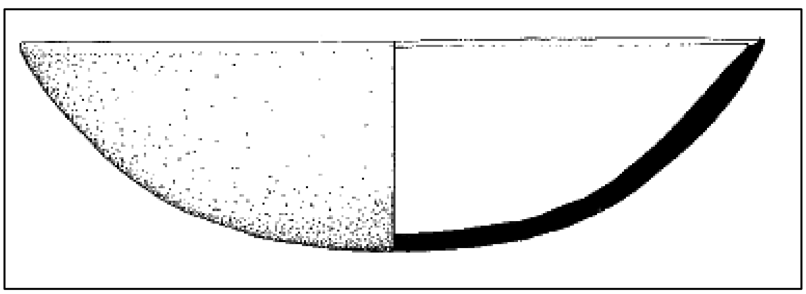


Figure 5.10. Open round-base bowl from Wilding (1989:243) Figure 16.47.

At Mai Adrasha, it seems very likely that vessels with similar forms are present. Some of these do have exterior molded decoration or strap handles. Unfortunately, the bases of many of these vessels are not preserved. One exception where the entire profile from the rim to the round base is preserved is 2016-CM-9 (Figure 5.11). This bowl has a diameter of 18 cm and a wall thickness of 6 mm. It has two molded circles set close together on the exterior beneath the rim. The rim is rounded and slightly everted. The vessel is slipped on both surfaces. At Mai Adrasha, there are no examples of painted decoration or Classic Aksumite motifs, so it may be that only one subclass of this type is present.

Figure 5.11. Example of open round-base bowl from Mai Adrasha 2016-CM-9.

Miniatures. Many miniature bowls were identified by Wilding, but only one is from a secure stratified context. Their rims vary between 2.4 cm and 6 cm with heights between 1.8 cm and 3.5 cm. One similar example exists from Mai Adrasha (2016-Z-12). It has a diameter of 5 cm and height of 1.9 cm. Its fabric, however, is blacked topped brown ware, and it was not slipped.

Open straight-rim footring bowls. At Aksum, these are the commonest of all RA forms. They are all slipped. A few appear to have decoration stamped on the interior surface. Most examples have vertical grooving on the exterior. All of these are mounted on splay footring bases. Sometimes the decoration has columns of impressed small ovals or incised diamonds containing about four impressed ovals each. On some examples these Classic Aksumite patterns also appear on vessel interiors. Their diameters range between 6 cm and 30 cm with an average of 14 cm.

Though foot rings are present at Mai Adrasha, they are seldom preserved to the extent where the entire shape of the vessel is identifiable. When it has been, most foot rings belong to globular bowl shapes or large storage jars. Though a few of the bowls may have strap handles and molded decoration as described for some of the examples from Aksum, at Mai Adrasha, Classic Aksumite decoration is completely lacking, shapes are different, and fabric seems to be different in texture and possibly composition. These examples are much closer to Wilding's plain bowl category.

Painted bowls appear to be quite common at Aksum. As with the round base bowl examples, these are pained in white, red, or black paint. No painted examples have yet been found at Mai Adrasha.

Plain bowls. These examples only make up a small number of the corpus of bowls from Aksum. They are simply smoothed or red slipped. They often lack external features but sometimes have a strap handle or molded circle or ring decoration. Roughly incised crosses also appear after the 4th century CE. Plain bowls are present throughout the Mai Adrasha assemblage though the fabric differs a bit in color and texture. Most of them have a red orange surface color with a coarser texture fabric. Most are in fragments, making it difficult to determine the overall shape. Some clearly have a low ring base with a strap handle and occasionally a molded circle, ring, or bar on the opposite exterior wall (ex. 2016-AN-1, Figure 5.13).

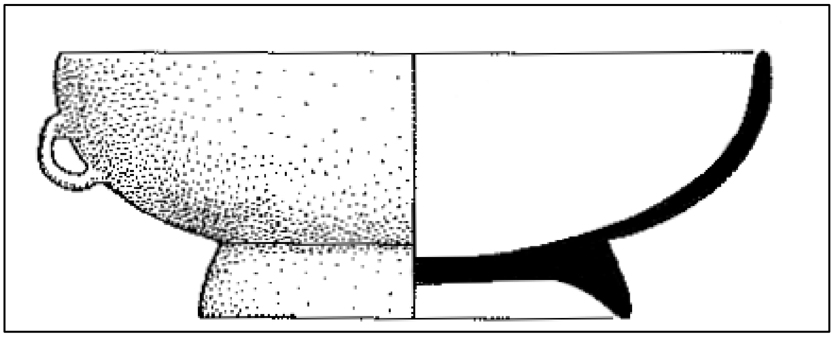


Figure 5.12 Example of a Plain Bowl from Wilding (1989:249). Figure 16.102.

Figure 5.13. Exterior of 2016-AN-1 from Mai Adrasha.

Cyma-rim round-base bowls. Cyma-rim footring bowl. *Open bowls with spouts*. All three of these classes are uncommon in the Aksum assemblage and not present at Mai Adrasha. No known examples of spouts have been found at Mai Adrasha.

Open ledge-rim bowls are very common in Wilding's assemblage. He suggests that they functioned as serving bowls for dry food, since the often were covered with heat sensitive surface treatment and decoration that was also in some cases heat sensitive (Wilding 1989:251). Bowls often had a reddish-brown slip or white wash. Some examples are painted on their rim ledges and exterior walls. Numerous examples are grooved and decorated by medallions in the center on their interiors. Some of the ledges are topped with double incised lines. Frilling on the exterior of the ledge rim is also common. Throughout Wilding's assemblage, there are fewer ledge rim vessels than straight rims with Classic Aksumite decoration, and most are simply grooved on the exterior.

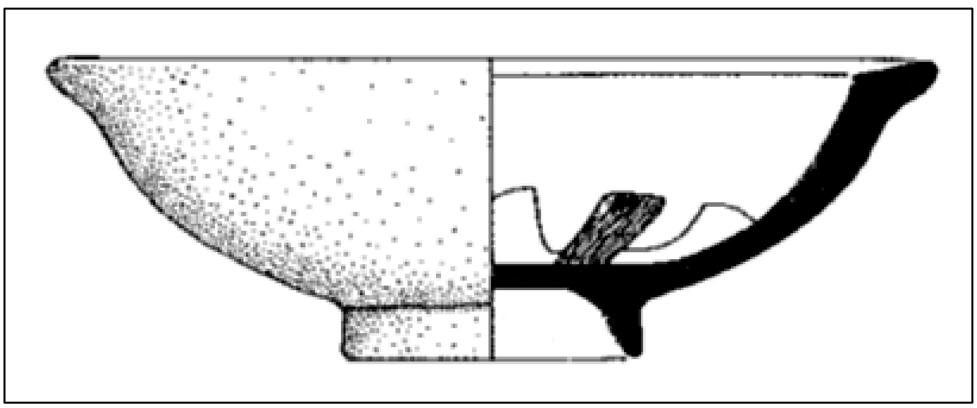


Figure 5.14. Open ledge rim bowl example from Wilding (1989:250). Figure 16.111.

Ledge-rim round-base bowls have decoration styles and motifs that are similar to those found on Open ledge-rim bowls. Plain wall pieces have rim diameters that range from 10 cm to 30 cm. Occasionally the rims are decorated with molding, incising, or impressing. Ledge-rim bowls do occur at Mai Adrasha but are rare. Only a few examples are decorated with incising on the rim top often in the form of zig-zags (ex. 2016-K-1, 2016-T-13 (Figure 5.15)). None of the examples have preserved bases.

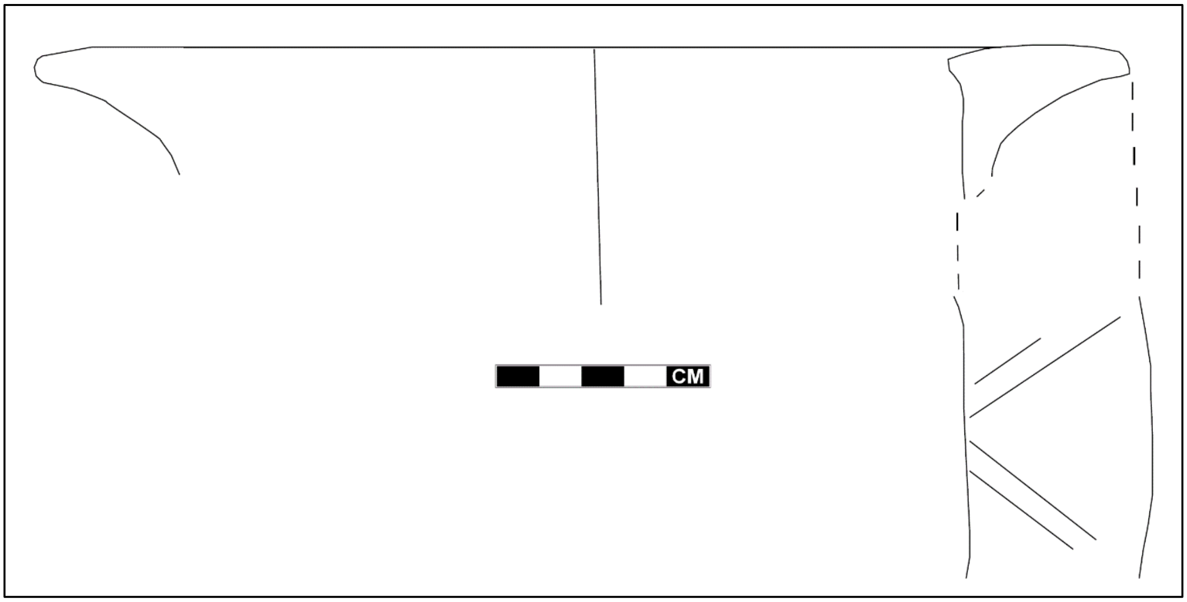


Figure 5.15. Sketch of 2016-T-13.

Tripod bowls are ledge rim bowls supported by three legs. They are often decorated in the Classic Aksumite style sometimes with elaborate molding on the rims. Though at least one leg similar to those that support these bowls have been found, there are no clear examples of tripod bowls at Mai Adrasha. However, small ceramic feet have been found similar to those on the Aksumite tripod bowls, but they could come from figurines rather than open vessels.

Pedestal bowls are ledge rim bowls mounted on a high ring base that flares at the bottom. The fabric is an early red fine ware covered in a reddish-brown slip. Their diameters are about 30 cm with vessel heights of about 20 cm. There are no comparable examples from Mai Adrasha.

Open flat-base bowls are small bowls with vertical walls and flat rims. All examples have grooving on both surfaces. One example has molded oxen and a plough in the center. As there are no examples of grooving from Mai Adrasha, there are no examples of this form.

Large basins are described by Wilding (1989:257) as the "extra-large versions of the open-bowl range". They have diameters of 20 cm to 45 cm and heights of averaging 30 cm. The walls are quite thick ranging from 1 cm to 5 cm. Their rims are flattened sometimes with a ledge. The decoration has the same range as other RA classes. While some rim fragments from Mai Adrasha may be examples of this form in that they have similar rim shapes and dimensions, not enough of their shapes has survived to confirm that they belong to this group.

'Pot-stands' are basins with inward sloping ledge rims. Most examples are plain, but a few have grooved walls. There are no clear examples from Mai Adrasha.

Basins with waisted vertical and slightly outward-leaning walls. The majority of the basins from the assemblage collected in 1973 is of this type. The interior of these vessels are simply smoothed, sometimes with deep incisions. Classic Aksumite decoration can be found but is rare. Rim shapes show a great variety, though some shapes are at least slightly everted. This shape is not present at Mai Adrasha.

Basins with deeply-incised decoration. This class has deeply scored internal walls. Their average diameter is 49 cm. Most diameters are between 40 cm and 55 cm, though there are some small examples with diameters around 22 cm. The fabric is coarse with temper composed of decayed basalt. No complete examples are present in the Aksumite assemblage. Sometime the interior has a rough herringbone pattern. Wilding (1989:259) correlates two of his examples with 'footwasher' bridges. While there are some examples of sherds from Mai Adrasha with very deeply scored decoration (ex. 2016-BB-7), only one example has a clear herringbone pattern (2015-AE-30), and all examples are found in small fragments, making their overall shape unclear.

Animal-model bowls and basins. These are large bowls or basins with molded clay animal figures in the center. They are often very ornately decorated. This form does not appear in the Mai Adrasha assemblage.

Footwasher basins. This class is virtually identical to ‘Basins with deeply-incised decoration’ except that all examples have footwasher bridges. These are rectangular slabs with deeply incised decoration supported by three flat legs. Because some examples of ceramics with deeply incised decoration exist at Mai Adrasha, it is possible, but not confirmed, that ‘Footwasher basins’ are also present.

Ledge-rim basins. These are basins with very wide ledge rims. Rims on average are 7 cm wide. The rims were built up of several folded slabs of clay. They are almost always decorated with a broad range of motifs. The surfaces are always slipped and sometimes also fluted or grooved. Decorations are incised. Chevrons and zigzags are the most common motifs with some examples covered by paint. Ledge rims from Mai Adrasha are 6 cm wide at most. For these large rim examples, it is impossible to know the entire shape since only small fragments remain. Again, ledge rims are rare in the Mai Adrasha assemblage.

Ledge-rim round-base basins. This form is uncommon in the RA assemblage. These are similar to ‘Ledge-rim basins’ except with round bases. All of them are plain-walled. Classical Aksumite decoration is completely lacking. Rims are rounded with slightly everted lips. Wilding (1989:264) believes that most rim fragments belong to this category. It is possible that some of the ledge rims found at Mai Adrasha belong to this category, but again, it is impossible to know the shape of their bases.

Tapered-lip bellied basin. There is only one example from this class. It has a diameter of 31 cm and a thin neatly rounded rim. The exterior walls are covered with even fluted decoration. There are no examples of fluted decoration from Mai Adrasha.

Beaker basins are basins with straight slightly inward leaning walls. There are only two examples of this class in Wilding's assemblage. Their walls are relatively thin, about 5 to 6 mm, with diameters of 32 cm. One example is grooved on the exterior, while the other lacks decoration.

Hole-mouth bowls are a class of material named by Wilding. He breaks them into small and large varieties.

Small hole-mouth bowls. Wilding (1989:267) writes that this form first appears in the Pre-Aksumite and persists to the Aksumite. They have diameters of about 8 cm with 'ultra-thin' walls. The majority of their walls are thinner than 3 mm. Most are covered in a fine slip and are undecorated.

Large hole-mouth bowls. These are similar to the small version except their rim diameters exceed 15 cm. Wilding (1989:267) does not make it clear why he decided to divide these into small and large varieties. There are only three decorated examples from Wilding's collection, the rest have plain smoothed surfaces. Hole-mouth bowls are likely present at Mai Adrasha though no complete profiles are present. They exist in both small and large varieties. The majority of possible hole-mouth bowl rims do not have decoration, but some have simple incising or molding on their exteriors.

Cauldrons, cups, and dishes

Cauldrons are vessels with plump rounded bellies and bases. Their rims are inverted. Just below the exterior rim are two or four handles set horizontally. These vessels were used for cooking and often have sooting on their exteriors. It is unclear whether this type is present in the Mai Adrasha assemblage handles similar to those found on the Aksumite cauldrons are present, but what type of vessel they originally were a part of is unclear.

Twin-handled footring cups. These cups are wider at the bottom and have slightly restricted mouths. Their lips are slightly everted, and two vertical rounded handles extend from the rim. This form comes in a large range of sizes and usually has some form of decoration on the exterior. Though it is possible some sherds from Mai Adrasha could match this type. It is impossible to tell from existing fragments.

'Ladles'. There are three examples from Wilding's assemblage. These are round base open bowls with nearly straight walls. They have lug handles attached at the rim. Wilding (1989:268) admits that these vessels likely functioned as lamps rather than ladles. This form is not clearly present at Mai Adrasha.

Shallow dishes. This category has everted rim with very large diameters. Their diameters are on average 40 cm, and heights are about 11 cm (ex. Figure 5.16). Their rims are rounded or straight. Most examples have slowly descending wall, while a few are full bellied. There are no examples after the RA period. This form is present at Mai Adrasha (Figure 5.17). There are potentially 8 examples, though their fabric is slightly different. Their diameters range from 57 cm to 15 cm with an average of 37 cm. Their thicknesses range from 28.2 mm to 7 mm with an average of 13 mm.

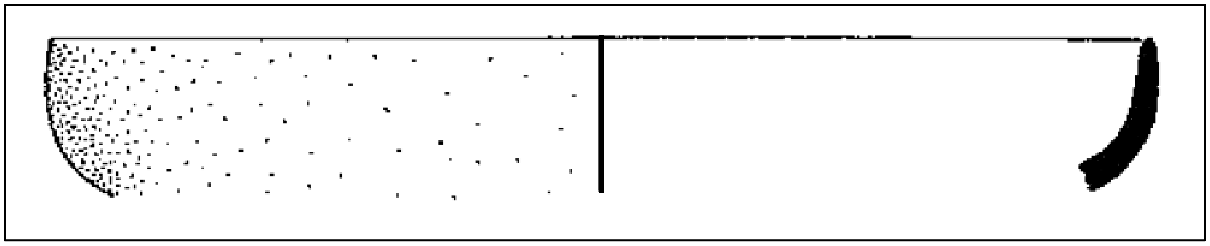


Figure 5.16 Shallow dish from Wilding (1989:270). Figure 16.233.

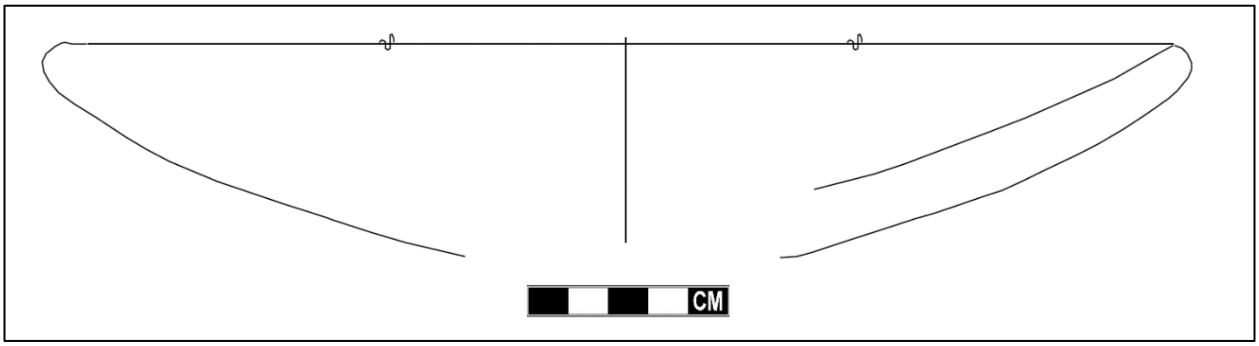


Figure 5.17. Example of a shallow dish from Mai Adrasha. Sketch of 2016-BM-1.

Flat-base tray with bellied walls. From Wilding's assemblage, there is only one example of this shape. It is a small tray with a diameter of 19 cm and height of 1.8 cm. Wilding (1989:268) points out that this form is very similar to the modern metad for cooking injera. There are no clear examples of this form from Mai Adrasha.

Flat-base shallow dishes. Wilding has few examples from this shape. They are flat base shallow dishes with low rims. These are only found in RA ware and occur late in the sequence. None of these vessels are decorated. There are no clear examples of this form from Mai Adrasha.

Pots and jars

Wide-necked round-base pots (bag pots). This form is only found in RA. These pots have no decoration, only simple smoothing. Their diameters average 18 cm, but range from 11 cm to 21 cm. There are no clear examples of this form from Mai Adrasha, but there is one fragment that from the rim and should appears to have a similar shape. It has a diameter of 19 cm. with a simple smoothed surface. Its neck, however, is not straight, and again the fabric is different trending towards more orange than red.

Wide-necked pots with short everted-rim necks. Wilding has only one example of this type. It was likely used for cooking with a blackened exterior and striations. The lip is everted with a narrow ledge rim. This type is not present at Mai Adrasha.

Cylinder-necked globular jars. This jar is a very common form in the Aksumite assemblage. It has a cylindrical neck. The exterior is often decorated with Classical Aksumite design. Many examples have strap handles. They are seldom decorated but often have a 2 mm to 3 mm perforation. There is often decoration in the form of incised lines or impressed dots around the neck on the shoulder. A few examples have a molded boss on the shoulder. The neck is usually plain but sometimes carries molded decoration. Most of rim are straight or slightly inverted. A few examples are slightly everted. Some examples were painted. All examples have round or slightly concave bases.

Medium-necked globular jars. This form is the most common jar type in the Aksumite assemblage. These jars have cylinder necks with diameters less than half the girth. The measurement of their heights is close to that of their diameters. Most have Classical Aksumite decoration, grooving on the body and neck and incised triangles on the collar are common. Many examples have vertical handles extending from the neck or shoulder. Some examples have molded decorations in the form of the crescent and disc or crosses. Wilding (1989:270-278) does not make the difference between ‘Cylinder-necked globular jars’ and ‘Medium-necked globular jars’ entirely clear. It seems that the latter is a slightly smaller, slightly squatter form of the former. Cylinder necks are uncommon in the Mai Adrasha assemblage, and the ones that are present are undecorated. However, in none of these examples is the base preserved. The lack of decoration makes it unlikely that either form was present at Mai Adrasha.

Broad-necked globular jars. This is the broad necked version of the globular jar type, but since no diameters are given, it is difficult to discern what qualifies as ‘broad’. They have the same Classic Aksumite decoration range as the other globular jar types. They almost always have decorated collars and bases. Common decorations included molding and grooving. All the examples Wilding (1989:278) gives except one have vertical rod handles extending from the neck or shoulder. Again since, vertical necks are uncommon at Mai Adrasha and no full profile is preserved, I cannot say whether this form is present.

Miniature pots. Wilding (1989:278) gives two examples of miniature globular jars. There dimensions are not given making it unclear what qualifies a pot to be miniature.

Jars with modelled human heads. This class is similar to larger size cylinder-neck jars except the neck is in the form of a molded and modelled human head. The wall exteriors are well smoothed. Their function is uncertain, and Wilding (1989:278) states that they are difficult to pour. He categorizes their fabric as fine and states that they are found in the early levels of fine RA. The bodies are covered in a white wash then painted. Sometimes the heads have incised decoration to simulate hair. Several have raised lumps on the forehead possibly indicating scarification. At the top of each head is at least one hole 2 cm to 2.5 cm across. No examples of this type were found in a secure context later than the 4th century.

Biconvex pot. Wilding only has one example of this form. It has a luted carination half way up the body. The exterior body is corrugated, and the base has two concentric circles of impressed dots. The fabric is a fine red with an exterior covered in slip. No known carinated forms have been found at Mai Adrasha.

Wide-necked four-handled jars. This class has two horizontal handles across from each other with two vertical handles on the remaining sides. The handles often bear incised decoration. No known examples of vessels from Mai Adrasha have four handles.

Flared cylinder-necked globular pots. There is only one example of this form. It has a wide cylinder neck with a straight rim. It has plain walls with two molded dome bosses with small impressions on one side. No similar dome bosses are known from Mai Adrasha.

Medium cylinder-necked jars with footrings. This is an early and rare type. All examples are heavily decorated in Classical Aksumite style. Because most motifs of Classical Aksumite decoration are not present at Mai Adrasha, and this class is heavily decorated, it is unlikely that this form is present there.

Wilding (1989:281-283) lists several forms of tripod jars including: basic *Tripod jars, Tripod jars from tomb contexts, Tripod bird jar, and Tripod jar with strainer and spout*. All of these types have three legs supporting a rounded globular body with a restricted neck and mouth. A couple of feet and at least one leg have been found at Mai Adrasha. It is possible that they came from tripod jars. No obvious bird shaped heads have been found.

Tall storage jars. Wilding (1989:284) states that these storage jars are locally made though does not explain why. They were found at all levels of Chittick's excavation and are one of the largest groups in the whole assemblage. This group is represented by two classes one with a flattened base and another with a footring. The former has two vertical handles extending from the rim to the shoulder. The latter has similar handles with a footring of about 15 cm. This form is more common and usually larger than the flattened base example. The footring jar is 65 cm high, 38 cm wide, and 12 cm in diameter on average. At Mai Adrasha, there are at least 16 examples of these tall storage jars. None of them are preserved to their full height; though it is clear a few have ring bases. These jars have much larger diameters, 34 cm on average, which may indicate that they are not the same type. Average thickness is 12.26.

Stoves or braziers

Wilding (1989:284) does not define this category. He does, however, state that through experimentation, he has determined that charcoal would have been the principal fuel used in these stoves. He also states that they were in use in Aksum from the 3rd to the 7th centuries.

Rectangular stoves are square-base stoves with thick walls luted to the base. They were made of a coarse red paste. Their exteriors were grooved, smoothed and slipped, or smoothed, whited washed, and painted. The walls have roughly round holes that may have been used as vents. Sometimes the exteriors bear rough impressed decoration. The interiors are sometimes, but not always finished. Some bear evidence of fire, particularly on the interior on or near the base. Rectangular stoves occur in a variety of sizes. The smallest is 8 cm tall, while the largest is 15 cm or 16 cm tall. These stoves appear early in Wilding's sequence, and he does not believe that they were manufactured after the late 4th century (Wilding 1989:284). There is no clear evidence for this type at Mai Adrasha.

Round high-wall stoves are also made with a coarse red fabric. They occur throughout the sequence but are particularly abundant in earlier deposits. They have a round open shape with a ring base. Three bulbous projections top the rim. Wilding (1989:286) found only one complete example (451/73). It has a height of 31 cm, a rim diameter of 44 cm, and a base diameter of 20 cm. On some examples molded decoration can be found on the exterior wall and is usually in the form of a molded boss. A similar object has been found on the surface of Mai Adrasha. Though in this case, the bulbous projection is positioned about halfway down the interior wall. It is possible that a few fragments belonged to vessels of a similar type (ex. 2015-BT-1).

Other pottery objects

House models. All examples from this assemblage depict rectangular houses with thatch roofs. Incised striations are used to depict gradual steps in the thatch. To date, no clear house models have been found at Mai Adrasha.

Plaques. It is unclear from Wilding's (1989:286) description what the form or function of this class of vessels is. He describes them simply as being decorated with "corrugated ovoid walk punctate and diaper ribbing". Though, he does provide an illustration on page 298, which shows an elongated oval shape about 9 cm in length, 4 cm in height, and 0.5 cm thick. I do not believe this form is present at Mai Adrasha.

Hollow double cones. Wilding (1989:286) describes these shapes as waisted bowls with an open straight rimmed bowl on the top of a hollow pedestal of similar shape. More examples of this form have been found at Seglamen and Beta Samati, where they have been identified as incense burners. No clear incense burners have been found at Mai Adrasha.

Stoppers and lids. Lids from Aksum are either flat or domed. Most domed examples have a round handle in the middle topping the lid. This handle often has molded and impressed decoration. This domed lids themselves are also often decorated, typically in Classical Aksumite style. Many have grooving on their exteriors. Wilding (1989:287) sometimes refers to flat lids as cap lids or waned discs. He concedes that some of the discs may have been used as spindle-whorls. At least one example has a small hole, possibly for thread to go through. There is only one example of a stopper, a small conical piece (218/74). No clear examples of lids or stoppers have been found at Mai Adrasha.

Lamps mainly occur later in RA sequence. Wilding (1989:287) hypothesizes that the presence of metal lamps may account for this. Most are ovoid or rectangular in plan with at least one piriform example. They are often made in coarse fabric and average 5 cm in height. Ovoid examples generally have a rounded base. A few of these have lug handles in the center. There are no forms that clearly have the same shape from Mai Adrasha.

Figurines and models. Wilding only has one example from this class. It’s a small molded animal head with a long neck. At Mai Adrasha, figurines are definitely present in the form of people and animals (Figure 5.18). There, however, is no example similar to the one given by Wilding.

Figure 5.18 Female figurine from Mai Adrasha, 2017-BX-1.

5.3.2 Brown Aksumite Ware

The second group is **Brown Aksumite ware** (BA). This group is found consistently later stratigraphically than RA ware (Wilding 1989:290). The paste is finely levigated making it hard, smooth, and dense. It lacks obviously added coarse temper. As opposed to RA ware, BA ware has few examples of open bowls. The firing of BA ware pieces was likely open air without great control of heat and oxygen exposure. Flash and smoking marks are common. Wet burnish on vessel surfaces is very common, while slip is rare. Painting is also rarely found. Compared to RA ware, there is a smaller range of forms and decorations in BA ware. This range, however, appears to be derivative from that found in RA ware. BA burnished material is frequently decorated with incised crosses, usually just below the rim. Grooving is still found on BA vessels, but it is noticeably less fine. Horizontal line decoration becomes very common. Small molded arcs on the shoulder or upper body of the vessel can also be found. For forms, wide-necked pots and bowls greatly increase in number. Wilding suggests from ethnographic parallels that these forms were used for cooking. Small globular bowls in particular seem ubiquitous. The range of forms for BA ware is quite limited. It includes: wide-necked pots, crude high narrow-necked pots, coarse and irregular large water pots, globular bowls, and ledge-rim bowls (Wilding 1989:291).

Beakers in BA ware are very similar to RA examples. The majority of these beakers have a simple burnished or slipped surface. Slipped vessels appear earlier in the sequence than burnished ones. A few slipped pieces also have exterior paint. While some rim fragments from Mai Adrasha could be beakers, this is difficult to confirm. They could also come from cups, vases, or jars. None of their profiles are preserved to an extent to confirm that they are beakers.

Bowls and basins

Open bowls in BA ware have an even greater variety of forms than in RA ware. Their decoration, however, decreases dramatically in range. The most common decoration is an incised or impressed cross. One clear class within open bowls is burnished open bowls. Most examples have round bases, with only a few footrings. The diameters come in a wide range of sizes, but the most common are 20-22 cm, 14 cm, or 8 cm. Many of these were somewhat warped from the firing process. The walls are generally plain. Although bowl rim fragments are very common in the Mai Adrasha assemblage, there are very few of these that are slipped or burnished, only 9 examples. Of the 9 examples, only 5 of these are within the same diameter ranges listed above.

In addition, no examples have incised cross decoration. It appears that bowls occur in a different form at Mai Adrasha.

Small deep straight-rim open bowls. There are only a few examples of this type. They often have plain bodies but sometimes bear a single or double incised line below the exterior rim. Their rim diameters vary between 10 cm and 15 cm. From Mai Adrasha, there are 9 examples of bowls in a brown ware in this diameter range. However, of these examples, none of incised or combed decoration. Only 1 has a straight vertical rim, 2016-AE-2. This fragment is not preserved to show the whole profile. It has a diameter of 15 cm and a 7 mm wall thickness. Some well-worn burnish is visible on the interior.

Large deep open bowls have diameters between 15 cm and 30 cm. These are plain or have a single or double incised line around the rim. A least one example has a concave base, and another has a square rim. From Mai Adrasha, there are 54 examples of rims in brown ware in this diameter range. Of these, only 5 have clear vertical or slightly inverted walls as Wilding's example (Wilding1989:348, fig. 16.348). Their diameters form a tight range between 17 cm and 20 cm with thicknesses from 4.7 mm to 9 mm. Three of these examples have burnish on both surfaces, and two of them have an exterior slip (2016-O-11, 2015-BF-5, 2016-O-2). It possible that these are a similar for to *Large deep open bowls*, but very little of their profiles are preserved.

Flattened-base open bowls. Most examples of these bowls are plain, usually simply smoothed and burnished. In a few rare examples there are incised lines below the rim on the exterior or an exterior molded bar decoration. They have rounded lips and diameters of 15 cm to 20 cm.

Sometimes the rim is thinned or pointed. Though a few flattened bases are present in the Mai Adrasha assemblage, none can be matched with shapes of this type.

Deep everted-rim bowls. This form has round or flat bases. The rims are slightly everted with diameters of 10 cm to 16 cm. Most are plain, but one example has a line of impressed ovals on the exterior beneath the rim. From Mai Adrasha, there are many examples of fragments with everted rims. 41 of these are in some type of brown ware. There profiles are not preserved to the extent that their overall shape may be inferred. It is my suspicion, that many of these may be jars rather than bowls.

Deep everted-rim restricted bowl. Wilding (1989:293) has only a few examples of this type in his assemblage. He states that there are no examples of this type in the RA material, but references similarities to Pre-Aksumite material published by Fattovich (1980, plate VII:5). As mentioned above, there are 41 examples of everted rims in brown ware from Mai Adrasha. Many of them would have produced restricted mouths. It is likely that this form is present, but there are no preserved examples.

Waisted-rim restricted bowls and basins. This is a very rare form in Wilding's assemblage. He classifies most examples as bowls with only one example exceeding 30 cm in diameter. There are no clear examples of waisted vessels in the Mai Adrasha assemblage.

Ledge-rim bowls have vertical or nearly vertical straight wall. This group only appears as a yellowish-brown variant of BA ware (Wilding 1989:293). The ledge rim itself is often decorated with impressed dots, single or double incised lines, incised zig-zags or molded crosses. Each of these motifs has several variations. Bases are either high splayed footrings or slightly concave flattened bases. Only four clear examples of ledge rims in brown wares have been found at Mai

Adrasha. Of the four, one has clearly waning walls and may be similar to some of the vessels described here (2016-T-7). It has a flattened ledge rim with the remnants of a slip on both surfaces. The diameter measures 42 cm, and the walls are 8.5 mm thick. With these measurements, Wilding might characterize this as a basin rather than a bowl. Another ledge fragment (Figure 5.19) is very damaged, but clearly has an incised zigzag pattern topping the rim. This fragment has a diameter of 28 cm and a thickness of 16 mm.

Figure 5.19 Ledge rim bowl from Mai Adrasha with incised zig-zag design topping the rim. 2016-T-13.

Bowls in buff-bodied material. The buff color is a variant of BA ware. It is characterized by ledge rim bowls, especially those with a molded "snake motif" topping the rim (Wilding 1989:294). No examples of these bowls have footrings. Rim shapes are similar to those found in the more general *Ledge-rim bowl* category, with some added unique shapes. These include: "a hollowed short ledge with a nicked outer lip, a hollowed short ledge, and near vertical ledge with an incised line on the lip" (Wilding:1989:294). At Mai Adrasha, despite the presence of some potential snake figurines, no molded snakes have been found atop ledge rims. For the Mai Adrasha assemblage, brown wares have been given a subcategory of light brown ware. From this category, there is one clear ledge rim bowl (2016-CH-5). This fragment had a diameter of 20 cm and a thickness of 9 mm. It is burnished on both surfaces.

Rebate-girth bowl. Wilding (1989:294) has only example of this form. The exterior surface is covered in a dark slip. It has a wide straight neck that makes up two-thirds of the vessel height, while the base makes up the remaining third. It has a horizontal round handle with impressed decoration at the point of attachment at the top of the base. In bias balance to the handle are two molded rings. Handles decorated in the same way are not present in the Mai Adrasha assemblage. Molded rings do occur, but none are preserved with a rim or base still attached. This makes this forms presence in the assemblage unlikely.

Large open basins have straight rounded rims with diameters between 20 cm and 40 cm. Their walls are quite thick, around 1 cm near the base. These fragments have waned inner walls. It is unclear why Wilding does not classify some of the smaller examples of this form as bowls. Bowls and basins with waned walls are very common in the Mai Adrasha assemblage. The rim fragments that show this, however, are often not preserved to a height that allows me to infer the entire profile. Therefore, it is possible that this shape is present at Mai Adrasha, but not certain.

Hollow everted-lip basin. Wilding (1989:294) has only one example of this form. It has a diameter of 39 cm. A small molded circle impressed with a point is on the upper body. No similar decoration has been found at Mai Adrasha.

Hole-mouth bowls. Wilding describes this type as “a very common form in the late Aksumite period” (Wilding 1989:294). These are restricted neckless globular bowls. They come in a range of sizes, but Wilding identifies two groups the first has diameters of 7 cm to 9 cm. The second group has diameters of 12 cm to 15 cm. Their walls are thicker compared to the RA variety, about 6mm rather than 3mm. Most of these bowls are burnished on both surfaces, though Wilding points out that this is often done poorly. The exteriors are sometimes slipped. Only one example shows clear signs of secondary exposure to fire. This leads Wilding (1989:296) to believe that that these vessels were not used for cooking. He instead suggests that they were either for serving or drinking. Vertical grooving on the exterior characterizes a sixth of the collection. Incised decoration on the exterior is common and half the motifs are crosses. Two examples bare a Ge’ez inscription on the exterior. A few of the early examples have an incised line below the exterior rim. Most examples are undecorated and simply burnished. It is possible that some examples of Hole-mouth bowls can be found at Mi Adrasha, discussion follows below.

Large hole-mouth bowls. This group has nearly double the carrying capacity of Hole-mouth bowls. Most of their diameters range from 12 cm to 16 cm, and there is a small group with diameters around 26 cm. All examples have plain exterior walls, but just below the exterior lip is always decorated. Most examples have a simple single incised line, but other have multiple or more elaborate incised decoration. These bowls are uncommon in Wilding’s assemblage. He has forty-three examples in BA and only nine in RA (Wilding 1989:297). He notes that examples between wares are virtually indistinguishable. No single piece has evidence of secondary burning, and their walls are relatively thin. This leads Wilding to believe that they were not moved often, and primarily functioned as storage vessels for liquid.

There are few examples of bowls with restricted mouths from Mai Adrasha. There are ever fewer in brown wares, only three examples (2016-G-21, 2016-AT-12, 2015-AK-8). None are burnished and only 2015-AK-8 has an external slip. 2015-AK-8 also has and incised line on the exterior just below its short neck. It has a diameter of 14 cm. Its walls are very thin, 5.5 mm at the thickest point. This is example is most similar to the form described by Wilding, but Mai Adrasha has no other clear examples like those at Aksum.

Hole-mouth footring bowl. Wilding (1989:299) has only one example of this type. It has a dark red burnished exterior and incised decoration in an abstract pattern on the exterior. No clear examples of this type can be found in the Mai Adrasha assemblage.

Everted-lip hole-mouth bowls. There are only three examples of this type in Wilding's assemblage. All three pieces are burnished. One example has plain walls, while the other two are decorated. The first has an incised collar and "tailed loop motif". The other has an incised cross on the shoulder and some other abstract incised decoration. As mentioned above, everted rims are relatively common in the Mai Adrasha assemblage. None, however, have a profile preserved high enough to confirm that they belong to this class. In addition, the decorative motifs described by Wilding for this type are not present at Mai Adrasha.

Cups and dishes

Cups. Wilding (1989:299) describes only one cup. It has two handles, one vertical and one horizontal. It has a low girth and triple incised line combed decoration. A similar cup has not been found at Mai Adrasha.

Small shallow dishes. These are similar to the same form in RA ware, but both groups are rare. Wilding gives two examples. One is smaller and shallower with waned walls. The other has a vertical straight tapered rim and is significantly deeper. There are a few examples of dishes from Mai Adrasha in a similar ware (ex. 2016-AB-10). None of these, however, were made on such a small scale.

Pots and jars

Round-base pots. There is a great variety of this form, some are more globular, while other have straighter walls. Wilding (1989:299) describes a number of specific examples from this group that are all slightly different. Most are necked with round vertical handles. The handles often have incised decoration and a few examples are perforated. Most of Wilding's examples also have incised decoration on the neck or shoulders, and a few also have molded decoration on the shoulder. All examples are burnished on the exterior. From the Mai Adrasha assemblage, it is not clear that this form is present. Also incised motifs on the exterior of similarly shaped fragments do not match those from Wilding's examples.

Small globular pot. Wilding (1989:301) has only one example of this type. It is a pot with a constricted wide neck and rounded body. It has a molded decoration of two circles on the exterior. No similar example is present from the assemblage at Mai Adrasha.

Large globular pots. The two examples of this form are similar to the small globular pot but carry twice or more the volume. One of them has combed wavy line and dot impressed decoration at its shoulder. Again, this form is not clearly present in the Mai Adrasha assemblage.

Waisted-rim globular pot. Wilding has only one example of this form. It has a diameter of 10 cm with two rounded horizontal handles on opposite sides of the vessel. Though rounded horizontal handles are common in the assemblage from Mai Adrasha, those in brown ware are not. There is only one obvious example of a rounded horizontal handle in brown ware, 2016-AC-9, but it is unclear what form the original fragment belonged to.

Cylinder-necked jars. This form is very similar to the example from RA ware but is not common in BA ware. These vessels have globular bodies and vertical or slightly tapered necks. The average diameter is 18 cm, girth 26 cm, and height 28 cm. Wilding's assemblage also includes one example of a warped miniature, which has a rim diameter of about 9 cm. It is unlikely that this form exists in a brown ware in the Mai Adrasha assemblage. Completely vertical straight and slightly tapered rims are not present.

Necked single-handled pots. Wilding (1989:301) makes a point of stressing how poorly this form is made. Their average heights are 15 cm high, and average girth is 10 cm to 14 cm. Most of their exteriors are poorly grooved, and all are highly burnished. This form appears to be a cooking pot as all bases clearly had heat regularly applied to them. Some have decorated exteriors in the form of incised lines, impressed dots, or molded crosses. Round handles in brown wares are present in the Mai Adrasha assemblage, but it is often difficult or impossible to determine if they were originally placed horizontally or vertically. Some rims and necks are similarly shaped to the example given by Wilding. In no instances, however, have they been found together on the same artifact.

Other pottery objects. This groups includes *Stopper*, *Handles*, *Lamps*, *Spouts*, and *Filter*. It possible that some of these classes are present at Mai Adrasha, but only in small fragments.

5.3.3 Grey and Black Aksumite ware

The third group is **Grey and Black Aksumite** ware. This ware comes last in Aksum's stratigraphic sequence. Its dark color is created by firing in a reduced atmosphere. There is a subgroup of black highly burnished pieces. Wilding (1989:302) is not sure if these should be separated into a distinct group.

Beakers. There is a clear progression from RA to BA to GA beakers. Over time, the volume has increased and the wall angles slightly outward. GA beakers generally have a bulbous body with irregular walls. They were poorly fired. Many examples incised line and triangle decoration on their exteriors. Wilding (1989:303) points out that they are similar to the ethnographically attested horn beakers and may replicate vessels in that material. He believes their primary function was for drinking. There are several examples of slightly everted rims from Mai Adrasha that may belong to this class. No profiles are fully preserved to show their full shape.

Open round-base bowls. This group has heavy coarse rims that are straight. They have an average rim diameter of 30 cm. Incised decoration is common on the upper body and sometimes under the interior rim. Some examples are finer and appear stratigraphically earlier. It is possible that this type exists at Mai Adrasha. A number of open rims in grey and black wares have diameters around 30 cm (17 examples). None, however, have decorations matching those described by Wilding (1989:304).

Open round-base carinated bowl. There is only one example for this class. It has a round base and is carinated 2.5 cm from the lip. Combed parallel lines topped by combed zigzags are just below the rim on the exterior. No examples of carinated vessels have been found at Mai Adrasha.

Open straight-rim footring bowls. Like *Open round-base bowls*, this class has two varieties one fine and one coarse. Some are very similar to BA examples and have rims of about 10 cm diameters. They are well made set on high thin slender ring bases. The others were made in a coarse fabric with rough surfaces. The rims that could fit this type from Mai Adrasha are mostly made in a medium fine ware. There is a range some being coarser and others finer. A few pieces from small bowls are made in finer wares (ex. 2015-BM-3). However, there is only one ring base in black ware, 2015-S-85. It has red burnish on the exterior, unlike Wilding’s examples here.

Ledge-rim bowls. This shape is very similar to BA and RA examples. It is distinguished by its frequent dot impressed decorations. There is only one example of a rim from Mai Adrasha that could potentially fit into this group, 2016-G-16. This is the only ledge rim preserved in a black or grey ware. It is undecorated. The shape of the walls is not entirely clear, so it may not fit this category and the shape of the base cannot be predicted. This makes it very unlikely that this type was preserved at Mai Adrasha.

Ledge-rim footring bowls. Wilding (1989:304) has only a few examples of this form. Most are decorated with interior arcading or incised crosses on the rims or interiors. As mentioned above, there is only one example of a ledge rim and on one example of a ring base from Mai Adrasha, making it highly unlikely that this form occurs.

Hole-mouth bowls. Wilding mentions only a few examples of this class. Some are decorated with incised crosses or zig-zags on the exterior. Wilding mentions that the large form of this class persists until the end of the Aksumite period. About one-fifth of the rims in black or grey wares from Mai Adrasha are inverted or belong to closed forms. Only one of these rims, 2016-AZ-4, has decoration, in the form of an incised line just below the exterior rim. This decorative motif is not mentioned by Wilding. Incised or combed lines are relatively common on the exterior of body sherds from Mai Adrasha, but none in black or grey wares can confidently be identified as a zigzag pattern.

Cups and Dishes

Chalice. Wilding's assemblage has only one example of this type. It is shallow with a straight rim and tapered lip. The fabric is very dense and highly burnished. The center has an incised cross. Wilding (1989:304) hypothesizes that this form may have been used for communion. No incised crosses have yet been found at Mai Adrasha, nor any profiles similar to this shape

Dishes. This is a rare class in GA ware, and is similarly shaped to burnished BA pieces. This class can have flat or rounded bases Wilding gives two examples with diameters of 18 cm and 24 cm. Only two rims potentially belonging to dishes in grey or black wares have been found at Mai Adrasha. 2016-CM-11 has a diameter of 26 cm and a wall thickness of 7 mm. Its fabric is hard and fine. The interior surface has been polished while the exterior is smoothed. It has a rounded straight rim. The base is not preserved. 2016-O-7 has a diameter of 21 cm and a wall thickness of 6 mm. It has a medium coarse fabric and is highly smoothed on both surfaces. It also has a rounded straight rim. The base is not preserved. Both of these examples could potentially fit this class.

Pots and Jars

Waisted-necked globular pots. These pots have narrow necks and a rounded vertical handle, usually from the neck to shoulder. All of their exterior surfaces are highly burnished. Nearly all examples have incised decoration, usually on the neck and shoulder. The handles often also carry decoration. This is sometimes simple incised line decoration, a perforation, or incised crosses. Wilding (1989:306) mentions several motifs that were common in RA ware, disappeared in BA ware, and are now reappearing in the GA ware examples of this form. From Mai Adrasha, there are no examples of decorated handles in black or grey wares, and there are only a few examples of preserved rounded handles. This is conjunction with the completely lack of incised crosses and the rarity of highly burnished fragment, make it unlikely that this class existed at Mai Adrasha.

Wide flaring-necked globular pots. These are very similar to *waisted-necked globular pots*, except with wider necks. Their diameters are between 15 cm and 20 cm. Their rims are slightly everted, flaring usually constitutes something more extreme. Occasionally, they have handles. Incised decoration is common on the neck and shoulders. Decorations of the same motifs on the same part of the vessel have not been found at Mai Adrasha.

Wide straight-necked globular pots. Wilding (1989:306) does not give an overall description of this form, but instead, launches into a list of examples. It appears that this class is quite similar to the preceding two forms. The main differences are the shape of the neck, which is relatively wide, though dimensions are not given, and the inclination of the neck, which is always vertical or near vertical. As with the other two types of globular pots in GA ware, it seems that no clear examples of these forms can be found in the Mai Adrasha assemblage. There, however, are some vertical rim in the assemblage, such as 2016-Z-1, so this form could potentially exist.

Bag pots. This class of vessels has restricted necks and deep bodies. Their diameters are around 14 cm to 15 cm and their heights are about 20 cm to 21 cm. Incised decoration on the exterior of these pots is common often in the form of parallel lines or zigzags. From the size of remaining fragments, it is unclear if this type of vessel is present at Mai Adrasha.

Cove-rim carinated pots. Wilding (1989:308) has only found this form in GA ware. He states that carinations are rare in Aksumite material but are a common feature of later periods. Vessels in this class have a low carination. Flattened and round bases can be found. Incised and molded decoration is common, especially in the form of crosses. No examples of carinated forms are known to exist from Mai Adrasha.

Straight-rim cylinder-necked carinated pots. Wilding (1989:308) has only one certain example of this type. It has a rim diameter of 10 cm and a long cylinder neck. A flattened handle connects the neck and shoulder. At the base of the neck and at the point of carination are two incised horizontal parallel lines. A decoration of groups of six molded bosses is on the lower shoulder. This class does not exist at Mai Adrasha.

Pedestal-base carinated pot. There is also only one example of this form. It has a solid pedestal base and restricted mouth. Unusually, one side has a vertical handle, while the other has a horizontal one. No similar form is known from Mai Adrasha.

Cylinder-necked carinated jug with spout. There is only one example from this class, which was a surface find. The vessel has a high carination and dimpled base. Its height is 16 cm. The base of the handle, spout, and some molding on the rim bear impressed oval decoration. No similar form has been found at Mai Adrasha.

Other pottery objects. This class includes a number of other objects: lids, lamps, pedestal, 'metad', and miscellaneous sherds. At Mai Adrasha, it is possible from rims that lids, and lamps are present from remaining fragments. The other forms do not appear.

5.3.4 Purple-painted Aksumite Ware

The fourth group is **Purple-painted Aksumite** ware (PPA). Wilding (1989:311) describes its fabric as very similar to buff BA ware. It is wet burnished like BA ware. Its decoration is a gingham or checkered pattern of purple or reddish-purple panels. These are often outlined by incised lines, floral motifs, or geometric motifs. From Aksum, most of this material comes from the ES site, Enda Sem'on. This ware has similar shapes to BA ware including hole-mouth bowls, ledge-rim bowls, and open bowls. At Mai Adrasha, what I have called light brown ware, may be equivalent to buff BA ware. It makes up about 7% of the total assemblage, but in no instances is there evidence of paint. Though some of the forms may be present in light brown ware, the total lack of paint makes it very unlikely that this group of vessels exists at Mai Adrasha.

Following the discussions of these four ware types, Wilding (1989:312) discusses a few more classes of objects. These include glazed wares, discs or spindle-whorls, cones and crosses, and imported wares. No examples of glazed wares, cones and crosses, or imported wares have been found at Mai Adrasha. There is at least one example of a disc, 2015-AE-47.

5.4 Comparisons to Mai Adrasha

Through comparing each type described by Fattovich and Wilding. It is clear that only a few of them can be directly aligned with examples from Mai Adrasha. Thus if our goal is to summarize the assemblage as has been at least partially the goal of many historical typologies in the past, using only those examples that are well aligned would leave us with a short and not very descriptive typology. This makes it abundantly clear that the assemblage at Mai Adrasha is significantly different from the two Fattovich and Wilding employed in their publications. Though it should be mentioned that many of their type descriptions are imprecise, thus it may be that if the physical artifacts were compared, they may not align directly.

The first group that can be partially aligned with Mai Adrasha's assemblage is **Group 1.A.1** (Fattovich 1980:21). Fattovich does not assign this group a particular shape. Instead he describes other features including: inclusions (frequent large mineral), ware (red orange), wall thickness (thin to medium, though measurements are not given), surface treatment (unslipped and polished, burnished, or, more rarely, rough), surface color (light orange to more vibrant red orange), rim shape (occasionally flared), handles shape (cylindrical or flat grip), base shape (ring or round), and decoration (incised, molded, impressed, or corded). From Mai Adrasha, the rim sherds that align to this type belonged to open bowls or jars. Examples of decorated body sherds fitting this type and examples given by Fattovich are common at Mai Adrasha. Some similar motifs include rows of impressed dots, molded circles, and wave combing of body exteriors.

The second is **Group 2.A.1** (Fattovich 1980:24). This group is described in reference to the following categories: inclusions (few fine mineral), ware (red orange), wall thickness (thin to medium, though measurements are not given), surface treatment (unslipped and smoothed and usually burnished), surface color (darkish orange), form (cups, bowls, or jars), and decoration (incised, molded, impressed, or rarely pained red). From Mai Adrasha there are a few rim fragments belonging to cups or closed bowls that could belong to this category though they may not match Fattovich's examples precisely (see above). Only one decorated sherd from Mai Adrasha matches an example from Fattovich precisely, though several are similar.

The third is **Group 2.B.3** (Fattovich 1980:28). This group is described in reference to the following categories: ware (black topped red), wall thickness (medium to thick, 6 mm to 8 mm), surface treatment (slipped), form (cups, jars, or bowls), and base shape (round). Many examples from Mai Adrasha are similar to examples given by Fattovich but do not match the ware type exactly, except possibly in one instance.

The fourth is **Group 3.A.3** (Fattovich 1980:32). This group is described in reference to the following categories: ware (red), inclusions (quartz), form (bowls), and decoration (incised or impressed). There are a couple examples from Mai Adrasha that may belong to this category, but their surface colors may not be precisely the same.

The fifth is **Open round-base bowls** (Wilding 1989:244). This group is described in reference to the following categories: ware (Aksumite Red Ware), rim type (plain and straight, sometimes slightly everted), handle type (sometimes have vertical strap handles), surface treatment (slipped or glazed), form (bowls), and decoration (molded circles or bars, incised lines and/or chevrons, painted, grooved, impressed ovals). From Mai Adrasha, there are several rims that could belong to similar shapes with some having vertical strap handles and molded decoration. Only one clearly has a rounded base.

The sixth is **Plain bowls** (Wilding 1989:249). This group is described in reference to the following categories: ware (Aksumite Red Ware), handle type (sometimes have vertical strap handles), surface treatment (slipped or smoothed), form (bowls), and decoration (molded circles, bars, or rings, or incised crosses). From Mai Adrasha, several rim fragments may fit into this category though their fabric may be a bit coarser, and their surface color may be more orange than red.

The seventh is **Open ledge-rim bowls** (Wilding 1989:250). This group is described in reference to the following categories: ware (Aksumite Red Ware), surface treatment (slipped or washed), form (bowls), and decoration (painted, grooved, or incised lines). There only a few rare examples of ledge rims from Mai Adrasha, but it is quite possible that they belong to a similar form. A few have zigzags incised on the tops of their rims, similar to some examples given by Wilding.

Only for the above seven classes can I be fairly certain that the same types exist at Mai Adrasha. One general observation is that shapes and decoration have more in common with Fattovich's assemblage likely as a result of their relative proximity in time. This may also be partly the result of Fattovich's broad type descriptions. In creating this typology, I have noted that some of Fattovich's and Wilding types could overlap. If I chose to consolidate these overlapping types, the resulting typology would have four classes making it very short and of limited applicability. All three of Wilding's types listed above could feasibly be added to Fattovich's Group 1.A.1, which is quite broad. I have noted, however, that these groups are some of the most general, and it seems from this comparison that they may not signify chronological or cultural affinity. All seven classes are found in some variety of redware. This may have to do with similar technological methods pertaining to clay recipes and firing across a broader geographic range. It may also have to do with broadly similar geological conditions in the northern highlands of Ethiopia resulting in similar clay composition. Both of these hypotheses require further study to be verified.

Overall, the assemblage at Mai Adrasha has little in common with both typologies discussed here. Aligning the historical types with artifacts from Mai Adrasha almost always makes for tenuous connections. Often artifacts can be aligned with these types in reference to one or two features, but differ in others, making it questionable that they should be placed in the same group. No unique recognizable types are aligned. Aligning attributes that are simple shapes or surface colors seems tenuous at best. This lack of alignment may be due in part to the extremely fragmentary nature of the assemblage from Mai Adrasha. Other types named by Fattovich and Wilding could be present, but with the amount of data now available, I cannot confirm their presence. The differences between these three assemblages is also no doubt due to change over space and time. Quantifying that change is difficult, since raw ceramic data is not available from either Fattovich's or Wilding's study. If these data were available, comparisons could be made directly, and firmer conclusions could be drawn about the relationships between these assemblages.

CHAPTER 6: STATISTICS AND CERAMICS

6.1 Introduction

Since the advent of the New Archaeology in the 1960s, statistics has been widely employed in archaeological study. Archaeologists turned to statistics as a way to be more scientific and rigorous in their methods. Since then, a number of studies have extensively employed statistics to measure frequencies of different artifact types and their relationships. Statistics has also been widely employed in the creation of artifact types. To this end, multivariate methods feature prominently. These include cluster analysis, principle component analysis (PCA), and correspondence analysis (CA). The main goal of these types of analysis is to reduce the dimensionality of large multivariate data sets to two or three dimensions so patterns in the data can be more easily identified by the researcher. These methods allow for the simultaneous comparison of all variables in a data set for each observation.

Cluster analysis is a set of methods each with an individual algorithm. It creates subgroups in the data without presuming the nature of particular groupings (Baxter 1994). This method has been widely employed in the creation of types (Adams and Adams 1991; Hodson 1982; Perlingieri 1999; Redman 1978; Sokal and Sneath 1963). Clustering methods assume that an underlying pattern already exists in the data set. In this way, creating types is likened to a discovery process to find that pattern. Clustering methods can be divided into non-hierarchical and hierarchical. Non-hierarchical methods assume that the more attributes that are added to the data, the more likely true types will be discovered (Read 1989). Hierarchical methods assume certain attributes have greater or more important influence over variability. Read and Russell (1989) advocate a hierarchical method and believe that attributes that vary in reference to each other are more likely to be culturally salient.

Principal component analysis (PCA) and correspondence analysis (CA) indicate where the most variability and conversely similarity occurs over a data set. Both are employed in classifying and grouping archaeological data (Smith 2014). They are descriptive, exploratory techniques that do not presuppose which attributes affect groupings. Both can be termed types of indirect ordination analysis. PCA uses a linear model and is applied to numerical data, while CA employs weighted averaging and can be applied to categorical data. Both have the potential to reveal patterning in large data sets and identify what causes similarity or dissimilarity between data points. PCA condenses the variables that affect variability the most by summarizing them into a new set of variables called principal components. These groupings are based on correlation coefficients, and attributes with the greatest statistical correlation are grouped together to form the principal components. PCA has limited applicability for determining ceramic types, however, because it works best with measurements, rather than ranked or categorical data. It further assumes that principal components are uncorrelated and that the data has a normal distribution. In ceramic data sets, it is more widely employed to group elemental data for provenance studies (ex. Neff 1994, Ma et al. 2000).

CA is widely employed with ceramic data sets, because CA functions well with large data sets, presence/absence data, and abundance data sets that include numerous zero values. It employs the chi-squared test to assess variance within a data set. CA, however, is sensitive to small sample sizes, and, for this reason, cannot be employed with many archaeological data sets. It is often used by archaeologists to create frequency seriations of assemblages (Baxter 1994, 2003; Smith and Neiman 2007). Canonical correspondence analysis (CAA) is also employed in the classification of other types of archaeological data. CCA is a branch of CA in which ordination is constrained by defined variables. Thus, research can measure the effects of the chosen variables. Both CA and CCA have not yet been used in the classification of ceramics. For purposes of this study, I have chosen to employ CA. Unlike cluster analysis, CA has the potential to identify the variables that are causing the most variability in the data set. For these results, I can prioritize those variables in the ordering of types. Further unlike PCA, CA can easily work with categorical data, which makes up the bulk of my ceramic data set.

6.2 Redman's essential variables

I begin by employing a dataset of 1,331 artifacts excavated from Mai Adrasha during the 2015 and 2016 seasons. Before preforming CA, I follow part of Redman's method discussed in Chapter 2. I first remove what Redman (1978) calls inessential variables, or those variables that do not show clear variation in reference to space or time. To find these, I compared several recorded attributes (shape, decoration, exterior surface treatment, interior surface treatment, and fragment type, fabric ware type) by the trench and unit from which they were excavated. Comparison between trenches represent change over space, while comparison between units represents change over time. To test for association, I performed a chi-squared for each comparison. Assuming an alpha of 0.05, I could not reject the null in only one case, decoration and unit (highlighted below). I did not, however, remove decoration from my analysis since, I could reject the null in the case of decoration and trench. The following table (Table 6.1) is a summary of the chi-squared results. Please note that all decimals are reported to four places. Zero values are in reality not zero but are zero up to four decimal places.

Variable	**Time/Space**	X^2	**Degrees of Freedom**	**p-value**
Shape	Trench	135.13	57	0
Shape	Unit	2008.1	1064	0
Decoration	Trench	37.745	15	0.0009
Decoration	Unit	235.2	235	0.4841

Internal Surface Treatment	Trench	29.436	12	0.0033
Internal Surface Treatment	Unit	109.76	72	0.0027
External Surface Treatment	Trench	65.852	12	0
External Surface Treatment	Unit	440	164	0
Fragment Type	Trench	44.362	24	0.0069
Fragment Type	Unit	1026.4	480	0
Ware	Trench	98.162	66	0.0062
Ware	Unit	1993.3	1254	0

Table 6.1. Finding Redman's essential variables. Attributes compared through chi-square over Trench and Unit. In this case, only decoration and unit are likely independent variables.

After this initial test, Redman calls the remaining variables "essential variables". In this case, all the variables are essential, since the change in these variables is associated with change over space and/or time. Redman's next step is to identify key variables. These are variables that vary in reference to at least one other attribute. Again, to test for association, I performed a chi-squared test for each comparison. Assuming an alpha of 0.05, I cannot reject the null in several cases (highlighted below).

Variable 1	**Variable 2**	X^2	**Degrees of Freedom**	**p-value**
Shape	Decoration	52.468	40	0.0895
Shape	Internal Surface Treatment	7.8757	12	0.7948
Shape	External Surface Treatment	77.394	44	0.0013
Shape	Fragment Type	430.65	64	0
Shape	Ware	358.21	323	0.0863
Decoration	Internal Surface Treatment	2.7617	3	0.4298
Decoration	External Surface Treatment	10.817	12	0.5446
Decoration	Fragment Type	51.146	25	0.0015
Decoration	Ware	230.79	90	0
Internal Surface Treatment	External Surface Treatment	193.19	16	0

Internal Surface Treatment	Fragment Type	33.777	20	0.0276
Internal Surface Treatment	Ware	67.977	68	0.478
External Surface Treatment	Fragment Type	87.807	24	0
External Surface Treatment	Ware	107.37	76	0
Fragment Type	Ware	283.11	147	0

Table 6.2. Finding Redman's key variables. Attributes compared to other attributes. In this case, four pairs are likely independent variables.

The variables in cases where I cannot reject the null include: shape, decoration, ware, internal surface treatment, and external surface treatment (Table 6.2). All of these variables, however, are included in other cases where I could reject the null. Thus, I retain all of them as key variables.

Though following Redman's method does not allow me to cut down my data set, it does shed light on some interesting trends in the data. In the cases to identify essential variables, decoration and unit do not show clear association. Changes in the type of decoration that occur on ceramics (incising, molding, applique, grooving, combing, paint) do not reliably change over units. Looking at a few histograms (Figures 6.1-6.3) of the most common types of decoration by stratigraphic unit below, reinforces this conclusion.

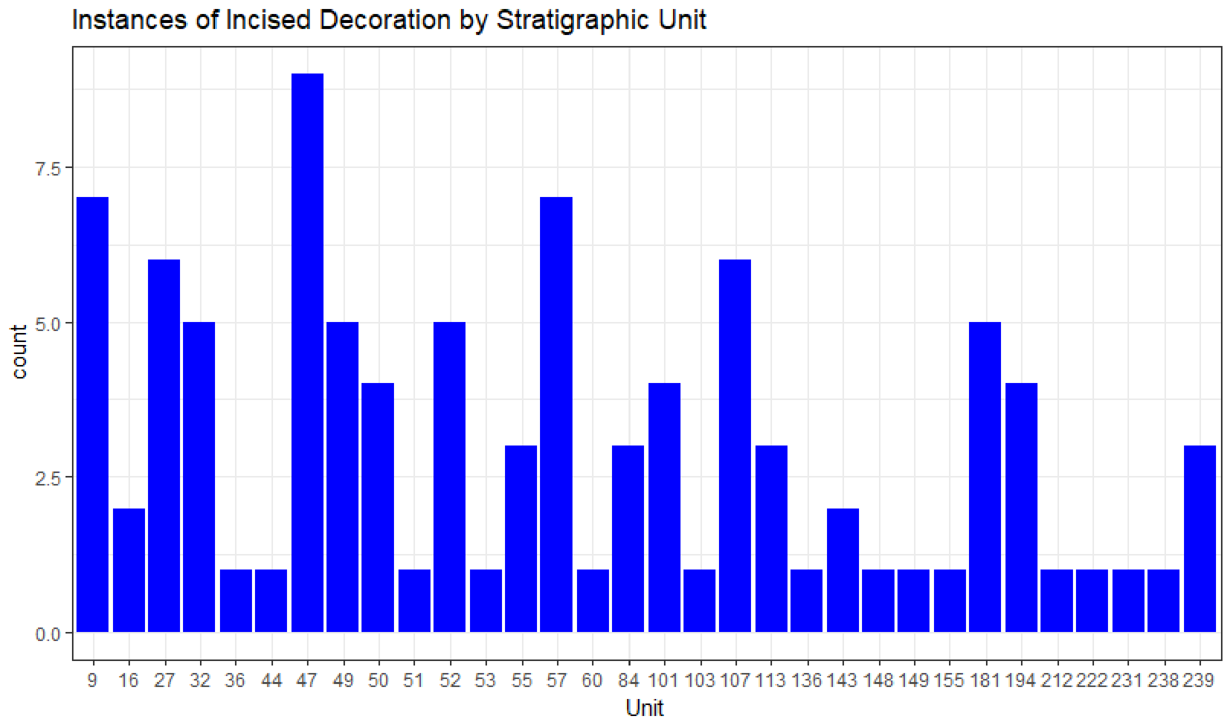


Figure 6.1

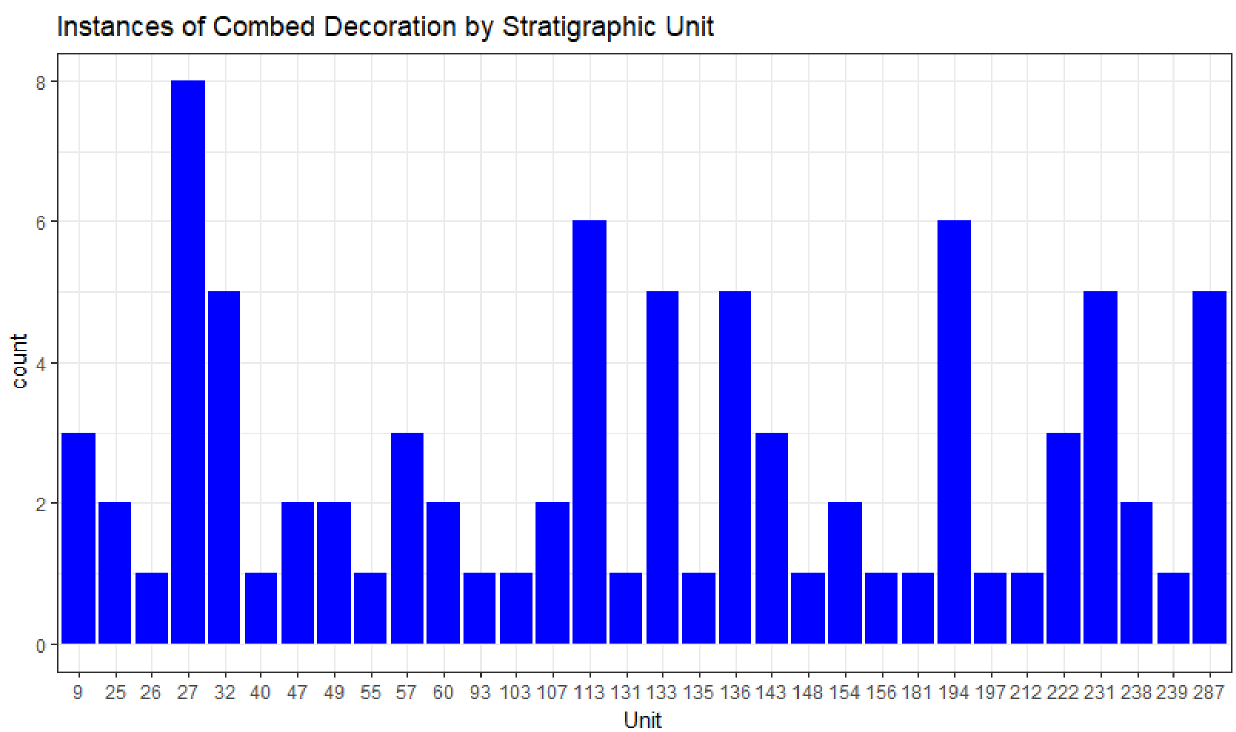


Figure 6.2

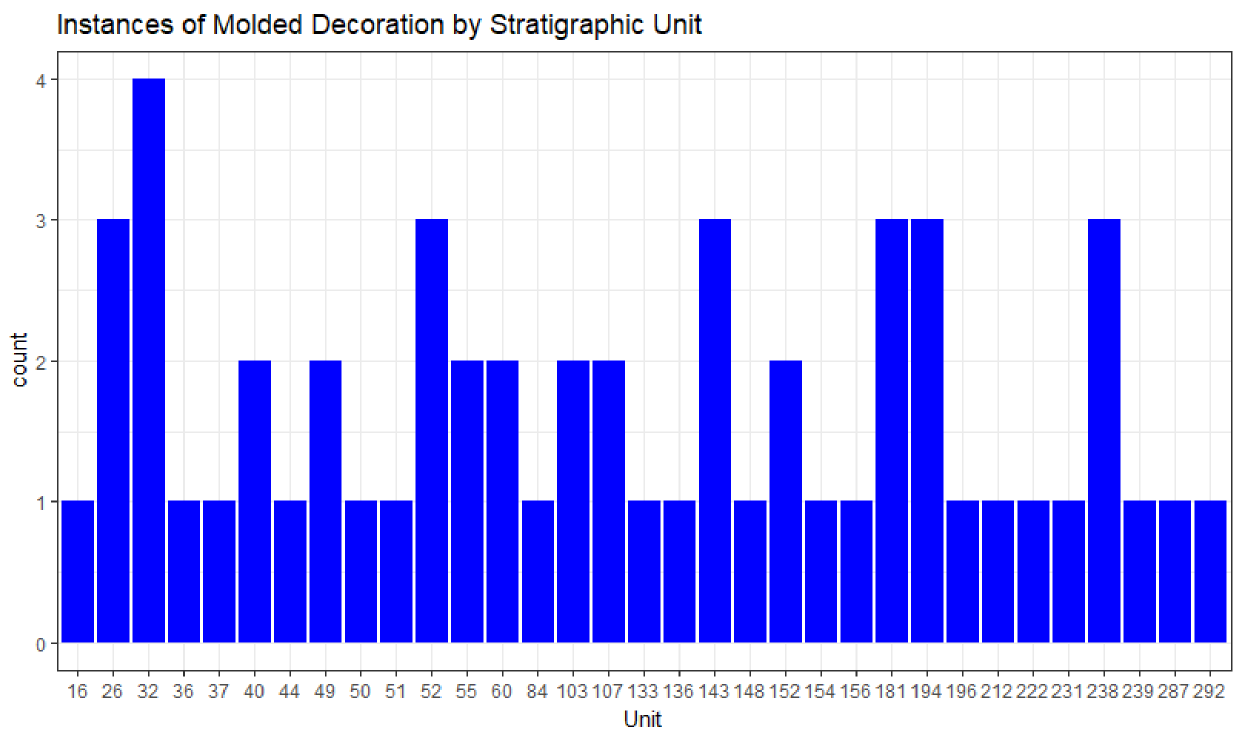


Figure 6.3

Since the amount of types of decoration do not show clear variation over stratigraphic units, we may conclude that over the time covered by the first two seasons of excavation, change in decoration type cannot be used as a reliable proxy for change over time. These conclusions should be retested as excavations progress. It should also be noted that this observation is only applied to the type of decoration and not the decorative motif, as motifs were difficult to identify due to the extremely fragmentary nature of the assemblage.

In the cases to identify key variables, decoration and shape, ware and shape, internal surface treatment and decoration, external surface treatment and decoration, and ware and internal surface treatment did not show clear associations. It is interesting to note that not only is variation in the type of decoration clearly unassociated with change in units, but also unassociated with change over shape, internal surface treatment, and external surface treatment.

That variations in shape and ware are also not clearly associated is also interesting, in that these are often the first two features used to sort ceramic types. The lack of association between internal surface treatment and ware is also interesting as external surface treatment and ware show a very clear association.

6.3 Correspondence Analysis for Classification

After checking the associations of my variables, I decided to retain all of them for correspondence analysis. To perform correspondence analysis, I used the environment and language R. Within R, I used the ca package. Specifically, I used the function ca, which "computes a simple correspondence analysis based on singular value decomposition" (Greenacre et al. 2016:3). The output of the ca function includes principal inertias for each row (observation) and column (variable), chi squared distance, mass, dimension 1, dimension 2, and singular values. The summary of ca gives some additional values including, COR, CTR, and QLT. The COR represents the relative contribution of a variable or data point to the point inertia along the principal axis. The CTR represents the absolute contribution of a variable or data point to the point inertia. The quality or QLT is the sum of COR values over n dimensions. QLT in particular allows me to isolate the values causing the most variation in my data. After performing the initial analysis below, it was clear that several outliers were having a strong effect on the output.

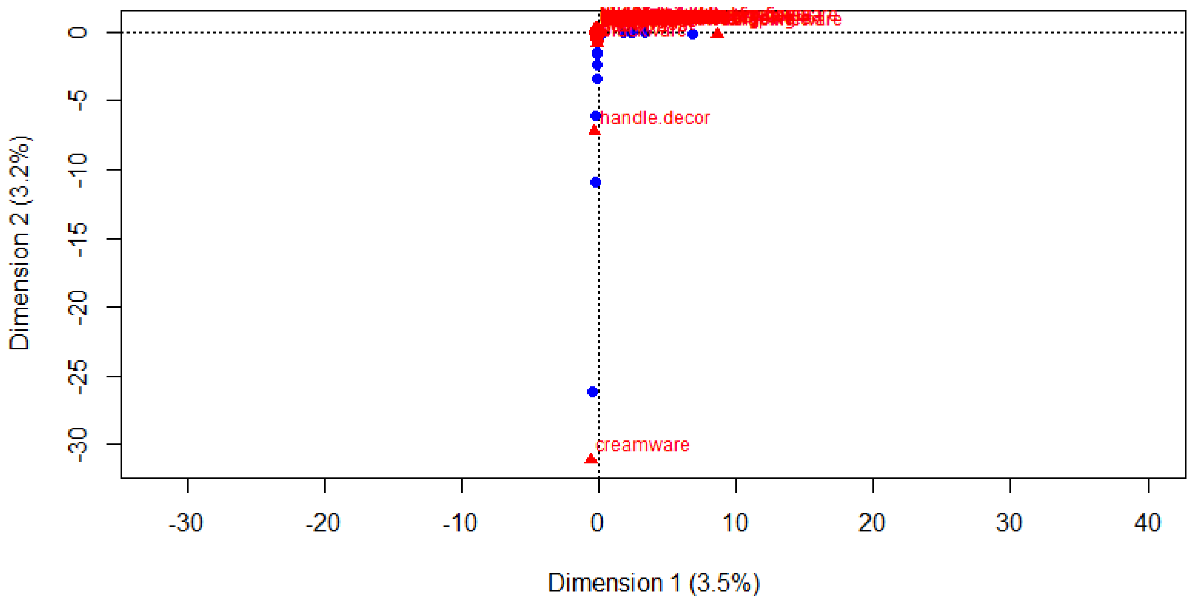


Figure 6.4 Initial Correspondance Analysis.

Before performing the first CA analysis, I removed several variables from my data set that are not directly relevant for classification. I removed all fragment types except handle. I also removed unique forms such as, figurine, waster, tool, and token. Based on the initial CA output (Figure 6.4), I removed several outliers from my data set. These include: applique decoration, jar type 4100, cream ware, and dark red ware. All the variables I removed had only one or two cases. After data cleaning, the second output (Figure 6.5) showed two variables were pulling the data more than others, brown micaceous ware and exterior scraping. Both of these variables, however, have more than one or two cases. Brown micaceous ware has five, and exterior scraping has thirty-four. From brown micaceous ware, it is difficult to observe trends with only five cases, but two of them have combed decoration and are open bowls. Over the entire data set, wavy line combed decoration often appears just below the rim of open bowls of other ware types. The third form is a plate. The fourth is a body sherd that has decoration on the body exterior. The thirty-four cases of exterior scraping have fewer other variables associated with the scraping. There are two open bowls, one example of smoothing on the interior surface, one example of scraping on the interior surface, two examples with decoration on the body, and two examples with decoration on the neck. After removing both brown micaceous ware and exterior scraping, we get a much clear picture (Figure 6.6).

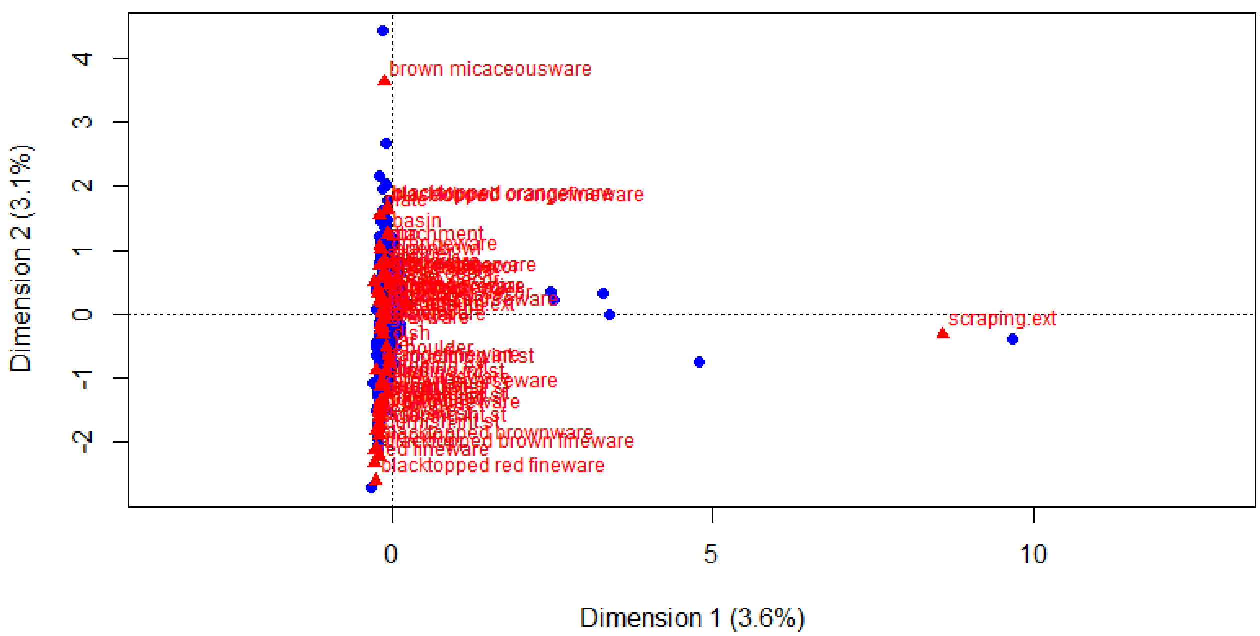


Figure 6.5 Second CA output.

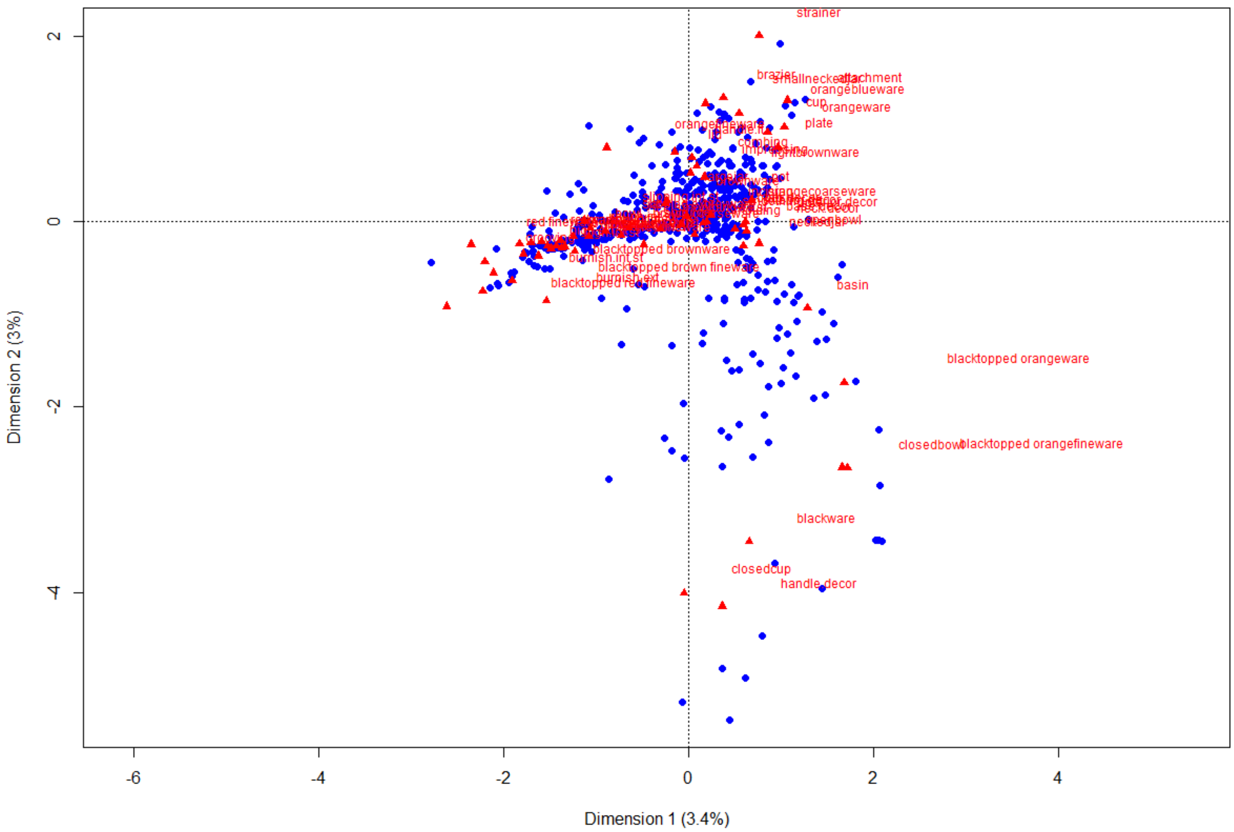


Figure 6.6 CA output with the outliers of Brown Micaceous Ware and Exterior Scraping removed.

Since there are many individual sherds and features of those sherds, the above visualization is difficult to parse. To make more sense of it, we can refer to the various numerical outputs mentioned above. Of these, quality (QLT) is the most useful for our purposes. Quality measures the sum of the relative contributions to the point inertia over all dimensions. The inertia of each column or variable in the above correspondence analysis indicates the amount of influence that variable is having on the data. Thus, quality reduces the dimensionality of the inertia allowing me to more easily identify the variables responsible for the most variance over the data set. Table 6.3 below is part of the output of the summary function from the ca package. It lists the following variables: mass, quality, inertia, cor, and ctr. I arranged Table 6.3 below in order of descending quality. The visualization (Figure 6.7) shows those variables and points with the largest relative contribution as darkest with lessening impact the points get progressively fainter. I suggest that perhaps a better method to begin classifying ceramic data is to let those data speak for themselves by beginning to divide types by the variables causing the most variance. In this case, orange ware, black topped orange ware, black ware, high intensity exterior surface treatment, and bowls are causing the most variance.

Variable	**mass**	**Qlt**	**inr**	**k=1**	**cor**	**ctr**	**k=2**	**cor**	**ctr**
orngw	105	416	21	850	181	113	966	234	164
hghx	10	215	8	-1792	207	50	-347	8	2
bowl	46	169	16	-1081	166	79	-160	4	2
brnshn	6	169	8	-1915	152	35	-634	17	4
hghn	9	159	8	-1626	152	34	-371	8	2
mdmn	10	155	8	-1489	150	35	-290	6	1
rghn	19	153	12	-1391	150	53	-203	3	1
rghx	20	150	13	-1373	144	57	-286	6	3
mdmx	10	119	9	-1434	115	32	-264	4	1
smthngn	39	111	15	-901	109	48	-103	1	1
opnb	58	108	17	756	99	49	-233	9	5
lwnt	6	99	8	-1531	96	22	-261	3	1
brnshx	6	91	11	-1541	70	23	-855	21	8
cup	15	72	22	1029	36	23	1023	36	26
lwxt	5	64	7	-1344	61	13	-270	2	1
hndlf	33	56	18	-156	2	1	753	54	32
brwnf	4	54	9	-1590	53	14	-218	1	0

scrp	2	40	8	-1834	39	9	-240	1	0
blcktppdbrwnf	1	37	7	-2232	33	7	-749	4	1
orngf	10	33	22	-888	18	12	798	15	11
orngb	9	29	25	543	5	4	1170	24	21
nckdc	18	27	13	622	27	10	-101	1	0
cmbn	26	26	18	83	0	0	599	25	16
rdwr	4	24	23	-1704	24	16	-226	0	0
pot	16	22	19	677	20	11	232	2	1
intr	16	21	13	589	21	8	-35	0	0
rdfn	1	20	17	-2358	20	10	-246	0	0
impr	24	19	18	15	0	0	529	19	11
slppngx	3	16	10	-1065	15	5	-66	0	0
blcktppdrd	0	14	8	-2621	13	3	-916	2	0
lght	19	12	20	169	1	1	484	11	7
grvn	1	11	22	-2209	10	7	-435	0	0
brwnw	41	10	21	-253	6	4	193	4	3
bdyd	61	10	11	188	10	3	-1	0	0
strn	1	10	22	760	1	1	2011	8	6
plat	2	9	23	963	5	3	805	4	3
blcktppdbrwnw	0	9	8	-2111	8	2	-554	1	0
top	6	8	13	613	8	3	-3	0	0
gryf	1	8	6	-1235	8	1	-320	1	0
incs	31	6	17	236	5	3	71	0	0
extr	59	6	11	151	6	2	-15	0	0
nckdj	4	5	20	587	4	2	-261	1	0
brwnc	0	4	6	-1249	4	1	-162	0	0
smthngx	106	4	11	-88	4	1	-28	0	0
attc	0	3	17	1068	1	1	1309	2	1
brzr	1	3	18	370	0	0	1342	3	2
jar	2	3	17	-644	3	2	-66	0	0

lid	1	3	10	27	0	0	691	3	1
slppngn	0	3	7	-1133	3	1	16	0	0
shld	1	2	12	-735	2	1	-149	0	0
smll	0	2	17	181	0	0	1279	2	1
gryw	9	2	21	-308	2	1	-84	0	0
mldn	19	1	18	60	0	0	-139	1	1
dish	1	1	15	-486	1	0	-244	0	0
lrgj	4	1	18	-237	1	0	227	1	0
Orngc	34	0	20	-25	0	0	60	0	0
Bsdc	0	0	17	492	0	0	-79	0	0

Table 6.3. Variables from the CA output listed by order of descending quality.

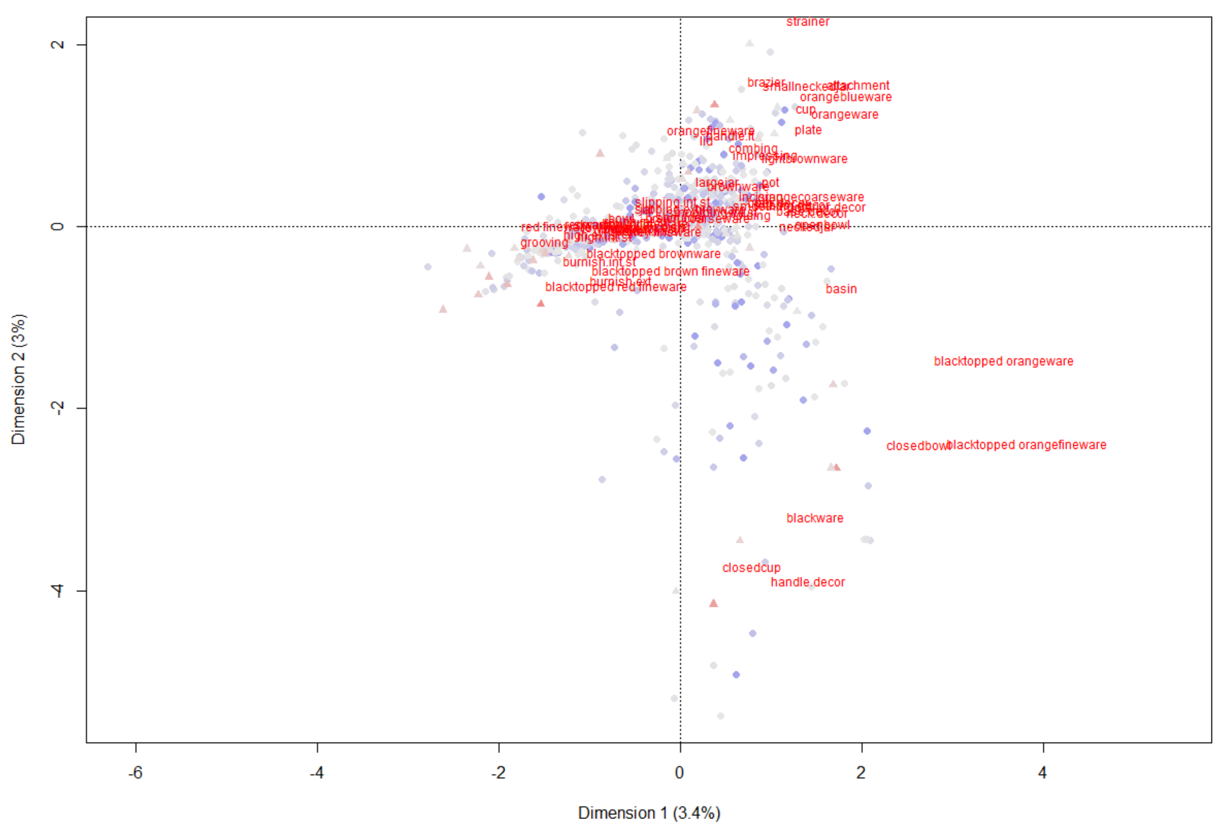


Figure 6.7 Same CA output from Figure 6.6 with variables and points with the largest relative contribution as darkest with lessening impact the points get progressively fainter

Each of these visualizations (Figures 6.4-6.7), only show two dimensions. On each axis, I have listed how much that particular dimension explains the variation across the whole data set. In Figure 6.7, only a total of 6.4% (the two axes totaled) of the variation is explained. In the scree plot (Figure 6.8) below, each dimension is shown with the percentage of the variation it explains. Thus, referring to QLT in Table 6.3, is most appropriate as it sums contributions across multiple dimensions. Despite removing several outliers, in Figure 6.7, the relationships of the variables continue to be difficult to observe. A simplified biplot makes this the variables a bit more visible, Figure 6.9.

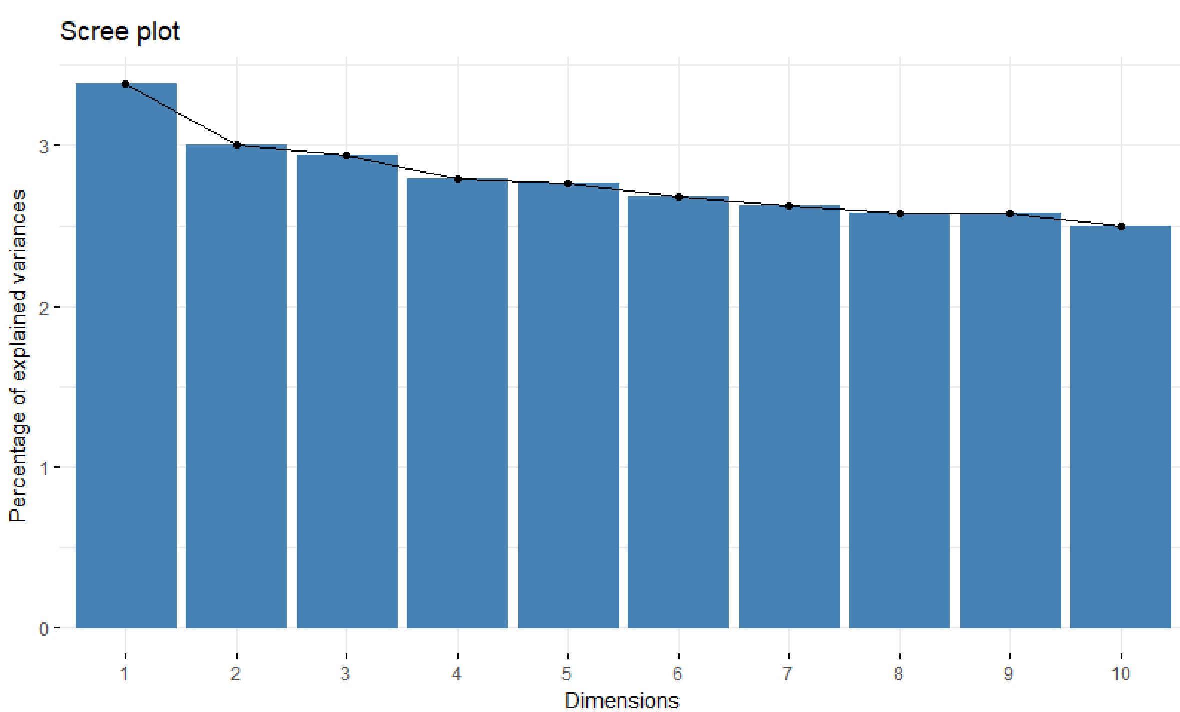


Figure 6.8. Scree plot showing the variation explained by the first ten dimensions.

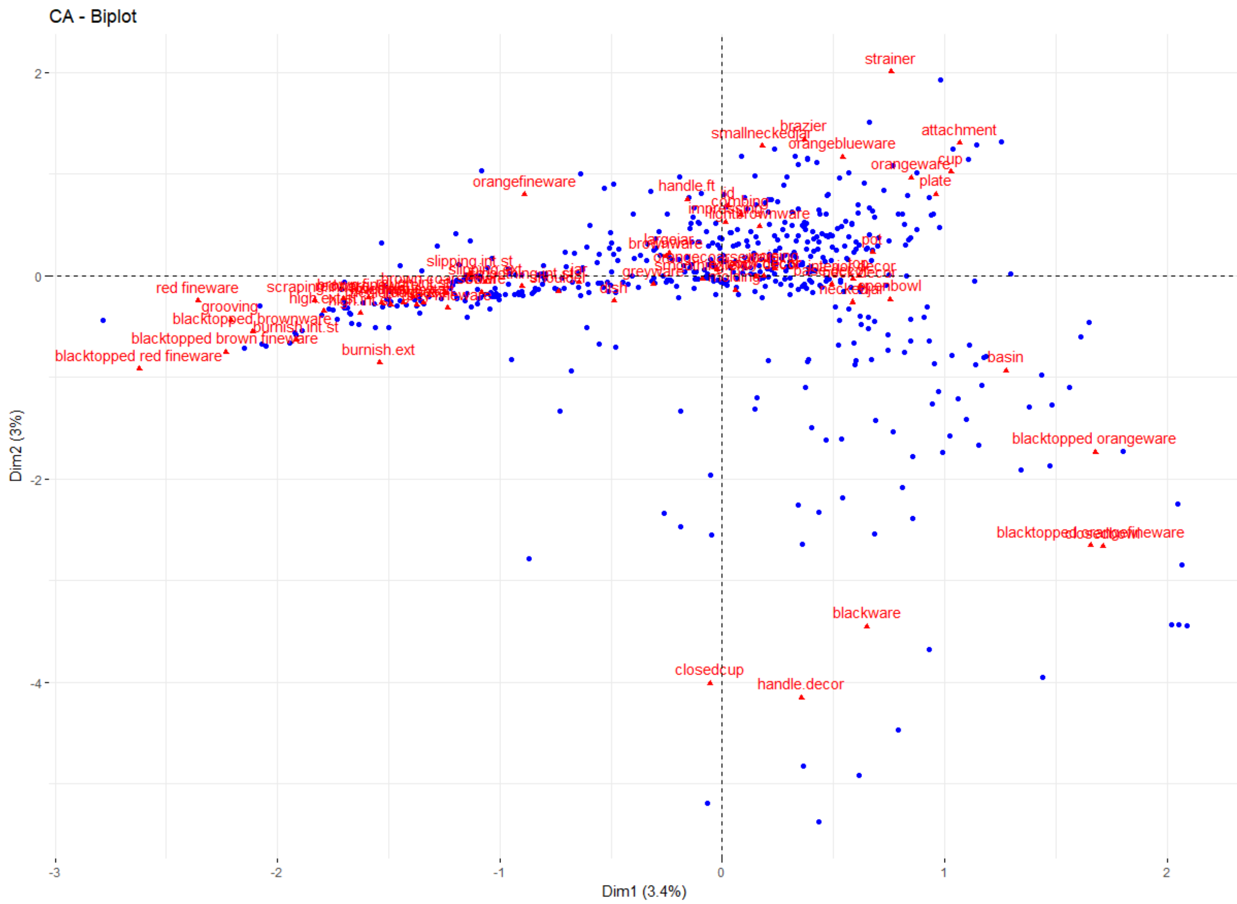


Figure 6.9. Simplified biplot of the CA output shown in Figure 6.7.

It is clear from Figure 6.9, that one group of variables is pulling the data to the bottom right making it still difficult to see patterns. These variables include closed cup, closed bowl, decorated handle, basin, black ware, black topped orange ware, and black topped orange fine ware. The pull of these variable is preventing us from seeing the relationships in the above cluster. Removing these variables makes other patterns more visible, Figure 6.10.

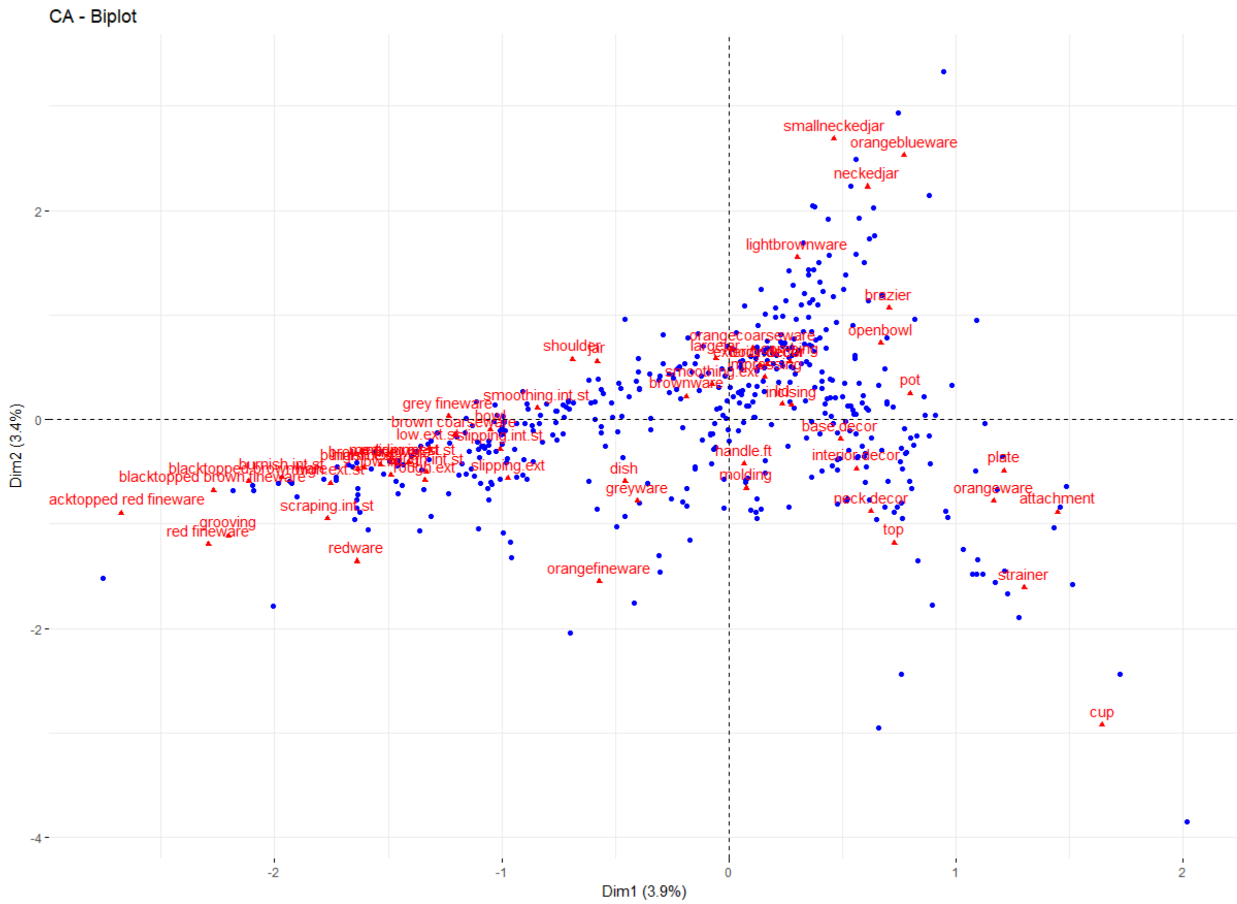


Figure 6.10. Simplified biplot of CA output with the outliers, closed cup, closed bowl, decorated handle, basin, black ware, black topped orange ware, and black topped orange fine ware.

Despite being easier to read, the data points in Figure 6.10 do not cluster into discreet groups. To form types, I again refer to quality in Table 6.3. I progress through Table 6.3 looking at all the examples that have the first variable as an attribute then checking to see which other variables they often have in common. For this process, I created the following list of eighteen types.

Type 1

Open bowls made in an orange or red/orange ware with a smoothed exterior and decoration on the exterior body. This decoration is often molded or impressed. Some have ring bases while others are rounded. Most have rounded rims. The diameters range from 11 to 26 cm. The average thickness is 6.13 mm. There are examples from all trenches, but the majority come from trenches 1 and 4.

Type 2

Bowls highly treated on both surfaces. Interiors are burnished, and exteriors are smoothed or burnished. The fabric is brown ware or blacktopped brown ware. Examples with burnish on both surfaces have diameters from 14 to 24 cm. Examples with burnish on both surfaces and slip on the exterior have diameters from 18 to 20 cm. All the diameters range from 33 to 9 cm, 21cm on average. Most examples are fine ware. Most inclusions include feldspar.

Type 3

Small cups with rough interior and exterior surfaces. They likely function as crucibles. Most examples have metal residues on the interior surface. They all have rounded rims and pointed bases. Large quartz inclusions are common. Diameters range from 6 to 4 cm. Wall thickness ranges from 10 to 4 mm. Examples only occur from trench 1.

Type 4

Large jars with rough interior and exterior surfaces and ring bases. Diameters range from 32 to 25 cm. Ring bases range in diameter from 15 to 11.5 cm. Feldspar and quartz inclusions occur frequently. Examples have been found in trenches 1, 2, and 3.

Type 5

Bowls with burnish on both surfaces and rounded rims. They have vertical or slightly outward angled walls. The wares are blacktopped red fine ware or blacktopped brown fine ware. Their diameters range from 20 to 14 cm with an average of 18 cm. Wall thickness ranges from 8.5 to 6.5 mm with an average of 7.625 mm. All examples have mica and/or feldspar inclusions. Examples are only found in trench 2.

Type 6

Thick vessels that are rough on both surfaces. They are decorated on the exterior surface with thick incised lines. The fabric is usually brown coarse ware with frequent large feldspar inclusions. They have an average thickness of 10 mm. They occur in trenches 1, 3, and 4.

Type 7

Vessels that are rough on both surfaces with combed decoration on the body exterior. The decoration is likely in the form of horizontal lines. The fabric is either brown or redware. The average wall thickness is 6.5 mm. Examples occur in trenches 1 and 3.

Type 8

Open bowl in orange ware with frequent feldspar inclusions. The diameters range from 24 to 29 cm with an average of 26 cm. Wall thickness ranges from 5.5 to 7.5 mm with an average of 6.7 mm. Examples are found in trenches 1, 2, and 3.

Type 9

Vessels in orange-blue ware with parallel incised lines on the body exterior. The majority of examples are coarse, around 70%. The fabric has frequent feldspar inclusions. The thickness ranges from 13.8 to 5.4 mm with an average thickness of 9.4 mm. examples are from trenches 1, 2, and 3, but the majority come from trench 1.

Type 10

Vessels in orange-blue ware with impressed dots on the body exterior in one or two rows. Thickness ranges from 6 to 12.8 mm, average 9.7 mm. Examples come from trenches 1, 2, and 4. Most of the examples come from trench 2.

Type 11

Open bowl with combed wave decoration on the interior just below the rim. Most examples are brown ware, but some are orange ware. The diameters range from 39 to 19 cm, average 27.85 cm. The thickness ranges from 9.5 to 5 mm, average 7.72 mm. Examples found in all trenches, but most are from 1 and 4.

Type 12

Bowl, jar, or pot with combed triangle or diamond pattern on the exterior. Examples are in orange ware or brown ware. The thickness ranges from 12.5 to 6.3 mm, average 8.65 mm.

Type 13

Bowls, jars, or pots with combed horizontal lines alternating with combed wavy lines. Most examples are brown ware, but orange ware and grey ware are also represented. The thickness ranged from 10.7 to 4.5 mm, average 6.67 mm.

Type 14

Small bowls with a low ring base. The diameters range from 17 to 18 cm. Examples have external slip. They have slightly everted rounded rims. Two molded circles on the exterior body. Ring base with a diameter of 9 to 10 cm. The wall thickness is 6 to 9 mm with an average 6.7 mm. All examples come from trench 1.

Type 15

Rounded jar with everted rounded rim. Coarse fabric mostly in orange ware. The thickness ranges from 16.8 to 7.6 mm with an average of 10.25 mm. The diameters range from 11 to 42 cm with an average of 26.69 cm. Examples occur in all trenches, but most are from trench 1 and 4.

Type 16

Open bowls in orange ware with impressions on the rim top. The diameters range from 30 to 21 cm with an average of 24 cm. Wall thickness from 8.5 to 6 mm with an average of 7.12 mm. Found in trenches 1, 2, and 4, but most examples from trench 2.

Type 17

Necked jars in black ware or brown ware, possibly blacktopped fabrics. The fabric has frequent feldspar inclusions. They have two rows of impressed dots on the exterior and everted rims. Diameters range from 10 to 31 cm with an average of 22 cm. Wall thickness ranges from 8 to 17 mm with an average of 12.1 mm. Examples come from trenches 1 and 2.

Type 18

Decorated fine ware vessels with columns of vertical impressed dots bordered by combed horizontal lines on either side. Examples in orange fine ware, red fine ware, and brown fine ware. The wall thickness ranges from 3.5 to 5.5 mm. Examples occur in trenches 2 and 4.

6.4 Discussion

In performing this analysis, it is immediately apparent that types do not cluster into easily divisible and definable groups. While employing correspondence analysis reveals which attributes are causing the most differentiation in the data, to create a type with multiple attributes, the ceramicist still has to perform a lengthy process of comparing different examples from the dataset that share a common value for an attribute. In this case, since I sorted types by the quality of variables, or how much variance each attribute is contributing to the data set over all tests, the variables with high quality do not necessarily belong to the same category of attributes. For example, the variable with the highest quality was “orange ware”, which belongs to the larger category “ware type”, and the variable with the second highest quality was “high exterior surface treatment”, which belongs to the larger category “degree of surface treatment”. In creating an intuitive typology (Chapter 4), the ceramicist chooses which variables to prioritize in sorting and usually sorts based on all the variables of a particular category of variable before moving on to the next category. As described in Chapter 3, these variables are most commonly ware/fabric, shape, and surface color. The intuitive method has the benefit of making types easily describable, recognizable, and sortable. In organizing by quality without uniting categories for variables, it is much more difficult in a practical sense for a ceramicist to name, recognize, and sort individual artifacts without constantly checking them against the full list of types. Despite these types being more confusing to work with, sorting by attributes that are responsible for the most variability in a dataset may show “types”, or patterned covariances in the data, that were not immediately apparent.

In light of the above discussion, employing correspondence analysis with large ceramic data sets may be more useful to answer specific research questions than creating typologies with the primary goal of summarizing or sorting. They are less useful for direct observations of patterns in the field and communication between ceramicists but more useful for attempting to analyze and explain variation across a dataset. For instance, a ceramicist who is interested in technology might first divide their dataset into different ware types, then perform correspondence analysis on each to determine if different communities of potters are using the same fabric recipes to make similar shapes with similar decoration and surface treatment. Organizing by a primary variable allows the ceramicist to observe variation in the dataset in the context of a particular topic. In this way, typologies can be generated with particular questions in mind. Currently, the dataset from Mai Adrasha is too fragmentary and thus not large enough to produce clear results with this method. However, with more seasons and/or data from other archaeological sites, this will soon be possible. As with all statistical methods, results become more accurate with larger samples sizes.

Multivariate statistical methods are valuable for their ability to identify patterns/types that are not immediately apparent allowing for a more nuanced understanding of a ceramic assemblage. Creating a typology like the one made in this chapter clearly illustrates the variation in a large data set and can lead to new research questions in order to explain that variation. Generating a typology by first isolating single variables in the dataset and them employing correspondence analysis has the potential to answer wide-ranging archaeological questions typically addressed with ceramics in a more rigorous way.

CHAPTER 7: NORTHERN HORN CERAMICS: A PLATFORM FOR COLLABORATION

7.1 Introduction

The Northern Horn of Africa is a relatively understudied region. In comparison to the nearby Mediterranean and Red Sea, there have been few archaeological projects in the Horn, though there has been a notable increase in the past decade. For the most part, ceramic studies in the Horn have been associated with individual archaeological sites. As discussed in Chapter 3, for all periods, the only example of a typology created using multiple sites was published by Rodolfo Fattovich (1980). One other typology making use of multiple sites is expected to be published soon by Andrea Manzo, focusing on the Pre-and Proto-Aksumite Periods. Though there has recently been an uptick in the number of projects in the Northern Horn, there are still relatively few comprehensive publications, and when these publications do appear, they seldom include complete datasets. In archaeology, there is an increasing emphasis on sharing and preserving data (ex. *Journal of Open Archaeology Data, Journal of Archaeological Science, Advances in Archaeological Practice*), but despite current trends in publishing, some journals do not yet provide outlets to publish data, and some scholars are still reluctant to publish their complete data. It is indeed a time-consuming task to prepare data for publication, and at present, archaeologists are not heavily incentivized to do so. As a result, researchers have great difficulty accessing data that can be reused. Without easy access to other data sets, researchers cannot do in depth analysis on larger scales and can often only make superficial comparisons. In many studies, without data reuse deep analysis cannot be performed on aggregate datasets and only superficial comparisons can be made. All of this makes large comparative or regional studies, such as Fattovich's influential 1980 publication difficult, if not impossible, to do thoroughly.

There is also the problem of terminology. Scholars use a variety of words to describe shapes, fabrics, decorative motifs, etc. For example, closed/restricted bowl and neckless jar often mean essentially the same thing despite very different terms. Creating a unified terminology would do much to encourage discussion and comparison and avoid miscommunication. This confusion over terms also extends to ceramic types. Authors do not always clarify the methodology they employ to categorize their assemblages. The logic behind the grouping of different ceramic attributes should be made clear, in order to more fully understand sequences within a single site or spanning an entire region.

In the effort to understand regional trends and relationships between sites, we are positioned at an opportune moment. With only a few projects operating in the Northern Horn, through collaboration, we can create comprehensive regional typologies. In this way, we will gain a better understanding of ceramic change through time and space.

To address these issues, I set out to create the Northern Horn Ceramics site. I built this site along with Deidre Whitmore, who is the digital lab manager at the Cotsen Institute of Archaeology. The concept for the site was conceived during the 2016 UC Metadata Central Workshop held at UCLA.

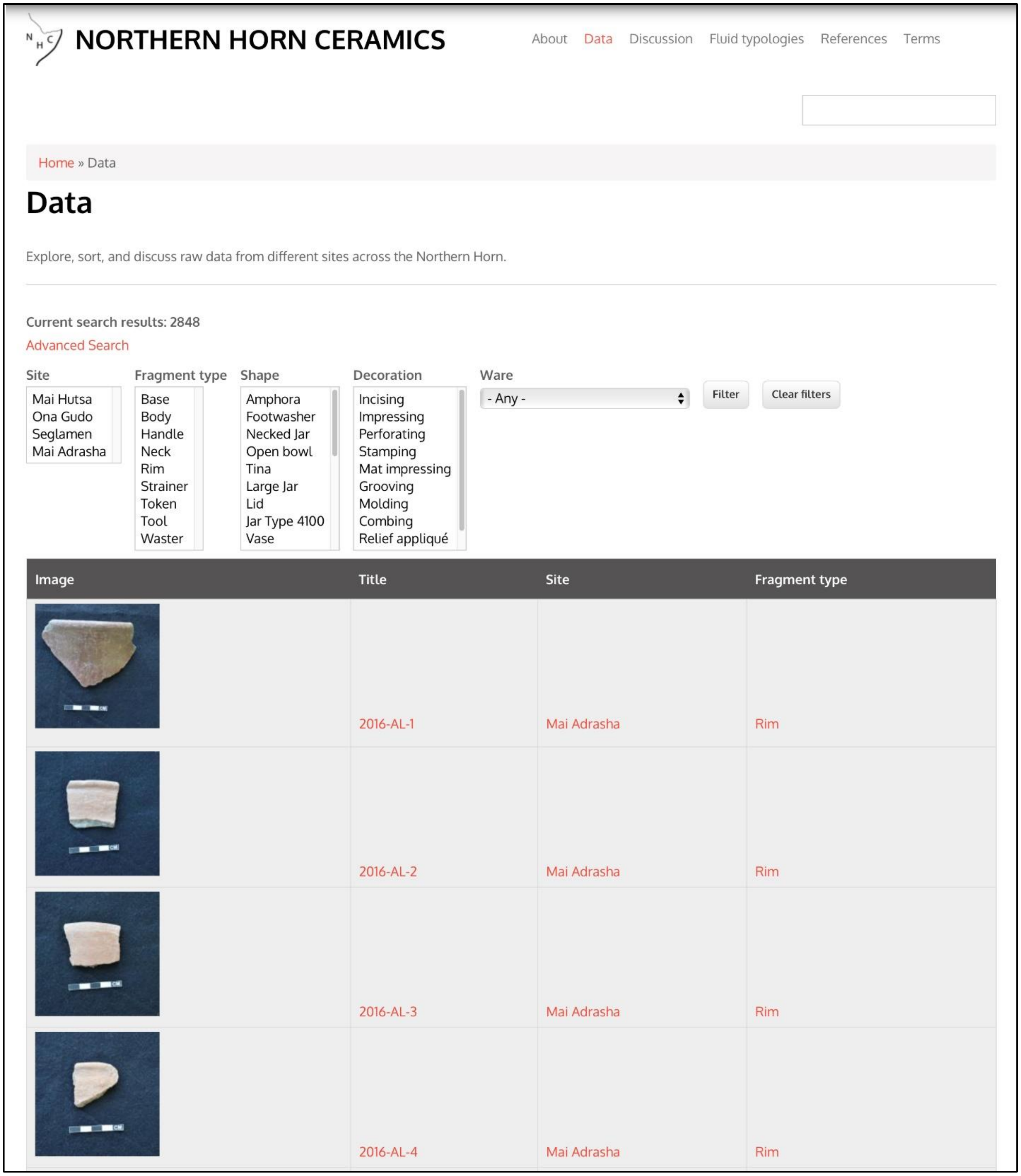


Figure 7.1. List of individual artifact records on NHC's data page. Menu is visible at the top followed by quick sorting criteria.

The Northern Horn Ceramics (NHC) website is at its core a database. The site was built with the open source content management system Drupal 7, which utilizes a MySQL database with a JavaScript and PHP front-end. All data from the website or from specific queries can be exported and imported in csv format, allowing for easy transfer to and manipulability in other programs. For each individual artifact entry, users enter data for the categories of metrics, fabric, morphology, context, surface treatment, and decoration. All qualitative categories are entered with controlled vocabularies to prevent errors from misspellings, missing spaces, or term disagreements. By enforcing these standards and reducing errors the data are more easily manipulatable, require minimal cleaning before quantitative analysis, and are more readily comparable across sites or other attributes within the database.

NHC is hosted through the Digital Archaeology Lab of the Cotsen Institute of Archaeology at UCLA. The address is https://dal.ucla.edu/nhc/. To access the site a login is required. There are three basic levels of access: administrator, specialist, and viewer. A viewer only has the ability to view the data, discussions, and search. A specialist can do all of these things but can also contribute their own data and participate in discussions. An administrator has all the capabilities of a specialist and viewer but can also make fundamental changes to the structure of the site. Currently, all of the data on the site is only viewable to users furnished with a login.

Each artifact page will be given individual persistent identifiers, which allow every record to be directly cited. On NHC, all versions of each page are retained. In this way, the changes and the user who made them are tracked. Deidre and I are currently working with Timothy Dennis, Director of the Social Sciences Data Archive at UCLA Library, to make both of these goals possible. The database also has an advanced search page that allows users to search using combinations of ceramic attributes. The results of these searches can also be exported.

NHC is being used as a pilot for the Social Sciences Data Archive at UCLA. The archive uses the open source web application Dataverse. Dataverse was first created at the Harvard Institute for Quantitative Social Sciences (IQSS) (King 2007) and now has 34 installations across the world (https://dataverse.org/). Dataverse is described on the project website as an "open source web application to share, preserve, cite, explore, and analyze research data" (https://dataverse.org/about), which is very similarly aligned with the goals of this project. We are currently preparing NHC's data for ingest into the UCLA data archive in a number of ways. We are making sure that each field is defined. Each individual virtual archive or dataverse within the overall archive or dataverse installation contains its own set of defined metadata. We are cleaning our data for an initial batch deposit. Once the archive is up and running, NHC will be directly linked to the archive. Ingest will then be as simple as pressing a button. Ultimately, NHC's individual dataverse within the Social Sciences Archive will contain and preserve copies of all versions of each page. Once safely in the repository, each page of NHC will have suggested citations making them openly available and citable.

7.2 Data Entry

Data entry can take place in the field or the lab. It can be primary data creation, recording direct observations of an artifact, or it can be the ingest of existing data, in the form of paper recording sheets, transfer from other database types, or digitizing previously published data. In either case, both quantitative and qualitative data is collected.

Quantitative data can be collected in several fields that are all limited to the overarching category of metrics. Sherd count is the number of ceramic fragments recorded on a single page. This is used when there is more than one fragment from a single vessel. To be sure they originate from the same vessel, they often can be fitted together. Thickness, height, and width of sherds are recorded in millimeters and taken from the thickest, tallest, or widest part of the fragment. Weight is recorded in grams. If the fragment is a rim, the diameter is measured in cm. The percentage of the original circumference of the vessel should also be recorded. Rim measurements should only be taken if enough of the rim is present to measure the diameter with some accuracy.

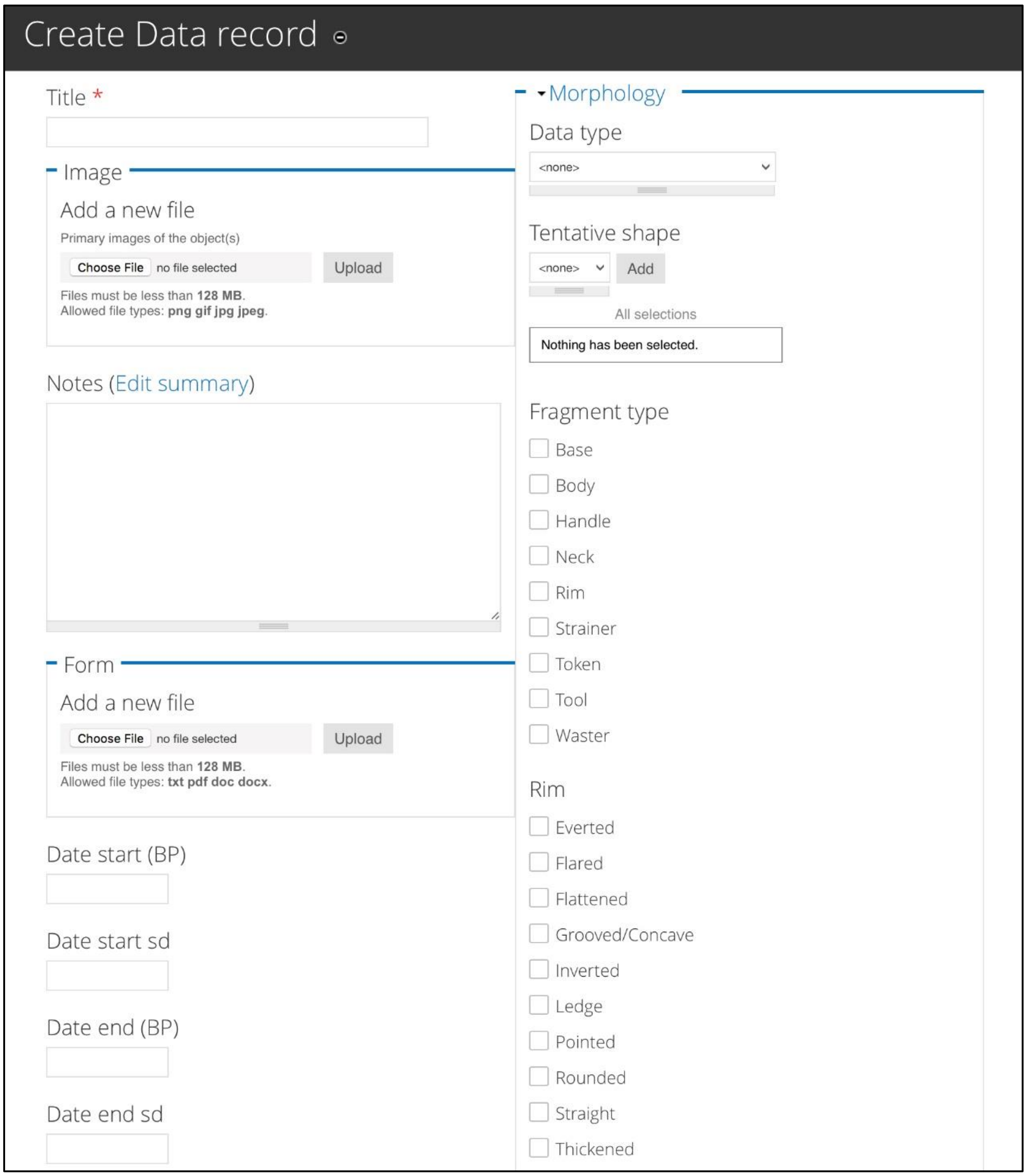


Figure 7.2. Data entry page showing some controlled vocabularies.

The majority of fields in data entry are qualitative. In order for data to be clean and comparable, I have created controlled vocabularies for most qualitative data fields (Figure 1.1). These fields come in several categories including context, morphology, fabric, surface treatment, and decoration. For context, there are several fields. The first is recorder. This is the specialist that collected primary data on the object(s). The selection of the recorder is limited currently to researchers that have contributed data to the database: Haregwin Belete, Matthew Curtis, Gabriella Giovannone, Rachel Moy, and Luisa Sernicola. Next is the date excavated. This is a free text field but does include guidelines for how the date should be added. Registry number is an external, usually excavation, database number. Site is a controlled list of sites that have contributed data so far: Mai Adrasha, Seglamen, Mai Hutsa, and Ona Gudo. Specific site context information is based on the system currently used at Mai Adrasha. Trench and Unit are free text fields. Context gives some idea of the type of deposit the object comes from. This field includes architectural debris, backfill layer, courtyard, domestic interior, fill, floor, foundation layer, natural layer, occupational layer, packing fill, tomb, topsoil, trash deposit, wall, wall collapse, and water laid deposit. The final field for context is bag. At Mai Adrasha, as at many other sites, we collect pot sherds in the field in large sample bags. I give each bag a letter at the beginning of the season beginning with A. The names of bags get a second letter when I reach the end of the alphabet (i.e. Z is followed by AA then AB then AC, etc.). Since not all sites record context in the same way, on some entries fields may be left empty or there may be additional context information in the notes field. These fields will be given site specific definitions on the terms page as many projects record context differently.

The next group of fields belongs to the category morphology. This category begins with data type. There are only three options for this category: diagnostic, nondiagnostic, and complete or nearly complete. Fragment type includes: base, body, handle, neck, rim, strainer, tool, and waster. If a fragment is large, more than one category can be selected. Since it is often difficult or impossible to determine the shape of vessels from fragments, I created a tentative shape category. It includes amphora, basin, bowl, brazier, cup, dish, figurine, jar, lid, miniature, pot-stand, strainer, tool, and vase. A few of these shapes also have sub-types (i.e. necked or neckless jar). The morphology of features of a shape is also addressed in this category. Rim shape can be described in a number of ways: everted, inverted, flattened, grooved, ledge, pointed, rounded, straight, thickened, and thinned. The bases field also includes several options: concave, convex, footed, flat, ring, and round. Handles are the last similar category. First vertical or horizontal handle orientation is chosen, then handle or grip is chosen. If handle is chosen, the recorder is prompted to round or strap handle.

The third category is fabric. Here Munsell measurements of the interior, exterior, and core of each fragment are recorded. A separate field was created for additional specific color notes. Wares are identified by name through a dropdown selection pane. There is a three-tiered entry system for inclusions. First the inclusion type is selected: rock fragments, iron oxide, quartz, feldspar, organics, or mica. This is always somewhat guesswork for the naked eye or a hand lens. Microscopy is needed to verify these observations. The attributes for this field were chosen after initial thin section analysis of some sherds from Mai Adrasha (Moy and Fischer, *In preparation*). After the type of inclusion is added, the recorder is prompted to add the relative abundance. This is measured in five categories: extremely frequent, very frequent, frequent, some, few, and very few. Finally, a subjective size value is given: small, medium, and large. Rough parameters for these subjective values are recorded on the terms page. A field is also provided for a text description of the inclusions to be added.

The fourth category is surface treatment. A list of different types of surface treatment is provided, multiple values can be selected: no treatment, smoothing, burnish, slip, wash, rough, and scraping. After the type of surface treatment is added, the recorder is prompted to add whether this treatment was on the exterior or interior of the vessel. Finally, the recorder adds the intensity of the treatment, high, medium, or low. I have also included two other groups in this category, finishing marks and sooting. In both cases, the researcher can record their presence and whether they are on the exterior or interior.

The fifth category is decoration. This category only contains two fields. The first is decoration. The recorder first chooses the type of decoration: impressing, perforating, stamping, grooving, incising, molding, combing, and relief applique. Then, they add the location of the decoration on the vessel: attachment, body, rim, shoulder, neck, base, and handle. They are then prompted to record whether the decoration is on the exterior or interior of the vessel. The second field is motif. Here the recorder is prompted to select, which decorative motif was used. In both fields, multiple selections can be made.

In addition to these fields, data can also be added in the form of pictures and pdfs made from paper forms. Photos of both surfaces of each object should be added along with other views when appropriate. Images of angle and decoration sketches should also be provided by the recorder. In choosing these attributes, I have attempted to be inclusive. Each ceramicist that participates in the project may not record every field listed here, but the system allows for blank entries when the information is not available.

7.3 The Discussion

At the bottom of the data entry page, every artifact has its own discussion forum. In this way, examples from different sites can be easily shared, compared, and discussed. NHC has general discussion boards to facilitate conversation between users. Here, any ceramics question can be posited to the whole community and new forum topics can be started. More specific discussion of terms takes place on the terminology page. Here, the controlled vocabularies for data entries, and other terms the users are interested in, can be discussed. I have provided definitions of terms sometimes taken from existing publications (mainly from Fattovich 1980, Phillips 2000, and Wilding 1989) or from discussion at the workshop on "the definitions and typology of ancient Ethiopian Pottery" held during the "first international conference on the Archaeology of ancient Ethiopia" held in Paris April 2016, with a few I created myself. The bottom of each term page is populated by examples of artifacts with that particular attribute housed in the database.

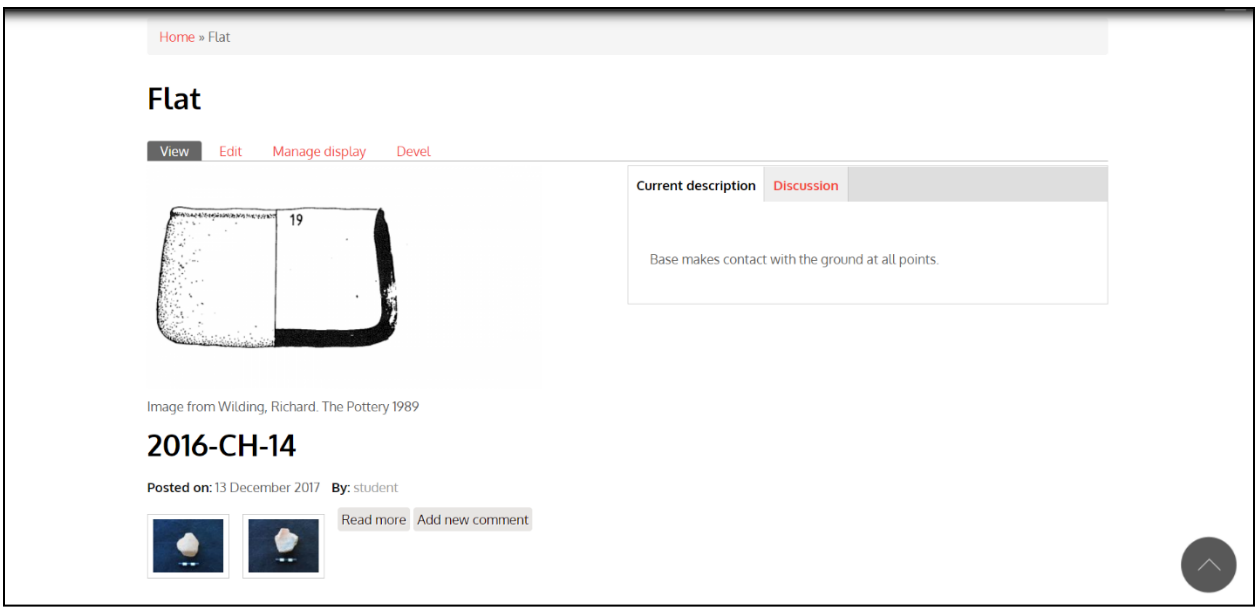


Figure 7.3. Example of the term page for "Flat" under the category "Bases".

Each term has an individual discussion forum. In this way, the definitions can be examined and changed by user consensus. This allows for fluid definitions rather than the fixed ones you would find in print. Standardized and broadly accepted terms allow for greater understanding between scholars and facilitate comparisons between sites and studies. Beginning with Tigrinya, Amharic, and Italian, we are also working to make the terms and definitions multi-lingual to facilitate international exchange.

7.4 Fluid Typologies

The fluid typologies page gives users the ability to propose new types by choosing attributes to group together. The bottom of each type's page is populated with database entries that could belong to that type based on its defining attributes. These entries are linked directly back to the database allowing users to explore them. These newly created types can then be discussed by all users in the discussion forum linked to each type page. Newly created types with their examples and discussion boards will also be deposited into the repository thereby receiving unique identifiers, also allowing them to act as small publications.

Some types that have been previously published can also be added here, discussed, and compared to new types. Currently, several of Rodolpho Fattovich's (1980), Richard Wilding's (1989), and Jacke Phillipson's (2000) published types have been added. We are working towards the ability for users to combine types to create their own typologies, which can be site-, region-, or period-specific. Like single types, whole typologies can also be compared to each other and past publications. Both types and typologies can be easily changed as new information becomes available. These new types and typologies can then be presented to the community immediately, without the delays of traditional print publication. As typologies change, the different versions will remain available. Each version will be provided with unique identifiers; thus, each version can be individually cited, not just the most recent.

7.5 Other Applications

NHC is a versatile platform that has the potential to address issues concerning data standards and terminology for archaeologists worldwide. The core structure has been adapted for use with

Egyptian ceramics, Egyptian Paleoethnobotany, and Peruvian textiles. Considering these applications, NHC's framework has the potential to be reused with other artifact types and in other regions. Through open communication, transparency, and collaboration, this tool will allow us to better understand the cultural and chronological sequences in the Northern Horn of Africa and potentially, in other regions across the globe.

NHC has been employed as a teaching tool. For the Institute for Field Research Shire Field School in Tigray Ethiopia, pairs of students spent at least two days training with each specialist on the project, including the ceramicists. Students learned to process and analyze ceramics that had been excavated that season. Observations they made were entered directly into NHC.

The first partner site to NHC is *Museo Egizio Pottery*. The address for this site is https://dal.ucla.edu/mepots/. The site was created for the Institute for Field Research Field School, "Turin Museum of Egyptology", in 2017. During the field school, the classes were split into two main modules, ceramics and textiles. For the ceramics module, students learned to draw and analyze fragments of vessels of the site of Deir el-Medina, Egypt. This town was the home of artisans who worked on the tombs in the Valley of the Kings from the 18th to 20th dynasties and has been the subject of intensive study by Egyptologists. Many of these fragments were uncovered by Ernesto Schiaparelli, the former director of the museum, in the early 1900s. These objects were not on display but kept in storage. They are stored and listed in the museum catalog by box rather than individual artifact. On the Museo Egizio Pottery site, students were able to create detailed records of each individual piece. They did basic recording, drawing, and created 3D models of artifacts. In this way students were able to apply what they had learned in the field school, and museum staff gained more specific records for individual artifacts.

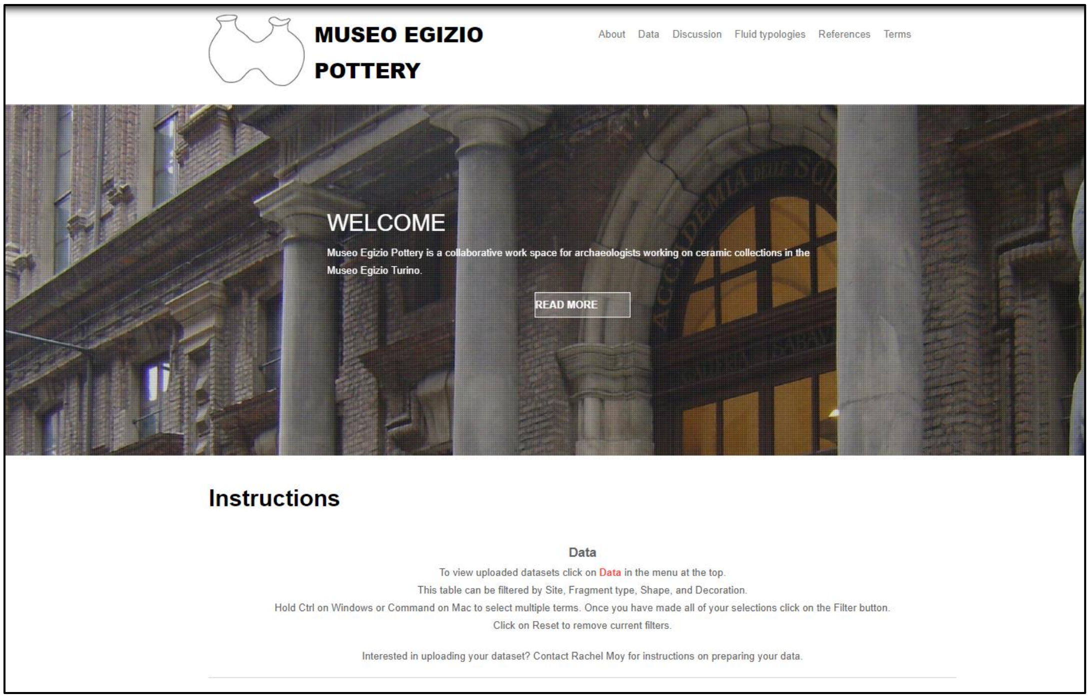


Figure 7.4. Home page of Museo Egizio Pottery

The second partner website is, Textile Mordant Analysis. The address for this site is http://dal.ucla.edu/tma/. Deidre and I created this site together with Terrah Jones, a graduate student at the Cotsen Institute of Archaeology. Terrah wanted to employ the framework of the site as a database to unite data coming from multiple sources. She also wanted a method to easily share information with other specialists. Currently, her collection includes textile samples from throughout the Andes. To develop this site, we used the core framework, then created textile specific categories with their own metadata.

The third partner website, which is still in early development stages, will focus on Egyptian paleoethnobotany. Another Cotsen graduate student, Amr Shahat, is working on a number of different assemblages throughout Egypt now housed in the Agricultural Museum in Cairo. He is collaborating with Dr. Ro'ayat el Khateeb who will focus on non-botanical samples in the museum's collection. They are migrating the physical records of the museum to a digital format. Amr would like to keep his data in a centralized location, help the museum organize their collections, and be able to share them easily with associated projects. Similar to the other partner sites, Amr will use the core framework of NHC, and then create specific attributes with associated metadata for the collections of each department of the museum. The museum will offer internships for students from Cairo University, so this site has a special emphasis on making his database bilingual in Arabic and English.

Future potential projects using the NHC framework include documenting shell midden from the Channel Islands off the coast of California and preserving obsidian data from the Neolitic Tel site of Masis Blur.

7.6 Conclusion

NHC has several main goals:

- to create transparency related to the collection, categorization, and interpretation of data;
- to facilitate communication between scholars and encourage collaboration;
- to create ease in archaeological data sharing and reuse; and
- to preserve data long-term.

Problems of data collection, dissemination, reuse, and preservation are well known in the field of archaeology (Kansa 2014, Kansa et al. 2013). It is our hope that NHC will encourage best practices in these areas.

In comparison to other data tools and repositories, NHC has a number of strengths. NHC is region and specialty specific. With this targeted audience, communication is streamlined, and collaboration across projects can be more easily initiated and accomplished. NHC facilitates this collaboration by providing a unique terms page that captures discussion and changes to definitions. NHC is not only a tool for data collection and analysis. It also serves as a data repository. Researchers can use NHC for field data entry, data preservation, and data dissemination.

Another particular feature of NHC is the fluid typologies page. As discussed in Chapters 1 and 3, typologies are often created from limited datasets; the methods used by the researcher to collect, categorize, and form ceramic data into typologies are often not clarified by authors; how metadata and data are defined and collected vary by researcher. Due to the lack of availability of raw data from previous studies, large scale comparative studies are difficult to produce. Using NHC as a tool can help reduce these problems. NHC has the potential to hold multiple large datasets and allows for cross referencing through the use of the standardize terminology. The dictionary discussion enables users to address and compare past definitions. This approach also allows the incorporation of legacy data (either published or recorded in the past). Definition of terms and types are available and version controlled, allowing for greater transparency. Datasets in NHC can be queried and compared, thus facilitating comparative studies. NHC's fluid typologies page allows users to create alternative typologies following best data practices in a transparent way.

CHAPTER 8: Evaluating Typological Methods in the Ethiopian Highlands

8.1 Assessing Typological Methods

As we have seen in the previous chapters, there are many methods employed by ceramicists to create typologies. Shortly after the introduction of archaeology as an academic discipline until quite recently the organization and categorization of archaeological material was subject of a lively debate (see Chapter 2). Currently typological discussions seem to have fallen somewhat out of fashion though types and typologies are still central to many of the conclusions archaeologists draw. The ability of specialists to communicate with one another is still key to good research, and a ceramic type is a tool that can enable this. With the realization that ceramics are not just a useful relative dating tool but can be used to answer many types of questions on social context, long distance contacts, social signaling, and many other topics, ceramicists are collecting many more data, and the time it takes to record and make sense of these data can easily become overwhelming. Many disciplines are developing new ways to deal with large data sets, and archaeology is no exception. In our discipline, we are now learning to focus more on data management and statistics and are discovering the huge interpretive power of large data sets (ex. Atici et al. 2013; Borgman 2015; Schachner 2015).

In this dissertation, I have examined four ways to make sense of a large ceramic data set. The first, employed in Chapter 4, is the intuitive typology. Such a typology is, however, often limited to a specific site and temporally bounded. This method relies on one of humanities' talents, the ability to find patterns. It is easier for a ceramicist to makes sense of large assemblages using this method, if they have experience recognizing ceramic details and determining patterns. How ceramicist divide their data intuitively is partially governed by scholarly tradition, training, and regional practice. The intuitive typology is, therefore, partly determined by the school of thought the ceramicist adheres to. Thus, typologies are created with some bias not just with intuitive pattern finding.

The intuitive typology I have created in Chapter 4 is based first on form/shape and therefore focuses on complete or almost complete vessels only. By far the majority of the ceramic finds from Mai Adrasha consist of small fragments and are not first considered in the typology, because they do not hold sufficient information. Thus, the subjective typology created in Chapter 4 is made up of only complete or nearly complete vessel fragments. The complete or almost complete vessels only make up small portion of the data set, and thus I identified seven types, based on vessel shape, with twenty-five subtypes, based on whatever other attributes seemed to differ most obviously. For example, subtypes might be based on rim shape or decorative motif. This method seems to be the easiest and fastest of those discussed in this dissertation, but its use is very limited. It merely provides a convenient “ordering” of a subscribed corpus but does not have explanatory power. If something quick is needed in the field to identify the differences between trenches and levels, the subjective typology appears to be the best method. This gives a quick impression allowing for initial comparison between different contexts and communication between specialists. It can give specialists an idea of what patterns may exist in the data and make hypotheses about these patterns. Those hypotheses can later be tested more rigorously. Intuitive typologies have the disadvantage of being highly reliant on how well certain forms are preserved. Those forms that are represented only by small fragments can be missed entirely, giving the research a potentially skewed view of what the full assemblage was in the past.

The second method, employed in Chapter 5, was the historical typology. This method has strength in that it builds on the work of other scholars. It comes with the major disadvantage of not taking spatial and sometimes temporal variability into account. Researchers can easily fall into the trap of interpreting small fragments as known types from nearby sites, when they cannot be certain that those types are even present at their site. Historical typologies take this a step further and are explicitly based on assemblages from other sites and are often amalgamations of several intuitive typologies. In comparison to the intuitive typology, my historical typology had much fewer types. Types from two influential typologies in the region failed to clearly match objects from Mai Adrasha. My historical typology only has seven classes of artifacts, four from Fattovich (1980) and three from Wilding (1989). All of these groups fit nicely within the intuitive typology created in Chapter 4. In light of this, creating a historical typology did little to clearly categorize the assemblage at Mai Adrasha. Creating a historical typology may be more valuable if more obvious parallels can be seen between artifacts. However, while creating a historical typology does little in this case to help organize artifacts from Mai Adrasha, it can help answer different research questions. Making direct comparisons between ceramic assemblages can help us understand the nature of the relationships between those sites overall. In this case, it is clear that Mai Adrashans had a very different ceramic tradition than the contemporary pre-Aksumite sites studied by Fattovich (Yeha, Matara, Hawelti, and Melazzo). As all of these sites are located in Eastern Tigray or Eritrea, it appears that a separate ceramic tradition existed further west. The assemblage from Mai Adrasha is also significantly different from that of Aksum. Although these two sites only overlap slightly chronologically, they are only located 50 km apart. This could potentially indicate that these two centers were not closely linked during overlapping periods.

The third method, employed in Chapter 6, was based on a statistical approach. This method's strength is that it can show patterns that are not obvious intuitively. Although the ceramicist selects the aspects that are initially recorded, this method is less directly affected by personal bias. It does not prioritize one attribute over another. In this typology, I created eighteen types. Overall the types built for the statistics typology are more specific than those in the intuitive and historical typologies, as in a combination of more criteria is employed to define types. This method reveals patterns I could not readily identify or did not align with sorting by shape, so they do not always align with intuitive and historical typologies. Another advantage is that I could incorporate fragmentary materials.

8.2 Discussion

Below I directly compare the types of the typologies formed in chapters 4 and 6. Of the eighteen types in the statistical typology, nine can be at least partially aligned with types from the intuitive typology. Only two, however, match very closely in their attribute descriptions. As is clearly illustrated by Table 8.1, the criteria for the statistics types are much more extensive than the intuitive types. However, I often divided the intuitive types into subtypes, which are more specific in their definitions. To clarify my discussion, I follow statistical typology types with "s" and intuitive typology types with "i".

Statistics Type	Statistics Type Criteria	Intuitive Type	Intuitive Type Criteria
Type 1	-Open shape -Bowl -Red/Red orange fabric -Smoothed exterior	Type 1 Type 1.a Type 1.a.1 Type 1.a.1.a Type 1.a.1.b Type 1.a.2	-Open shape -Bowl -Red orange/brown/orange fabric

	-Decoration on the exterior body (usually molded or impressed) -Usually rounded rim -Diameter 26cm-11cm -Average thickness 6.13mm	Type 1.a.2.a Type 1.a2.b Type 1.b	-Some with incised or combed decoration on the rim top or interior. -Diameter 32cm-19cm
Type 3	-Open shape -Small cup -Tapered base -Rounded rim -Roughened exterior and interior -Large quartz inclusions common -Diameter 6cm-4cm -Thickness 10mm-4mm	Type 2.a.4	-Open shape -Cup -Tapered base -Grey coarse fabric -Direct rim -Diameter 5cm-4cm
Type 4	-Large jar -Ring base -Ring base diameter 15cm-11.5cm -Roughened exterior and interior -Feldspar and quartz inclusions common -Rim diameter 32cm-25cm	Type 4	-Large jar -Ring base -Flaring top rims and bases -Orange medium fine or coarse fabric -Diameter 40cm-27cm.
Type 8	-Open shape -Bowl -Orange fabric	Type 1 Type 1.a Type 1.a.1	-Open shape -Bowl

	-Frequent feldspar inclusions common -Rim diameter 29cm-24cm -Thickness 7.5mm-5.5mm	Type 1.a.1.a Type 1.a.1.b Type 1.a.2 Type 1.a.2.a Type 1.a2.b Type 1.b	-Red orange/brown/orange fabric -Some with incised or combed decoration on the rim top or interior. -Diameter 32cm-19cm
Type 11	-Open shape -Bowl -Combed wave decoration just below the interior rim -Brown fabric most common, some orange fabric -Diameter 39cm-19cm -Thickness 9.5mm-5mm	Type 1.a.2.b	-Open shape -Bowl -Round base -Combed wave decoration just below the interior rim
Type 14	-Small bowl -Low ring base -Ring base diameter 10cm-9cm -Slipped exterior -Slightly everted rounded rims -Two molded circles on the exterior body -Rim diameter 18cm-17cm -Thickness 9mm-6mm	Type 1.b	-Bowl -Ring base -Vertical strap handle -Orange exterior surface color -Molded decoration on the exterior surface -Rounded rim -Rim diameters 18cm-11cm
Type 15	-Jar -Rounded body -Everted rounded rim	Type 3	-Jar -Orange fabric most common

	-Coarse fabric, mostly orange ware -Thickness from 16.8mm-7.6mm -Diameters range from 42cm-11cm		-Occasion decoration in the form of molding on the exterior shoulder or impressing on the rim top -Flaring everted rims common
Type 16	-Open shape -Bowl -Orange ware -Impressions on the rim top -Diameters range from 30cm-21cm -Thickness from 8.5mm-6mm	Type 1 Type 1.a Type 1.a.2 Type 1.b	-Open shape -Bowl -Red orange/brown/orange fabric -Diameter 32cm-19cm
Type 17	-Closed shape -Jar -Neck with vertical walls -Black or brown fabric, potentially blacktopped -Frequent feldspar inclusions -Two rows of impressed dots on the exterior -Everted rim -Diameters range from 31cm-10cm -Thickness ranges from 17mm-8mm	Type 3.a	-Constricted neck -Jar -Neck with vertical walls

Table 8.1. Comparison of statistics and intuitive types. Types highlighted in grey that are near exact matches.

Type 1.s matches Type 1.i. This is the only case where the intuitive typology was more specific in its type definition as Type 1.i was created along with eight subtypes. Type 2.s does not appear at all in the intuitive typology. It does appear to be distinctive, however, no complete examples and few fragments were found. This is likely the reason I did not distinguish it as an intuitive type. Type 3.s is one of only two instances where these two typologies line up nearly exactly. This form is matched with Type 2.a.4.i. It is easily recognizable as there are many complete examples. Type 4.s would fit into the larger Type 4.i. It, however, would be more appropriate as a subtype because of the tighter range of the diameter and the different surface treatment. I failed to recognize this subtype when creating my intuitive typology. Type 5.s does not appear in the intuitive typology. This is unsurprising as Type 5.s is primarily designated by shape. Types 6.s, 7.s, 9.s, and 10.s also do not appear in the intuitive typology, because shape is not one of their defining attributes. For the intuitive typology, I first sorted all attributes by shape, but in these cases other characteristics are responsible for initially discerning variation. These include surface treatment, decoration, and ware. Type 8.s, like Type 1.s, could fit under the larger umbrella of intuitive Type 1.i. It, however, has more specific attributes that would designate it as a subtype that I did not recognize. In this case, both types are bowls. In my intuitive typology, it made the most sense to further divide by base shape. Type 8.s does not include base type, since it is often not preserved, and perhaps there are clearer attributes to sort by.

Type 11.s is the other instance where the two typologies closely match. Again, the statistical typology is more specific, but all the attributes of intuitive type 1.a.2.b.i fit directly into it. Types 12.s and 13.s are not restricted to a single form. Instead, they are identified by their distinctive decorative motifs. Thus, these types were not recognized in the intuitive typology.

Type 14.s matches the subtype 1.b.i but is more specific especially in terms of its diameter range. Type 15.s, like type 4.s, fits under the larger umbrella of Type 3.i. Again, in some ways Type 15.s is more specific in terms of fabric and range of thickness. Similar to bowls being separated by base shape, in the intuitive typology, I first separated jars based on the presence or absence of a neck. Type 15.s does not specify the presence of a neck but is specific in terms of the texture of the fabric, the shape of the body, and the shape of the rim. Type 16.s would also fit into Type 1.i as a subtype. Type 16.s is mainly distinguished by its decoration of impressions topping the rim. Type 17.s could fit into intuitive Type 3a.i, necked jars, but is much more specific in the attributes that define it. Type 18.s does not match any of the intuitive types, as the main defining feature is not form but fabric texture (fine) and decoration (columns of vertical impressed dots bordered by combed horizontal lines on either side). As can be seen from the above discussion of statistical types, multivariate statistics allows me to recognize patterns from fragments that I could not easily identify in my intuitive typology.

These two methods clearly produce different results. There are only two examples of types that can be matched directly. In the majority of cases, the statistical typology produced more precise types, or those identified by more attributes. However, several subtypes of larger types that existed in the intuitive typology were missed in the statistics typology. Since I chose to sort my intuitive typology by shape, groups that were better divided by ware, surface treatment, and decoration were not recognized in the intuitive typology but came to the fore in the statistical typology.

The fourth method is the relational database, accessed and shared through a website. This website has several strengths in that intuitive and historical typologies can be easily reflected here by defining which criteria they are based on side by side with the raw data. Specific parallels from different assemblages can be found and compared. By making typologies available in a digital form, rather than in the inflexible medium of print, they can be easily discussed openly, changed, and updated when more data becomes available. With more projects producing more data every year, Northern Horn Ceramics allows for the process from initial physical analysis to sorting into types to be streamlined without having to extract the research questions or criteria from printed typologies, which is at best an uncertain and time-consuming process.

Data interpretation, dissemination, and preservation are central to archaeological research. With rapidly advancing technology, archaeologists are changing how they deal with their data. In effect, archaeologists are now analyzing larger and larger corpuses of data. The use of large databases is allowing archaeologists to more quickly move from data collection to interpretation to dissemination. These interpretations are also becoming more flexible to incorporating new information as it becomes available. Digital platforms including databases and digital publishing make dissemination a faster, if not instant, process. In addition, the rise of open source databases and journals allow for dissemination to a wider audience facilitating cross-pollination between periods, regions, and even disciplines. Digital platforms further allow for multiple avenues of data preservation, even though this is a notorious problem with archaeological data as a whole. The digital archaeology community is well-aware of the great importance of digital data preservation and several initiatives are addressing this issue, such as ADS, Open Context, and tDAR. The institutional home of the Northern Horn Ceramics database considers data preservation as a key responsibility and the Cotsen Institute of Archaeology and the UCLA Digital Library have declared their full support for its long-term preservation.

With all of these technological changes, it is clear that ceramic typologies are shifting from solely physical print to digital formats. It is difficult to create typologies on paper from large datasets. Furthermore, almost as soon as they are printed, typologies become obsolete due to the rapid availability of newly excavated or analyzed data. There is however still reliance on older established typologies. Currently, there is a need to synthesize data and communicate and compare results of this research among specialists, and Northern Horn Ceramics accomplishes this. It allows old types, new types created with any method, and raw data to all be viewed on the same platform.

If we view types as groups of traits that appear frequently together and change over time and space, the above discussion makes clear that the combination of intuitive and statistical methods can create the most complete typology. Using a previously developed "historical" typology has the advantage of allowing comparisons over wide regions and periods, but the criteria are sometimes unclear, and therefore there is a great potential to introduce error. The Northern Horn Ceramics data initiative has the advantage of allowing the incorporation of multiple typologies, because all raw data, and therefore the implicit typological organizations, are made explicit.

With the aggregation of a large amount of data in the NHC database, ceramicists can explore covariation in the data through use of the advanced search page. Through this exploratory tool, revelations of patterns in the data can lead to new research questions. These in turn, can lead to the creation of variable typologies with these questions in mind. These types and hypotheses can be further checked with other methods, such as the multivariate statistical methods discussed in Chapter 6. Ceramicists can isolate specific attribute values, then perform correspondence analysis in order to address particular research questions. In this way, we can use big datasets to make better sense of the past in more comprehensive ways.

Characterizing data through intuitive pattern recognition is still useful in terms of communicating with other researchers and making initial observations in the field. Typologies in this sense simplify and summarize archaeological assemblages. But with such large data sets and the continued influx of new data, typologies cannot remain static. Changing questions, large data sets, and new digital tools allow them to be fluid, as they should be. We are constantly learning more about the past and how we organize our assemblages should reflect that learning. Scholars both need to consider more and be more transparent about their research goals in presenting typologies. Does the researcher set out to make them, as stated above, to simplify and communicate or to explain and analyze?

Creating a typology as simplifying an assemblage to become familiar with the material and generate questions and then using typological methods to analyze it based on specific attributes can be expanded to any manmade artifact type. This method can be useful for any artifact type that has a number of attributes, such as textiles, lithics, figurines. As discussed in Chapter 7, the NHC framework has already be expanded to a few other projects with plans to add more in the future. This tool allows researchers of other artifact types to explore their data easily and discuss them openly.

Both the consideration of typological methods and the new data platform presented in this dissertation could have wide reaching applications for the field of archaeology. They will encourage clarity of method and research questions before analysis and encourage transparency when publishing. They will promote greater rigor in data practices, including preservation, publication, and reuse. They will facilitate communication and collaboration between scholars. All of these points together will help us gain a better understanding of the past.

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APPENDIX 1: PRELIMINARY SITE REPORTS FROM THE UCLA SHIRE PROJECT

The UCLA Shire Project Mai Adrasha

Field Report 2015

Willeke Wendrich
UCLA

Rachel Moy UCLA

Hans Barnard, Rose Campbell, Debby Sneed, Degsew Zerihun, Dylan Guerra, Annelou van Gijn, Bisrat Gebreegziabher, Gidey Gebreegziabher, Kifle Zerue, Gabriella Giovannone, Guish Assefa, Alek Dooley

December 21, 2015

The first season of the UCLA Shire Project took place from November 27 to December 21, 2015 in a 100 square kilometer area near the town of Shire, also known as Inda Selassie. Our team included:

Willeke Wendrich PhD, Archaeologist Rachel Moy, Ceramicist
Hans Barnard PhD, Surveyor Annelou van Gijn, Lithicist Rose Campbell, Archaeologist Deborah Sneed, Archaeologist
Degsew, Paleobotanist and Archaeologist Dylan Guerra, Archaeologist
Bisrat Gebreegziabher, National Representative Gidey Gebreegziabher, Regional Representative
Gabriella Giovannone, Registrar and Ceramicist Guish Assefa, Archaeologist
Evelyn, Field School Coordinator Kifle Zerue, Archaeologist
Alek Dooley, Finds Photographer

The objectives of our fieldwork in 2015 were twofold:

1) Gauge the extent of the destruction at Mai Adrasha and prevent future looting.
2) Begin excavations in the undisturbed western portion of Mai Adrasha.

We are extremely pleased with the results of our pilot season in Shire. Though much of the site of Mai Adrasha is destroyed, the remaining areas have still produced a wealth of archaeological information. This season, we opened excavations in three 5x5 meter trenches. A small survey was conducted by Hans Barnard and Kifle Zeru to measure the extent of damages to the site since 2015 and examine the distribution of surface finds. We plan to continue both excavation and survey in November 2016. We will continue in the existing three trenches and open several new ones.

Part 1: Excavation

1.1 Trench MA 01

Rose Campbell

A. General Information

Trench 01 the southernmost of three (3) trenches excavated in the 2015 season at Mai Adrasha. Excavation began on 30 November 2015 and completed on 18 December 2015 (backfilling the trenches occupied two days, 19 and 21 December 2015). Trench 01 was supervised by Rose Campbell, and work was also conducted by Evelyn Leuker and Kifle Zerue. Trench 01 measured 5.0 meters North-South and 5.0 meters East-West.

- Benchmark: 1915.09 mASL
- UTM Coordinates:
  - SW Corner: 426199.15 E, 1560190.90 N ○ NW Corner: 426199.53 E, 1560195.92 N ○ NE Corner: 426204.54 E, 1560195.58 N ○ SE Corner: 426204.21 E, 1560190.50 N

B. Excavation Purpose

Trench 01 is located on a small plateau on the southern side of a small hill or mound at Mai Adrasha. This hill is surrounded to the south and east by vast areas of site destruction, caused by local villagers panning for gold and taking stones from ancient buildings to use in modern construction. Much of the site has been destroyed, and the initial goal of excavation in 2015 was to assess the amount of data that might still be gained from what remains of the site. In addition, there has been very little archaeological research conducted in the northern highland region west of Axum, and thus the 2015 Mai Adrasha excavations also aimed to begin the process of establishing a chronology and typology for the cultural use of this region in the past.

Trench 01 is the most southern and eastern of the three trenches opened in 2015, and also the most secluded. Trench 01 is almost completely surrounded by large shrubs on the northern and eastern sides, and by a sheer drop to looters pits on the east. At least three large looters' pits are located 3-5 meters west of the trench. Sheep and cattle occasionally graze in the area.

Trench 01 was intended to clarify the extent of the site west of the destroyed area. The discovery of at least 5 intact walls (two of which are bonded to each other, and 1 which is considerably larger than all the others) seems to indicate that parts of the site do indeed remain intact, and may provide useful information about site organization, architecture, and dates during which the site was occupied.

The extreme compactness of the soil at Mai Adrasha, often requiring excavation with a large pickaxe, means that many of the recovered artifacts are highly fragmented. Nevertheless, large amounts of pottery, including dateable diagnostic fragments, were recovered at Trench 01. Most of the animal bone recovered was two fragmentary to be identified, though some mammal ribs and parts of a large mammal vertebra (probably a cow or donkey) were recovered in the southern part of the trench. Large amounts of charcoal were recovered, and future excavations could gain a great deal of information by employing an expert in charcoal and/or wood identification.

Numerous fragments of a slag-like substance may indicate the presence of metal production and/or processing at the site. Various types of lithics were also recovered, made out of local chert but also from (presumably imported) obsidian.

C. Stratigraphic Relations

Due to incomplete excavation and large size of Trench 01, these phases are tenuous at best, and most relationships in the trench can only be estimated.

Phase	**Description**	**Units**	**Notes**
Phase I	Construction of stone walls	0003, 0082, 0004, 0019, 0020, 0081	It may be that these walls were not all constructed at the same time (with the likely exception of 0003 and 0082, which are bonded together), but we were not able to excavate to the bottom of any of the walls, so the relative time of construction cannot yet be determined.
Phase II	Deposition of soil	0012, 0013, 0014, 0016, 0018, 0083, 0084	The relationship of these units to each other cannot yet be determined in most cases
Phase III	Destruction of stone walls	0008, 0010, 0011, 0015, 0006, 0007	
Phase IV	Deposition of stones and soil	0017, 0083, 0005	See discussion below for more information about 0017
Phase V	Deposition of layer below topsoil	0002	This phase may in fact be the same as Phase VI if 0001 and 0002 were laid down simultaneously (the division between 0001 and 0002 was arbitrary)
Phase VI	Deposition of topsoil	0001	This layer of soil has likely been plowed more than once and may be heavily disturbed from its original context.

A. Discussion and Interpretation

The 2015 Mai Adrasha excavation season was very short (three weeks) and intended to establish the potential of the site for future research. The short season necessitated stopping excavation before reaching the natural bedrock or lowest deposit of Trench 01. This in turn means that the relationships between the many walls in the trench remain ambiguous pending further excavation.

The earliest phase that can currently be seen in Trench 01 is the construction of various stone walls (=Phase I). It seems that walls [0003] and [0083] were probably constructed at the same time, as they are so closely bonded together that the seam cannot yet be seen. Walls [0004] and [0020] both abut Wall [0003], but are not as tightly aligned, suggesting that [0004] and [0020] may have been later constructions, or perhaps later repairs to earlier walls. This hypothesis is further supported by the fact that the alignment of [0020] is offset from [0003], i.e. the east side of [0003] aligns with the west side of [0020].

Based on the approximate height of the other walls in the trench (Walls [0019] and [0081]), which is slightly lower than the height of Wall [0003], it is possible that all the walls in the trench were constructed at approximately the same time. Alternatively, [0019] and [0081] may have been constructed at a different time than [0003], [0082], and [0020], and may have simply collapsed to a similar level as the other walls. Future excavation will hopefully reveal the bottom of these walls, which will clarify the relative order of construction.

At some point after the construction of these walls, large deposits of soil ([0012], [0013], [0014], [0016], [0018], [0083], [0084]) were laid down, presumably naturally (=Phase II). While [0012] and [0013] occupy most of the unit, other deposits are confined by walls (e.g. [0014] and [0015] are bounded by the southeast corner of the trench and by [0003] to the west and [0004] to the north, while [0016], [0018], and [0083] are confined to the northern half of the trench thus far). The distinction between [0084] and [0016] may be somewhat artificial, as further excavation of [0084] in the southern half of the trench may reveal deposits similar or equal to [0016]. It is possible that [0017] was also deposited during this phase (before [0084]), but since [0017] was incompletely excavated, it is not yet possible to determine the exact relationship between these units (e.g. perhaps a cut was made for [0017], thus making it later than [0084] rather than earlier).

After deposition of these soil layers was a phase of architectural collapse and/or destruction (=Phase III). Stone tumbles [0006], [0007], [0008], [0010], [0011], and [0015] may not all have occurred at the same time, but it is currently impossible to determine the relative chronology of these stone tumbles. It is also not possible to determine at this time if the tumbles derived from walls within the trench or from unidentified structures outside the current trench. It seems likely that at least [0007] and possibly [0008] derive from as yet unidentified structures outside the trench.

Some time after this phase of architectural collapse, more soil and stones were deposited (=Phase IV). The relationship of the deposition of [0017] to [0084] has already been discussed (see above). The relationship of [0017] to [0083] cannot be determined.

It is likely that Phases V and VI are in fact the same, since [0002] and [0001] were arbitrarily divided and seemed extremely similar, if not identical, during excavation. The soil in these units has likely been disturbed by agricultural practices, such as plowing, on more than one occasion.

B. Recommendations for Future Work

Trench 01 shows excellent potential to explore multiple phases of use and construction. The various types of walls, some bonded, some larger or smaller, and some potentially later, may shed light on practices of reuse and/or modification of architectural space over time. Continued excavation in this trench will reveal the relationship of the walls to each other, and to the spaces bounded by these walls. The concentrations of charcoal and pottery in the trench suggest that the areas bounded by the walls were used extensively.

Future excavations might gain the most knowledge by extending the trench to the north. The east side of the trench is very close to a sheer drop into a gully created by very large looters' pits, and thus expansion to the east seems unproductive and difficult. Expansion to the south might prove informative, but the south side of the trench yielded the least architectural elements, as well as the least charcoal and pottery, of any other part of the trench. Expansion to the west would again approach large looters' pits, albeit pits which do show the remains of ancient stone walls. The north side of the trench has yielded the most charcoal, the most architecture, and the most pottery, and thus it seems that expansion to the north would prove the most fruitful. In addition, just north of the trench is the highest point on the hill upon which Trenches 01 and 02 rest, and thus this area might provide indication of why and how the mound came to be (e.g. was it purposely constructed for some kind of use or construction, or was it simply a natural hill that arose over the deposits over time).

1.2 Trench MA 02

Degsew Zerihun and Dylan Guerra

A. General Information

Excavation of trench 2 at Mai Adrasha began November 30, 2015 and ended December 18, 2015. The trench was initially 5x5 meters, but on December 3 was sectioned into 3 meters (m) by 5m. Thus, the rest of the field season focused on the southern, 3m by 5m portion. Concerning the coordinates of our trench: the southwest corner was located at 426215.78 E and 1560212.51 N, the northwest corner at 426216.01 E and 1560217.48 N, the southeast corner at 426220.85 E and 1560212.49 N, and the northeast corner at 426220.98 E and 1560217.98 N. Our benchmark changed number and position for taking elevations. First, it was located on the southwest rebar, calculated at 1915.96 meters above sea level (mASL). The second position was also on the southwest rebar, but calculated at 1916.02mASL. Finally, the third location was based on a known point (the top of [unit 0023]), and calculated at 1915.99mASL.

B. Excavation Purpose

Previous survey of Mai Adrasha suggested that this site relatively dates to the pre-Aksumite period. Naturally, given the lack of archaeological data and information from outside historical sources, Trench 2 was opened to further examine and expand information on Aksumite civilization, particularly focusing on the pre-Aksumite and proto-Aksumite periods. The goal of this work was to delineate chronological phases of the site and establish radiocarbon dates to support this data and develop a sequence for pre-Aksumite and proto-Aksumite ceramics. Mai Adrasha is also an archaeological site at risk of being damaged by gold panning because gold naturally occurs in the soil. In addition, the site has been prone to looters who illicitly dig for artifacts and stone. Therefore, excavation of this trench will not only effectively serve as an important source of information regarding pre-Aksumite and proto-Aksumite activities in this region, but also provide the necessities to preserve the site so that archaeology may shed light on an often overshadowed piece of Ethiopia's history. Trench 2 was, therefore, expected to provide information about the later phase of the site and extract crucial dating resources, such as charcoal, for sequencing pottery types. This would further accentuate the chronology of Aksumite sites within the Tigray region by creating a system for defining pottery types. However, because this is the first excavation at Mai Adrasha, the context of Trench 2 remains uncertain. Analysis and interpretation of the unit relationships and associated finds, however, will hopefully add to understanding the context for further excavation. Trench 2 certainly provides complete and/or intact ceramics that would be useful in establishing pottery typologies, including archaeological material for means of dating and chronological sequencing. Therefore, ceramic specialists are essential in analyzing potsherds from Trench 2 for vessel reconstruction. These specialists would also contribute to understanding the high ceramic concentration of Trench 2 and its context within Mai Adrasha. Broader impacts of studying the ceramics from Trench 2 have the potential for understanding the cultural fabric of pre-Aksumite and proto- Aksumite vessel creation, function, and patterns of style.

C. Stratigraphic Relations

The lowest units reached this field season consisted of units below [0032], a 5m by 5m, 0.25m to 0.30m deep reddish brown deposit: [0094], [0093], [0092], and [0091]. [0094] is a deposit of dark brown soil located in the southwest. [0094] is capped by [0039], which consists of a sub- rounded stone deposit. Above [0039] is [0033], a soft, dark reddish brown soil deposit. [0030] ([0030] = [0031]), a ceramic vessel, sat on the soil of [0033]. [0093] is a deposit, consisting of three pot-stands, the soil around them, and the impressed soil below them caused by their concave bases. Above these pot-stands lie another deposit [0040], which included three broken but apparently nearly complete vessels that contained dark reddish brown, compact soil within. The vessels in [0040] lay below a later wall, [0023], in the southeast, which was originally revealed in [0022]. [0092] is a deposit of small, lined stones under [0036], and parallels another deposit, [0037], about 0.22m to the east. [0037] contained large, vertical stones that acted as a barrier that separated [0032] from the western portion of the trench, creating the deposit [0036]. [0036] contained a firm, darker reddish brown soil compared to that in [0032]. Also, under [0036] is [0091], an early rectangular wall consisting of large stones, of only the top course is visible. [0032] contains two animal burrows, [0028] and [0029]. Directly above [0032] is [0025], a dark reddish gray deposit. Under this deposit were [0034], [0027] and [0026]. [0034] contains a single row and course of stones. Unrelated to [0034] is [0027], a reddish brown deposit that occupied the middle of the trench, but leveled to [0032] alongside [0025]. Another unrelated unit is [0026], a cluster of angled stones in the southwest corner. [0025] also contained seven animal burrows to the south, referred to as [0024]. Visible from the top of [0025] was [0038], a deposit of worked stones arranged in a curve. Above [0038] and [0025] is [0022], a dark reddish gray topsoil layer, which follows [0021], the topsoil of trench 2. [0035] was a mixed context consisting of [0025], [0027], and [0032]; therefore, it is not included in the Harris Matrix model, the discussion and interpretation of the units, or mentioned in stratigraphic relations.

D. Discussion and Interpretation

Discussion and interpretation of trench 2 will begin from the last (i.e. chronologically earlier) units excavated and end with the top soil, deposit [0021]. The earliest units in Trench 2 include wall [0091], only the top course of which is currently exposed, and deposit [0093]. Wall [0091] was exposed in the course of excavating deposit [0036], and is not in physical contact with deposits [0092] or [0037], which also underlay deposit [0036]. From what is visible of wall [0091], it was constructed of large stones (relative to those that were used to construct the later wall [0023]), all apparently of a single type, spaced closely together. Deposits [0092] and [0037] each includes a single row of stones, oriented north-south, possibly intentionally erected to form a barrier or a marker of some sort. These rows of stones are parallel, and not in physical contact with one another, so is at present, impossible to establish a relationship between them, or with any other deposit in the trench, except [0036], which overlays them. The stones that form the row within [0037] are not in physical contact with one another; rather, soil links them together. The six stones that form a row within [0092], however, are spaced closely together. Deposit [0093] includes three pot stands, as well as the soil around and beneath them. In order to remove these stands entirely by the end of the excavation season, it was necessary to dig a hole around them; the stratigraphic context of this deposit is, then, unclear, and will remain so until further excavation in the trench. The concave bases of the pot stands preserved a mound of soil once they were removed. Within these mounds were many bits of charcoal, which were subsequently collected, together with the soil, and saved for flotation analysis. Deposit [0040] includes at least three large closed vessels that were set into or atop the pot stands, and includes the soil excavated around and within the vessels as they were removed. All soil excavated from this deposit was saved for flotation analysis. The three vessels, though broken, were found *in situ*, still atop or associated with pot stands, though they could be described as resting on their sides. The southernmost vessel (Vessel 3) was missing its complete upper body. Because some of the fragments from these vessels, particularly the eastern vessel (Vessel 2), extended underneath the bottom course of wall [0023], and because the pot stands are at a lower elevation than this bottom course of wall [0023], we suggest preliminarily that the vessels and their pot stands are chronologically earlier (i.e. older) than the construction of wall [0023]. The vessel fragments, however, only barely extended beneath wall [0023], so their position there may also be due to other processes. Further excavation and complete analysis of the context from which the vessels were excavated may help establish a fuller understanding of the relationship between the vessels and wall [0023]. The bottom course of [0023] was exposed at its southern end in the attempt to remove the vessels and pot stands that were a part of deposits [0040] and [0093] before the end of the season; the northern remainder of the wall is not fully excavated. The wall was originally exposed in the course of excavating deposit [0022] and has a preserved height of approximately 0.62m. It is oriented SW-NE, and forms a corner in the southeast portion of Trench 2. Wall [0023] appears to have been constructed using a hard-packed clay mortar. The stones themselves are either worked or unworked, with uneven spacing, but most often with smaller stones, worked or unworked, filling the gaps between larger stones. Some of these smaller stones are positioned at an angle or vertically so that they move inward, however, the larger stones are usually flat faced and positioned horizontally. Deposit [0094] is a dark brown soil deposit that has yet to be fully excavated and currently remains as an irregular oval outline of dark brown soil. Because we have not yet reached the bottom of [0094], it is

unclear how this deposit relates to those around it. Soil samples were, however, taken from what was excavated from [0094]. Interestingly, this deposit contained a damaged ceramic snake head, similar to one that was found in deposit [0036]. Whether this deposit holds any significance in relation to this find has yet to be determined. [0094] was capped by deposit [0039]. [0039] contained of a cluster of stones arranged in a circle with many overlapping and in contact, forming closed spaces. The stones were similar to one another in size and shape, and also were a single type, suggesting that they were collected together in order to serve some function, perhaps related to the deposition of the ceramic vessel in [0030] = [0031]. Deposit [0033] overlays most of the stones that are contained within [0039] and formed an outline of soft, dark soil within the stones that are a part of [0039]. Flotation analysis revealed charcoal within [0033], which possibly gave the soil its distinct darker color relative to [0032]. Sitting on a thin layer of [0033] and supported by a flat stone of [0039] was [0030] = [0031], a deposit that included a complete and intact ceramic vessel. This vessel is an open shape, supported by a thick base, and features a protruding decoration or handle that is difficult to identify. Overlaying these deposits and walls is a single deposit [0032]. Cut into [0032] are two separate and large animal burrows, identified as [0028] and [0029]. The burrow of [0029] is circular in shape, with a sharp slope downward to the southeast; that of [0028] is rectangular, oriented west-east and located beneath a large stone. [0030] = [0031] sat below [0025], a dark reddish gray deposit that contained widely broadcast rubble, in which we identified large worked stones and grinding stones. Below [0025] there are three separate and unrelated deposits in different areas of trench 2. First, [0027] is a reddish brown deposit below [0025] and located in the center portion of trench 2. [0026] is located in the southwest corner, and contained stone rubble which might be architectural debris from a nearby structural element. There are many stones angled upward, extending 0.198m east from the southwest corner.
Between these stones were many roots that contributed to this deposit's dark reddish brown soil color. Protruding from the southern baulk is structural element [0034], a line of three stones that together may have been a part of a wall, but not enough was exposed within the bounds of trench 2 to make any definite conclusions. After removing [0034], we exposed another large stone that continues into the southern baulk. Not enough of this stone was exposed to make any conclusions about its function or relationships to other deposits or structural elements within the trench. Seven animal burrows cut into the southern portion of [0025], all of which constitute deposit [0024]. On the same level as the burrows, [0038] is an arrangement of worked stones that form a curve visible from the top of [0025]. The stones within [0038] are not in physical contact with one another, connected with one another only by means of the soil of deposit [0025], but their close proximity and arrangement suggests that they should be associated. It is not possible to associate [0038] with any other units than deposit [0025], in which it was exposed. Above [0025] is deposit [0022], a compact, reddish gray layer followed by the topsoil [0021].

E. Recommendations for Future Work

Trench 2 has several deposits that would benefit from further excavation, particularly leveling the 3m by 5m trench to unit [0093], which would also partially reveal the extent of [0091] and unearth more complete ceramics associated with [0040]. In addition, pedestaling [0023] may provide assistance in phasing the trench's chronology because there are two walls clearly on different stratigraphic layers; [0023] being a later wall evidenced by [0040] and [0091] being an early wall with a distinct stone type.

Pedestaling would also assist in understanding the foundation of [0023]. Further excavation in the same proximity would also determine whether [0094] is a deposit within a cut and further detail its relationship with [0033] and [0039].
Meanwhile, the expansion of the trench 3x5 meters to the east could assist in understanding its context. Following [0023] could possibly uncover its extent, arrangement, and shape, revealing detail about a single phase of the trench in anticipation of finding the opposite side of the wall. This expansion might also make it possible to see whether [0023] articulates with trench 1 walls.

Alternatively, expanding another 3x5 meters to the south could reveal more ceramics associated with [0040] and an understanding of why there is a cluster of large ceramics in that area and what features they are associated with. This would also possibly assist in defining the context of the trench and reveal more information about [0034] as a structural element. There is some doubt on excavating the remaining northern portion of the 5x5 as it might not contribute to understanding the context of trench 2. Very little archaeological data was extracted from the northern portion of the 3x5. Excavation should focus on following the current walls revealed this field season and use them to phase the site.

1.3 Trench MA 03

Debby Sneed

A. General Information

Trench 3, the northernmost of the three trenches excavated at Mai Adrasha in the 2015 season, was originally laid out with a north-south orientation as a 5 meters (m) by 5m square, but we focused almost exclusively on the southern half (2.5m by 5m) of the original limits of the trench. For our elevation benchmark, we used a large rock located just outside the southwest corner of the trench; the elevation of the benchmark was 1913.70 meters above sea level (mASL). The excavation season lasted from 30 November until 18 December 2015; we excavated Monday through Saturday.

Trench E coordinates:

NW corner:	426218.65 E 1560238.35 N
NE corner:	426223.74 E 1560238.61 N
SE corner:	426224.01 E 1560233.56 N
NW corner:	426218.87 E 1560233.29 N

B. Excavation Purpose

The site of Mai Adrasha has been extensively destroyed by villagers who dig the soil in order to pan it for gold that occurs naturally in the soil and to sell the stones that are exposed (as parts of ancient structures, etc.) in these illegal operations. From what remains visible in the destroyed areas of the site, it seemed that it had the potential to yield Axumite, Proto-Axumite, and possibly even Pre-Axumite remains, but the extent of the damage was difficult to assess: was anything left to excavate? or was the entire site destroyed? The primary goal for Trench 3 – as for all three trenches – was to establish the potential of the site for archaeological excavation, despite this destruction. The secondary goal was to begin developing a stratigraphic sequence for the region, since little archaeological work has been conducted farther west than Axum in the northern highland region of Ethiopia.

By the end of the excavation season, Trench 3 had reached a maximum depth of 1912.29mASL, and in it we exposed parts of four different walls, at least two of which may be exterior walls, and what may be a kind of substantial stone pavement. In addition to collecting typical archaeological materials (pottery, lithics, bone, etc.), we collected soil from nearly every unit for flotation analysis.

C. Stratigraphic Relations

Phase	Description	Units	Additional Information
I	Construction of stone walls	45, 48, 54, 59	[45] and [48] are bonded; [48] and [54] are bonded
II	Construction of stone pavement	56	[56] abuts [Wall 59] and [Wall 45]
IIIa	Fill atop pavement	55, 57, 60, 103, 104	
IIIb	Fill in SE corner	44, 50, 58, 101, 102, 105	
IV	Architectural debris	49, 51, 52, 55	
V	Nondescript fill	47	
VI	Ceramic vessel deposit	46	
VII	Nondescript fill	42, 43	
VIII	Topsoil	41	

D. Discussion and Interpretation

During Phase 1, four stone walls were constructed: [Wall 45] is bonded with [Wall 48], which also appears bonded with [Wall 54], though not enough of [Wall 54] is exposed to make a definite conclusion about this relationship (Figure 1). These three walls, then, should all be roughly contemporary in their construction. [Wall 59] is not in physical contact with any other wall, and not much of it is exposed within the limits of Trench 1, so its exact chronological and physical relationships with the other walls is, at present, impossible to reconstruct.

[Wall 45] and [Wall 48] appear to have the same or a similar method of construction, namely, large stones on either face, with smaller stones, not obviously worked, as infill (Figure 1). Built into the top preserved course of [Wall 48] is half of a grindstone, lying flat, fitted or worked to align with the southern face of the wall (Figure 3). The use of large grindstones in the construction of walls is evident, also, in some of the walls in Trench 1. Perhaps a shift in the use of grain or grindstones rendered the larger versions excessive, and they were reused in the construction of walls? The stones that make up

[Wall 45] and [Wall 48] are, on average, more substantial in size than those that comprise walls in Trenches 1 and 2, suggesting that, perhaps, [Wall 45] and [Wall 48] are exterior walls.

Not enough of [Wall 54] (Figure 1) or [Wall 59] (Figure 5) is exposed, however, to make definite conclusions about their methods of construction.

The "outside," or western face of [Wall 45] is roughly constructed: while the overall effect of the profile is flat, the stones of different courses and even within the same course are uneven (i.e. do not form a flat or smooth plane), sometimes jutting out or recessed by as much as 0.08 meters from the "best fit" plane (Figure 2). What is more, there is a gap of approximately 0.30 meters toward the northern end of [Wall 45] where there appear to be no stones before the stone that constitutes the "outside" corner where [Wall 45] and [Wall 48] meet. This gap is at the point where, if it continued across the trench, [Wall 59] would intersect with [Wall 45].

The "inside," or eastern face of [Wall 45] has a more even construction, with the stones nicely faced to create a flat profile (Figure 3). Near the bottom the exposed extent of [Wall 45], at roughly the same elevation as the top of a large, flat stone exposed at the bottom of deposit [Unit 105], the courses of [Wall 45] jut out by approximately 0.06 to 0.08m, creating a kind of stepped profile. This "stepped" profile is not as noticeable as that seen at Dungur, so perhaps this is an earlier iteration of the technique? Or it is perhaps related to the large, flat stone exposed at the bottom of deposit [Unit 105], despite that this stone does not come into physical contact with [Wall 45] (though it appears to abut [Wall 48]) (Figure 3)? These suggestions are very obviously preliminary, as only two courses of this stepped profile are visible.

Both the northern ("outside") and the southern ("inside") faces of [Wall 48] form flat planes (Figure 3; Figure 4). Not enough of [Wall 54] or [Wall 59] is exposed to suggest anything additional about their construction, function, relationship with the rest of the trench, etc.

During Phase II, a substantial stone pavement [Unit 56] was installed (Figure 6), abutting [Wall 45] (Figure 2) and [Wall 59] (Figure 5). The stones that comprise [Unit 56] vary in size—the largest is approximately 0.76m by 0.47m, the smallest mere cobbles—and are obviously fitted together and form part of a structural element, but whether it is the pavement of some kind of courtyard or something else is difficult to ascertain. [Unit 56] does not form a level plane, but the stones are at differing elevations (ranging from 1912.43mASL to 1912.84mASL). The overall effect is a downward slope to the southwest, with a "ridge" running between the stone that abuts [Wall 59] to the stone that abuts [Wall 45], a roughly northwest-southeast line across the trench. [Unit 56] does not yet seem to have even boundaries in any direction, except where it abuts [Wall 45] and [Wall 59], suggesting that either some stones were robbed out at some point in its life, or other stones exist at lower elevations than those reached in this excavation season.

The stones of [Unit 56] appear to be only one "course" thick, though there are small indications of peeking stones that suggest that there may be more stones under some (or all?) of [Unit 56]. The only way to determine whether this is so is to remove [Unit 56] and continue excavating beneath it.

Except where otherwise noted, the soil in all of the units excavated within Trench 3 can be characterized as dark brown or black, with a silty clay or sandy clay composition. The soil was remarkably moist/wet, muddy, and sticky throughout all of the units excavated as a part of Phases IIIa, IIIb, IV, and V, making it very difficult to excavate and to dry-sieve. For all units below topsoil (Phase VIII), we used the dry-sieve screen as a neutral plane on which to search through the soil by hand. If the walls in and around the boundaries of Trench 3 were constructed using a mud mortar, then the muddiness of the soil may be explained as mortar that has been dislodged or displaced from the walls (within the course of the processes that contributed to the deposit of architectural debris that constitutes Phase IV).

Phase IIIa contains those units that lay directly atop the stone pavement [Unit 56], that is, those units that revealed at least one stone that is associated with [Unit 56]. These units include [Unit 104], [Unit 103], [Unit 60], [Unit 57], and [Unit 55]. There is no indication as to the processes that contributed to the formation of these units. [Unit 55] was completely empty of botanical remains, according to Degsew Zerihun, who floated the samples, but as we excavated [Unit 60], immediately beneath [Unit 55], we noticed bits of charcoal throughout (though the flotation sample yielded few remains of charcoal), suggesting that perhaps these two units should not be considered contemporary, though no conclusions are yet possible about the chronological relationship between any other units in this phase.

Phase IIIb includes all those units located in the southeast corner of the trench, completely bounded by [Wall 45] to the west and [Wall 48] to the north. This phase includes [Unit 105], [Unit 102], [Unit 101], [Unit 58], [Unit 50], and [Unit 44]. The soil in each of these units was remarkably consistent, so many of the divisions between units were arbitrary, or due to the presence or not of large stones. Because not enough of the structure formed by [Wall 45] and [Wall 48] has been excavated, we cannot assign a function to it, nor can we properly identify these deposits excavated within it. At the bottom of [Unit 105] we revealed a very large, flat stone (Figure 3), the full extent of which is not exposed and which appears to abut [Wall 48], but does not come into physical contact with [Wall 45]. This may be part of another structural element – a stone pavement? – but this suggestion is obviously preliminary.

Phase IV is characterized as architectural debris, and includes [Unit 55], [Unit 52], [Unit 51], and [Unit 49]. In each of these units was a large number of stones, ranging in size from boulders to cobbles and smaller, some of which preserved worked (i.e. flat) faces, suggesting that they were once part of a wall or walls. The stones were broadcast across the whole southern half of the trench, exclusive of the corner formed by [Wall 45] and [Wall 48], and could not be obviously grouped or associated with any one wall in particular. The soil throughout all of these units can be described as mixed: brown, dark brown, and black soils were present in each unit, in a kind of marbled fashion, such that it was impossible to excavate each separately.

Phase V includes only [Unit 47], a nondescript fill that lay atop the architectural debris of Phase IV. It covered the entire southern half of the trench, exclusive of the corner formed by [Wall 45] and [Wall 48]. There is no indication as to the process(es) that led the formation of [Unit 47].

Phase VI includes only [Unit 46], the deposit of an open-shaped greyware vessel, which was preserved in a fragmentary state (Figure 7).

Phase VII, which includes [Unit 43] and [Unit 42], is characterized as nondescript fill that covered the entire southern half of Trench 3, the excavation of which revealed the very tops of [Wall 45] (Figure 7), [Wall 48], [Wall 54], and [Wall 59]. The soil in this phase was quite dry, and also very compact, able to excavated with a big pick and only with difficulty. There is no indication of the processes that led to the formation of these deposits.

Finally, Phase VIII includes [Unit 41], the excavation of topsoil, that is, the soil that lay within the plowzone. The soil in this phase, like that of Phase VII, was very dry and very compact.

E. Recommendations for Future Work

As stated above, the primary goal of the 2015 excavation season was to establish the potential of the site for archaeological excavation, and in this we succeeded in all three trenches. The quality of what survives outside of the destroyed areas of the site to the east is very high, supporting the continuation of work within the current boundaries of the trenches, as well as within new trenches.

Future excavation within the southern half of Trench 3 may help answer some questions that remain for me. What is the relationship of the stone pavement [Unit 56] with the deposits around it? Was the stone pavement [Unit 56] constructed in an outdoor area? Was its uneven plane, as it is preserved, intentional or the result of natural processes of settling, etc.? Is there another "course" of stones beneath [Unit 56]? The last question can only be answered with the removal of the stones that currently comprise [Unit 56].

Work in Trench 3 could expand to the north, within the original bounds of the trench, but none of the currently exposed structural elements continue in that direction. If [Wall 45] and [Wall 48] are, indeed, exterior walls, then there may, in fact, be open space north of them, that is, in the northern half of Trench 3, which remained unexcavated in this season. If it is an open area, archaeobotanical analysis may answer questions about the use of space outside of the built environment: what kinds of crops were cultivated? was agriculture practiced within close proximity of built structures, or farther afield?

The trench would be more productively, to my mind, expanded to the south or to the east (as opposed to the north), based on the proposed continuation of currently exposed structural elements. Expansion to the east would, hypothetically, reveal more of [Wall 48] and of [Wall 54], clarifying their relationship to one another (are they bonded?). It could also reveal more of the large, flat stone that was revealed at the bottom of [Unit 105], located in the corner of the trench created by [Wall 45] and [Wall 48], perhaps allowing conclusions about its function (is it a stone pavement? part of a platform?) and also its relationship with [Wall 48].

Expansion to the south would, hypothetically, reveal more of [Wall 45], and given the wall's northeast-southwest orientation, would open up more of the space contained "within" the structure suggested by the presence of [Wall 45] and [Wall 48] than would be possible with expansion of Trench 3 to the east. Expansion to the south may also reveal more of the stone pavement [Unit 56]; because some of the stones that comprise [Unit 56] rest against or continue into the southern baulk of Trench 3, it is possible that [Unit 56] continues in this direction.

F. Figures

Figure 1

[Wall 54] (along and continuing into the western baulk], [Wall 48] (beneath the north arrow), and [Wall 45]. [Wall 45] is bonded with [Wall 48], which appears bonded also with [Wall 54].

Figure 2

Western ("outside") face of [Wall 45], with its uneven plane, and the point at which the stone pavement [Unit 56] abuts [Wall 45].

Figure 3

[Wall 45] (at left) and [Wall 48]. N.B. the large, flat stone at the bottom of the corner created by the two walls; the lower exposed courses of stones on the eastern ("inside") face of [Wall 45] that jut out relative to the upper preserved courses.

Figure 4

Northern (“outside” face of [Wall 48].

Figure 5

Southern face of [Wall 59] and the point at which the stone pavement [Unit 56] abuts [Wall 59].

Figure 6

Stone pavement [Unit 56], [Wall 45], [Wall 48], [Wall 54], and [Wall 59].

Figure 7

Ceramic vessel deposit [Unit 46] and the first peek at the top preserved courses of [Wall 45] and [Wall 48].

Part 2: Ceramics

Rachel Moy

During the 2015 field season, ceramics were analyzed from the excavations at Mai Adrasha. Both diagnostic and nondiagnostic sherds were analyzed from the three excavated trenches: MA1, MA2, and MA3. Not all the materials from each stratigraphic unit have been analyzed in detail due to time constraints.

Each day, the excavators carried ceramics from the field to the Gebar Shire Hotel. There, the finds were washed and dried. They were then sorted into diagnostic and nondiagnostics sherds and weighed. The nondiagnostic sherds were sorted by fabric types. Once sorted, each fabric group was counted and weighed. Ceramic processing forms were completed for individual or groups of diagnostic sherds. Information recorded included dimensions, color, shape, inclusions, decoration, surface treatment, and other noteworthy details. All studied diagnostic sherds were photographed and select diagnostic sherds were drawn. The analysis of these ceramics is still in the beginning stages. More research is needed before conclusions can be made, however the following observations can be made.

The fabric types represented at Mai Adrasha have much in common with other archaeological sites in the highlands. Red or orange fabric is the most common. An orange or pink exterior with a blue grayish interior found at some pre-Aksumite sites, such as Seglamen, appears frequently. Black, grey, and brown wares are also present, but in lesser quantities. Black topped is also present, suggesting a pre-Aksumite date (Figure 1). A majority of black topped ceramics were found in MA 1. Most fabrics are characterized by a large number of small white sub-rounded inclusions. Under a high powered magnifying glass they appear to be quartz or a similar stone type.

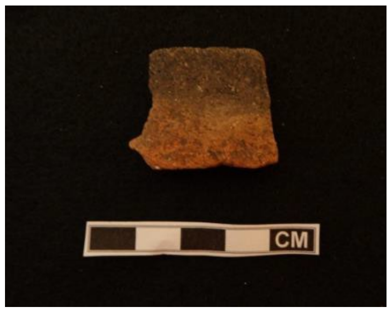


Figure 1: Black topped rim sherd from MA 1

Common shapes include globular cups, small and large open bowls, plates, and basins. Strap handles are very common and appear to occur most often with globular cups or slightly closed or direct rim bowls. They have also been associated with ring bases that suggest the site may have an early date.

Molded and incised decorations are by far the most common types. Both appear to occur frequently on the shoulder. Molded decoration is often in the form of a small line, arrow, or bump. Incised decoration is usually in the form of lines and in rows of incised dots.

Several nearly complete vessels were uncovered over the course of the season (Figure 2). Three large storage jars with pot stands were found in Trench 2. Unfortunately, they were discovered at the end of the season and further study will take place next year.

Figure 2: Nearly complete vessel from MA 1.

Further study is needed before specific conclusions can be made of each trench; however a consistent assemblage appeared shortly after the beginning of excavation. From my initial impressions before complete study the material appears to be early in date, perhaps pre or Proto Aksumite.

Part 3: Lithics

Annelou van Gijn

1. Introduction

From December 8-14, 2015 I examined all lithic material from Mai Adrasha excavated from the period November 30- December 9, 2015. The aim was to obtain a general idea of the kind of raw material utilized, the technological features present, the range of modified artefacts and the presence of macroscopic use wear traces and post-depositional surface modifications. In addition all material was counted to help with next year's planning.

In order to meet this aim all find bags from this period of excavation were opened and the total number of artefacts present was counted. The range of raw materials present was described and the number of pieces made of each raw material was listed. At the same time I tried to reconstruct the production sequence, how the cores were prepared and how and in which way the flakes were struck.

In order to assess the suitability of the material for microwear analysis, a method to infer the past function of prehistoric artefacts, casts were made of many of the artefacts. These casts, made with a dental casting material called Provil, are going to be studied under the microscope in the Laboratory for Material Culture Studies at the Faculty of Archaeology, Leiden University in the Netherlands.

2. Knapped stone

A total of 674 lithic artefacts were examined cursorily, consisting of the categories gi (lithics), gc (worked stone) and gh (geological sample). Because it occurred rather often that small lithic implements, including retouched items like scrapers, were put in the same back as large nodules and cores, it was suggested at one meeting to separate the large lithics (to be put in category gl) and the smaller items (continuing in category gi).

Most of the raw material is a fine-grained siliceous stone of an ochre color, sometimes reddish or brown. The nodules are frequently dissected by quartz veins and are generally not very homogeneous. At times the material seems "mangled" and distorted, causing random fracture planes which make flaking difficult and the intended end products impossible to anticipate (fig. 1). This material bears a strong similarity to the European jaspis that I am familiar with, but it could also be a chert variety. In any case, it concerns a siliceous stone, fine grained and flakeable. Its origin was unclear until we went to see the site of Mezaber Adimenaber, where we found this raw material in situ, sometimes in very close proximity to a whitish granite (fig. 2, 3). It thus looks like this chert was easily obtainable, something that is also quite clear from the abundance of this raw material in archaeological context, both in Mai Adrasha, but also at the surface of Mezaber Adimenaber.

Fig. 1. The somewhat mangled surfaced of the reddish/ochre colored chert/jaspis which is the most frequently occurring raw material at Mai Adrasha.

Fig. 2. Surface of the site of Mezaber Adimenabe, showing a large boulder of ochre colored chert/jaspis.

Fig. 3. Detail of the chert/jaspis outcrops at Mezaber Adimenaber.

Obsidian, in contrast, only occurred in small quantities. No cores were encountered, only flakes and splinters. Core preparation or core rejuvenation pieces were also lacking, indicating that most likely the obsidian was not knapped locally, at least not in the parts of the settlement excavated so far. Quartz was found frequently and occasionally I came upon an intentionally made flake from this material. In addition to these raw materials, a few flakes were made on quartzite and on a coarse-grained mudstone.

As to the technological process, the many cores present in the assemblage have a platform consisting of one flake negative. Most likely a core cap was removed from the nodule and the nodule was flaked around most of its circumference. The knappers seem to have been somewhat frugal with their raw material. Several of the cores are completely exhausted, whereas others are turned around to be exploited from two sides. There are also quite a number of core rejuvenation flakes indicating the continued exploitation of cores after the occurrence of problems with the edge between core face and platform or the development of stacked step fractures on the core face. In a few cases it concerns the removal of the original platform, taking along part of the core face.

The bulbs of percussion are pronounced but in general the flakes are short and squat, with a very wide and thick platform (fig. 4). These are frequently retouched to a very steep edge. As the striking platforms on the cores are flat and consisting of a single negative, this retouch must have been secondary. It seems likely that the makers were after steeply retouched, sturdy edges. I took casts of several such edges in order to look for the presence of use wear traces. Such edges are useful for hide scraping but no extensive rounding of the edges, associated with such a task, was observed.

Fig. 4. Short flake with a very wide and thick striking platform (SH15.45-gi).

Fig. 5. Small scraper (SH15.150-gi).

The amount of intentionally retouched artefacts is quite small. It mostly concerns small scrapers (fig. 5). A few larger retouched tools were encountered, perhaps used as some sort of chopping implement. The most frequently occurring tool type are flakes with retouch, most likely developed through use.

3.Ground stone

A total of 34 grinding stones were observed. These tools were not washed in order to be able to obtain botanical samples for residue studies (starch and phytolith analysis). The tools were not washed and could not always be easily determined in the field, so some objects were included in the bags with grinding stones that certainly were not: for example, some stones seen as hand stones turned out to be nodules or even cores made of chert.

The raw material of most of the grinding stones was granite with a lot of pink feldspars, very similar to the local bedrock (fig. 6, 7). The grinding stones were shaped by means of (probably) hard hammer percussion, the negatives of which are still visible on many of the edges. Then the surfaces were pecked to a flat surface using a hammerstone. I have found quite a number of chert nodules displaying a lot of battering marks. I suggest that these have been used to peck the grinding stones into shape and to rejuvenate the working surfaces when they became too smooth through use.

Fig. 6 Grinding slab (cleaned) (SH15.76-g).

Fig. 7. Naturally occurring bedrock.

The grinding slabs seem to come in two varieties: a smaller kind with a width of 11-13 cm and an elongated shape, and a much longer, thicker and wider variety. At the moment it is not clear whether there is a functional difference. Casts were taken to be able to look at the use wear traces. Most of the grinding stones are broken. The fractures are 4-6 cm thick. These fractures can hardly be accidental or due to rejuvenating the grinding surface. Some of the grinding stones were used as building material so the breaking may be related to this. In addition to the grinding slabs a few hand stones were found as well. An interesting artefact is an unmodified pebble with clearly visible polish found in Trench 2/Unit 0023. A cast was made to elucidate its former use.

4. Conclusions

The pilot study of the lithic material has provided the necessary background to create a database to be used in the 2016 excavations. I obtained insight into the range of raw materials used and can now, on the basis of macro photographs attempt to identify them. I took five geological samples which will be compared to the reference collections at my own lab and at the Naturalis Museum, Leiden. I will examine the casts I took in the coming months in order to see whether the material is suitable for microwear analysis, and if so, what kind of activities could be inferred from the traces observed.

Part 4:Archaeobotany

Degsew Zerihun

By: Degsew Zerihun

This report will discuss briefly about the archaeobotanical recovery process of soil samples from Mai Adrasha, Shire. In this season three trenches were opened and soil samples from each trench were collected. This will help to understand the archaeobotanical record of the site.

1. *Methodology*

   1.1. *Collection*

The soil samples were collected from each trench. Trench supervisors were making self-decision from which unit soil could be taken. When the soil samples taken information like the collection date, unit number, trench number, number of samples and location from the unit was labeled. Each sample was labeled and sorted for flotation in the working room of the research team.

   1.2. *Processing*

Flotation was conducted in the compound of Gebar Shire Hotel in Shire. Manual Machine was built by team members and local carpenters. Materials including bucket, clothespins, mosquito net etc were utilized.

   1.3. *Light fractions*

In order to capture light fraction white and smooth local scarves were utilized. In this case a light fraction means charred seeds and any tiny botanical samples. After the samples getting dry they put in plastic bags for further study. The light fraction will be studied in Laboratory at ARCCH (Authority of Research and conservation of cultural heritage) and Addis Ababa University.

1.4. Heavy Fractions

After the light fractions collected the remaining soil in the mosquito net will be collected as a heavy fraction. Basically, heavy fractions are mostly used for identifying small artifacts like lithics, beads, pot sherds etc. For this year we decide to bag and stored the heavy fractions, which will be sorted next season.

1.5. Drying light and heavy fractions

Because of the light fractions were small in size drying was take 1-2 days. However, for heavy fraction especially samples from clay soil take the drying process 2-4 days.

1.6. Result

Accordingly, 69 soil samples were floated. We recover 69 heavy fraction samples and 69 light fraction samples. Further, identification will be made in laboratory at Addis Ababa, Ethiopia.

The UCLA Shire Archaeological Project

Mai Adrasha Field Report 2016

Willeke Wendrich, Rachel Moy UCLA

Hans Barnard, Bisrat Gebreegziabher, Gidey Gebreegziabher, Gabriella Giovannone, Karlene Shippelhoute, Dil Singh Barsanti, Diego Capra, Deidre Whitmore, Degsew Zerihun

December, 2016

Contents:

1. Introduction

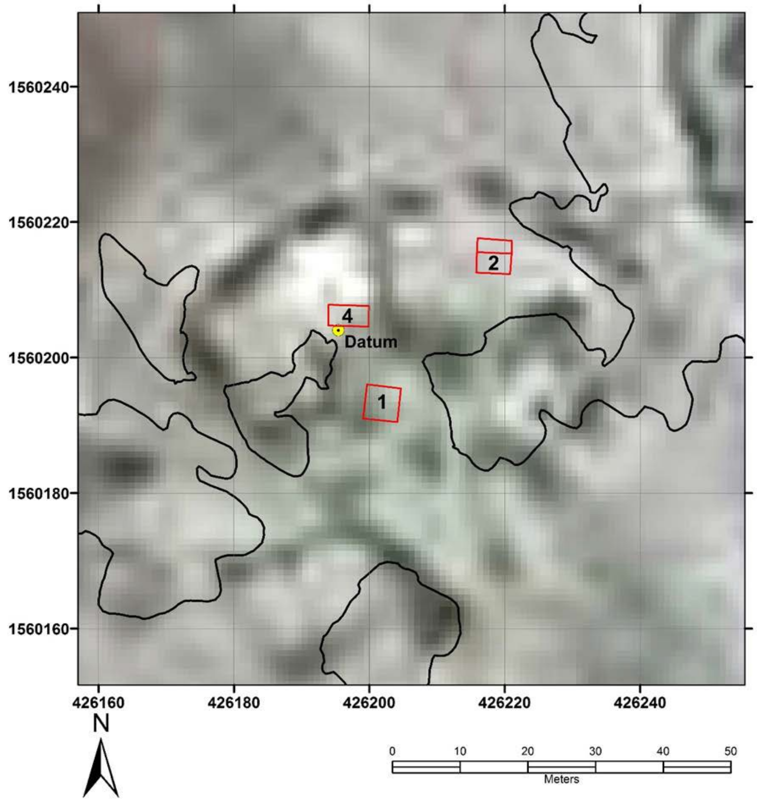
The second season of the UCLA Shire Archaeological Project took place from November 28 to December 20, 2016 in a 100 square kilometer area near the town of Shire, also known as Inda Selassie. Our team included:

Willeke Wendrich PhD, Archaeologist
Rachel Moy, Ceramicist
Bisrat Gebreegziabher, National Representative Gidey Gebreegziabher, Regional Representative
Deidre Whitmore, Registrar and Artist
Hans Barnard PhD, Surveyor Karlene Shippelhoute, Archaeologist Dil Singh Basanti, Archaeologist Diego Capra, Archaeologist
Guish Assefa, Archaeologist Nigus Baraki, Archaeologist Degsew Zerihun, Paleobotanist
Gabriella Giovannone, Ceramicist Haregwien Belete, Ceramicist Aregay Ydeho, trainee
Hadgu Zeru, trainee Haddas Tafere, assistant Alamru Gebru, assistant
Kewnit Gebrehiwot, assistant Haile Myriam Tareke, assistant Gebremedihin Mekonen, assistant
Amaresh Negash, assistant

The objectives of our fieldwork in 2016 were threefold:

1) Gauge the extent of the destruction at Mai Adrasha
2) Continue excavations in the undisturbed western portion of Mai Adrasha.
3) Engage in community outreach to protect the Mai Adrasha cultural heritage.

We are extremely pleased with the results of our second season in Shire. Though much of the site of Mai Adrasha is destroyed, the remaining areas have still produced a wealth of archaeological information. This season, we continued excavations in two trenches and opened a third one. A small survey was conducted by Hans Barnard, Diego Capra and Guish Assefa to explore ancient remains in the direct environs of Mai Adrasha. We plan to continue both excavation and survey in November 2017. We will continue in the existing three trenches and open several new ones. In addition we plan to start our ethnoarchaeological work, related to the excavations and community outreach.



UCLA Archaeological Project in Shire (northern Ethiopia)

Position of the 2016 excavation trenches
Datum: 426195.42 E / 1560204.03 N / 1915.07 mASL

Coordinates projected onto Zone 37P (N) of the WGS84 geode

2. Excavation

In 2016 work continued in two trenches (MA01 and MA02), each in an agricultural field of Mai Adrasha, while a new trench was opened in a third field, but focused on the high overgrown ridge between the fields (MA04). We decided to not continue excavations in trench MA03, which was started in 2015, because we had only three weeks and were keen to explore the theory that the overgrown field boundaries might indicate below lying structures. The direct reason for this theory was a looter's hole adjacent to one of the field-boundaries, found in 2015, which displayed a very substantial wall and seemed to indicate that this might be the case in other overgrown areas as well. Upon return to Mai Adrasha it appeared, however, that the wall and the area around it, had been destroyed completely.

2.1 Trench MA 01

Karlene Shippelhoute, Aregay Ydeho, Guish Assefa, Haddas Tafere, Alamru Gebru

2.1.1. General Information

Trench 01 is the southernmost of the three trenches excavated during the 2016 season. The initial fieldwork began on November 29th to remove backfill from the squares. Excavation took place from December 2nd to December 14th. Backfilling the trenches occupied three days, 17,19 and 20 December

2016. Trench 01 was supervised by Karlene Shippelhoute, and work was also conducted by Aregay Ydeho, Guish Assefa, Haddas Tafere and Alamru Gebru. Due to an inability to correct for the GPS in real-time the measurements of the trench were slightly off from last season. The dimensions were 4.94 meters East to West and 4.95 meters North to South (rather than 5 x 5 m).

- Benchmark in 2016: 1912.46 mASL

ID	Zone	Eastings	Northings	Elevation
Trench 1 - SW	37P	426193.91	1560204.74	1914.81
Trench 1 - SE	37P	426199.08	1560191.02	1914.64
Trench 1 - NE	37P	426199.62	1560196.00	1914.71
Trench 1 - NW	37P	426193.97	1560207.81	1914.74

2.1.2 Excavation Purpose

Trench 01 is located on a small plateau on the southern side of a small hill or mound at Mai Adrasha. This hill is surrounded to the south and east by vast areas of site destruction, caused by local villagers panning for gold and taking stones from ancient buildings to use in modern construction. Much of the site has been destroyed, and the initial goal of excavation in 2015 was to assess the amount of data that might still be gained from what remains of the site. In addition, there has been very little archaeological research conducted in the northern highland region west of Axum, and thus the 2015 Mai Adrasha excavations also aimed to begin the process of establishing a chronology and typology for the cultural use of this region in the past.

Continuation of work in Trench 01 in 2016 was based on the results from the 2015 season which showed promising preservation of walls, ceramics and charcoal for dating, with ample opportunity to find undisturbed evidence for activities in this part of the settlement. The calibrated C^{14} readings from 2015 gave dates ranging from the 19^{th} century AD (unit 0025); the17^{th} century AD (unit 0005); the 15^{th} century AD (unit 0013) and the 1^{st} century AD (unit 0016). At the end of the 2015 season the northern part of the trench was much lower than the southern due to a deep cut. The main goals of excavation are to understand the relationship of the walls that bisect the trench E-W (0082 and 0020) and N-S (0003, 0081).

The extreme compactness of the soil at Mai Adrasha, often requiring excavation with a large pickaxe, means that many of the recovered artifacts are highly fragmented. Nevertheless, large amounts of pottery, including dateable diagnostic fragments, were recovered at Trench 01. Most of the animal bone recovered was too fragmentary to be identified. Large amounts of charcoal were recovered, and future excavations could gain a great deal of information by employing an expert in charcoal and/or wood identification. Several fragments of two sizes of crucible, as well as red-colored earth in the Southwest and Northeast of the trench indicate the presence of metal production and/or processing at the site. Various types of lithics were also recovered, made out of local chert but also from (presumably imported) obsidian.

2.1.3. Stratigraphic Relations

There were multiple phases of tumble in both the northern and southern sections of the trench. Further analysis will be required to understand these relationships and the following phases should be understood as very preliminary.

Phase	Description	Units	Interpretation
I	Construction of walls	0003, 0082, 0004, 0019, 0081	Walls 0003, and 0082 are bonded and probably built at the same time. Wall 0019 leans on wall 0081 and may belong to a later phase.
II	Deposition of soil and fill	0279, 0283, 0284, 0275, 0276, 0278, 0285, 0295, 0296	Fill layers with varying sediment colors. It is difficult to determine if these are natural or occupation layers.
III	Occupation layer	0191, 0192, 0194, 0195, 0196, 0218, 0290, 0291, 0292, 0293, 0294 0107	Units included complete or near complete vessels. Unit (0107) likely began during this phase
IV	Deposition above occupation layer	0287, 0286, 0274, 0190, 0280, 0209, 0273	More lithics and artifacts than in phase III
V	Abandonment	0193, 0195, 0148, 0135, 0136, 0206, 0202, 0205, 0207, 0272, 0203	Deposition of tumble and large boulders in multiple layers. The time span over which this happened is as yet unclear.
VI a	Wall construction	0020	Wall (0020) built in NE corner of trench, abutting wall 0004.
VI b	Clay layer and wall tumble	0143	Clay layer 0143 was deposited before wall 0020 was built, as well as after and mixed with wall tumble (unit should have been split).
VII	Abandonment	0133, 0132, 0131 (Unit 0134)	Collapse of wall: boulder and stone tumble appear to be from wall 0019 and other architecture in the southern part of the trench.

			Unit 0134 is bioturbation (rodent hole).
VIII	Abandonment	0130, 0139, 0140, 0141, 0142	Deposition of sediment and tumble from wall 0082.
IX	Occupation Phase	0146 , 0147	Pot 0146 sitting on lower courses of wall 008, with pot fill 0147.
X	Abandonment	0138, 0144, 0145	Collapse of walls. Deposition of sediment and tumble lying over second course of wall 0082
XI	Abandonment	0012, 0013, 0014, 0016, 0018, 0083, 0084, 0200, 0277, 0282	Deposition of soil and continued collapse of walls 0003 and 0004
XII	Abandonment	0008, 0010, 0011, 0015, 0006, 0007, 0149, 201, 208	Destruction of stone walls 0003 and 0004, tumble (0149) from wall 0081.
XIII	Abandonment	0017, 0083, 0005	Deposition of stones and soil. Unit 0017 turned out not to be a wall and is tumble associated with this phase.
XIV	Modern agriculture	0001, 0002	Topsoil, with plow disturbance. Division between the two layers is artificial

2.1.4 Discussion and Interpretation

The season was once again a short three-week season and natural bedrock was not reached. The earliest phase (I) is the construction of stone walls 0003, 0082, 0081, 0019, and 0004. Excavation confirmed that walls 0003 and 0082 were built in the same phase. The relationship of wall 0004 is still unclear as the bottom has not been reached. Wall 0004 was not bonded with wall 0020, which is of a later date. The relationship of Walls 0019 and 0082 likewise still remains unclear.
The top three courses of the northern section of wall 0019 are leaning severely. The associated tumble from units (0131 and 0132) confirms the partial collapse of this wall.

In the second phase there are layers of fill. At time of excavation it was difficult to determine if they were natural fill. Some of the units within this phase were split artificially for better control of finds location.

In Phase III of the trench there is evidence of an occupation. Various complete and almost complete vessels (0293, 0292, 0291, 0196) were excavated along with flat lying sherds and a base in the eastern section of the trench. The occurrence of large quantities of pottery and slag in this area as well multiple units with a variety of silty clay inclusions indicates that this use occurred within a space delineated by the surrounding walls (0003, 0081, and 0082). Unit 0292 included a large vessel that was likely a storage jar and included a crucible. This vessel is very similar to those found in Trench 04 this season. Unit (0196) also associated with this layer was a small bowl that is characteristic of proto and early Aksumite ceramic styles. The initial analysis of the pottery from a limited number of units seems to confirm that the trench has reached a much earlier phase of occupation than the units excavated in 2015. This phase also aligns with the bottom of unit (0107). The unit is nearly a meter deep and sits in the southwest corner of the trench. The very red sediment and artifacts including slag and copper alloy fragments suggest that this area was used for metal production and is likely from the same period as the occupational phase within the walls. In the north of the trench the same red sediment was found along with artifacts associated with metalworking.

In the fourth phase of the trench there are large amounts of natural fill layers with various pottery, lithics, and a figurine that are likely out of context and disturbed by fill and tumble layers above.

Phase V contained a large number of tumble units in all areas of the trench. Units 0193 and 0195 are below unit 0143 and contained very large boulders of a substantial collapsed wall. Units 0135 and 0136 were fill layers with smaller stone inclusions. In the southern portion of the trench units 0206 and 0202 were large units of tumble extending to most of the southern half of the unit.

Medium sized boulders suggest that they are tumble from walls 0003 and 0082. Tumble layers in the NW corner included units 0205 and 0207.

Trench MA01 at the end of the excavation season before backfill, looking West.

A revised interpretation from last season is that it is now clear that wall 0020 is younger than the other walls in the trench. The wall consisted of only three courses and did not bond with walls 0004, 0003, or 0082. It abuts all three walls in a later phase of occupation. Tumble 0143 should have been split in two layers of silty clay and tumble. It included sandy orange clay which predate and postdate wall 0020. For this reason, Phase VI was separated in VI a (which includes the construction of wall 0020) and Phase VI b tumble on top of clay. The silty clay sediment and sandy orange clay inclusions are present both above and below wall (0020). The largest concentration or orange inclusions was found above wall (0020) but smaller concentrations were found after the wall was removed. These did not continue into units (0193 and 0195). The orange sandy inclusions were primarily found in the corner where wall 0020 abuts 0004. It has been interpreted as an activity area where craftsmen may have been mixing local sands and clay for ceramic production, or as evidence for plaster preparation and slump.

Phase VII comprised two large areas of tumble in the south of the trench including units 0131 and 0132. The tumble from 0131 likely came from the collapse of wall 0019 and tumble 0132 is oriented north to south and possibly came from an architectural element that is no longer or not yet visible in the southern section.

Phase VIII is yet another abandonment phase consisting of tumble and sediment fill. It is separated from Phase VII because it is associated with Wall 0082 and collapsed to the north of the wall and on some of the remaining courses of the wall. After removing these layers of tumble, it was apparent that wall 0082 continued in the west and was not in fact a threshold as was thought at some point. The tumble removed last season and this season were from the upper courses of this wall. It is hard to tell if this collapse occurred at the same time as units 0131 and 0132 and for this reason they have been given a separate phase.

Phase IX suggests an occupation or use of the space after the walls had already begun to collapse. Vessel 0146 sits on remains of wall 0082. It was filled with sediment and charcoal samples and floatation revealed a grain of barley.

Phase X is the latest collapse of walls and tumble that was uncovered this season. These units were above the occupational (re-use) phase of the space and were likely the final collapse of wall 0082.

Phases XI – XV were excavated in the 2015 season and correspond to the 2015 Phases II-VI. A few units excavated from 2016 were added to these phases due to the fact that the trench was not left level and certain areas of collapse likely happened at the same time. Phase XI included units 0277 and 0282, which were left unexcavated in 2015 just below topsoil in the NE corner of the unit. They were taken down about 0.75 meters and appear to be natural fill layers with two different sediment types. Phase XII now includes unit 0149, the tumble from wall 0081 that was left floating just a few centimeters below the highest remaining course of the wall. The substantial walls contain several occupation phases in a large building, with at least two phases of re-use of a partly collapsed structure. The relationship and age of the walls is still unclear and requires further excavation.

Phase	Descriptions	Units	Interpretation
I	Construction	0153, 0217, 0023	Possible reuse phase of the site. Some construction and deposition of new materials. Difficult to establish the overall relationship of these units given the lack of clarity with upper deposits.
II	Deposition	0227, 0152, 0113, 0218, 0116, 0219	Represents the second stage of deposition after the abandonment of the site. Walls or other structures begin to collapse in on already accumulated deposits and more of the site becomes buried.

III	Abandonment	0151, 0150, 0161, 0162, 0168, 0165, 0167, 0158, 0155, 0156, 0164, 0117, 0216, 0159, 0160 0155	Represents the first stage of deposition after the abandonment of the site. Deposits begin to build up around use areas and Rodent and other activity intensifies shortly after abandonment. Pots break due to unknown circumstances (falling roofs?).
IV	Use	0157, 0166, 0212, 0213, 0165, 0220	Main use of the site as delineated during 2016 excavations. Seen in the build up of small deposits on platforms and pavements on which pots were set and associated activities were carried out.
V	Construction	0091, 0221, 0214, 0222, 0229, 0223, 0215, 0228, 0114	Construction of walls, platforms, potential other floors and other activities that would set the stage for later use.
VI	Unclear	0224, 0225, 0226	Relations between units is currently unclear, but it is clear another construction and use phase exist below.

The discovery of multiple crucible, slag, and copper fragments in association with red sediment strongly suggests metal production in this area of the site. We took several charcoal samples from the tumble layer 0143, the metal production layer 0107, and ceramic vessels 0147 and 0293 that will give more stable dates to the earlier occupation phases of the trench, but initial analysis of pottery suggests that we have reached a much earlier level of occupation than the 1st century CE.

2.2 Trench MA 02

Dil Singh Barsanti, Gidey Gebreegziabher, Degsew Zerihun, Hadgu Zeru, Kewanit Gebrehiwot, Haile Myriam Tareke.

2.2.1 General Information

Trench 02 the easternmost of three (3) trenches excavated in the 2016 season at Mai Adrasha. Excavation began on 29 November 2016 and completed on 16 December 2016 (backfilling the trenches occupied three days, 17,19 and 20 December 2016). Trench 02 was supervised by Dil Singh Barsanti, and work was conducted by Hadgu Zeru, Kewanit Gebrehiwot, Haile Myriam

Tareke, while Haile Maryam's wife, Latay, also assisted for 2 days. Occasional assistance was provided by Gidey Gebreegziabher and Degsew Zerihun.
Trench 02 measured 5.0 meters East-West and 3.0 meters North-South.

- Benchmark in 2016: 1912.46 mASL

ID	Zone	Eastings	Northings	Elevation
Trench 2 - SW	37P	426199.87	1560204.58	1915.77
Trench 2 - SE	37P	426204.06	1560190.47	1914.60
Trench 2 - NE	37P	426204.64	1560195.42	1914.72
Trench 2 - NW	37P	426199.95	1560207.63	1915.70

2.2.2 Excavation Purpose

The results of the 2015 excavation season showed that Trench 2 provided the earliest dated deposits of the three trenches excavated that year, ranging from the 7th century BCE (units 0027 and 0040) to approximately 1200 BCE (unit 0102). This would place the deposits firmly into the pre-Axumite period and gives an excellent opportunity to explore the earlier periods of activity in Eastern Tigray. The earlies date was retrieved from charcoal underneath what was identified in 2015 as 4 post stands [0093], discovered at the end of the short 2015 season. In retrospect these were the bases of three large storage jar.

The goals for excavation of MA 02 for the 2016 season were to 1) produce samples to verify the results of the previous season; 2) investigate whether the dates could be correlated to an occupation phase; 3) continue retrieving data to help establish the chronology of the region, particularly absolute dates to anchor a pottery typology. Explorations into the social life of Mai Adrasha would only be minimally informative until the foundational chronological work was established.

Excavation of MA 02 in the 2016 was slow. Considerations brought by the State of Emergency called in Ethiopia reduced the scale of excavation. Consequentially, personnel were limited and the season was shortened.

2.2.3 Stratigraphic Relations

Correlating the stratigraphy recorded this year with that of the 2015 season is difficult. The criteria for demarcating units in MA 02 were apparently quite different between the two seasons, and the tunneling to retrieve pot-bases [0093] before the close of the 2015 season produced a different understanding of the relative stratigraphy. The following relations therefore reflect the stratigraphy as recorded in the 2016 season alone:

Phase	Descriptions	Units	Interpretation
I	Construction	0153, 0217, 0023	Possible reuse phase of the site. Some construction and deposition of new materials. Difficult to establish the overall relationship of these units given the lack of clarity with upper deposits.
II	Deposition	0227, 0152, 0113, 0218, 0116, 0219	Represents the second stage of deposition after the abandonment of the site. Walls or other structures begin to collapse in on already accumulated deposits and more of the site becomes buried.
III	Abandonment	0151, 0150, 0161, 0162, 0168, 0165, 0167, 0158, 0155, 0156, 0164, 0117, 0216, 0159, 0160 0155	Represents the first stage of deposition after the abandonment of the site. Deposits begin to build up around use areas and Rodent and other activity intensifies shortly after abandonment. Pots break due to unknown circumstances (falling roofs?).
IV	Use	0157, 0166, 0212, 0213, 0165, 0220	Main use of the site as delineated during 2016 excavations. Seen in the build up of small deposits on platforms and pavements on which pots were set and associated activities were carried out.
V	Construction	0091, 0221, 0214, 0222, 0229, 0223, 0215, 0228, 0114	Construction of walls, platforms, potential other floors and other activities that would set the stage for later use.
VI	Unclear	0224, 0225, 0226	Relations between units is currently unclear, but it is clear another construction and use phase exist below.

2.2.4 Discussion and Interpretation

MA 02 was a complex trench with many diverging and converging horizontal stratigraphic relationships. Units belonging to the earliest phase (I) have not been fully excavated, so their relationships are unknown. [0091] sits over [0224] and suggests that a brief abandonment phase exists below, before which lies another occupation phase. Peeking through the later deposit [0215] are two features [0225] and [0226] that would belong to this earlier occupation phase. Both these units may bear some association with ceramic deposits excavated earlier if units are only insubstantially embedded in [0215].

The second phase entails the construction of stone features. The stone platform [0214] seems to be associated with N-S wall [0091] and E-W wall [0114] by alignment and relative stratigraphy. This may also suggest that these new buildings were constructed quickly over old ones, taking advantage of established levels and foundations. Possible earthen floors [0215], [0228], and [0223] were created at this time (as suggested by the flat levels and features laying atop.
Pavement [0222] appears to have been part of the same construction sequence as E-W wall [0214]. The platform resembles examples from other areas, such as Seglamen, but is much smaller in size, and is only 3 courses high. Wall [0214] may represent activity area, and good amounts of obsidian, lithics, grinding stones, bone, teeth, and pottery were found nearby, suggesting that food preparation could be one activity that went on (though not necessarily specialized as such). Relative stratigraphy dictates that the structures are older than the earliest dates acquired last year. Charcoal and seed samples taken from pavement [0222] may help date the platform. The structures appear large and well-made and represent a cultural florescence rather than any formative stage of urban development. If the foundation of these structures do indeed date around 1200 BC, than it is likely the origins of the ancient town are significantly older than this.

N-S wall [0091] and pavement [0241], Trench MA02, at the end of the excavation, looking North.

The next phase (III) is a habitation or use phase. Pots [0115] and [0157] were deposited and soil deposits [0212] and [0213] accrued around them. Both pottery units contained the same type ceramic vessel, and may be related to the large storage jars excavated at the end of the 2015 season. One pot was left in situ [0226], as it seems to originate in a deeper layer, as yet unexcavated layer. Broken sherd clusters [0117], [0155], and [0156] are considered to belong to the next phase and may be associated with these pots by belonging to a single use phase, though this is not clear. The early radiocarbon dates from the previous season likely correlate to this stage or right before this stage. Stratigraphy to the west end of wall [0214] is unsecure with features occurring at both higher and lower levels of the area simultaneously.

Phase III in trench MA02, looking South

The fourth phase is an abandonment phase. Ancient Mai Adrashans left the pots and other materials in the area and moved on. Animal (rodent/termite) disturbances in the area intensify in this phase. Soils [0158], [0159] and [0160] were deposited above which layers of broken sherds ([0117], [0155], and [0156]) were strewn throughout, possibly a result of pots breaking in situ. After wall [0091] was abandoned, a small deposit of soil ([216]) spilled past and over the earlier wall [0224]. Ceramics from [0155] were leaning against this deposit, suggesting his vessel broke some time after the abandonment of wall [0091]. The ceramics from [0155] also leaned against wall [0091], suggesting the wall is indeed older than these features. We then know that these pots broke sometime after the accumulation of these deposits around the structures.

Phase V represents the continuing accumulation of deposits over the abandonment layer. Walls collapse and form tumble layers ([0016] and [0219) that fall over features in the unit. The coverage area of the tumble is not extensive enough to have destroyed all the pots, however, so other factors are evident even if they cannot be specified (collapsing roofs maybe?). It is also not certain these tumble features derive from walls associated with the earlier occupation. Larger deposits (such as [0113]) also accrue, likely wind-blown, sealing the human activity below. This phase then indicates the more long-term abandonment of the site and accumulation over archaeologically relevant deposits.

Phase VI is unclear, but may represent some sort of construction or use activity given wall [0023] found at this layer, partly over wall [0114]. Better incorporation of the stratigraphy recorded last year would be more informative, but wall [0023] does appears to be much younger in time compared to [0091] and [0224]. Termite activity ([0217)] was present at the bottom course of [0023] going below. A line of stones – [0153] – was constructed over the deposits, but it is unknown how these features correlate. This phase indicates a later reoccupation of the area.

1.3 Trench MA 04
Bisrat Gebreegziabher, Willeke Wendrich, Diego Capra, Nigus Baraki, Gebremedihin Mekonen, Amaresh Negash.

1.3.1 General Information

Trench 03, in which excavations started in 2015, with C14 dates indicating occupation in the 6th and 7th centuries BC) was not opened in 2016. Instead Trench 04 was started as the westernmost of the three trenches excavated in the 2016 season at Mai Adrasha. Excavation began on 29 November 2016 and completed on 17 December 2016 (backfilling the trenches occupied three days, 17,19 and 20 December 2016). Trench 04 was supervised by Bisrat Gebreegziabher, while Willeke Wendrich, Gebremedihin Mekonen and Amaresh Negash participated in the work.
Diego Capra and Nigus Baraki assisted for a week.

Trench 04 measured 6.00 meters East-West and 3.00 meters North-South.

- Benchmark in 2016: 1912.46 mASL

ID	Zone	Eastings	Northings	Elevation
Trench 4 - SW	37P	426215.78	1560212.53	1914.45
Trench 4 - SE	37P	426220.79	1560212.32	1914.39
Trench 4 - NE	37P	426221.04	1560217.24	1914.40
Trench 4 - NW	37P	426215.97	1560217.65	1914.35

1.3.2 Excavation Purpose

During the 2015 excavation season a study of the edges of the destroyed area gave the impression that several large exposed walls were aligned with the boundaries of agricultural fields owned by different persons. These boundaries are marked by substantial earthen ridges overgrown with bushes. The outline of the field boundaries as seen on satellite photography thus could indicate the lay-out of a very large architectural complex. In order to check the theory that the field boundaries coincided with substantial walls trench 4 was positioned at the border of an agricultural field, sectioning one of the earthen ridges. In addition, the purpose of excavation was, as with the other trenches, to continue building a ceramic sequence upon well-stratified and well- dated contexts.

1.3.3 Stratigraphic Relations

Phase	**Description**	**Units**	**Interpretation**
I	Construction of stone walls	0178, 0179, 0184, 0240	Room formed by walls 0178 and 0178 (bonded) and wall 0184 (abuts 0179, is not quite parallel to 0178 and may be later). An earlier wall 0240 may run parallel to 0178.
II	Abandonment east side of trench	0189, 0230, 0235, 0233, 0239	Seeds (coffee beans?) found within the tumble or architectural debris and sand layers in between. Copper oval rings and circular iron (gilded?) ring / bracelets found in 0235 against E. baulk
III	Abandonment	0237, 0238	Abandonment of Space A. The room is filled with stone tumble, debris of wall 0184.
IV	Re-use	0236	Red-colored soil. Metal related activity in room?
V	Abandonment	0232	Sand layer in space A, indicating an abandonment phase of the room.
VI	Late use layer	0234, 0188, 0231	Pot stand, charcoal
VII	Abandonment	0185, 0186, 0187	Abandonment of space A and east side of trench Seeds (coffee beans?) found in debris on east side of trench.
VIII	Building phase	0170, 0182	Construction of wall 0170
IX	Abandonment	0181, 0175, 0241, 0177, 0183	Sand and tumble layers north and south of wall 0170
XII	Pavement or path	0180, 0773, 0171	parallel to wall 0170, approximately 1.50 wide and made of small stones
XIII	Abandonment	0125, 0130, 0129, 0128,	Abandonment in modern times (finds include bullet, razor blade, pair of trousers)

		0121, 0120, 0176, 0119	
XIV	Modern agriculture	0174, 0118 and two cuts filled with stones 0126, 0122, 023, 0124	

1.3.4 Discussion and Interpretation

The earliest phase in the trench, Phase 1, saw the construction of a space or room (A), delineated by four stone walls. Walls [0178] running N-S and [0179] running E-W, are bonded, while wall 0184 running N-S, abuts wall [0179]. Remarkably wall [0184] does not run quite parallel to wall [0178], which results in a space that is slightly trapezoid. The putative fourth wall of space A is outside the trench to the north.

Trench MA04 at the end of the excavations, looking West

In Phase II the area to the east of Space A is characterized by layers of tumble interspersed with sand. There is no clear use surface, but some of the large stones seem to be set in the sand layer, perhaps as steps or informal seats. Four copper alloy bracelets and one which may have been gilded, were set in the sand. Some of the seeds which resemble an early form of coffee beans were found in the tumble of this phase, but also in later layers (Phase VI). They will be separately dated and analyzed.

MA04, east part of trench, looking East. Location of metal rings near the baulk, to the right the tumble in which the seeds (putative coffee beans) were found.

MA04 close up of copper alloy rings and broken iron, possibly gilded bracelet.

One of the seeds from MA04, a putative coffee bean (not confirmed, further research is ongoing).

An abandonment phase in space A consists of tumble layers [0237] and [0238] of wall [0184]. It is impossible to say whether this happened before or after the abandonment phase and tumble identified as "phase II" east of wall [0184] and therefore it is considered a separate phase (III).
While we have a period of re-use, perhaps metal working, in the room on top of the tumble (Phase IV). The sand layer that covered the red-soil in this room indicates a second period of re- use (Phase V), after which a re-use surface was identified with a pot stand made of a small circle of five stones, and an abundance of pot sherds and charcoal (Phase VI).

The area east of space A had another abandonment phase with more tumble in which also several seeds (putative coffee beans) were found (Phase VII), which predated the building of wall [0170] (Phase VIII).

The area both north and south of wall [0170] was abandoned (Phase IX), but then a pavement or path was made north of wall [0170], possibly as a connection between fields (Phase X). This was covered with several layers of debris, building up the ridge between agricultural field. These units contained modern material, such as a bullet, razor blade, plastic and a pair of pants. The ridge was partly built up and covered with stones, which seem to have been thrown on the ridge area by farmers to clear their field. This latest phase also included a plow layer at the western part of the trench.

Excavations in Trench 04 required the removal of a thick sloping layer of modern overburden, but immediately underneath were found a late wall and stone paved path. The ceramics underneath these features shows similarities to those of Trench 01. Charcoal and seed samples were taken to date the most secure deposits. As in Trench 01 metal working may have been the most important activity in this area of the site.

3 Ceramic Analysis

Rachel Moy

During the 2016 field season, ceramics were analyzed from the excavations at Mai Adrasha. Both diagnostic and nondiagnostic sherds were analyzed from the three excavated trenches: MA01, MA02, and MA04. Analysis was continued on artifacts collected during the 2015 season from trenches MA01, MA02, and MA03. Not all the materials from each stratigraphic unit have been analyzed in detail due to time constraints. This season the ceramic team consisted of three persons: Rachel Moy, Gabriella Giovannone, and Haregwien Belete.

Each day, the excavators carried ceramics from the field to the dig house. There, the finds were washed and dried by Mezan Gebreyohanes. They were then sorted into diagnostic and nondiagnostics sherds. The nondiagnostic sherds were sorted by fabric types. Once sorted, each fabric group was counted and weighed. Ceramic processing forms were completed for individual or groups of diagnostic sherds. Information recorded included dimensions, color, shape, inclusions, decoration, surface treatment, and other noteworthy details. All studied diagnostic sherds were photographed and select diagnostic sherds were drawn.

The analysis of these ceramics is still in the beginning stages. More research is needed before more definite conclusions can be made, however the following points were observed.

Observations of the fabrics are in line with those made in the 2015 report. The fabric types represented at Mai Adrasha have much in common with other archaeological sites in the highlands. Red orange fabric is by far the most common. This fabric seems to range from a darker brown or red to a lighter orange or light brown. These changes in color appear to result from differences in the firing process rather than significant differences in clay composition. An orange or pink exterior with a blue grayish interior found at some pre-Aksumite sites, such as Seglamen, appears frequently, though slightly darker. Black, grey, and brown wares are also present, but in lesser quantities. Black topped is frequently present in all four trenches (Figure 1), but is the most frequent in MA02. Small amounts of a marl type fabric and a blue grey fabric are observed. Samples of these types have been selected for thin section analysis. Most fabrics are characterized by a large number of small white sub-rounded inclusions. Thin section analysis has shown these minerals to be quartz and feldspar. Biotite mica is also a frequent temper, especially in brown fabrics. Temper is usually large and frequent. Fine fabric is rare.

Figure 3.1 Black topped closed bowl from MA04

Vessels are typically smoothed. Burnishing occurs infrequently and these vessels always have a black or red surface. Scraping occurs in all four trenches and typically on the interior of vessels. Red slip occurs in nearly every stratigraphic unit. In most cases, it has been at least partially eroded.

Common shapes include cups, small and large open bowls, pots with everted rims, necked jars, and large storage vessels. A number of nearly complete globular bowls with a ring base, a strap handle, and a nonfunctional molded handle on the opposite side (Figure 3.2). Examples were found from MA01 and MA04. There diameters range from 10 to 20cm. This form is like that found in the excavations at Bieta Giyorgis. Nearly all of the large storage jars were found in MA02. These are large pots with everted rims and a ring base. All have a coarse orange to brown fabric. The diameters are all between 30 and 35cm. Sometimes they have nonfunctional molded handles or other molded decoration. Large open bowls were common in all three trenches usually in an orange or brown fabric, but sometimes black topped. Occasionally examples in orange or brown fabric have a combed wave decoration just below the interior of the rim.

Figure 3.2 Globular Bowl from MA01

One strange shape was found exclusively from MA01is a small cup with a rounded base, possibly used in metal production. This form is made of an extremely coarse grey fabric that is only used for this shape. One body sherd of this fabric was found in MA04 SU181. Another strange shape was uncovered in MA02. These are long shallow forms with rims on both sides and measuring about 10cm across.

Figure 3.3: Unusual form from MA02 SU154.

A few of the fragments are curved, but they are mostly straight (Figure 3.3). 14 fragments were recovered from SU154 and one from SU32.

Molded, incised, impressed, and combed decoration all occur with some frequency. Molded decoration is often in the form of a small line or half sphere, sometimes with the center indented. Molded half spheres occur in all four trenches. Molded decoration frequently appears on the shoulder of vessels.

Impressed dots often occur on the exterior in the center the body, on top of the rim, or handle. Impressed dots or lines occur on the tops of rims in all four trenches. Combed decoration occurs in the form of straight lines or waves. Combed waves typically occur just under the rim on the interior of bowls (Figure 3.4), but can also occur on exterior central body or neck. Incised decoration in the form of diamonds is common on body exteriors.

Two fragments of ceramic figurines were uncovered this year. A leg and buttock of a figurine was found in MA02 SU32 from 2015 (Figure 5). The torso of a woman was uncovered from MA01 SU279.

Figure 3.4: Combed wave decoration just below the rim on the interior

Figure 3.5: Figurine leg from MA02 SU32.

Units studied from the 2015 season are listed below. MA01: 12, 16, 83

MA02: 25, 27, 32, 33, 36, 37, 40, 93, 94

MA03: 42, 47, 49, 50, 51, 55, 57, 58, 60, 101, 103, 109

Units studied from the 2016 season are listed below.

MA01: 84, 107, 131, 132 133, 136, 138, 143, 148, 149, 191, 192, 194, 196, 197, 287, 295

MA02: 113, 115, 117, 152, 154, 155, 156, 212, 222

MA04: 125, 181, 231, 238, 239

All the trenches excavated in 2016 have some similarities in their ceramic assemblages. MA01 and MA04, however, appear to be the most similar in terms of form, fabric, and decoration. There are a few distinctions that can be observed. MA01 is the only trench where ledge rims appear. MA01 is also the only trench that has incised zigzag line decoration topping the rim. MA02 is the only trench excavated in 2016 with a decorated pattern of vertical short incised lines bounded by bands of longer combed incised lines. This decoration is also present in MA03 (Figure 6). In the finds from 2016, only one basket impressed sherd was found from MA04.

Figure 6: Incised decoration from MA02.

4 Survey
Hans Barnard

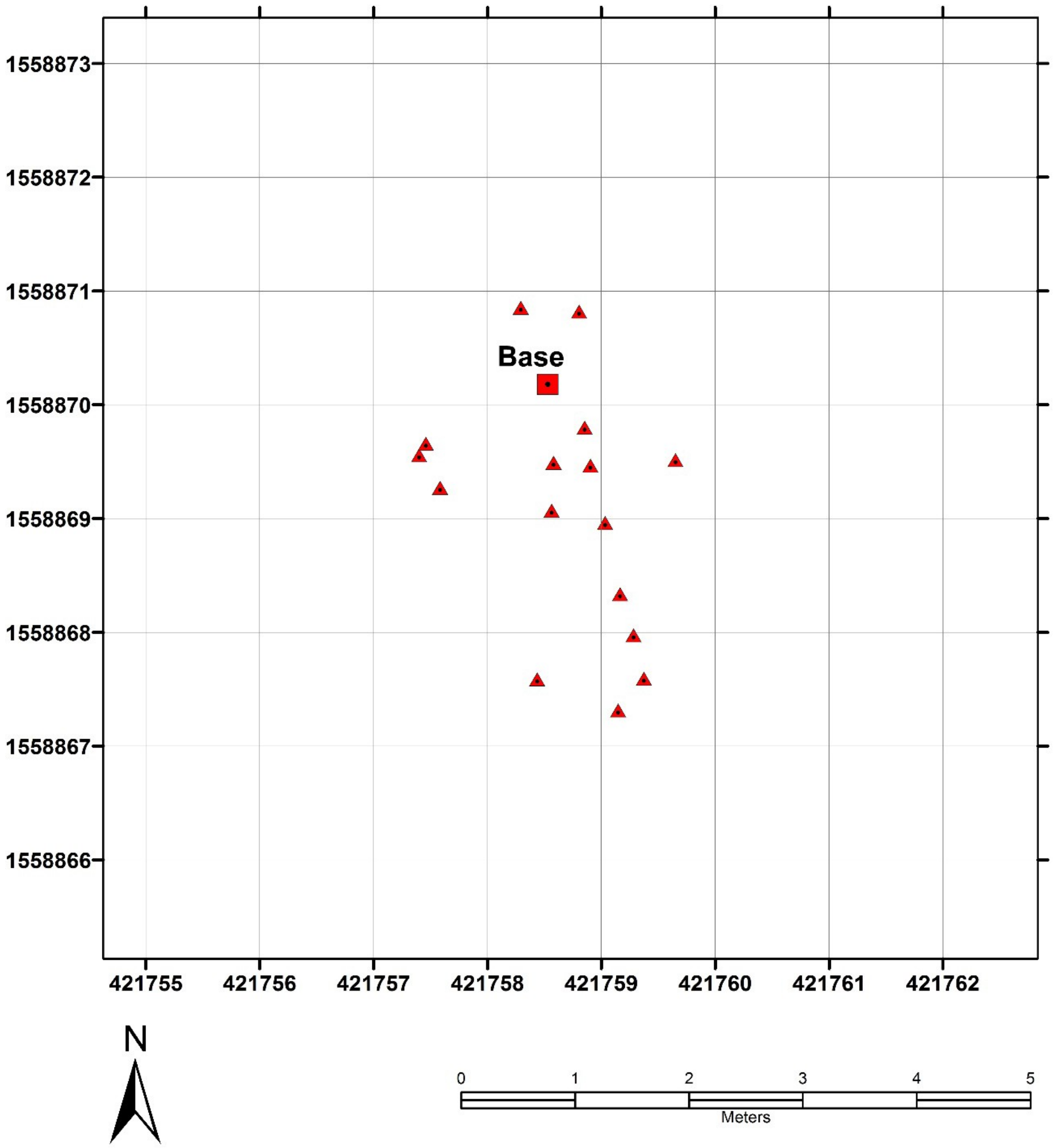
In December 2016, the survey of the ancient site of Mai Adrasha, west of Aksum and just east of modern Indaselassie (Shire, Tigray, Ethiopia), was continued. This survey project was started in December 2014, when a 100 km² concession area and two promising archaeological sites (Mai Adrasha and Mezaber Adimenabr) were identified to the east of Indasilassie. More data was collected in December 2015, when detailed plans of Mai Adrasha were prepared. The instruments used were a Trimble Geo 7X rover, corrected by a Trimble 6H antenna and Juno 3B data logger at a fixed position. All data were analyzed using GPS Pathfinder Office (Trimble), Foresight DXM (TDS) and Surfer (Golden Software) software; the results of which were combined with existing maps and satellite imagery in ArcMap (ESRI). All coordinates were projected onto zone 37P (N) of the WGS84 geode; all heights were calculated above mean sea level (mASL). All this was made possible by the Joan Silsbee Chair of African Cultural Archaeology and the Cotsen Institute of Archaeology at UCLA and executed in cooperation with the Ethiopian Authority for Research and Conservation of Cultural Heritage and Axum University.

The GPS base-station on the roof of the dighouse in Indaselassie (December 2016); its corrected coordinates are: 37P / 421758.53 E / 1558870.18 N / 1913.79 mASL

The 2016 survey started with establishing a new, more permanent base station on the roof of the dighouse in central Indaselassie. The Trimble Pro 6H DGPS antenna and Juno 3B data collector were fixed to a metal pole and placed on the rebar emerging from a concrete pillar in the middle of the northern facade of the building, with a clear view of a large section of the sky. Sixteen sets of positional data were collected over a period of three days by averaging the uncorrected position each second for a period of approximately one hour each (3000–4000 data-points). The overall average was used as the actual position of the antenna during the first day of survey. A number of known features were located and the position of the antenna corrected for the newly collected data to be consistent with previously collected data. The final coordinates of the antenna were decided to be 37P (N) – 421758.53 E – 1558870.18 N – 1913.79 mASL.

ID	Zone	Eastings	Northings	Elevation	Vertical precision	Horizontal precision
161206_a	37P	421757.58	1558869.27	1917.46	19.20	9.90
161206_b	37P	421759.65	1558869.51	1915.81	13.50	9.60
161206_c	37P	421759.15	1558867.31	1916.39	15.10	8.90
161206_d	37P	421758.44	1558867.59	1914.83	13.00	9.10

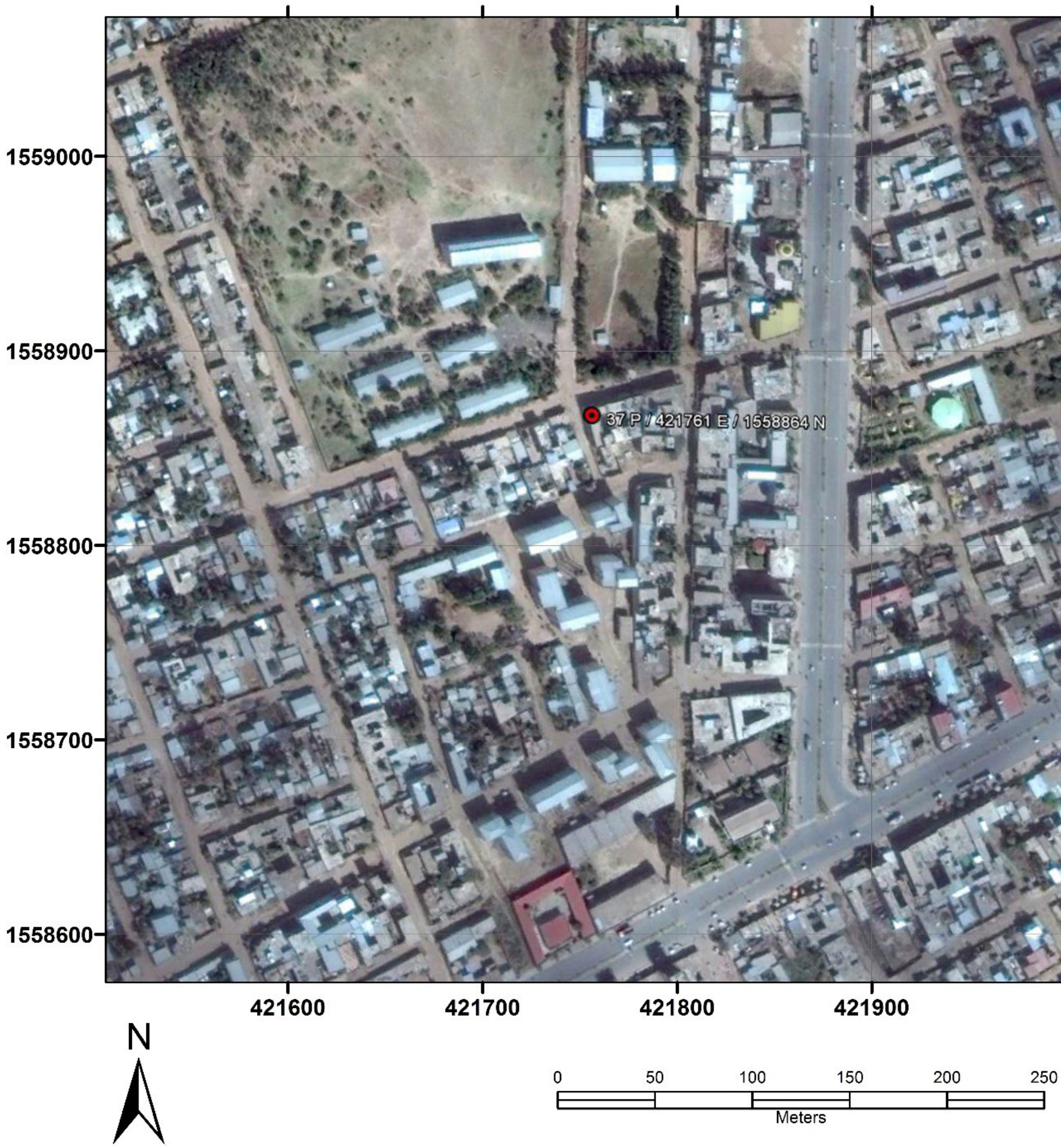
161206_e	37P	421759.03	1558868.96	1915.53	14.70	10.30
161206_f	37P	421758.56	1558869.07	1916.95	19.10	9.90
161207_g	37P	421757.40	1558869.56	1915.15	13.50	9.50
161207_h	37P	421758.58	1558869.49	1920.47	12.70	8.90
161207_i	37P	421757.46	1558869.66	1919.30	13.10	8.90
161207_j	37P	421758.90	1558869.46	1917.11	12.50	8.90
161207_k	37P	421759.28	1558867.97	1916.52	12.50	8.90
161207_l	37P	421759.37	1558867.59	1916.47	13.00	8.90
161207_m	37P	421759.16	1558868.33	1915.54	15.90	9.70
161207_n	37P	421758.85	1558869.80	1913.11	11.40	5.20
161207_o	37P	421758.80	1558870.82	1911.20	9.50	5.80
161207_p	37P	421758.29	1558870.85	1911.99	9.00	6.10
Average		421758.66	1558869.08	1915.86		
St.dev.		0.68	1.07	2.39		
Correction		-0.13	1.10	-2.07		
BASE 2016	**37P**	**421758.53**	**1558870.18**	**1913.79**		



UCLA Archaeological Project in Shire (northern Ethiopia)

Base station readings on the roof of the dighouse
Base: 421758.53 E / 1558870.18 N / 1913.79 mASL

Coordinates projected onto Zone 37P (N) of the WGS84 geode



UCLA Archaeological Project in Shire (northern Ethiopia)

Position of the dighouse in Indaselassie
Base: 421758.53 E / 1558870.18 N / 1913.79 mASL

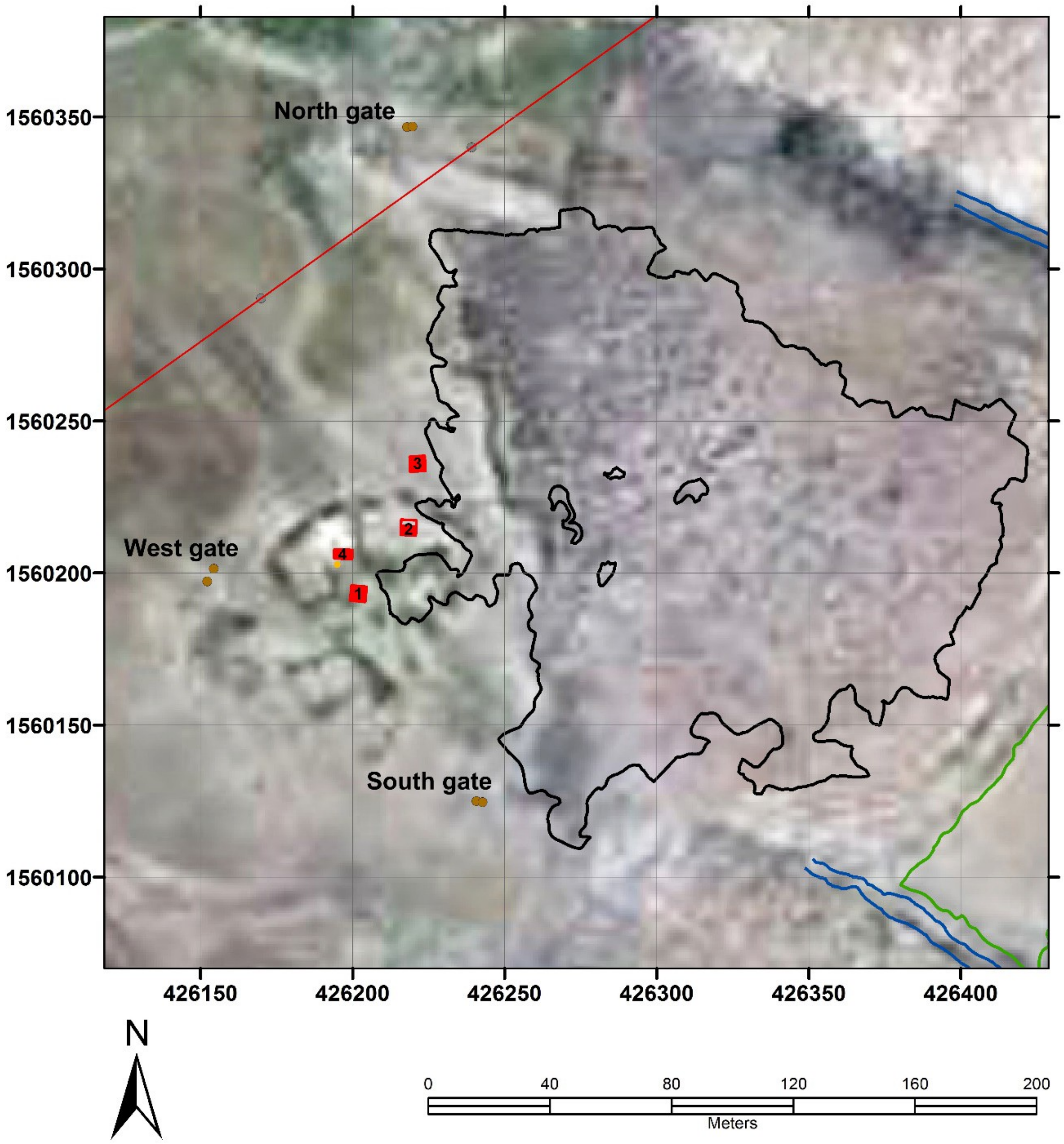
Coordinates projected onto Zone 37P (N) of the WGS84 geode

To provide for the event that a new base station needs to be established, the tops were located of the six concrete jambs of the three modern gates built north, west and south of the site as part of a protective barb-wire fence. This fence was completed in June 2004, but is now entirely gone except for the jambs of the gates. As some or all of these can be expected to stay in place for the foreseeable future, their coordinates can be used to correct any new base station.

Coordinates tops of gate jambs				
ID	**Zone**	**Eastings**	**Northings**	**Elevation**
W-gate N-jamb	37P	426154.43	1560201.49	1916.60
W-gate S-jamb	37P	426152.21	1560197.29	1916.52
S-gate W-jamb	37P	426240.78	1560124.93	1913.01
S-gate E-jamb	37P	426242.57	1560124.80	1912.96
N-gate W-jamb	37P	426217.83	1560346.77	1912.11
N-gate E-jamb	37P	426219.74	1560346.86	1912.06

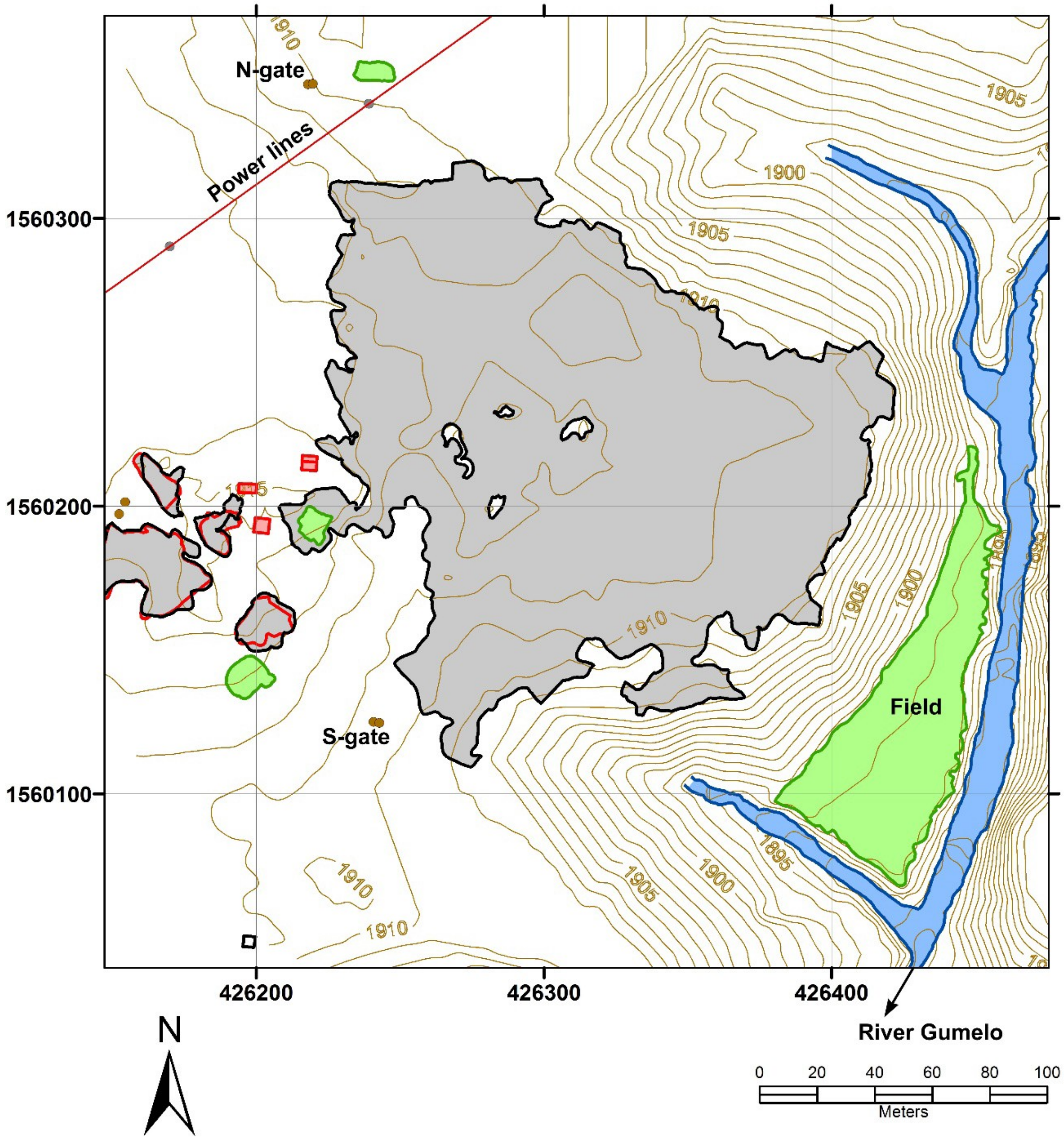
Next, an assessment was made of the damage done to the ancient remains between January– November 2016. It appeared the excavation of the soil in search for alluvial gold had continued, albeit probably at a smaller scale than before 2015 and our interest in the site. Two vegetable gardens had been constructed in the center of the site, one in the area already disturbed by gold digging, and a third at its northern edge. After this the excavation units were located and the elevation of the 2016 datum established (1915.07 mASL).

ID	Zone	Eastings	Northings	Elevation
Trench 1 - SW	37P	426193.91	1560204.74	1914.81
Trench 1 - SE	37P	426199.08	1560191.02	1914.64
Trench 1 - NE	37P	426199.62	1560196.00	1914.71
Trench 1 - NW	37P	426193.97	1560207.81	1914.74
Trench 2 - SW	37P	426199.87	1560204.58	1915.77
Trench 2 - SE	37P	426204.06	1560190.47	1914.60
Trench 2 - NE	37P	426204.64	1560195.42	1914.72
Trench 2 - NW	37P	426199.95	1560207.63	1915.70
Trench 4 - SW	37P	426215.78	1560212.53	1914.45
Trench 4 - SE	37P	426220.79	1560212.32	1914.39
Trench 4 - NE	37P	426221.04	1560217.24	1914.40
Trench 4 - NW	37P	426215.97	1560217.65	1914.35
Datum 2016	**37P**	**426195.42**	**1560204.03**	**1915.07**



UCLA Archaeological Project in Shire (northern Ethiopia)

Mai Adrahsha - Position of the modern gate jambs
Coordinates projected onto Zone 37P (N) of the WGS84 geode

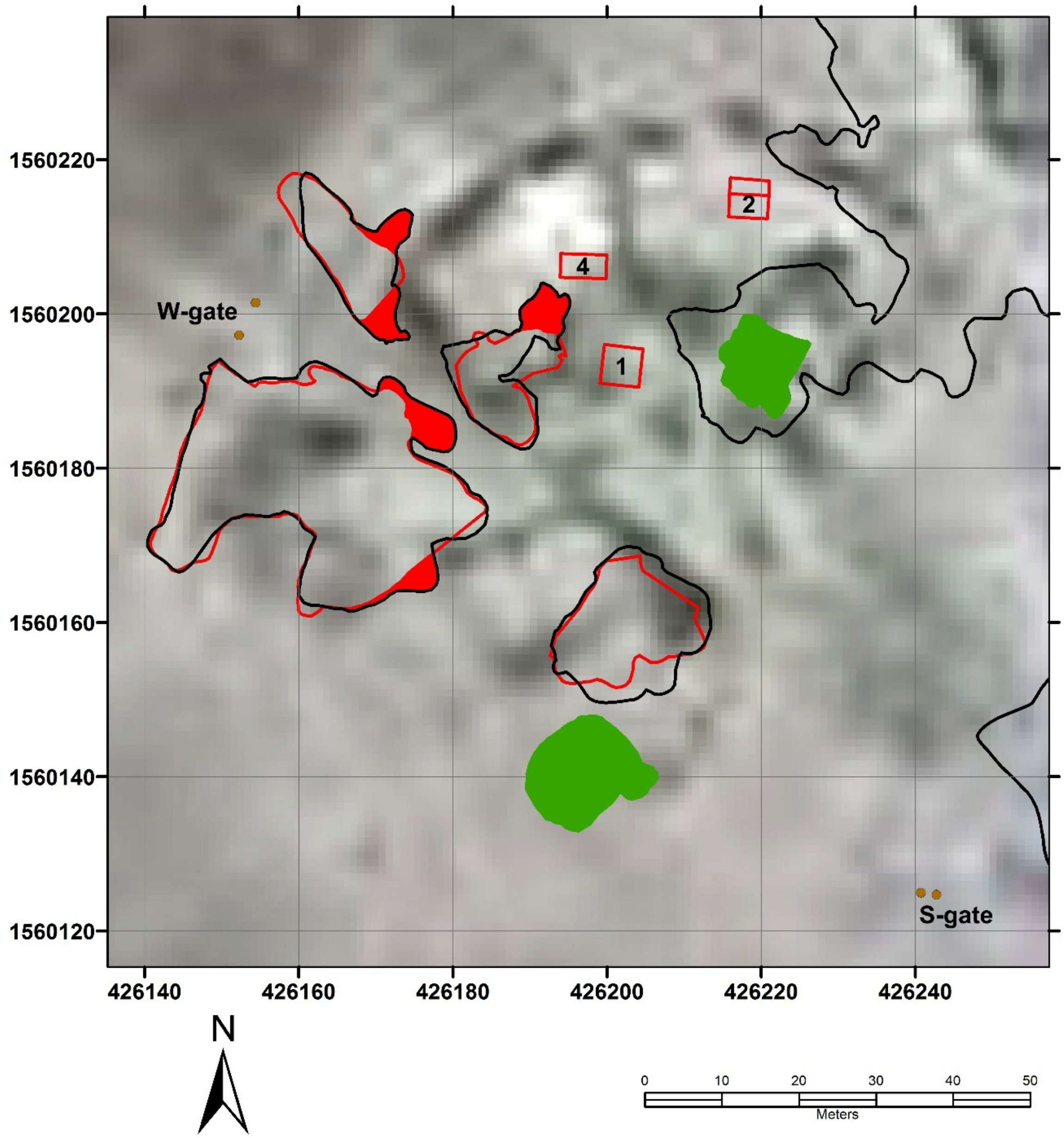


UCLA Archaeological Project in Shire (northern Ethiopia)

Mai Adrahsha - Overview (December 2016)
Coordinates projected onto Zone 37P (N) of the WGS84 geode

One of the gates in the protective fence just after its construction (Spring 2004).

One of several newly established (Fall 2016) vegetable gardens within the ancient site.



UCLA Archaeological Project in Shire (northern Ethiopia)

Mai Adrahsha - Recent damage to the ancient remains
solid red : recent excavations
solid green : newly established vegetable gardens
Coordinates projected onto Zone 37P (N) of the WGS84 geode

The damage inflicted between January 2016 and November 2016 is marked in solid red and green.

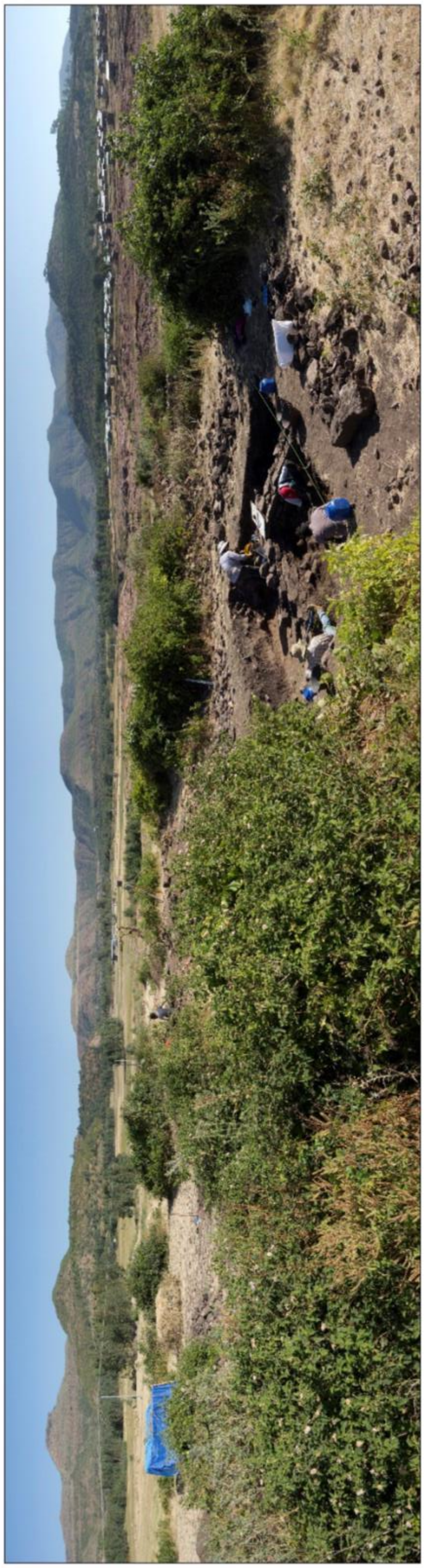
A brief walking survey was carried out to investigate the direct environs of the ancient site. Just south of the site is the modern village Maishum, partly constructed from stones taken from ancient buildings. West and north of the site several wells were recorded, both modern and of more ancient date. Otherwise very limited remains were observed in the fields in vicinity of the site, partly because of the plant cover. Many more artifacts were seen across the river, in modern Mai Adrasha. Even more were present in the river valley, where they must have washed down from the site or sites further upstream.

The regional survey data kindly provided by the Cambridge team that worked in the area previously—which was originally likely projected onto the Clarke 1880 (modified) spheroid (Adindan)—was converted to UTM coordinated, projected onto the WGS84 geode, and visualized in the project's GIS. The positions of the churches in the dataset are concurrent with the topographic map of the area. Unfortunately, the archaeological data is more difficult to interpret, with several instances of duplicate coordinates for different sites, as well as different coordinates for the same site. Many sites are furthermore to the northwest and outside the project's concessions area. In the near future an intensive surface survey of this concession area should be carried out.

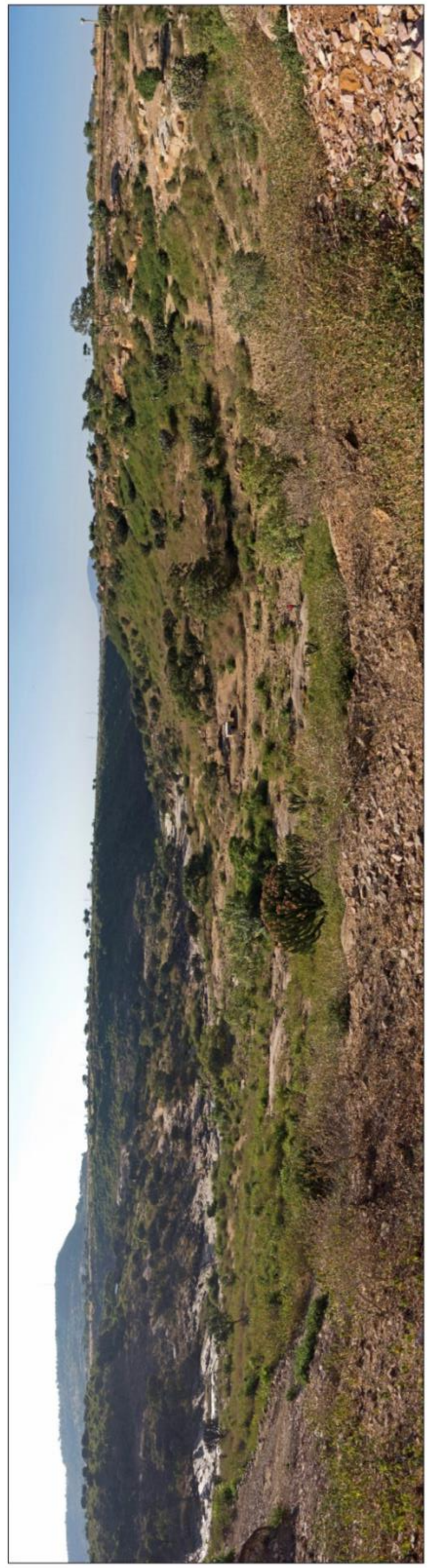
The village and site of Mezaber Adimenabr—about 12 km. (7.5miles) southeast of Mai Adrasha— was briefly visited to monitor for additional damage done to the ancient remains. The site was found unchanged compared to our previous visit in December 2015, when a large undocumented excavation had taken place in the center of the settlement. This had revealed substantial walls and numerous potsherds, indicating the presence of important ancient remains. During our visit in 2016, a large stone slab was pointed out by one of the inhabitants of the village. This artifact was duly located and photographed.

Mai Adrasha seen from the North, December 2016

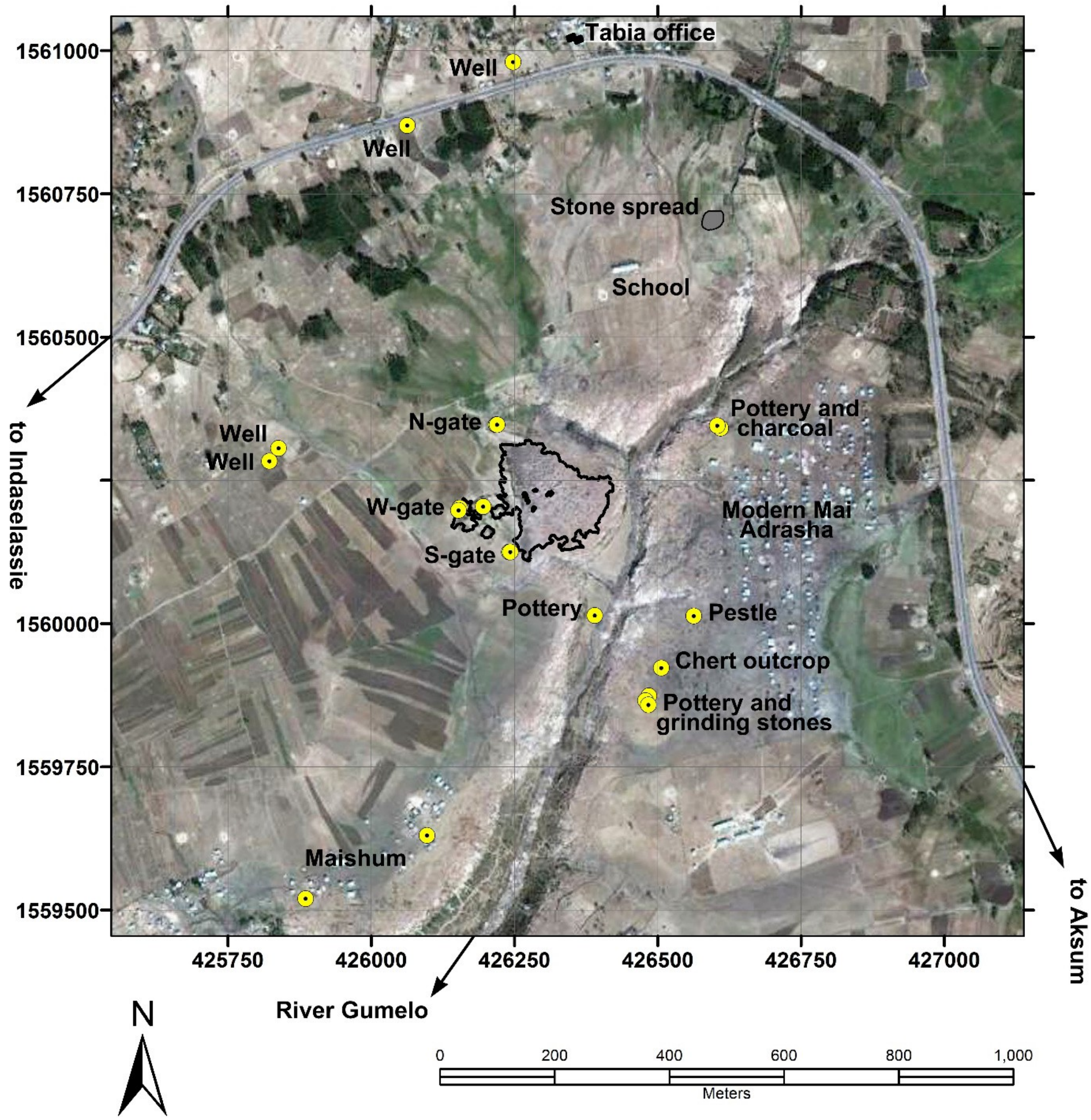
Mai Adrasha seen from the South, December 2016



Mai Adrasha, area under excavation, December 2016



The landscape just South of Mai Adrasha, December 2016



UCLA Archaeological Project in Shire (northern Ethiopia)

Mai Adrahsha - Environs
Coordinates projected onto Zone 37P (N) of the WGS84 geode

Maishum, just South of ancient Mai Adrasha (December 2016).

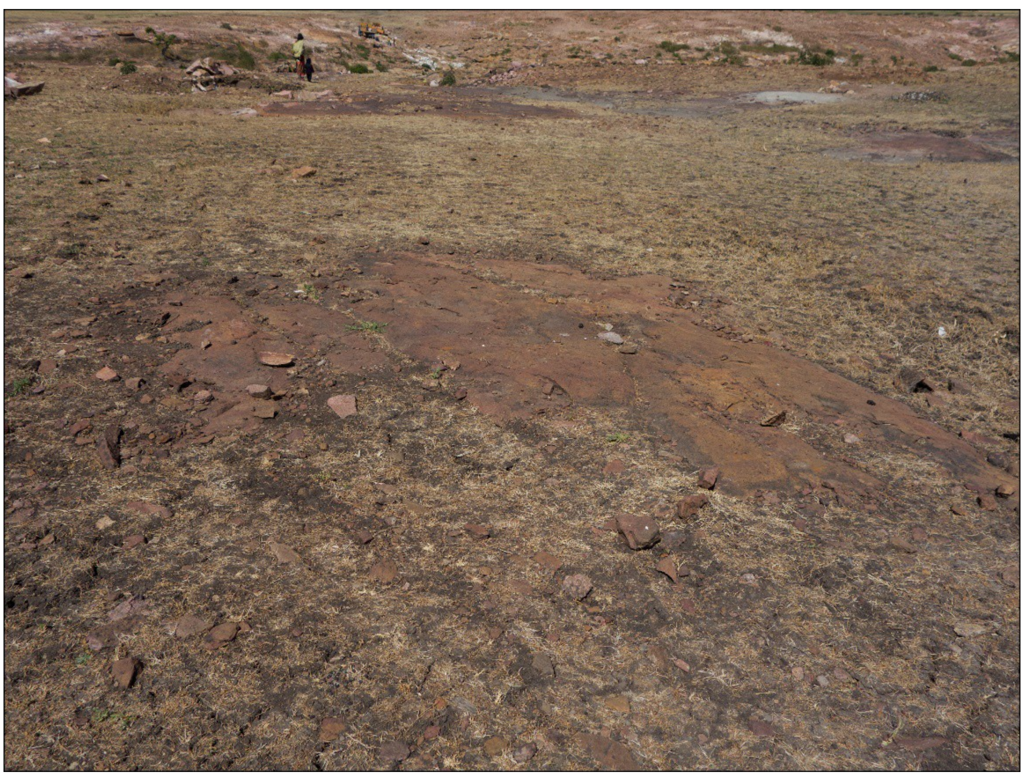
Maishum, just South of ancient Mai Adrasha (December 2016).

Well just West of Mai Adrasha; 425838 E / 1560306 N

Well just North of Mai Adrasha; 426063 E / 1560869 N

Large stone slab at Mezaber Adimenabr; 435891 E / 1553270 N

Charcoal layer near modern Mai Adrasha (426604 E / 1560345 N).



Chert outcrop near modern Mai Adrasha (426506 E / 1559922 N).

Grinding stones found near modern Mai Adrasha (426483 E / 1559858 N).

Potsherd found between modern and ancient Mai Adrasha (426389 E / 1560013 N).

Mezaber Adimenabr, seen from the North (December 2016)

Undocumented excavation in the center of Mezaber Adimenabr;
435852 E / 1553293 N (December 2016)

Undocumented excavation in the center of Mezaber Adimenabr;
435852 E / 1553293 N (December 2016)

5 Archaeobotany
Degsew Zerihun

5.1 Introduction

Soil samples for the archaeobotanical analysis were taken from every unit of the three trenches excavated in 2016. The process of archaeobotanical flotation, the collection of modern comparative plant sample and the sorting of the 2015 heavy fraction results are presented in this report.

5.2Method

Soil samples were systematically taken in 5-liter buckets from each unit. Every sample was given a unique finds number and any necessary information , such as the location within the unit, possible contamination, were noted on the tag. All trench supervisors were instructed to collect the entire unsieved unit as soil sample when hearths or other important archaeological deposits relevant to the archaeobotanical analysis were encountered.

The collected soil samples were taken to the dig house and registered by the registrar before being given to the archaeobotanist. The samples wore weighed and recorded, after which they were floated by using a manual flotation machine (Fig A).

Figure A. The flotation machine (Photo by Degsew Zerihun)

The Light fraction is the one which will help us to identify charred seeds and any micro and macro botanical samples. In order to capture the light fraction fine-meshed white and smooth local scarves were utilized. The light fraction will be studied in the Laboratory at the Authority of Research and Conservation of Cultural Heritage (ARCCH), Addis Ababa.

The importance of the heavy fraction is to identify artifacts, such as lithics, pot sherds, beads, slag etc. collected with the soil samples. After the light fraction was collected the remaining soils were collected in mosquito netting and will be sorted in 2017.

Because of the sunny and windy weather in Shire drying the light fraction took one day, while the heavy fraction was dry and ready for storage in one to two days, depending on the size.

Between December 3-17, 82 soil samples were processed to identify light and heavy fraction: 46 from trench 01; 22 from trench 02 and 14 from trench 04.

5.3 Sorting and identification heavy fraction from 2015 Field season

The heavy fractions processed last year were sorted in this field season. Accordingly, 60 heavy fractions were sorted and identified. 12 heavy fractions from trench 01 were sorted. Artifacts includes pot sherds both diagnostic and undiagnostic, lithic, obsidian, bone fragments, and fragmented metal slags were identified. From trench 02 about 35 samples were sorted and a number of metal slags, bone fragments, pot sherds, lithic, and one unidentified artifact were sorted. About 13 heavy fractions were processed from trench 03 and the same kind of materials were identified as in trench 01 and 02.

5.4 Comparative modern plant sample

Comparative modern plant samples were taken around the newly opened trench 04. This will help us to easily identify the seeds of plants from the archaeobotanical samples. Furthermore, before opening trench 04 while removing the bushes growing between the agricultural fields, we documented the existing flora of the area. The plants were systematically collected and pressed. About 5 modern plant samples were collected and the identification will be done in Addis Ababa with possible help from the herbarium collection of Adds Ababa University natural science faculty.

5.5 Conclusion and recommendation

Generally, the UCLA Shire Archaeological 2016 field season was a successful year. In trench 01, we were able to identify barley (*Hordeum vulgare)*. This analysis will be presented in more detailed way in the main report. Furthermore, the finding of seeds, which may be charred coffee beans from trench 04 looks promising. So far, the oldest coffee bean was discovered in Yemen in the 15th century. Therefore, the dating and further determination of these seeds are of great importance.

6. Community Outreach

Because of ongoing damage to the site the team decided to focus this year on community outreach in Mai Adrasha and Indaselassie. This effort was led by Willeke Wendrich and Gidey Gebreezhiaber and consisted of discussions with the Mai Adrasha Tabia, the Woreda and Zone officials, as well as visits to two primary schools near the Mai Adrasha. Subsequently the children visited the excavation and were led by their teachers in a pledge of support to safeguard the cultural heritage of Mai Adrasha. The presentation to the community started with showing the site the way everybody knows it: a wasteland of stones, with at the edges people panning for gold. Then we show what the site could have looked like (e.g. like the "palace of the Queen of Sheba" in Axum). We have found evidence for extensive buildings with substantial walls, so this is not farfetched. Then we show how much of the site is already destroyed. The reactions range from shock to fervent support and we hope to continue this work next year.

Visit of pupils and teachers of the Mai Adrasha Primary School.

Meeting of teachers at the Indaselassie Woreda.

At a meeting of the teachers on the Woreda, the project presented a small gift to support the schools, an effort that will be stepped up in preparation of the 2017 field season.

7. Recommendations for Future Work

Trench 01 shows excellent potential to explore multiple phases of use and construction. The various types of walls, some bonded, some larger or smaller, and some potentially later, may shed light on practices of reuse and/or modification of architectural space over time. Continued excavation in this trench will reveal the relationship of the walls to each other, and to the spaces bounded by these walls. The concentrations of charcoal and pottery in the trench suggest that the areas bounded by the walls were used extensively. Future excavations might gain the most knowledge by extending the trench to the north, to explore the relationship with Trench 04, which seems similar in date. The north side of the trench has yielded the most charcoal, the most architecture, and the most pottery, and thus it seems that expansion to the north would prove the most fruitful. Working with a metal specialist has become imperative, considering the many traces of metal production at the site.

Trench 02 has the largest chronological depth and undisturbed deposits of substantial buildings with ample evidence for the use of the spaces and excellent material to improve the ceramic chronology. The stone platform found in 2016 can be explored towards the North to reveal where it sits in the larger architectural setting, before we decide to excavate the deeper levels underneath the platform.

Trench 04 likely has yielded important information and should probably be expanded to the North to get better insight in the structure of which three walls have been identified. Expansion to the East would help identify the context of the seeds, which possibly are a very early form of coffee beans, found in between stone tumble layers.

The UCLA Shire Archaeological Project

Mai Adrasha and Exploratory Survey Field Report 2017

Willeke Wendrich, Rachel Moy UCLA

Contributors: Hans Barnard, Dil Singh Basanti, Matthew Curtis, Richard Ehrich, Jordan Galczinsky, Gidey Gebreegziabher, Annelou van Gijn, Gabriella Giovannone, Anneke Janzen, Joseph Lehner, Katie Simon, Christine Markussen, Robyn Price, Katie Simon, Reuven Sinenski, Scott Sunnell, Goitom Weldehaweriat, Deidre Whitmore, Degsew Zerihun, Kifle Zerue

Contents:

1. Introduction
Willeke Wendrich, Rachel Moy

The third season of the UCLA Shire Archaeological Project took place from November 3 to December 19, 2017 in a 100 square kilometer area near the town of Shire/Inda Selassie.

Our team included:
Willeke Wendrich, director, ethno-archaeology, Community outreach
Rachel Moy, director, ceramicist

Gidey Gebreegziabher, TCTB regional representative
Degsew Zerihun, ARCCH federal representative and archaeobotanist
Hans Barnard, surveyor
Matthew Curtis, survey Kifle Zerue, survey
Katie Simon, SPARC geophysicist Christine Markussen, SPARC geophysicist Richard Ehrich, trench 1 supervisor
Dil Singh Basanti, trench 2 supervisor Robyn Price, trench 3 supervisor
Scott Sunell, trench 5 and 7 supervisor Reuven Sinensky, trench 6 supervisor Negasi Awetehey, archaeologist
Vera Rondano, archaeologist Guish Assefa, archaeologist Negasi Awetehey, archaeologists
Goitom Weldehaweriat, ethno-archaeologist and community outreach Deidre Whitmore, registrar, digital archivist
Annelou van Gijn, lithics and ground stone specialist and ethno-archaeologist Jordan Galczynski, archaeologist and ethno-archaeologist
Anne Austin, ethno-archaeologist Gabriella Giovannone, ceramicist Anneke Janzen, zooarchaeologist Joseph Lehner, metallurgist
Jeff Newman, archaeologist, photographer Cori Hoover, IFR field school student Kristin Gates, IFR field school student
Marianne Tamas-Demauras, IFR field school student Fire Tafere, Axum University student
Sintayehu Desta, Axum University student Habtamu Guta, Axum University student Alamru Gebru, excavator
Haddas Tafere, excavator
Haile MaryamTareke, excavator Letai Wallu, excavator
Kewanit Gebrehiwot, excavator Gebremedihin Mekonen, excavator Amaresh Negash, excavator
Ablulum Hagos, excavator
Tabere Imbaie, excavator Letorhan Tafere, excavator Lilty Hargu, excavator

The objectives of our fieldwork in 2017 were five-fold:

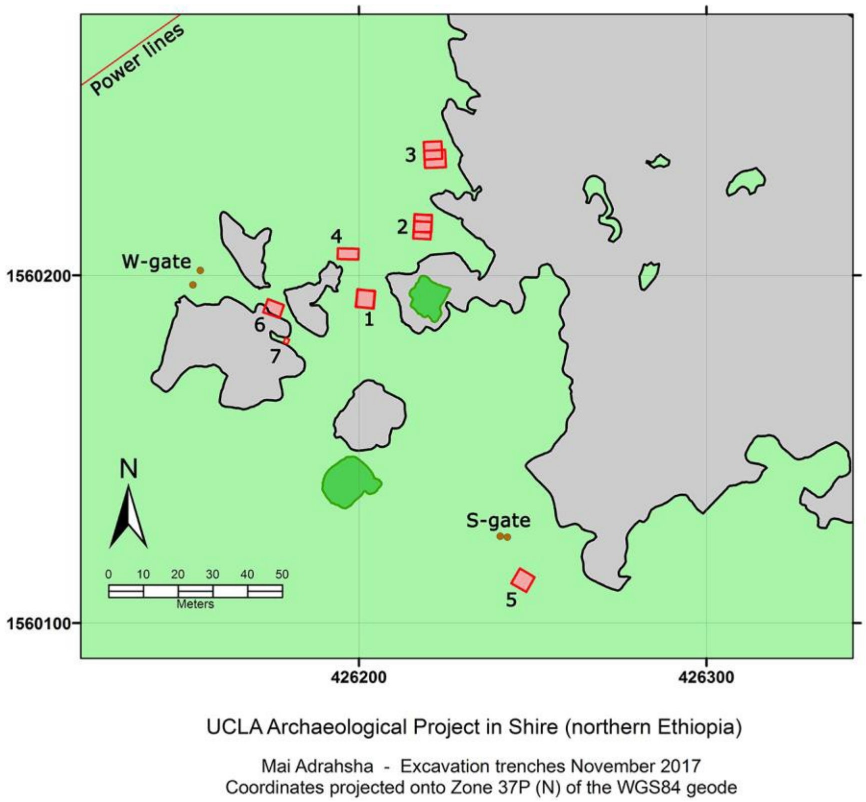
1) Continue excavations in the less-disturbed western portion of Mai Adrasha, to address our main research foci:
   a. Determining the depth of deposit and the time depth of the archaeological remains at Mai Adrasha
   b. Refining the ceramic and stratigraphic sequence through targeted dating of selected contexts
   c. Study the nature of agriculture and industries at Mai Adrasha
2) Determine the extent of the preserved part of Mai Adrasha
3) Conduct a survey of the entire research area
4) Prepare next year's ethno- and experimental archaeological research projects
5) Engage in community outreach to help protect the region's cultural heritage

We are extremely pleased with the results of our third season in Shire. Though much of the site of Mai Adrasha is destroyed, there were no further illegal excavations, partly because of increased awareness among the people living around the site, but also because the project contributed to the establishment of a permanent guard on the site.

The trenches continue to produce a wealth of archaeological information. This season, we continued excavations in three trenches and opened two more. A survey was conducted by Matthew Curtis and Kifle Zerue in preparation of a systematic random collection survey next year. We plan to continue both excavation and survey in November 2018, when we will continue excavation in five of the existing trenches and perhaps open additional ones. A limiting factor is the attitude of in particular one of the land owners, whose obstructive attitude indirectly influences the selection of the excavation areas. This year's magnetic survey did not result in a clarification of extant architecture and other ancient remains, such as metal working loci. We hope to continue geophysical exploration of the site with one or several other methods, such as resistivity survey or ground penetrating radar. In addition, we plan to start our ethnoarchaeological work, which is related both to the excavations and community outreach.

2. Excavation Willeke Wendrich

In 2017 work continued in three trenches (MA01, MA02 and MA03), each in an agricultural field of Mai Adrasha. Last year's opened trench (MA04), which was focused on the exploration of a high overgrown ridge between fields, was not continued because the land owner delayed the teff harvest in the adjacent field and we were forced to start work in two other areas instead in order not to lose valuable time in our all-too-short field season. The magnetometric survey showed only one unexpected anomaly in an outlying field near the river. Trench MA05 was located in this area to ground truth the results of the geophysical survey, but did not result in a clear explanation of the anomaly. Trench MA06 ran parallel to a wall that was exposed by illegal excavation in early 2016. The exposed area seemed to be the outside of the wall, which was undercut and displayed a large underlying ashy trash deposit. Samples of charcoal and other materials have been collected for dating the building of this wall. The trench thus caught the inside of the space outlined by this wall. Finally, at the edge of the same destroyed area a 1x1m trench was excavated in an area that did not seem to have extant architecture. This trench provided a full profile of outside activities over a long time span.



2.1 Trench MA 01
Richard Ehrich (supervisor), JeffreyNewman, Kristin Gates, Haddas Tafere, Lilty Hargu, Amaresh Nagash

Dates of work:
Removal of backfill: 08 Nov – 13 Nov, Initial Documentation: 14 Nov – 15 Nov, Excavation: 16 Nov – 12 Dec, Final Documentation: 13 Dec – 16 Dec
Trench coordinates (5x5 m):

Trench 1 datum	37P	426207.91	1560193.66	**1914.99**
Trench 1 NE	37P	426204.70	1560195.44	1914.80
Trench 1 NW	37P	426199.65	1560195.98	1914.85
Trench 1 SE	37P	426204.25	1560190.47	1914.74
Trench 1 SW	37P	426199.18	1560190.93	1914.75

2.1.1. Purpose of Excavation

The location of Trench 01 was chosen in 2015 in order to assess the extent of preserved architectural remains at the site, since there are areas of severe destruction close nearby. The large walls that were uncovered proved this to be a significant location for studying Pre-Aksumite architecture. In 2016, sizable amounts of metallurgical remains in the form of slag and crucible fragments were uncovered as well, adding a new dimension to this trench as an important source of information on metal production.

The five walls that are currently visible in Trench 01 divide it into three distinct areas: A large South Area, a smaller North Area, and a small Southeast Area. Although an attempt was made in 2016 to elucidate the structural and chronological relationship between the walls, it is our opinion this season that no reliable statements in that regard can be made by looking at them from the outside without actually dismantling them. Taking down at least parts of the walls will certainly become a future task, not the least for reasons of safety, since some of them are leaning precariously. At the latest when the bottom of the walls is reached can their dismantling begin and their relationships be known for certain. We did not take down any parts of any walls this season, however. Instead, our aim was to facilitate a comparison between the three areas by taking them down to a similar level and excavating them in parallel. By comparing their respective sedimentation, we were hoping to possibly distinguish between inside and outside areas of the building.

In addition, through finds and samples, the trench would continue to provide information on metal production, ceramic sequences, floral and faunal remains, use of lithic tools, and absolute dates for the occupation of ancient Mai Adrasha.

2.1.2 Phases of Construction, Occupation, Destruction, and Deposition in Trench 01

Phase	Description	Units	Notes
Phase I	Construction of walls.	0003, 0004, 0019, 0081, 0082	Bonded walls (0003, and 0082) are from the same construction. Wall (0019) leans on wall (0081) and may be from a different phase.
Phase II	Application of mud plaster to walls 0019 and 0082	0326	All walls could potentially have been covered in plaster, but it was preserved in this corner specifically, because burning debris during the southern fire destruction event caused it to be burned as well.
Phase III	Position of vessels 0470	0470	One or more vessels were placed in the southern area, including an incense burner. This could have been part of the use of that area. It probably occurred shortly before the fire event.
Phase IV	Destruction through fire, possible collapse of wood-frame-and-daub roof	0324, 0325, 0328, 0329, 0471	The assumption for now is that both fires in the north and south areas happened at the same time, since the debris layers are at a similar elevation. This might prove to be untrue. The units indicated here are stone tumbles created by the collapse caused by the fires and one tumble unit of burnt daub: 0329. The charcoal clusters recovered from 0310 and 0287 should be counted into this phase as well.

Phase V	Cavities left by the collapse get filled in and debris degrades to mix with sediment	0287, 0295, 0310, 0312, 0317, 0320, 0321, 0322, 0327, 0472, 0473	The abrasion of the burnt daub and the filling in of sediment created the red sandy clay layers covering both the north (0287) and south (0310) areas. Unit 0321 may turn out to date earlier than this phase upon further excavation.
Phase VI	Additional collapse of walls	0208, 0323	The assumption that the collapse events in the south and the southeast area are contemporaneous is of course unproven and has to stand until further evidence can be uncovered.
Phase VII	Deposition of fill	0200, 0283, 0284, 0285, 0294, 0311, 0313, 0315, 0316, 0318, 0319	These fill layers are frequently dark, implying decayed organic content, and rich in artifacts. At this point the ruined building was likely used as a refuse dump.
Phase VIII	Deposition of soil and fill.	0275, 0276, 0278, 0279, 0296	Fill layers with varying sediment colors defined in the 2016 season. Could be part of the previous phase defined in the 2017 season.
Phase IX	Use of area for activities including deposition of vessels	0191, 0192, 0194, 0195, 0196, 0218, 0290, 0291, 0292, 0293	Units included complete or near complete vessels sitting at or near the edges of the section. Reasons for why the complete vessels were just left here are unknown. There is a possibility they were already broken and just dumped here along with the other trash.
Phase X	Additional deposition of fill	0190, 0209, 0273, 0274, 0280, 0286	Increased lithics and artifacts.
Phase XI	Additional deposition of fill and tumble	0135, 0136, 0148, 0193, 0195, 0202, 0203, 0205, 0206, 0207, 0272	Multiple layers of sediment and tumble may have all been contemporaneous or happened over a long period of time.

Phase XII	Construction of wall 0020	0020	Wall 0020 built in NE corner of trench.
Phase XIII	Collapse of wall 0020	0143	Due to supervisor error (2016) tumble and clay layer were not split units. The clay inclusions happened before construction of the wall and continued after construction of the wall in the Southern part where wall 0020 abuts wall 0004. (Note from 2017 supervisor: Unable to determine nature of clay inclusions from photographs. Could they be additional evidence of wall plaster or burnt daub?)
Phase XIV	Collapse of walls and deposition of tumble.	0131, 0132, 0133	Boulder and stone tumble appear to be from walls (0019) and other architecture that was within the South section of the trench.
Phase XV	Digging of pit 0474	0474	Original function as a pit is unknown, but it appears to have ended up as a refuse pit.
Phase XVI	Fill of pit 0474	0107, 0314	Fill 0107 contains a lot of metallurgical remains and has a red color and sandy clay texture indicative of burn debris. This fill could indicate refuse from metallurgical activity nearby that was swept into this pit.
Phase XVII	Deposition of sediment and tumble and destruction of walls.	0130, 0139, 0140, 0141, 0142	Destruction of wall (0082).
Phase XVIII	Deposition of complete vessel	0146, 0147	Pot sitting on lower courses of wall 0082 and pot fill.

Phase XIX	Collapse of walls. Deposition of sediment and tumble.	0138, 0144, 0145	Tumble layers over second course of wall (0082).
Phase XX	Deposition of soil	0012, 0013, 0014, 0016, 0018, 0083, 0084, 0277, 0282	Continued collapse of walls (0003 and 0004).
Phase XXI	Destruction of stone walls	0008, 0010, 0011, 0015, 0006, 0007, 0149, 0201	Continued Destruction of Stone walls (0003 and 0004). Tumble (0149) from wall (0081).
Phase XXII	Deposition of stones and soil.	0005, 0017, 0083	Unit (0017) was not a wall and is tumble associated with this phase.
Phase XXIII	Deposition of Topsoil	0001, 0002	This layer of soil has likely been plowed more than once and may be heavily disturbed from its original context. The division between 0001 and 0002 was arbitrary.

Trench MA 01 in process of excavation, looking East.

2.1.3. Discussion of Findings

As noted above, not a lot of new information about the construction of the walls [0003], [0004], [0019], [0081], and [0082] (= Cluster 1: Walls) could be obtained this season. Some new courses were exposed and documented, but no clear bottom has been found (with the possible exception of wall [0081], see “Recommendations for Future Work” below). It therefore remains unclear, if all walls were constructed simultaneously or if **Phase I** would have to be split up.

We managed to find possible evidence of wall plaster, however (**Phase II**). The plaster layer [0326] is located in the corner of wall [0019] and wall [0082] and it is very small in its preserved extent. We were doubtful at first if it is a plaster layer at all, since it was found right next to a cluster of burnt daub. It turned out not to be part of that cluster, however, but burnt mud stuck against the wall. Our current hypothesis is that the mud plaster was preserved in this place specifically by accident during the burn event (see **Phase IV**), namely burning debris landing right next to it and heating it up, hardening it in the process. We cannot say at this point if all wall surfaces were originally covered by plaster and almost all of it eroded with the exception of plaster layer [0326]. Perhaps more preserved layers will be uncovered under the burn horizon.

Trapped underneath the burnt debris from **Phase IV** in the South Area, we discovered sherds of one or more complete vessels [0470]. Their deposition in that spot would be **Phase III**, which presumably immediately preceded the burn event of **Phase IV**, since it appears that they were crushed by falling debris. Further analysis of the ceramic forms is still under way, but we know that the vessels include an incense burner. These vessels may have been part of the original inventory of the room that burned down.

As frequently alluded to above, the major discovery in Trench 01 this season was the existence of burn horizons in both the South and the North Areas of the trench, representing **Phase IV**. In both areas, we could see small deposits of reddish sandy clay from the beginning of the season, but upon further excavation these turned out to cover almost the whole respective areas of the trench. Especially in the South Area, a tumble of large pieces of burnt clay and a multitude of charcoal accumulations support our suspicion that these layers were created by structural elements having been subjected to a considerable fire and subsequently collapsed into the trench. More specifically, the tumble of burnt clay [0329] as well as various stone tumbles [0324], [0325], [0328] form the architectural debris immediately caused by the destruction in the South Area (**Phase IV**), while the layer of red sediment represented by units [0310], [0312], [0317], [0322], and [0473] is the result of the abrasion of the burnt clay debris mixed with blown in sediments and degraded charcoal (**Phase V**). All of these units together ([0310], [0312], [0317], [0322], [0324], [0325], [0328], [0329], and [0473]) form Cluster 2: The Southern Burn Horizon. The North Area, on the other hand, has only yielded small pieces of burnt clay and a few charcoal accumulations. One stone tumble [0471] is probably related to the collapse event (**Phase IV**), while there are multiple layers of red fill [0287], [0295], [0320], [0472] that could partly be filling in cavities left by the collapse (**Phase V)**. Together, these units ([0287], [0295], [0320], [0471], [0472]) form Cluster 3: The Northern Burn Horizon. Since the Southern and the Northern Burn Horizon are at a comparable elevation, our assumption is that the burn events in both areas happened at the same time. This is not proven stratigraphically, however. The burnt clay pieces in the Southern Burn Horizon could be safely identified as burnt daub thanks to their hard but porous consistency, indicating a mixture of mud and straw, and imprints of wooden beams. A few of the charcoal samples yielded preserved pieces of beams which are large enough to be identified by an expert. We can conceive of two possibilities for wood-frame-and-daub structures that this might indicate: 1) Only the lower courses of the walls were made of stone, while the upper parts consisted of wood-frame-and-daub. 2) The wood-frame- and-daub structure formed a roof that collapsed into the trench. At this point, we favor the second hypothesis, since there is no indication of how a wood frame superstructure would be attached on top of the walls. In addition, the even distribution of debris through the room could support the collapsed roof hypothesis. If this was indeed a flat roof plastered in daub, this could give another hint towards the question of how the rooms were accessed: Since no doorways have been detected yet (in Trench 01, but compare Trench 06), perhaps the rooms were entered through a hatch in the roof. The two Burn Horizons yielded a multitude of artifacts, including a bead possibly made of glass and the head of a ceramic serpentine figurine in the South Area. We took a large volume of soil samples for flotation. Layers [0321] and [0327] in the South Area might be part of this post-collapse fill or they might be earlier. We have not fully excavated them yet, so their role will have to be determined next season.

On top of the Southern Burn Horizon was a stone tumble that had already been detected last season (but not named) [0323]. This likely represents a later collapse event of the already weakened walls (**Phase**

VI). In addition, there is a large tumble in the Southeast Area which also had been identified last season [0208]. At the moment, it is unclear from a stratigraphic point of view if this collapse should be included in **Phase VI** as well, but since it is on a similar level, we are making the arbitrary assumption that it is.

The Southeast Area shows no traces of burning so far, aside from little bits of charcoal that probably got swept there with other refuse. The layers [0200], [0311], [0313] that filled in the gaps of tumble [0208] in **Phase VII** are dark, rather loose, and rich in artifacts. They probably represent refuse thrown in the hollow spaces of the by now ruined house. A comparable situation presents itself in the South Area with fill layers [0283], [0284], and [0285] and in the North Area with a large fill layer represented by units [0294], [0315], and [0319]. In addition, the North Area features some transitional layers, namely the very compact layer [0316], that might have been created by moisture collecting alongside wall [0082], and layer [0318] that might have been created by the further degradation of the burn horizon [0287] and mixing with blown-in or thrown-in deposits.

Phases VIII and after correspond to the observations made in previous seasons. There is one exception: We declared layer [0107], which had been excavated in the 2016 season, as fill of a pit [0474] together with layer [0314]. Together, these units ([0107], [0314], and [0474]) form Cluster 4: The Metallurgical Refuse Pit. As the name implies, the fill of the pit [0107] contained numerous metallurgical remains, specifically slags and fragments of crucibles. In addition, the color and consistency of fill [0107] really resembles that of the Burn Horizons, implying the presence of a large amount of burnt clay. The difference, we assume, is that this very localized deposition [0107], for which no burnt architectural remains were recorded, does not represent a destructive fire event, but the use of fire in metallurgy. Unlike the interpretation from last season, I do not believe the very deep deposit [0107] among the tumbled ruins of the building to be a primary location of metal production, but rather the refuse created by metal production nearby that was swept into a pit ([0474]). This changes the chronological position of [0107] in relation to adjacent units. I believe **Phases XV** and **XVI** to represent the digging and filling in of the pit respectively, but these events could just as well have happened before the stratigraphically unrelated construction and collapse of wall [0020] in the North Area (**Phases XII** and **XIII**).

Trench MA01 at the end of the 2017 excavation looking east.

2.1.4. Recommendations for Future Work

The most important practical question, that will have to be addressed next season before excavations can start, is how to get safely in and out of a trench that is getting deeper and deeper. This season, we have been using the walls and stools, but with a little more depth, this will not be an option any more. Stepladders should be acquired, at best more than one, so that work can continue in parallel in multiple areas.

There will be no need to expand the trench, as sufficient information should be contained in the three areas currently exposed. Excavations should continue to aim for keeping a comparable level in all three areas. In the South and North Areas, only small tools should be used, no large pickaxes, to keep any burnt architectural remains as intact as possible. The large-scale sampling of soil for flotation is advisable from the burn horizons and any layers underneath that are sealed by them. Accumulations of charcoal and clusters of burnt clay should be numbered and their locations noted on the top plans in accordance with our practice this season. If the destruction layers turn out to be covering intact room inventories, a system should be set up to record the exact location of artifacts or installations that might be in situ.

For the safety of those working the Southeast Area, the top few courses of wall [0003] should be taken down. For this purpose, every stone should be numbered on annotated pictures and marked with that number (perhaps through the use of flagging tape), in order to make a reconstruction theoretically possible. Actually, rebuilding the wall after the binding material has been removed might prove to be difficult, however, so a solution should be sought before the dismantling begins. The removal of these stones might prove to be a chance, on the other hand, to study the structural relationship between walls [0003], [0004], and [0082].

We were unable this season to detect the lower courses of wall [0081]. Either it terminated at an elevation above our current level of excavation or the lower courses are still hidden behind the sediment covering the wall. However, [0081] is leaning towards the east, so that any further scraping of the lower east face might be dangerous. Therefore, taking down this wall in a controlled fashion as well could be the right course of action.

In order to account for disparities between the elevations of benchmarks of different seasons, we took elevations at fixed points on top of the walls that should be easy to find again (see Notebook p. 47 and annotated photographs). By determining the difference between the measurements of these points in 2017 and 2018, the elevations of this season can be calibrated to fit the grid of next season.

Prepared by Richard Ehrich and Jeffrey Newman

2.2 Trench MA 02

Dil Singh Barsanti, Cori Hoover, Kewanit Gebrehiwot, Haile Myriam Tareke, Letai Wallu .

Trench 2 datum	37P	426227.46	1560216.56	**1914.79**
Trench 2 NE	37P	426220.94	1560215.33	1913.99
Trench 2 NW	37P	426215.97	1560215.67	1914.20
Trench 2 SE	37P	426220.60	1560210.37	1914.21
Trench 2 SW	37P	426215.63	1560210.67	1914.37

2.2.1 Preliminary Information:

Trench 02 (MA 02) is one of three trenches excavated at Mai Adrasha as part of the UCLA Shire Archaeological Project 2016 field season. MA 02 was originally placed and excavated in the 2015 field season and was reopened on 09-Nov-2017. MA 02 was originally a 5 x 5M trench but was bisected E-W so that only the southern 5 x 3M was excavated in the previous season two seasons. This year, the trench was expanded 2M to the south, creating a 2x5M section where excavations took place. This extension was created to better understand room function of the platform ([0214]0 area uncovered last year. MA 02 was primarily excavated by Kewanit GebreHaywot and Haile Maryam Tarakhe from nearby Mai Adrasha village. They were assisted by Dil Singh Basanti and Cori Hoover. Haile Maryam's wife, Latey Wallu, also assisted multiple days. Dil Singh Basanti supervised and recorded the operations. The field season lasted 4-5 weeks and excavations were completed on 16-Dec-2016. The trench was backfilled the following Monday.

2.2.2 Excavation Purpose:

MA 02 was originally placed to assess the integrity and archaeological viability of Mai Adrasha. In the previous season, the trench was excavated to investigated early 1200 BC radiocarbons dates recovered in the 2015 season. Dates consistently in the 7-9th century BC range were pulled from underneath layers of pottery on top of platform [0214]. Excavations in 2017 were intended to uncover more of the cultural horizon to understand the use and history of the platform ([0214]) and wall features ([0114], [0091]). An expansion south was deemed most prudent as this would help uncover more of the extent of wall [0091] and the unusual paving stones [0222] found in 2016 and because additional ceramic layers were thought to extend this way. This southern expansion was excavated to the basal layers of the occupation phase encompassing platform [0214] and the wall features. Excavation met many of the research goals outlined in the investigation.

2.2.3. Stratigraphic Relations:

Correlating the stratigraphy recorded this year with that of the 2016 season was only minimally evaluated, primarily once occupation layers defined by ceramic deposition were uncovered. The following relations therefore reflect the stratigraphy as recorded in the 2017 season alone:

Phase	Units	Interpretation
Phase VIII - Abandonment 4	0250, 0251, 0260, 0262, 0263, 0264	Final abandonment of site, which entails deposition over all rooms likely in gradual sub-phases as indicated by separation of lots by rodent activity.
Phase VII – Remodeling or Possible Construction Phase 3	0256	An alignment of stones was placed, though it is unknown what function purpose this served in relation to the other architectural features. Wall 0258 and 0257 would still have been visible at this time.
Phase VI - Abandonment 3	0252, 0253, 0254, 0255, 0259, 0269, 0265, 0391, 0266, 0390, 0267, 0395, 0268, 0393, 0392, 0400, 0401, 0396	Lengthy period of abandonment, with depositions happening in multiple stages. Multiple stages of wall collapse, likely from wall 0258,

		punctuate graduate stages of soil deposition. Trash build up occurs on the W side of the trench, suggesting continued use of space nearby. Ceramic layers from the preceding use phase are crushed at this time. Tumble also falls from unseen sources to the W and E, suggesting more architectural features nearby. Animal activity is high, suggesting the presence of organics and softer/looser soils.
Phase V - Use of the Site	0397, 0402	Use of the site as determined by the placement of ceramic vessels on deposits roughly equivalent to platform 0214 uncovered in 2016. This phase is restricted to the “courtyard area of the structure. It is possible that 0397 does not belong to this phase given its location on tumble layers. It is also likely that 0404 belongs to this layer as an area of intentional deposits up to the surface of the platform, and where vessel 1 may have been buried up to its mouth.

Phase IV - Abandonment 2	0394, 0403, 0404, 0407, 0408, 0512, 0511, 0398	Initial abandonment of the site. Tumble fills up under layers that will later be used for trash fill. The earliest phase of wall collapse occurs at this time, though it is unknown from wall 0258 or 0510. Animal activity is high, suggesting the presence of organics and soft soil.
Phase III - Construction Phase 2?	0510	Wall 0510 is built. This may be associated with wall 0091 from 2016, and may have been in use at the same time as the platform. Wall 0258 and 0257 would still have been visible at this time, even if they were constructed earlier. A use phase is implied between this phase and Abandonment 2, although there is little evidential presence.
Phase II - Abandonment 1 (or Site Use?)	0405, 0409, 0406	Initial period of soil deposition being lain after architectural features are produced. Soil deposition may have been intentional, so that this phase may not actually represent abandonment but the use of earthen floors. However, more excavation is needed to determine this.

Phase I - Construction Phase 1	0261, 0257, 0258, 0399	Initial construction of architectural features. These features may predate platform 0214 from 2016, though this platform was later constructed in relation to these wall features. These walls may be related to wall 0224 from 2016. It is unknown if wall 0261 belongs to this phase or if this wall was constructed later, but it is placed here due to its association. Courses of the walls appear to continue below the Phase 7 deposits. More excavation is needed to ascertain.

Figure. Trench MA02 after the 2017 excavations looking east.

2.2.4. Discussion and Interpretation:

MA 02 was a complex trench with many diverging and converging horizontal stratigraphic relationships. Units belonging to the earliest phase were only minimally excavated, so their relationships are unknown. Many wall features were not excavated nor were their bases yet uncovered, obscuring their relationship with other features as well. The follow interpretation is therefore only tentative with further research needed to investigate relations.

Phase I consists of the initial construction of features. The relationships in this phase are hypothesized and not yet established through excavation. The earliest activity appears to be the construction of E-W wall [0258] and N-S walls [0257], [0261], and [0399]. [0258] is the largest wall so far uncovered, consisting of 7 courses and continuing down past the depths excavated. This wall appears to be associated with platform [0214], but may also be earlier. The wall is about 1.3m away from platform [0214], the same distance as walls [0091] and [0114]. Construction techniques are also similar, consisting of two rows of large 10-30cm stones with a layer of smaller stone fill in the center. It is likely that this area was one time used as a courtyard given the high number of large ceramic vessels. The wall could also have been used in later phases, perhaps bearing a relationship with wall [0023] excavated in 2016. This wall is therefore thought to have a long use history. N-S wall [0257] also appears to have great time depth, though the lowest areas of this wall are obscured by tumble [0511] so that only 5 courses have so far been revealed. A small room is made by walls [0257] and [0261], perhaps once holding a staircase or many animals (further excavation is needed to ascertain). It is possible that [0261] belongs to a later phase as it may be floating on some cobble stones, though this is not yet certain. wall [0399] abuts [0258] with 5 courses visible. This unit seems to run parallel to wall [0023] uncovered last year but may also be associated with the courtyard (though this is not yet certain).

Phase 2 consists of an initial period of slight abandonment. Deposits were lain, ultimately building up the area to the level of the platform top [0214]. [0406] reflects this event just north of wall [0258] and extending to the platform. [0405] and [0409] reflect this event on the W side of the trench, with differentiation based on relationship to wall feature [0510]. It is possible these deposits were built up intentionally to level out the ground to the base of platform [0214].

Phase 3 consists of a small possible period of construction. Wall [0510] was built, and may be an extension of wall [0091] from the previous season. This wall appears to be resting on top of deposit [0405], but may still continue down. It was preliminarily determined that the wall terminates at this deposit, and represents a later construction phase than [0258] and [0257].

Phase 4 consists of another small abandonment phase. Tumble (0511) and its associated deposit [0512] obscures part of wall [0257]. Wall collapse [0398] + associated fill [0403] also occurs in the vicinity of [0510], but it is unknown if this collapse derived from wall [0258] or [0510]. This feature represents the earliest known event of wall collapse. Rodent activity – defined through [0394]. [0407], and [0408] is abundant, perhaps indicating the presence of organics or softness of the deposit. [0404] is listed as belonging to this phase, but may be an intentionally laid deposit that leveled the ground up to the platform [0214]. A large vessel was found in this unit, and appeared to be resting on unit [0406]. Many flotation samples were taken for analysis and dating of annuals.

Phase 5 consists of a use phase where ceramic layers [0397] and [0402]. These may be associated with each other, but it is unsure given that [0397] rests atop a layer of wall collapse

([0398]) and seemingly not in placed and used there. Layer [0402] maybe associated with layers [0117], [155], [0156], [0157]. Dating material was taken from this unit and can help establish associations between strata from 2016 and 2017.

Phase 6 consists of another stage of abandonment. This phase appears large in the stratigraphy but really captures a gradual deposition over a lengthy period of time. Trashfill [0392] is first deposited on the W side of the unit, and holds much large bones, grindstones, burnt charcoal and other materials, as well as ceramic vessels. It is likely that this trash pit is occurring from outside the courtyard room, as wall collapse [0398] had already occurred and been covered

by this layer. This trash feature could explain the late radio-carbon dates (1st century AD), found in nearby layer [0216] that spills over wall [0224] and just past wall [0091]. Deposit [0396] fills in the internal "staircase" area, and rodent activity is present throughout the unit. Afterwards, a large wall collapse ([0268[), occurs seemingly quickly, as judged by the proximity of stones and lack of deposit between them. The wall collapse likely originates from [0258], and was followed by deposit [0395]. This deposit itself was covered by deposit [0390], which also covered trash fill [0392], as seen by the krotovena ([0391]) tunneling through [0390] and terminating at [0392].

These events were followed by another sub-phase of wall collapse ([0266]) and additional trashfill ([0265]). This trashfill contained many interesting Aksumite/pre-Aksumite artifacts, but was also mixed with modern contexts. Wall collapse also occurs from wall [0257] internally into the "staircase" area of the trench ([0267]), followed by more deposition of soil ([0269]). Finally, areas of small cobble tumble ([0252] and [0254]) and their associated tumbles ([0253] and [0255]) are strewn on both NE and NW edges of the unit, and were later covered by another deposit fill [0259].

Phase 7 consists of another small cultural phase where a small alignment of stones ([0256]) was placed E-W on deposit [0259]. This alignment seems to continue from [0258] and may

be associated with this feature at a very late use stage. The alignment may be more modern, and its contexts could not be clearly established. Phase 8 consists of a final layer of abandonment events. Deposits [0264] and [0263] fill the internal rooms (areas between walls [0261] and [0257], while deposit [0262] caps the two tumble features in the courtyard. Finally, deposit [0251] is lain over the entire trench, and is sealed by modern topsoil [0250], which has been plowed repeatedly over the years.

While much of the investigation delineated gradual deposition events following abandonment, excavation of occupation layers at [0402] and [0397] and lower helped to meet the research goals of the unit. The wide use of pottery and delineating of four possible walls seems to suggest that platform [0214] was used as an activity area, though it may have originally been constructed for a different purpose. A courtyard area for domestic activities may be an appropriate label for this particular occupation phase. The small punctuations of cultural periods ([0256] and [0510]) within lengthy periods of abandonment may represent appropriations of wall [0258] for different use. The gradual buildup of trash ([0265] and [0392]) on the SW end of the unit may suggest ongoing activity in the location just to the W of the trench long after this particular domestic area was abandoned.

2.2.5. Recommendations for Future Work.

Recommendations for future work depend on the research questions. It is suggested that greater clarity on the use-life of this domestic structure can be gained by vertical excavation of

the existing trench downwards beyond the platform. This can better reveal the relationships between wall features [0258], [0257], [0399], and [0261] – particularly in the relationship to platform [0214]. Such excavations could also provide more information on the reuse of the site. Additionally, there appears to be another cultural horizon under the courtyard area defined by platform [0214]. Working towards uncovering this cultural horizon can provide more dates to evaluate the origins of complex society in in the area, perhaps uncovering more dates near 1200 BC, which would be significant for examining
the origins of complexity and urbanism in Africa given its earliness. It is therefore recommended that existing architectural features be excavated and investigations continue vertically into older periods of the site as this provides the greatest research value. Additionally, excavating the internal areas between walls [0261] and [0257] could also reveal more room function.

Work is also recommended to correlate the stratigraphy of the 2015, 2016, and 2017 seasons together. Additionally, the original excavation of baulk walls for this unit were imprecise, impacting the plan mapping dimensions of the area. It is predicted all plan maps are off 5cm (or possibly more) horizontally. It is recommended that a plan-map be traced from a digitized version of the trench so that architectural features can be better related in space. It is then recommended that all future plan-maps use these architectural features as their mapping reference.

2.3 Trench MA 03

Robyn Price (trench supervisor), Jordan Galczynski, Marianne Tames-Demauras, Letorhan Tafere, Gebremedihin Mekonen, Tebreh Embaye, Hadas Tafer

Trench 3 is the northernmost trench of the 5 trenches open in the 2017 excavation season at Mai Adrasha. This year, after removing the backfill, it was decided to expand the trench one meter to the east and two and a half meters to the south. This made the entire trench 6m EW by 5m NS. Hans Barnard set our benchmark using a rebar and a Trimble at 1914.09 meters above sea level (mASL). We excavated Monday through Saturday from 20 November 2017 until 15 December 2017.

Trench coordinates (6x5):

Trench 3 datum	37P	426227.23	1560224.28	**1914.09**
Trench 3 NE	37P	426224.80	1560236.17	1913.41
Trench 3 NW	37P	426218.83	1560235.83	1913.40
Trench 3 SE	37P	426225.06	1560231.14	1913.46
Trench 3 SW	37P	426219.04	1560230.94	1913.48

2.3.1 Excavation Purpose

The original goal for the opening of trench 3 in the 2015 season at Mai Adrasha was to establish the potential of the site for archaeological excavation, despite the extensive destruction due to the nearby gold panning. This earlier season was also intended to begin developing a stratigraphic sequence for the region as little archaeological investigation has been undertaken west of Axum.

Trench 3 was reopened this 2017 season. Debby Sneed's excavation in 2015 had revealed an extensive pavement as well as a corner of some structure. In addition, radiocarbon dates were taken from this square which dated to around 800 BCE. This season was meant to further explore the exposed architectural features from 2015 as well as to collect more material to assist with dating the site and surrounding architecture. We also hoped to catch the rest of the exposed room.

By the end of the season, we seem to have caught the extensions of both walls first excavated in 2015 ([0045] and [0048]), as well as a possible third wall parallel to [0048] as the south wall of the enclosed space. We also found the extension of the pavement [0056] excavated in 2015 which continues to abut wall [0045] and continue into the south baulk. On the very last day of excavation we also found a series of flat lying stones inside the area bounded by the exposed walls (i.e. east of [0045] that may represent an earlier wall phase or pavement.

2.3.2 Stratigraphic Relations

Phase	***Description***	***Unit(s)***	***Notes***
I	Construction of Walls	[0045, 0048, 0054]	[0045] and [0048] are bonded; [0048] and [0054] relationship is unclear
II	Construction of stone pavement	[0056]	[0056] abuts [0045]
IIIa	Occupational fill on pavement [0056]	[0347]	
IIIb	Occupation fill in area bounded by walls [0045] and [0048]	[0348]	Also includes the deeper artificial cut in the north-western corner of [0348]
IVa	Architectural debris, tumble	[0342, 0345]	
IVb	Architectural debris, tumble	[0343]	
Va	Small stone pavement construction	[0341]	
VIa	Nondescript fill	[0338]	
VIb	Nondescript fill	[0339]	
VII	Pit cut	[0346]	

VIII	Pit fill	[0344, 0340]	
IX	Nondescript fill	[0337, 0336, 0335, 0334, 0333, 0332, 0331]	
X	Top Soil	[0330]	

Trench MA03 after excavations 2017 looking west. Phase "b" referenced below is pictured in the foreground.

2.3.3 Discussion and Interpretation

In the following discussion, all phases to be discussed that are labeled a/b have been thus divided as wall [0045] separated our trench into two small areas whose relationships cannot be determined despite similarities in sediment quality and finds as they are not touching. Phase “a”’s are located west of wall [0045] and phase “b”’s are located east of wall [0045].

In Phase I, walls [0045], [0048], and [0054] were constructed. While [0045] and [0048] can be identified as bonded from their southern facing corner, the northern edge requires articulation to understand their relationship further. Extensions of both of the walls were excavated in the 2017 trench 3 extension. It should be noted, however, that wall [0048]’s extension cuts more sharply to the east than the part of [0048] excavated in 2015. To understand this change, further work needs to be conducted in this NE corner of the trench. It is also possible that in this season we caught two stones of the southern-most wall of this bounded area just cutting into the south baulk. Again, no unit number was assigned to these two stones as not enough work was done in this corner to make any conclusive interpretations.

The construction of wall [0045] and [0048] is discussed extensively in the 2015 report. I would only like to add that [0045] slopes down to the south, similar to the slope down of the pavement (*phase II* [0056]), and to the rock tumble visible in the western baulk of both the 2015 and the current seasons. In addition, we dug very little east of wall [0054] in the norther east corner as there was very little space and we thought it would be better to excavate this area once the trench was expanded further. So, though we were able to define the eastern edge of this wall little else was determined. The eastern face of this wall were it comes into contact with wall [0048] seems to have been robbed out to the cobble center, though this needs further exploration. The northern face of [0048], because of this area of robbing and because we did not excavate in this small area has yet to be fully defined, as well.

After the construction of these walls, pavement [0056] was laid (*phase II*) We can know this from how the pavement abuts wall [0045] just below the top three courses of this wall. This extension of [0056] is quite regularly constructed and has a rather steep slope down to the south. In the center of this pavement, which was partially exposed in the 2015 season, there is a semi-circular area ~1m^2 of missing stones. Though these might have been robbed out, I would hypothesize that this is a cut and would recommend it be further explored in the coming seasons.

Occupational fill/debris [0347] built up upon this pavement [0056] (*phase IIIa)*. There was an increase in finds from this area, including larger, less worn pottery sherds, worked lithic, metal bits, and charcoal flakes. This sediment was also mottled brown/black and had a higher silt content than the above layers. Above this sediment, *phase IVa* units [0342 and 0345], was a tumble layer and surrounding sediment. The tumble was made of medium-large cobbles concentrated along the western baulk, likely indicating a wall or architectural feature located outside the extension of trench 3. This sediment, like all that above these units, was black, compact, and mostly clay. In *phase V* unit [0341], small, cut cobbles ~10-15cm seemed to have been placed along the western baulk possible representing another smaller pavement layer.

Phase VIa represents an erosional fill that was built up upon this possible smaller pavement, unit [0338]. I would suggest this fill, which had a lot of well-worn pottery and lithic bits that were all deteriorating in the very wet, dark, clay soil. Cut into units [0338, 0341, 0342, and 0345] was pit cut [0346], *phase VII.* This pit was then filled with several large, flat lying sherds and then filled with further erosional fill, units [0340 and 0344].

Moving to the eastern side the trench, the earliest architectural evidence we have is visible in the north western corner of [0348]. This area measures ~1.20 m x ~1.50 m, and was cut in an attempt to level the eastern units with the 2015 excavation in their south-eastern corner. Due to time constraints only, this small area was able to be completed. A unit number was not assigned as well, since the excavation was not completed.

Phase IIIb entails the construction of the possible pavement in the north-western corner discussed in the previous paragraph. This pavement is made of large shaped stones laid in a north-east south-west orientation, following the angle of wall [0045]. Another possible interpretation is that these flat-lying stones are a course of another wall that was either dismantled, or continues deeper.

Following the laying of these large stones, there is an occupational layer with stone tumble that built up in this area [0348]. The soil is of a homogenous nature, including a large accumulation of cultural material including pottery, metal, a possible burnishing stone, bone, lithic, possible glass, charcoal, and many grinding stones in the associated tumble. Due to the high level of cultural material, a soil sample was taken for closer analysis. In association with this occupation layer, a layer of tumble fell in the south-eastern corner. It is not believed to be associated with any walls visible in trench, but is probably connected to architecture outside of the excavation area, given the distance and angle of the fall.

Following this accumulation of occupational debris and tumble there was a layer of architectural debris [0343] (*Phase IVb*). This phase is notable for the inclusion of many large grinding stones amongst the debris material that were likely part of the construction of wall [0045], but then later fell or were removed during this later phase. Amongst the architectural debris, there was still an abundance of pottery, several pieces of metal including a late Axumite coin, a bead, and lithic material. This Axumite coin is of the same design as the one found in [0037], on the eastern side of wall [0045]. This could indicate that these two units [0343] and [0337] are of a similar date.

Phase VIb represents a nondescript fill layer [0339]. This layer was made of a mixture of large tumble, probably wall-fall associated with wall [0045]. Amongst the tumble, there was an abundance of well-worn pottery and denuded calcium-carbonate type rock.

Following this layer, *Phase IX* [0337, 0336, 0335, 0334, 0333, 0332, 0331] incorporates a level of erosional debris likely from water run-off due to the worn nature of the pottery and the lack of other occupational material. This phase reaches above wall [0045] and covers the extent of the 2017 expansion. Included in this layer was evidence of bioturbation filled with clayey sediment. Notable finds in this phase are a copper alloy coin and metal bell. This coin is the same design as the one mentioned previously found in [0343].
The coin was found in the south-western side, and possible indicates that an earlier sediment was disturbed.

Most recently, the area was capped by a layer of top soil [0330] (*Phase X*) that contained very little ceramic, metal, and lithic inclusions. The soil here was extremely compact probably due to its use in modern farming.

2.3.4 Recommendation for Future Work

We would suggest that the unit be once again extended to the south and east in order to catch the rest of the area bounded by walls [0045] and [0048]. In this way the whole area might be excavated in context. It might also be fruitful to investigate the cut mentioned above into the pavement [0056]. We would also recommend that the exposed walls be further articulated especially where they bond with one another in order to better understand their relationships.

Alternatively, it might be better to remove pavement [0056] and the rest of unit [0348] to continue down in the 2017 extension in order to reveal the bottom extent of walls [0045] and [0048]. This might be a better alternative as the late Axumite coins might indicate we have not yet reached any pre-Axumite levels.

In addition, the slope up to trench 2 from trench 3 might be interesting to investigate when one considers the downward slope to the south visible in the architecture and strata of our trench 3 excavation.

Prepared by Robyn Price and Jordan Galczynski

2.4 Trench MA 05

Scott Sunell (trench supervisor), Gebremedihin Mekonen, Tabere Imbaie

Excavation dates 11 – 30 Nov. 2017

Trench 05 was 5m x 5m with corners located at:

Trench 5 datum (12 Dec. '17)	37P	426245.54	1560115.23	**1910.54**
Trench 5 datum (13 Dec. '17)	37P	426245.34	1560115.35	**1910.75**
Trench 5 datum (16 Dec. '17)	37P	426245.49	1560115.34	**1910.32**
Trench 5 NE	37P	426246.33	1560115.70	1910.29
Trench 5 NW	37P	426243.85	1560111.44	1910.10
Trench 5 SE	37P	426250.56	1560113.15	1910.17
Trench 5 SW	37P	426248.17	1560108.93	1909.92

Datum was reset three times due to magnetic survey and unanticipated removal of trench markers on 13 Nov. 2017. Final value (for which other heights were corrected) is 1910.32.

2.4.1 Purpose of Excavation

Magnetic survey identified a large, circular anomaly in shallow soil at the edge of the recognized site boundary. The trench was sited to expose the entirety of this anomaly, which appeared to be approximately 5m in diameter based on the survey results. The trench itself was situated near the south gate constructed in the fence erected after the previous project at Mai Adrasha in the mid-2000s. Two concrete pillars mark the location of the gate. These pillars stand approximately 50m N of the datum point. The bulk of the intact site deposits are approximately NW of trench 05, and are notably upslope from the trench.

Runoff channels to the N and S of trench 05 suggest waterborne sediment and artifacts are likely to be present in this location. Trench 05 is significantly lower in elevation than the other trenches at Mai Adrasha. In addition to its relationship to the site itself, the trench was situated approximately 100m NW and S of large expanses of bedrock. When measured, the bedrock outcrops lay between 70cm and 100cm below the modern ground surface of trench 05, suggesting a shallow deposit. The immediate surroundings of the trench was a field of teff. The trench itself was aligned slightly off true north to accommodate both the anomaly and a modern field boundary that runs roughly E-W along the N edge of the trench.

The primary goal of work in this trench was to test the effectiveness of magnetometry as a method for identifying architecture at Mai Adrasha and elsewhere. Secondary goals include identifying whether the previous project's site boundary was accurate in capturing the extent of the deposits, the depth and topography of bedrock underlying the site, the sequence of soil formation, the patterns of erosion impacting the site, and potentially the presence of occupation dating to periods before the introduction of ceramics at Mai Adrasha. Accomplishing these goals would have the effect of ground truthing the remote sensing method, refining understandings of taphonomy at the site generally, and potentially identifying the earliest deposits associated with occupation at Mai Adrasha. Generally, trench 05 will provide background information related to site formation and occupation through time at Mai Adrasha.

The most likely specialist study to benefit from trench 05 would be paleoethnobotanical and geomorphological. Trench 05 will ideally contribute significant quantities of plant material to help identify the sequence of use of the agricultural fields, and possible to assist in environmental reconstruction depending on the depth and contents of the trench. The trench will also ideally provide an opportunity to evaluate erosion and water transportation of artifacts and soils at the site. Detailed analysis may be able to identify how and when the deposits composing trench 05 were deposited and how they relate directly to strata at the site itself.

2.4.2 Stratigraphic Relations

Phase	***Description***	***Units***
I	Bedrock	0501
II	Natural deposits	0361, 0358
III	Natural cut formed	0500
IV	Cut infilled	0357, 0356, 0354
V	Waterlaid deposit	0353, 0351
VI	Surface/Ploughzone	0352, 0350

2.4.3 Interpretation and Discussion

The sequence of deposition in trench 05 is the result of natural erosion impacting Mai Adrasha, located upslope. There is no compelling evidence for construction of field fences or other architectural features in the trench, and excavation results suggest that magnetometry is not suitable at Mai Adrasha. No circular features of any kind were identified during excavation, nor was it possible to arrive at any strong explanations for the anomaly. Currently, it seems most likely that soil conditions themselves are confounding the use of that instrument to identify buried architecture. There is also the possibility that local bedrock composition in the area below trench 05 could have interfered with the survey results. Some metal objects were recovered during excavation, but their appearance was very limited and would in no way account for the large and well-defined anomaly present in the survey.

At some initial point, the bedrock [0501] was exposed [=*Phase I*], after which deposition of clay with few artifacts [0361] took place. Above this deposit, a further clay deposit was laid down by water transport [0358] [=*Phase II*]. Inclusions in these units (and in fact all units in trench 05) strongly suggest natural water transport of sediments along with small pebbles and a few cobbles/boulders. The lack of obvious size-sorting in the strata is likely the result of the parent soils upslope at Mai Adrasha lacking significant inclusions, being dominantly silty and clayey in composition with few pebbles and nearly devoid of sandy deposits. After [0358] was deposited, it was cut by [0501], forming a channel running E-W [=*Phase III*]. That channel filled in over an unspecified period in three main phases distinguished from one another by artifact density and distribution, as well as soil texture and color. [0357] was laid down first, followed by [0356] and [0354] in sequence [=*Phase IV*]. These units, the cut and the associated fills, are grouped as cluster 03. Above those strata and the entire infilled channel, unit [0353/0351] was deposited at a later point [=*phase 5*]. Laying above [0353/0351] is topsoil [0352/0350], and the current active ploughzone of the teff field into which the unit was excavated [=*phase 6*]. During excavation, the uniformity of soil texture and contents made identifying some units difficult. As a result, the upper component of [0358] was combined with [0354]. [0358] contains very low artifact densities, however, and is unlikely to have impacted the overall distribution of recovered materials from the upper strata which were combined with it. [0355] and [0354], as well as [0359] and [0357], were separated during excavation due to artifact density differences, but recombined after analysis of the stratigraphy revealed that those sets of units were equal, respectively. During excavation the trench was sectioned twice, first from a 5m x 5m to a 2m x 2m, and then from a 2m x 2m to a 50cm x 50cm. This was done to minimize labor requirements while still capturing the magnetic anomaly (in the former case), and to quickly reach and identify bedrock when that anomaly was not identified (in the latter). A column sample was taken from immediately outside the unit, adjacent to the 50cm x 50cm section. This sample went from surface to bedrock, including units [0363] – [0415] (inclusive of trench 05 units). The entire column sample is grouped as cluster 02.

Trench MA05 showing the area where the column sample was removed.

Artifacts recovered from trench 05 generally conform to the pattern found at Mai Adrasha itself, and were generally not of specific typological interest. The one except was a biface preform recovered in [0358], which was fundamentally unlike all other lithics at the site, and suggests the possibility of very early occupational layers in this area of the site. Otherwise, few significant artifacts were recovered in trench 05.

2.4.4 Future Work

Depending on project goals, trench 05 may be worth continuing. Though magnetometry failed to yield useful data concerning subsurface deposits, the trench was not entirely without value. As paleoethnobotanical analysis proceeds, there is significant potential for seeds that help define the natural and agricultural regimes present in the area around Mai Adrasha. Depending on the age of the deposits in trench 05, this may capture all of the occupation of the site (and possible beyond the limits of the excavated deposits so far). Extending the 2m x 2m section of the trench to the East by 1m or more would provide opportunities to sample soils more extensively in order to generate such material, if it is present. Depending on the age of the site, this may include opportunities to identify early use of teff or other domesticates that could significantly impact regional understandings of plant use. Any continuation of environmental reconstruction and off-site excavation would be extremely valuable for these reasons as well, even if not at trench 05 specifically. A second advantage to expanding the 2m x 2m section to the East is the potential to capture more of [0358], which yielded the biface preform. That deposit may date to periods before the pre- Axumite occupation at Mai Adrasha, and would be a major opportunity to assess the change in site use through time. Again, this result may also be achieved by excavating elsewhere offsite at another targeted location. In any case, I strongly recommend further excavations similar to trench 05, if not in that location specifically, to provide critical data concerning the formation of the site and its occupation through time. The potential for identifying very early occupations is also significant via such work.

Prepared by Scott Sunell

2.5 Trench MA 06

Reuven Sinensky (trench supervisor), Vera Rondano, Negasi Awetehey, Guish Assefa, Alamru Gebru, Ablulum Hagos

Date of Excavation: November 13 – December 12 2017

Trench Size: 5 m x 4 m

Trench 6 datum	37P	426179.88	1560186.57	**1915.48**
Trench 6 NE	37P	426173.84	1560193.18	1915.06
Trench 6 NW	37P	426172.48	1560189.41	1914.19
Trench 6 SE	37P	426178.42	1560191.47	1915.94
Trench 6 SW	37P	426177.17	1560187.76	1915.04

2.5.1 Purpose of Excavation

Excavation at Trench 06 was undertaken in order to investigate a substantial structure with large, well-faced architectural stones that was exposed by illicit digging on the Mai Adrasha site. The structure's south wall [0372], which measures roughly 8 meters long and runs at a 200-degree angle, is completely exposed on the south side, and a 2 meter stretch of wall [0444], the perpendicular wall which serves as the southeastern corner of the structure is also exposed. Since the corner and a small stretch of wall are exposed it is clear that the area to the north represents the intramural space associated with the structure. Trench 06 was placed just north of [0372] in order to expose the plan view and interior face of the wall, and investigate the intramural space of the structure.

Trench 06 is located in the southwestern portion of the Mai Adrasha site, about 40 meters west of Trench 01, and 20 meters southeast of Trench 07. While illicit digging has impacted this portion of the site, the destruction is not as severe as the area closer to the modern village of Mai Adrasha. Mounded architectural rubble with likely in-situ archaeological deposits are interspersed with large tracts of completely destroyed architecture. Around 20 meters southwest of Trench 06 a very large area, perhaps measuring more than 50 x 50 meters appears to contain the remains of what was once a large a structure with upwards of 50 rooms that is now completely destroyed. Just north and northwest of Trench 06 an additional area with damaged architecture is visible. This area however still appears to contain several in- situ wall alignments that were exposed by illicit digging, and may contain some preserved in-situ deposits. The structure targeted for excavation in Trench 06 appears to be located stratigraphically below the overwhelming majority of the destroyed architecture to the south and northwest, and thus may represent an earlier use of the site compared to much of the exposed architecture.

The goal of excavations in Trench 06 during the 2017 season was to investigate the substantial structure visible in profile just south of the trench. However, like much of the previous work on the site, excavation in Trench 06 revealed a complex sequence of construction, abandonment, and remodeling episodes. Understanding the sequence of events required detailed excavation and mapping of the in-situ deposits that postdate the construction and occupation of Cluster 7. This limited the possibility of excavating the interior space associated with Cluster 7 during the 2017 season, but provided high quality data on a number of features and structures that postdate Cluster 7. If these structures and features are well- dated using high quality AMS C14 methods on annual plants they may provide a sequence of well-dated contexts for Early and Late Pre-Aksumite material culture and architecture that can serve as a template for understanding the rest of the Mai Adrasha site, and the Pre-Aksumite occupation of the region as a whole.

Other notable aspects of the 2017 Trench 06 excavations include excavation of feature types and structure attributes not previously recorded at Mai Adrasha, including the excavation and detailed documentation of two formally prepared plastered floor surfaces and their associated artifacts (Cluster 1, floor [0378] and Cluster 5 floor [0442]), the excavation of a thermal feature [0375], and the collection of large flotation samples from all structures and floor related contexts, which have the potential yield annual plant material for AMS dating. Several notable finds were also made in the trench, including two ceramic stamp-seals with similar shape, seal design, and construction, two groundstone earspools, a small groundstone anthropogenic figurine, numerous groundstone beads and pendants, and a finely made of an unidentified white stone or ivory crescent-shaped object.

A number of specialists will benefit from analyzing material from the 2017 excavations of Trench 06. Ceramics from a number of structures with a known construction and occupation sequence (at least 4 discrete episodes) will allow for a detailed analysis of change in ceramic technology and style through time. Of interest to lithic analysts, abundant small debitage was found associated with the plastered floor surfaces of Cluster 1 and Cluster 5, and two lithic tools, a small, one-handed mano used with a reciprocal stroke (PP1), and a utilized core were found on the Cluster 5 floor surface (Unit 0442). The mano in particular would be a very important candidate for starch grain and phytolith analysis. The mano was found in-situ in an ideal context and may provide the best evidence to date for routine food processing practices that took place in the structure. The small amount of sediment sitting between the mano and the plastered floor (less than 1cm) was collected as a sediment sample, and is ideal for pollen analysis. Flotation samples from a variety of intramural and extramural context were collected which may shed light on routine food processing and consumption practices in intramural and extramural spaces. A flotation sample was also collected from the charcoal and ash rich deposit that underlies the large structure in Cluster 7, and the contents of this sample will provide an excellent date for the construction of the structure and a look into the contents of primary refuse during that time. Faunal bone associated with hearth [0375] and from the heavy fraction associated with [0374] will also provide important data on Pre-Aksumite foodways.

2.4.1 Stratigraphic Relations

Phase	Description	Units
IVc	Occupation and abandonment of clusters 1 and 8	0370, 0371, 0373, 0375, 0376, 0378, 0379, 0381, 0382, 0385, 0432
IVb	Earlier occupation and abandonment of Cluster 1, occupation and abandonment of Cluster 6.	0430, 0432, 0434, 0438, 0441, 0443
IVa	Cluster 1 and Cluster 6 construction.	0380
IIIb	Post-depositional trash filling and sediment accumulation of clusters 2 and 3 and 5.	0386, 0387, 0433, 0435, 0431, 0440, 0442
IIIa	Clusters 2, 3, and 5, construction.	0384, 0389
IIb	Post-abandonment trash accumulation, Cluster 4.	0437, 0439
IIa	Cluster 4 construction	0377, 0383
Ic	Post-abandonment deposition, Cluster 7.	0436
Ib	Cluster 7 construction.	0372, 0444, 0445
Ia	Pre-construction trash deposition, Cluster 7.	0374

2.4.2 Interpretation and Discussion

Excavation and detailed mapping facilitated an understanding of the sequence of construction, abandonment, and reuse of cultural features in and adjacent to Trench 06 during the 2017 fieldwork season at Mai Adrasha. The following contains a discussion of the sequence of archaeological events (units) investigated during the 2017 field season, and description regarding the temporal relationships between units. The discussion begins with the earliest units investigated and moves forward through time. Units were grouped together into clusters in order to denote relationships between units, and cluster designations are described below. Units were also grouped into phases and sub-phases to explain relationships between Units.
For example, the construction, occupation, and abandonment of a structure were grouped together as a phase (ie. Phase I), but the initial construction of walls and the floor of a structure were classified to the earliest Sub-Phase (Sub-Phase Ia), and the subsequent intentional deposition of domestic refuse into the structure is characterized as a late SubPhase (Sub-Phase Ib). This allows the author to highlight the relationship between units during a particular phase, but also elucidate the sequence of events within a phase.

Phase One

The earliest temporal interval investigated during the 2017 field season was Phase I. Trash deposit [0374] currently represents the earliest evidence of occupation in the Trench 06 area (Sub-Phase Ia), and consists of a dense concentration of primary refuse that underlies wall [0372], wall [0444], and floor [0445], which in turn comprise Sub-Phase Ib. It is currently unclear whether trash deposit [0374] represents an unusual trash deposit, or is a votive deposit associated with the construction of the structure associated with wall [0372] and wall [0444], but a 5 Liter flotation sample collected from the deposit yielded more than 5 intact groundstone beads. The final deposit associated with Phase I is fill layer [0436], which was deposited atop floor [0445] immediately adjacent to wall [0372], and thus post-dates these constructions, and represent Sub-Phase Ic. Custer 7 refers to all of units previously described for Phase I, as all are associated with the construction, occupation and abandonment of a single structure. It is important to note that the units comprising Cluster 7 were not formally excavated, and were mapped in profile. Flotation samples were however collected from trash deposit [0374], and packing fill [0436], and since these two deposits immediately predate and postdate the building and occupation of Cluster 7, high quality dates from these two samples should provide an excellent date for the building and disuse of the structure. A charcoal sample embedded in the mud mortar of wall [0372] was also collected, but annual plants remains from trash deposit [0374] and [0436] are preferable for AMS dates.

Figure 1. Profile view of wall [0372] facing north. Note the pink ribbon on rebar stakes that mark the corners of Trench 06.

Figure 2. View of Phase Ia trash deposit [0374], underlying Phase Ib wall [0372] and Phase Ib floor [0445], and Phase Ic fill layer [0436] overlying and abutting the Phase Ib units.

Phase Two

The remaining units, clusters, and phases investigated in Trench 06 were all exposed in plan-view and were excavated within the boundaries of Trench 06. The earliest evidence for occupation following Phase I is represented by the construction of wall [0377], and wall [0383] which are tied to one another (Figure 3), and comprise Sub-Phase IIa. Trash fill [0439] and the subsequent unit of trash fill [0437] comprise Sub-Phase IIb, and together these four units comprise Cluster 4, the earliest investigated evidence for the use of the intramural space located between wall [0377] and wall [0383]. The large flotation sample collected from trash fill [0439] should provide an opportunity to date annual plant remains to identify when the absolute temporal association of Cluster 4. One of two groundstone ear spools found during the 2017 excavations was also found in the earlier trash deposit [0439] (Figure 4).

Figure 3. Cluster 4 units associated with the Phase II occupation of Trench 06.

Figure 4. Groundstone earspool from trash fill [0439], dating to Sub-Phase IIb.

Phase Three

Following the initial trash filling of Cluster 4, the subsequent Phase III occupation was initiated by two distinct construction events, the temporal relationship between which cannot currently be discerned. Wall [0384] (Sub-Phase IIIa) was constructed in the intramural space previously occupied by Cluster 4, atop trash fill [0437] and abutting wall [0383]. The western intramural space formed by this additional wall is referred to as Cluster 2, and includes two units of trash fill [0433], [0386] (Sub-Phase IIIb), while the eastern intramural area is referred to as Cluster 3, and also includes two units of trash [0435], [0387] (Sub-Phase3b), which were deposited following the abandonment of clusters 2 and 3. The best contexts for dating the construction of wall [0384] are the flotation samples collected from trash fill [0387] and [0386] because the lowest portion of units 435 and 433 were excavated below the foundation of wall [0384] and may represent material deposited prior to the remodeling episode.

Figure 5. Remodeling episode in which wall [0384] (Sub-Phase IIIa) was constructed to create clusters 2 and 3. Photo facing north.

In a distinct building episode associated with Sub-Phase IIIa, wall [0389] was constructed abutting wall [0383]. This created the intramural space associated with Cluster 5, which includes a plastered floor [0442], a lower unit of trash fill [0440] and an upper unit of naturally deposited sediments mixed with cultural material, [0431]. A small incised groundstone anthropomorphic figurine made from an unknown raw material was found in the upper deposit associated with Cluster 5 [0431] (Figure 7). The Cluster 5 floor [0442] was very well-preserved and an intact one-handed reciprocal mano and a utilized core were found lying on the floor surface. The floatation sample from the lower trash fill deposit [0442] was collected from the sediment immediately above the floor surface, and will provide an opportunity to find annual plant material suitable for a high quality AMS C14 date.

Figure 6. Cluster 5 intramural space formed by wall [0389], which abuts wall [0383].

Figure 7. A groundstone, incised, anthropomorphic figurine found in Cluster 5.

Phase Four

The construction of wall [0380] marks the beginning of Phase IV, which contains three clusters of units with an unknown temporal association to one another. Wall [0380] (Sub-Phase IVa) abuts wall [0389] (Figure 8). The space created between wall [0380] and wall [0389], and the upper trash fill [0430] and lower trash fill [0434] in this space are referred to as Cluster 6.

Although Cluster 6 is located a lower elevation than all other units and clusters in Phase IV, due to destruction from illicit digging, and subsequent erosion, the stratigraphic relationship between Cluster 6 and higher elevation Phase IV deposits remains unclear, and thus limits my ability to assess the temporal relationship between Cluster 6 and the remaining Phase IV deposits beyond stating that Cluster 6 post- dates the construction of wall [0380], and may predate all other units in Phase IV based on elevation differences. Nevertheless, Cluster 6 deposits are grouped with other Sub-Phase 6b units. Cluster 6 intruded on the upper portion of wall [0372] and the upper course of wall [0372] is visible in the base of the lower trash fill [0434]. A ceramic stamp seal was found in lower portion of Cluster 06 at an elevation below the foundation of wall [0389] and wall [0380], and may in fact be associated with the underlying Cluster 7 deposits (Figure 9). The best context to procure a date for Cluster 6 will be either the flotation sample collected from either 0430 or 0434.

Figure 8. Wall [0380] (Sub-Phase IVa) abuts wall [0389], and is the earliest unit associated with Phase IV.

Figure 9. Ceramic stamp seal found in the lower trash fill [0434] associated with Cluster 6.

Wall [0380] also form the southern wall of Cluster 1, which also includes wall [0377], wall [0443], and other units in Sub-Phase IVb including, possible floor [0441] and lower naturally deposited sediments [0438]. The later occupation of Cluster 1 (Sub-Phase IVc) includes a more intact formally prepared floor surface [0378], [0388], naturally deposited sediment [0381] located between the floor and wall fall associated with wall [0377], and naturally deposited sediment above the floor [0376], and naturally deposited sediment above the floor surface in the entry [0382] (Figure 10). The best context for a date associated with later use of Cluster 1 will be from the flotation sample collected from sediment located between the wall fall and the plastered floor [0381] (Figure 11), and the best context for a date on the possible earlier use of Cluster will likely be procured in future excavation season, as the identification of the possible earlier floor [0441] remains tenuous. Several significant artifacts were found associated with Cluster 1, including a tubular shaped groundstone bead, and a groundstone pendant lying directly on the upper floor [0378] (Figure 12).

Figure 10. Overview of the upper floor [0378], [0388] surface of Cluster 1.

Figure 11. Close-up of the sediment [0381] located between the upper plastered floor surface [0378], and wall fall [0432] that would provide the best context for a high quality AMS date. All of unit [0381] was collected as a flotation sample.

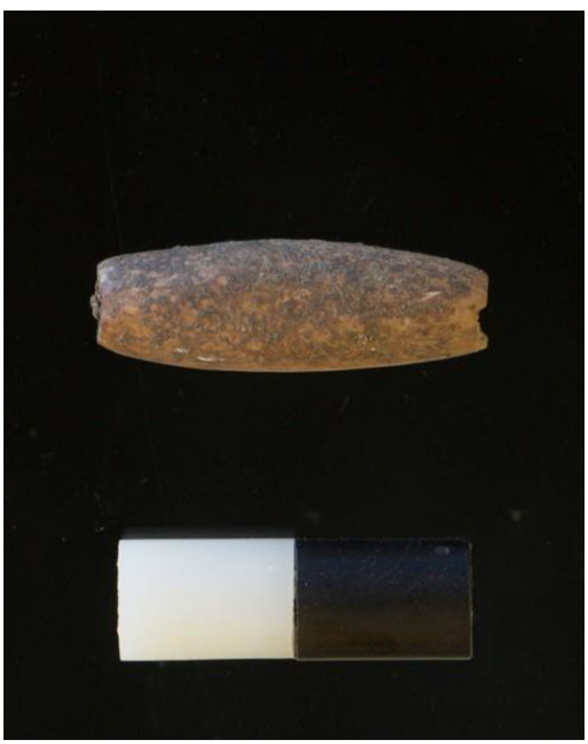


Figure 12. Groundstone bead found lying the upper floor surface of Cluster 1 [0378].

Finally, Cluster 8 refers to a number of units located in the northeastern portion of the Trench 06 that overlie clusters 2, 3 and 4, but their temporal association with Cluster 1 and Cluster 6 remains unclear. Natural deposit [0385] overlies both Cluster 5 and Cluster 6, but little is known about its temporal association beyond this. Extensive, but largely undifferentiated trash deposits [0379], [0373], and [0371] overlie clusters 2, 3, and 4. However, a large extramural hearth [0375] originated in trash fill [0371], and intruded into trash fill [0373], creating a distinction between the two trash deposits. The stones lining hearth [0375] appear to have been robbed from wall [0377], which it was cut immediately adjacent to.

These units contained two possible reconstructable vessels, including one with a ring base (see Figure 13), and a number of significant artifacts, including a groundstone ear spool, and a ceramic stamp seal remarkably similar to the seal found in trash deposit [0434] (Figure 14). Hearth [0375] contained a large amount of charred material, and the entire fill was collected as a flotation sample. This sample could provide a date for the largely undifferentiated trash deposits comprising Cluster 8. Finally, piled architectural stone [0370] (Figure 15) is stratigraphically the earliest unit in Trench 06, and although it was initially thought that these stones were piled to serve a field berm in the relatively recent past, no modern material was found in the deposit, and other than the density of rubble the sediment and artifact content in the deposit was nearly identical to that comprising [0371], [0373], and [0379]. It is possible that mounded architectural material [0370] actually represents an in-situ deposit formed by collapsed architecture.

Figure 13. Overview of trash fill [0371] post excavation/trash fill [0373] prior to excavation. Hearth [0375], which intrudes into trash fill [0373] is visible as is the upper course of wall [0377], and one of the reconstructable vessels associated with [0373].

Figure 14. Ceramic stamp seal found in trash fill [0371].

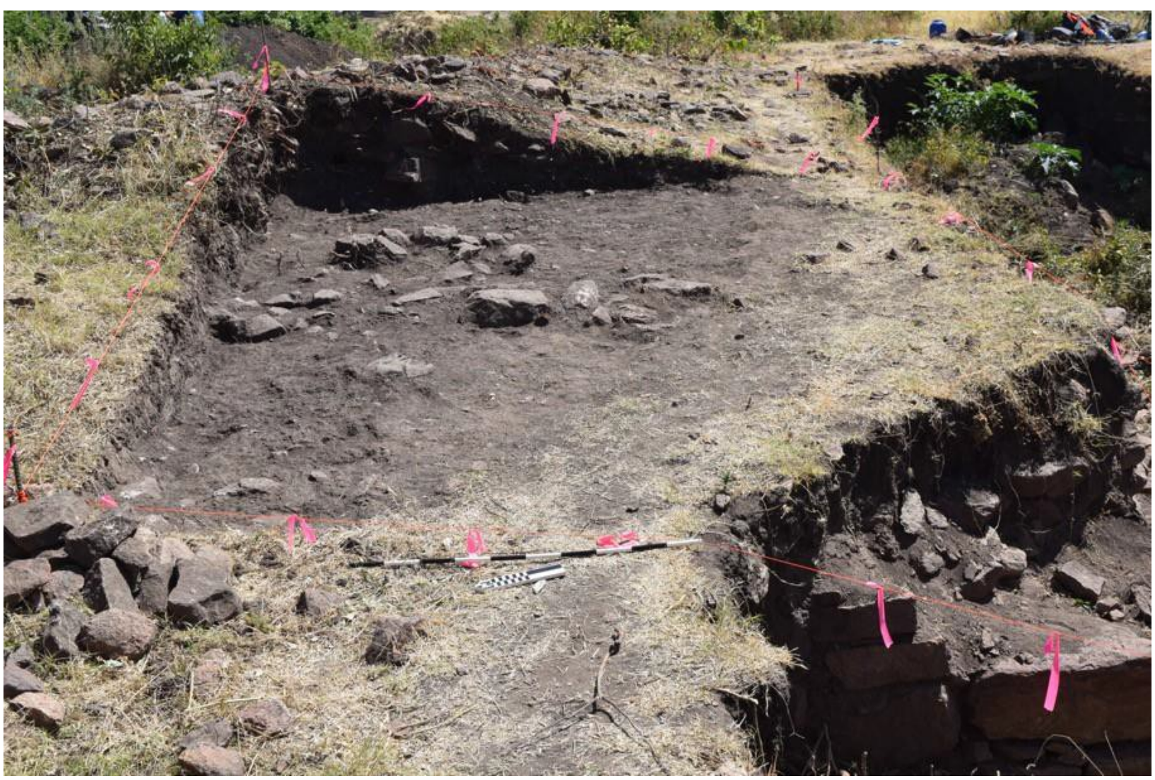


Figure 15. Mounded architectural stone located just northeast of Trench 06. This material was excavated within the trench as [0370], and appears to be an undisturbed cultural deposit formed by collapsed architecture.

2.5.4 Future Work

The presence of numerous cultural features built directly atop one another provides an opportunity to develop a well-dated cultural historical sequence of architecture and material culture. To this end, large volumes of soil samples were collected for flotation from all significant contexts in order to ensure that charred annual plants suitable for high quality AMS radiocarbon dates were available. Future work should prioritize running high quality AMS dates, if possible from each phase and each cluster, in order to understand the sequence of construction events in the area, and identify the contexts to invest in studying during future field seasons. The following is a list of high priority contexts from which flotation samples should be analyzed to identify annual plant material. The most crucial dates for understanding the sequence of construction events in the area are dates from trash [0374] and packing fill [0436] to identify the beginning and ending dates for Phase I construction and occupation, trash fill [0439] or [0437] to identify when Phase II construction began to be trash filled/remodeled, trash fill [0440] in order to identify when Phase III structures fell into disuse, and [0381] to investigate when Phase IV structures were abandoned. After dating the construction sequence the ceramic, lithics, faunal bone, and botanical remains associated with each Phase will provide important lines of evidence for continuity and/or change in ceramic manufacture, and routine on-site activities through time at Mai Adrasha. While the dates previously mentioned should be prioritized a comprehensive list of potential high quality contexts for dates for all phases and clusters is included below.

Phase I:

- Trash fill [0374]
- Packing fill [0436] Phase II
- Trash fill [0439] or Trash fill [0437] Phase III
- Trash fill [0386] or Trash fill [0387]
- Trash fill [0440] Phase IV
- Trash fill [0434]
- Natural deposit [0381]
- Hearth [0375]

In addition to high quality AMS dates, flotation samples may provide evidence for differential food processing and consumption practices in intramural and extramural spaces through time. For example, Cluster 05 contains a formally prepared floor surface with associated in-situ food processing tools, and the flotation sample from this structure [0440] may provide evidence for intramural food processing or consumption, while the extramural hearth [0375] may provide evidence for extramural food processing and consumption activities. One particular context, trash fill [0374] produced a very high density of charred plant material and charred faunal material, and when this unit is excavated in future field seasons researchers should prioritize collecting *a very large amount of soil* for flotation. Flotation will not only ensure that plant foods are identified, and high quality dates are procured, but will ensure that all faunal remains, including small animals and potentially fish bones are identified from these deposits. These deposits represent some of the densest concentrations of charred plants and animals on the site, and intensive sampling, analysis, and dating of this deposit will contribute to our understanding of Pre-Aksumite foodways.

Prior to excavation in future field season archaeologists should spend some time cleaning up, surveying and mapping the area located just northeast of Trench 06. Although this area has been heavily impacted by illicit digging several rock alignments that appear to be masonry walls are still visible, and several also appear to potentially be continuations of alignments exposed during Trench 06 excavations. Cleaning up the profile of architectural rubble located just northeast of the trench and mapping all visible rock alignments located in the damaged area with a Trimble GPS unit will allow researchers to assess whether the walls uncovered in Trench 06 are related to the exposed walls in this impacted area.

In addition to mapping the area to the northeast, it will also be worthwhile to clean up the heavily impacted area located just south of the trench and just south of wall [0372]. This would entail moving all of the previously excavated and disturbed sediment and architectural stone from the base of the destroyed area. It might be easiest to move this material into and over the two wells that were excavated and used for gold panning activities, as they are nearby, deep, and will lead to additional on-site destruction as the deep holes begin to widen and form arroyos with each monsoon season. Removing the disturbed rock and soil from this area will allow archaeologists to investigate whether this area, (which is currently 2.5 meters below the adjacent area) contains additional in-situ deposits at this depth. Two lines of evidence support the notion that this area will contain additional significant deposits. First, while this area was being cleaned in order to investigate whether trash fill [0374] extended beneath the entire extent of wall [0372] (which it did), a possible wall alignment was exposed in plan-view just south of the location at which wall [0444] is tied to wall [0372] which would predate all deposits associated with Cluster 7. In addition, Trench 07 is located just east of the destroyed area, and it proved that in-situ archaeological deposits are present over a meter below the destroyed area. Cleaning up the entire area and removing all previously disturbed deposits will allow archaeologists to potentially place a full sized trench at a staring depth 2.5 meters below the modern ground surface and target these deep and potentially very significant cultural deposits.

Finally, excavation in Trench 06 during 2018 should prioritize continuing excavation within the 5m x 4m area in order to completely excavate the portion of the Cluster 7 structure and underlying significant deposit [0374] before considering whether to open additional areas to the east, north, or west. However, after running dates from clusters 4 and 5, it may be deemed worthwhile to investigate more of the Cluster 4 structure by opening the area to the northeast of Trench 06, or opening the area to the east of Trench 06 in order to expose more the Cluster 05 structure, which contains a plastered floor at a relatively shallow depth below the modern ground surface.

In conclusion, Trench 06 provided important architectural, and artefactual data that contributed to the overall goals of the Shire archaeological project. Although the 2017 excavation did not investigate the Cluster 7 structure that served as the impetus for the placement of the trench, it provided significant data on the sequence of occupation prior to construction of the structure. It also collected samples that will allow the Cluster 7 structure and overlying structures to be dated with high quality and accurate methods. The detailed excavation and documentation of structures that postdate the construction, occupation and abandonment of Cluster 7 will allow researchers during the 2018 season to focus their time and energy on the lower deposits.

Prepared by Reuven Sinensky

2.6 Trench MA 07

Scott Sunelll (trench supervisor), Guish Assefa, Alamru Gebru, Ablulum Hagos

Excavation dates 5 -16 Dec. 2017

Trench 07 was 1m x 1m with corners located at:

Trench 7 datum	37P	426179.28	1560180.74	**1915.47**
Trench 7 NE	37P	426178.83	1560182.09	1914.92
Trench 7 NW	37P	426178.55	1560181.12	1914.96
Trench 7 SE	37P	426179.63	1560181.89	1915.11
Trench 7 SW	37P	426179.36	1560180.94	1915.14

2.6.1 Purpose of Excavation

The goal of work in trench 07 was to establish the depth of deposits at Mai Adrasha, and to provide a stratigraphic sequence for comparison of other strata across trenches at the site. Importantly, the unit was situated near the large wall bounding trench 06 in order to assess the use of space through time near that very prominent structure. Additionally, the extent of looting in the immediate vicinity (and the presence of large numbers of diagnostic artifacts and intact faunal elements), the presence of a large ash lens located ~2m below the surface level in the cut bank exposure resulting from that looting, and the instability of the site deposits at the location suggested that a trench that could salvage as much data as possible from the eroding and damaged deposits would contribute significantly to the understanding of the site as a whole. The exposure also suggests that there are no walls or other forms of large-scale architecture in the area of trench 07, which could interfere with the goal of identifying the sequence of deposition at the site.

The trench itself was cut into the bank created by the gold panners during their looting. The top surface level was 2m above the bottom of the eroded area. This location was chosen for the reasons listed above, but also because the W wall of the trench could be collapsed outward to provide access to an increasingly deep 1m x 1m unit that would otherwise be impossible to enter or exit and unsafe to excavate. The trench was also situated to capture part of the ash lens visible in the exposure, the horizontal extent of which was unclear but was assumed to be very limited. To the north of trench 07 was trench 06 and the large stone wall that formed the S edge of that trench. The curve of the cut bank connected the edge of trench 07 with the edge of trench 06, which were separated by 10m of open space caused by looting. As a result, it is possible to trace strata between the two units and to draw connections between the material recovered from trench 07 that from trench 06. The remaining trenches were located further away to the NE, but ideally trench 07 will extend below those trenches in order to capture the entire sequence of occupation. The ultimate goal of trench 07 is to provide a comparative baseline for strata at the rest of the site, ideally connecting thoroughly dated deposits in trench 07 to those elsewhere to support interpretations about site use and reuse through time.

Trench 07 will likely reach the earliest in situ deposits at Mai Adrasha, exposing strata that have not been excavated elsewhere at the site. This will provide substantial opportunity to date the site thoroughly and in sequence, which has been difficult in other trenches due to the extensive reoccupation and reuse of architectural features at the site. If the deposits in trench 07 are similar to the looted areas adjacent, there is significant potential for the trench to yield large quantities of diagnostic pottery, substantial plant remains from ash and charcoal deposits, and large faunal elements in excellent preservation. Each of these material types will benefit from specialist analysis to identifying patterns of use through time, and to distinguish any temporally diagnostic signatures that may contribute to understanding site use.

2.6.2 Stratigraphic Relations

Phase I: Trash deposit	0498
Phase II: Pit with fill	0496, 0497
Phase III: Sequential trash deposition	0421, 0422, 0423, 0424, 0425, 0426, 0427, 0428, 0429, 0490, 0491, 0492, 0493, 0494, 0945
Phase IV: Waterlaid deposit	0419
Phase 5: Collapse/tumble	0418
Phase 6: Surface/Ploughzone	0416, 0417

Trench 7, a 1x1 m trench at the edge of the destroyed area, which is used to get a stratigraphic overview of this part of the site.

2.6.3 Overview and Discussion

Trench 07 represents a long-term trash dump, capped by natural deposits, the collapse of architectural stone, and the use of the topsoil for teff cultivation. As a result, trench 07 yielded substantial amounts of material that will contribute directly to evaluating the history of occupation at the site, and to connecting the sequence of use at trenches 01, 02, 03, 04, and 06 to one another. While trench 07 is somewhat far from trenches 01-04, the depth of the excavations exceeded that of all other trenches at Mai Adrasha and will likely remain deeper than those trenches at least for another season. Though trench 07 did not reach bedrock at the end of the season, it did cut through a large ash lens (likely a hearth or hearth remains dumped in the area), yielded significant quantities of seeds and charcoal even in preliminary processing, identified the first true sand deposits at the site, and encountered a pit below 1912.00m that was filled with large sherds of burnished and impressed blacktop wares.

The strata that underlie [0498] are essentially unknown. A small sounding in the NW corner of the unit identified a dark black clay layer, but no further detail about that deposit [0499] could be ascertained besides color, depth, and composition. [0498] and units above, however, are already clearly trash deposits from the very beginning. [0498], the earliest deposit, is the

sandiest of the recorded strata, [=*Phase I*]. Into this stratum, a pit was cut and filled with very large sherds.
This pit is defined as cluster 01, and is composed of a cut [0496] and a single fill layer [0497]. Most of these strata are characterized by relatively large pot sherds, large quantities of charcoal and faunal remains, and very sparse lithic density. This pattern suggests repeated dumping of kitchen or food preparation debris of some kind, accumulating through time in the area of trench 07. The bulk of the deposit represents this sequence: [0421] – [0429] and [0490]-[0495] nearly all lie in direct vertical orientation to one another. The one exception is the substantial ash lens represented by [0492], which is likely either a discrete dump event or a hearth feature. The soils at depth are extremely wet, however, and distinguishing between those alternatives was unfortunately not possible. Individual events cannot otherwise be discerned, though the accumulation of trash deposits such as this were undoubtedly the result of many such small depositional events. The general uniformity of soil texture, and lack of significant non-artifactual inclusions in much of the sequence, makes distinguishing these events difficult. At a first approximation, however, this suggests continual use of the site without interruption for a substantial amount of time. Above [0421], the strata become obviously natural, with a significant uptick in stone content (primarily pebbles with the exception of the cobble layer [0418]. [0420], which lay outside of the unit, was sampled with trench 07. That unit was taken from the exposed ash lens in the cut bank. Above [0418], units [0417] and [0416] represent the topsoil composing the contemporary ploughzone and active agricultural field.

Significant artifacts from trench 07 were abundant. Notable finds were stone and bone beads (and bead fragments), a very large rim/shoulder sherd of blacktop ware at the top of [0497], and substantial amounts of charcoal throughout the trash deposits in the trench. Bone preservation in the lower strata was also excellent, with very large and frequently complete elements recovered. This trench has significant potential to yield plant materials for analysis, and to contribute substantially to our understanding of animal use as well. All of the primary goals of excavation for this trench were accomplished (reaching depth, identifying dateable plant materials, capturing a vertical sequence of site formation), except the possibility of reaching bedrock to establish the full depth of the site.

2.6.4 Future Work

Trench 07 should be continued next season. Identifying the depth of bedrock would itself be a reason to do so, but the sequence of trash deposits that had not ended by the time the trench was closed suggests substantial potential to continue yielding dateable material for radiocarbon analysis if the trench is reopened. The location of trench 07 is ideal, and it should be reopened as is, with the addition of a stepped 1m x 1m unit to the W to provide access in and out of the unit and a route of escape in the event of collapse. The location of trench 07 is incredibly fortunate, as the likelihood of finding a suitable location like it for this work is low given the amount of architecture at the site, and other excavations aimed at characterizing the entire site sequence would require much larger exposures (e.g. stepped units based on depth) or would likely encounter stones that would halt progress. Finding an undisturbed trash deposit in situ like trench 07 is incredibly good fortune and will likely provide critical support for nearly all future analyses at Mai Adrasha. Furthermore, the deeper the trench extends the more likely it is to encounter material from very early periods. It is possible that the rate of trash accumulation was rapid and that the bottom deposits exposed this season in trench 07 do not represent early components of the site occupation necessarily. Therefore, after absolute dates for the trench can be established, further work should commence as soon as possible to identify any such deposits that may be present. Rather than starting from the surface elsewhere at the site, reopening trench 07 would be an ideal avenue by which to approach these issues. The existence of trench 06 nearby provides valuable cross-reference for the material in trench

07, and is another mark in favor of reopening trench 07 next season.

Prepared by Scott Sunell

3. Topographic Survey
Prepared by Hans Barnard

In November-December 2017, the survey of the ancient site of Mai Adrasha, west of Aksum and just east of modern Indaselassie (Shire, Tigray, Ethiopia), and its environs was continued. This project was started in December 2014, when a 100 km² concession area and two promising archaeological sites (Mai Adrasha and Mezaber Adimenabr) were identified. More data were collected in December 2015 and December 2016. The instruments used were a Trimble Geo 7X rover, corrected by a Trimble 6H antenna and Juno 3B data logger in a fixed position (37P – 421758.53 E – 1558870.18 N – 1913.79 mASL). All data were analyzed using GPS Pathfinder Office (Trimble), Foresight DXM (TDS) and Surfer (Golden Software) software; the results of which were combined with existing maps and satellite imagery in ArcMap (ESRI). All coordinates were projected onto zone 37P (N) of the WGS84 geode; all heights were calculated in meters above mean sea level (mASL). This research was made possible by the Joan Silsbee Chair of African Cultural Archaeology, the Cotsen Institute of Archaeology at UCLA and the Institute for Field Research; and executed in cooperation with Aksum

University and the Ethiopian Authority for Research and Conservation of Cultural Heritage.

The GPS base-station on the roof of the dig house in Indaselassie (December 2016); its corrected coordinates are: 37P (N) / 421758.53 E / 1558870.18 N / 1913.79 mASL.

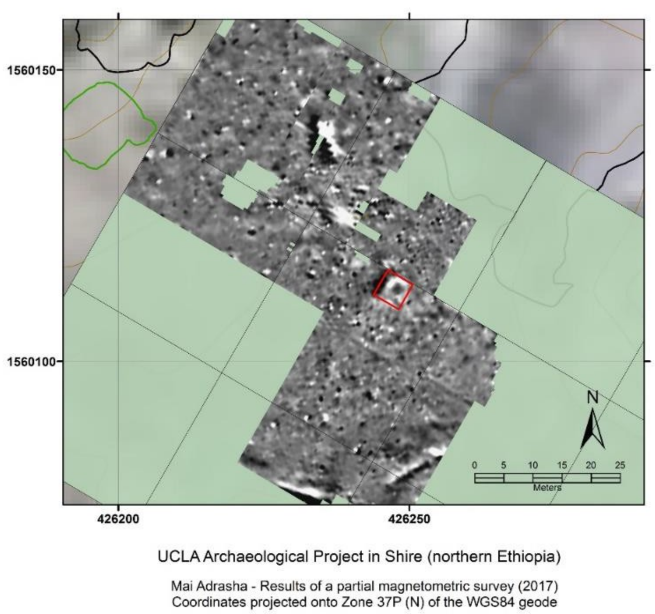
The modern north gate at Mai Adrasha, as seen from the north in December 2015.

The sole remaining (east) jamb of the north gate,as seen from the north in November 2017. Its top is at 37P (N) / 426219.74 E / 1560346.86 N / 1912.06 mASL.

In 2016 the tops of the six jambs of the three gates in the 2004 fence were located to correct the elevation of newly collected data and to provide for the event that a new base station needs to be established. In November 2017 the west jamb of the north gate appeared lost, the otherfive jambs were found unchanged.

Coordinates of the tops of the modern gate jambs at Mai Adrasha				
ID	**Zone**	**Eastings**	**Northings**	**Elevation**
W-gate N-jamb	37P	426154.43	1560201.49	1916.60
W-gate S-jamb	37P	426152.21	1560197.29	1916.52
S-gate W-jamb	37P	426240.78	1560124.93	1913.01
S-gate E-jamb	37P	426242.57	1560124.80	1912.96
~~N-gate~~ W-jamb	~~37P~~	~~426217.83~~	~~1560346.77~~	~~1912.11~~
N-gate E-jamb	37P	426219.74	1560346.86	1912.06

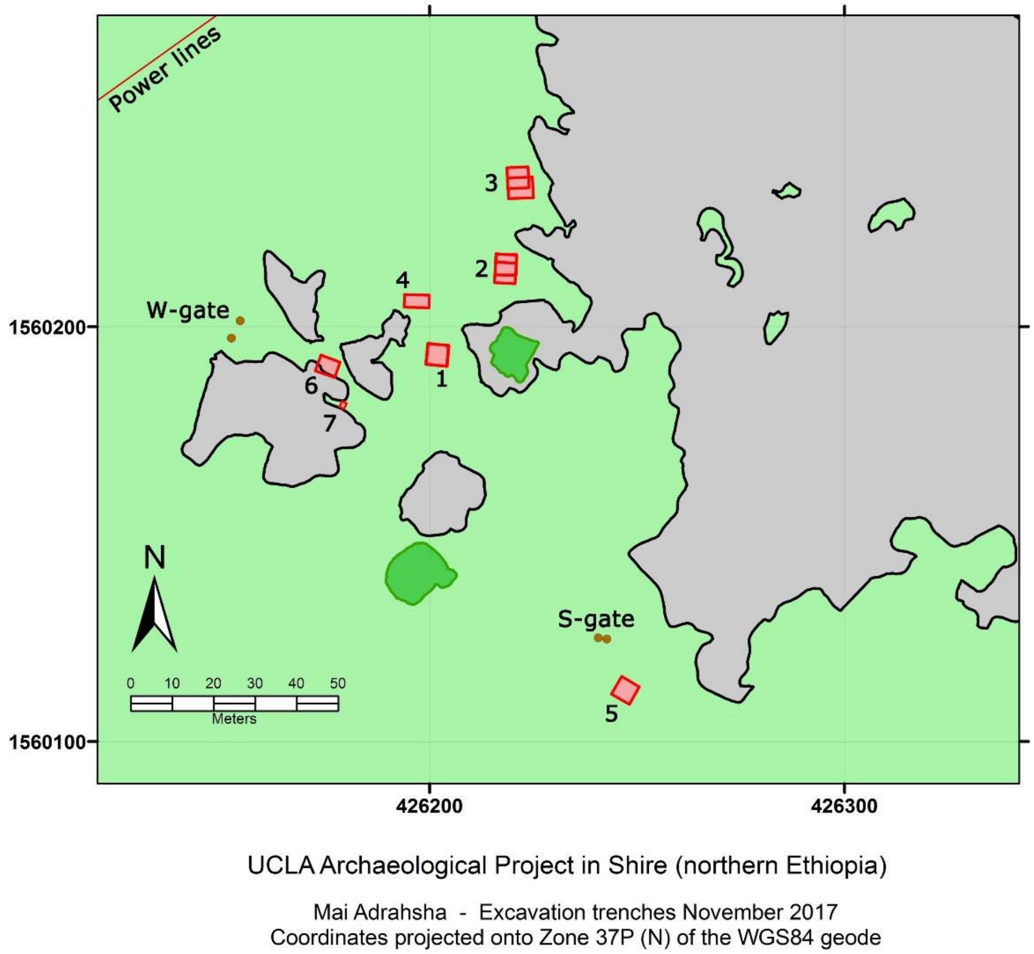
Topographic surveywork in 2017 was mostly complimentary to other research projects. In November the grids used by a team of geophysical surveyors from SPARC (Arkansas) were located so that the results could be overlaid on existing maps and plans. The results of the magnetometric survey that was performed were inconclusive, partly because many fields surrounding the site were not yet harvested and therefore inaccessible. In one place, south of the main site, a large circular anomaly was seen and a 5×5 excavation trench (Trench 5) was opened to investigate this finding. No obvious archaeological features were encountered that could explain the observed anomaly.



Part of the magnetometric map of the surface at Mai Adrasha and the location of Trench 5 over one of the observed anomalies (November 2017).

During the excavation season the coordinates of the corners of the excavation trenches were established:

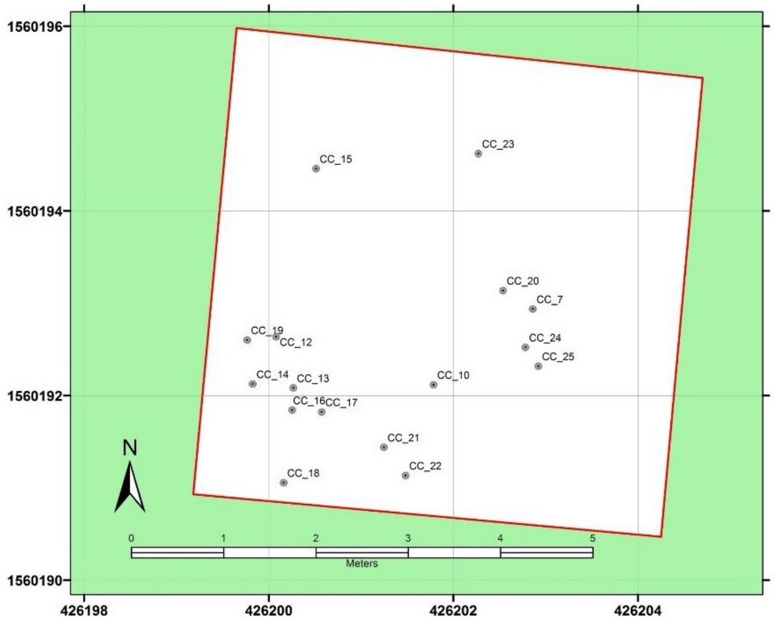
Location of the 2017 excavation trenches at Mai Adrasha				
ID	**Zone**	**Easting**	**Northing**	**Elevation**
Trench 1 datum	37P	426207.91	1560193.66	**1914.99**
Trench 1 NE	37P	426204.70	1560195.44	1914.80
Trench 1 NW	37P	426199.65	1560195.98	1914.85
Trench 1 SE	37P	426204.25	1560190.47	1914.74
Trench 1 SW	37P	426199.18	1560190.93	1914.75
Trench 2 datum	37P	426227.46	1560216.56	**1914.79**
Trench 2 NE	37P	426220.94	1560215.33	1913.99
Trench 2 NW	37P	426215.97	1560215.67	1914.20
Trench 2 SE	37P	426220.60	1560210.37	1914.21
Trench 2 SW	37P	426215.63	1560210.67	1914.37
Trench 3 datum	37P	426227.23	1560224.28	**1914.09**
Trench 3 NE	37P	426224.80	1560236.17	1913.41
Trench 3 NW	37P	426218.83	1560235.83	1913.40
Trench 3 SE	37P	426225.06	1560231.14	1913.46
Trench 3 SW	37P	426219.04	1560230.94	1913.48
Trench 5 datum (12 Dec. ’17)	37P	426245.54	1560115.23	**1910.54**
Trench 5 datum (13 Dec. ’17)	37P	426245.34	1560115.35	**1910.75**
Trench 5 datum (16 Dec. ’17)	37P	426245.49	1560115.34	**1910.32**
Trench 5 NE	37P	426246.33	1560115.70	1910.29
Trench 5 NW	37P	426243.85	1560111.44	1910.10
Trench 5 SE	37P	426250.56	1560113.15	1910.17
Trench 5 SW	37P	426248.17	1560108.93	1909.92
Trench 6 datum	37P	426179.88	1560186.57	**1915.48**
Trench 6 NE	37P	426173.84	1560193.18	1915.06
Trench 6 NW	37P	426172.48	1560189.41	1914.19
Trench 6 SE	37P	426178.42	1560191.47	1915.94
Trench 6 SW	37P	426177.17	1560187.76	1915.04
Trench 7 datum	37P	426179.28	1560180.74	**1915.47**
Trench 7 NE	37P	426178.83	1560182.09	1914.92
Trench 7 NW	37P	426178.55	1560181.12	1914.96
Trench 7 SE	37P	426179.63	1560181.89	1915.11
Trench 7 SW	37P	426179.36	1560180.94	1915.14



Location of the 2017 excavation trenches at Mai Adrasha (see table above).

At the end of the season targets were located in Trenches 1, 2, 3 and 6 to allow digital three-dimensional (structure-from-motion) models to be georeferenced.

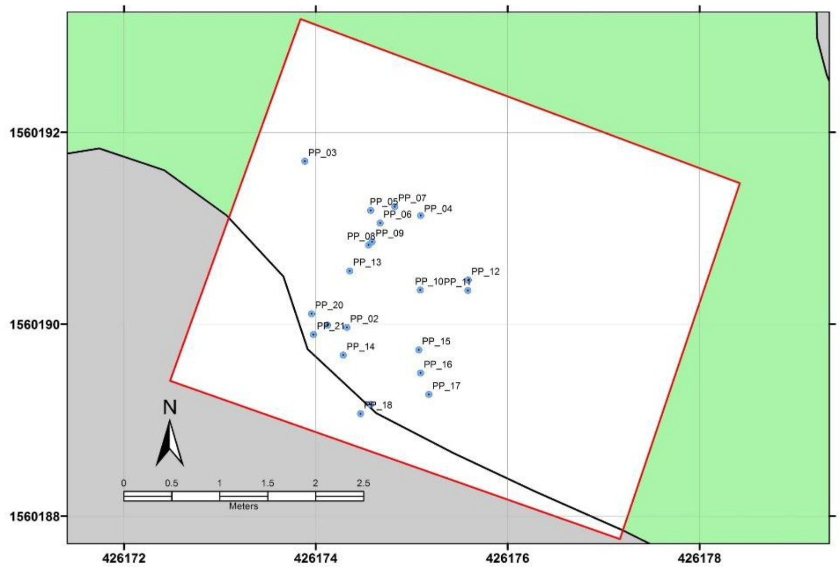
Next to this, selected items were located in Trenches 1 and 6. In Trench 1 these were a number of charcoal samples (CC) and in Trench 6 larger items found on top of a plaster floor (PP):



UCLA Archaeological Project in Shire (northern Ethiopia)

Trench 1 - Location of selected charcoal finds (07 Dec. '17)
Coordinates projected onto Zone 37P (N) of the WGS84 geode

Selected charcoal samples in Trench 1 (2017)				
ID	**Zone**	**Easting**	**Northing**	**Elevation**
CC_7	37P	426202.86	1560192.94	1913.20
CC_10	37P	426201.79	1560192.12	1913.12
CC_12	37P	426200.08	1560192.64	1913.33
CC_13	37P	426200.27	1560192.08	1913.32
CC_14	37P	426199.83	1560192.12	1913.35
CC_15	37P	426200.51	1560194.46	1913.32
CC_16	37P	426200.25	1560191.84	1913.36
CC_17	37P	426200.57	1560191.82	1913.39
CC_18	37P	426200.16	1560191.06	1913.41
CC_19	37P	426199.77	1560192.60	1913.51
CC_20	37P	426202.54	1560193.14	1913.41
CC_21	37P	426201.25	1560191.44	1913.41
CC_22	37P	426201.48	1560191.13	1913.59
CC_23	37P	426202.27	1560194.62	1913.53
CC_24	37P	426202.78	1560192.52	1913.46
CC_25	37P	426202.92	1560192.32	1913.59



UCLA Archaeological Project in Shire (northern Ethiopia)

Trench 6 - Location of selected objects on a plaster floor (4 Dec.'17)
Coordinates projected onto Zone 37P (N) of the WGS84 geode

Selected finds on a floor in Trench 6 (2017)				
ID	**Zone**	**Easting**	**Northing**	**Elevation**
PP_01	37P	426174.57	1560189.16	1914.73
PP_02	37P	426174.32	1560189.97	1914.72
PP_03	37P	426173.89	1560191.70	1914.68
PP_04	37P	426175.09	1560191.13	1914.74
PP_05	37P	426174.57	1560191.19	1914.78
PP_06	37P	426174.67	1560191.05	1914.83
PP_07	37P	426174.82	1560191.23	1914.80
PP_08	37P	426174.55	1560190.83	1914.75
PP_09	37P	426174.59	1560190.86	1914.69
PP_10	37P	426175.09	1560190.36	1914.78
PP_11	37P	426175.59	1560190.35	1914.83
PP_12	37P	426175.59	1560190.46	1914.84
PP_13	37P	426174.35	1560190.56	1914.80
PP_14	37P	426174.29	1560189.68	1914.78
PP_15	37P	426175.07	1560189.73	1914.81
PP_16	37P	426175.09	1560189.49	1914.79
PP_17	37P	426175.18	1560189.27	1914.84
PP_18	37P	426174.47	1560189.07	1914.78
PP_19	37P	426174.12	1560189.99	1914.80
PP_20	37P	426173.96	1560190.11	1914.80
PP_21	37P	426173.98	1560189.89	1914.82

Mai Adrasha seen from the South, November 2017.

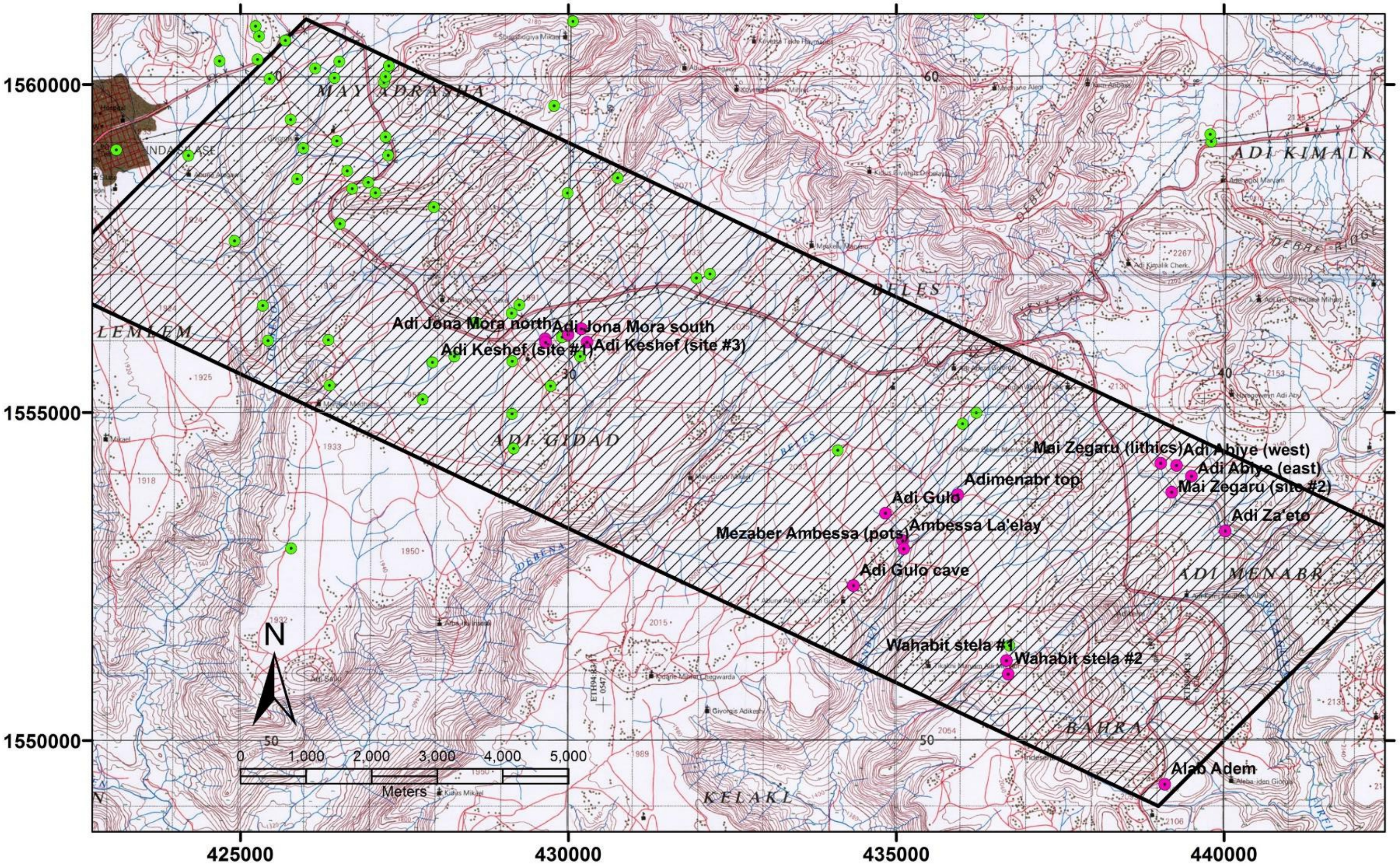
Mai Adrasha seen from the East, December 2017.

The regional survey data kindly provided by the Cambridge team that worked in the area previously—which was originally likely projected onto the Clarke 1880 (modified) spheroid (Adindan)—was converted to UTM coordinates projected onto the WGS84 geode, and visualized in the project's GIS (in green).

Finally, the data collected during a field-walking survey conducted by Matthew Curtis were corrected, collated and visualized in the project's GIS (in purple).

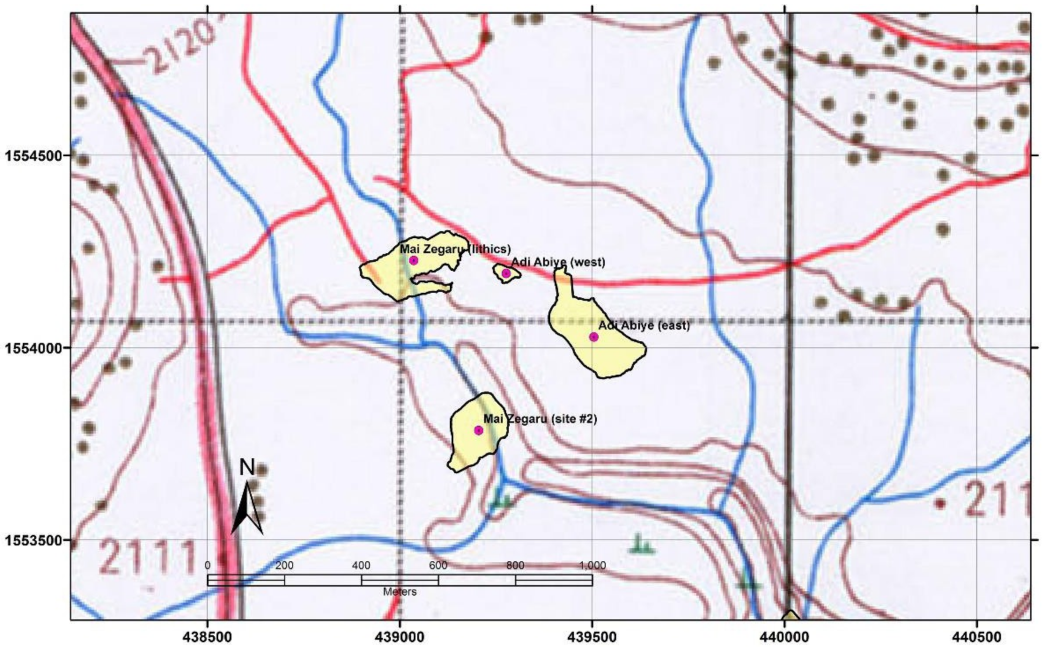
The village and site of Mezaber Adimenabr—about 12 km. (7.5 miles) southeast of Mai Adrasha—was visited again to monitor for additional damage done to the ancient remains. The site was found unchanged compared to our previous visit in December 2015, when a large undocumented excavation had taken place in the center of the modern settlement. A partial magnetometric survey was performed and the outline of the site located.

Results of the 2017 regional survey				
ID	**Zone**	**Easting**	**Northing**	**Elevation**
Adi Abiye (east)	37P	439504.60	1554027.60	1953.10
Adi Abiye (west)	37P	439277.10	1554192.50	1953.10
Adi Gulo	37P	434837.90	1553461.90	1919.60
Adi Gulo cave	37P	434351.25	1552359.01	1911.45
Adi Jona Mora (north)	37P	429651.26	1556120.92	1918.91
Adi Jona Mora (south)	37P	429657.85	1556068.57	1922.37
Adi Keshef (site #1)	37P	430001.65	1556188.59	1918.33
Adi Keshef (site #2)	37P	430202.63	1556274.30	1920.94
Adi Keshef (site #3)	37P	430288.98	1556069.79	1916.69
Adi Za'eto	37P	440020.20	1553193.40	1949.20
Adimenabr	37P	435940.88	1553742.92	1928.99
Alab Adem	37P	439097.20	1549332.90	1945.80
Ambessa La'elay	37P	435101.10	1553045.30	1895.30
Mai Zegaru (lithics)	37P	439036.70	1554226.30	1950.30
Mai Zegaru (site #2)	37P	439205.50	1553784.70	1952.30
Mezaber Ambessa (pots)	37P	435117.94	1552920.86	1885.41
Wahabit stela #1	37P	436684.16	1551215.93	1932.43
Wahabit stela #2	37P	436709.79	1551009.60	1940.77



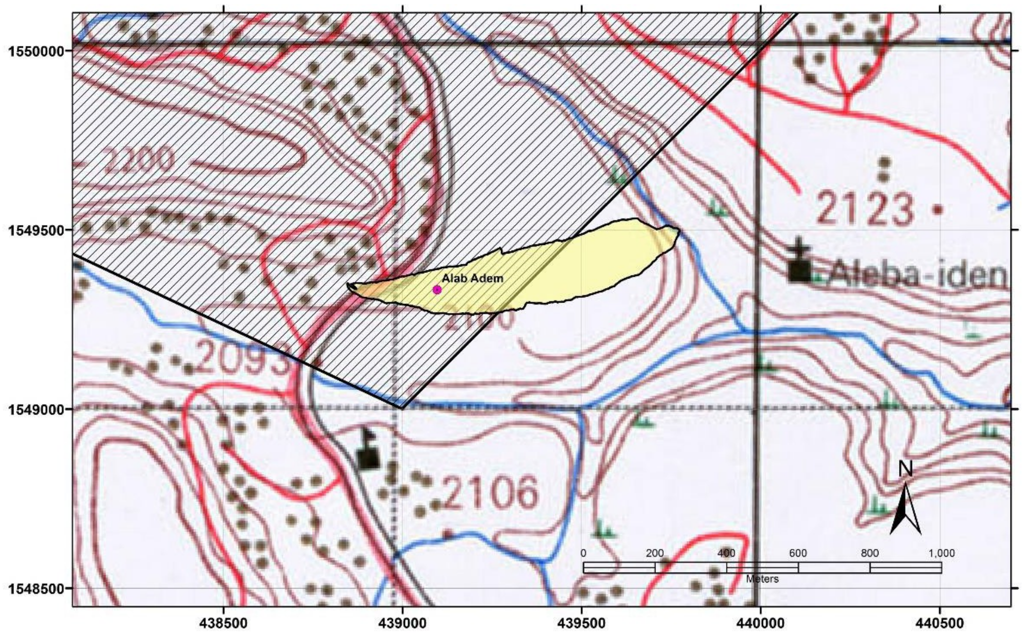
UCLA Archaeological Project in Shire (northern Ethiopia)

Regional survey - Location of newly discovered ancient sites (December 2017)
UTM-coordinates projected onto Zone 37P (N) of the WGS84 geode



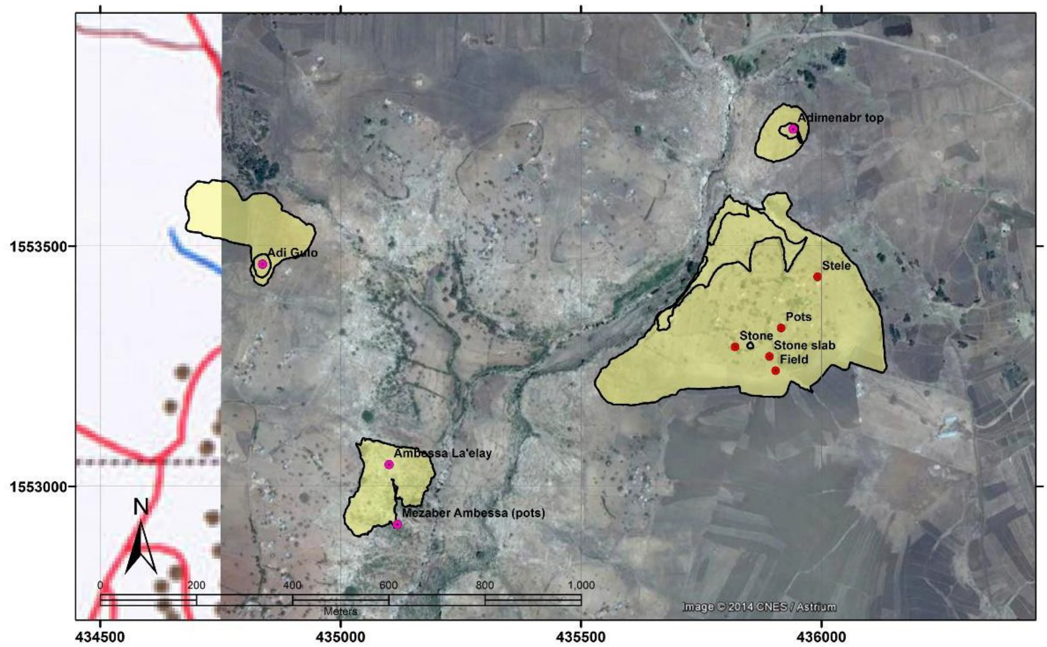
UCLA Archaeological Project in Shire (northern Ethiopia)

Regional survey - Location of Adi Abiye and Mai Zegaru (December 2017)
UTM-coordinates projected onto Zone 37P (N) of the WGS84 geode



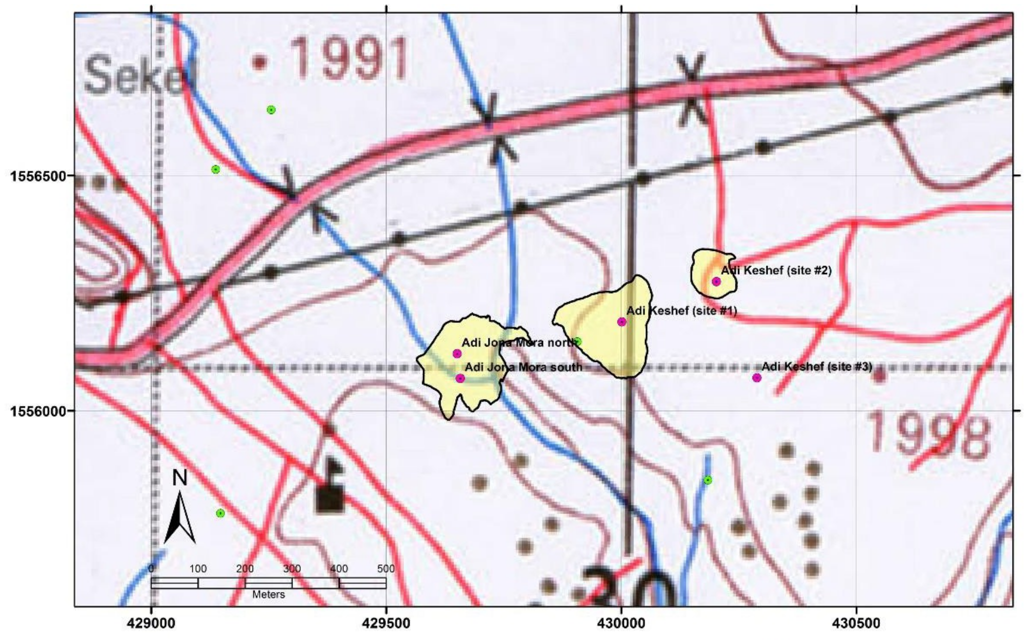
UCLA Archaeological Project in Shire (northern Ethiopia)

Regional survey - Location of Alab Adem (December 2017)
UTM-coordinates projected onto Zone 37P (N) of the WGS84 geode



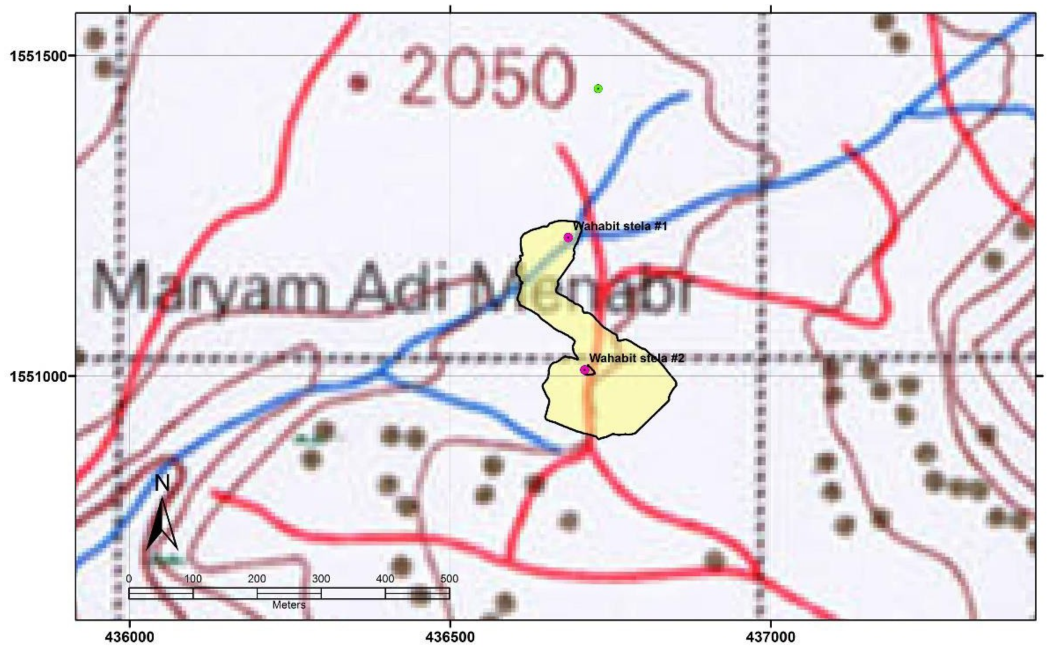
UCLA Archaeological Project in Shire (northern Ethiopia)

Regional survey - Location of Adi Gulo, Ambessa La'elay, Mezaber Adimenabr and Mezaber Ambessa (December 2017)
UTM-coordinates projected onto Zone 37P (N) of the WGS84 geode



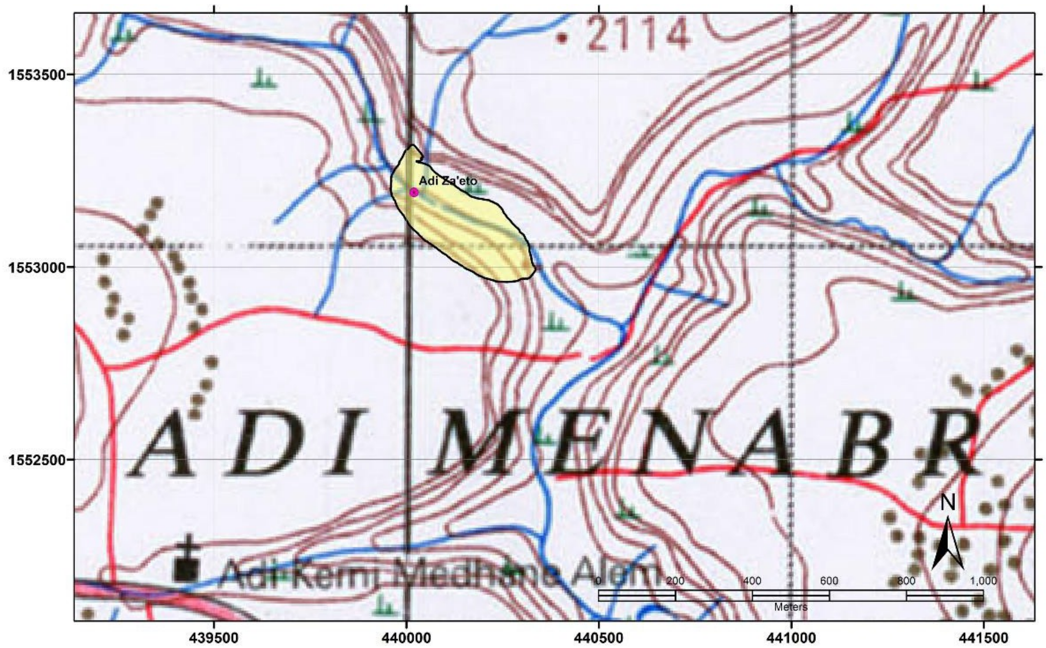
UCLA Archaeological Project in Shire (northern Ethiopia)

Regional survey - Location of Adi Jona Mora and Adi Keshef (December 2017)
UTM-coordinates projected onto Zone 37P (N) of the WGS84 geode



UCLA Archaeological Project in Shire (northern Ethiopia)

Regional survey - Location of Wahabit (December 2017)
UTM-coordinates projected onto Zone 37P (N) of the WGS84 geode



UCLA Archaeological Project in Shire (northern Ethiopia)

Regional survey - Location of Adi Za'eto (December 2017)
UTM-coordinates projected onto Zone 37P (N) of the WGS84 geode

4. Regional Survey

Matthew Curtis, Kifle Zeruhe, Prepared by Matthew Curtis

Archaeological pedestrian reconnaissance survey was conducted over 12 days between Tuesday, November 14 and Thursday, November 30, 2017, led by Matthew C. Curtis (UCLA) and Kifle Zerue (Axum University), with assistance from Gidey Gebreegziabher (Tigray Culture and Tourism Bureau) and involving 14 project participants. Archaeological survey targeted the upper segments of the Mhtsabare/Debena, Senbet/Mai Ambessa, and Guna Guna/Kumil/Mai Suri stream courses within three of the four major stream drainage systems in the 100 square kilometer UCLA Shire Archaeological Project survey area (see image below). Reconnaissance involved a judgmental sample walking in groups of two to five surveyors in areas chosen through on-ground observation of landscape features and topography and from Google Earth images and topographic maps, and from previous archaeological sites information collected by Gidey Gebreegziabher during cultural heritage impact assessment research conducted in the region in 2012. Previous archaeological survey information from the international Cambridge University – led survey project (Finneran et al. 2003 and Finneran 2005; and J. Phillips notes) was consulted, but the majority of sites located and documented by the UCLA project in 2017 were not documented by this previous archaeological survey effort (only the Ziban Ar'ada Dungur cemetery and ceramic/lithic area and the Mai Adrasha site area were previously recorded in published literature by Finneran et al.).

Reconnaissance survey in 2017 resulted in the location of 15 archaeological sites previously unmapped and the exploration of environs within and surrounding two sites previously recorded (Ziban Ar'ada Dungur and Mai Adrasha). Each site perimeter was determined by field-walking and mapped using a Trimble Geo7X GPS unit. Ad hoc surface collections of representative material culture were made and photographs taken of artifacts, landscape and archaeological features at each site. Sites recorded were placed on existing Inda Selasie sheet 1:50,000 scale topographic map (Ethiopian Mapping Authority) and georeferenced within the UCLA Shire Archaeological Project GIS program.

The UCLA Shire Archaeological Project survey area consists of 126 survey units, the majority of which are 1 square kilometer in extent. These survey units are numbered sequentially from north to south and west to east. In future field seasons the survey effort will involve complete coverage of a stratified random sample of these survey units, to be carried out by survey teams of four surveyors walking 100 meter transect segments spaced at 25 meter intervals. Intensive and extensive survey forms on computer tablets will be utilized, recording a variety of environmental and archaeological phenomena. Sites discovered during transect segment recording will receive perimeter and major surface feature mapping and systematic surface collections of a percentage of total site surface area (to be determined in 2018) in an effort to identify preliminary site chronology and function.

The following archaeological sites perimeters were mapped during 2017 survey efforts (listed from west to east within the project survey area):

(1) Adi Jamera or Ajaramera: This site is located with survey units 40, 54, and 55 near the modern village community of Adi Gidad. The Ajaramera site comprises a large complex of mound features and ancient terraces and a likely midden area located above the Mai Qoho and Mhtsabare stream courses. About half of the site area is located within the modern village area. This site is relatively well preserved, having, perhaps, the best state of preservation and extent of any site documented in the survey area. However, the site is threatened by reported imminent plans by the local community to mine the site for building material and by interests by individuals to "pan for gold" as has been experienced at the Mai Adrasha archaeological site.

(2) Adi Keshef Site #1: This site is a small site with concentrations of predominantly chert lithic tool, core, and preform material and occasional ceramic sherd material. Adi Keshef Site #1 is positioned on a slight ridge area.

(3) Adi Keshef Site #2. This site comprises several small remnant mounds with architectural rubble, exposed wall features, and concentrations of mostly chert lithic material and ceramic sherds. Adi Keshef #2 site is located above the Mai Qoho and Mhtsabare streams and a couple hundred meters opposite of the nearby Ajaramera site area.

(4) Adi Keshef Site #3. This site is situated east of Adi Keshef Site #2. The site perimeter was not mapped due to its discovery on the last day of survey fieldwork and lack of time. It is similar to Adi Keshef Site #2, only larger, and should be explored in the 2018 field season.

(5) Adi Gulo remnant mound site. This site is located within survey unit 86 adjacent to the modern village community of Adi Gulo. The site includes a remnant mound of architectural rubble and anthropogenic soil and an extensive scatter of lithic and ceramic material surrounding the remaining mound feature.

(6) Adi Gulo Caves Site. This is a cave complex located in survey unit 99 immediately adjacent to the Abune Aby Igizi Adi Gulo church compound. There are two major chambers observable (with deeper chamber areas likely) located at the head of a stream course flowing into the Mai Ambessa stream valley. The caves include springs and were the location of a church structure (walls of which are still visible in the caves) that tradition suggests was established in the late 19th century and remained until the new above-ground church of Abune Aby Igizi Adi Gulo was built around 1929. The caves contain substantial sediment deposits, surface ceramic sherd, lithic cores and tools, and faunal material, and may provide an important location for retrieving archaeological and environmental data of deep antiquity through future excavation and environmental sampling of the deposits.

(7) Mezaber Ambessa La'elay Geza Site. This is a site that includes both the area above the Mai Ambessa canyon and the slope and floor of the canyon in survey unit 100. It is characterized by large boulders, old stone terraces, paths, and significant amounts of anthropogenic soil with ceramic and lithic material culture. Me'asho Tesfahuny found three complete ancient ceramic vessels eroding from the site and now keeps the vessels in his house above the site. He showed us the vessels and they were recorded with photographs and video.

(8) The Mezaber Adi Menaber site. This site, located in survey unit 87, was investigated by the UCLA Shire Archaeological Project team in previous season. In 2017 the site perimeter and western mounds area was mapped and an additional mound area north of the main site area was documented and mapped as well. It was revealed that a large, thin stela was removed from the Mezaber Adi Menaber some 8 or 9 years ago and placed in front of the nearby Tikakni Maryam Adi Menaber Church. The stela was observed in front of the church.

(9) The Wahabit site. This site is located in the Adi Alaba Adin village area above the Gulo Gulo stream in survey units 112 and 119. The site consists of dense architectural rubble, extensive lithic and ceramic material culture scatters, several remnant mound areas, and two standing stelae. The site has been largely destroyed by agricultural terracing and gardens and from quarrying of stone for local building construction. An interesting aspect of the Wahabit site is the presence of many stone sickle-like artifacts, many of which are made from the locally available metavolcanic rock material.

(10) Mai Zegaru Site #1. This site is a fairly dense and diverse lithic artifacts scatter area, with cores, preforms, flakes, and finished formal tools in abundance and made from a range of raw material types. Some of the material resembles LSA and MSA forms present elsewhere in the northern Horn. The site is situated in the Mai Zegaru stream area and within proximity to several springs and seeps, as well as a deep slot-like canyon area with fresh water pools.

(11) Mai Zegaru Site #2. This site sits above the Kumil Canyon area adjacent to the Mai Zegaru Site #1 and consists of lithic scatters and occasional ceramic sherds.

(12) Adi Abiye Lithic Site #1. This is a small, but dense lithic scatter area situated between Mai Zegaru Site #1 and the Adi Abiye Lithic Site #2 in a rocky area adjacent to slot-like canyon. Lithic material is diverse and substantial, with large numbers of chert cores, flakes, and tools, as well as lesser amounts of quartz and chalcedony lithic artifacts and occasional basalt material.

(13) Adi Abiye Lithic Site #2. This side is located on an upland area on the East side of the Kumil stream canyon, a tributary to the larger Guna Guna stream canyon. The site has abundant lithic material, including many cores, preforms, flakes, and finished tools, some of which resembles MSA and even ESA tools in the large scrapers, choppers, and hand axe-like forms made predominantly from chert. Some of this material was eroding from in-situ deposits on the site. There is the potential that this site may contain adequate amounts of material culture-bearing sediment in which to excavate in the future.

(14) Adi Za'eto site. This site is located above the Gunde stream area, part of the Guna Guna canyon watershed area just south and east of the Kumil area. The site is located in survey unit 92 and consists of substantial architectural rubble, ceramic sherds, lithic artifacts, and several small intact mound areas with architectural rubble and exposed wall features. The site has been largely destroyed by quarrying and plowing. On the northern side of the side overlooking the stream canyon are two bedrock mortars.

(15) Alab Adem lithic site. This site is near the village of Bahra and above the Mir Sury stream, which feeds into the larger Firfira stream gorge or canyon. The site is characterized by a diverse range of lithic artifacts, including cores, preforms, flakes, and occasional finished tools made from a range of material, including chert, quartz, chalcedony, quartzite, and basalt. The site may represent a lithic production area.

5. Finds Registry Deidre Whitmore

During the 2017 field season the Shire Archaeological Project tested a primarily digital recording procedure. Information about the trenches and units was recorded in the field by the trench supervisors and excavators on Microsoft Surface tablets. This information was directly recorded into the project database thereby reducing the risk of loss or transcription errors that can occur when paper records are migrated into digital databases. In addition, the field team also used these tablets to take contextual photographs, to which they added annotations and then entered into the project database with the appropriate metadata. Each evening the data collected on the tablets was backed up to the registry computer and external drive and the databases were synced and updated across all of the tablets weekly.

A barcode printer and scanner were introduced into the registry workflow this season. Trench supervisors continued to add tags to artifact bags which describe the trench, unit, and date of collection. All bags are sorted and reviewed by the registrar and each bag is entered into the project database and given a unique identifier. A new tag with this identifier, contextual information, and a barcode is then thermally printed on durable, waterproof labels. The thermal printing process prevents the ink from fading with time and the printed data is easier to read than handwritten tags. In addition, a barcode scanner can be used to quickly pull up the associated record. Once a bag is entered and labeled the materials are distributed to the appropriate specialist for study or stored until they can be analyzed.

In 2017 the project manual was updated and archaeological data management guidelines and standards were incorporated as part of an effort to increase data literacy within archaeology and to better train the project team on best practices surrounding the collection and management of archaeological data. These guidelines emphasize the importance of documentation and appropriate metadata and outline how to record this information. This documentation is essential for specialists to analyze the materials and by managing the records the data collected by the Shire Archaeological Project can continue to be used and reused by researchers for years to come.

6. Lithic materials and ground stones Annelou van Gijn and Diego Capra

The remaining of lithic materials (2015) and the new ones (2017) have been sorted and entered in an Excel file according the methodology used by Prof. A. van Gijn. Most of them were natural fragments and include several raw materials such as chert, obsidian, quartz, chalcedony, and other stones. Artefacts mainly include very small or tiny flakes, while very few examples of diagnostic pieces such as core preparation flakes, decortication flakes or core rejuvenation flakes and cores were found. Stone tool examples comprise a few crescents (short and elongated), backed flakes, hammerstones and possible handstones.

The remaining lithic materials from 2015 field season include 153 examples: 65 are chert, 10 obsidian, 37 quartz, 11 chalcedony and 30 other stones. Artefacts include 30 flakes, 5 flake fragments, 1 bladlet and 4 casual cores as well possible 4 handstones and 6 hammerstones. Among the flakes there are 1 decortification flake, 1 possible core rejuvenation flake and 1 backed flake. 2 chalcedony crescents were found (Tab. 1).

The lithic material from 2017 field season include 1482 examples: 828 are chert, 183 obsidian,

119 quartz, 112 chalcedony, 238 other stones and 2 possibly heated examples.
Artefacts include 333 flakes, 78 flake fragments, 25 bladelet, 1 bladelet fragment, 9 casual cores and 6 core fragments as well possible 14 hammerstones (made from chert, quartz and chalcedony). Among the flakes there are 9 decortification flakes (1 primary, the others are secondary with very few cortex), 14 possible core rejuvenation flakes, 6 possible core preparation flakes, 3 backed flakes and bladelets (these comprise flake or blade fragments) and 9 possibly used flakes. 20 crescents made from chalcedony, obsidian and chert were found (Tab. 1). Interesting are three pieces made from basalt or volcanic rocks: 2 are blades with retouched sides possibly used as side scrapers and the last apparently is a natural piece of basalt with a possibly retouched long side.

Tab. 1. Crescent examples.

Material	**Registry ID**	**S.U.**	**Measures in mm**	**Description**	**Photo n.**
Chalcedony	SH17.2309gi	450	>16.2x7.9x3.0	Fragment of backed crescent	1
Other chert	SH17.2309gi	450	13.4x6.2x2.7	Short backed crescent	2
R/Y chert	SH17.2291gi	403	14.9x6.0x2.4	Short backed crescent	3
Chalcedony	SH17.1445gi	350	15.3x7.3x2.8	Short backed crescent or backed flake	4
Other chert	SH17.1395gi	350	13.7x5.8x3.2	Short backed crescent	5
Obsidian	SH17.1417gi	251	27.6x11.5x5.0	Elongated backed crescent	6
Reddish chalcedony?	SH17.1921gi	379	17.0x7.3x4.3	Short unbacked crescent	7
Reddish chalcedony?	SH17.2128gi	419	20.4x9.2x3.9	Unbacked crescent?	8
Chalcedony	SH17.2128gi	419	19.3x6.7x5.6	Unbacked crescent?	9
Chalcedony	SH17.2064gi	342	23.2x8.8x3.9	Elongated backed crescent	10
Obsidian	SH17.2094gi	392	32.1x10.3x4.6	Elongated backed crescent	11
Chalcedony	SH17.2119gi	410	>17.5x6.7x4.8	Backed crescent with broken one tip	12
Other chert	SH17.2119gi	410	>15.4x7.0x3.0	Possible crescent	13
Chalcedony	SH17.1463gi	253	21.6x10.6x4.0	Backed crescent	14
Grey chert	SH17.1463gi	257	>15.5x8.93.0	Short backed crescent	15
Chalcedony	SH17.1945gi	310	16.1x6.9x2.6	Short backed crescent	16
Other chert	SH17.1858gi	310	>13.4x9.0x2.9	Fragment of backed crescent	17
Obsidian	SH17.1869gi	390	>23.2x13.7x3.7	Fragment of elongated backed crescent	18
Other chert	SH17.1887gi	382	18.9x9.4x3.8	Unbacked crescent	19
Reddish chalcedony	SH17.2344gi	348	16.7x9.4x4.0	Short backed crescent	20
Chalcedony	SH15.374gi	9	16.8x6.4x2.2	Short backed crescent	21
Obsidian	SH15.233ai	50	21.9x11.8x4.8	Backed crescent or backed flake	22
Chalcedony	SH15.459gi	83	27.0x14.3x4.8	Elongated backed crescent or backed flake	23

Conclusions

This preliminary study suggests that flaking activities were rarely carried out inside the trenches excavated so far, since most of the flakes are very small or tiny examples and rare casual cores with just one or two removed flakes were found. This preliminary conclusion could be changed by the micro-wear analysis of these materials and it will be necessary to understand in which daily activities crescents and hammerstones were used, because they represent most of the stone tools so far.

It has been also carried out a preliminary obsidian analysis on 28 samples collected in the trench 5 from the S.U. 350 (SH17.1395gi and SH17.1423) and S.U. 490 (SH17.2387gi). The outcomes suggest that three different kinds of obsidian were flaked. The obsidian analysis should be continued in the coming years. These data should be compared with other obsidian coming from other sites in order to try to located from where it come from and its trade.

7.Archaeobotany

Degsew Zerihun **7.1Introduction**

The Shire Archaeological project was excavating Mai Adrasha, Shire from 2nd of November to December 15. Accordingly, 6 trenches were opened and the collected soil samples were floated in the dig house. In addition, heavy fractions from year 2016 had sorted. This year plan was to collect more soil sample to recover more charred plant materials which can help for radiocarbon dating and enhance further understanding of the archaeobotanical potential of the sites.

7.2 Methodology

7.2.1 Collection

Unlike previous years (2015 and 2016) the volume of soil samples is increased for robust archaeobotanical result. Therefore, from each unit a minimum of 40 litter of soil was collected and from contexts that is rich in charcoal has been collected in more than 40 litter. In addition, soil samples from pot fill, hearth, and pit has been collected in full range.

7.2.2 Processing

The soil samples were processed in the dig house by using manual machine. Materials including bucket, clothespins, 2mm net and 1 mm sieve were used.

a. Light fractions

The light fractions were capture by using 1 mm sieve and white clothes for drying. Some of the dry light fractions are exported for possible radiocarbon dating and the rest will be studied in Addis Ababa.

b. Heavy fractions

2 mm net was used to capture the heavy fractions. The heavy fractions will be processed next year.

7.3 Result

In general, 218 soil samples were collected and 202 of them were processed. Further, study and analysis will be held in Addis Ababa, National Museum of Ethiopia.

7.4 Recommendation and conclusion

Collecting more soil sample will help us to recover more seeds and this method show promising results even in a preliminary sorting of the 2017 selected light fractions. Therefore, it is better to continue on collecting more soil samples. To make the soil sampling proportional, it is recommended that, each trench supervisors should give more attention to sampling each unit. Since archaeobotanical study has sub-disciplines, it is vital to incorporate data from ethnoarchaeologcal, phytolith analysis, residue, charcoal and pollen analysis.

8. Faunal Remains Anneke Janzen

This report summarizes the zooarchaeological data from the 2016 and part of the 2015 excavations. Each analyzed specimen was assigned a unique catalog number. That catalog numbering sequence does NOT start over with each new registry ID number, nor does the sequence align with trenches units, as bags of bone were not analyzed in any particular order (aside year of excavation).

Prior to analysis the faunal remains were sorted into two groups: non-identifiable and identifiable/potentially identifiable. The non-identifiable bones comprised mammal bone fragments completely unidentifiable to element or narrower taxonomic group. These were also all under 30 mm in maximum dimension. Fragments that were unidentifiable, but over 30 mm in maximum dimension, were included in the analysis

Only bones identifiable/potentially identifiable category were washed, which involved dipping a toothbrush into water and lightly brushing in one direction to remove dirt. Most of the bones were very friable, and so extreme care was taken during the washing process. Bones were left to dry overnight before analysis the following day.

8.1 Results

The bone is quite fragmented. Among identified specimens the mean fragment size is 31.7 mm. Few specimens are identifiable to species, so the lack of a comparative collection at the moment did not significantly hinder analysis. Many identifications were made using photographs of comparative materials by A. Janzen.

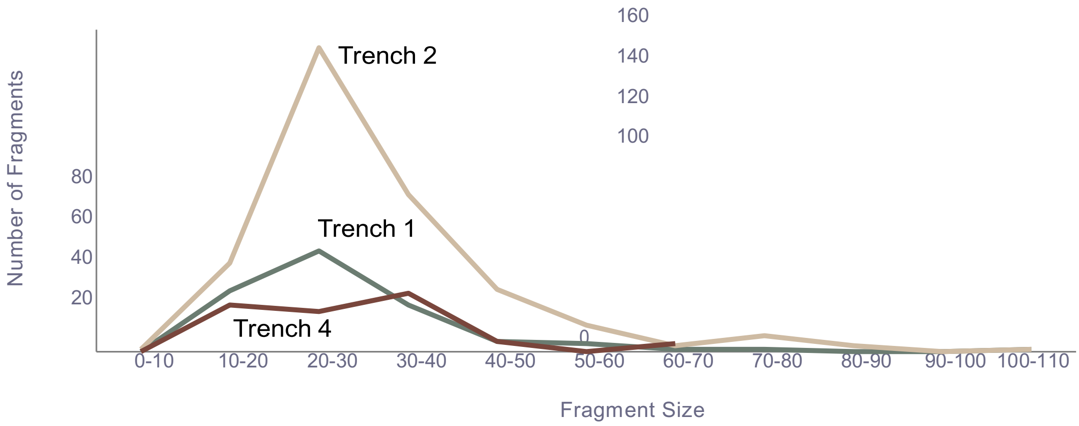


Figure 9.1: Distribution of fragment sizes by trench.

The overwhelming majority of specimens are mammal. Only two specimens were identified as bird, and no fish or reptile elements were found. All specimens identifiable to taxon were identified to either Bos sp. (or cf. Bos sp.) or Caprini (or cf. Caprini). Among those specimens, the larger bovids (NISP 38) greatly outnumber medium-sized bovids (NISP 7). However, it should be noted that the one specimen identified to Caprini came from Unit 113 trench cleaning, and may not be archaeological.

Some specimens were also identifiable to the broader taxonomic category of "bovid". These are mostly dental remains. Specimens identified as bovid size 2, or goat-sized bovid (NISP 46) and those identified as bovid size 3, or cow-sized bovid (NISP 34), are nearly equal in number. This pattern does not align with identifications made to narrower taxonomic categories, but most certainly due to the fact that small bone fragments of small animals are more readily identifiable to element and taxon than similar-sized fragments of large animals. Similarly, relatively even numbers of very fragmented dental remains are identified as hypsodont mammal sized at least 2 (goat-sized) or at least size 3 (cow or donkey-sized). Size estimates are based upon enamel thickness. Mammal remains display a similar pattern, with equal numbers of specimens assigned to mammal size 2 and mammal size 3. These include specimens easily identified to element and animal size, but not taxon, such as ribs or long bones with nearly complete circumferences.

Table 8. 1: Identified taxa from all trenches. Minimum Number of Elements (MNE) and Minimum Number of Individuals (MNI) only calculated for specimens identified to the species level. Specimens identified as Non-Identifiable are not included in this table, nor are specimens recovered from trench/balk cleaning, as they are not from secure contexts.

Taxon	Trench 1	Trench 2	Trench 4	Total
***Bos* sp.**	7	12	1	20
cf. *Bos* sp.	11	4	3	18
cf. Caprini	2	3	1	6
Bovid size 2	26	12	8	46
Bovid size 3	13	17	4	34

Bovid ≥ size 3	11		9	20
Hypsodont ≥ 2	9	13	41	63
Hypsodont ≥ 3	9	39	2	50
Mammal size 2	1	16	1	18
Mammal size 3	1	13	7	21
Mammal ≥ size 2	16	87	23	126
Mammal ≥ size 3	11	118	12	141
Aves indeterminate			2	2
Total	**117**	**334**	**121**	**572**

The age at death of cattle may be estimated by dental development and wear (Grant, 1982, Jones and Sadler, 2012a, Jones and Sadler, 2012b). Three third molars recovered from the site can be assessed for dental wear. All third molars exhibit wear stage G or H, indicating slaughter of young adults ormature adults. One upper first molar is in an advanced stage of wear, characteristic of an aged individual. While more faunal material is necessary for an interpretation of livestock management practices, the faunal evidence thus far does point to keeping some animals alive for either milk or labor.

Table 8.2: Tooth development in cattle.

Source	M1	M2	M3
Silver 1969	5-6 mo: eruption	15-18 mo: eruption	24-30 mo: eruption
Brown et al. 1960	*In utero*: formation begins 2-3 mo: crown complete	1 mo: crown formation begins 12-13 mo: crown complete	9-10 mo: crown formation begins 23-24 mo: crown complete
Soana et al. 1997	*In utero* (3 mo before birth): formation begins	Not studied	Not studied

Table 8.3: Wear stages and age classes for the lower deciduous fourth premolar (dp4) and lower first, second, and third molars (M1, M2, M3) of cattle. Wear stages are described in Grant 1982.

Broad Age Class	Grant (1982) Wear Stage			
	dp_4	M_1	M_2	M_3
Infant (0-6 mo.)	a-g	C, V, E, ½, U, ^{1}, b	C, V	n/a*

Young Juvenile (6 to 24 mo.)	h-m	c-h	E, ½, U, a-f	C, V, E ½, U
Older Juvenile (2-4 years)		j	g-h	a-f
Young Adult (4 to 6 years)		k	j	g
Mature Adult (6 to 8 years)		l	k	h-j
Aged (> 8 years)		m-p	l-p	k-m

[1] The following footnotes are based upon Gifford-Gonzalez's notes on specimens from the NMK Osteology Museum: M1 at A is under 6 months (NMK)

The most faunal remains were recovered from Trench 2 (Table 8. 1). However, in terms of taxonomic or element frequencies, few differences are apparent between trenches. However, the only avian elements recovered from the site come from Trench 4, and future analysis may reveal intra-site differences.

Trenches 1 and 4 show similar frequencies of major element groups, with cranial and dental elements dominating each faunal assemblage (Figure 8.1). This pattern is largely due to the fact that ungulate cheek teeth fragment significantly, and can still be relatively identifiable. Trench 2 displays a slightly different pattern, with a smaller proportion of cranial fragments and larger proportion of long bone fragments.

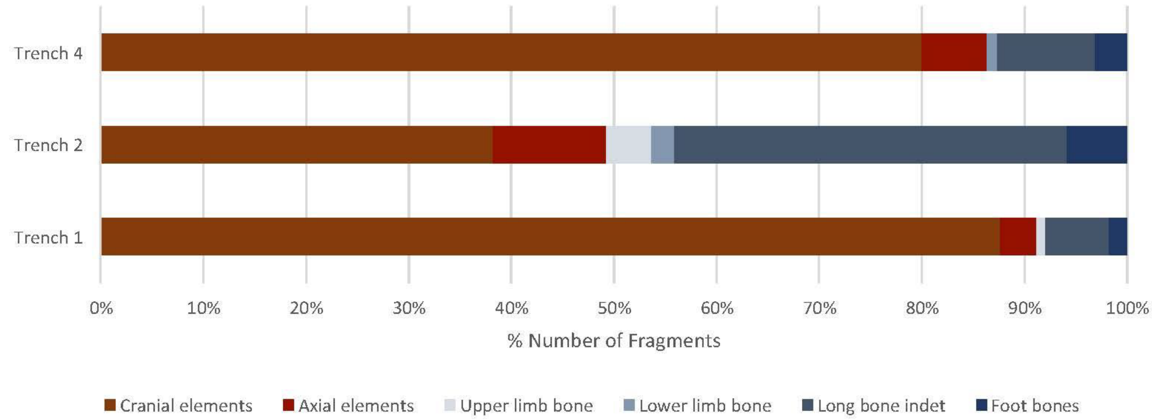


Figure 8.1: Mammal element groups by trench.

8.2 Butchery and Culinary Processing

The frequency of cut or chop marks on bone is low. Among fragments analyzed for surface modifications, only 26 of 572 specimens display any evidence of culinary processing (chops, cuts, or percussion marks). All but two specimens with butchery marks come from large mammals, likely due to increased processing required for processing larger carcasses. Cuts occur on a range of elements and locations, reflecting different activities. Nine elements display cuts on the midshafts of long bones, pointing to filleting. Cuts on one astragalus and one fibulare (bones of the ankle) are likely the result of skinning, as are cuts on 3 metapodia. Four ribs also display cut marks.

Very few specimens show any evidence of burning, suggesting that meat was not typically roasted on the bone (Table 8.4). Nor was burning a common method of refuse disposal. The few specimens from Trench

4 that are calcined may represent hearth clean-out.

Table 8.4: Identified bone grouped by burning stage.

Trench	Unburned	≤ 50% carbonized	≥ 50% carbonized	100% carbonized	≤ 50% calcined	≥ 50% calcined	100% calcined
Trench 1	117						
Trench 2	304	8	9	13			
Trench 4	116					2	3

Animal modification of elements is restricted to rodent gnawing, found only on 7 specimens from Trench 2.

8.3 Interpretations

The identifiable specimens recovered from Mai Adrasha thus far point to an economy reliant on domestic livestock, particularly cattle and caprines.

Other pre-Axumite or Axumite assemblages show similar patterns. Domestic livestock, particularly cattle, remains comprise the overwhelming majority of faunal remains at the pre-Axumite faunal assemblage from Mezber, situated in Eastern Tigrai (reported in D'Andrea, et al., 2011). Avifauna at Mezber also comprise a very small portion of the assemblage, only 3% (NISP). The Mezber faunal assemblage (NISP of 5192) is significantly larger than what has been analyzed for Mai Adrasha, and thus the paucity of birds at Mai Adrasha may not simply be an artifact of the small sample size, but rather a characteristic of Pre-Axumite foodways.

Other relevant sites (for which such detailed faunal data is currently not available) include the Ona sites of Sembel, Sembel Kushet, Sembel II, Mai Hutsa, and Ona Gudo, reported by Schmidt and Curtis (2001). These assemblages also demonstrate an emphasis on domestic livestock, particularly cattle.

The paucity of elements with butchery marks aligns with reports from Ona sites (Schmidt and Curtis, 2001).

8.4 Next Steps

Only a few bags from 2016 and 2015 remain unanalyzed. None of the material recovered from the 2017 excavations has been analyzed. The remaining material will be identified by A. Janzen in 2018. Plans for future analyses (with a larger assemblage) include assessments of intra-site patterns in faunal materials. For example, the two bird elements were recovered from Trench 4. It is possible that other differences in taxonomic or element representation may be revealed upon analysis of more recently excavated material. Currently, no clear patterns stand out.

Other plans for analysis include sequential sampling of cattle tooth enamel for stable isotope analysis. Isotopic data from some faunal from Mezber point to different feeding, and thus, possibly herding strategies, for cattle and caprines (D'Andrea, et al., 2011). Potential future work could also include genetic analysis of cattle bones to determine whether these were straight-backed cattle (Bos taurus) or zebu/humped cattle (Bos indicus), or a mixed breed. Straight-backed cattle are depicted in ceramics, (e.g. yoked cattle in a bowl from Chamber B, Tomb of the Brick Arches, see Phillipson 1995), and stone bulls' heads with humps have been recovered from the site of Sembel, dated to ~2500 BP (Schmidt and Curtis, 2001). Current published data from Mezber do not indicate whether cattle were humped.

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9. Metallurgy Joseph Lehner

Preliminary Archaeometallurgy Report for the 2017 Shire Archaeology Project

Systematic study of finished metals and metal production debris from Mai Adrasha (Shire, Tigray, Ethiopia) began on Dec. 3rd and finished on Dec 17th, 2017. This first preliminary report contains an abbreviated assessment of all finds in general, and then I split up different kinds of analysis depending on the preserved remains (ore procurement, primary, and secondary metallurgy, finished metals). Ore procurement, or alternatively raw material procurement, is defined as the collection and transport of the raw materials necessary for the production of metal. This evidence usually consists of extractive mining sites, metal ores, bulk fuel, fluxing agents, etc. that can be mined and minimally prepared for primary metal production. Primary metallurgy is defined broadly as those technologies involved in the reduction of ores into metal, and this is typically observed with smelting slags, partially reduced ores, and certain kinds of crucibles and furnaces. Secondary metallurgy is defined broadly as those technologies involved in the melting of metal, alloying, and its transformation into finished objects. Secondary metallurgy is usually observed with the presence of crucibles, furnaces, molds, related metal working tools like small chisels and hammers. Together these basic categories comprise part of the so-called metallurgical cycle and defining their presence on or off site forms the basis of interpreting and reconstructing metal technologies and trade/exchange routes associated with them.

Importantly, nearly all stages of metal production are represented at the site. Typically, in village or town like contexts, especially those with highly differentiated societies, various stages of the metallurgical cycle become spatially segregated with the formation of specialist workshops and intensification of production. While further stratigraphic control of the Mai Adrasha assemblage will no doubt help discern between the stages we observe so far, the organization of production, at least of copper and bronze, is closely related in space.

General assessment

During the first few days of analysis, I started to familiarize myself with the metal assemblages across the trenches. It became clear very rapidly that there is present at the site several stages present of the metallurgical cycle. Part of the next weeks will focus on any possible chronological distinction of the metallurgical cycle as it is evident at Mai Adrasha; however, for now and in aggregate, there is evidence of high-quality copper ores, furnace lining, smelting and melting slags, small-volume crucibles for copper/alloy melting, casting waste, and finished metals.

Ore Procurement

I observed several examples of metal ores, in particular copper and iron minerals coming from deposits in trenches MA 01 [0148], MA 02 [0025], and MA 05 [0350, 0356, 0357, 0358, 0359, 0361]. Among the copper minerals, there are at least two types of secondary weathered ores observed, including high grade secondary and polymetallic ores. A large nodule of high-grade green ore (oxides and silicates: ex. malachite, chrysocolla, quartz) is an excellent example of reducible copper ores, as this kind of ore is ideal for copper smelting without any necessary roasting. Smaller fragments of green ores were also noted in MA 05; however, a larger example (SH17-001732-gh) is notably different. This example bears resemblance to a finer quartz matrix with copper oxides and possible sulphides. Quick qualitative scans with a Bruker Tracer 5i pXRF (40 keV 4uA) demonstrate the minor presence of lead and zinc, too, demonstrating the possible exploitation of polymetallic ores. It is presently unknown where these minerals come from, but larger copper sources in Eritrea are known.
Low grade iron ores are also present at the site. These include examples of hematite/goethtite/quartz rocks, some of which appear with spheroidal structures enriched in manganese. Some of these rocks also bear resemblance to laterite deposits known to the region. It is presently unclear if these rocks were being used for iron metallurgy.

Located in a perpendicular gully relative to the largest river gully off the site were located classic pit marks in the bedrock. These may be related to local ore benefaction, perhaps even winning locally available gold from quartz veins. It must be said, however, that these marks could also reflect modern quarry activities, where men hammer into the rock with chisels to dislocate large blocks. This carries on into the present day. See Figure 1 below.

Figure 2: Possible ore preparation and benefaction marks on the bedrock in a gully adjacent to the site.

Primary Metallurgy

Primary metallurgy is evinced primarily from smelting slags and possible furnace lining fragments in deposits in MA 01 [0083, 0132, 0202, 0203, 0205, 0209, 0249, 0284, 0310], MA 02
[0023, 0215, 0218, 0251, 0253], MA 05 [0355], and MA 07 [0491]. pXRF analysis of all slags revealed that these are composed of at least three types: (1) yellow to black/green slags enriched with copper, (2) black slags with minor concentrations of copper, (3) yellow to rust colored slags with variable copper. It is presently impossible to tell if all slags are limited to copper smelting. The difference between iron slags and copper slags produced with high efficiency is a qualitative difference in phases and quantitative difference in copper content. Nevertheless, it remains sometimes impossible to tell the difference without ancillary evidence from microscopy, phase analyses, and the reconstruction thermodynamic histories.

Secondary Metallurgy

Metal melting and production is evinced mostly from crucible fragments. All examples of crucibles come from trench MA 01 [0012, 0083, 0194, 0287, 0290, 0291, 0293, 0315]. The crucibles are all composed of technical ceramic with some noted differences in composition and level of firing. The crucibles are diagnostically small and conical, with noted diameters roughly ranging from 5-10 cm and up to 14 cm deep. The corresponding volumes would therefore be limited to small melts, perhaps for small tools or jewelry. Residue analysis of the interior areas demonstrate both copper and copper-tin alloy melting, which shows strong evidence for the local production of bronze items. One example (SH16-002068-cf) had very high impurities of lead and zinc suggesting that lead melting may also have been an activity, however I have not observed any lead metal objects from Mai Adrasha.

Some examples display high vitrification on both interior and exterior surfaces while others display vitrification on just the exterior. It is presently unclear if the crucibles were produced for multiple uses or for one-off use, but their preservation suggests that they could have been used more than once.

Finished Metal

During this season, I spent most time focused on ores, slags and technical ceramics; however, preliminary analysis of the metals does suggest that there were at least two, perhaps three, copper alloys present, and iron, too. Among the copper alloys, there includes unalloyed copper, arsenical copper and tin bronze. I only observed a couple objects of iron that were from secure contexts (i.e. not surface deposits), including a single iron bangle (SH16-001358-bd 1) which was associated with five other bangles, two produced of unalloyed copper (SH16-001358-bd 2-3) and three produced of tin bronze (SH16-001358-bd 4-6). Two tin bronze coins dating the final king of Aksum (obverse: seated king with staff, reverse: cross with wreaths; both sides with inscriptions) were also analyzed and pXRF analyses were able to conclusively demonstrate the presence of gold in the center of the depicted cross.

A single copper ingot fragment (SH16-000747-cb) was discovered from MA 02 [0113], and this to my knowledge is the only such fragment from the site so far. Whether it is copper produced from primary or secondary metallurgy processes is unknown.

12. Community Outreach
Willeke Wendrich, Gidey Gebreegziabher

In light of the positive responses to our work in the 2016 season, in the 2017 season, we expanded and intensified community outreach efforts begun in 2015 and 2016. This effort was led by Willeke Wendrich and Gidey Gebreezhiaber and consisted of several different measures. Discussions were begun or continued with several Tabia offices, the Woreda office, and the Zonal office. We created posters for these offices to explain the research we were undertaking at the site and its importance. To increase visibility and knowledge of the site in the broader community, we also printed pamphlet sized versions of the poster, which we passed out to neighbors, shopkeepers, coworkers, and schools.

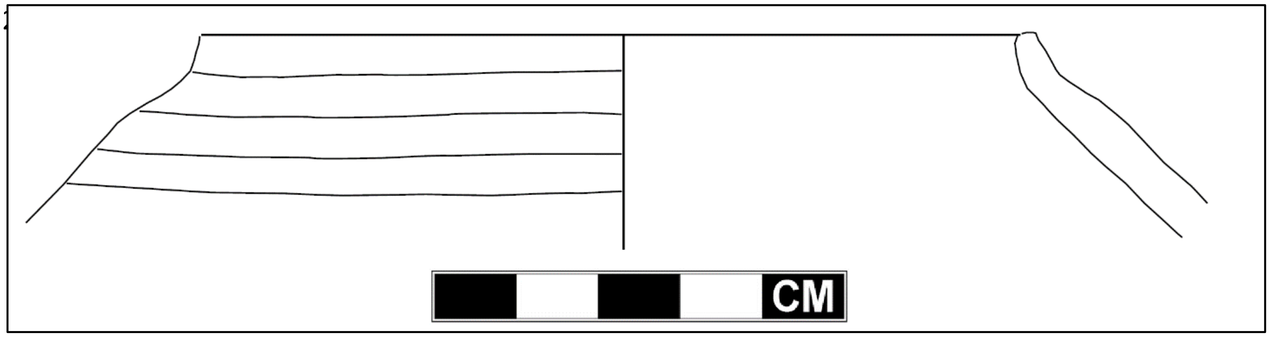
We continued to visit schools and expanded our reach to visit schools in the city of Shire, including the high school across the street from our dig house. We had numerous visitors to the site this year. These included many residents of surrounding villages, as well as, individuals affiliated with local universities. Pictured below is a visit Axum University professors and administrators.

Finally, at the end of the season, Willeke Wendrich presented a lecture about the progress of the excavation in addition to our community work in and around Mai Adrasha.

APPENDIX 2

Selected Ceramic Drawings by Trench

MA1



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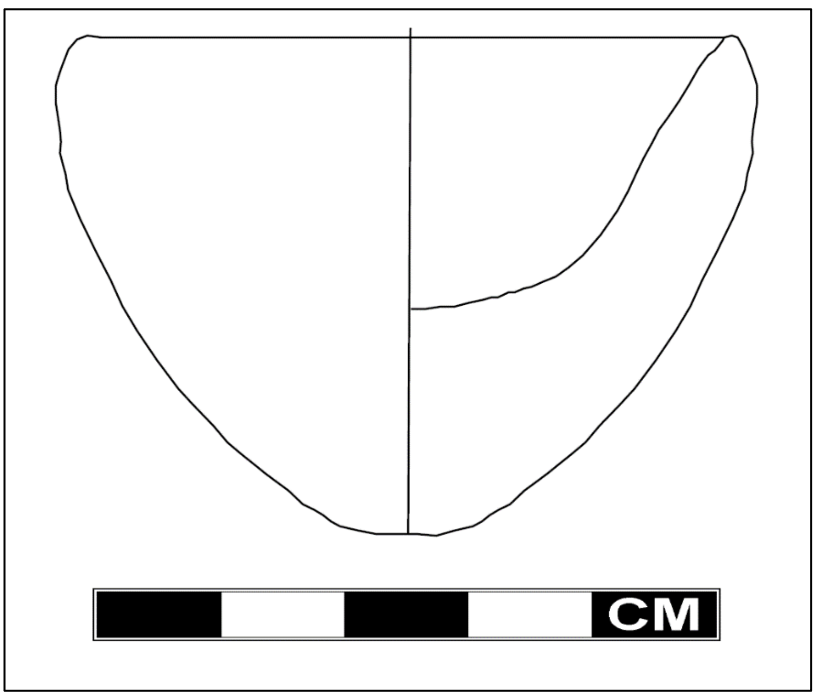

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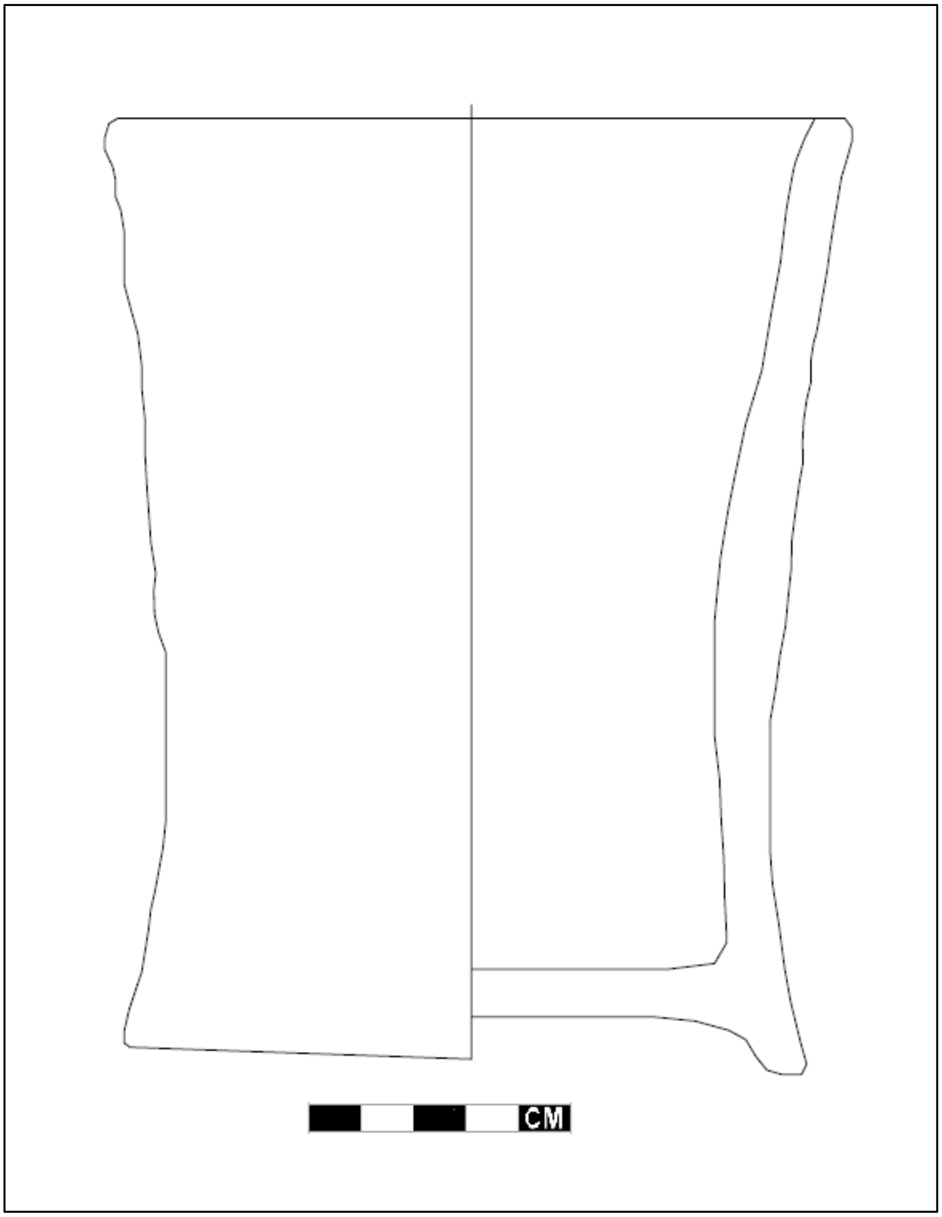

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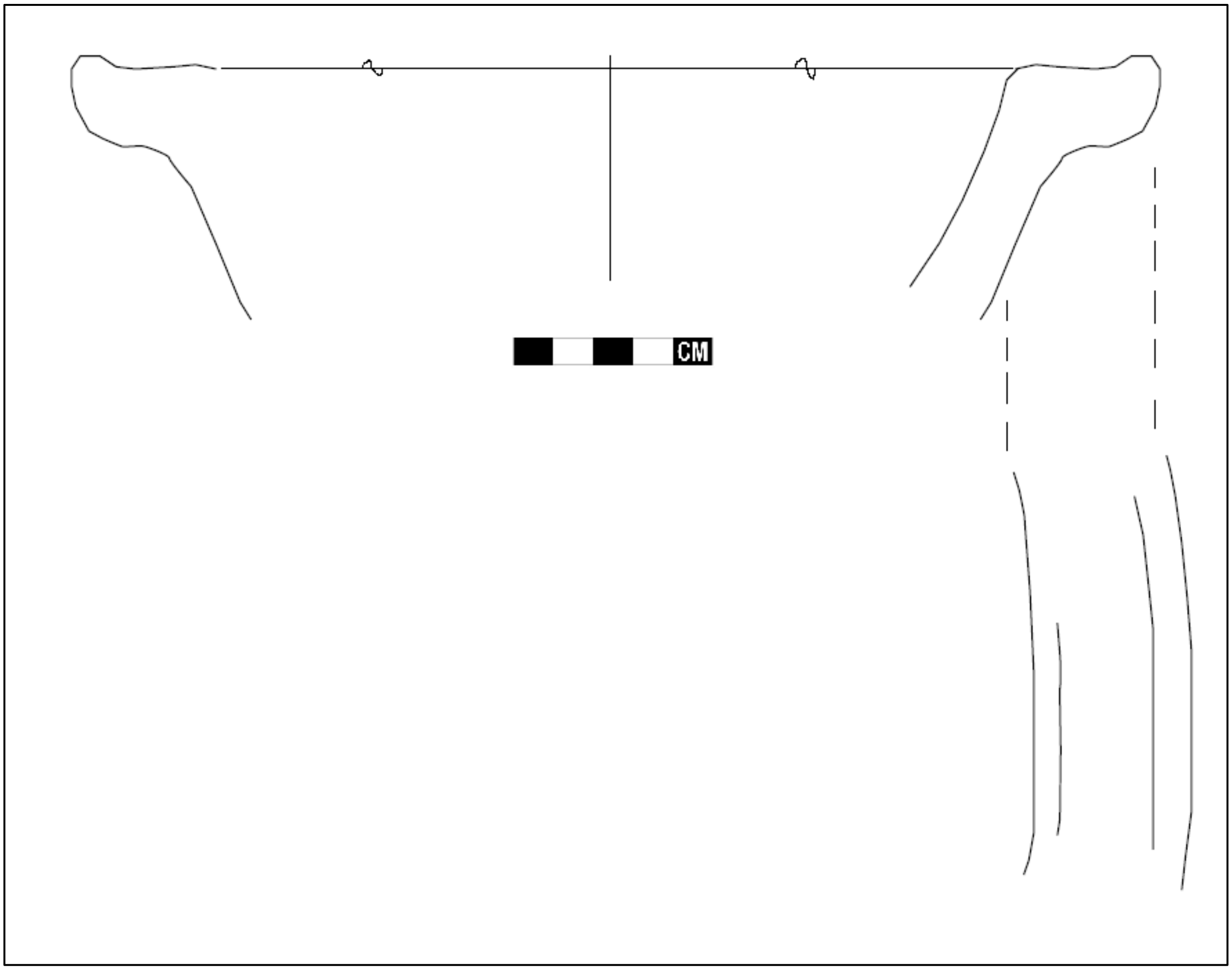
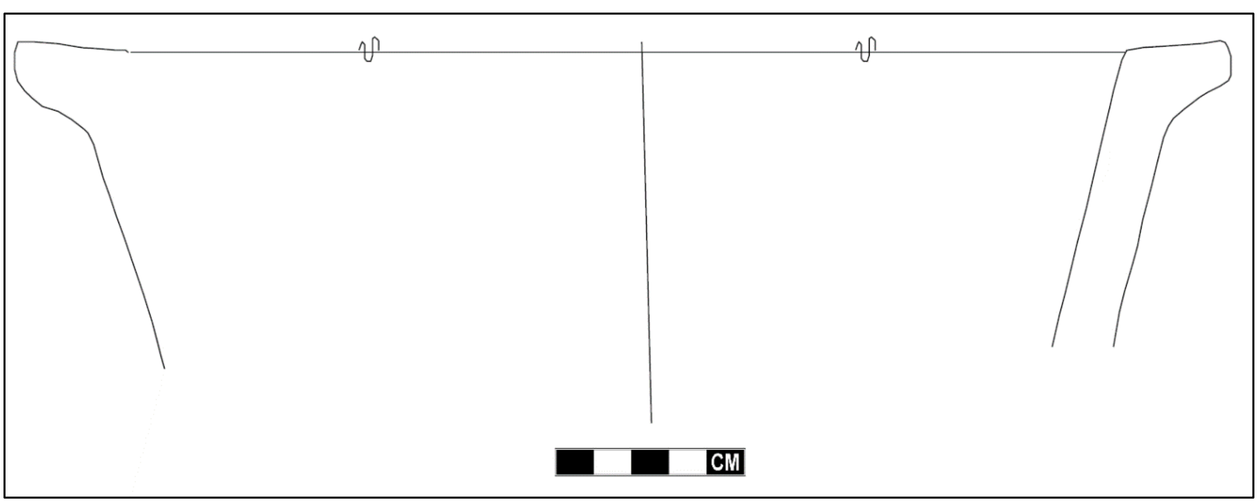


2016-T-7



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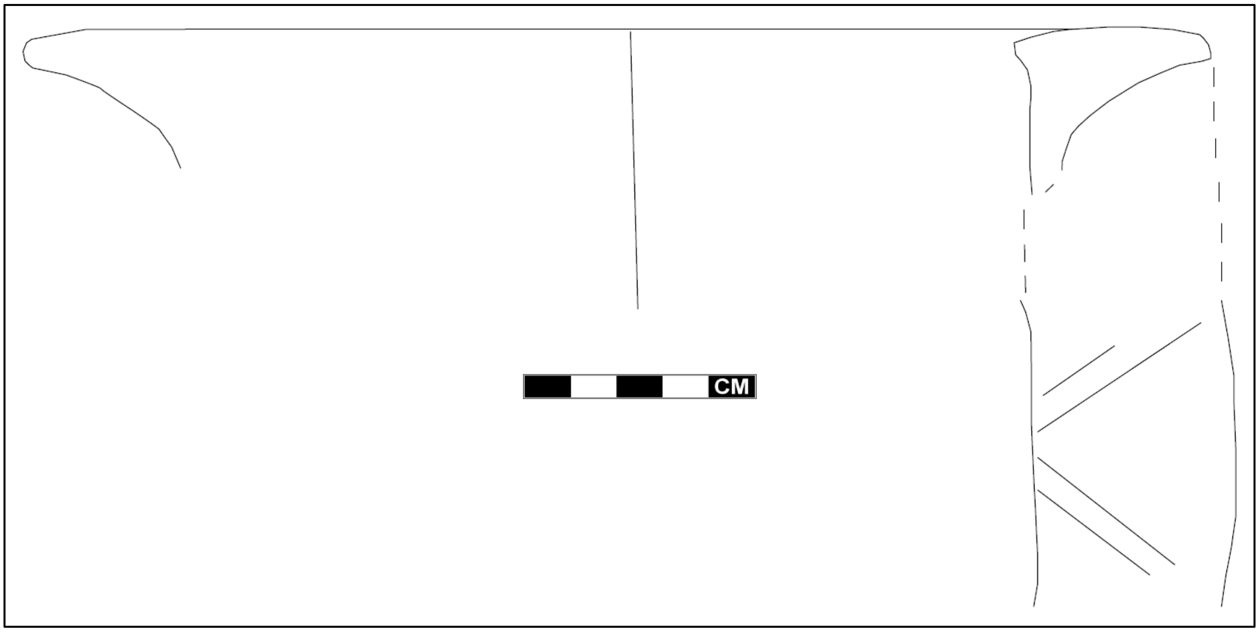

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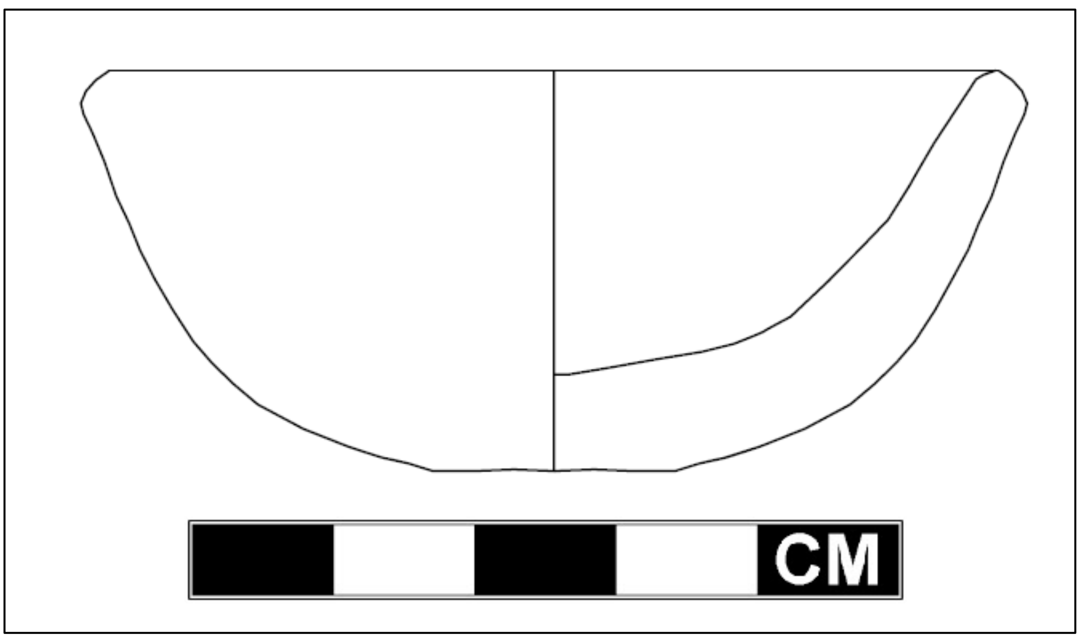

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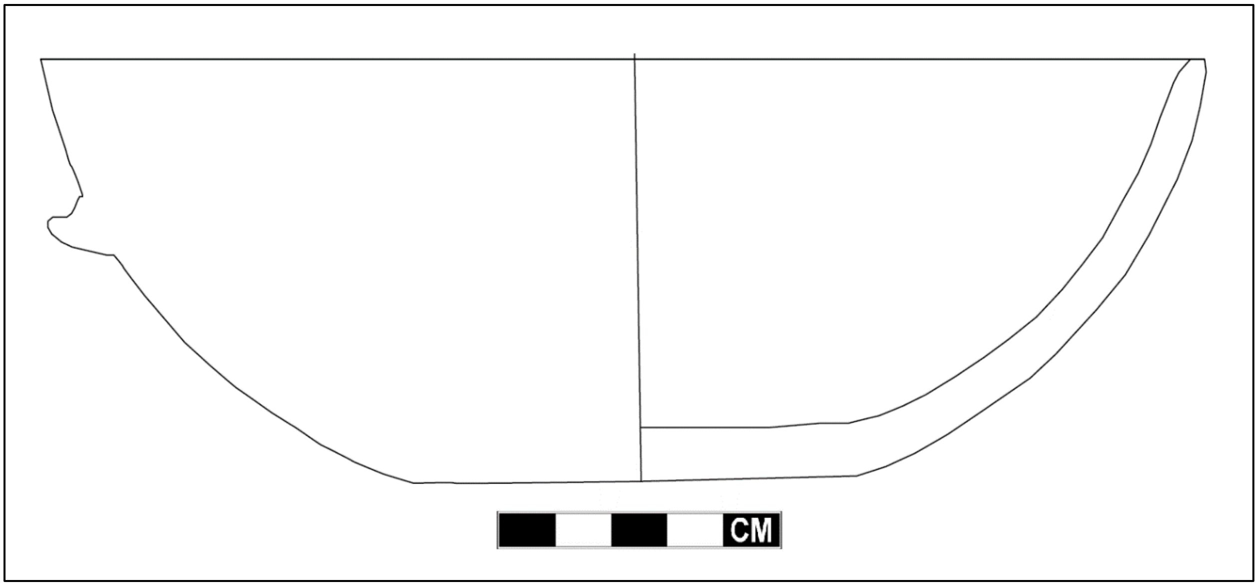
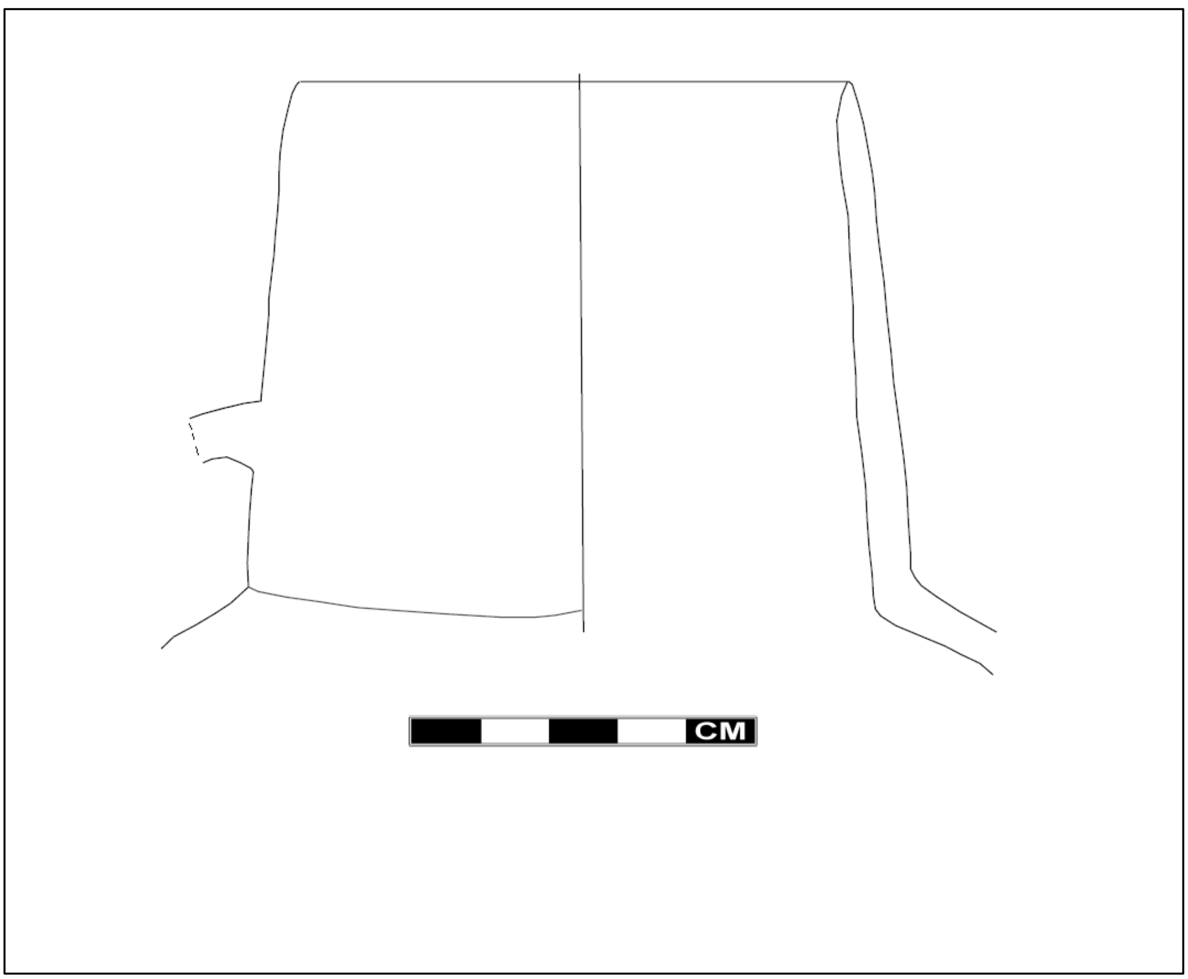
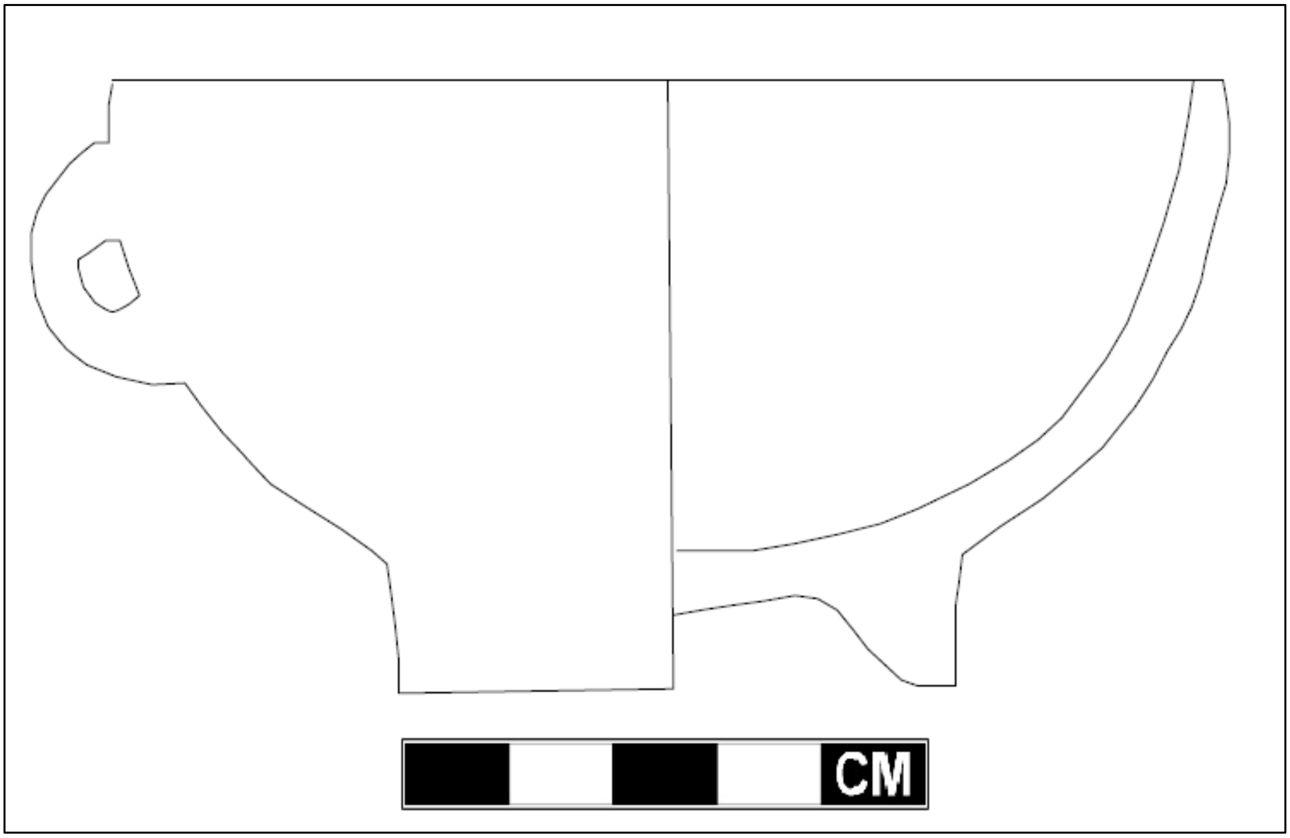


2016-AD-1

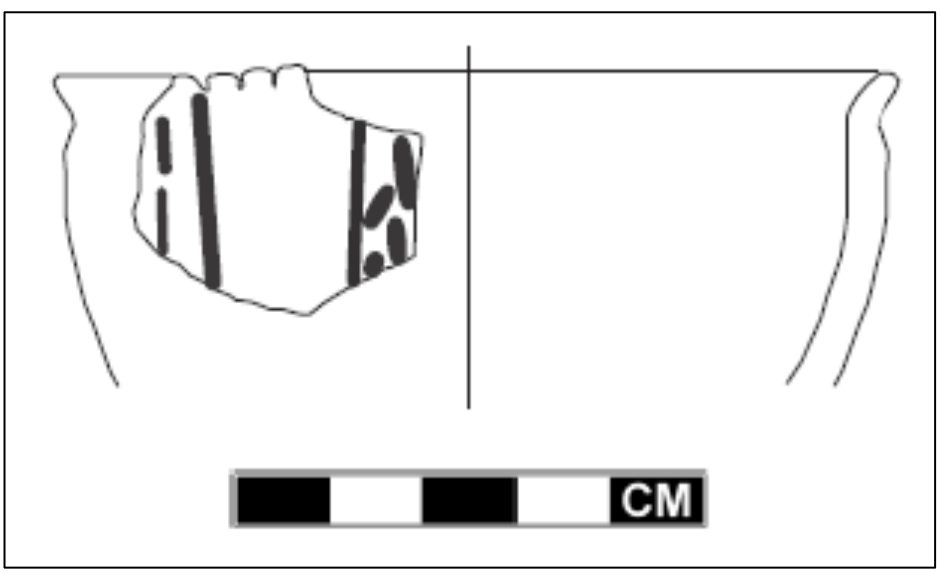


2016-AO-1



MA2

2015-S-14



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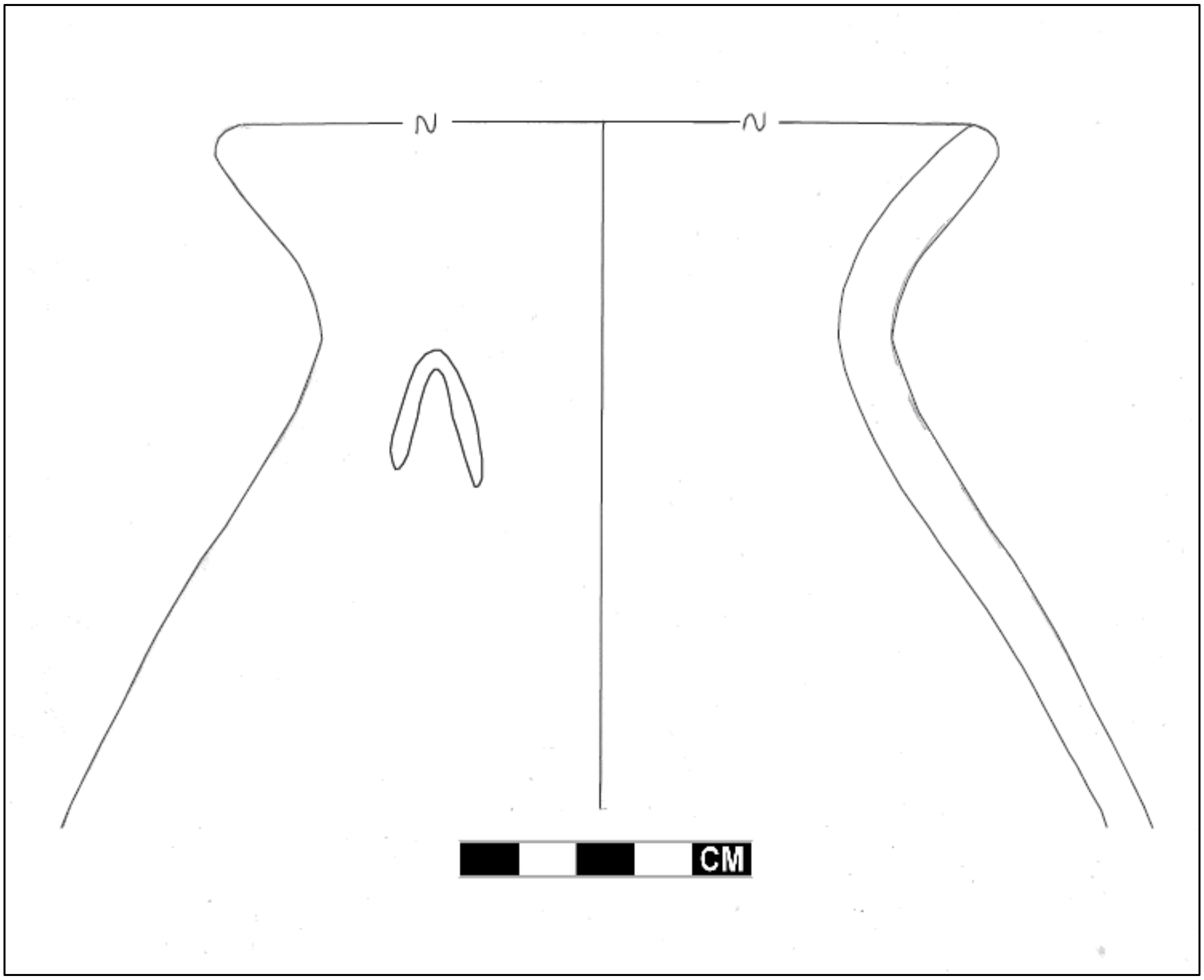

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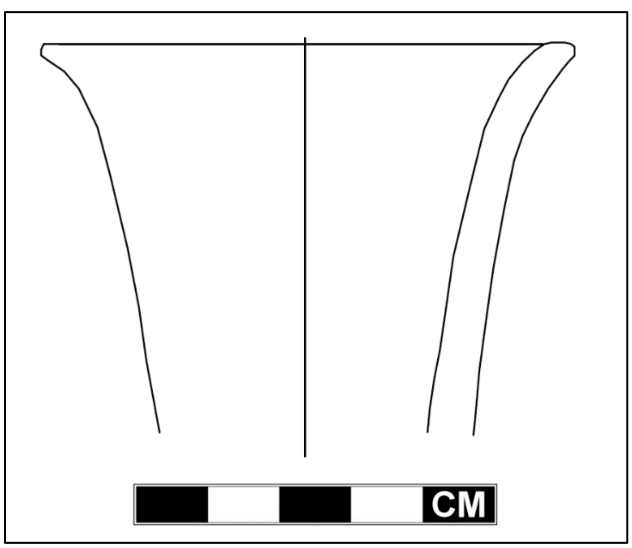

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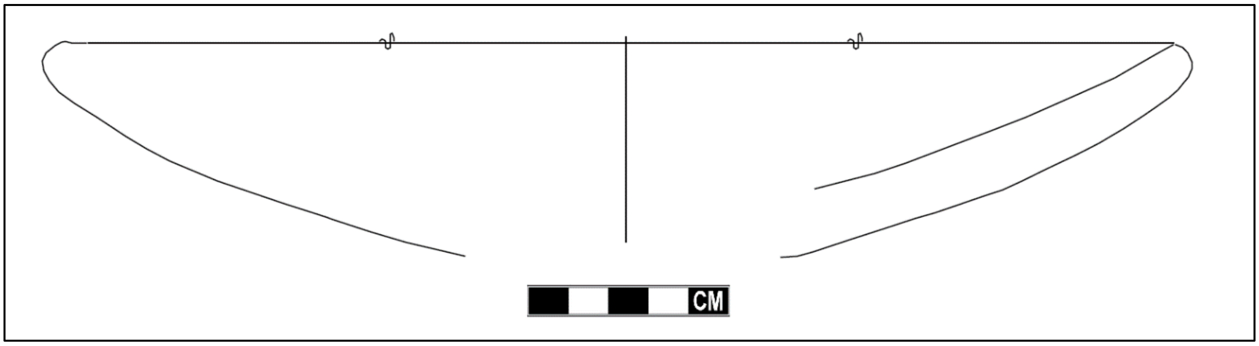
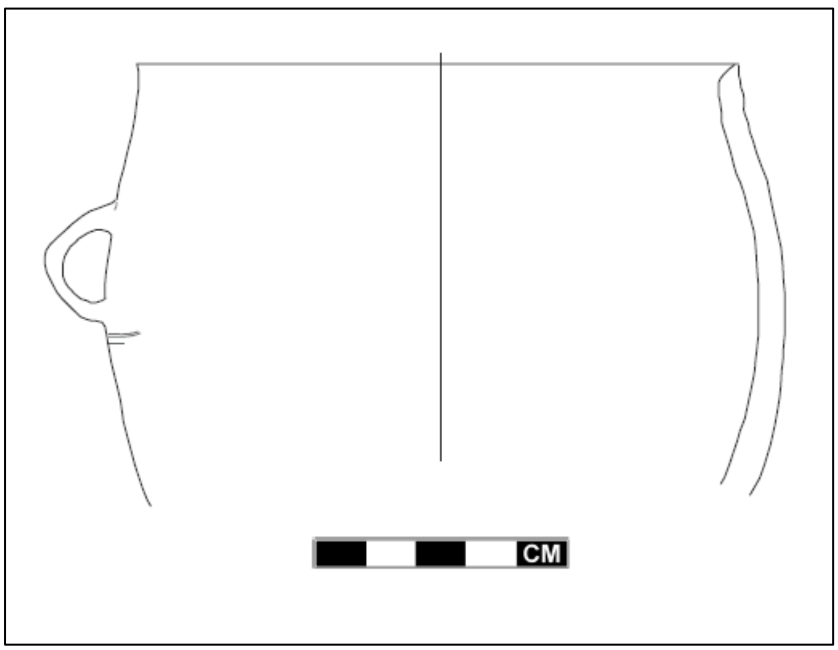
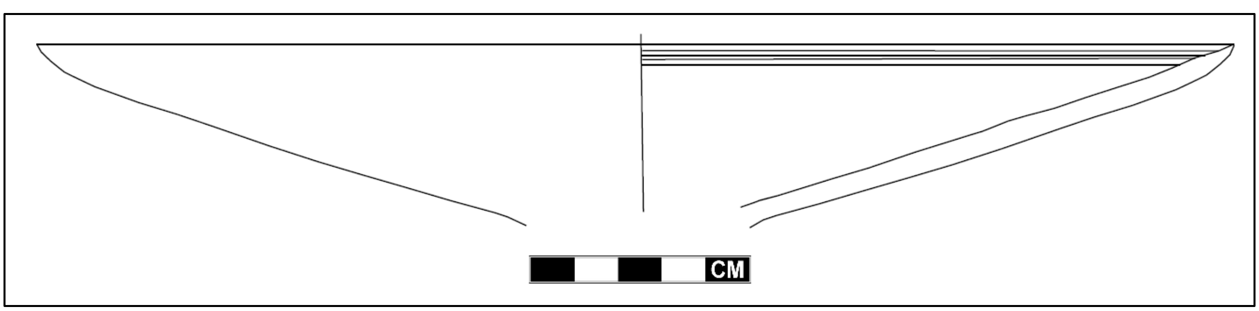


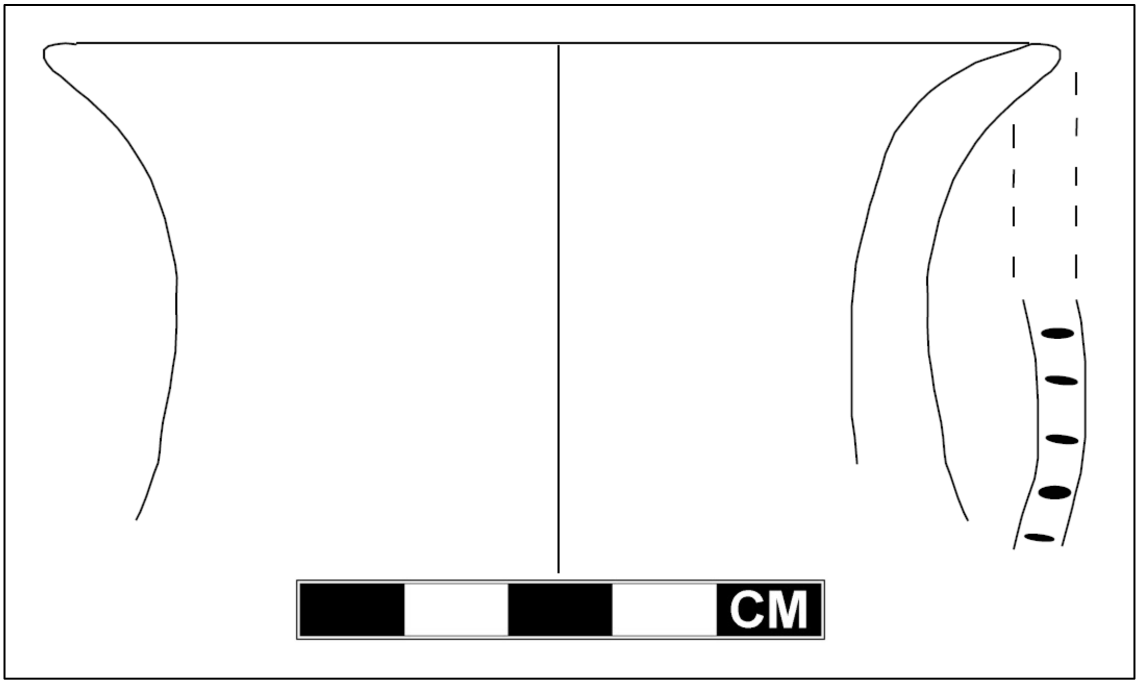
2015-BW-1



2016-O-26

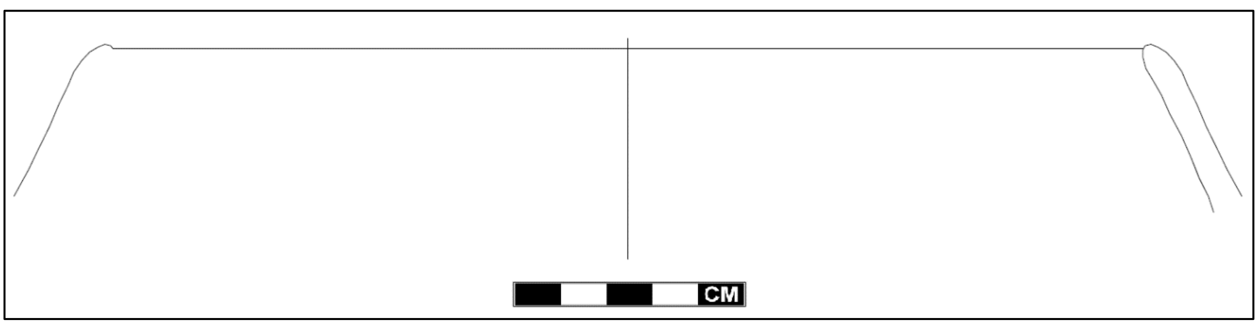


2016-AG-1



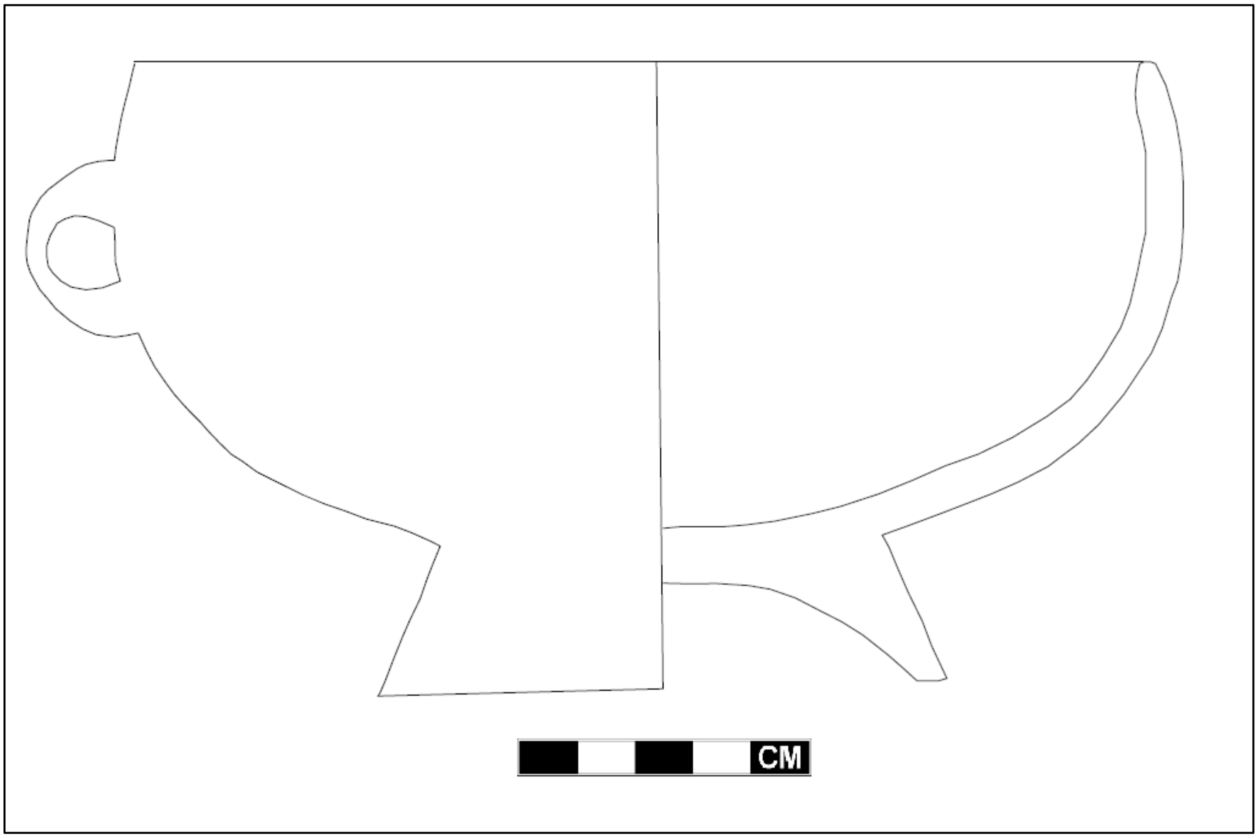
MA3

2015-AK-2

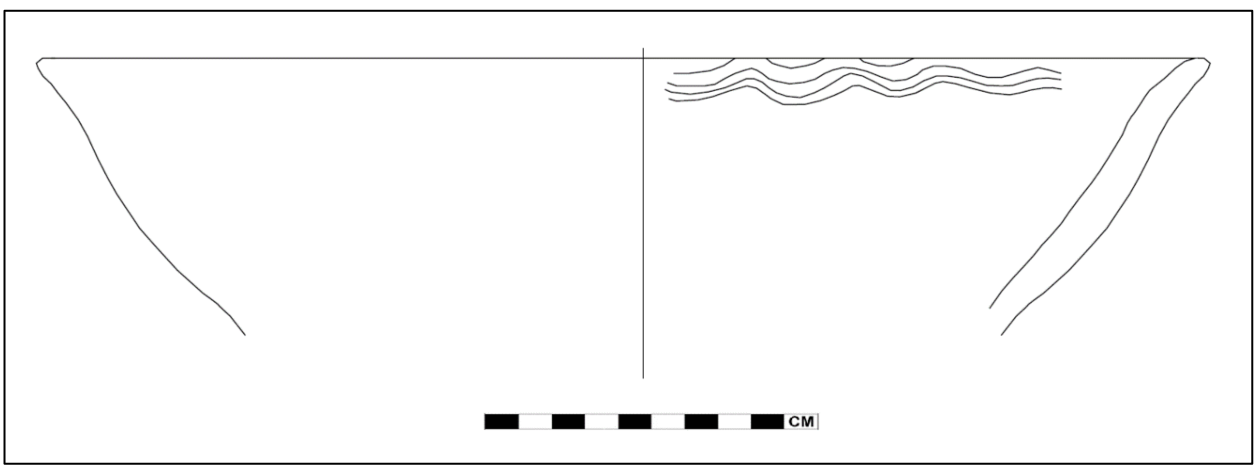


MA4

2016-AN-1



2016-AS-1



APPENDIX 3

Selected code for removing outliers and correspondence analysis

*Employed data sets in csv format highlighted below

```
library(readr)

pa_edit <- read_csv("C:/Users/rache/OneDrive/Chapter 6/ca/pa.edit.csv")

View(pa_edit)

pa_edit$total<-rowSums(pa_edit)

library(tidyverse)

pa_edit%>%filter(total==0)

no.zero<-pa_edit%>%filter(total!=0)

no.zero%>%filter(total==1)

library(ca)

no.zero.ca<-ca(no.zero)

plot(no.zero.ca)

colSums(no.zero)

names(no.zero)

no.cream<-no.zero[,-34]

no.cream<-no.cream[,-68]

no.cream.ca<-ca(no.cream)

no.cream$total<-rowSums(no.cream)

no.cream<-no.cream%>%filter(total!=0)

no.cream.ca<-ca(no.cream)

plot(no.cream.ca)

names(no.cream)

no.scrapex<-no.cream[,-54]

no.scrapex<-no.cream[,-67]

no.cream<-no.cream[,-68]
```

```
no.cream.ca<-ca(no.cream)

plot(no.cream.ca)

no.scrapex$total<-rowSums(no.scrapex)

no.scrapex<-no.scrapex%>%filter(total!=0)

no.scrapex<-no.scrapex[,-67]

no.scrapex.ca<-ca(no.scrapex)

plot(no.scrapex.ca)

names(no.cream)

no.scrapex<-no.cream[,-53]

no.scrapex$total<-rowSums(no.scrapex)

no.scrapex%>%filter(total==0)

no.scrapex<-no.scrapex%>%filter(total!=0)

no.scrapex.ca<-ca(no.scrapex)

plot(no.scrapex.ca)

names(no.cream)

no.scrapex<-no.cream[,-54]

no.scrapex$total<-rowSums(no.scrapex)

no.scrapex%>%filter(total==0)

no.scrapex<-no.scrapex%>%filter(total!=0)

no.scrapex.ca<-ca(no.scrapex)

plot(no.scrapex.ca)

colSums(no.scrapex)

no.scrapex.inertia<-data.frame(no.scrapex.ca$colnames,no.scrapex.ca$colinertia)

View(no.scrapex.inertia)

names(no.scrapex)

no.mica<-no.scrapex[,-32]

no.mica<-no.mica[,-66]

plot(no.mica)
```

```
no.mica.ca<-ca(no.mica)
no.mica$total<-rowSums(no.mica)
no.mica<-no.mica%>%filter(total!=0)
no.mica.ca<-ca(no.mica)
plot(no.mica.ca)
names(no.mica)
no.drw<-no.mica[,-33]
no.drw.ca<-ca(no.drw)
plot(no.drw.ca)
names(no.drw)
no.drw<-no.drw[,-65]
no.drw.ca<-ca(no.drw)
plot(no.drw.ca)
no.drw.inertia<-data.frame(no.drw.ca$colnames,no.drw.ca$colinertia)
View(no.drw.inertia)
no.drw.inertia %>% arrange(desc(no.drw.ca.colinertia))
no.drw%>%filter(blackware==1)
no.drw.inertia<-no.drw.inertia %>% arrange(desc(no.drw.ca.colinertia))
no.drw.inertia<-data.frame(no.drw.ca$colnames,no.drw.ca$colinertia)
no.drw.inertia.desc<-no.drw.inertia %>% arrange(desc(no.drw.ca.colinertia))
colSums(no.drw)
no.drw.inertia$total<-colSums(no.drw)
no.drw.inertia.desc<-no.drw.inertia %>% arrange(desc(no.drw.ca.colinertia))
View(no.drw.inertia.desc)
no.drw%>%filter(blackware==1)
as.data.frame(no.drw%>%filter(blackware==1))
blwa<-as.data.frame(no.drw%>%filter(blackware==1))
colSums(blwa)
```

```
summary(no.drw.ca)
colSums()
colSums(no.drw)
View(no.drw)
plot(no.drw.ca)
no.drw.ca$rowinertia
plot(no.drw.ca)
plot(no.mica.ca)
library(ca)
plot(no.drw.ca)
summary(no.drw.ca)
no.drw.ca$sv
print(no.drw.ca)
library(ca)
summary(no.drw.ca)
no.drw.ca$N
summary(no.drw.ca)
head(no.drw)
names(no.drw)
nrow(no.drw[rowSums(no.drw)>0,])
colSums(no.drw)
test.ca<-ca(no.drw[1:1000,])
test.ca<-ca(no.drw[1:50,])
test.ca<-ca(no.drw[50:500,])
no.drw[rowSums(no.drw)==0,]
test.ca<-ca(no.drw[rowSums(no.drw)>0,])
summary(test.ca)
test.ca$call
```

```
library(ca)

summary(test.ca)

plot(test.ca)

plot(no.zero.ca)

View(no.scrapex.inertia)

View(blwa)

library(tidyverse)

View(no.zero)

colSums(no.zero)

as.data.frame(colSums(no.zero))

no.zero.totals<-as.data.frame(colSums(no.zero))

View(no.zero.totals)

plot(no.mica.ca)

plot(no.scrapex.ca)

plot(no.cream.ca)

no.zero%>%filter('brown micaceousware'==1)

no.cream%>%filter('brown micaceousware'>0)

no.cream%>%filter('brown micaceousware'==0)

no.cream%>%filter('brown micaceousware'!=0)

no.zero$brwnmica<-no.zero$`brown micaceousware`

no.cream%>%filter('brwnmica'!=0)

no.zero%>%filter(brwnmica!=0)

mica.cases<-as.data.frame(no.zero%>%filter(brwnmica!=0))

colSums(mica.cases)

scraping.ext.cases<-as.data.frame(no.zero%>%filter(scraping.ext!=0))

colSums(scraping.ext.cases)

colSums(mica.cases)

colSums(scraping.ext.cases)
```

```
install.packages("factoextra")
fviz_eig(no.drw.ca)
library(factoextra)
fviz_eig(no.drw.ca)
plot(no.drw.ca, contrib=TRUE)
plot(no.drw.ca, contrib="relative")
plot(no.drw.ca)
plot(no.drw.ca, contrib="absolute")
fviz_ca_biplot(no.drw.ca, repel = TRUE)
plot(no.drw.ca)
fviz_ca_biplot(no.drw.ca)
fviz_ca_biplot(no.drw.ca, repel=FALSE)
fviz_ca_biplot(no.drw.ca, label ="column")
fviz_ca_biplot(no.drw.ca, label ="row")
fviz_ca_biplot(no.drw.ca, label ="column")
fviz_ca_biplot(no.drw.ca, label ="col")
write.csv(no.drw, file = "no.drw.csv")
library(readr)
drw2 <- read_csv("C:/Users/rache/OneDrive/Chapter 6/ca/no.drw.csv")
View(drw2)
drw2<-drw2[,-1]
drw2$total<-rowSums(drw2)
drw2%>%filter(total==0)
drw2<-drw2%>%filter(total!=0)
drw2.ca<-ca(drw2)
plot(drw2.ca)
fviz_ca_biplot(drw2.ca, label ="col")
drw2<-drw2[,-58]
```

```
drw2.ca<-ca(drw2)

fviz_ca_biplot(drw2.ca, label ="col")

library(readr)

outlier <- read_csv("C:/Users/rache/OneDrive/Chapter 6/ca/outlier.csv",

View(outlier)

outlier<-outlier[,-1]

outlier$total<-rowSums(outlier)

outlier%>%filter(total==0)

outlier<-outlier%>%filter(total!=0)

colSums(outlier)

no.drw%>%filter(basin=>1)

bsn<-no.drw%>%filter(basin>0)

colSums(bsn)

names(bsn)

bsn<-bsn[,-c(1:26)]

View(bsn)

colSums(bsn)

names(bsn)

bsn<-bsn[,-c(21:38)]

colSums(bsn)

names(bsn)

bsn<-bsn[,-c(10:12)]

colSums(bsn)

names(bsn)

bsn<-bsn[,-c(11:12)]

colSums(bsn)

names(bsn)

bsn<-bsn[,-13]
```

```
bsn<-bsn[,-7]
bsn<-bsn[,-5]
bsn<-bsn[,-4]
bsn<-bsn[,-2]
colSums(bsn)
plot(bsn)
barplot(bsn)
View(bsn)
library(tidyverse)
library(ca)
outlier.ca<-ca(outlier)
plot.ca(outlier.ca)
View(bsn)
barplot(bsn)
plot(bsn)
plot(no.drw.ca)
plot.ca(drw2.ca)
library(ca)
plot.ca(drw2.ca)
View(outlier)
View(scraping.ext.cases)
View(no.zero)
View(no.mica)
plot(no.mica.ca)
plot.ca(drw2.ca)
library(factoextra)
fviz_ca_biplot(no.drw.ca)
fviz_ca_biplot(no.drw2.ca)
```

```
fviz_ca_biplot(drw2.ca)

fviz_ca_biplot(drw2.ca, label ="col")

summary(drw2.ca)

drw2.ca

summary(ca(drw2))

drw3<-drw2[!is.na,]

drw3<-!is.na(drw2)

drw3<-as.data.frame(!is.na(drw2))

drw3.ca<-ca(drw3)

plot(drw3.ca)

View(drw3)

is.na(drw2)

na.drw2<-is.na(drw2)

View(na.drw2)

drw3 <- drw2[!!rowSums(!is.na(drw2)),]

drw3.ca<-ca(drw3)

summary(drw3.ca)

is.na(drw2)

ca(drw2, na.rm=TRUE)

drw3.ca<-ca(drw2, na.rm=TRUE)

plot(drw3.ca)

summary(drw3.ca)

drw2$total<-rowSums(drw2)

drw2<-drw2%>%filter(total!=0)

library(tidyverse)

drw2<-drw2%>%filter(total!=0)

drw2<-drw2[,-58]

drw2.ca<-ca(drw2)
```

```
summary(drw2.ca)
drw3<-na.omit(drw2)
drw3.ca<-ca(drw3)
summary.ca(drw3.ca)
summary(drw3.ca)
drw3.ca
drw4.ca<-ca(drw3[rowSums(drw3)>0,])
summary(drw4.ca)
View(no.drw)
names(no.drw)
names(drw3)
drw4<-(drw3[rowSums(drw3)>0,])
drw4.ca<-ca(drw4)
summary(drw4.ca)
drw5.ca<-ca(drw4[rowSums(drw4)>0,])
summary(drw5.ca)
head(drw4)
summary(drw4)
write.csv(drw4, file = "drw4.csv")
library(readr)
drw4 <- read_csv("C:/Users/rache/OneDrive/Chapter 6/ca/drw4.csv")
View(drw4)
drw4<-drw4[,-1]
drw4.ca<-ca(drw4)
summary(drw4.ca)
View(drw4)
drw5<-as.data.frame(drw4)
drw5$n<-rowSums(drw5)
```

```
drw5.nozero<-drw5[drw5$n>0,]

library(ca)

drw5.nozero.ca<-ca(drw5.nozero)

summary(drw5.nozero.ca)

drw5.nozero.ca$call

drw5.nozero.ca$colinertia

drw5.nozero.ca$rownames

drw5.nozero.ca$colnames

plot(drw5.nozero.ca)

plotca(drw5.nozero.ca)

plot.ca(drw5.nozero.ca)

library(factoextra)

library(ggplot2)

library(ca)

plot.ca(drw5.nozero.ca)
```