POTTERY FROM PRASAT BASET, CAMBODIA: A STUDY OF EARTHENWARE CERAMIC VESSELS AND RIM FORMS

by

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A THESIS

Presented to the Department of Anthropology
and the Robert D. Clark Honors College
in partial fulfillment of the requirements for the degree of
Bachelor of Science

February 2026

An Abstract of the Thesis of

Gabby Shaffer for the degree of Bachelor of Science
in the Department of Anthropology to be taken June 2026

Title: Pottery from Prasat Baset, Cambodia: A Study of Earthenware Ceramic Vessels and Rim Forms

Approved: *Alison Carter, Ph.D.*
Primary Thesis Advisor

This thesis presents results from a study of earthenware vessels and rim forms dating to the Pre-Angkorian and Angkor periods (6 -15th century CE) from the site of Prasat Baset, Cambodia. This provincial site is unique in having a long occupation history that pre-dated the beginning of the Angkor Empire. Earthenware makes up the majority of the ceramics assemblage and was important for a variety of daily life activities yet has been historically understudied compared to Angkorian stonewares. Earthenware vessels and rims were sorted by composition and decoration, measured, and drawn for comparison within the collection. The frequency and chronological order of these ceramics are analyzed to see temporal patterns. The major findings of this are that there are 13 distinct types of ceramics, within 6 classes. There is a loss in variation as time goes on, including through the spread of the Angkor Empire to the area. Furthermore, the Late Angkor Period (late 11th through the 14th centuries CE) shows the least amount of variation of the four periods studied in this thesis. These findings contribute to understanding the range of earthenware vessels at Baset, their possible function, and address questions about transitions within households from the Pre-Angkor to Angkor period in provincial Cambodia.

ACKNOWLEDGEMENTS

This thesis would not have happened without the immense help and mentorship of Dr. Alison Carter. Through her guidance and support, I was lucky enough to join her and her team in Cambodia for five weeks. I am indebted to her and the archaeologists I worked with. She took a chance on a sophomore who was excited about the chance to learn more about archaeology and experience a new place and culture. In one email, she changed the trajectory of my college career. She provided me with opportunities I never thought I would have and helped me have a life-changing experience in Cambodia. Without her support, this thesis would not be possible. This thesis is based on work supported by the National Science Foundation (NSF) Award #2148332.

I would also like to thank Dr. Miriam Stark and Dr. Carmen Sarjeant. They provided guidance and technical help while in Cambodia and were incredible mentors in the field. I learned so much from them and by watching them interact with their peers. Tiyas Bhattacharyya, Zachary Dierks, and Marly Howell were my fellow Ducks abroad. Marly and I shared a room in Battambang and bonded over the endless ceramics we sorted throughout the day and dreamed about the massages we hoped to get on the weekends. Zachary and Tiyas, two PhD candidates at the University of Oregon, provided honest mentorship and guidance that I greatly appreciate. They took time to teach me new archaeological methods they were applying, when they didn't have to. Ms. Ranet Hong, thank you for completing the drawings with precision and care, as these were essential to completing this project. Dr. Gyoung-Ah Lee also provided a space for me to further my research in the Archaeobotany Lab and helped me explore a new field of archaeology that I had not yet been exposed to.

I would also like to thank the Cambodian archaeologists with whom I worked in the field. I gained so much knowledge from them, without them even knowing it. Even though I still

cannot count to ten in Khmer (I did try, but I kept getting them mixed up), I appreciate them trying. They were incredible people to work with and had so much patience for a rising junior with no field experience.

I would like to thank Dr. Yalda Asmatey for her guidance. She provided support and mentorship through my time at the Honors College. She believed in me and always provided kind words in meetings, even when I was doubting myself. With her support, I felt more confident in myself and with this project.

My friends and family endured me through some of the most trying times in my life, as writing a thesis is no easy feat. They helped me get through this process and have fun while doing it. Without them, this thesis would have looked a lot different. I'm sure they have heard enough about Cambodia and pottery by now, but I appreciate them being sounding boards for me.

My parents have always been my #1 supporters. They shaped my worldview and taught me to work hard and, most importantly, follow my passions. Without their help, I can say with absolute certainty, they are the reason I am where I am today, and this thesis project would not exist without their support. They have always supported my passions, even when I proposed the idea of their then 19-year-old daughter going to Cambodia with a professor and other people they had never met.

Thank you all for supporting me and helping me with this journey. I am endlessly grateful.

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INTRODUCTION

"Studying earthenware is also essential for understanding the social, political, economic, and ritual milieus of Cambodia's past, in which these ceramics played vital roles" Miriam T. Stark, The Chronology, Technology and Contexts of Earthenware Ceramics in Cambodia (2003, p. 210)

"We will not dwell further on this modest branch [earthenwares] of Khmer ceramics, totally ignored by collectors and with good reason," B.P. Groslier, Introduction to the ceramic wares of Angkor (1981, p. 14)

Ceramics were ubiquitous within the Angkor Empire. Stonewares – high-fired ceramics that are typically made in a kiln and can be glazed or unglazed – produced from the 9th through 14th centuries, have become markers of the spread of the Angkor Empire (Grave et al., 2021). However, their earthenware counterparts are often understudied in comparison to stoneware ceramics. Stonewares in the Angkor Empire have been subjected to typologies, chemical analysis, and kiln-specific studies (Desbat, 2023; Grave et al., 2021). However, earthenwares are not understood in the same way. Earthenwares differ from stonewares in that they are more likely made at a household level, low-fired, and over open fire pits (Stark, 2003). Often, as seen today in Cambodia, these ceramics are made by women (Cort & Lefferts, 2000). When going through markets and households in Cambodia today, there are earthenwares being used and sold for similar purposes to their ancestral pottery.

Earthenwares were likely used as everyday vessels, such as cookware or storage containers (Groslier, 1981). These ceramics are physically less ornate compared to the stonewares, since they lack a glaze and are often not as elaborately decorated (SEACS, 2024**).** A culmination of these reasons has led to earthenware ceramics often remaining in storage or even in the field in some instances (Albrecht et al., 2000). As this study will demonstrate, earthenware ceramics did not simply disappear from the archaeological record; earthenware ceramics were used in the region during the Angkor Empire, as well as before and after. This means that

earthenware ceramics provide a unique lens to analyze social, cultural, and political change that may have occurred in these periods of change.

There is currently no extensive typology regarding these earthenware ceramics. This research project will begin this process based on a provincial site around a temple called Prasat Baset, near Battambang, in northwest Cambodia (Figure 1). The site has occupation periods from before, during, and after the Angkor Empire with extensive collections of earthenware ceramics from each period (Carter & Stark, 2024a). This provides the unique opportunity to study the changes that may have occurred from each time period. This study will utilize earthenware ceramic rim forms, radiocarbon dates, and statistical analysis of measurements to reach a better understanding of these underrepresented ceramics.

Figure 1:

Map of Cambodia with Prasat Baset Highlighted

Note: Map created on ArcGIS Online, with Phnom Penh, Siem Reap, Prasat Baset, and Battambang locations highlighted.

Three primary research questions are at the core of this research: (1) What rim forms are present in the ceramic assemblage at Baset? (2) Is there a change in the ceramic rim forms over time? (3) Is there a change correlating with the spread of the Angkor Empire to the Prasat Baset site (1018 CE)? Each of these research questions contributes to the development and application of an earthenware typology at Prasat Baset. The major findings of this are that there are 13 distinct types of ceramics, within 6 classes. There is a loss in variation as time goes on, including through the spread of the Angkor Empire to the area. Furthermore, the Late Angkor Period (late 11th through the 14th centuries CE) shows the least amount of variation of the four periods studied in this thesis. This culminates in a greater understanding of earthenware ceramics in the area, which can be continued through further research in the region and throughout the rest of Cambodia.

BACKGROUND

Historical Context: The Angkor Empire

The Angkor Empire was, at one point, the largest empire in Southeast Asia. Its strong military presence led to the empire having territory throughout Cambodia, Thailand, the Lao People's Democratic Republic (PDR), and Vietnam. Beginning in 802 CE with King Jayavarman II, the Angkor Empire would go on to last for over 600 years, ending in the 15th century CE (Evans et al., 2023). The relevant time periods for this thesis include the Pre-Angkor period (from 500-802 CE), the Angkor Period (802-15th century), and the Post-Angkor period (15-17th centuries).

Prior to what is considered the Pre-Angkorian era (beginning in 500 CE), much of the power in Cambodia was concentrated in the Mekong River Delta with Funan, an early group of polities. Funan dates from approximately the first century CE to the seventh century CE and was mainly based out of the Mekong River Delta. These dates initially stemmed from Chinese texts that referred to this polity as a "guo" (which is a state-like system) and remarked that the polity declined beginning in the late sixth century (Manguin & Stark, 2022). Dates were further analyzed by École française d'Extrême-Orient (EFEO) scholar Louis Malleret, who looked at sites in the Mekong Delta, including Oc Eo, Vietnam. Oc Eo was a mound site that was initially documented by Vietnamese archaeologists as a defining feature of Funan. It is now considered the harbor city of Funan and provided an important port for trade. This site also contributed to what is known as the "Oc Eo" culture, which dates from the first to the eighth centuries CE. Research from Malleret indicated that "the Funan polity appeared during the first century AD, flourished in the third century, and re-emerged in the fifth and sixth centuries in conjunction with

the region's earliest Indic statues and stone or brick sanctuaries" (Manguin & Stark, 2022, p. 641).

The Mekong River Delta was an extremely powerful location in Maritime Southeast Asia and served as "its largest artery" (Stark & Manguin, 2023, p. 66). This region provided connections to Thailand and the Lao PDR, while serving as a transportation network for imported goods. South Asia had a large influence on this region, with trade coming via India, with some trade and influence from China (Stark & Manguin, 2022). This region would have likely provided an in-between point for trade within these regions as well. However, Funan was not exclusively a trade-oriented polity; there was also importance placed on agricultural yields and harvests, as noted in certain Chinese texts from the period. Chinese texts also indicated that the region was a singular polity, but in reality, it was not a unified power, but instead multiple polities with political centralization (Manguin & Stark, 2022). However, Funan eventually did end in the seventh century CE. There is no clear reason, as some elevated ritual sites continued to be used, as well as continued occupation in sites like Angkor Borei. Some hypotheses include that Funan was built with a canal system that could have led to erosive processes, shifts towards inland agriculture could have led to a decline in coastal settlement, or maritime trade competition from Island Southeast Asia led to a decline in Funan's trade prominence (Manguin & Stark, 2022). Multiple hypotheses can be true and require more archaeological data to understand, but it is clear that Funan did decline and eventually reach its demise in the seventh century, allowing for the rise of Chenla.

After the collapse of Funan, the Chenla kingdom came to power from the 6th through the 8th centuries. This kingdom served as the precursor for the Angkor Empire. According to inscriptions, multiple people took the power from Funan "by military might" (Stark, 2004).

Unlike Funan in the Mekong River Delta, the center of Chenla was likely in east-Central Cambodia (Stark, 2004). The location change could partially be due to the lessened importance of the Mekong River Delta in maritime trade networks. There is inscriptional evidence that a ruler of Chenla expanded control of the kingdom into the Thai coast, demonstrating some form of extensive power. Chenla was not the only power at the time, as multiple groups were aiming to achieve more control over the region.

Figure 2:

Map of the Major Angkor Empire Sites and Major Road Networks

Note. Taken from Prologue: An Introduction to the Angkorian World, Hendrickson, M., Stark, M., Evans, D., & Fletcher, R, 2023.

The resulting power struggles caused the rise of the Angkor Empire, starting in the 9th century with Jayavarman II. Hinduism, charitable donations, and forced work were some hallmarks of the Empire. Angkor Wat, the most famous structure from the Angkor Empire, was

constructed and overseen by Suryavarman II in the 12th century, but the imperial capital of the empire had been in that area (modern-day Siem Reap) since the 10th century CE (Stark, 2004). In the first three centuries, the empire was focused on expansion and reached its peak population in the 12th and 13th centuries CE, with estimates ranging from 700,000 to 900,000 people (Klassen et al., 2021). Jayavarman VII is widely considered the last great Khmer ruler and expanded the empire from Thailand into the Lao PDR and through the Mekong Basin into Myanmar in the 12th century CE (Stark, 2004). Beginning in the 13th century CE, the empire began to ideologically shift away from Hinduism towards Theravada Buddhism, potentially due to Thai influence (Stark, 2004). In the same centuries, the empire also shifted away from militarism and towards international commerce under Jayavarman VII. After his reign, the empire began to decline for two centuries until its eventual demise in the 15th century.

Why study earthenware ceramics?

Earthenware ceramics are an important part of occupational history and can reveal important aspects of daily life in the Pre-Angkor, Angkor, and Post-Angkor periods; earthenwares can reveal information about cooking, food storage, rituals, and household environments (Stark, 2003). These types of ceramics are defined by being low-fired clay below the point of vitrification, typically in open air or bonfire settings rather than in kilns (Stark, 2003). Earthenwares can also be constructed using various techniques, including paddle-and-anvil, with a rotatable base, or without, or with coil-and-scrape methods (Stark, 2003). The use of ceramics has been speculated throughout archaeological excavations, but there are still questions regarding the specific uses for distinct types of pottery, especially with earthenwares. Art historian Dawn Rooney has suggested that “within the royal establishment, Chinese porcelains and celadons were preferred for ornamentation and for serving and eating food,

Khmer glazed vessels as containers for religious rituals, and unglazed earthenware for preparing food" (Coe & Evans, 2018, p. 209). However, earthenwares were likely used for utilitarian purposes (Stark, 2003). Earthenware vessels have not been linked to kiln sites and were likely produced at the household or community level.

Earthenware ceramics are understudied in the broad scheme of Cambodian cultural history. Stoneware ceramics have been studied more throughout history, and there are established typologies and understandings for the vessels (Desbat, 2023; Grave et al., 2021). In order to understand earthenware ceramics and their place in the Angkor Empire, it is important to understand the role of stonewares and glazed ceramics. Before the Angkor period, "all clay vessels and pottery roof tiles were unglazed earthenware" (Coe & Evans, 2018, p. 208). This does not mean that unglazed earthenware completely ceased to exist in the Angkor and Post-Angkor periods. Instead, glazed ceramics were likely introduced from China and also included imported Chinese ceramics during the Angkor Empire (Coe & Evans, 2018). There is evidence that the Khmer produced their own stonewares in larger quantities from kiln sites throughout Cambodia and Thailand (Grave et al., 2021). Glazed Khmer ceramics can be traced back to Indravarman and Yasovarman, from the 880s to 940 CE, but most production occurred between the 11th and 13th centuries (SEACS, 2024). These glazes are primarily green-glazed (a light and slightly translucent green) and brown-glazed (Coe & Evans, 2018). Certain glazes, styles, and geochemical signatures allow for Angkorian glazed stoneware to be traced back to a specific kiln site or general region of the Angkor Empire (Grave et al., 2021). Many of the stonewares were elaborately decorated or made, like zoonotic jars (see Figures 3 and 4). These objects have garnered more attention from archaeologists and collectors over time, and the process of their

production has been studied for decades. Kiln sites have become increasingly studied as well, as these are where Khmer stonewares were produced in larger quantities.

Figure 3:

Zoomorphic Owl Jar

Note. Linked to the Angkor Empire Found in Northeastern Thailand, Dating to the 12th century. Taken from Cambodian Ceramics, Southeast Asian Ceramics Society, 2024.

Figure 4:

Broken Green-Glazed Ceramic

Note. Intentionally broken green-glazed dates to the 10th or 11th centuries from the Srah Srang burial site. Taken from Cambodian Ceramics, Southeast Asian Ceramics Society, 2024.

Additionally, stoneware ceramics appear more abundantly in the record due to this selective sampling. Archaeologists and researchers have a unique power to decide what gets included in the archaeological analysis and collection. Earthenware ceramics may have been left out in the past or simply collected and left in storage for years. One example of this is an assemblage of the Krek 52/62 circular earthworks sites in southeastern Cambodia that was excavated by Bernard Phillipe Groslier in the 1960s.

> *"However, the proportions of decorated to undecorated fragments are completely different in the two assemblages: two-thirds of the potsherds from the collection at the National Museum are decorated, apparently due to Groslier's selection. Most of the undecorated pieces of the old excavation were not kept" (*Albrecht et al., 2000, p.25*).*

There are many reasons that ceramics have been understudied, but this provides a unique opportunity to research something that has been neglected in archaeological studies. Dr. Miriam Stark underscores the importance of earthenwares in that the study of earthenwares is essential to understanding political, social, economic, and other aspects of life throughout history in Cambodia (2003). These ceramics provide an important lens into the often-understudied aspects of life, which often provide incredible amounts of insight into the time periods being studied.

In addition to the aspects of life and technological changes that earthenwares can provide, they also demonstrate social or societal changes. To understand this aspect of the pottery, the people need to be considered alongside the pottery. The ceramics were made by individuals who made conscious choices to produce the piece of pottery we see today. Ceramicist Dr. Carmen Sarjeant argues that identity can be seen through household archaeology, even with ceramic

manufacture (2014). If this is taken into consideration with Baset, changes in a potter's identity (for example, if a potter becomes part of a new community), the vessels may also change. With Baset, this understanding of pottery as an expression and extension of identity allows us to view changes in the larger community as a whole via earthenware ceramics. Dr. Miriam Stark also underscores the importance of earthenware vessels in understanding the social, political, economic, and ritual spheres of life in Cambodia (2003). It is these social and larger community-wide connections that allow research questions relating to social change over time to be addressed via earthenware ceramics in this region.

The Site: Prasat Baset, Battambang, Cambodia

Figure 5:

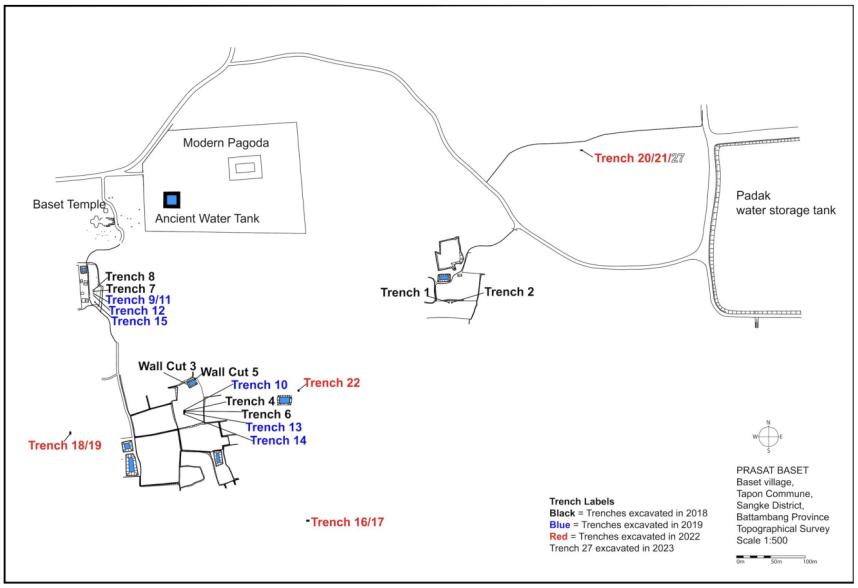
Prasat Baset Temple

Note. Image by Gabby Shaffer.

The study area for this ceramic analysis is Baset village, which is located in Battambang province in northwest Cambodia. The village surrounds the Prasat Baset temple, which is located approximately 11 kilometers outside of Battambang. The temple was dedicated in 1018 by Suryavarman I, but it is possible that there was another structure in the same area dating to the Pre-Angkor period (Carter & Stark, 2024b). The site was excavated throughout 2018-2024, with a hiatus due to the COVID-19 pandemic from 2020-2022 as part of the Pteah Project, co-directed by Dr. Alison Carter (University of Oregon) and Dr. Miriam Stark (University of Hawai'i-Mānoa). A field research season was conducted in 2024.

Figure 6.1:

Trenches from the Pteah Project



Note. Taken from Pteah Cambodia Project Excavating Ancient Households June-July 2024 Field Season Report, Carter, A. K., & Stark, M. T, 2024.

Figure 6.2:

Additional Trenches from the Pteah Project

Note. Taken from Pteah Cambodia Project Excavating Ancient Households June-July 2024 Field Season Report, Carter, A. K., & Stark, M. T, 2024.

Battambang Province, where Baset is located (See Figure 1), has occupational evidence dating to 71,000 BP from Laang Spean Cave (Carter & Stark, 2024b). There is also inscriptional evidence dating to the Pre-Angkorian period, with residents of the area being labeled as Khmer speakers with small chiefdoms (Carter & Stark, 2024b). This long occupation history makes Prasat Baset a good site for understanding change through time. The goal of the Pteah Project is to understand how life changes through time, particularly with the expansion of the Angkor Empire into the region with the construction of the Prasat Baset Temple (Carter & Stark, 2024b). The work in this thesis will contribute to understanding change through time through the lens of earthenware ceramics and the development of an earthenware ceramic typology.

METHODOLOGY

Data Collection in Cambodia

This project has taken place in multiple phases. The first phase was over five weeks in Battambang, Cambodia, in the summer of 2024. I received training from Dr. Sarjeant, alongside another University of Oregon undergraduate student and Cambodian archaeologists, on how to identify and sort ceramics that had been found in previous excavations spanning from 2019 to 2023. This sorting was based on a typology developed by Dr. Sarjeant in the prior excavation years, and included the temper type, part of the ceramic, and any decorations (Carter & Stark, 2024b). The temper types were sorted into three categories, including sand-temper, organic temper, and minimal-temper. Each of these categories are visible to the naked eye. From there, the ceramics were sorted by the morphological characteristics of the sherd, which typically included rims, foot rims, spouts (Kendi spouts in particular), carination (shoulders of vessels), and body sherds. Once divided into parts of ceramics, sherds were further classified by the type of design. This included cord marking, stamping, painting, plain, incised, and impressed. These categories were not always clear, or there were sometimes combinations of decorations that were in additional categories.

This system, by Dr. Sarjeant, laid the groundwork for the initial understanding of the pottery and allowed for more in-depth analysis. I selected the rim forms as a focus for this study as they can serve as a guide for the overall shape of the vessel and allow for patterns to be found. While in Cambodia, I photographed, measured, and started a database of the rims (See Appendix A for the dataset and Appendix B for selected images of vessel sherds). The rims were measured for the diameter, percentage of the whole rim, thickness of the rim, thickness at the midpoint (usually if there was a protruding or different thickness at the midpoint), thickness where the rim

and neck meet (when applicable, as not all rims had this portion connected), and thickness of the upper and lower body (when applicable). The tools used in this phase of the project were a digital caliper (for all measurements of the vessel body) and a rim diameter chart for the diameter and percentage of the body. This methodology is adapted from *Contextualizing the Neolithic Occupation of Southern Vietnam: The Role of Ceramics and Potters at An Son* (Sarjeant, 2014). The rim diameter and percentage of rim were measured with a rim diameter chart. The rest of the measurements were taken with a digital caliper. Each rim is identified on the database using a similar coding and typology system to the original system created by Dr. Sarjeant. Each rim is labelled as 'BSTR'-XXX, meaning 'Baset Rim' and the number in the identification system. A total of 173 ceramic rims from across 13 trenches were analyzed in this typology.

Statistical and visual data analysis was completed using R Studio. The code utilizes various packages, including ggplot2, dplyr, khroma, scico, and ggsci. These packages allowed for data manipulation and the clean display of variables. Appendix C has the complete R Studio code used for this project.

Creating the Typology

One goal of this study was to develop a preliminary ceramic typology based on the rim forms. The first step of this was to sort the rims by visual differences using drawings of the rim forms by Ms. Ranet Hong. These drawings, combined with the front, back, and side profile photographs I took in-field, were the primary data sources used in developing the typology. The drawings also allowed for close comparison of the rims in the collection. The initial sorting resulted in 11 different categories. The typology is not determined by function, as "the same shape may have a variety of uses, and conversely the same purpose may be served by many forms" (Shepard, 1956). While it is tempting to label pots as water jugs, storage jars, and

cooking pots, it is not always possible and can be limited by current ethnographic and archaeological understandings. For this reason, the typology presented in this paper will be described by visual characteristics from Dr. Anna Shepard's *Ceramics for the Archaeologist.*

Shepard describes three main differentiations between ceramic shapes, including "1. unrestricted orifice, 2. restricted orifice, 3. neck" (Shepard, 1956). An unrestricted vessel has an open and extending rim form that is the maximum diameter of the vessel, whereas restricted vessels have a rim that is less than the maximum diameter (Shepard, 1956). Furthermore, this typology uses the term "simple," which means that the drawing and outline of the pottery vessel is smooth and without a carination or any other form of contour and indentation.

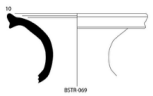
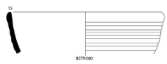
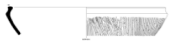
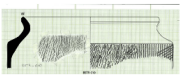
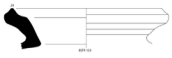
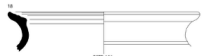
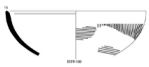
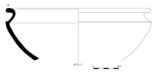
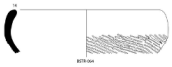
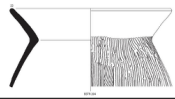
RESULTS

An Earthenware Typology for Prasat Baset

Using the terminology and descriptive methods from Shepard (1956), the vessel sherds were divided into six primary categories (Figure 7). Each class represents a common identifiable aspect of each sherd, in some instances indicating potential design decisions and variations in the smaller categories. Class 1 is everted restricted vessels, meaning the rim form angles outward and the vessel is restricted (the diameter of the rim is smaller than the largest diameter of the vessel). Class 2 is unrestricted vessels, where the vessel's rim is likely the largest diameter of the pot. Class 3 is simple, described by Shepard as “the tangent at the end point of simple and dependent restricted vessels is inclined inward, but the profile also lacks a construction marked by a corner inflection point (1956, p. 230). Class 4 is restricted, everted carinated, indicating that the vessels in that class have an inflection point at the shoulder, and the rim form is angled outward with the diameter less than the largest diameter of the vessel. Class 5 is everted with a lip, with the rim angled outwards, but there are additional characteristics of a thickened or different lip than the other classes. Class 6 are concave vessels, where the rim form indicates a concave shape.

Figure 7:

Table with Class and Type with Sample Drawings

Class 1: Everted Restricted	*Class 2: Unrestricted*	*Class 3: Simple*	*Class 4: Restricted Everted Carinated*	*Class 5: Everted with Lip*	*Class 6: Concave*
Everted Restricted 	Everted Concave (Unrestricted) 	Simple Restricted 	Everted Restricted Carinated Straight 	Everted Restricted (Thickened Rim) 	Restricted Concave Everted 
Everted Restricted Short Rim 	Everted Unrestricted (Straight) 	Simple Unrestricted 	Short Everted Restricted Carinated 	Restricted Everted with Vertical Lip 	Inverted Concave 
Straight Everted Restricted 					

Note. Drawings courtesy of Ms. Ranet Hong.

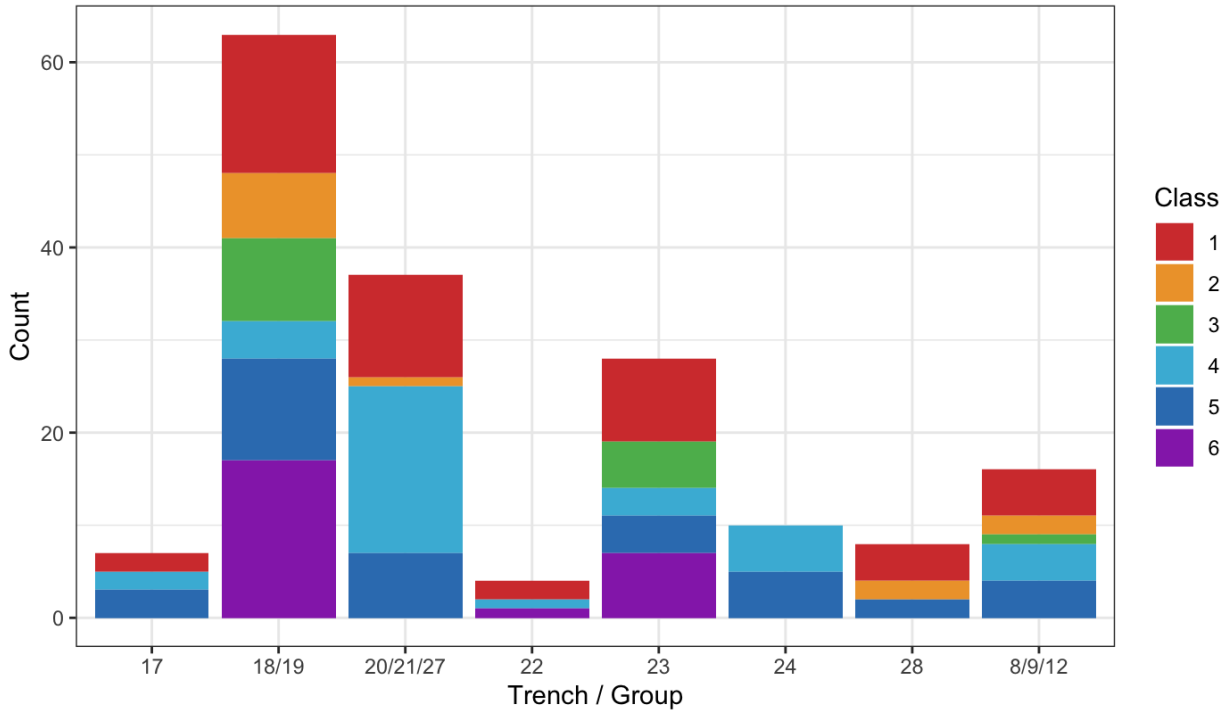
Within each class are two to three distinguishable categories (Figure 7). Within Class 1, there are everted restricted, everted restricted short rim, and straight everted restricted. Each form is everted and restricted, with the variations appearing in each category. The everted restricted short rim is a vessel with the everted restricted characteristics, as well as a shorter rim than the rest of the vessels. The straight everted restricted vessels have an outwardly angled rim, but rather than it outcurving (as is typical in the everted restricted categories), the rim protrudes straight outwards. Class 2 (Unrestricted) contains everted concave (unrestricted) and everted unrestricted straight vessels. Both of these groups are unrestricted, as is shown by the diameter of the rim being the largest diameter of the vessel. Both categories are everted as well, indicating that the rim typically protrudes outward. The straight vessel category within this class has vessel walls without curvature, but the concave vessels have a curvature inward. Class 3 is simple

vessels, including categories of simple restricted and simple unrestricted. The inflection point of both of these vessels is inward (as opposed to the everted rim), with the restricted category having a smaller rim diameter than the largest rim diameter of the vessel, and the unrestricted category having the largest diameter of the vessel. Class 4 includes restricted everted carinated vessels, containing the categories of everted restricted carinated straight, and short everted restricted carinated. The everted restricted carinated straight vessels are unique in that they have both a carination (an inflection point at the shoulder) and have a straight outward protruding rim. The short everted restricted carinated vessels have a carination as well, but the rim length is shorter than what is common in this vessel collection. Class 5 are everted vessels with a lip. The categories are everted restricted with a thickened rim and everted restricted with a vertical lip. The thickened rim is not common in this assemblage, making it its own category. The vertical lip is also uncommon in this assemblage, but it is designed to have a lip pointing downwards and is much thinner than the thickened rim. However, these are both in the same class due to the rim lip difference from the rest of the vessel collection. The final class, Class 6, is concave vessels. This includes restricted everted concave and inverted concave. The everted concave still has the concave shape of the rim, but the rim overall points outward. If a tangent were applied along this rim, it would be angled outward. The inverted concave, if a tangent were applied, would have an inward angle to the rim. See Appendix D for a table with examples of the rims in each type.

Applying the Typology to Prasat Baset

Figure 8:

Class Distribution by Trench



Note. Trenches 18 and 19, 20, 21, and 27, and 8, 9, and 12 are grouped because they were excavated as part of the same mound.

The typology reflects the variation in the rim vessel forms present at Prasat Baset. 173 rims were included in this typology, with 13 trenches represented. Trench 18 is the only trench with all six classes present, with trenches 9, 19, and 23 representing five classes. Class 1 (Everted restricted) is the most dominant of the six classes, followed by classes 4 (Restricted Everted Carinated), 5 (Everted with lip), and 6 (Concave). Class 1 also has the highest number of categories within it.

Boxplots were created using R Studio, focusing on the rim diameter, rim thickness, and upper body thickness by class. This allowed for a closer analysis of the differences between the classes and whether they go beyond the visual differences. From each of these boxplots, there is not much variation, and most of the boxplots partially or completely overlap. This demonstrates that a majority of the differences between these earthenware vessels in each class largely lie in the visual and form-related aspects of the vessels.

Figure 9.1:

Diameter by Class

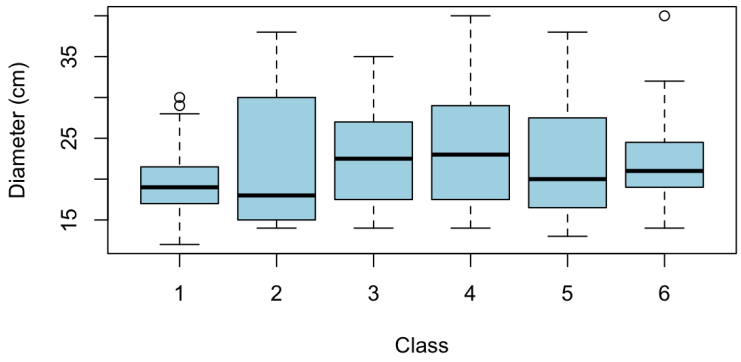


Figure 9.2:

Rim Thickness by Class

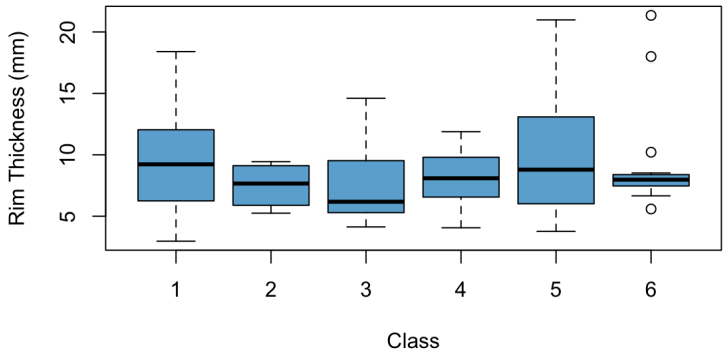
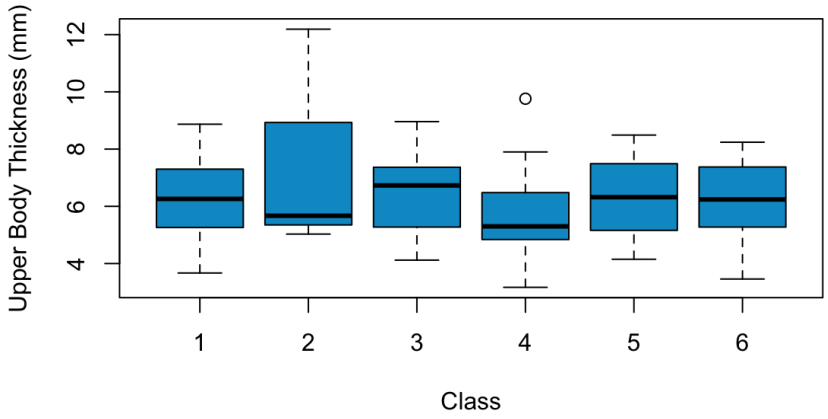


Figure 9.3:

Upper Body Thickness by Class



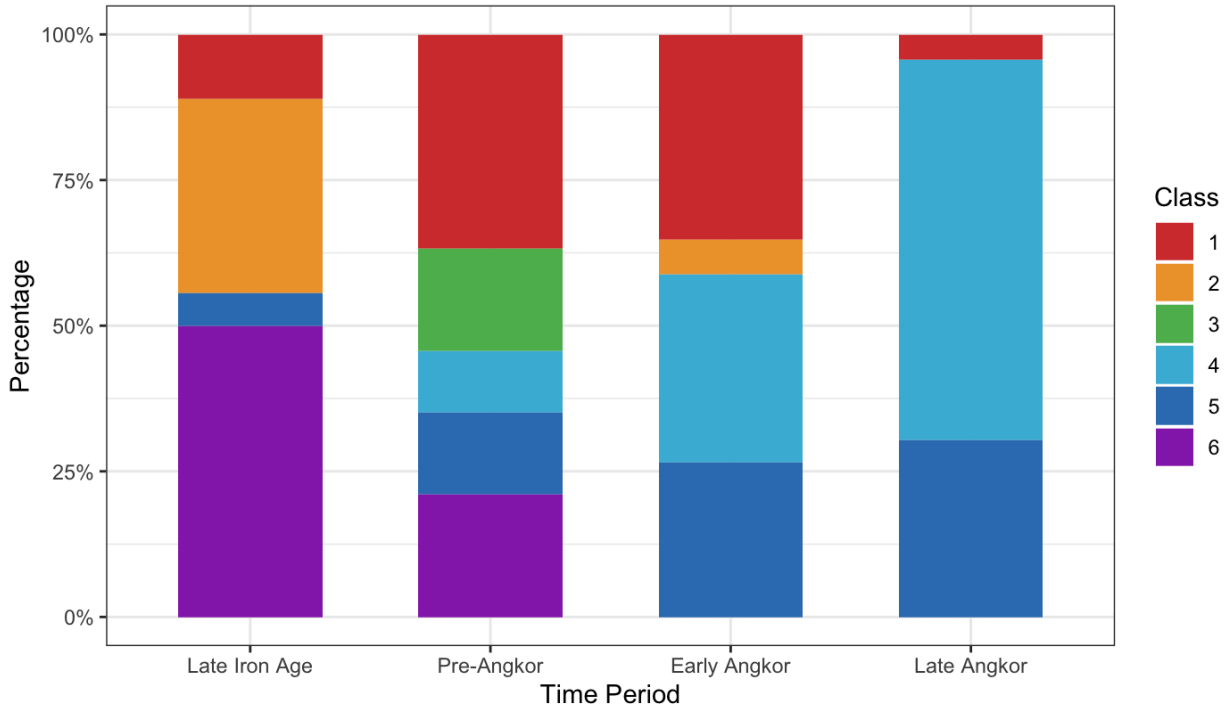
Further analysis was conducted with this typology to get to a central question: what happened to craft production (and other areas of life) when the Angkor Empire expanded into the area? Ceramics were sorted into general time periods using radiocarbon dates (See Appendix E for the table with dates, contexts, and stratigraphic layers used for relative dating). Ceramics were aligned with a time period if there were radiocarbon dates from the same stratigraphic context (e.g., Trench 18, with specific layer 18011, which is dated to the Pre-Angkor Period). The periods are defined as follows: Late Iron Age (3-5th Centuries CE), Pre-Angkor (5-8th Centuries CE), Early Angkor (8- Early 11th Centuries CE), and Late Angkor (11th-14th Centuries CE). The Angkor period is divided in this instance, as the temple was dedicated in 1018 CE, marking a definitive date for the expansion of the Angkor Empire to this region.

There are four classes present in the Late Iron Age (Class 1, 2, 5, and 6). In the Pre-Angkor period, there is the most variation, with five classes present. The variation decreases by one class in the following time periods (Early and Late Angkor), with Class 4 becoming increasingly dominant over time. Class 5 becomes more dominant over time as well and is present in each time period but is most present in the Late Angkor period. Furthermore, Class 6

appears to disappear within this assemblage following the Pre-Angkor Period. Class 1 is the most dominant in the Pre-Angkor period but gradually lessens through the Late Angkor Period. Class 2 appears in both the Late Iron Age and the Early Angkor period but is much more dominant in the Late Iron Age. The common trend among these data is that from the Pre-Angkor period onward, variation amongst the ceramic classes is reduced

Figure 10:

Class by Time Period

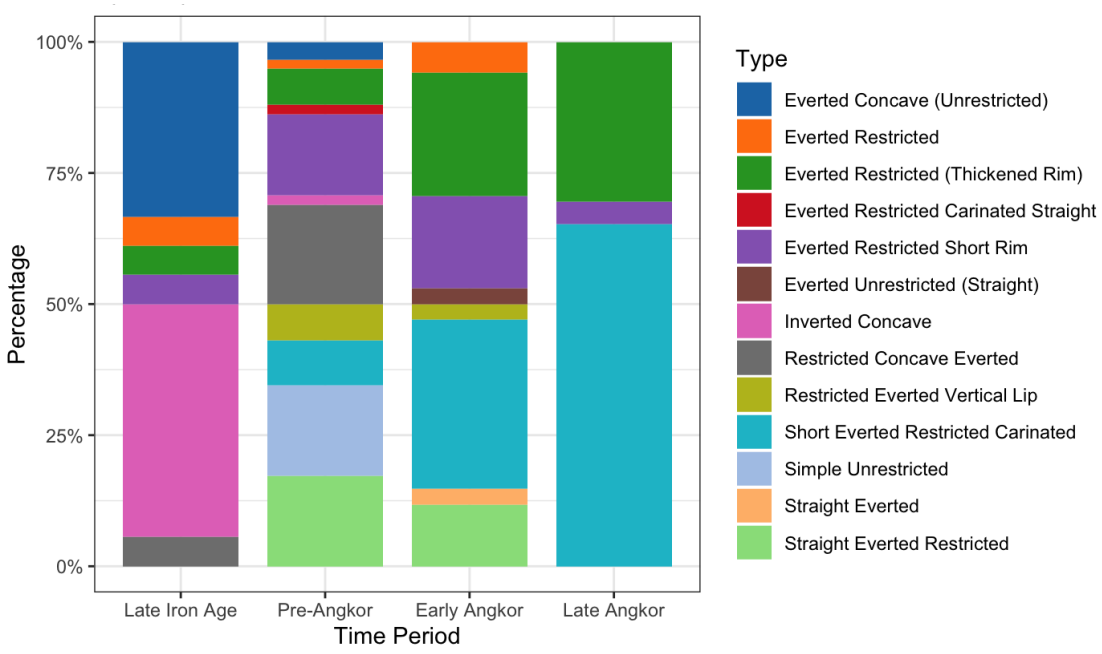


A reduction in rim form variation is also demonstrated with the specific ceramic types found within each of the classes. The Late Iron Age has six types present, with the Pre-Angkor period having eleven types. This decreased in the Early Angkor period, with eight types present. A sharp decrease occurs in the Late Angkor period, with only three types present. Additionally, in the Pre-Angkor period, there is a relatively even distribution of types present, whereas in the

Late Angkor period, the short everted restricted carinated vessel type becomes incredibly dominant over time. In a similar pattern, the everted restricted thickened rim type increases from the Late Iron Age through the Late Angkor period.

Figure 11:

Type by Time Period

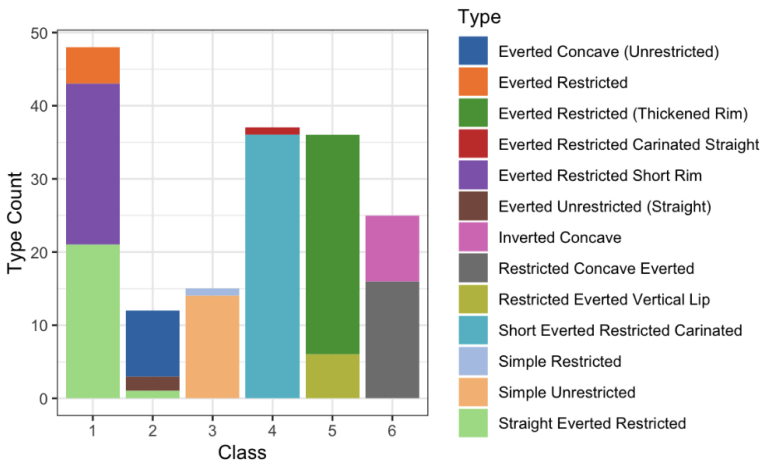


DISCUSSION

One of the primary goals of this study was to determine what rim forms were present in the ceramic assemblage at Baset. From this typological study, I identified six classes with 13 types from a total of 173 rims (138 of which have radiocarbon dates from their respective archaeological contexts). The second research question was to examine whether there were changes in the rim forms over time. The trend is an overall loss of variation in both classes and types over time. There is a loss of Class 2 in the Pre-Angkor Period from the Iron Age, but Class 4 emerges. There is a loss in variation beginning from the Pre-Angkor Period, which has all but Class 2 present in the assemblage. In the Early Angkor period, there is a loss of Class 3, but Class 2 emerges again. Class 6 is not present during either the Angkor Period time frame. A similar, but more stark pattern is clear with the types. In the same vein as the pattern with the classes, there is an increase in type presence from the Late Iron Age to the Pre-Angkor period. Of the 13 types, 11 are present in the Pre-Angkor Period, with a decrease to eight in the Early Angkor Period, and an intense decrease to only three types in the Late Angkor period.

Figure 12:

Type Within Classes



In addition to the types changing, there also appears to be different trends within the assemblage of rim diameter, rim thickness, and upper body thickness measurements. When the data is analyzed in R Studio to produce boxplots and summary statistics, the average rim diameter increases over time, with a sharp decrease in the Late Angkor Period. This differs from what was observed in the rim diameter differences by class, as there was a minimal difference in average diameter between classes. The average rim thickness also decreases slightly from the Pre-Angkor through the Late Angkor Period. The upper body thickness displays the most random pattern of each of the characteristics, with no consistent pattern throughout. These trends demonstrate that there are changes occurring between time periods not only visually, but also morphologically.

Figure 13.1:

Rim Diameter by Time Period

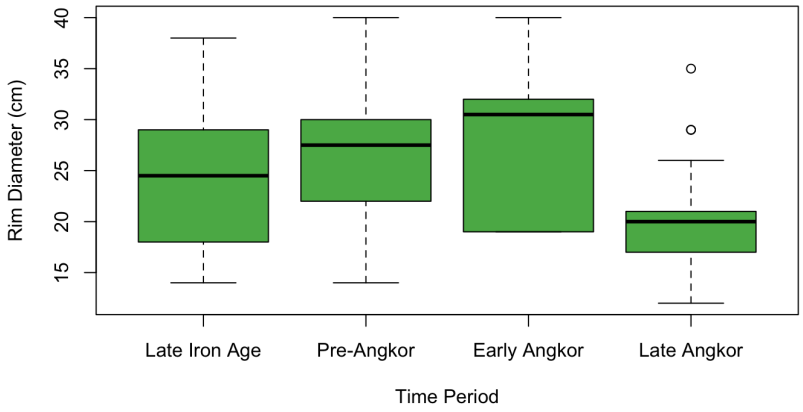


Figure 13.2:

Rim Thickness by Time Period

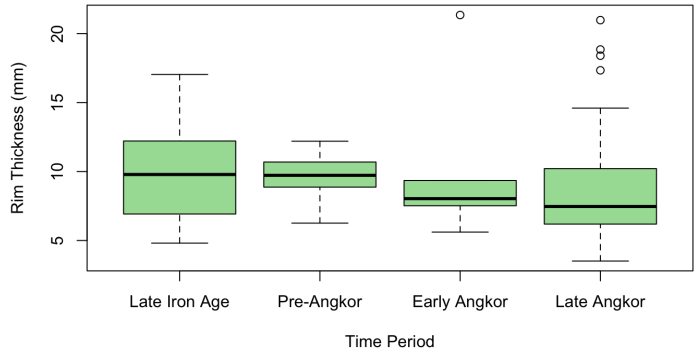
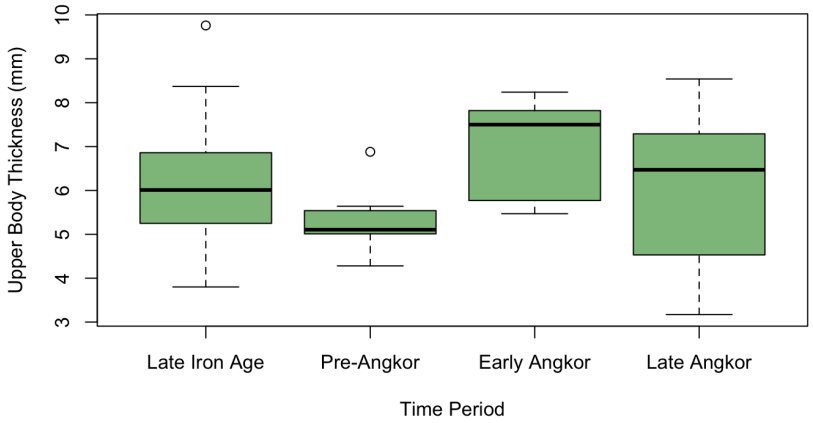


Figure 13.3:

Upper Body Thickness by Time Period



Lastly, these data also allow me to address the third research question regarding the implications of the spread of the Angkor Empire to the area, with the dedication of Prasat Baset in 1018 CE by Suryavarman I. Ceramics and their rim forms are one way to understand this, specifically through the changes (or lack of changes) that may occur during the Angkor Empire's dated spread to the area (1018 CE). As explained previously, there is a significant decrease in variation in both class and type from the Pre-Angkor to the Late Angkor periods. The increasing dominance of certain classes and disappearance of others over time demonstrates both change

and persistence of particular pottery types. Interestingly, there are no new types introduced in the Early or Late Angkor Period, but the presence of the pre-existing types does change.

Specialization is one of the potential ways to understand the change across time at Baset. Specialization is defined broadly as differential participation in production of a product within a larger group, which could be a community, village, region, or larger area, While we do not have direct evidence of specialization, which is often seen as kilns, workshop areas, or processing loci, there is indirect evidence, in the form of increasingly standardized rim forms (Costin, 1991). However, it is important to note that standardization does not always mean that there is specialization (Costin, 1991). Standardization can also be a result of efficiency in the manufacturing process and demand. It is not clear whether these vessels were being traded, but specialization and standardization can still be important ways to examine the vessel changes over time. Furthermore, Costin explains that "[v]ariability at this level [single assemblage] often reflects sociopolitical processes or functional concerns, rather than economic organization" (1991). This would align with potential occurrences at Baset, where sociopolitical changes may have occurred as a result of the expansion of the Angkor Empire to the area. With these sociopolitical changes, new people may have brought different techniques with varying efficiency, preferences for different types of pottery (for example, short everted restricted carinated vessels due to their dominance in the Late Angkor Period). These changes may have resulted in increased standardization and changing specialization at Baset, leading to a decrease in the variety of pottery forms that are found in the Late Angkor Period.

A second way to view this change is through communities of practice. This theory, first coined by Jean Lave and Etienne Wenger, can be used as a theoretical framework to understand the transmission of knowledge within communities (Wenger, 2011). This theory is based on the

concept that learning is social participation (Wenger, 1998). When taken in the context of Baset, it can be the transmission of pottery-making traditions among social settings within the community. Should this be the case, a new group of people, like people settling at Baset with the expansion of the Angkor Empire, could impact the way that pottery traditions are learned. Furthermore, Wenger explains that "[f]or *communities,* it means that learning is an issue of refining their practice and ensuring new generations of members" (1998, p. 7). Learning, in communities, can be seen as a way to refine practices, like pottery making. With the data presented in this paper, this can be seen through the vessel types decreasing over time, potentially due to a refining of practice or technology as a result of social learning. Ideas and practices can wax and wane over time in communities of practice, particularly relating to shared histories. With the concepts of communities of practice, this could mean that if new individuals came to Baset, the shared histories are different, and they may have had different preferences, techniques, or uses for pre-existing pottery types, but not necessarily entirely new pottery forms.

A third way to understand this change is through the popularity principle, as described in LeCount (2018). This is used in the sense that certain types of styles become more popular over time, and thus other types of ceramics fade away. This scenario does not necessarily rely on the influx of new individuals, groups, ideas, or exposure to different cultures, but rather the natural flow of preference and creation. This could still account for new individuals coming into the community, but it means that the processes of change are not necessarily due to outside influences.

None of these scenarios is mutually exclusive. It is not yet known the extent to which the Angkor Empire's presence in the area impacted the social, economic, and community aspects of life at Baset. Ceramics and their rim forms are one way to understand this, specifically through

the changes (or lack of changes) that may occur during the Angkor Empire's dated spread to the area (1018 CE). One piece of evidence that can be tied to the Angkorian presence in the area outside of temple dedication is the presence of Angkorian stonewares. It is unclear if these stoneware ceramics arrived at Baset through trade or were brought by individuals who came to Baset from other areas of the Angkor Empire, or a combination of these. Similarly, the change in earthenwares could possibly be due to new people, new ideas, and cultural shifts as a result of the expansion of the Angkor Empire. It is also possible that this trajectory of change occurred due to the natural progression in popularity, use, and techniques of the local populations. Nevertheless, it is clear that there is change occurring when the Angkor Empire spreads to the area.

While this is only one area, there are studies that have been completed on earthenwares in other regions of Cambodia that can provide insight. Dr. Miriam Stark completed research at Angkor Borei as part of the Lower Mekong Archaeology Project with over 32,000 ceramic sherds (2000). Angkor Borei is located south of Phnom Penh in the Takeo province in Cambodia but has some similarities to the collections we have from Baset. The study examines ceramics ranging from 400 BCE to approximately 600 CE, indicating temporal overlap with parts of the Baset assemblage (from the Late Iron Age through part of the Pre-Angkor Period). In Figure 14, there are clear similarities between the shapes of these pots.

In another study, Dr. Tse Siang Lim examined earthenware ceramics from the Iron Age (500 BCE to 500 CE) from three sites in northwest Cambodia, with a control site in northeast Thailand (Lim, 2020). One parallel can be drawn between the Plain^2 CO group from Non Ban Jak (northeast Thailand), with the straight everted restricted and restricted concave everted vessels from Baset. Completing a further comparison of this assemblage to Baset's would

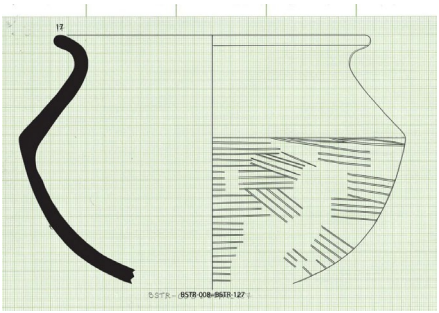
provide information regarding the regional variation in northwestern Cambodia with earthenware ceramics.

Another site of comparison is the circular earthworks found in the Kampong Cham province in Cambodia, as well as the nearby region in Vietnam, particularly Krek 52/62. There have been decades of research at these circular earthworks that have revealed some earthenware ceramic forms (Albrecht et al., 2000). Many of these forms align with types found at Baset, specifically restricted concave everted and straight everted restricted. While there is no consensus on the specific dates for the Krek 52/62 curricular earthworks, they are largely placed in the prehistoric period. Each of these sites provides an opportunity to take this research further to understand the way ceramic traditions vary across the region in similar time periods. There are many more sites throughout Cambodia as well, but these three provide a cursory view of the potential comparisons.

Figure 14:

Brief Comparison of Other Collections to Baset's Assemblage

Cord-marked jar from Angkor Borei, no provenance (Stark, 2000, p. 75).



BSTR-127, a Class 4, short everted restricted carinated vessel with relative dating to the Pre-Angkor Period.

<table>
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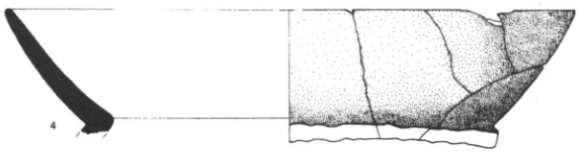
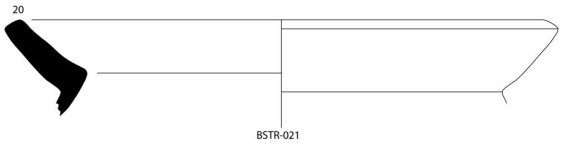
<td> 
From the Krek 52/62 circular earthworks archaeological excavations (Albrecht et al., 2000, p. 26).</td>
<td> 
BSTR-021, a Class 6, restricted concave everted vessel with relative dating to the Pre-Angkor Period.</td>
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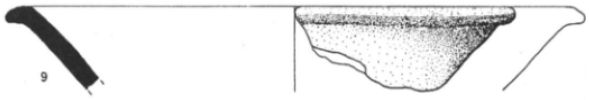
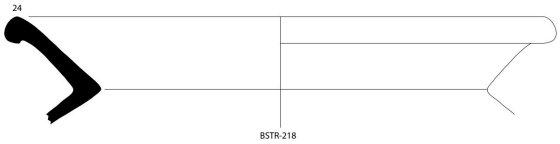
<td> 
From the Groslier Site part of the Krek 52/62 circular earthworks (Albrecht et al., 2000, p. 26).</td>
<td> 
BSTR-218, a Class 1, straight everted restricted vessel, with no relative dating.</td>
</tr>
</table>

Note. Drawings of Baset Vessels Courtesy of Ms. Ranet Hong

CONCLUSION

The guiding questions in this thesis were: (1) What rim forms are present in the ceramic assemblage at Baset? (2) Is there a change in the ceramic rim forms over time? (3) Is there a change correlating with the spread of the Angkor Empire to the Prasat Baset (1018 CE)? These questions resulted in the creation of an earthenware ceramic typology based on 173 rims from 13 different trenches. The typology resulted in six classes and 13 individual types. A total of 138 of these samples were able to be linked to a broad time period: Late Iron Age, Pre-Angkor Period, Early Angkor Period, and Late Angkor Period. Through the analysis of the frequencies and presence of the types and classes in each time period, a pattern emerged. The ceramic types and classes decrease in presence as the periods progress, with the Pre-Angkor Period having the most variation and the Late-Angkor Period having the least variation.

However, the reasoning behind this change is still unknown. In order to pursue this further, *chaĩne operatoire* could be used to understand the full manufacturing process from start to finish for these vessels. This would allow archaeologists to see where the changes in the processes may have occurred over time and how individuals within the community at Baset were involved. Further analyses could also include a comparison with other rural archaeological excavations, which are uncommon in Cambodian archaeology due to the presence of large-scale settlements like Angkor. However, this typology could still be compared to earthenware vessels found at habitation sites within Angkor. This study revealed much-needed information regarding the impact of the Angkor Empire on communities in other areas outside of the greater Angkor region, but there is still work that can be done in household archaeology before, during, and after the Angkor Empire.

APPENDIX:

Appendix A:
Copy of Database for Rim Classification and Measurements

Rim Database ID	Class	Type	Box #	Trench	US #	Feature?	Photo ID	Typology Code	N=	Name of rim type (F	Description?	Diameter (in cm)	% of pot	Thickness of the rim	Length of the rim (m	Thickness at midpo	Thickness of where	Thickness of the bo	Thickness of the bo	Notes
BSTR-230	1	Straight Everted Re	94	20	21024	Trench 20 side	5,733,573,557,375,74	8a-2Rb	28	everted, restricted,	reconstructable pot	14	0.33	9.97	12.99		12.83	3.8		
BSTR-229	4	Short Everted Restr	94	20	20015		572,757,295,731.000	8a-1Ra	1	everted, restricted, concave		32	0.14	9.54	19.84		9.53	5.64		
BSTR-228	5	Everted Restricted	94	20	20015		572,357,245,725.000	8a-1Rd-HF	1	everted restricted,	ripples on inside of	31	0.065	12.16	20.27	10.29	10.1	5.16		
BSTR-227	4	Short Everted Restr	94	20	20015		571,357,155,717.000	8a-1Rd-HF	1	everted, restricted, flat		15	0.08	10.23	22.21		7.55	6.49		
BSTR-226	4	Short Everted Restr	94	20	20015		570,757,095,711.00	8a-1Ra- HF	1	everted, restricted		29	0.06	10.64	15.08		7.6	5.63		
BSTR-225	4	Short Everted Restr	94	20	20015		570,157,035,705.00	8a-1Ra-HF	1	everted, restricted, slightly concave/flat		15	0.27	7.56	20.02		7.29	6.85		
BSTR-224	4	Short Everted Restr	94	20	20003		56,915,693,569,556	8a-1Ra	7			22	0.17	10.26				4.84		
BSTR-223	4	Short Everted Restr	94	20	20006	Bag 2	568,356,855,689.00	8a-1Ra-HF	2	everted, restricted, short		32	0.16	6.26	13.83		6.99	5.1		
BSTR-222	4	Short Everted Restr	94	20	20006		566,756,795,681.00	8a-1Ra	1	everted, restricted, flat		30	0.105	8.87	12.85		9.44	4.28		
BSTR-221	4	Short Everted Restr	94	20	20006		567,256,735,675.00	8a-1Rd-HF	1	everted, restricted, flat/flared		23	0.05	9.39	13.12		7.76	5.09		
BSTR-220	1	Everted Restricted	94	20	20013	NW Corner	566,456,665,668.0	8a-1Ra-HF	3	everted, restricted, concave flared?		18	0.11	11.72	18.96		6.39	5.01		
BSTR-219	5	Everted Restricted	94	20	20016		565,856,595,662.00	8a-3Ra	1											
BSTR-218	1	Straight Everted Re	94	19	19049		565,056,545,657.00	8a-3Ra	1	everted, restricted										
BSTR-216	1	Straight Everted Re	94	18	18030		339,733,983,402.00	8a-1Ra	1	everted, restricted	horizontal lines alon	17	0.14	3.51	18		6.91	3.67		
BSTR-215	1	Everted Restricted	94	18	18039		344,034,423,443.00	8a-2Ra	2	everted, restricted,	ridges	19	0.25	9.35	20.82		12.57	5.47		from bag 1 of 2
BSTR-214	4	Short Everted Restr	94	27	27011		341,834,193,423.00	8a-1Ra-HF	1	everted, restricted		25	0.1	8.19	15.64		6.93	4.31		
BSTR-213	4	Short Everted Restr	94	27	27004		343,434,353,436.00	8a-1Ra	4	everted, restricted		24	0.155	6.86	15.33		5.39	4.94		
BSTR-212	5	Everted Restricted	94	12	12023		340,534,063,407.00	8a-1Ra	1	everted, restricted	2 edges to the rims	14	0.12	12.2	20.29		5.78	6.88		
BSTR-211	5	Everted Restricted	94	12	12023		342,534,263,427.00	8a-1Ra	2											draw only
BSTR-210	4	Short Everted Restr	94	12	12022		343,734,383,439.00	8a-1Ra	2	everted, short, restricted		27	0.22	10.69	11.13		8.88	5.54		
BSTR-207	1	Straight Everted Re	94	22	22004		342,834,293,430.00	8a-2Rd	3	everted, restricted,	3 pieces cross-men	20	0.21	10.54	44.19		9.62	6.24		
BSTR-205	6	Restricted Concave	94	22	22015		341,234,133,414.00	8a-2Rb	2	everted, restricted,	2 pieces cross-mend	21	0.08	6.8	65.19		10.31	7.46		
BSTR-204	1	Straight Everted Re	94	22	22007		344,634,473,448.00	8a-1Rc	6	everted, restricted,	6 pieces cross-men	21	0.25	7.04	60.2		12.11	4.23		
BSTR-203	4	Short Everted Restr	94	22	22003		331,433,151,316.00	8a-1Rb	1	everted, restricted, concave		18	0.06	11.88	10.67		6.99	3.17		
BSTR-202	1	Everted Restricted	94	21	21001		341,534,163,417.00	1-Ra-HF	1	everted, restricted, concave		15	0.07	8.21	10.72		6.83	7.41		
BSTR-198	5	Everted Restricted	94	19	19028		330,633,073,310.00	8a-2Ra	2	everted, flared, concave		20	0.1	17.79	22.91		10.13	8.49		
BSTR-197	6	Restricted Concave	94	19	19028		331,733,183,319.00	8a-2Ra	3	everted, restricted, concave		19	0.1	8.35	22.84		7.87	6.23		
BSTR-196	6	Restricted Concave	94	19	19028		335,633,573,358.00	8a-2Ra	2	everted, concave, restriced		16	0.08	7.9	37.92		10.68	5.56		
BSTR-194	5	Everted Restricted	94	19	19028		333,233,333,334.00	8a-1Rb	1	everted, restricted, concave		21	0.2	6.9	51.81		8.42	5		
BSTR-191	3	Simple Unrestricted	94	19	19020		332,633,273,328.00	8a-2Rg	1	Special foot rim										
BSTR-189	5	Everted Restricted	94	19	19020		335,933,603,361.00	8a-1Ra	1	everted, concave, restricted		28	0.115	3.77	27.89	7.93	4.94	7.49		
BSTR-188	5	Restricted Everted	94	19	19020		334,233,433,344.00	8a-1Ra	1	everted, restricted, flared		16	0.13	4.6	20.78		13.66	5.78		
BSTR-187	4	Short Everted Restr	94	19	19020		336,533,663,367.00	8a-2Ra	4	everted, restricted, short rim		19	0.1	4.06	17.78		6.94	3.89		
BSTR-186	3	Simple Unrestricted	94	19	19020		333,933,403,341.00	8a-2Ra	1	everted, concave	not very restricted?	28	0.05	7.47				8.96	6.88	

BSTR-185	5	Everted Restricted	94	19	19028		337,433,753,376.00	8a-1Rb	2	everted, restricted, concave	23	0.22	6.42	51.89		9.23	4.92		
BSTR-184	4	Short Everted Restr	94	19	19028		336,833,693,370.00	8a-2Rb	1	everted, restricted	20	0.14	7.38	21.41		11.31	5.44		
BSTR-183	1	Everted Restricted	94	19	19028		335,333,543,355.00	8a-2Ra	1	everted, restricted, Carmen thought foo	23	0.23	9.12	25.87		17.66	6.19		
BSTR-182	6	Restricted Concave	94	19	19028		335,033,513,352.00	8a-2Rb	2	everted, concave, restricted	18	0.23	8.43	39.3		7.51	4.14		
BSTR-181	4	Short Everted Restr	94	9	9003/11003		337,733,783,379.000	8a-1Ra	3	everted, concave, short, restricted	25	0.29	7.38	17.06		10.6	6.48		
BSTR-180	3	Simple Unrestricted	94	9	9023/11023		336,233,633,364.00	8a-2Rc	2	direct, unrestricted	14	0.11	4.13				5.54	3.6	
BSTR-179	1	Everted Restricted	94	9	9023/11023		333,533,363,337.00	8a-2Rb	1	everted, restricted, flared, concave	25	0.08	12.45	20.93		13.65	6.26		
BSTR-178	1	Everted Restricted	94	9	9008/11008		332,033,213,322.00	8a-1Ra	1	everted, flared, concave?	30	0.09	2.97	19.42		11.27	8.84		
BSTR-177	2	Everted Unrestricte	95	9	9005/11005		338,033,813,382.00	8a-1Ra	2		30	0.09	9.44	23.44		11.23	12.19	7.06	2 pieces cross men
BSTR-176	5	Everted Restricted	94	9	9005/11005		332,933,303,331.00	8a-1Ra	1	everted, concave, restricted	29	0.12	8.77	19.67		7.49	6.8		
BSTR-175	4	Short Everted Restr	94	9	9004/11004		334,533,463,347.00	8-1Ra	1	everted, restricted, flared?	14	0.14	8.09	13.03		6.34	5.11		
BSTR-174	4	Short Everted Restr	94	27	27006		338,333,843,385.00	8a-1Ra-HF	6	everted/inverted (out then in slightly), re	30	0.17	6.98	12.01		8.15	5.57		
BSTR-172	1	Everted Restricted	94	27	27006		338,633,873,388.00	8a-1Ra-HF/8a-1Bd-H	4	horizontal rim, vertid' lines lower neck/u	17	0.7	13.1	58.11		6.97	5.96	4.7	2 rim sherds, 2 body
BSTR-171	4	Short Everted Restr	95	20	20011		303,430,353,036.00	8a-1Ra-HF	14										Carmen already dre
BSTR-169	1	Straight Everted Re	95	8	8013		304,630,473,048.00	8a-2Ra	1	everted, unrestriced?	17	0.07	14.2	34.85		12.04	8.87		
BSTR-168	2	Everted Concave (U	95	8	8036		302,930,303,033.0	8a-3Ra	1	everted, simple, unrripples on ext	15	9%							draw only
BSTR-167	3	Simple Unrestricted	95	19	19020		304,330,443,045.00	8a-2Ra	1	simple, direct, unrestricted?	18	0.18	5.58				7.49	4.69	
BSTR-166	5	Everted Restricted	95	19	19020		304,030,413,042.00	8a-2Ra	1	everted, straight to flare, restricted?	17	0.24	4.26	30.3			7.81	5.71	
BSTR-165	1	Everted Restricted	95	28	28020		293,029,312,932.00	8a-1Ra	2	everted, restricted									
BSTR-163	1	Straight Everted Re	95	28	28020		292,129,222,923.00	8a-2Ra	1	everted, restricted	19	0.07	4.96	22.03		8.87	6.56		
BSTR-162	5	Restricted Everted	95	28	28020	south part	29,582,959,296,029	8a-3Rh/3Bh	9	everted, ext ridge atpainted	19	0.18	4.92	44.86	9.72	7.04	6.01		8 pieces cross-men
BSTR-161	1	Straight Everted Re	95	28	28020		294,729,482,949.00	8a-2Ra	1	slightly everted (straight?), restricted	18	0.21	6.47	46.58		14.28	7.05		
BSTR-160	5	Everted Restricted	95	28	28023		291,829,192,920.00	8a-2Ra	1	everted, outcurvingslightly rippled	14	0.1	7.81	38.17		9.83	6.32		
BSTR-159	1	Straight Everted Re	95	28	28020	south part	29,632,965,296,629	8a-2Ra	18	everted, restricted whole pot?	19	0.1	5.02	20.81		6.33	5.34		at least 5 pieces cr
BSTR-158	2	Everted Concave (U	95	28	28015		295,429,552,956.00	8a-2Ra	2	inverted, simple, unburnished? VERY sm	18	0.175	6.53			6.26			2 pieces that cross-
BSTR-157	2	Straight Everted Re	95	28	28022		293,929,402,941.00	8a-2Rd	1	slightly everted (strslight ridges along r	14	0.2	5.25	50.62	7.06	13.85	5.67		
BSTR-156	1	Everted Restricted	95	8	8032		291,229,132,914.00	8a-1Ra	1	everted, restricted									
BSTR-154	1	Straight Everted Re	95	8	8010		294,229,442,945.00	8a-1Rb	1	long everted rim, rec/m	21	0.11	6.14	73.76		20.06	6.04		
BSTR-151	5	Everted Restricted	95	8	8006		293,629,372,938.00	8a-1Ra-HF	1	everted, thick rounded lip, short rim, restricted									
BSTR-150	4	Short Everted Restr	95	8	8006		293,329,342,935.00	8a-1Ra-HF	1	everted, short rim, rincised combo	40	0.14	10.06	12.81		9.88	5.64		
BSTR-148	4	Short Everted Restr	95	24	24009		486,248,634,865.00	8a-1Ra-HF	4	everted, short rim, restricted, carinated	29	0.09	8.34	12.38		6.81	5.16		
BSTR-144	4	Short Everted Restr	95	24	24016		484,448,464,848.00	8a-1Rd	1	everted, short rim, rd liines upper body	16	0.15	4.81	18.93		8.6			
BSTR-143	4	Short Everted Restr	95	24	24014		483,248,344,836.00	8a-1Ba-HF	2	everted, short rim, restricted									
BSTR-142	4	Short Everted Restr	95	24	24012		472,747,284,730.00	8a-1Ba-HF	2	everted, short rim, restricted									
BSTR-139	5	Everted Restricted	95	24	24016		475,247,544,756.00	8a-2Ra	1	everted restricted, flared?	27	8.5	13.97	27.65		7.86	4.15	4.15	4.15

BSTR-138	3	Simple Unrestricted	95	23	23021		48,174,819,482,148,	8a-2Rb	14	undetermined, body sherds with foot rim	24	0.15	8.09				7.24		
BSTR-136	1	Straight Everted Re	95	23	23023		472,347,244,726.00	8a-2Ra	4	everted, restricted	15	~50%	9.33	34.09		6.54	4.44		
BSTR-134	5	Restricted Everted	95	23	23021	pot 4	479,547,984,800.00	8a-3Ra	8	everted or invertedthese forms are usually painted									
BSTR-133	5	Everted Restricted	95	23	23024		473,247,344,735.00	8a-3Ra	2	very thick, concave int at lip, everted str	19	0.28	18.4	64.21	18.56	22.38	8.34		
BSTR-133	1	Straight Everted Re	95	23	23024		473,247,344,735.00	8a-3Ra	2	very thick, concave int at lip, everted str	19	0.28	18.4	64.21	18.56	22.38	8.34		
BSTR-130	5	Everted Restricted	95	23	23021	pot 1	475,847,604,762.00	8a-3Ra	1	very thick, everted rim, rippled rim form	19	0.35	18.85	56.75	16.18	14.57	6.83		
BSTR-127	4	Short Everted Restr	95	23	23022	pot 5	477,547,764,778.000	8a-2Rb/2Cb	2	everted rim, restricted; other sherd is ca	17	0.15	6.2	18.83		6.33	7.9		
BSTR-125	5	Everted Restricted	95	23	23022		271,927,202,721.000	8a-2Ra	1	very thick, everted rim, rippled rim form	21	1	20.98	58.93	18.51	16.08	8.1		
BSTR-122	1	Straight Everted Re	95	19	19021		271,327,142,715.000	8a-3Rh	1	large vessel, horizonremnant paint on neck									
BSTR-120	4	Short Everted Restr	95	17	17004		259,825,992,600.00	8a-1Ba-HF	1	everted, short rim, restricted									
BSTR-118	5	Restricted Everted	95	17	17022		260,426,052,607.00	8a-3Rh	1	everted, short rim, rpainted									draw only
BSTR-117	1	Everted Restricted	95	17	17023		260,826,092,610.008a-3Rh		1	everted, short rim, restricted									
BSTR-116	6	Restricted Concave	95	19	19003		265,726,582,659.00	8a-2Ra	1	everted, concave, restricted	14	0.15	7.9	32.17		9.22	5.82		
BSTR-115	5	Everted Restricted	95	17	17003		262,626,272,628.00	1	1	everted, short rim, restricted									
BSTR-115	1	Everted Restricted	95	17	17003		262,626,272,628.00	1	1	everted, short rim, restricted									
BSTR-114	5	Everted Restricted	95	24	24013		257,025,712,573.000	8a-1Ra-HF	1	everted, short rim, restricted									
BSTR-113	5	Everted Restricted	95	24	24013		262,926,302,631.00	8a-1Ra-HF	1	everted, short rim, restricted									
BSTR-111	5	Everted Restricted	95	24	24008		263,826,392,640.00	8a-1Ra-HF	1	everted, short rim, restricted									
BSTR-110	5	Everted Restricted	95	24	24008		258,925,902,591.00	8a-1Ra-HF	1	everted, short rim, restricted?/foot rim?									
BSTR-109	3	Simple Unrestricted	95	19	19008		266,326,642,665.00	8a-2Ra	1	simple, direct, unrestricted	24	0.085	5.26				6.65		
BSTR-108	5	Everted Restricted	95	19	19007		268,126,822,683.00	8a-2Ra	1	everted, restricted, concave	14	0.05	10.15	31.02		9.08	5.6		
BSTR-107	1	Everted Restricted	95	19	19007		269,726,982,699.00	8a-2Ra	1	everted, restricted, flared?	22	0.05	6.73	12.96		8.14	4.58		
BSTR-105	1	Straight Everted Re	95	19	19003		267,826,792,680.00	8a-2Ra	2	everted, restricted	16	0.08	6.55	41.25		14.42	5.18		
BSTR-104	5	Everted Restricted	95	17	17011		269,026,922,693.00	8a-2Ra	1	everted restricted, flared?	13	0.24	9.84	19.59		10.82			
BSTR-103	1	Straight Everted Re	95	21	21012		269,426,952,696.00	8a-2Rb	1	everted restricted short rim	20	0.08	11.81	18.85	13.39		6.31		
BSTR-102	1	Everted Restricted	95	20	20019		268,726,882,689.00	8a-2Rb	1	everted concave restricted	28	0.09	17.04	21.35		12.25	6.72		
BSTR-101	1	Everted Restricted	95	20	20017		268,426,852,686.00	8a-2Rb	1	everted concave record marking on nec	29	0.08	14.23	22.37		14.92	7.19		
BSTR-100	1	Everted Restricted	95	20	20018		266,626,672,668.00	8a-2Ra	1	everted, concave? rburnishing?	28	0.135	12.27	23.9		12.69	6.87		
BSTR-098	4	Short Everted Restr	95	24	24010		2,650,265,126,522,6	8a-1Ra/1Bd-HF	9	large vessel, short ehorizontal lines at neck and shoulder/body									
BSTR-097	6	Restricted Concave	95	18	18057		261,726,182,619.00	8a-2Ra	1	everted, slightly concave, restricted	19	0.04	7.52	44.31		12.7	5.77		
BSTR-096	2	Everted Concave (U	95	18	18057		261,426,152,616.00	8a-2Ra	1	direct, undetermined									
BSTR-095	6	Inverted Concave	95	18	18057		258,025,812,582.00	8a-1Ra	1	inverted, simple									
BSTR-094	2	Everted Concave (U	95	18	18057		262,326,242,625.00	8a-1Ra	1	inverted, simple									
BSTR-092	4	Short Everted Restr	95	17	17009		259,225,932,594.00	8a-1Ra-HF	1	everted, short rim, restricted, carinated	30	0.095	10.85	18.03		9.28	9.76	6.86	
BSTR-091	6	Restricted Concave	95	18	18035		266,026,612,662.00	8a-2Ra	1	everted, straight, restricted	26	0.04	8.09	42.28		9.27	6.52		

BSTR-090	6	Restricted Concave	95	18	18035		267,526,762,677.00	8a-2Ra	1	everted, concave, restricted?		17	0.12	8.05			8.19			
BSTR-088	1	Everted Restricted	95	18	18035		266,926,702,671.00	8a-2Ra	1	everted, curved neck, restricted		12	0.08	6.36	17.51		10.89	7.8		
BSTR-086	3	Simple Unrestricted	95	18	18035		264,426,452,646.00	8a-1Ra	1	everted, unrestricted?										
BSTR-082	3	Simple Unrestricted	95	18	18011		264,726,482,649.00	8a-3Ra	1	everted, simple										
BSTR-081	1	Straight Everted Re	95	18	18011		262,026,212,622.00	8a-1Ra	1	everted, restricted										
BSTR-080	2	Everted Concave (U	95	18	18011		263,526,362,637.00	8a-3Rh	1	everted, simple										
BSTR-079	5	Restricted Everted	95	18	18011		264,126,422,643.00	8a-3Rh	1	everted, simple	painted									draw only
BSTR-078	5	Restricted Everted	95	18	18011		261,126,122,613.00	8a-3Rh	6	everted, simple	painted									draw only, 6 sherds
BSTR-075	1	Everted Restricted	95	18	18012		446,644,684,470.00	8a-1Ra	1	everted, short rim, undetermined vessel form										
BSTR-074	5	Everted Restricted	95	18	18012		446,144,634,464.00	8a-1Ra	1	everted, short rim, undetermined vessel form										
BSTR-073	1	Everted Restricted	95	18	18012		448,744,894,491.00	8a-1Ra	1	everted, short rim, undetermined vessel form										
BSTR-070	6	Inverted Concave	95	18	18010		431,843,194,321.00	8a-3Rh	1	inverted rim, simple	painted									draw only
BSTR-069	1	Everted Restricted	95	18	18034		427,642,784,282.00	8a-3Rh	2	rim and foot rim	high fired type?									
BSTR-067	6	Inverted Concave	95	18	18054		431,343,144,316.00	8a-2Ra	1	inverted, undertemined vessel form										
BSTR-065	2	Everted Concave (U	95	18	18048		430,743,094,311.00	8a-3Ra	1	inverted, simple (rim same thickness as body)										
BSTR-064	6	Inverted Concave	95	18	18048		429,642,984,300.00	8a-3Rb	1	inverted, simple (thc/m										draw only
BSTR-063	2	Everted Concave (U	95	18	18042		440,044,014,403.0	8a-3Rd	2	inverted, simple	horizontal lines on body									
BSTR-061	1	Everted Restricted	95	18	18042		430,243,044,306.00	8a-3Ra	1	everted, short tim, restricted (thicker type)										
BSTR-060	6	Inverted Concave	95	18	18042		433,343,354,339.00	8a-3Ra	1	inverted, simple (thicker type)										
BSTR-058	2	Everted Concave (U	95	18	18042		425,642,574,259.00	8a-2Ra	1	inverted, simple										
BSTR-057	2	Everted Concave (U	95	18	18042		427,142,724,274.000	8a-2Ra	1	inverted, simple										
BSTR-054	6	Inverted Concave	95	18	18057		418,841,904,192.00	8a-2Ra	1	unrestricted, inverted rim		30	0.03	7.55		12.11		8.24		
BSTR-053	6	Inverted Concave	95	18	18057		417,841,804,186.00	8a-2Ra	1	unrestricted, invert	parallels to large/ro	32	0.06	21.35		8.83		7.5		
BSTR-052	5	Everted Restricted	95	18	18042		416,841,704,174.00	8a-2Ra	1	everted, restricted	flare?	31	0.12	5.61		9.52				VERY thick, hard to
BSTR-051	6	Inverted Concave	95	18	18054		416,241,644,166.00	8a-2Ra	1	simple, unrestricted	ridge in middle	40	0.04	8.52		8.87		7.82		very small piece, ha
BSTR-050	1	Straight Everted Re	95	18	18035		415,641,584,160.00	8a-2Rg	1	everted, restricted,	pre-firing marks (ac	19	0.11	10.31	43.37		10.09	6.03		
BSTR-049	6	Inverted Concave	95	18	18015		415,041,524,154.00	8a-2Ra	2	simple, unrestricted	light burnishing or s	29	0.06	8.19					5.31	2 pieces in bag (me
BSTR-048	4	Short Everted Restr	95	18	18015		414,441,464,148.00	8a-2Ra	1	everted restricted,	light horizontal line	17	0.16	5.39	18.81		8.23	3.97		
BSTR-047	3	Simple Unrestricted	95	18	18015		414,141,434,217.00	8a-2Ra	1	simple, unrestricted, direct rim		17	0.22	4.76				6.03	5.39	
BSTR-045	3	Simple Unrestricted	95	18	18034		413,341,354,219.00	8a-2Rb	2	Simple Unrestricted	cording	26	0.17	10.96		4.97		4.39		2 pieces in bag, mic
BSTR-043	3	Simple Unrestricted	95	18	18015		412,441,264,211.00	8a-2Rb	1	Simple Unrestricted	direct rim	29	0.06	14.6				8.08	3.91	
BSTR-042	6	Restricted Concave	95	18	18011		412,041,224,221.00	8a-2Ra	1	everted, restricted	ripples on neck/upp	22	0.12	7.48	23.68		7.05	3.46		
BSTR-041	4	Short Everted Restr	95	18	18011		411,741,184,202.00	8a-2Ra	1	everted, restricted	ripples on neck/upp	23	0.08	7.38	21.22		7.35	7.01		
BSTR-040	1	Straight Everted Re	95	18	18011		411,441,154,207.00	8a-2Rc	3	everted, restricted	combing on body	15	0.16	4.87	27.04		11.58	6.72		3 pieces in bag
BSTR-039	5	Everted Restricted	95	20	20018		445,044,514,453.00	8a-1Ra-HF	1	everted, restricted										

BSTR-038	1	Everted Restricted	95	20	20018		441,544,174,419.00	8a-3Ra	1	everted, short rim, restricted										
BSTR-036	5	Everted Restricted	95	20	20018		434,143,424,344.00	8a-3Ra	1	everted, short rim, restricted										
BSTR-032	4	Short Everted Restr	95	20	20011		429,042,924,294.00	8a-1Ra-HF	1	everted, short rim, restricted										
BSTR-031	4	Short Everted Restr	95	21	21007		441,044,114,413.00	8a-1Ra-HF	1	everted, short rim, restricted	28	0.1	9.37	16.52			5.11			
BSTR-030	4	Short Everted Restr	95	21	21007		449,344,954,496.00	8a-1Ra-HF	1	everted, short rim, restricted										
BSTR-029	4	Short Everted Restr	95	21	21007		426,042,624,263.00	1	1	everted, short rim, restricted										
BSTR-028	4	Short Everted Restr	95	20	20017		434,643,484,350.00	8a-1Ra-HF	1	everted, short rim, restricted										
BSTR-027	1	Everted Restricted	95	20	20017		437,743,794,381.00	8a-1Ra-HF	1	everted restricted?	18	0.185	9.6				8.37			
BSTR-026	5	Everted Restricted	95	20	20017		436,643,684,373.00	8a-1Ra-HF	1	everted unrestricted?	38	0.15	8.79				5.03			
BSTR-026	2	Everted Unrestricte	95	20	20017		436,643,684,373.00	8a-1Ra-HF	1		38	0.15	8.79				5.03			
BSTR-025	5	Everted Restricted	95	20	20017		438,843,904,392.00	8a-1Ra-HF	1	foot rim										draw only
BSTR-024	5	Everted Restricted	95	20	20017		435,243,544,356.00	8a-1Ra	1	everted unrestricted?										
BSTR-024	4	Short Everted Restr	95	20	20017		435,243,544,356.00	8a-1Ra	1	everted unrestricted?										
BSTR-023	1	Everted Restricted	95	20	20017		435,843,594,364.00	8a-2Rb	1	everted restricted, c/m	28	0.16	13.54	27.5	15.29	12.98	8.13			
BSTR-022	1	Straight Everted Re	95	23	23018		393,139,344,238.00	8a-2Ra	1	everted restricted	21	0.105	5.03	20.57		6.53	5.66			
BSTR-021	6	Restricted Concave	95	23	23019	19	392,839,304,233.00	8a-2Ra	2	1	everted restricted concave		18	0.065	7.85	34.97		12.27	4.79	
BSTR-021	1	Straight Everted Re	95	23	23019		392,839,304,233.00	8a-2Ra	1	everted restricted concave	18	0.065	7.85	34.97		12.27	4.79			
BSTR-019	6	Restricted Concave	95	23	23020	feature 3	391,939,224,240.00	8a-2Ra	1	everted restricted	20	0.18	5.59	31.09		6.01	7.29			
BSTR-018	3	Simple Restricted	95	23	23020	feature 3	391,539,174,226.00	8a-2Rb	1		35	0.09	11	17.3		8.37	6.94	6.09	(measured rim to ca	
BSTR-017	1	Everted Restricted	95	23	23020	pot 4	391,139,134,228.00	8a-2Ra	2	everted restricted (rim is kind of square	13	0.15	10.12	25.6		8.34	8.54		2 pieces in 1 bag	
BSTR-016	1	Everted Restricted	95	23	23020	pot 4	390,739,094,234.00	8a-2Ra	2	everted restricted concave	19	0.15	6.45	28.68		17.47	6.47	6.4		
BSTR-015	6	Restricted Concave	95	23	23020	feature 1	390,339,044,223.00	8a-2Ra	1	everted restricted cadditional part stick	21	0.13	8.14	30.2	12.84	14.43	6.58			
BSTR-014	6	Restricted Concave	95	23	23020	feature 1	389,638,984,245.00	8a-2Ra	1	everted restricted concave	21	0.1	7.05	33.32		12.52	4.85			
BSTR-012	6	Restricted Concave	95	23	23021	Pot 1	388,938,914,239.00	8a-2Ra	2	everted restricted concave	20	0.1	6.66	60.55		10.22	6.25			
BSTR-010	4	Everted Restricted	95	23	23021	Pot 4	387,938,814,235.00	8a-2Rc	1		20	0.1	6.19	21.55		8.82	3.76			
BSTR-009	3	Simple Unrestricted	95	23	23022	Pot 7	38,753,877,423,247,9	8a-2Rb	7	Simple Unrestrictedc/m	16	0.13	5.33				6.81	6.06	7 sherds; mended, r	
BSTR-008	4	Short Everted Restr	95	23	23022	Pot 5	3,867,386,938,714,2	8a-2Ra	1	everted restricted concave	17	0.125	6.02	21.19		7.99	7.74	8.95		
BSTR-007	1	Everted Restricted	95	23	23022		386,338,644,203.00	8a-2Ra	1	everted restricted celevated section in	22	0.34	17.34	64.72	20.71	21.94				
BSTR-006	1	Straight Everted Re	95	23	23022		385,638,584,213.00	8a-2Ra	1	everted restricted concave	20	0.06	5.13	30.37		8.97	4.53			
BSTR-005	1	Everted Restricted	95	23	23023		385,338,554,237.00	8a-2Ra	1	everted, restricted, outcurving	16	0.18	4.21	21.16		7.29	7.45			
BSTR-004	6	Restricted Concave	95	23	23023		384,938,514,209.00	8a-2Ra	1	everted restricted concave	23	0.09	7.45	58.85	10.32	11.42				
BSTR-003	3	Simple Unrestricted	95	23	23023		384,038,424,198,47	8a-2Ra	3	Simple Unrestricted direct rim	21	0.075	5.52				4.12	2.71		
BSTR-002	3	Simple Unrestricted	95	23	23024		383,738,394,249.00	8a-2Ra	1	Simple Unrestricted direct rim	20	0.1	6.78				5.01	2.91		
BSTR-001	6	Restricted Concave	95	23	23024		3,830,383,338,354,2	8a-2Ra	1	restricted vessel, evcord marking (rubbe	19	0.06	10.21	34.2	12.21	13.96	4.99			ridge on rim (midpo

Appendix B:
Vessel Images from the Baset Earthenware Rim Assemblage

Note. A: BSTR-172; B: BSTR-224; C: BSTR-016; D: BSTR-011; E: BSTR-008; F: BSTR-122; G: BSTR-092; H: BSTR-138; I: BSTR-045; J: BSTR-150; K: BSTR-166; L: BSTR-144; M: BSTR-018; O: BSTR-182

Appendix C:
R Studio Code for statistical calculations and visualizations

Visualizations and Statistical Calculations for Prasat Baset Ceramic Typology

Formatting the file output

title: “Visualizations and Statistical Calculations for Prasat Baset Ceramic Typology” author: “Gabby Shaffer” date: “2026-03-10” output: html_document: theme: flatly toc: true toc_float: true toc_depth: 2 —

Boxplots and Summary Statistics

Converting the CSV file to a named and read file in R & checking the column names

```
Typology_CSV <- read.csv("Typology.csv")
colnames(Typology_CSV)
```

```
##  [1] "Rim.Database.ID"
##  [2] "Class."
##  [3] "Type"
##  [4] "Box.."
##  [5] "Trench"
##  [6] "US.."
##  [7] "Feature.."
##  [8] "Photo.ID."
##  [9] "Typology.Code."
## [10] "N."
## [11] "Name.of.rim.type..From.Sarjeant.thesis."
## [12] "Description."
## [13] "Diameter..in.cm."
## [14] "X..of.pot."
## [15] "Thickness.of.the.rim..mm....0.03.mm."
## [16] "Length.of.the.rim..mm."
## [17] "Thickness.at.midpoint..mm."
## [18] "Thickness.of.where.the.neck.rim.meet."
## [19] "Thickness.of.the.body..upper."
## [20] "Thickness.of.the.body..lower."
## [21] "Notes"
```

Checking the column types

```
str(Typology_CSV)
```

```
## 'data.frame':    173 obs. of  21 variables:
##  $ Rim.Database.ID                       : chr  "BSTR-230" "BSTR-229" "BSTR-228" "BS
TR-227" ...
##  $ Class.                                : int  1 4 5 4 4 4 4 4 4 4 ...
##  $ Type                                  : chr  "Straight Everted Restricted" "Short
Everted Restricted Carinated" "Everted Restricted (Thickened Rim) " "Short Everted Restr
icted Carinated" ...
##  $ Box..                                 : int  94 94 94 94 94 94 94 94 94 94 ...
##  $ Trench                                : int  20 20 20 20 20 20 20 20 20 20 ...
##  $ US..                                  : chr  "21024" "20015" "20015" "20015" ...
##  $ Feature..                             : chr  "Trench 20 side" "N" "N" "N" ...
##  $ Photo.ID.                             : chr  "5733, 5735, 5737 ,5739, 5741, 5743,
5745" "5727, 5729, 5731" "5723, 5724, 5725" "5713, 5715, 5717" ...
##  $ Typology.Code.                        : chr  "8a-2Rb" "8a-1Ra" "8a-1Rd-HF" "8a-1R
d-HF" ...
##  $ N.                                    : int  28 1 1 1 1 1 7 2 1 1 ...
##  $ Name.of.rim.type..From.Sarjeant.thesis.: chr  "everted, restricted, concave" "ever
ted, restricted, concave" "everted restricted, concave" "everted, restricted, flat" ...
##  $ Description.                          : chr  "reconstructable pot" "" "ripples on
inside of rim" "" ...
##  $ Diameter..in.cm.                      : chr  "14" "32" "31" "15" ...
##  $ X..of.pot.                            : chr  "0.33" "0.14" "0.065" "0.08" ...
##  $ Thickness.of.the.rim..mm....0.03.mm.  : num  9.97 9.54 12.16 10.23 10.64 ...
##  $ Length.of.the.rim..mm.                : num  13 19.8 20.3 22.2 15.1 ...
##  $ Thickness.at.midpoint..mm.            : num  NA NA 10.3 NA NA ...
##  $ Thickness.of.where.the.neck.rim.meet. : num  12.83 9.53 10.1 7.55 7.6 ...
##  $ Thickness.of.the.body..upper.         : num  3.8 5.64 5.16 6.49 5.63 6.85 4.84 5.
1 4.28 5.09 ...
##  $ Thickness.of.the.body..lower.         : num  NA NA NA NA NA NA NA NA NA NA ...
##  $ Notes                                 : chr  "" "" "" "" ...
```

Loading package to complete group based summary statistics by class

```
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

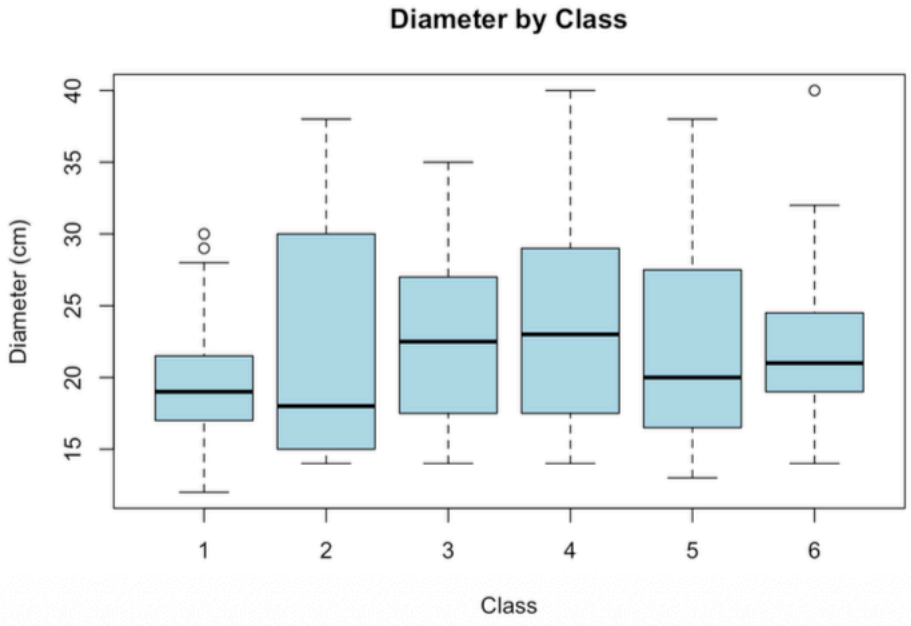
```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
Typology_CSV_Clean <- Typology_CSV %>%
  mutate(
    T_diameter_cm = as.numeric(trimws(Diameter..in.cm.)),
    T_rim_mm = as.numeric(trimws(Thickness.of.the.rim..mm....0.03.mm.)),
    T_upper_mm = as.numeric(trimws(Thickness.of.the.body..upper.)),
    T_diameter_cm = na_if(T_diameter_cm, 0),
    T_rim_mm = na_if(T_rim_mm, 0),
    T_upper_mm = na_if(T_upper_mm, 0)
  )
```

```
## Warning: There was 1 warning in `mutate()`.
## ℹ In argument: `T_diameter_cm = as.numeric(trimws(Diameter..in.cm.))`.
## Caused by warning:
## ! NAs introduced by coercion
```

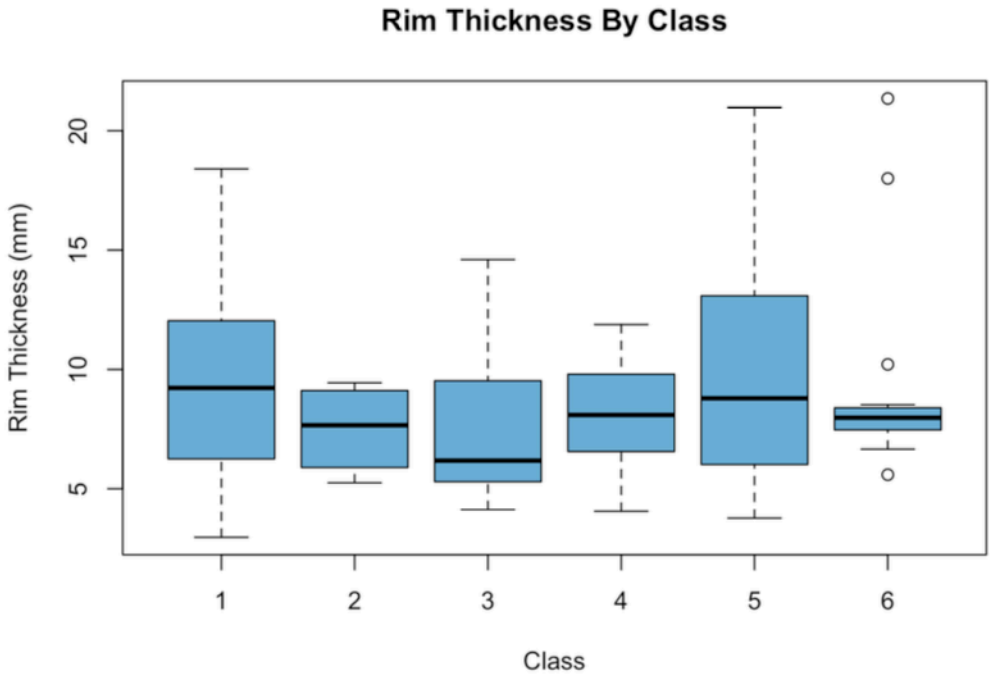
Making a boxplot for the diameter by class

```
# Make a standard box plot
boxplot(T_diameter_cm ~ Class.,
        data = Typology_CSV_Clean,
        col   = "lightblue",
        main  = "Diameter by Class",
        xlab  = "Class",
        ylab  = "Diameter (cm)")
```



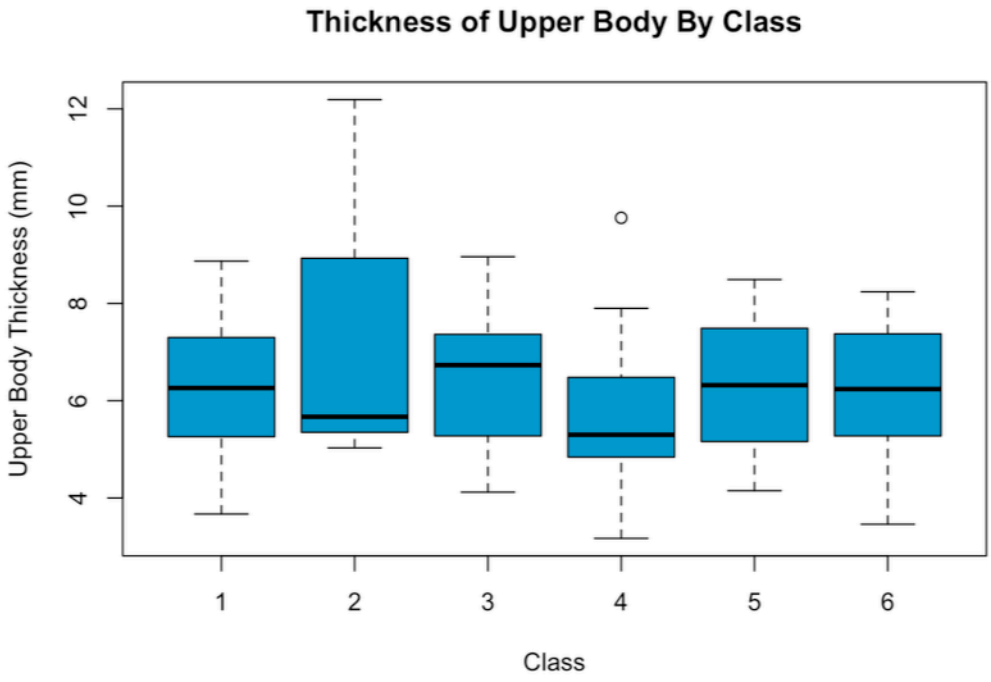
Boxplot for rim thicknesss by class

```
boxplot(T_rim_mm ~ Class.,
        data = Typology_CSV_Clean,
        col   = "#6BAED6",
        main  = "Rim Thickness By Class",
        xlab  = "Class",
        ylab  = "Rim Thickness (mm)")
```



Creating a boxplot for upper body thickness by class

```
boxplot(T_upper_mm ~ Class.,
        data = Typology_CSV_Clean,
        col   = "deepskyblue3",
        main  = "Thickness of Upper Body By Class",
        xlab  = "Class",
        ylab  = "Upper Body Thickness (mm)")
```



##Completing the summary statistics by class Rim thickness summary statistics by class

```
Typology_CSV_Clean %>%
  group_by(Class.) %>%
  summarise(
    mean_thickness   = mean(T_rim_mm, na.rm = TRUE),
    median_thickness = median(T_rim_mm, na.rm = TRUE),
    sd_thickness     = sd(T_rim_mm, na.rm = TRUE)
  )
```

```
## # A tibble: 6 × 4
##   Class. mean_thickness median_thickness sd_thickness
##    <int>          <dbl>            <dbl>        <dbl>
## 1      1           9.22             9.22         4.04
## 2      2           7.50             7.66         1.95
## 3      3           7.46             6.18         3.19
## 4      4           8.11             8.09         2.04
## 5      5          10.3              8.79         5.42
## 6      6           8.96             7.98         3.81
```

Diameter summary statistics by class

```
Typology_CSV_Clean %>%
  group_by(Class.) %>%
  summarise(
    mean_diameter   = mean(T_diameter_cm, na.rm = TRUE),
    median_diameter = median(T_diameter_cm, na.rm = TRUE),
    sd_diameter     = sd(T_diameter_cm, na.rm = TRUE)
  )
```

```
## # A tibble: 6 × 4
##   Class. mean_diameter median_diameter sd_diameter
##    <int>         <dbl>           <dbl>       <dbl>
## 1      1          19.8            19          4.54
## 2      2          23              18         10.5
## 3      3          22.7            22.5        6.17
## 4      4          23.6            23          6.61
## 5      5          21.8            20          7.05
## 6      6          22.5            21          6.36
```

Upper body thickness summary statistics by class

```
Typology_CSV_Clean %>%
  group_by(Class.) %>%
  summarise(
    mean_body   = mean(T_upper_mm, na.rm = TRUE),
    median_body = median(T_upper_mm, na.rm = TRUE),
    sd_body     = sd(T_upper_mm, na.rm = TRUE)
  )
```

```
## # A tibble: 6 × 4
##   Class. mean_body median_body sd_body
##    <int>     <dbl>       <dbl>   <dbl>
## 1      1      6.32        6.26    1.45
## 2      2      7.63        5.67    3.96
## 3      3      6.44        6.73    1.47
## 4      4      5.55        5.3     1.45
## 5      5      6.39        6.32    1.34
## 6      6      6.16        6.24    1.35
```

Time Period Data

Reading and uploading the CSV for the typology with time data attatched

```
Time_CSV <- read.csv("Time_Typology.csv")
colnames(Time_CSV)
```

```
##  [1] "Rim.Database.ID"
##  [2] "Time"
##  [3] "Class"
##  [4] "Type"
##  [5] "Box.."
##  [6] "Trench"
##  [7] "US.."
##  [8] "Feature."
##  [9] "Photo.ID"
## [10] "Typology.Code"
## [11] "N."
## [12] "Name.of.rim.type..From.Sarjeant.thesis."
## [13] "Description."
## [14] "Diameter..in.cm."
## [15] "X..of.pot"
## [16] "Thickness.of.the.rim..mm....0.03.mm."
## [17] "Length.of.the.rim..mm."
## [18] "Thickness.at.midpoint..mm."
## [19] "Thickness.of.where.the.neck.rim.meet"
## [20] "Thickness.of.the.body..upper."
## [21] "Thickness.of.the.body..lower."
## [22] "Notes"
## [23] "X"
## [24] "X.1"
## [25] "X.2"
## [26] "X.3"
## [27] "X.4"
## [28] "X.5"
## [29] "X.6"
## [30] "X.7"
## [31] "X.8"
## [32] "X.9"
## [33] "X.10"
## [34] "X.11"
## [35] "X.12"
## [36] "X.13"
## [37] "X.14"
## [38] "X.15"
## [39] "X.16"
## [40] "X.17"
## [41] "X.18"
## [42] "X.19"
## [43] "X.20"
## [44] "X.21"
## [45] "X.22"
```

Checking the types of the columns in the time dataset

```
str(Time_CSV)
```

```
## 'data.frame':    132 obs. of  45 variables:
##  $ Rim.Database.ID                       : chr  "BSTR-001" "BSTR-002" "BSTR-003" "BS
TR-004" ...
##  $ Time                                  : chr  "PreAngkor" "PreAngkor" "PreAngkor"
"PreAngkor" ...
##  $ Class                                 : int  6 3 3 6 1 1 1 4 3 4 ...
##  $ Type                                  : chr  "Restricted Concave Everted" "Simple
Unrestricted" "Simple Unrestricted" "Restricted Concave Everted" ...
##  $ Box..                                 : int  95 95 95 95 95 95 95 95 95 95 ...
##  $ Trench                                : int  23 23 23 23 23 23 23 23 23 23 ...
##  $ US..                                  : int  23024 23024 23023 23023 23023 23022
23022 23022 23022 23021 ...
##  $ Feature.                              : chr  "N" "N" "N" "N" ...
##  $ Photo.ID                              : chr  "3830, 3833, 3835, 4247" "3837, 383
9, 4249" "3840, 3842, 4198, 4718, 4719, 4721" "3849, 3851, 4209" ...
##  $ Typology.Code                         : chr  "8a-2Ra" "8a-2Ra" "8a-2Ra" "8a-2Ra"
...
##  $ N.                                    : int  1 1 3 1 1 1 1 1 7 1 ...
##  $ Name.of.rim.type..From.Sarjeant.thesis.: chr  "restricted vessel, everted concave
rim" "Simple Unrestricted direct rim " "Simple Unrestricted direct rim " "everted restri
cted concave" ...
##  $ Description.                          : chr  "cord marking (rubbed off or errode
d)" "" "" "" ...
##  $ Diameter..in.cm.                      : int  19 20 21 23 16 20 22 17 16 20 ...
##  $ X..of.pot                             : chr  "0.06" "0.1" "0.075" "0.09" ...
##  $ Thickness.of.the.rim..mm....0.03.mm.  : num  10.21 6.78 5.52 7.45 4.21 ...
##  $ Length.of.the.rim..mm.                : num  34.2 NA NA 58.9 21.2 ...
##  $ Thickness.at.midpoint..mm.            : num  12.2 NA NA 10.3 NA ...
##  $ Thickness.of.where.the.neck.rim.meet  : num  13.96 NA NA 11.42 7.29 ...
##  $ Thickness.of.the.body..upper.         : num  4.99 5.01 4.12 NA 7.45 4.53 NA 7.74
6.81 3.76 ...
##  $ Thickness.of.the.body..lower.         : num  NA 2.91 2.71 NA NA NA NA 8.95 6.06 N
A ...
##  $ Notes                                 : chr  "ridge on rim (midpoint measurement)
" "" "" "" ...
##  $ X                                     : logi  NA NA NA NA NA NA ...
##  $ X.1                                   : logi  NA NA NA NA NA NA ...
##  $ X.2                                   : logi  NA NA NA NA NA NA ...
##  $ X.3                                   : logi  NA NA NA NA NA NA ...
##  $ X.4                                   : logi  NA NA NA NA NA NA ...
##  $ X.5                                   : logi  NA NA NA NA NA NA ...
##  $ X.6                                   : logi  NA NA NA NA NA NA ...
##  $ X.7                                   : logi  NA NA NA NA NA NA ...
##  $ X.8                                   : logi  NA NA NA NA NA NA ...
##  $ X.9                                   : logi  NA NA NA NA NA NA ...
##  $ X.10                                  : logi  NA NA NA NA NA NA ...
##  $ X.11                                  : logi  NA NA NA NA NA NA ...
##  $ X.12                                  : chr  "" "" "" "" ...
##  $ X.13                                  : int  NA NA NA NA NA NA NA NA NA NA ...
##  $ X.14                                  : chr  "" "" "" "" ...
##  $ X.15                                  : chr  "" "" "" "" ...
##  $ X.16                                  : chr  "" "" "" "" ...
```

```
##  $ X.17                                  : chr  "" "" "" "" ...
##  $ X.18                                  : chr  "" "" "" "" ...
##  $ X.19                                  : chr  "" "" "" "" ...
##  $ X.20                                  : chr  "" "" "" "" ...
##  $ X.21                                  : chr  "" "" "" "" ...
##  $ X.22                                  : chr  "" "" "" "" ...
```

Getting the unique values in the type column

```
unique(Time_CSV$Type)
```

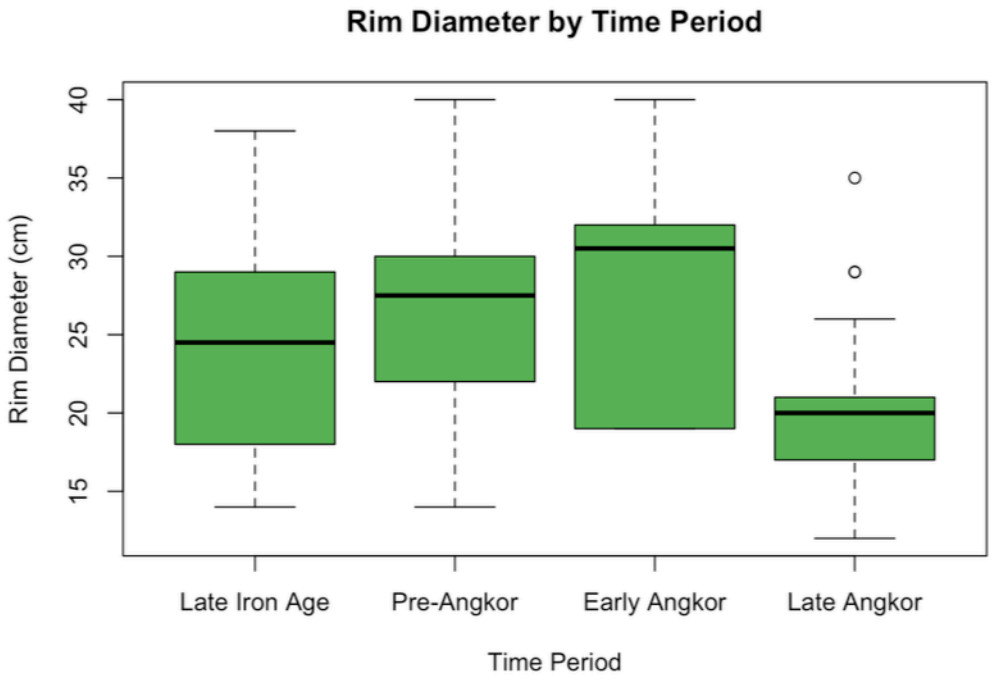
```
##  [1] "Restricted Concave Everted"
##  [2] "Simple Unrestricted"
##  [3] "Everted Restricted Short Rim "
##  [4] "Straight Everted Restricted"
##  [5] "Short Everted Restricted Carinated"
##  [6] "Everted Restricted Carinated Straight"
##  [7] "Everted Restricted (Thickened Rim) "
##  [8] "Everted Unrestricted (Straight)"
##  [9] "Everted Restricted "
## [10] "Inverted Concave"
## [11] "Everted Concave (Unrestricted)"
## [12] "Restricted Everted Vertical Lip"
## [13] "Straight Everted"
```

Boxplots and Summary Statistics by Time Period

```
Time_CSV_clean <- Time_CSV %>%
  mutate(
    diameter_cm = as.numeric(trimws(Diameter..in.cm.)),
    rim_mm = as.numeric(trimws(Thickness.of.the.rim..mm....0.03.mm.)),
    upper_mm = as.numeric(trimws(Thickness.of.the.body..upper.)),
    diameter_cm = na_if(diameter_cm, 0),
    rim_mm = na_if(rim_mm, 0),
    upper_mm = na_if(upper_mm, 0)
  )
```

Boxplot for diameter by time period

```
boxplot(diameter_cm ~ Time,
        data = Time_CSV_clean,
        col   = "#59B356",
        names = c("Late Iron Age", "Pre-Angkor", "Early Angkor", "Late Angkor"),
        main  = "Rim Diameter by Time Period",
        xlab  = "Time Period",
        ylab  = "Rim Diameter (cm)")
```



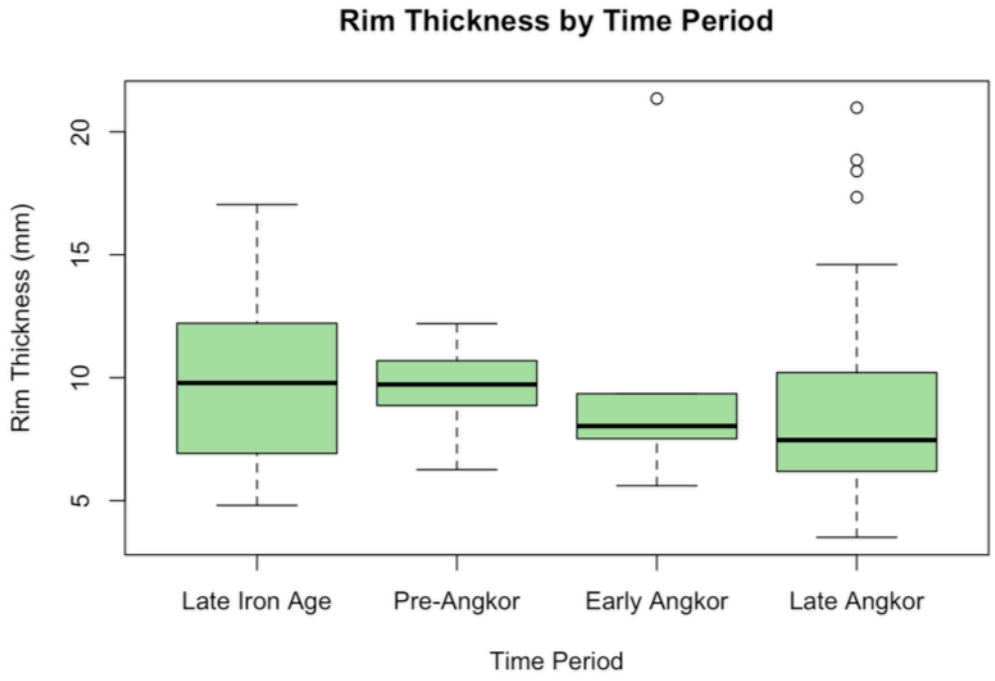
Diameter summary statistics by time period

```
Time_CSV_clean %>%
  group_by(Time) %>%
  summarise(
    mean_diameter   = mean(diameter_cm, na.rm = TRUE),
    median_diameter = median(diameter_cm, na.rm = TRUE),
    sd_diameter     = sd(diameter_cm, na.rm = TRUE)
  )
```

```
## # A tibble: 4 × 4
##   Time        mean_diameter median_diameter sd_diameter
##   <chr>               <dbl>           <dbl>       <dbl>
## 1 EarlyAngkor          23.7            24.5        6.68
## 2 LateAngkor           26.3            27.5        7.41
## 3 LateIron             28.5            30.5        8.17
## 4 PreAngkor            19.8            20          4.48
```

Boxplot for rim thicknesss by time period

```
boxplot(rim_mm ~ Time,
        data = Time_CSV_clean,
        col   = "#A6DEA4",
        names = c("Late Iron Age", "Pre-Angkor", "Early Angkor", "Late Angkor"),
        main  = "Rim Thickness by Time Period",
        xlab  = "Time Period",
        ylab  = "Rim Thickness (mm)")
```



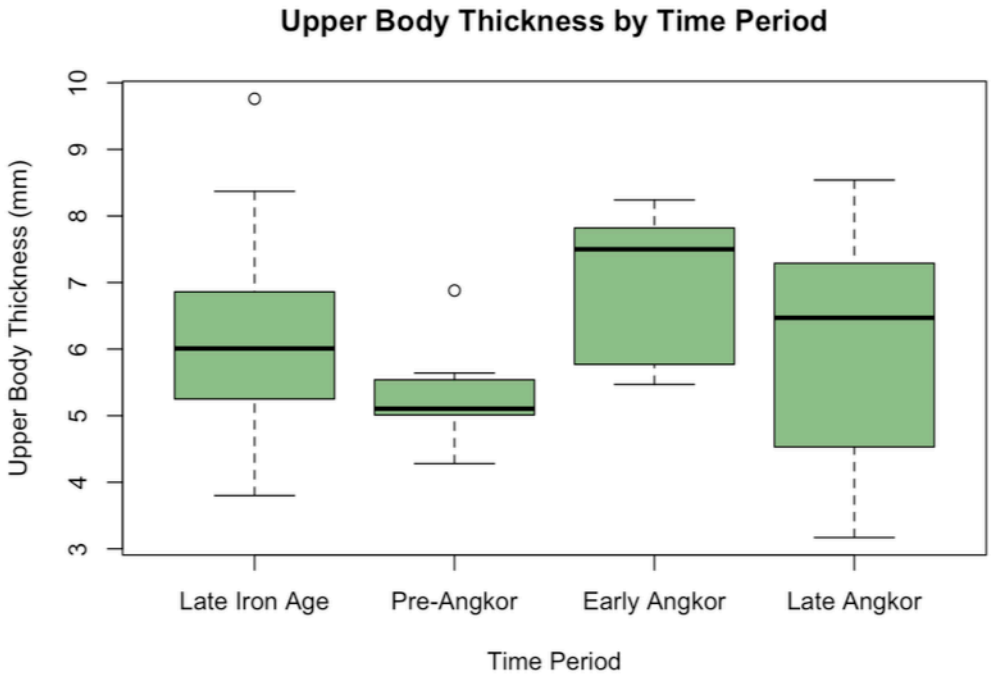
Rim thickness summary statistics by time period

```
Time_CSV_clean %>%
  group_by(Time) %>%
  summarise(
    mean_rimthickness   = mean(rim_mm, na.rm = TRUE),
    median_rimthickness = median(rim_mm, na.rm = TRUE),
    sd_rimthickness     = sd(rim_mm, na.rm = TRUE)
  )
```

```
## # A tibble: 4 × 4
##   Time        mean_rimthickness median_rimthickness sd_rimthickness
##   <chr>                   <dbl>               <dbl>           <dbl>
## 1 EarlyAngkor              9.73                9.78            3.38
## 2 LateAngkor               9.72                9.73            1.71
## 3 LateIron                 9.98                8.04            5.71
## 4 PreAngkor                8.69                7.46            4.06
```

Upper body thickness boxplot by time period

```
boxplot(upper_mm ~ Time,
        data = Time_CSV_clean,
        col   = "#8EBF8A",
        names = c("Late Iron Age", "Pre-Angkor", "Early Angkor", "Late Angkor"),
        main  = "Upper Body Thickness by Time Period",
        xlab  = "Time Period",
        ylab  = "Upper Body Thickness (mm)")
```



Upper body thickness summary statistics

```
Time_CSV_clean %>%
  group_by(Time) %>%
  summarise(
    mean_bodythickness   = mean(upper_mm, na.rm = TRUE),
    median_bodythickness = median(upper_mm, na.rm = TRUE),
    sd_bodythickness    = sd(upper_mm, na.rm = TRUE)
  )
```

```
## # A tibble: 4 × 4
##   Time        mean_bodythickness median_bodythickness sd_bodythickness
##   <chr>                    <dbl>                <dbl>            <dbl>
## 1 EarlyAngkor               6.17                 6.01            1.41
## 2 LateAngkor                5.26                 5.11            0.678
## 3 LateIron                  6.96                 7.5             1.26
## 4 PreAngkor                 6.05                 6.47            1.58
```

Analyzing class, type, and trench distribution by time period

Accessing the ggplot library

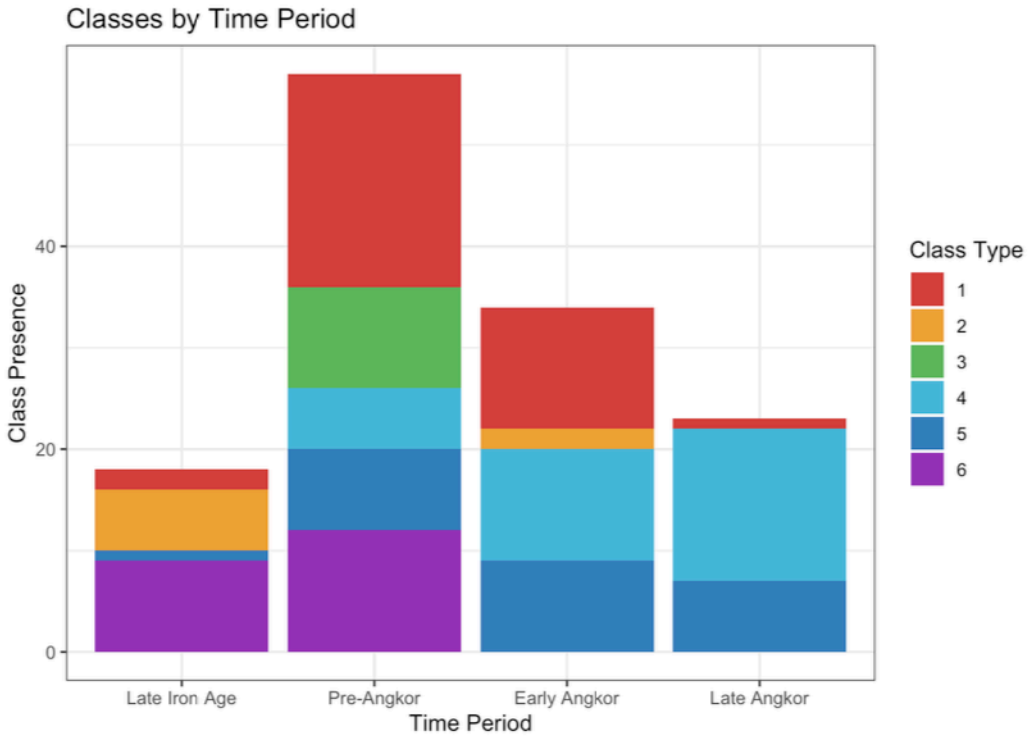
```
library(ggplot2)
```

Accessing packages for colorways

```
library(khroma)
library(scico)
library(ggsci)
```

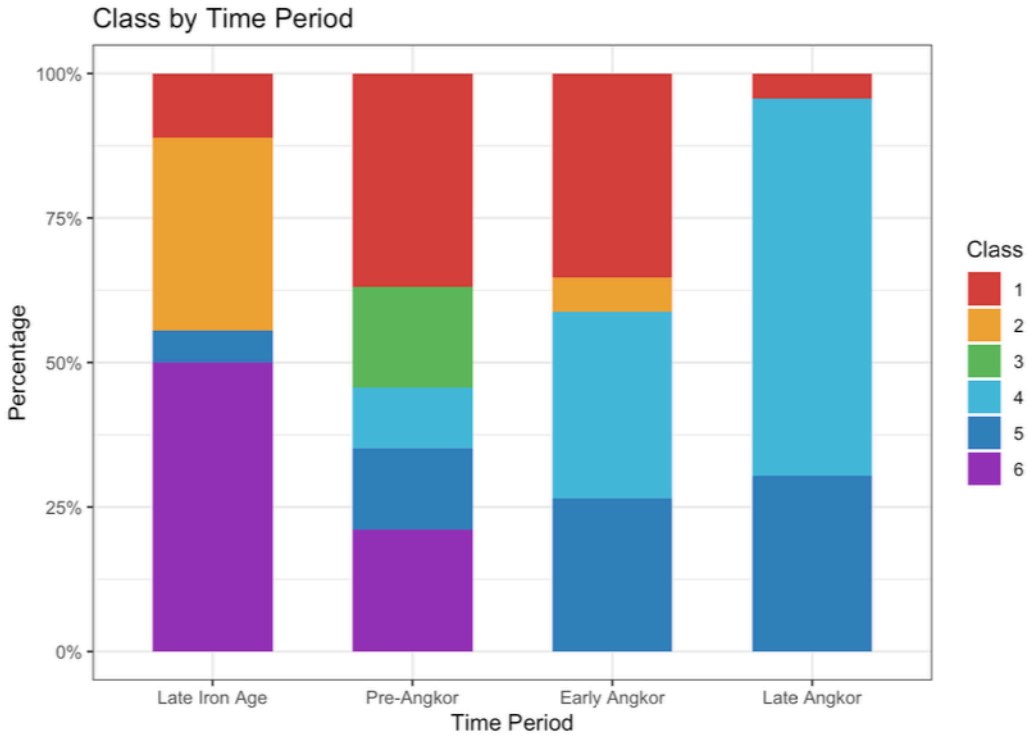
Analyzing class by time period

```
Time_CSV$Time <- factor(
  Time_CSV$Time,
  levels = c("LateIron", "PreAngkor", "EarlyAngkor", "LateAngkor")
)

ggplot(Time_CSV, aes(x = Time, fill = factor(Class))) +
    scale_x_discrete(labels = c(
    LateIron = "Late Iron Age",
    PreAngkor = "Pre-Angkor",
    EarlyAngkor = "Early Angkor",
    LateAngkor = "Late Angkor"
  )) +
  ggtitle("Classes by Time Period") +
  xlab("Time Period") +
  ylab("Class Presence") +
  labs(fill = "Class Type") +
  theme_bw() +
  scale_fill_locuszoom() +
  geom_bar()
```



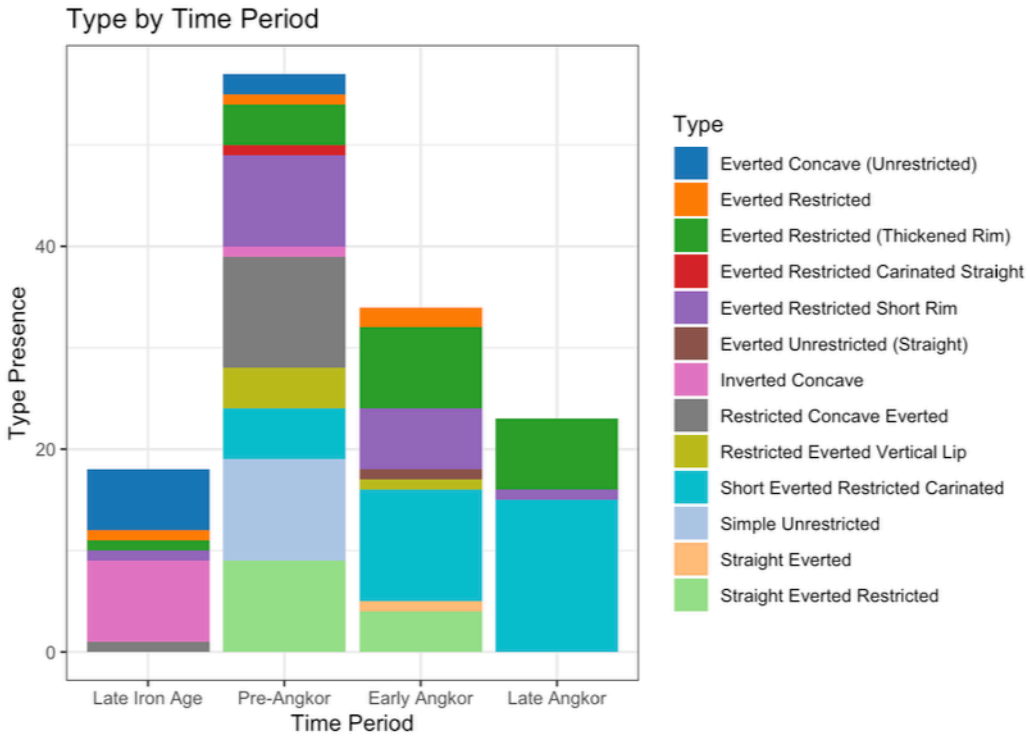
Analyzing class by time period with percentages

```
Time_CSV$Time <- factor(
  Time_CSV$Time,
  levels = c("LateIron", "PreAngkor", "EarlyAngkor", "LateAngkor")
)

ggplot(Time_CSV, aes(x = Time, fill = factor(Class))) +
    scale_x_discrete(labels = c(
    LateIron = "Late Iron Age",
    PreAngkor = "Pre-Angkor",
    EarlyAngkor = "Early Angkor",
    LateAngkor = "Late Angkor"
  )) +
  geom_bar(position = "fill", width = 0.6) +
  ggtitle("Class by Time Period") +
  xlab("Time Period") +
  ylab("Percentage") +
  labs(fill = "Class") +
  theme_bw() +
  scale_fill_locuszoom() +
  scale_y_continuous(labels = scales::percent)
```



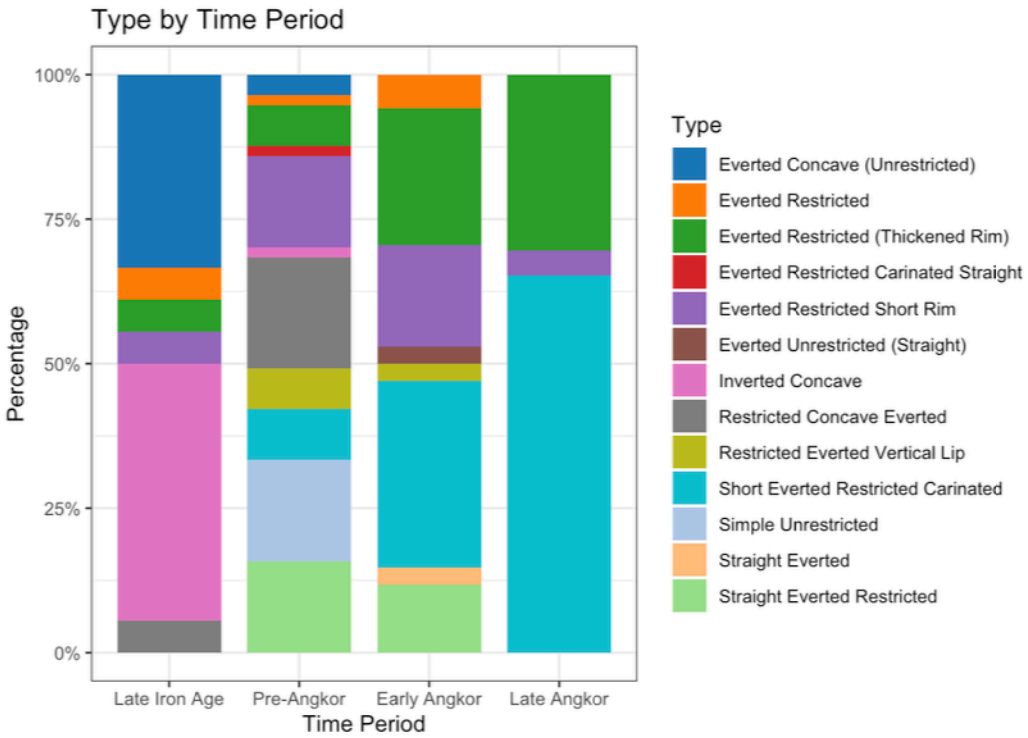
Analyzing type by time period

```
Time_CSV$Time <- factor(
  Time_CSV$Time,
  levels = c("LateIron", "PreAngkor", "EarlyAngkor", "LateAngkor")
)


ggplot(Time_CSV, aes(x = Time, fill = factor(Type))) +
    scale_x_discrete(labels = c(
    LateIron = "Late Iron Age",
    PreAngkor = "Pre-Angkor",
    EarlyAngkor = "Early Angkor",
    LateAngkor = "Late Angkor"
  )) +
  ggtitle("Type by Time Period") +
  xlab("Time Period") +
  ylab("Type Presence") +
  labs(fill = "Type") +
  theme_bw() +
  scale_fill_d3("category20") +
  geom_bar()
```



Analyzing type by time period with percentages

```
Time_CSV$Time <- factor(
  Time_CSV$Time,
  levels = c("LateIron", "PreAngkor", "EarlyAngkor", "LateAngkor")
)

ggplot(Time_CSV, aes(x = Time, fill = factor(Type))) +
    scale_x_discrete(labels = c(
    LateIron = "Late Iron Age",
    PreAngkor = "Pre-Angkor",
    EarlyAngkor = "Early Angkor",
    LateAngkor = "Late Angkor"
  )) +
  geom_bar(position = "fill", width = 0.8) +
  ggtitle("Type by Time Period") +
  xlab("Time Period") +
  ylab("Percentage") +
  labs(fill = "Type") +
  theme_bw() +
  scale_fill_d3("category20") +
  scale_y_continuous(labels = scales::percent)
```



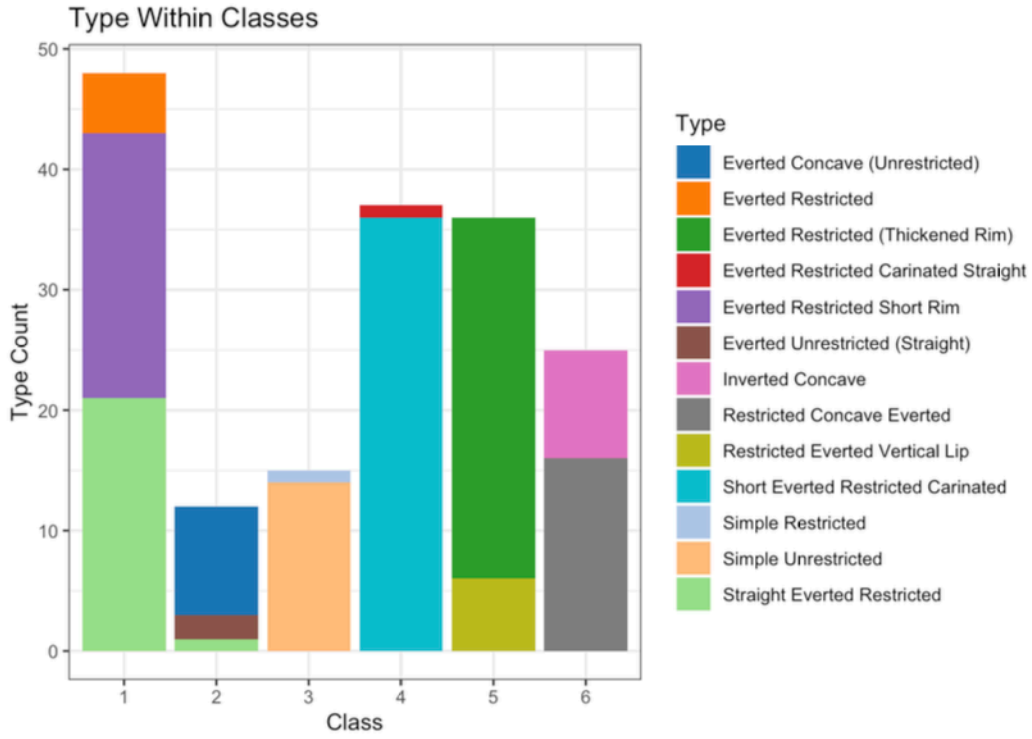
Making a chart for class type

```
table(Typology_CSV$Class., Typology_CSV$Type)
```

```
##
##     Everted Concave (Unrestricted) Everted Restricted
##   1                              0                  5
##   2                              9                  0
##   3                              0                  0
##   4                              0                  0
##   5                              0                  0
##   6                              0                  0
##
##     Everted Restricted (Thickened Rim)  Everted Restricted Carinated Straight
##   1                                  0                                     0
##   2                                  0                                     0
##   3                                  0                                     0
##   4                                  0                                     1
##   5                                 30                                     0
##   6                                  0                                     0
##
##     Everted Restricted Short Rim  Everted Unrestricted (Straight)
##   1                           22                               0
##   2                            0                               2
##   3                            0                               0
##   4                            0                               0
##   5                            0                               0
##   6                            0                               0
##
##     Inverted Concave Restricted Concave Everted Restricted Everted Vertical Lip
##   1                0                         0                                0
##   2                0                         0                                0
##   3                0                         0                                0
##   4                0                         0                                0
##   5                0                         0                                6
##   6                9                        16                                0
##
##     Short Everted Restricted Carinated Simple Restricted Simple Unrestricted
##   1                                  0                 0                   0
##   2                                  0                 0                   0
##   3                                  0                 1                  14
##   4                                 36                 0                   0
##   5                                  0                 0                   0
##   6                                  0                 0                   0
##
##     Straight Everted Restricted
##   1                          21
##   2                           1
##   3                           0
##   4                           0
##   5                           0
##   6                           0
```

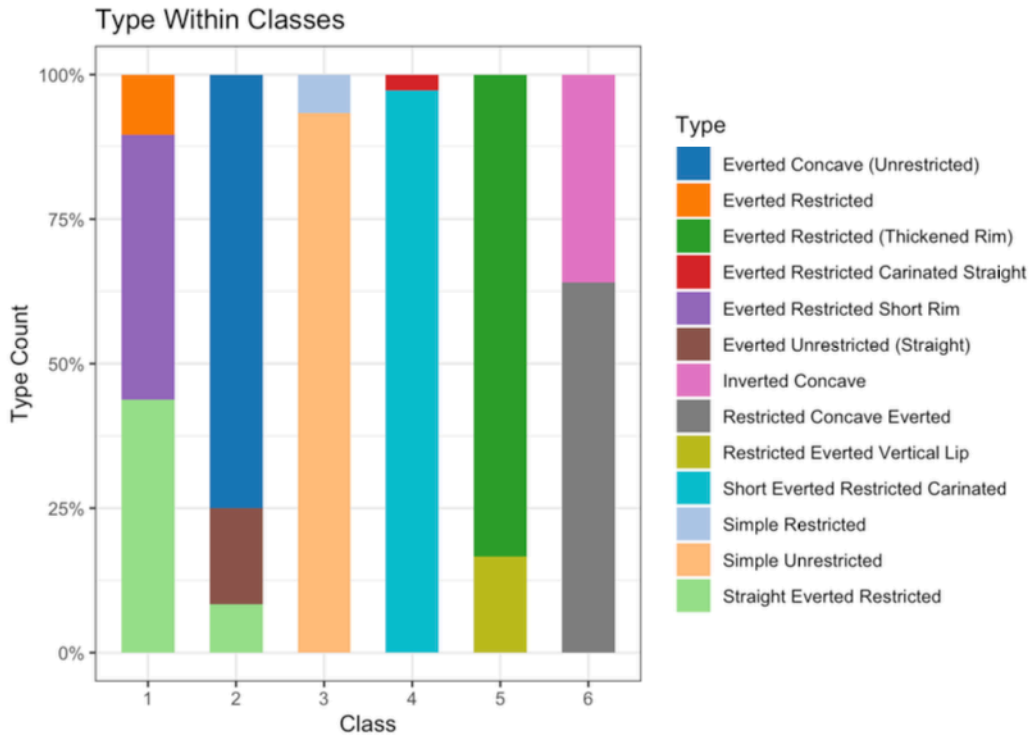
Analyzing type within classes

```
Typology_CSV$Class. <- factor(Typology_CSV$Class.)
Typology_CSV$Type  <- factor(Typology_CSV$Type)

ggplot(Typology_CSV, aes(x = Class., fill = Type)) +
  ggtitle("Type Within Classes") +
  xlab("Class") +
  ylab("Type Count") +
  labs(fill = "Type") +
  theme_bw() +
  scale_fill_d3("category20") +
  geom_bar()
```



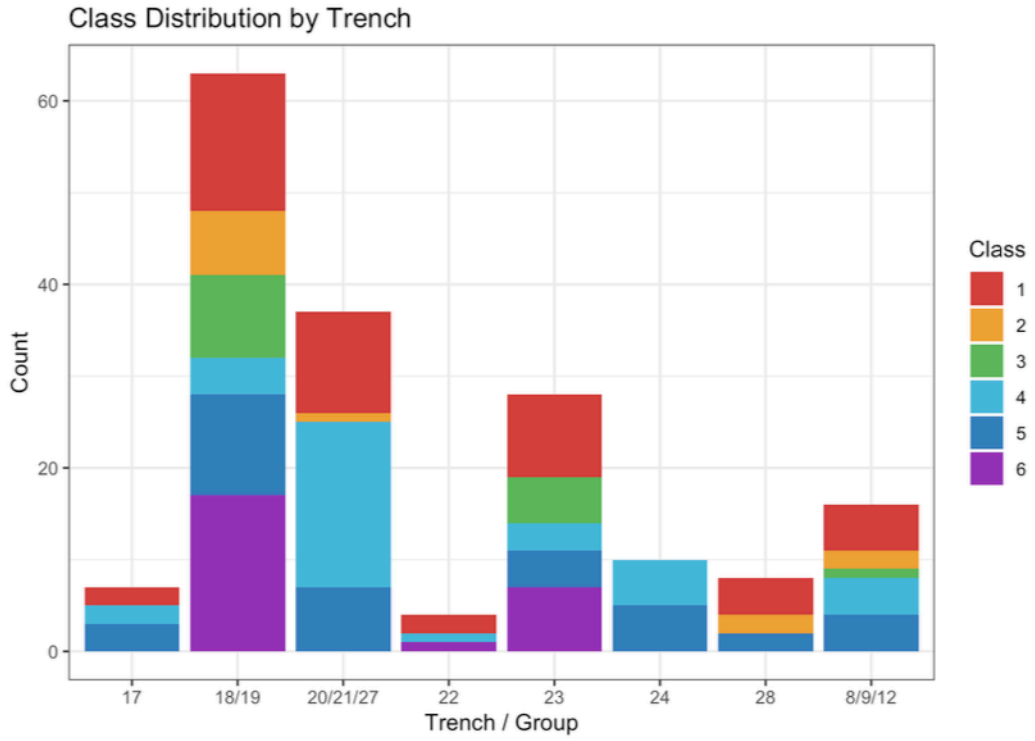
Analyzing type within classes by percentage

```
Typology_CSV$Class. <- factor(Typology_CSV$Class.)
Typology_CSV$Type  <- factor(Typology_CSV$Type)

ggplot(Typology_CSV, aes(x = Class., fill = Type)) +
  geom_bar(position = "fill", width = 0.6) +
  ggtitle("Type Within Classes") +
  xlab("Class") +
  ylab("Type Count") +
  labs(fill = "Type") +
  theme_bw() +
  scale_fill_d3("category20") +
  scale_y_continuous(labels = scales::percent)
```



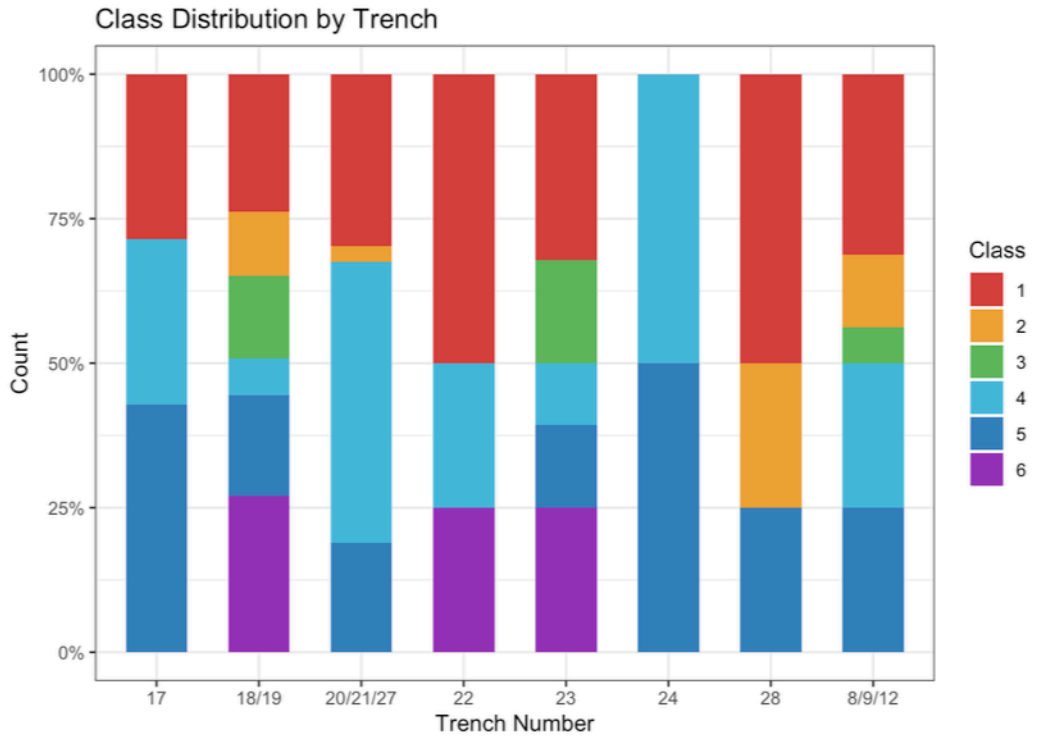
Analyzing class by trench

```
Typology_CSV$Class. <- factor(Typology_CSV$Class.)
Typology_CSV$Trench  <- factor(Typology_CSV$Trench)

Typology_CSV <- Typology_CSV %>%
  mutate(Trench_group = case_when(
    Trench %in% c("8","9","12") ~ "8/9/12",
    Trench %in% c("18","19")     ~ "18/19",
    Trench %in% c("20","21","27") ~ "20/21/27",
    TRUE ~ as.character(Trench)
  ))

ggplot(Typology_CSV, aes(x = Trench_group, fill = Class.)) +
  ggtitle("Class Distribution by Trench") +
  xlab("Trench / Group") +
  ylab("Count") +
  labs(fill = "Class") +
  theme_bw() +
  scale_fill_locuszoom() +
  geom_bar()
```



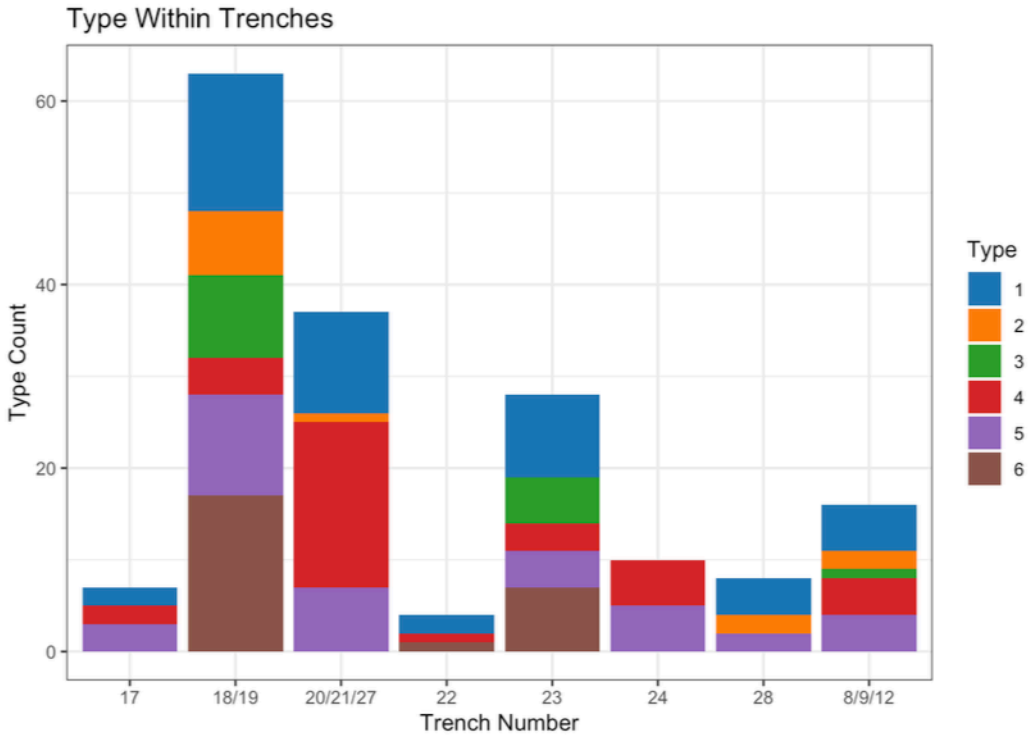
Analyzing class by trench with percentages

```
Typology_CSV$Class. <- factor(Typology_CSV$Class.)
Typology_CSV$Trench  <- factor(Typology_CSV$Trench)

Typology_CSV <- Typology_CSV %>%
  mutate(Trench_group = case_when(
    Trench %in% c("8","9","12") ~ "8/9/12",
    Trench %in% c("18","19")     ~ "18/19",
    Trench %in% c("20","21","27") ~ "20/21/27",
    TRUE ~ as.character(Trench)
  ))

ggplot(Typology_CSV, aes(x = Trench_group, fill = Class.)) +
  geom_bar(position = "fill", width = 0.6) +
  ggtitle("Class Distribution by Trench") +
  xlab("Trench Number") +
  ylab("Count") +
  labs(fill = "Class") +
  theme_bw() +
  scale_fill_locuszoom() +
  scale_y_continuous(labels = scales::percent)
```



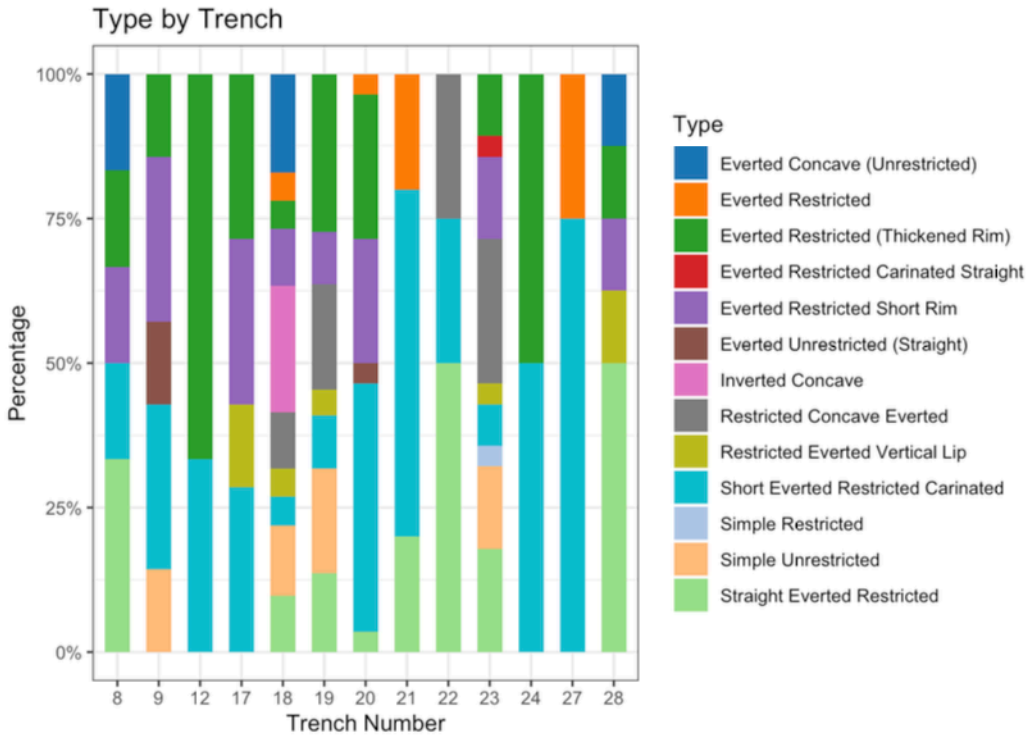
Analyzing type by Trench

```
Typology_CSV$Type <- factor(Typology_CSV$Type)
Typology_CSV$Trench  <- factor(Typology_CSV$Trench)

Typology_CSV <- Typology_CSV %>%
  mutate(Trench_group = case_when(
    Trench %in% c("8","9","12") ~ "8/9/12",
    Trench %in% c("18","19")     ~ "18/19",
    Trench %in% c("20","21","27") ~ "20/21/27",
    TRUE ~ as.character(Trench)
  ))

ggplot(Typology_CSV, aes(x = Trench_group, fill = Class.)) +
  ggtitle("Type Within Trenches") +
  xlab("Trench Number") +
  ylab("Type Count") +
  labs(fill = "Type") +
  theme_bw() +
  scale_fill_d3("category20")  +
  geom_bar()
```



Analyzing Type by Trench with percentage scale

```
Typology_CSV$Type <- factor(Typology_CSV$Type)
Typology_CSV$Trench  <- factor(Typology_CSV$Trench)

ggplot(Typology_CSV, aes(x = Trench, fill = Type)) +
  geom_bar(position = "fill", width = 0.6) +
  ggtitle("Type by Trench") +
  xlab("Trench Number") +
  ylab("Percentage") +
  labs(fill = "Type") +
  theme_bw() +
  scale_fill_d3("category20")  +
  scale_y_continuous(labels = scales::percent)
```



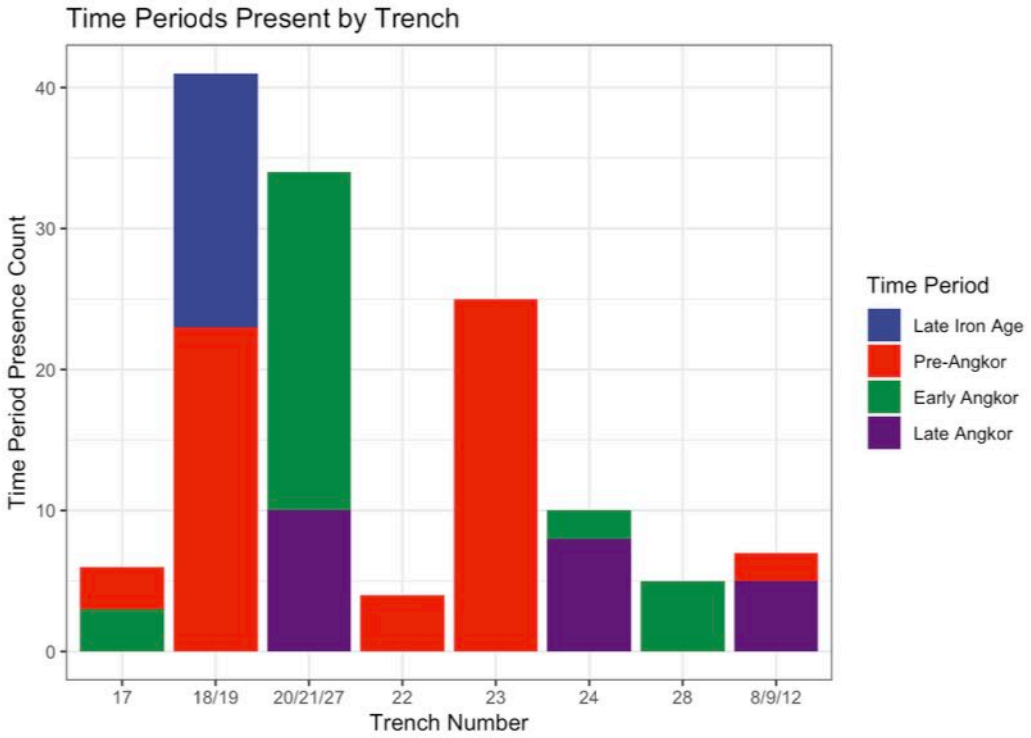
Another table to analyze time and trench in a different way

```
table(Time_CSV$Trench, Time_CSV$Time)
```

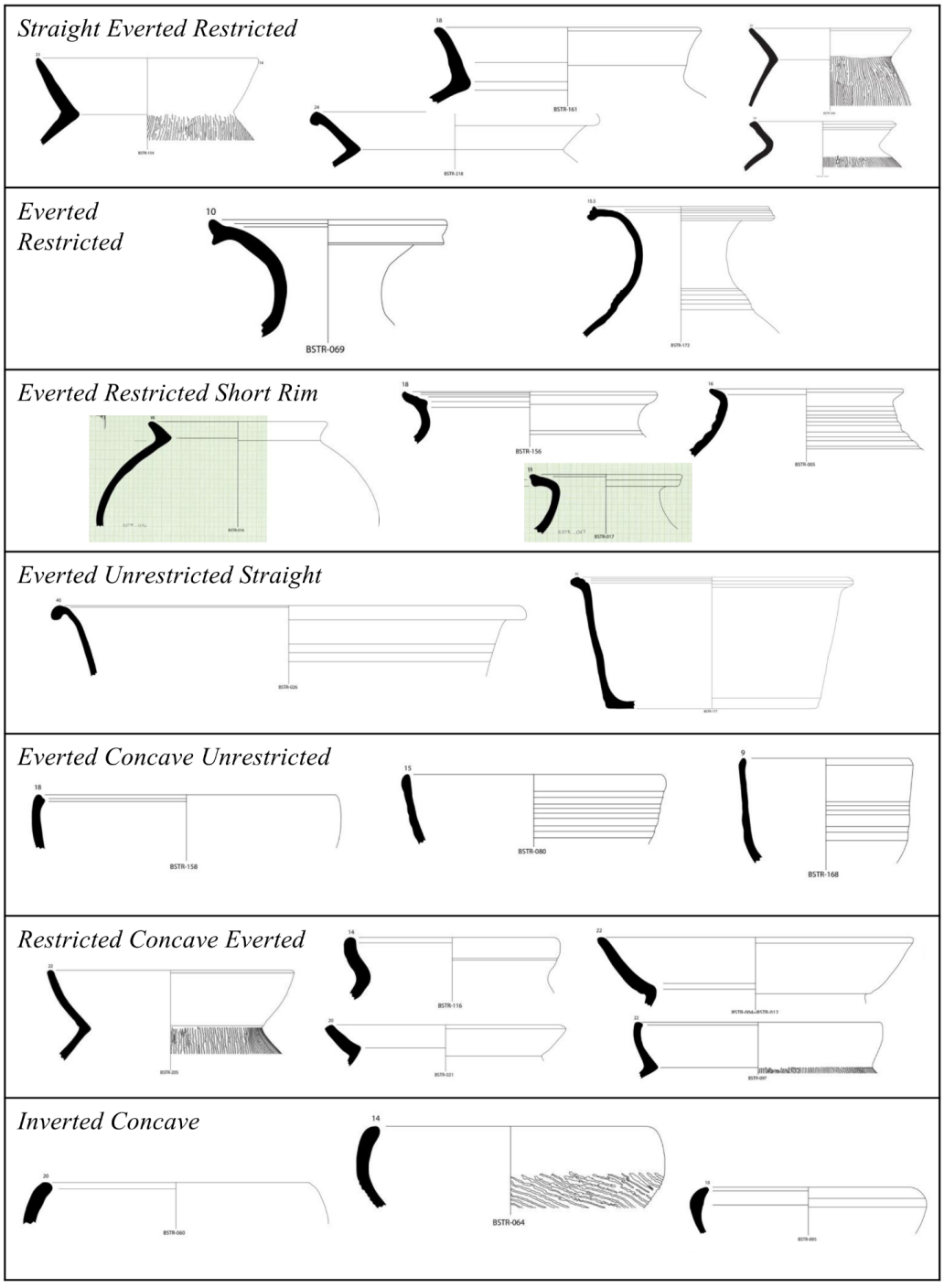
```
##
##      LateIron PreAngkor EarlyAngkor LateAngkor
##   8         0         2           0          2
##   12        0         0           0          3
##   17        0         3           3          0
##   18       18        23           0          0
##   20        0         0          19          7
##   21        0         0           1          3
##   22        0         4           0          0
##   23        0        25           0          0
##   24        0         0           2          8
##   27        0         0           4          0
##   28        0         0           5          0
```

Time periods present in each trench

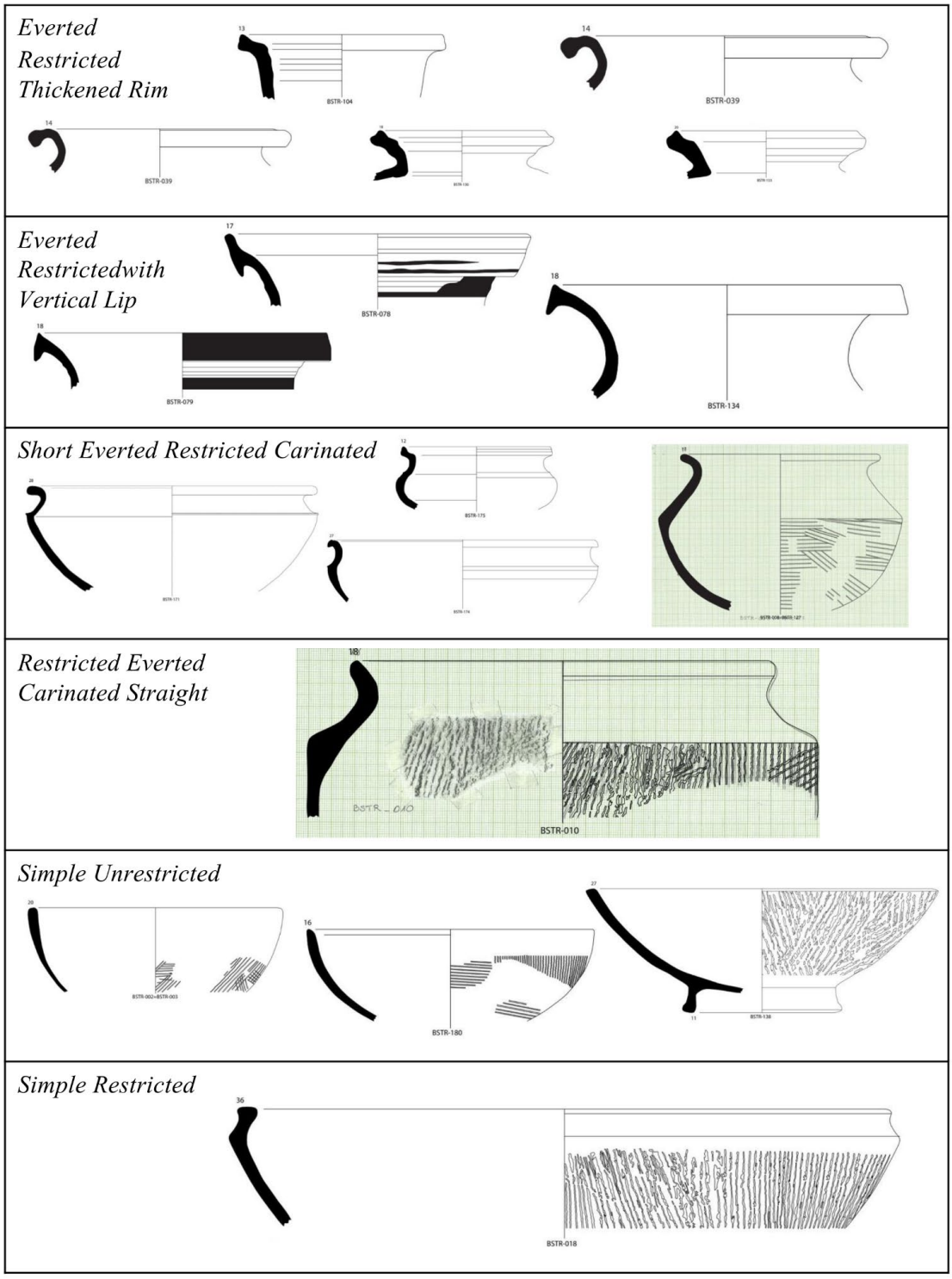
```
Time_CSV$Trench <- factor(Time_CSV$Trench)
Time_CSV$Time  <- factor(Time_CSV$Time)


Time_CSV <- Time_CSV %>%
  mutate(Trench_group = case_when(
    Trench %in% c("8","9","12") ~ "8/9/12",
    Trench %in% c("18","19")     ~ "18/19",
    Trench %in% c("20","21","27") ~ "20/21/27",
    TRUE ~ as.character(Trench)
  ))

ggplot(Time_CSV, aes(x = Trench_group, fill = Time)) +
  ggtitle("Time Periods Present by Trench") +
  xlab("Trench Number") +
  ylab("Time Period Presence Count") +
  labs(fill = "Time Period") +
  theme_bw() +
  scale_fill_aaas(
    labels = c(
      LateIron   = "Late Iron Age",
      PreAngkor  = "Pre-Angkor",
      EarlyAngkor= "Early Angkor",
      LateAngkor = "Late Angkor"
    )
  ) +
  geom_bar()
```


Time Periods Present by Trench
Time Period Presence Count
40
30
20
10
0
17
18/19
20/21/27
22
23
24
28
8/9/12
Trench Number
Time Period
Late Iron Age
Pre-Angkor
Early Angkor
Late Angkor

Appendix D:
Visual Examples of Typological Designations



Note. Drawings courtesy of Ms. Ranet Hong.



Note. Drawings courtesy of Ms. Ranet Hong.

Appendix E:
Table used for relative dating of pottery sherds

Late Iron Age (3-5th Centuries CE)	Pre-Angkor (5-8th Centuries CE	Early Angkor (8-Early 11th Centuries CE)	Late Angkor (11-14th Centuries CE)
Trench 18/19: Anything	Trench 1: 1024-1038 Trench 2: 2018-2032 Trench 8: 8022-8037 Trench 16/17: 16011-16038, 17011-17039 Trench 18: 18011-18035 Trench 22: 22002-22020 Trench 23: 23019-23024 Trench 24: 24019-24024 Trench 26: 26024-26029 Trench 27: 27019-27032	4/6/10/13/14: Anything Trench 8: Trench 16/17: 16004-16010, 17003-17011 Trench 20/21/27: 20015 – 20021; 21012-21041; 27003-27016 Trench 23: 23011-23013 Trench 24: 24015-24024 Trench 26: 2605-26023 Trench 28:28003-28021	Trench 8: 8007-8004 Trench 9/11: Anything from these trenches Trench 12: Anything from this trench Trench 15: Anything from this trench Trench 20/21: 20003-20013; 21003-21008 Trench 23: 23007-23008 Trench 24: 24001-24014 Trench 26: 26001-26013

Note. Table courtesy of Dr. Alison Carter.

REFERENCES

Albrecht, G., Haidle, M. N., Sivleng, C., Hong, H. L., Sophady, H., Than, H., Someaphyvath, M., Kada, S., Sophal, S., Chanthourn, T., & Laychour, V. (2000). Circular Earthwork Krek 52/62: Recent Research On The Prehistory Of Cambodia. Asian Perspectives, 39(1/2), 20–46. Http://Www.Jstor.Org/Stable/42928468

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