THE CURIOUS CASE OF THE WHITE-TAILED DEER: AN ANALYSIS OF DEER USE IN THE CEREMONIAL CENTER OF TEOTIHUACAN

by

Esther Aguayo
A Thesis
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of
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by

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DEDICATION

This thesis is dedicated to my parents, Saul and Lupe, for supporting me and allowing me to pursue the career of my choice. Thank you for moving to this country and your arduous sacrifice to give me the opportunity to pursue an education. I would also like to dedicate my thesis to my siblings Elaine and Isaac, I hope that you will believe in yourselves to achieve your dreams just as you believed in me.

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ABSTRACT

THE CURIOUS CASE OF THE WHITE-TAILED DEER: AN ANALYSIS OF DEER USE IN THE CEREMONIAL CENTER OF TEOTIHUACAN

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This thesis investigates the pattern of deer bones present at the Plaza of the Columns Complex in the ceremonial center of the ancient metropolis, Teotihuacan. As a large urban center, with a population of around 100,000 people at its height, Teotihuacan had to have a complex food system in order to feed its population. Interestingly, the largest mammal available in the New World, the white-tailed deer (*Odocoileus virginianus),* is a rare animal in Teotihuacan's faunal assemblage. This research, which involves the study of deer remains, indicated that deer were not a necessary resource in the everyday life of Teotihuacanos. Instead, deer exploitation was elevated into highly specific ritual contexts, such as offerings and consumed by elite groups that partook in such occasions.

CHAPTER 1 – INTRODUCTION

In modern times, acquiring food is a relatively simple task. Many people can shop at their local supermarket, which will have several food options at their disposal. Meat is represented by a select group of frequently consumed domesticated animals, primarily beef, pork, fish, chicken, and turkey. Most of these domesticates originate from the Old World, and as Europeans colonized and transplanted their methods for food production and acquisition, these animals were introduced to the Americas. Humans in pre-contact North and Central America had domesticated only two animals: the turkey (*Meleagris gallopavo*) and the dog (*Canis familiaris*). This lack of domestic animals meant that Pre-Columbian societies relied heavily on wild meat acquisition, including the white-tailed deer (*Odocoileus virginianus*). As the largest herbivore available in the region, the deer was a staple of the ancient Mesoamerican diet (Emery 2004).

Deer were widespread, ranging from Canada to South America (Codding et al. 2010; Manin and Lefvre 2019), and the species was exploited as an essential food resource for many groups throughout the latter continent (Martinez-Polanco 2011). The Spanish Conquistadors documented economic endeavors such as trade and hunting amongst the Maya (Linares 1976; Thornton et al. 2011). Maya art depicting deer led archaeologists to infer that the deer is connected to the sun god, making the animal a crucial actor in Maya cosmology (Biro and Montero-Lopez 2008). This marks the species as a prevalent actor in Mesoamerica. However, the city of Teotihuacan, an urban center in the Basin of Mexico, does not follow this pattern in deer acquisition and depiction. This study's goal was to analyze the bone remains of deer found at the Plaza of the Columns Complex, located west of the Avenue of the Dead, in close proximity to the Sun Pyramid.

Teotihuacan was located in the Basin of Mexico. The city encompassed about 500 square kilometers and, at its peak, had approximately 100,000 residents (Cowgill 2015). The city rose to prominence around 100 BCE and grew to become the sixth-largest city in the world at its peak around 400 CE (Cowgill 1997; Sugiyama 2005). The city's construction required extensively deliberate planning from the Teotihuacan state in order to achieve the level of accuracy and grandeur evident in the ceremonial center. With a large population and urban landscape, a highly efficient and complex food system was needed for Teotihuacan to feed its people. At its peak, Teotihuacan required around 180,000,000 kcal per day to sustain its city (Sugiyama and Somerville 2017: 2). In light of the significant amount of food required, osteological evidence presents that, even in the most impoverished enclaves of the city, people were still consuming enough meat to have a healthy amount of vitamin B12 (Widmer and Storey 2017).

There is evidence of state-sponsored tortilla manufacturing, irrigation canals, and large marketplaces in Teotihuacan which reflect institutions in place to produce and distribute food to its people (Sugiyama and Somerville 2017). Thus, it is plausible to assume that the acquisition of the largest mammal, the white-tailed deer, was an important activity in Teotihuacan. However, deer comprise as little as 7% of the fauna recovered at the site and small mammals are predominantly found within the city (Sugiyama et al. 2017). Then if deer were not a staple food in Teotihuacan, for what purpose were deer used within the city?

Objectives

Archaeological evidence shows that the pattern of deer use does not extend into the city of Teotihuacan. The “deer dilemma” has confounded archaeologists and generated broader questions regarding Teotihuacan’s animal use (Sugiyama et al. 2017). Strangely, the largest and most logical source of meat is virtually absent in the archaeological record at Teotihuacan (Sharpe and Emery 2015; Sugiyama et al. 2017). This anomaly is the foundation of this research. It is vital to study how deer were being used in Teotihuacan compared to their Mesoamerican counterparts because of the stark difference in deer representation in the archaeological record. In the neighboring cultures, there was a heavy reliance on deer, but with deer comprising only minimal amounts of the faunal assemblage found in Teotihuacan, it is difficult to find a pattern in order to discover if deer were a coveted food in this city (Sugiyama et al. 2017). This thesis intends to define better how deer were used in Teotihuacan society.

Hypothesis 1

Population size and density restricted citizens’ mobility to the periphery; thus people who lived at the edges of the city had better access to deer’s natural habitat. This likely limited access to the animal for a large portion of the population (Sugiyama et al.

2017). The small numbers of deer, which comprise but 11% of all the documented faunal remains (Sugiyama et al. 2017), are present in the ceremonial center. There was a specific circumstance which deemed it necessary to transport deer or deer bones to the ceremonial center such as a commercial product for markets. Thus, the first hypothesis is:

> Deer element distribution in the ceremonial center will be skewed towards meat bearing elements and long bones used for tool making.

Due to the large size of the white-tailed deer, body parts that are deemed unimportant by the hunter are often left at the kill site to make it easier to transport. This skews the element distribution at the use site (Reitz and Wing 2008). At Teotihuacan, evidence of animal management has been observed, and it is hypothesized that Teotihuacan likely had a market system for the distribution of goods in open areas such as plazas (Cowgill 2015; Somerville et al. 2017; Sugiyama 2013; Sugiyama et al. 2017). It is plausible, then, that deer or portions of deer were a market commodity brought into the city to be sold.

Hypothesis 2

Deer were brought in as a source for food, since remains are present in the archaeological record, but it was a seemingly rare occurrence. What, then, was the primary source of food at Teotihuacan? Zooarchaeological research at the Oztoyahualco compound at Teotihuacan demonstrated that rabbit acquisition exceeded the residential needs, indicating commercial surplus (Manzanilla 1993; Somerville et al. 2017). This suggests that small animals such as rabbits were accessible for purchase and the high number of rabbit bones recovered at Teotihuacan reflect a high reliance on rabbits as food (Somerville et al. 2017). Thus, the second hypothesis is:

> Due to the availability of rabbits and other small animals as primary food sources, deer acquisition was focused on its secondary by-products (pelts, tools).

These two hypotheses are not mutually exclusive, as not all animals are utilized for a single purpose. Therefore, it is possible that specific deer cuts were available in Teotihuacan markets and that they were not a staple food source. Analysis of bones excavated in the heart of the city and the anthropogenic surface modifications of the bone, such as cuts, chops, and scrapes that are the results of hunting, butchering, transportation, and use of the deer can potentially reveal the purpose of these bones. As deer are large, hunting practices could reflect a bias in the bones present with elements with less meat discarded at the kill site, an analysis of the faunal assemblage was implemented to discover a pattern of bones present at Plaza of the Columns.

Thesis Structure

Here, chapter one provides an overview of the research problem, hypotheses, and organization of the thesis. Chapter two will present a brief history of Teotihuacan and will situate the city within the broader archaeological contexts. This approach is meant to provide an understanding of the natural environment around Teotihuacan and a timeline of the Basin of Mexico. Further, contextual evidence helps frame how an urban city acquired meat and focuses on the ceremonial center of Teotihuacan, called the Plaza of the Columns Complex. The study analyzes the zooarchaeological remains from the

Project Plaza of the Columns Complex (PPCC), co-directed by Dr. Nawa Sugiyama, and stems from research carried out by project members (Hsu et al. 2016) and the team from PPCC. As such, the sample used was exclusively excavated at Plaza of the Columns Complex. A history and explanation of the structures present will be provided in this chapter. This chapter will end with a discussion of the economic and social subsistence strategies and explain the ceremonial center of Teotihuacan.

Chapter three provides a foundation of understanding of the white-tailed deer and will begin by explaining its basic biology, its environment, and its behavior, as well as human-deer interaction. Following that is a brief background of deer-human interaction and how it is represented in the archaeological record using examples in Northern, Central, and South America. Once the deer has been defined as an actor, the relationship that deer have with humans can be explored as zooarchaeological research has become an integral part of understanding trade, bone manipulation, and consumption of deer in various Maya cities (Thornton 2011; Sharpe and Emery 2015).

Chapter four presents the materials and methods used for this study. This chapter will present how the bones were selected and detail their excavated locations. Once the sample is clearly defined, the zooarchaeological methodology is explained. This section will explain the process of how faunal remains were quantified, identified, and analyzed.

Chapter five will explain the results of the zooarchaeological analysis at Plaza of the Columns, and the data of their respective fronts and sites. In each section, I consider the species identification, element distribution, age distribution, and surface modifications present in the sample. Concluding the chapter is an analysis of the trends present between the sites by studying the element distribution, surface modification, and age ranges of the deer bones at the site.

Chapter six will provide a discussion of the results and combine the information discovered from the assemblage to other Mesoamerican contexts and determine if the hypotheses were disproven. Finally, the conclusion will discuss future directions that may be taken in order to understand deer usage at Teotihuacan better.

CHAPTER 2 CHAPTER TWO – SITUATING TEOTIHUACAN

Mesoamerica before Teotihuacan

Cuicuilco and the Basin of Mexico

Humans have lived in Mesoamerica as early as 11,000 BCE. By 2000 BCE, permanent and relatively egalitarian farming settlements were widespread (Cowgill 2015). The Basin of Mexico is located in the semi-arid highlands of central Mexico and is approximately 5,000 square kilometers and is surrounded on most sides by volcanoes and mountains (Cowgill 1997). In the Late Preclassic (500-100 BCE), a large metropolis arose in the Basin of Mexico seen as the predecessor of Teotihuacan called Cuicuilco. Little is known about Cuicuilco due to its destruction by a volcanic eruption, but it was likely the most extensive urban environment (approximately 400 hectares) within the basin at its height with an estimated population of 20,000 (Cowgill 2015; Sanders et al. 1979). Cuicuilco is seen as the predecessor of Teotihuacan as the city entirely abandoned by the time Teotihuacan's population peaked by 200 CE (Cowgill 2015).

Teotihuacan Rising

Teotihuacan is in the Northeastern part of the Basin of Mexico (Figure 2.1). Its location near the opening between mountains allows for easy access outside the basin (Cowgill 1997). In the Terminal Preclassic (100 BCE- 300 CE), Teotihuacan rose to prominence in the Basin of Mexico to become the largest and most populated city in the New World (Cowgill 1997; Sugiyama 2005). Cowgill (2015) describes Teotihuacan as ignited by rapid population growth that stabilized by 100 CE. There was a corresponding decrease in the population elsewhere in the Basin of Mexico at large (Sugiyama 2005), which suggests this population nucleated into the city as Teotihuacan's population grew to 60,000- 80,000 people (Cowgill 2015). At the height of its prosperity, Teotihuacan grew to be the sixth-largest city in the world in 400-550 CE (Sugiyama 2005), with a maximum of 125,000 people living in Teotihuacan during this time (Cowgill 2015: 144).

Cowgill (1997) estimates that most ambitious architectural projects were mostly completed by 200 CE. The construction of the Sun Pyramid led to a ceremonial center emerging around pyramids and the principal road, the Avenue of the Dead (Cowgill 2015). The city took form in a centralized grid system that is angled 15.5 degrees east from true north with all structures, roads, and features abiding by this scheme during 150-300 CE (Cowgill 2015). The meticulous planning on a grid, the size of the pyramids and monuments, time, and labor needed to complete such structures is a testament to the prowess of the Teotihuacan state. The structures continued to reinforce their ideology and rulership in Teotihuacan until its decline.

The Decline of Teotihuacan

The decline of Teotihuacan took place during the Late Classic period (550 CE). The population at the great city decreased significantly, garbage accumulated in the streets, unfinished goods were left at workshops, and personal belongings abandoned. (Cowgill 2015). In 600 to 650 CE, severe destruction of structures occurred in the ceremonial center (Martinez and Jarquin 1982). Interestingly, the severe destruction that occurred in the ceremonial center was intentional and selective (Cowgill 1997). Archaeologists are unsure what led to the destruction of Teotihuacan. Theories range from political dissent, ecological changes, and even warfare with outside invaders (Cowgill 2015). Smaller groups resided in the area, but in the 1400s, the Mexica regularly visited central Teotihuacan, and archaeological artifacts show their impact and presence at the site until the Spanish Conquest beginning in 1519 (Cowgill 2015).

The Ceremonial Center

The ceremonial center is dominated by three imposing pyramids along a processional path, the Avenue of the Dead. The Feathered Serpent Pyramid (FSP) is located in the southwest sector of the city within a walled compound known as the Ciudadela. The FSP is characterized by a high enclosure that surrounds the third-largest structure at Teotihuacan (Sugiyama 2005). The Sun Pyramid is the largest structure at Teotihuacan and underwent various modifications over time, including the addition of a frontal platform and housing for religious officials (Cowgill 2015). The Moon Pyramid is located along the Avenue of the Dead's northernmost point encompassed by a large plaza surrounded by perimeter platforms (Cowgill 2015).

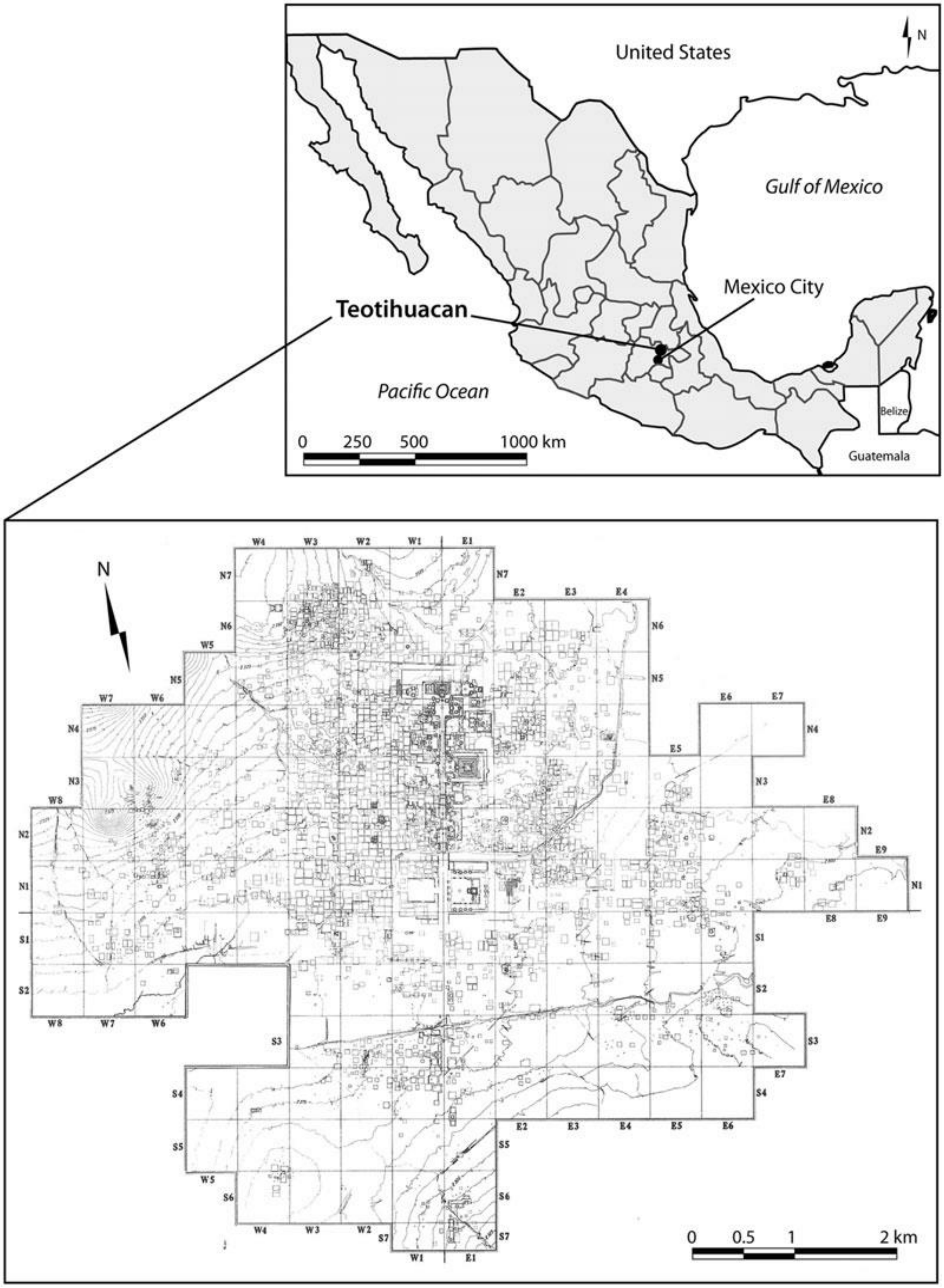

Figure 2.1. Map of Teotihuacan by Huster et al. (2018: Figure 1); adapted from Millon (1973).

Plaza of the Columns Complex

The Plaza of the Columns Complex traverses both sides of the Avenue of the Dead just north of the Sun Pyramid (Figure 2.2). This complex has a triadic group of pyramids, which includes the fourth largest pyramid in Teotihuacan (Sugiyama et al. 2016). Since 2015, the Project Plaza of the Columns Complex (PPCC) has excavated the Plaza of the Columns (western sector) and Plaza North of the Sun Pyramid (eastern sector), together known as the Plaza of the Columns Complex. Investigations at a centralized location such as the Plaza of the Columns complex have revealed much about the use of public civic-ceremonial spaces in Teotihuacan (Sugiyama et al. 2016).

At first, the project hypothesized that the Plaza of the Columns Complex was part of a palace, and the goal was to distinguish the type of people that resided there (Sugiyama et al. 2016). Excavators have divided the complex into six distinct fronts: A, B, C, D, E, and F (Figure 2.3). Investigations at Plaza of the Columns have found several offerings, administrative buildings, murals, and evidence of Teotihuacan-Maya interactions at the site (Sugiyama et al. 2018). The material from Front E and Front F are excluded as faunal analysis as these fronts are in the preliminary stages. Thus, only the other four fronts will be expanded upon in this study.

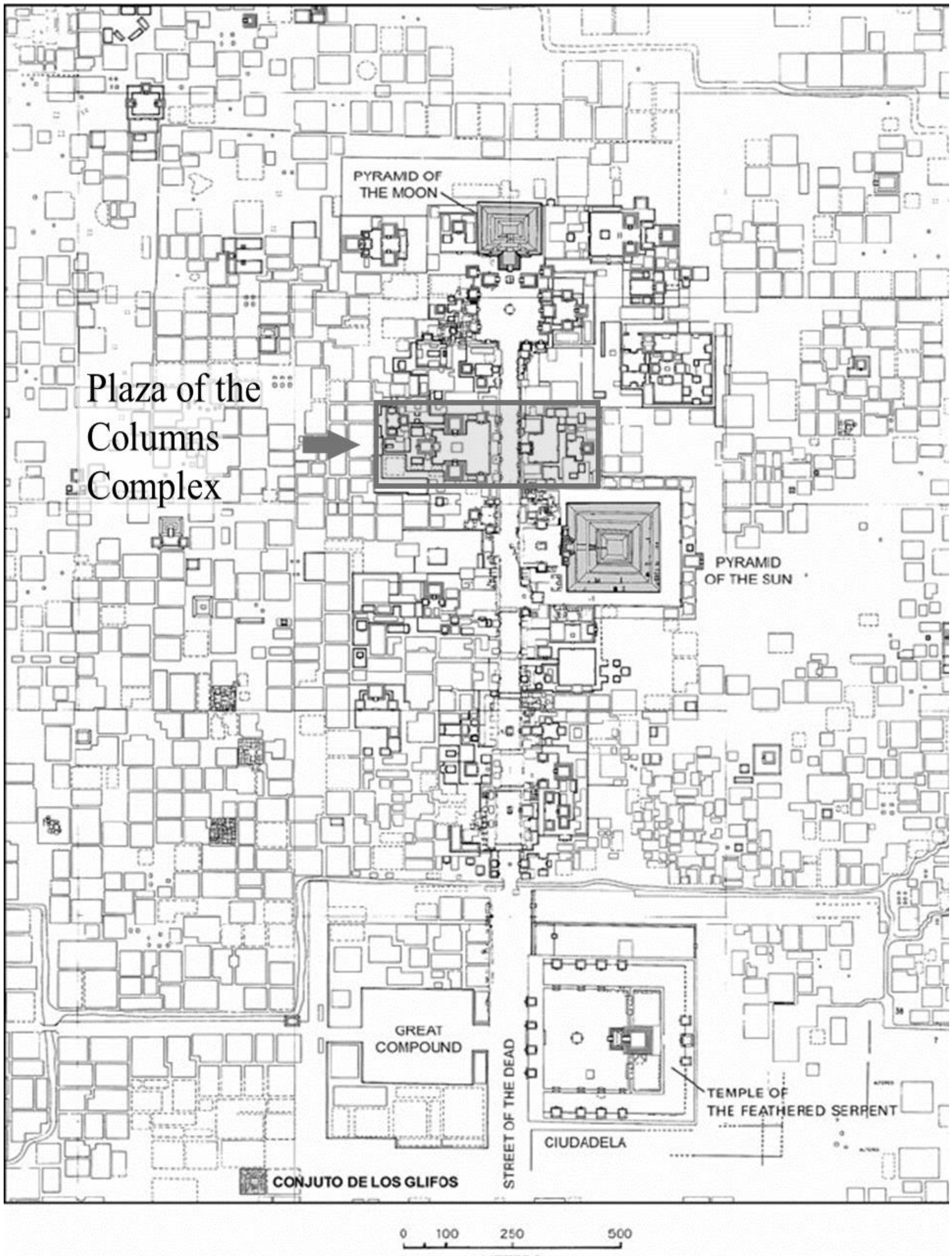

Figure 2.2. Map of Teotihuacan by Nielsen and Helmke (2011: Figure 3); adapted from Rene Millon (Pasztory 1988: Figure III.5), and Bruno Ortíz Marín (Cabrera Castro 1996: Lámina 1).

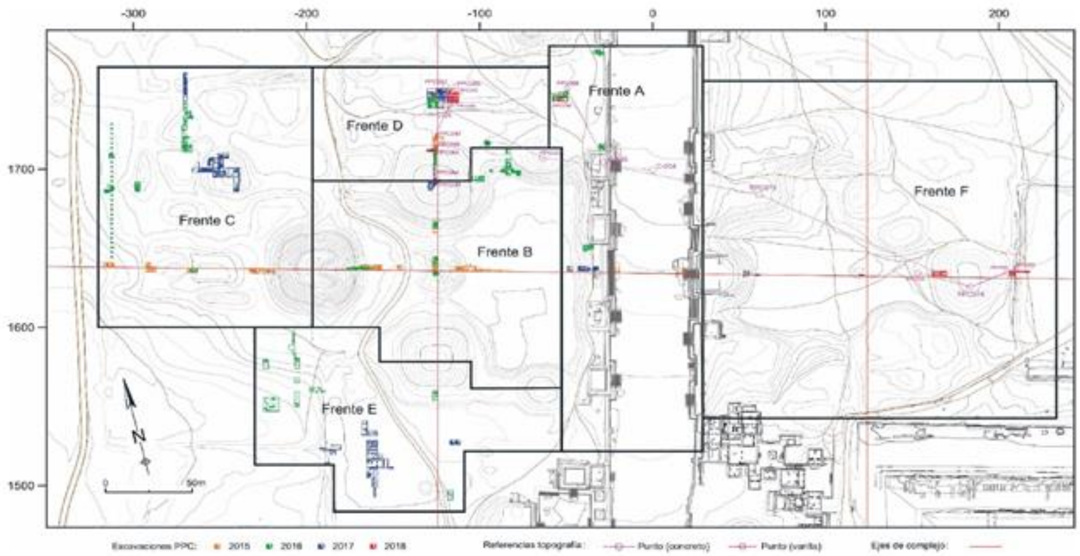

Figura 1. 1. Proyecto Complejo Plaza de las Columnas, mapa general 2017.

Figure 2.3. Plaza of the Columns Complex (Robles Salmeron 2018:Figure 1.1).

Front A

Front A is located along the Avenue of the Dead (Figure 2.3). Analysis of deer remains from Front A was restricted to four principal structures Structure 25K, Structure 51-SE, Structure 51-NE, and Structure 6-S (Figure 2.4). Structure 25K has a passageway leading into the Avenue of the Dead (Ortega et al. 2015). Structure 51-SE is the building that allowed access into the complex and out to the Avenue of the Dead (Sugiyama et al. 2018). Structure 51-NE is a rectangular-shaped building, is the building furthest away from the Avenue of the Dead, and is associated with the earliest occupation at Plaza of the Columns. Excavations near the structure led to the discovery of Offering A1, a big assemblage of human remains, faunal remains, and other artifacts left underneath one of the oldest floors, a large L-shaped plaza called Plaza 50 (Hsu et al. 2016). Finally, Structure 6-S is the northernmost structure of Front A.

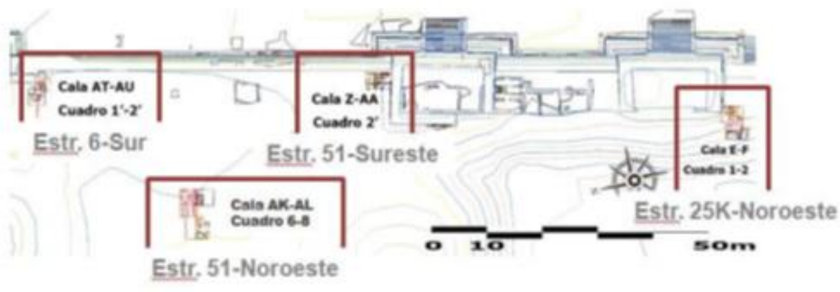

Figure 2.4. Map of Front A Structures (Hsu et al. 2017: Figure 10.1).

Front B

This front contains the triadic pyramid group which, includes the fourth, fifth, and sixth largest pyramids in Teotihuacan Pyramids 25A, 25B, and 25C. Excavations at Front B have found deer remains in Pyramid 25B, Pyramid 25C, Structure 25D, and Plaza 25G and are analyzed for this study (Figure 2.5). Pyramid 25B is the central pyramid in this group. Pyramid 25C is the northernmost pyramid. Structure 25D is a small platform that suffered much destruction. The materials of the building were removed and likely repurposed later (S. Sugiyama et al. 2015). Directly to the east of Structure 25D is Plaza 25G, a large plaza facing the Avenue of the Dead. Plaza 25G's expansive size suggests its importance as a stage for public events. Archaeologists found evidence of destruction at the plaza, with floors and architectural features being completely removed (S. Sugiyama et al. 2015).

Figure 2.5. Map of Front B structures (S. Sugiyama et al. 2015: Figure 3.2).

Front C

Front C is located on the western extent of the complex. The western perimeter of Front C is defined by a wall that runs parallel to the avenue. Of the structures in Front C, two structures have deer bones that were analyzed for this study. Structure 25Z-E is a smaller rectangular building and Structure 25B-W is long rectangular building west of the central pyramid in Front B (Figure 2.6).

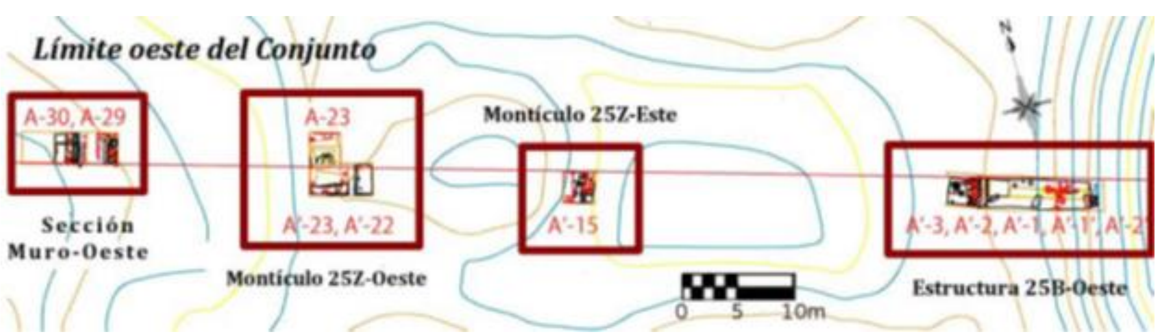

Figure 2.6. Map of Front C structures (N. Sugiyama et al. 2015: Figure 4.1).

Front D

Analysis of deer remains in Front D is comprised of three principal locations: Structure 44B, Plaza 50, and Pyramid 25C (Figure 2.7). This front is located north of Front B and on the western side of Front A. The large Plaza 50 continues into Front D and a tunnel underneath Plaza 50 has revealed Offering D1, a large cache with 1,100 osteological remains and over 13,000 ceramic fragments (Perez Antonio 2018). Hsu and Sugiyama (2017) found that many of the faunal remains were butchered and it is highly likely that Offering D1 was a feasting event. To the north of Pyramid 25C a large plaza, Plaza 50, directly north is Structure 44B. Structure 44B is an elongated building that was likely an administrative building based on its structural features (Sugiyama et al. 2018: 119). PPCC has discovered mural fragments that were destroyed and removed from the plaza facing wall of Structure 44B and buried. Similar to Structure 25D, this building had features removed, repurposed and later abandoned (Sugiyama et al. 2018).

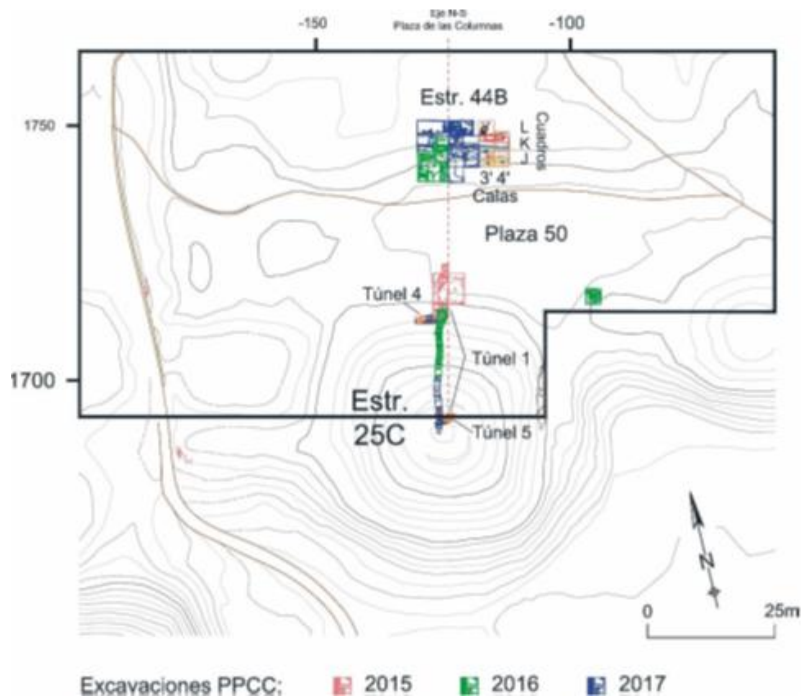

Figure 2.7. Map of Front D (N. Sugiyama et al. 2018: Figure 3.1).

Animals in Teotihuacan

Animals as Symbols

The imposing structures and large plazas of Teotihuacan are architectural feats utilized for reinforcing the ideologies of the state through public demonstration. Public rituals led by the Teotihuacan state displayed the unquestionable authority of the ruling elite. Sacrifice was a critical component of these ceremonies. For example, about 200 people dressed in military regalia were buried for the construction of the Feathered Serpent Pyramid (Sugiyama 2005). Isotope analysis found that most people were not born at Teotihuacan and were either war captives or Teotihuacan soldiers of foreign origin (White et al. 2002). Humans were not the only living actors in these ceremonies, as animals were an integral part of the Teotihuacan state's effort to showcase their power. As such, the type of animal that was chosen reflected the state itself and targeted powerful predators to make their statement.

An assortment of animals were carefully selected for dedication rituals conducted during the construction of new structures (Sugiyama et al. 2015b). The Moon Pyramid was under construction for seven phases and six burials have been found (Sugiyama and Lujan 2006). Burials two and six contained assemblages of humans, pumas, wolves, eagles, and rattlesnakes (Sugiyama et al. 2015b). As some of the most powerful and deadly predators in Mesoamerica, these animals were selected to represent the might of the Teotihuacan state (Sugiyama et al. 2015b).

Teotihuacan state's ability to capture, control, and sacrifice these animals were a testament to their power (Sugiyama et al. 2015c). The difficulty in acquiring these large predators meant that access to these animals was restricted as they are intrinsically tied to rulership and may not be the best sources of nutrition. With a population of about 125,000 people at its peak, Teotihuacan had many mouths to feed. Just as the predators had a specific role for the state, small prey had defined roles as food for the populace.

Animals as Food

The acquisition of food is an essential foundation to understanding the subsistence of a group of people. Archaeologists study foodways to understand the complex systems that determine how people acquire food. Foodways may be defined as:

"[C]lusters of intertwined ideas, values, formalized behaviors, and material objects that are organized and reenacted via the daily performance of social roles and tasks related to feeding oneself and dependents" (Sugiyama and Somerville 2017: 3).

By looking at the everyday behaviors of people, archaeologists gain a better understanding of the processes that contribute to the infrastructures that make up foodways called food systems (Sugiyama and Somerville 2017). Thus, studying food systems can work as a "starting point for studies of ancient foodways" by looking at "material traces of production, acquisition, and disposal of food" (Pitts 2015; Sugiyama and Somerville 2017: 3). Since meat is an important part of the human diet, understanding how meat was acquired and what resources were available for the Teotihuacan diet is imperative.

Zooarchaeologists theorize that large herbivores are ideal targets for food, as they are easier to hunt and capture, in addition to having higher return rates of meat, more food acquired than energy expended to hunt, than small prey such as rabbits and birds (Munro 2004). With a limited number of domesticated animals, Mesoamericans needed to rely heavily on hunting game for protein. This makes the white-tailed deer a critical species in the Americas. Capable of growing up to 7.75 feet tall and can weigh up to 300 pounds, the sustenance that a deer can provide is significant (Reid 1997).

However, as a large city, Teotihuacan's landscape could have negatively impacted the people's access to deer. Evidence of irrigation and complex canal systems are present in Teotihuacan (Cowgill 2015) as the city required tremendous amounts of water brought into urban areas to sustain the population of the city (Sugiyama and Somerville 2017).

The environmental changes and construction needed to house citizens, irrigate, and cultivate the land around Teotihuacan severely altered the surroundings of the city, and it is possible that deer were displaced and harder to acquire (Sugiyama et al. 2017). Previous analyses of Teotihuacan's faunal remains discovered that deer comprised only 11% of the faunal assemblage throughout Teotihuacan (Sugiyama et al. 2017).

According to Sugiyama et al. (2017), analysis of the spatial distribution of deer in the city did not lead to a wide-scale model of deer usage, but there was a lower MNI (minimum number of individuals) percentage in the ceremonial center than in residential areas. Teotihuacan likely had to rely on a different food source and zooarchaeological evidence indicates a heavy reliance on leporid consumption (rabbit and hare), with the small animals comprising 23% of the faunal assemblage at Teotihuacan (Sugiyama et al. 2017). Previously, a feast has been proposed to have occurred in Offering D1 with the consumption of quail, deer, and rabbit. Leporids accounted for 42% of the osteological remains in Offering D1 and is the highest concentration of rabbit throughout Plaza of the Columns Complex (Hsu and Sugiyama 2017). This high number of small mammals suggests that a large amount of meat was needed in order to feed the people in attendance (Hsu and Sugiyama 2017).

Manzanilla excavated at the northern compound of Oztoyahualco and discovered that during the Xolalpan phase (350-550 CE), there was a larger leporid assemblage than at any other location at Teotihuacan (1996). Further research at Oztoyahualco found that there is definitive evidence of leporid management within this compound (Somerville et al. 2017). Somerville et al. studied the cottontail rabbit and hare recovered from five locations, including Oztoyahualco, within Teotihuacan to see if there is a significant intra-site difference in the Leporidae assemblage at Teotihuacan (2017). The study concluded that the "human-leporid relationship was more intensive at Oztoyahualco than other site locations, and that residents were managing and producing/acquiring rabbits at levels greater than household needs" (Somerville et al. 2017: 94).

The prevalence of rabbit remains is an indication that, in addition to hunting rabbits, a compound within Teotihuacan specialized in the acquisition and production of leporids for commercial use and consumption at Teotihuacan (Somerville et al. 2017). With leporids accounting for almost double the MNI percentage of deer, it is clear that rabbits and hare are a primary resource for the Teotihuacan diet in domestic and ritual contexts (Sugiyama et al. 2017). Thus, since the rabbit is the staple food of the city, then what is the role of the deer within Teotihuacan and where does the white-tailed deer stand in other neighboring cultures?

CHAPTER 3 CHAPTER THREE – THE WHITE-TAILED DEER IN MESOAMERICA

An Introduction to the White-Tailed Deer

The white-tailed deer (*Odocoileus virginianus*) is one of three deer species that is native to Mesoamerica. The white-tailed deer is the largest of the three and has a brown coat, and white stomach, thighs, and of course, tail (Reid 1997). Although the white-tailed deer is relatively large, its size increases in areas of higher elevation and becomes smaller closer to the equator (Smith 1991). The white-tailed deer has a wide distribution from Southern Canada to Northern Brazil (Reid 1997). The white-tailed deer do not enjoy dense, mature evergreen forests and tends to live in the periphery of evergreen forests and preferring grasslands (Reid 1997). This is why the white-tailed deer continues to thrive in modern times, as second-growth forests, farmlands, and clearings have increased their habitats (Smith 1991).

The Ideal Resource

Bones are one of the strongest materials that come from the body: sturdy, flexible, and easily attainable for most humans. Since the tibia and metapodials are some of the straightest bones available, it can be easily modified and used as awls, needles, and other types of perforators these bones were highly coveted (Emery 2008). In Perez's (2013: 273) study of 1,509 artifacts, 88% were finished products and mostly comprised of utilitarian tools. Within Teotihuacan, artisans were likely producing copious amounts of product with the intent to sell their bone materials (Perez 2013). Of the analyzed artifacts 13% of the material was white-tailed deer, but the number of deer could be higher, as it is difficult to identify the species of finished tools (Perez 2013). Due to the expansive habitat of the white-tailed deer, understanding how neighboring Mesoamerican cultures interacted and used the deer can better illuminate how Teotihuacanos followed or deviate from these trends.

The Staple of the Mesoamerican Diet

Understanding the consumption and acquisition of animal products has become an integral part of archaeology. Animals are a fundamental part of human lives, whether it be as food or as materials for everyday goods they are present in our lives and arguably were more important in the past. Archaeologists benefit greatly from studying how animals manifest in the lives of people in the past and can help create a better understanding of subsistence, economics, art, and even religion. Zooarchaeology is a sub-field of archaeology dedicated to answering these questions. In Mesoamerica, archaeologists made strides in understanding the domestication of animals, animal management, trade, toolmaking, and ritual sacrifice (Pohl 1985; White et al. 2001; Emery 2008; Sugiyama et al. 2019).

Previously, animals in Mesoamerica were studied through historical documents and art. For example, the Maya codices give insight into the hunting practices of the Maya and serve as a valuable reference for zooarchaeologists (White et al. 2004). Documentation from the Spanish conquest has also detailed how Amerindian groups lived their lives. Although cultural bias is present, such texts also help illuminate economic practices and contemporary analyses of animal use that cannot be seen in the archaeological record. As archaeological methods advanced, zooarchaeologists used methods such as ethnography, experimental archaeology, and isotope analyses to expand upon the lives of these animals.

Within Mesoamerica, zooarchaeologists have been able to understand better the role of the deer in the Maya region. Similar to the carnivores of Teotihuacan, deer deeply impact the imagery and identities of the elites in the Maya region (Sharpe and Emery 2015). Thus, to understand the deer anomaly in Teotihuacan, it is critical to understand how the white-tailed deer impacted groups throughout the region. Therefore, this chapter will help create a contextual understanding of the deer in Mesoamerica. Explaining how deer are acquired, processed, eaten, and used as material goods in the Maya region, Oaxaca, Northwestern Mexico, and South America to compare to the white-tailed deer of central Teotihuacan.

Central and Western Mesoamerica

The best comparisons to Teotihuacan would be cultures that overlap in time with Teotihuacan. Manin and Lefvere's analysis of ten sites in Western and Central Mexico studied the distribution of animal remains between these sites to find the variation and similarities between them. (2016). Most sites occur during the Classic Period and range in location from Hidalgo, Michoacán, and Guanajuato. Their samples led to an analysis of 9,438 animal bones that were unequally distributed throughout the sites, favoring elite enclaves. (Manin and Lefvre 2016). While the wealthiest locations had a larger variety of animals present in their assemblages, the poorest sites only had access to fundamental species such as rabbit, dog, and deer (Manin and Lefvre 2016). Both deer and rabbit were the two most abundant animal remains found at all sites, but deer were the only species that occurred in all ten sites (Manin and Lefvre 2016). The high frequency of deer bones throughout these sites indicates how deer were a staple to the Mesoamerican diet. Angamunco in particular, is an example of limited access to deer as the distribution of deer was restricted to ritual contexts in public domains (Manin and Lefvre 2016). The following site also shows a trend of control over deer acquisition, but specifically impacted the foodways of the city.

Oaxaca

El Palmillo was a highly stratified terraced Zapotec city and a contemporary to Teotihuacan during the Classic period (200-800 CE). Excavations at El Palmillo discovered that the city had a three-class social system, with the higher status individuals living at the highest points of the city and social class diminishes in the lower terraces (Haller et al. 2006). Due to the definitive separation between social classes, the faunal assemblages in each terrace reflected each class's access to animal meat. Haller et al. found that the most common species at El Palmillo are rabbit, hare, white-tailed deer, dog, and turkey (2006: 46). White-tailed deer were found throughout the site, but there were copious amounts of deer in the highest terraces where elites resided (Haller et al. 2006).

Wealth disparity is often indicative through the availability of specific meat cuts, the higher the status a person has, the better the meat available to them (deFrance 2009). However, at El Palmillo, the connection between wealth and food manifests not through the selection of meat but by abundance. Higher quality cuts of venison are lacking in higher class terraces; however, even though the same elements are present throughout the site, the amount of deer reveals that deer were restricted amongst the lower classes (Haller et al. 2006). In the highest terrace at El Palmillo, 21% of the faunal assemblage was deer but comprised 8% of fauna in the lowest class terrace (Haller et al. 2006: 48). El Palmillo shows the restriction of animals in stratified societies, but these limits did not wholly eliminate access to deer among the lower classes.

The Maya

The relationships between the Maya and the white-tailed deer are one of the better documented human-animal relationships in Mesoamerica. The deer was a symbolically significant animal because of its direct relationship with the Maya solar god (Biro and Montero-Lopez 2008: 53). As an intermediary between humans and the gods, deer were frequently depicted in Maya iconography, specifically in scenes related to the Maya elites (Biro and Montero-Lopez 2008). White-tailed deer have played a central role in ritual burials (White 2004; Biro and Montero-Lopez 2008; Sharpe and Emery 2015). However, deer were not the only animal of significance in the Maya ritual contexts.

A distinct shift in focus in Maya rituals is seen in the transition from the Maya Preclassic to the Classic period (Biro and Montero-Lopez 2008). Dogs were one of two domestic animals in Mesoamerica and a frequent player in Preclassic Maya rituals (White 2001; White 2004). Nevertheless, the Classic period brought forth a stratified social hierarchy deer replaced the dog's role in ritual sacrifice (Pohl 1990). As social stratification increased, a shift in animal symbolism took place and was reflected through the ruling class limiting access to white-tailed deer to legitimize their power (Biro and Montero-Lopez 2008; Emery 2003).

The Maya had a mutually beneficial relationship with deer. White-tailed deer prefer to subsist on leafy, non-fibrous C3 plants which they eat opportunistically. Due to this preference, deer were known to roam the outskirts of crop fields and will also consume maize, a non-fibrous C4 plant (Emery et al. 2000; White et al. 2004). This phenomenon may have led to the Maya using "garden hunting" as a strategy for acquiring deer, which "took place in and near cultivated fields and house gardens" (Linares 1976: 347). Isotope analysis has allowed archaeologists to find evidence of deer being dependent on human food, and this is seen at the Maya site of Largatero. Two individuals show deer were consuming C4 plants exclusively from a young age rather than subsisting on C3 plants, as seen in wild deer (White et al. 2004: 158).

A study conducted by Sharpe and Emery (2015), specifically studied the distribution of animal remains in three Maya capital centers: Yaxchilan, Piedras Negras, and Aguateca. Access to certain animals reflected restrictions and control of resources by the state for the general population (Sharpe and Emery 2015). For example, in Late Classic Yaxchilan, 69.5% of the faunal assemblage is white-tailed deer, this drastic number led researchers to hypothesize that the Maya elites focused on few symbolically significant species to distinguish themselves from lower-ranking members of society (Sharpe and Emery 2015: 287). Across the city centers, white-tailed deer were found to be the most abundant species. This implied a distinct pattern where "the higher status contexts at the largest sites would have exhibited significantly disproportionate numbers of specific [deer] body parts than among the lower status contexts" (Sharpe and Emery 2015: 290).

South America

The white-tailed deer's presence as a food source can be traced back as far as the middle-late Holocene within South America. Around 3,000 BCE in the Sabana de Bogota, the white-tailed deer was a primary target of the local population (Martinez-Polanco 2018). During this time, the people of Aguazuque in Sabana de Bogota were in a transitory state where they were semi-dependent of hunting and low-level food production (Martinez-Polanco 2018: 109). Zooarchaeological research at Aguazuque found that the white-tailed deer and guinea pig were the two most abundant species being consumed (Martinez-Polanco 2018). Despite the prevalence of the white-tailed deer, the guinea pig was the staple source of meat as throughout occupation at Aguazuque, the number of individual guinea pigs was almost double the deer represented (Martinez-Polanco 2018: 112).

On the northern coast of Peru, the deer was a predominant food source until around 1,000 BCE when the domestication of camelids replaced the white-tailed deer as a staple food (Shimada 1999). The deer once again became an actor in the region during the Moche civilization. However, to the Moche deer was not meant for consumption and rarely appear in food refuse (Donnan 1997). Instead, deer became a symbolic actor in Moche hunting rituals (Bourget 2016). Donnan (1997) analyzed ceramic vessels depicting Moche warriors in combat regalia hunting and capturing white-tailed deer and depictions of anthropomorphized deer in warrior's regalia. In Moche religion, deer may have been a proxy of capturing and sacrificing human captives, and deer hunting was restricted to elite lords (Donnan 1997).

There is a limited assemblage of deer found in Moche sites, but as the iconography indicates deer are present but access was restricted to Moche elites (Matsumoto 2014). A white-tailed deer cranium has been identified in a Moche ceremonial courtyard and Matsumoto discovered that deer are significant in non-domestic contexts. In the subsequent Sicán Period, deer were a “special food” that was consumed solely by the elite in ceremonial feasting contexts (Matsumoto 2014: 702).

Conclusion

Deer usage varied across Mesoamerica and the New World more broadly. Still, there is a consistent correlation between access to food and wealth in the complex societies of later prehistory. If deer is a prized animal of religious or economic prestige, deer are relegated to public or ceremonial contexts such as ritual spaces, burials, and caches. Access to deer was closely monitored by Maya elites and was used as a source of legitimization for their power. As a source of food, this pattern of restriction is also palpable. The Maya used venison regularly in feasts, and access to the food was limited in the lower classes (Emery 2003). The element distribution across Maya city centers illustrates the wealth inequality present within these city-states through the consumption and acquisition of meat (Emery 2003; Sharpe and Emery 2015). In Oaxaca, deer abundance was comparatively less in lower status households. However, the lack of meat bearing bones could be an indication of the overall trend of deer for tool making. Since the Teotihuacanos relied on farming land due to the city structure, the conditions for acquiring deer are set (Cowgill 1997). Then, a pressing question remains: why is the deer assemblage at Teotihuacan so low?

CHAPTER 4 CHAPTER FOUR – MATERIALS AND METHODS

Materials

Introduction

This project was made possible with the collaboration of the Project Plaza of the Columns Complex (PPCC) at Teotihuacan and the archaeologists leading, excavating, and maintaining the material found at Plaza of the Columns. Zooarchaeological analysis was supervised by Dr. Nawa Sugiyama, with direct consultation from Yen-Shin Teresa Hsu, and Dr. Andrew Somerville. The analysis was conducted at the PPCC facilities at the Teotihuacan Archaeological Park, where we worked with the deer remains collected over the previous years of excavation as well as studied newly excavated and documented material.

Materials

In summer 2019, I analyzed 465 number of identifiable specimens (NISP) of even-toed ungulates (artiodactyls). Data collection was conducted after the bulk analysis was already completed by Hsu and colleagues (Hsu 2015; Hsu et al. 2016; Torres Estevez et al. 2018). I began by analyzing previously examined materials in order to determine if any large mammal fragments or artiodactyl elements could be further identified as white-tailed deer. This sample includes osteological material collected from 2015 to 2017, and additional material from Front A and Offering D1 from 2018. Due to the larger quantity of identified and analyzed bone in Front A and Offering D1, a sample bias is present, which will inflate the number of specimens in comparison to other fronts. Due to the larger sample size in Offering D1, the offering assemblage will be distinguished separately from Front D's assemblage. As such, deer abundances were calculated in proportion to its respective total counts per front (Table 4.1). All the material collected has exclusively been excavated at Plaza of the Columns, which reflects materials used within the ceremonial center.

Table 4.1. Plaza of the Columns Complex Faunal Elements by Front (NISP)

	Front A	**Front B**	**Front C**	**Front D**	**Offering D1**	**Total**
Total Fauna	2149	608	1140	1117	1711	**6725**
Non-Artiodactyl Fauna	1896	573	1084	1074	1651	**6278**
Artiodactyl	128	17	23	16	7	**191**
Deer	125	18	33	27	53	**256**
Deer %	**6%**	**3%**	**3%**	**2%**	**3%**	**4%**
Artiodactyl total %	**12%**	**6%**	**5%**	**4%**	**4%**	**7%**

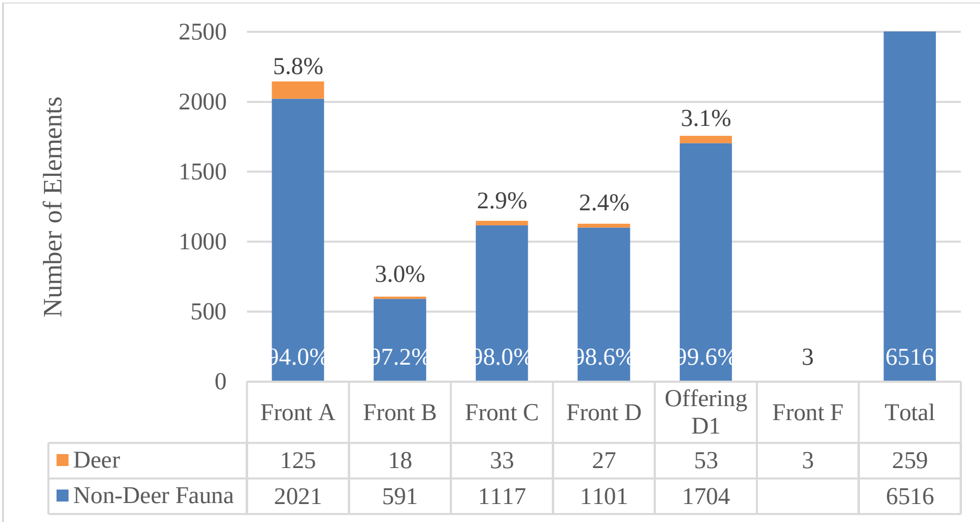

Figure 4.1. Plaza of the Columns Faunal Assemblage by Front.

After reexamining the previously studied material, I examined additional unstudied samples from Front A and Front D excavated in 2018. I began by conducting a bulk sort in order to increase the sample size of large mammal elements that I identified as white-tailed deer. Excluding human remains, Table 4.1 shows the total analyzed faunal assemblage (NISP=6725) at Plaza of the Columns. There was a surprisingly limited percentage of deer (4%) at the Complex as shown in Figure 4.1. The study excluded analysis of material above the first layer of excavation as intrusive modern specimens or specimens affected by modern activities may be mixed. Additionally, this would potentially remove post-Colonial artiodactyl species not native to Central Mexico and not present in Pre-Hispanic times (e.g. sheep, goat). Other artiodactyl remains may include mule deer (*Odocoileus hemionus*) and Pronghorn (*Antilocapra americana*), both of which are not local to the Basin of Mexico. Thus, while we excluded samples not identified to species level, it is likely all samples identified to order Artiodactyla are comprised of white-tailed deer. In certain contexts, such as Offering D1, the site was completely sealed and not opened until excavations. Thus, the total artiodactyl elements are likely native to the Americas.

Methods

All animal remains previously analyzed for this thesis has been identified by Yen-Shin Teresa Hsu, Dr. Nawa Sugiyama, Monica Gomez, and Leila Martinez-Bentley. For new material, I followed the same standard zooarchaeological methodology used by the PPCC members in the identification and analysis of animal remains (Hsu et al. 2016). I assisted with further identification of unidentified large mammal and artiodactyl specimens to the most accurate taxonomic level possible. At my disposal were the reference collections from the Smithsonian's Archaeobiology laboratory, the George Mason University Archaeological Sciences laboratory, as well as the modern comparative collection at the PPCC laboratory.

All specimens were identified to the most discrete taxonomic level using comparative collections and reference material from Rumph (1975), Elbroch (2006), and Post (2014). My reference collections of deer skeletons were the Smithsonian's Archaeobiology laboratory, the George Mason University Archaeological Sciences laboratory, as well as the modern comparative collection at the PPCC laboratory. Specimens were placed into size categories (small, medium, or large) and assigned to a class (mammal, aves, reptilia). Hsu (2017) follows the following size classification system to determine the size group animals is as follows:

Small: Passerine, Quail, Frog

Small-Medium: Skunk, Turtle, Rabbit

Medium: Turkey, Hare, Domestic Cat

Medium-Large: Dog, Sheep, Goat

Large: Puma, Human, Deer

The size classification of bone elements is crucial for archaeological contexts as bone is usually found broken when excavated. Features such as bone density, form, and size help narrow the possibilities of identification. Fragmentation also complicates the identification of bones and individuals in the archaeological record. NISP is used to calculate the identified specimens as an observable unit (Lyman 1994; Hsu et al. 2016). NISP is the most basic level of identifying bone in archaeology. Along with NISP, MNE (minimum number of elements) identifies bone elements as an observable unit (Lyman 1994). MNE defines the number of elements present based on the excavated fragments (Reitz and Wing 2008: 226). In order to calculate the MNE, specimens are weighed and the percentages of landmarks and element parts remaining are recorded to aid in the identification of a bone element.

Not all fragments can be pieced together like a puzzle. Landmarks such as the foramina, bony processes, and articular surfaces are in unique locations based on the bone and are used to calculate an accurate percentage of elements (Lambacher et al. 2016). Accurate record of the percentage of remaining bone, the epiphyseal fusion, and the percentage of landmarks present helps prevent inflation or under representation. Based on MNE designations, MNI (minimum number of individuals) values are generated. This number is not a definitive number for the individuals present in this site, but rather, it creates a minimum baseline of the element representation present for the purposes of analysis (Reitz and Wing 2008). Calculating MNI is specific to element and side as most bone elements appear twice in the skeleton as a left or right element (Reitz and Wing 2008).

When possible, the specimens were classified into two distinct age groups: sub-adults and adults. A fawn age group was considered, but a distinct time when weaning ends was unavailable. Thus, age of sexual maturity (16 months) was used distinguish between two broad classifications (Smith 1991). Calculating age is dependent on epiphyseal fusion. As bodies grow, the proximal and distal ends (epiphyses) of bones slowly fuse to the shaft of the bone (White et al. 2006). The bones in the body fuse following a known sequence (Reitz and Wing 2008). Deer age was calculated using Purdue's (1983) epiphyseal fusion sequence of white-tailed deer (1983). Sex estimation was not possible with recovered elements, thus the median of the two sex-specific age estimates provided by Purdue was used in order to calculate age (1983: 1210).

While NISP, MNE, and MNI will be explicitly presented, I utilized NISP as the primary means of quantifying the deer sample for the purposes of this study because previous studies by PPCC have quantified their data using this unit of measurement. On the other hand, MNE calculations allow comparison with Sharpe and Emery's (2015:285) study of element distribution at seven different Maya city centers. These quantification methods of species and element abundance are important to understand the use of the animal present, but also how and when they were acquired. Distinguishing between NISP, MNE, and MNI helps accurately calculate the deer assemblages for each front and Plaza of the Columns as a whole.

Element Distribution

Abundance of a particular bone in the archaeological record reveals which animal parts were the most coveted at the use site. Among large mammals, like white-tailed deer, the absence of certain elements illuminates how the animal was acquired and can reconstruct carcass transportation strategies. Certain hunting practices leave behind parts of the animal that are deemed unimportant at the location in which were hunted (Reitz and Wing 2008). Each specimen's contextual information, identification, fragment type, and surface modifications were all systematically recorded onto an Excel database to ensure the bone was accurately described and ready for further analysis.

Surface Modification

As not all surface modifications are anthropogenic in origin, distinguishing between human-made alterations and natural processes ensures an accurate assessment of changes on the bone surface. Buried bones are altered over time by the soil and environment where they were disposed. Natural transformations on the bone can be caused by root etching, carnivore gnawing, rodent gnawing, or sun exposure (Behrensmeyer 1978). Environmental factors such as the proximity to water, water salinity, humidity, soil, and climate can impact the integrity of the bone to become more fragile over time (Reitz and Wing 2008).

Human alterations to the bone surface can appear as cuts, scrapes, percussion marks, burning, punctures, digestion (gastric etching), boiling, and presence of adornment such as pigment. A careful analysis of these markings assists in assessing the procurement of white-tailed deer. Since obtaining white-tailed deer is an integral part of this study, careful analysis of the bone surfaces and calculating the number of specimens and elements is crucial. As the largest mammal in the region, it is crucial to search for cut marks on the bone surface. In the modern economy, consumers have the option of purchasing specific meat cuts of an animal (Figure 4.2), and the methodology used to acquire coveted portions of meat will be reflected in the abundance of the meat bearing bones (Fisher 1995; Reitz and Wing 2008). Additionally, deer bones with definitive signs of butchery on their surface were photographed for the purposes of this study.

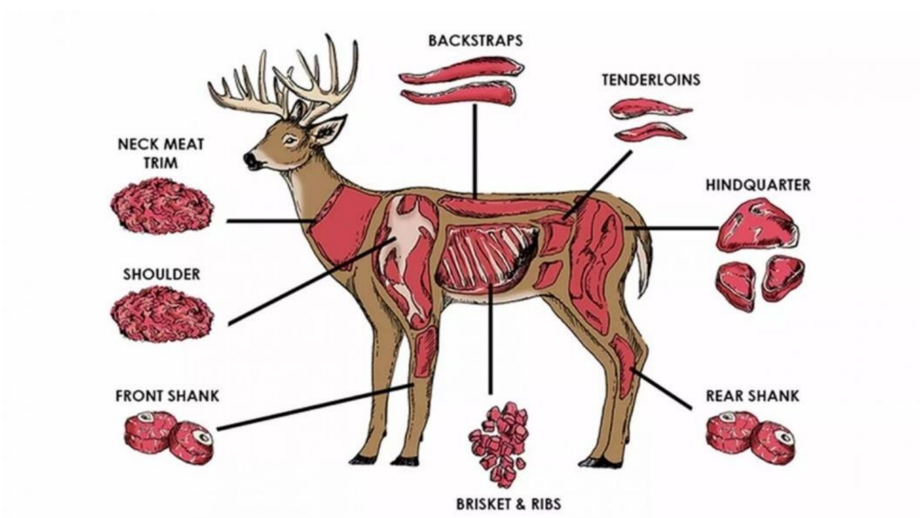

Figure 4.2. Diagram of Modern Deer Meat Cuts (May van Millengen 2019).

Long bones (humerus, femur, tibia) and axial elements (vertebrae, ribs, scapula) are considered meat bearing bones (Reitz and Wing 2008). Thus, these elements were likely butchered for the acquisition of the meat attached to the bone. Zooarchaeological approaches can reconstruct these patterns by quantifying specific locations such as the epiphyses, joints, and along the back of the animal. Other forms of human modification are chop marks, percussion marks, and teeth marks (Retiz and Wing 2008). All cutmarks were recorded onto a drawing of a printed deer skeleton taken from Rumph (1966) at the same locations to examine marks distribution throughout the skeleton.

The most extreme example of human alteration is called "worked bone," where the structure of the bone is completely altered in order to use it as a tool (Emery 2008). For example, deer metapodials are very straight long bones and can easily be turned into awls, needles, and other tools (Emery 2008; Perez 2005; 2013). Although identifying the tool and its purpose is useful, worked bone can be modified to the point that landmarks used in identification are completely removed, resulting in worked elements classified only as non-identified large mammal bones (Emery 2008). However, the texture of a bone's surface can often distinguish between animal and human bones (Reitz and Wing 2008). PPCC has previously identified worked human elements from the assemblage and is not included in the sample of worked large mammal elements for this study. The presence of the bones and the processes that they are subjected to reveal much about human practices. However, an invisible pattern seen through missing elements may reveal just as much.

CHAPTER 5 CHAPTER FIVE – RESULTS

The deer assemblage at Plaza of the Columns Complex is indeed sparse. A total NISP of 259 and an MNI of 28 white-tailed deer were documented in this study. To ensure the analysis' accuracy of deer usage, other artiodactyl were not included in the dataset for this chapter. Table 4.1 indicates the total deer percentage within each front and the sample bias present throughout the faunal sample. Front A and Offering D1 have larger faunal assemblages and previous analyses have focused on these large faunal deposits. Thus, tabulations are provided in percentages within each front to avoid interpretations due to sampling size biases. Table 5.1 displays the deer NISP percentages for each front. The total fauna from Front D (NISP=1,101) is comparable to the fauna recovered from Offering D1 (NISP=1,704) (Table 4.1), thus Offering D1 was categorized separately.

Table 5.1. Deer NISP, MNE, and MNI percentages by front

Front	Location	NISP (n)	NISP (%) n=255	MNE (n)	MNE (%) n=217	Deer MNI (n=29)
Front A (MNI=10)	Str. 25K	3	2.4%	3	2.9%	1
	Str. 51-NE	83	66.4%	67	64.4%	4
	Str. 51-SE	14	11.2%	12	11.5%	2
	Str. 6-S	25	20.0%	21	20.2%	3
Front B (MNI=5)	Pyr. 25B	4	22.2%	4	22.2%	1
	Pyr. 25C	7	38.9%	7	38.9%	2
	Str. 25D	4	22.2%	4	22.2%	1
	Plaza 25G	3	16.7%	3	16.7%	1
Front C (MNI=4)	W. Limit	21	63.6%	18	62.1%	2
	Pyr. 25B	11	33.3%	10	34.5%	2
	Str. 25Z-W	1	3.0%	1	3.4%	1
Front D (MNI=4)	Pyr. 25C	3	11.1%	3	12.5%	1
	Str. 44B	6	22.2%	6	25.0%	1
	Plaza 50-N	17	66.7%	15	62.5%	2
Offering D1 (MNI=4)	Pyr. 25C	53	100.0%	46	100.0%	4
Total		255		220		27

Table 5.2. NISP for Plaza of the Columns Complex

	Front A				**Front B**				**Front C**			**Front D**			
	25K	Str. 51-NE	Str. 51-SE	Str. 6-S	Pyr. 25B	Pyr. 25C	Str. 25D	Plaza 25G	W. Limit	Pyr. 25B	W. Str. 25Z	Pyr. 25C	Str. 44B	Plaz a 50	Offeri ng D1
Cranial Bone		2	2	1		2			1			1	3	2	2
Tooth						1			3						
Cervical Vertebra				3			1		1					1	2
Thoracic Vertebra			1	5											3
Lumbar Vertebra			1	5				1				1		1	1
Sacrum															1
Pelvis		1							2				1	1	2
Rib															7
Scapula		2	2											1	
Humerus		3		1	1			1	3	1	1				2
Radius		1			1	2			2	1					4
Ulna	1	1		2					1				1		3
Carpal Bone		2							1	1					
Femur		4		3						2				3	2
Patella										2			1	1	1
Tibia		4	2	1					1			1		2	7
Metapodial		13	3	2	1	1		1	3	1				2	5
Long Bone															1
Tarsal Bone	1	20	1			1	1		2					1	4
Phalanx	1	30	2	2	1		2		1	3				2	6
Total	**3**	**83**	**14**	**25**	**4**	**7**	**4**	**3**	**21**	**11**	**1**	**3**	**6**	**17**	**53**

Front A

Of the six fronts at Plaza, Front A has the largest deer assemblage totaling 6% of the total fauna, 2% higher than the rest of the fauna assemblage. Front A has a NISP of 125, MNE of 100, and a minimum of 10 individual deer. Deer distribution within Front A was uneven as Structure 51-NE alone comprises 66% of the deer assemblage (Table 5.1).

Structure 25K-West

Structure 25K-West had the smallest assemblage of deer within Front A (NISP=3). None of the deer elements were subject to cultural or human alterations and had relatively little discoloration to the bone surfaces. The proximal end of an ulna was completely unfused, indicating this individual was less than two years old and likely a subadult. However, without more elements to ascertain its age, a confident age range cannot be given.

Structure 6-South

Structure 6-S is adjacent to the Avenue of the Dead and is the closest structure at Plaza of the Columns to the Moon Pyramid on the map. This structure is the third most abundant deer assemblage at Plaza of the Columns with a NISP of 25, MNE of 21, and an MNI of 3 (Table 5.1). The element distribution is evenly dispersed with at least one bone represented in each major category (cranial, axial, upper limb, hind limb). The most abundant element is the vertebrae (NISP=7), and in particular, it was the thoracic vertebrae that were most common.

White-tailed deer at structure 6-South are younger and range between 0 months to 29 months old. Of the ten specimens with a designated age range, three were classified as sub-adult with high confidence, while the youngest individual deer was less than two months old. The rest of the specimens cannot be accurately assessed. The element with the highest age range of “less than 29 months” pertains to a humerus (Purdue 1983). This humerus is completely unfused suggesting that it was a subadult and so are the other individuals present in this context. Of the deer assemblage from Structure 6-South, five specimens show indication of human made alterations.

Structure 51

Structure 51 is one of the most exciting locations at Plaza of the Columns. Not only is Structure 51 the site of one of the main offerings (Offering A1) discovered at Plaza of the Columns, this structure also has the most diverse and abundant (NISP=97, MNE=76, MNI=6) distribution of deer elements at Plaza of the Columns. The NISP of structure 51 is the largest, with a total of 97 specimens. The MNE is also the highest at Structure 51 with 76 elements and an MNI of 6. The assemblage at Structure 51 shows a definitive trend with the most abundant group of elements in the entire site. Phalanges dominate this assemblage comprising 33% of the entire assemblage (NISP and MNE of 30) and is the dominant element represented at Plaza of the Columns. The prevalence of phalanges could be an indication that deer were primarily used as pelts since phalanges are challenging to separate from the animal skin (Sugiyama et al. 2019).

Within Front A, 24 elements show indication of butchery and 21 of those were from Structure 51 alone. The cutmark distribution support that the primary use for deer was for their secondary by-products. Of the 18 cuts found on deer bones, 13 cuts were present on elements around the ankle of the deer such as the metapodials, astragalus, and calcaneus (Table 5.3). A metatarsal with transverse cuts on the proximal end by the ankles was likely caused by the removal of the bottom half of the hind legs (Figure 5.1). Additionally, small transverse cuts on the proximal end of a calcaneus likely had a similar purpose (Figure 5.2). These cuts mean that the metapodial bones were sought after, likely for toolmaking.

Figure 5.1. Front A Structure 51-NE: Deer Metatarsal with evidence of transverse cuts on the proximal end. Photo by Esther Aguayo.

Figure 5.2. Front A Structure 51-NE: Deer calcaneus with transverse cuts on proximal epiphysis. Photo by Esther Aguayo.

Front B

Front B only comprises 7% of the white-tailed deer found at Plaza of the Columns with a NISP of 18 and MNI of 5. Most of the elements from Front B originate from Structure 25C as sampling bias is present in Front A favoring structure 51, most of the elements from Front B originate from Structure 25C (NISP=7). The element distribution seems to favor long bones (NISP=8). However, a maxilla and tooth are present. Deer teeth have been quite rare (NISP=4) only present in Front B and C (Table 5.2). Only one individual from Plaza 25G could be classified as a juvenile with high confidence as the epiphysis of the vertebra fuse at around two months of age (Purdue 1983). The rest of deer with an age approximation were of juveniles (NISP=5).

Pyramid 25B

The assemblage from Pyramid 25B totaled a NISP and MNE of 4 with an MNI of one deer. Two elements have a surface modification: a metacarpal with a group of cuts on the shaft and a second phalanx with transverse cuts on the distal end. Since the latter is part of the hoof, this cut likely separated the bones from the hide. Leg bones were the only elements documented at Pyramid 25B.

Pyramid 25C

Pyramid 25C has an MNI of 2, NISP and MNE of 7. The assemblage from Pyramid 25C is the only structure in Front B with cranial elements present. A metatarsal has a group of transverse cuts present on the shaft towards the proximal end of the bone. This cut was likely for the removal of the meat around and above the metatarsal, or the rear shank (Figure 5.3).

Figure 5.3. Front B Pyramid 25C: Metatarsal with a group of five cuts on proximal end of diaphysis. Photo by Esther Aguayo.

Structure 25D

With a smaller assemblage in this front, the deer assemblage at Structure 25D comprised 22% of the Front B assemblage (Table 5.1). This structure has a NISP and MNE of 4 and MNI of 1. None of the elements from this structure have any human-made modifications. Additionally, one phalanx and a cervical vertebra were identified as a medium confidence subadult of at least 11 months.

Plaza 25G

Plaza 25G has a small assemblage with a NISP of 3 and an MNI of 1. All three elements are meat bearing bones, as items that were likely for purchase within the Plaza. However, there is no evidence of butchery present on the bone surfaces. Although these elements are likely coveted in a market setting, the surfaces do not indicate that these were sold as parts. The lumbar fusion demonstrated that this individual was more than five months old.

<u>Front C</u>

Western Limit

Of the three sites analyzed in Front C, the Western Limit encompasses a series of test pits excavated to define the perimeter of the entire complex. The Western Limit has the largest deer assemblage from Front C. The Western Limit has a NISP of 21, an MNE of 18, and an MNI of 2 (Table 5.1). Almost half of the elements from the Western Limit are comprised of long bones (NISP=10). The long bones represent both front and hind legs with a preference for humeri (NISP=3) and metapodials (NISP=3). This site is the second area in Plaza of the Columns with both cranial elements and teeth present. Moreover, there is a distinct lack of phalanges for the size of this assemblage and this assemblage is mostly represented by meat bearing elements on the deer.

Figure 5.4. Front C Western Limit: Cervical vertebra with two deep transverse cuts under the right superior articular facet. Photo by Esther Aguayo.

Despite the large NISP count, the Western Limit has an MNI of 2 due to the diverse element distribution. The first individual was a very young juvenile who was less than five months old. The second individual has a broader age range of 11-29 months old and likely an adult based on the epiphyseal fusion of the radius (Purdue 1983). Of the assemblage from the Western Limit, two elements show evidence of butchery. Figure 5.4 shows a cervical vertebra with two deep transverse cuts underneath the right superior articular facet. The location of the cut indicates the removal of this vertebra from the proximal vertebrae it was articulated to. The second element is an ilium shaft with a transverse cut (Figure 5.5). This cut occurs close to the illio-ischial border of the pelvis, possibly to remove the meat in the surrounding area and potentially to aid in the disarticulation of the right hind leg.

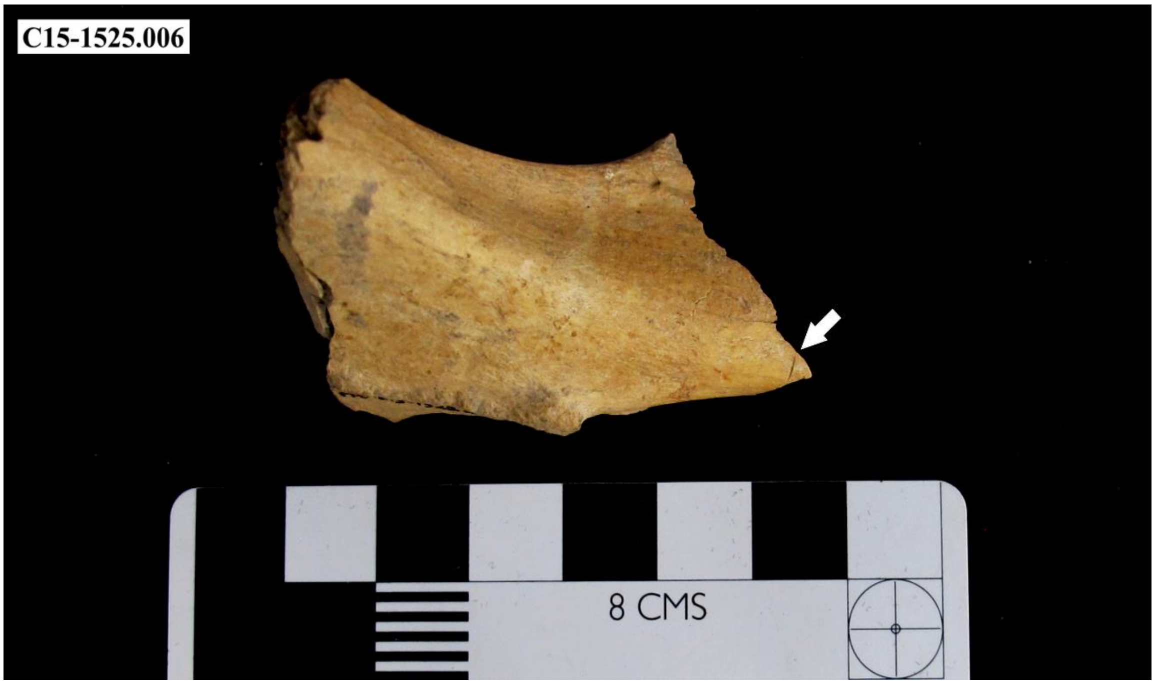

Figure 5.5. Front C Western Limit: Right deer pelvis with transverse cut. Photo by Esther Aguayo.

Structure 25B-West

Structure 25B-West is directly west of Pyramid 25B. As with Pyramid 25B in Front B, this assemblage is also comprised entirely of leg elements. With a NISP of 11, the assemblage is slightly larger than Pyramid 25B's assemblage (Table 5.1). The MNI from Structure 25B is 2 (Table 5.1), due to the presence of two right femurs (Table 5.2). A definitive age classification could not be given to this assemblage with a wide age range of 2 to 29 months. Of the seven elements that age could be estimated, 85% ranged from 17-29 months old. No cultural surface modifications were identified.

Structure 25Z-West

This structure only has one deer element as the faunal assemblage recovered from this site is quite small (NISP=32). A definitive age classification cannot be given for this individual since only the proximal end of the humerus is present and does not fuse until 29 months of age (Purdue 1986). Additionally, there are no cuts or human-made marks on this element.

Front D

Front D, excluding Offering D1 discussed in continuation, comprises 10% of the deer assemblage at Plaza of the Columns (NISP=27, MNI=4). Plaza 50 is the site with the most deer elements (NISP=17), representing 67% of deer within Front D (Table 5.1). Including the osteological remains from Offering D1, Front D is the only front where red pigment has been found on deer specimens. Offering D1 will be categorized differently to distinguish the faunal elements from the ritual context.

Pyramid 25C

The deer assemblage from Pyramid 25C is quite small, with a NISP of 3 and an MNI of 1 totaling 11% of deer elements within Front D (Table 5.1). The element distribution includes cranial, axial, and limb elements. Age could only be estimated based on the epiphyseal fusion of the tibia and the individual is at least 20 months old, an adult. None of these elements have evidence of human-made alterations on the bone surface.

Structure 44B

Structure 44B has a NISP of 6 where 50% of the elements are cranial bones (NISP=3). The MNI is one individual. The dental wear on the mandible suggests this individual was an adult. The ulna's pattern of fusion is that of a deer of a minimum age of 29 months. No butchery marks are present in this assemblage. However, other anthropogenic modifications are present. The ulna has burn marks on the anconeal process above the humeral articular surface. Additionally, there are traces of red pigment on the patella and pelvis.

Figure 5.6. Front D Plaza 50: Deer astragalus with multiple cuts on lateral surface marked by arrows. Photo by Esther Aguayo.

Plaza 50

Plaza 50 has 17 deer specimens and an MNI of 2 individuals (Table 5.1). The age range for Plaza 50 suggests two adult individuals with a range of 17-23 months old. There are two elements with cultural modification within Plaza 50. One metatarsal has red pigment on the anterior surface of the shaft near the distal metaphysis. The second element is an astragalus with four cuts on the medial surface, which wraps around to the proximal surface and continues towards the lateral surface (Figure 5.5). These cuts are distinct because they have the same objective and prominent. The purpose of these cuts was likely intended to disarticulate the tibia from the metatarsal.

Offering D1

Structure 25C

Deer are 3% of the faunal assemblage in Offering D1 (Table 4.1). With a NISP of 53, MNE of 45, and MNI of 3 (Table 5.1). While Front A is dominated by phalanges (NISP=32), the element distribution in Offering D1 includes elements found throughout the deer skeleton. Most elements in Offering D1 are meat bearing bones such as vertebrae (NISP=6), ribs (NISP=7), and upper hind legs (NISP=9). Offering D1 has an MNI of 3. Age ranges of the deer elements vary between 2-29 months. At least one individual was less than five months old. Since most elements ranged from 20-29 months old, at least one individual was likely an adult.

Evidence of butchery marks (NISP=6) in Offering D1 is second-highest, following Front A's assemblage (NISP=24). Five of the butchered elements in this offering are meat bearing bones, the outlier being a cranial element with transverse cut marks underneath the occipital condyles, indicating decapitation (Figure 5.7). On the frontal bone, the antlers were removed, and a large crude hole was made by the frontal margin. This hole is approximately 48 x 41 cm (Hsu et al. 2016).

Figure 5.7. Front D Offering D1 Caudal aspect of deer occipital with cuts directly underneath occipital condyles marked by arrows. Photo by Esther Aguayo.

In Figure 5.8, a thoracic vertebra has multiple fine transverse cuts along the bottom of the spinous process. These cuts are notable as they indicate the separation of the meat along the edge of the spine that is typical of butchering larger mammals and is still practiced in modern times. The left ilium shaft (of the pelvis) has several long and deep cuts posterior to the auricular surface (Figure 5.9). The cuts are in a similar location to the butchered pelvis in Front C (Figure 5.5), its deep grooves potentially indicating difficulty removing the meat.

Notably, a butchered femur is dominated by long sagittal cuts on the proximal surface of the bone (Figure 5.10). The cuts are grouped likely for the same purpose; the marks continue down into the patellar surface of the femur. These cuts were intended for the removal of meat from the leg (Hsu et al. 2016). In Figure 5.11, a distal tibia has a deep, transverse cut on the medial malleolus. This cut was likely intended for the disarticulation of the tibia from the carpal bones.

Figure 5.8. Front D Offering D1: Thoracic vertebra of deer with transverse cuts on spinous process marked by arrows. Photo by Esther Aguayo.

Figure 5.9. Front D Offering D1: Deer Pelvis with deep cut marks on the ilium shaft. Photo by Esther Aguayo.

Figure 5.10. Front D Offering D1: Deer Femur with sagittal cuts on the distal end of bone and patellar surface. Photo by Esther Aguayo.

Figure 5.11. Front D Offering D1: Deer tibia with transverse cuts on medial malleolus. Photo by Esther Aguayo.

<u>Discussion of Results</u>

Element Distribution

The two locations with highest concentration of deer are in Front A and Offering D1, specifically originating from the two offering deposits (Figure 5.13). Structure 51-NE, the location of Offering A1, has the largest assemblage of deer specimens (NISP=83) and most individuals present (MNI=4). Most of the elements of this structure are limb elements, specifically phalanges. 36% of the elements in Structure 51-NE are comprised of phalanges while and 94% belonging to the extremities.

Metapodials are the second largest group of elements at Structure 51-NE (NISP=13), suggesting they were used to fashion bone tools. Additionally, the metatarsal (NISP=3), the astragalus (NISP=8), calcaneus (NISP=5), and smaller tarsal bones (NISP=7) shows that the bottom half of the deer were coveted. Figure 5.12 shows an articulated metatarsal and tarsal bone indicating deer legs were brought to this site as complete limbs.

Figure 5.12. Front A Structure 51-NE: Articulated deer metatarsal, astragalus, Cubonavicular, and smaller tarsal bones. Photo by Esther Aguayo.

Offering D1 has the second largest group concentration of deer elements with a NISP of 53 and an MNI of 4. The element distribution of this site displays a bias towards meat bearing elements (NISP=35); most elements in the skeleton are present in Offering

D1 (Table 5.2). Moreover, the cranial element in Offering D1 is unique, as the most intact deer cranium found at Plaza of the Columns and has explicit surface modification such as removal of the antlers, a hole cut into the surface, and decapitation.

Deer represent only about 3% of the faunal assemblage within both Front B and Front C, but both fronts convey a bias for leg elements (Figure 5.13). In Front B, 72% of the deer elements (NISP=13) are on the front and hind legs of the deer (Figure 5.13). In Front C, 79% of the deer assemblage is comprised of leg bones (NISP=26) (Figure 5.13). As the Western Limit covers the most area, it also has the most abundant deer assemblage (NISP=21) in Front C (Table 5.2). Excluding Offering D1, Plaza 50 has the biggest deer assemblage in Front D with a NISP of 17. Following the trend of Front B and C, 53% of the deer elements from Plaza 50 are leg bones (NISP=9) (Figure 5.13). As a whole, Front D has a more even distribution of elements throughout the skeleton with cranial (NISP=8), axial elements (NISP=22), front limbs (NISP=10), hind limbs (NISP=31), and phalanges (NISP=8) (Figure 5.13).

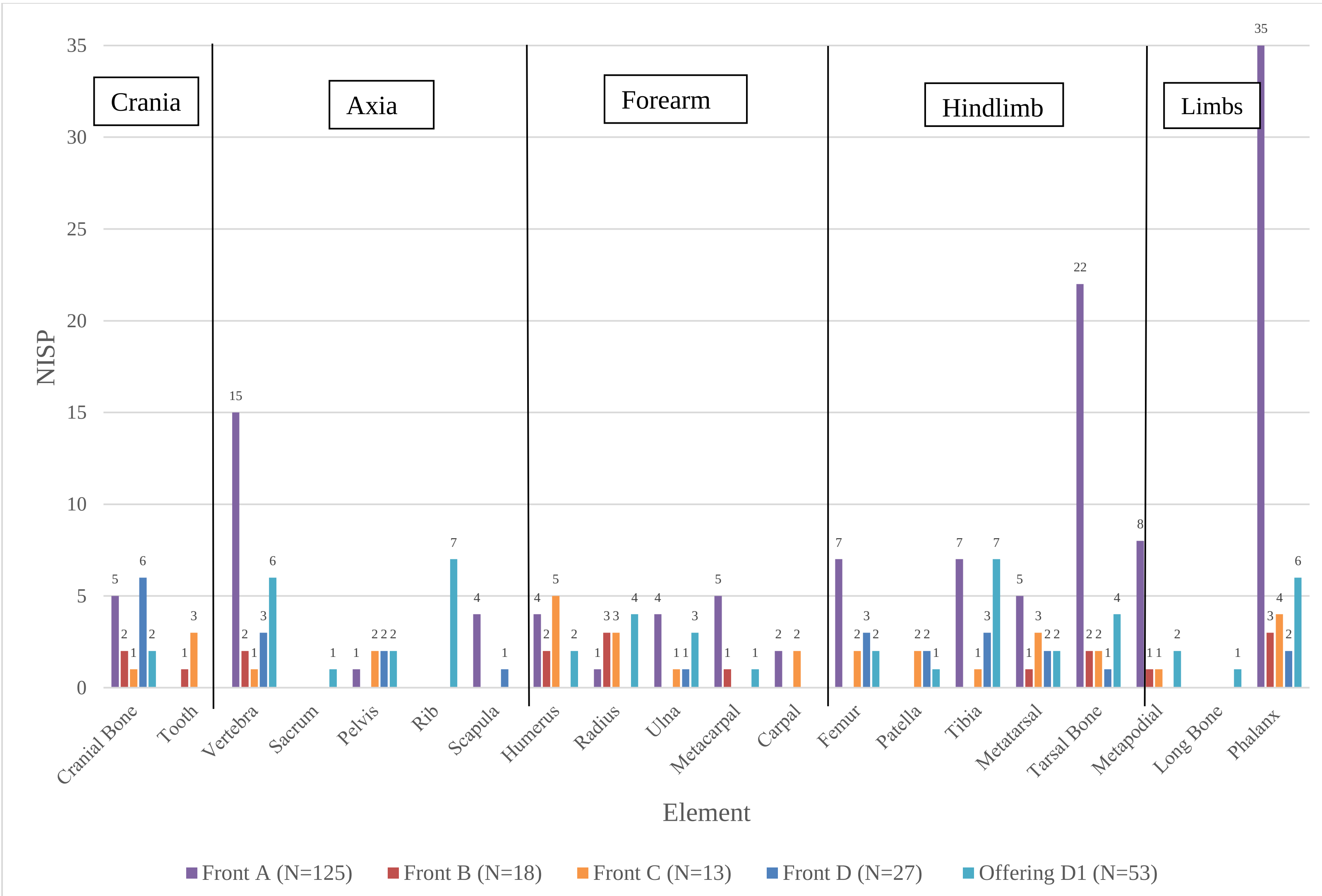

Figure 5.13. Element representation throughout Deer Skeleton at Plaza of the Columns Complex

Surface Modification

Figure 5.14 shows that Front A has the largest assemblage of deer elements with cutmarks (NISP=24, 20%), but the element distribution favors the bottom portion of the leg such as the metapodials, carpal bones, and phalanges. Elements with cuts from Offering D1 are represented by meat bearing elements excluding the cranial bone (Figure 5.14). While most of the cuts (NISP=5) were targeting meat bearing elements for consumption, the removal of the antlers, the hole on the cranium, and decapitation of the deer are an outlier in Offering D1 and Plaza of the Columns Complex.

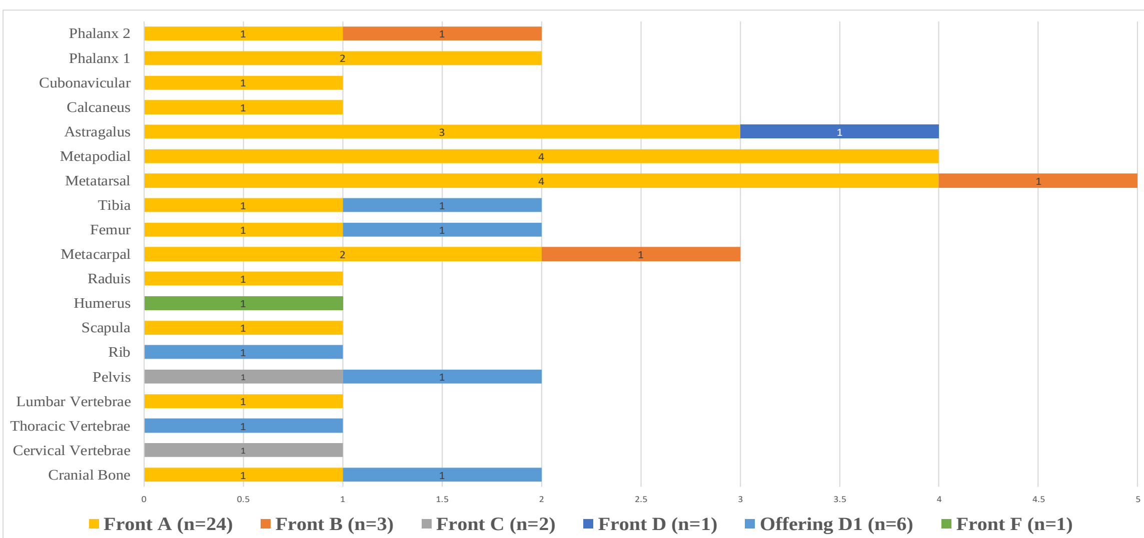

Figure 5.14. Deer Elements with cuts by Front.

Thirty-four percent of the elements with cuts were on coveted meat bearing elements and the cuts found on the vertebrae and the pelvic bones (as seen in Front C and Offering D1) were explicitly for the removal of meat from the bone (Table 5.3). While the elements present for the acquisition of bones used to produce material goods (metapodials and phalanges) are 45% of the cut elements (Table 5.3). Most of these elements needed for toolmaking are present in Front A, more specifically in Structure 51-NE, which could indicate a highly specialized use of deer within this structure.

Table 5.3 Deer Elements with cut marks by Site

	Front A			**Front B**		**Front C**	**Front D**	**Offering D1**	**Plaza Total**
	Str. 51-NE	Str. 51-SE	Str. 6-S	Pyr. 25B	Pyr. 25C	W. Limit	Plaza 50	Pyr. 25C	
Cranial Bone	1							1	2
Cervical Vertebra						1			1
Thoracic Vertebra								1	1
Lumbar Vertebra			1						1
Rib								1	1
Pelvis						1		1	2
Scapula		1							1
Humerus									1
Radius	1								1
Metacarpal		1	1	1					3
Femur	1							1	2
Tibia	1							1	2
Metatarsal	3	1	1		1				6
Metapodial	4								4
Astragalus	3						1		4
Calcaneus	1								1
Cubonavicular	1								1
Phalanx	2	1		1					4
Total	**18**	**4**	**3**	**2**	**1**	**2**	**1**	**6**	**38**

Pigment is another anthropogenic remnant found on deer bones at Plaza of the Columns Complex. (Table 5.4). The two pigmented elements from Offering D1 are both on the meat bearing bones of the deer but with only two elements, but this cannot be considered a definitive pattern. Additionally, red pigment does not overlap with the elements with cut marks on them. This does not imply that it is the same individual. Ascertaining a pattern of use and elements with this category is not possible at this time.

Table 5.4. Pigmented Deer Elements in Plaza of the Columns

	Front D		**Offering D1**
	Structure 44B	Plaza 50	Structure 25C
Cervical Vertebra	0	0	1
Pelvis	1	0	0
Radius	0	0	1
Patella	1	0	0
Metatarsal	0	1	0
Total	**2**	**1**	**2**

Previous works throughout Teotihuacan such as Perez (2005; 2013) have discovered that workshops dedicated to the production of material goods made of bone. Hsu et al. (2016) have identified a diverse assemblage of human and animal worked bone from Plaza of the Columns Complex, suggesting deer bones may have also been processed and used as tools. At Plaza of the Columns Complex there are only four deer specimens that appear to be worked (Table 5.5). Of those worked bones, only one was crafted into an awl.

Table 5.5. Plaza of the Columns Worked Bone Distribution (Hsu et al. 2016; Torres Estevez et al. 2018)

Worked Bone by Species	Front A	Front B	Front C	Front D	Offering D1
Deer (n=4)	3	0	0	0	1
Other Fauna (n=71)	31	8	8	16	8
Non-ID Mammals (n=65)	26	8	8	16	7
PCC Total (n=129)	**84**	**8**	**9**	**19**	**9**

The worked bone assemblage at Plaza of the Columns comprises only 1.92% of the total analyzed fauna. However, 31% of worked bone is categorized as unidentifiable large mammals (Table 5.5). Typically, worked bone is modified to the point that distinguishing features are removed. With the lack of large mammals that can produce straight, toolmaking items it is highly likely that the non-identified large mammal assemblage is either human or white-tailed deer which could imply a larger assemblage of deer bone that cannot be counted.

Age Distribution

The age of the deer at Plaza of the Columns was defined for 40% of the deer elements, with a high confidence of only 47% (Figure 5.15). Deer age was determined for 40% of the deer elements, of which 47% were assigned a high confidence identification of age (Figure 5.15). The white-tailed deer assemblage consistently favored young adults around two years old (Figure 5.15) despite their life expectancy can go up to 14 years. Additionally, most of the elements that are in the adult or possible adult category are phalanges which would support the use of deer as hides.

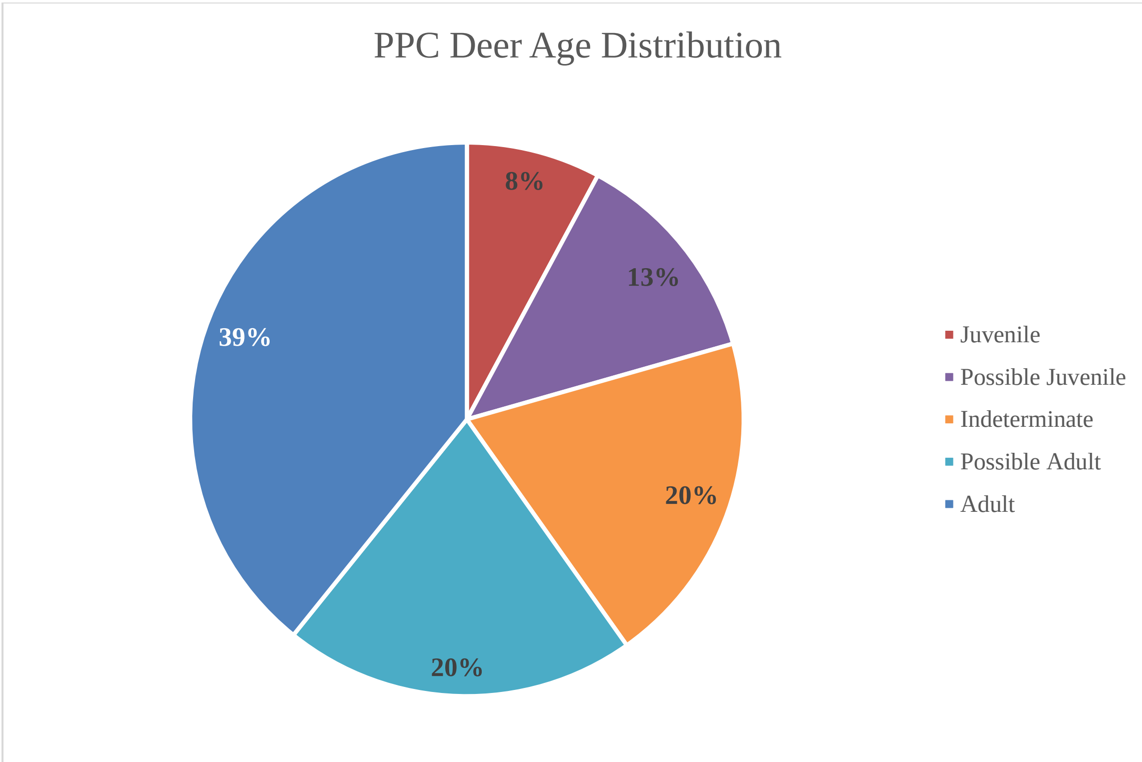

Figure 5.15. Age Distribution of Deer at Plaza of the Columns.

CHAPTER 6 CHAPTER SIX – DISCUSSION & CONCLUSION

The sample size of the deer assemblage at Plaza of the Columns was the principal limitation of this study. White-tailed deer comprise only 4% of the total faunal assemblage, which is a smaller figure in comparison to the 11% of deer found throughout the site (Sugiyama et al. 2017). This study was conservative in its inclusion of unidentifiable artiodactyl in deer estimations, but since the first layer is not included in the study, it is highly probable that most of the artiodactyl are white-tailed deer and raises the percentage of deer to 7% (Table 4.1). Despite the small numbers, the specimens recovered and tell a story about their presence at the ancient metropolis.

Hypothesis One

The first hypothesis theorized that deer elements would skew towards meat bearing elements and long bones used for tool making. Metapodials (metacarpals and metatarsals) are the second most abundant element at Plaza of the Columns (NISP=32) behind phalanges (NISP=50) (Table 5.2). As the straightest deer bone available, the high frequency of metapodials and ankle bones suggests that deer bones were acquired for tool making. Specifically, Structure 51-NE of Front A has the highest concentration of metapodials (NISP=13) at Plaza of the Columns (Table 5.2).

The abundance of tool making faunal elements is still a small portion of the osteological assemblage in Front A. Human bone comprised 79% of the bones recovered from Front A and included at least 17 worked human bones (Hsu et al. 2016: 411). In Structure 51-NE, 20% of the osteological material is worked bone; with 31% of the worked bone comprised of unidentified large mammals, it is likely that these elements are deer bone (Hsu et al. 2016: 413). The large deposit of disarticulated human remains along with worked human bone, and the prevalence in deer metapodials has suggested that these remains were refuse of a bone workshop (Sugiyama et al. 2018).

Throughout Plaza of the Columns Complex, several ankle elements (metatarsal and astragalus) have transverse cuts with the intention of removing the tibia from the metatarsal. There are two incentives for disarticulating the ankles: acquisition of meat from the tibia and seeking the metapodial for toolmaking purposes. As discussed previously, the marks in Structure 51-NE of Front a suggest tool making, while the cut mark distribution at Offering D1 suggests that the primary purpose of deer was for consumption, likely in a specific feasting event. The location of the cut marks indicates that specific meat cuts were targeted, such as the cuts along the spinous process of a thoracic vertebra for backstrap and ribs, cuts on the pelvis for hindquarter, and the femur for thigh meat (Figure 5.15).

Finally, the deer from Offering D1 offers the best evidence at Plaza of the Columns for deer consumption. Meat bearing long bones comprise 31% of the deer in Offering D1 (Figure 5.14). The cut marks that are present within this offering are largely on long bones and vertebrae, suggesting that the animal was butchered for meat. Since Offering D1 is a ritual context, it echoes the practices of other Mesoamerican cultures where access to deer was limited to the elites in the urban cities. This feast, which took place at Plaza 50, was likely and exclusive event where only Teotihuacan elite were able to attend and eat the deer presented and the abundant amounts of rabbit (42%) was for the majority of people in attendance (Hsu and Sugiyama 2017).

The most apparent cross-cultural parallel between Teotihuacan is with the Moche and Middle Sicán elite of ancient Peru. Deer were also virtually missing from everyday contexts in Andean sites and were restricted solely to elite feasting events (Matsumoto 2014). Although the symbolic significance may differ, the archaeological evidence at Plaza of the Columns suggests a similar social event was necessary for deer to be consumed. The deer were prepared and butchered specifically to be eaten, supporting Hsu and Sugiyama's study which proposed that a feasting event took place at Offering D1 (2016). While rabbit was still the main course at this event, the lack of deer elements from other contexts, and the location was for special use, imply the rarity of deer as food within Teotihuacan.

Figure 6.1. Front D Offering D1: Deer Cranium (Hsu et al. 2016: Figure 10.27).

The decapitated deer cranium from Offering D1 (Figure 6.1) also poses interesting questions about deer in ritualized events. This deer cranium is the most intact deer skull found at Plaza of the Columns thus far, and its presence in this cache illustrates that majority of the deer was present at the feast in Offering D1. Moreover, both the decapitation and antler removal represent deliberate modifications to the deer for or during this event. In addition, a large orifice was created on the frontal bone, potentially to access the brain or for further modification (Hsu et al. 2016). In the Maya region, Sharpe and Emery also found that deer crania were usually found amongst other ceremonial objects (2015). Since the element distribution of deer in Maya city centers was highly selective, deer crania, teeth, and axial elements were underrepresented throughout the city. Deer skulls were concentrated in highly ceremonial spaces and comingled with other ritual artifacts (Sharpe and Emery 2015).

The stark difference in deer remains between Maya sites and Teotihuacan was the inspiration of this research. With Maya city centers such as Yaxchilan having as much as 69.5% deer representation in their fauna (Sharpe and Emery 2015), the deer assemblage in Teotihuacan is an extreme outlier representing only 3.9% (Sugiyama et al. 2017) of the fauna assemblage. This study found that the ceremonial center of Teotihuacan still maintains a similar element distribution with a preference for specific body parts present in elite centers similar to those seen in Maya city centers. Within those Maya cities, forelimbs and hindlimbs are the most common deer elements found. This pattern indicates the selective acquisition of deer bones by elite residents in the Maya region (Sharpe and Emery 2015). In Plaza of the Columns, there is also a clear bias for deer forelimbs and hindlimbs as they comprise 73% of the deer assemblage (Figure 6.2). The most substantial disparity between the Maya and Teotihuacan limb elements, however, are the phalanges. The preference of the Maya elite for the limb elements is specifically for the acquisition of the best meat cuts (Sharpe and Emery 2015).

Phalanges are nonexistent in Maya deer assemblages while, at Plaza of the Columns, deer phalanges compose 20% of the deer assemblage. In several areas I was able to assess that secondary deer products were contributing to the faunal assemblage. Pelt extraction and tool making were recorded at Structure 51-NE in Front A. The prevalence of phalanges implies abundant quantities of deer pelts were located at

Structure 51-NE. Phalanges are abundant in Structure 51-NE (NISP=30) but is exceptionally concentrated in the Offering A1 context comprising one-third of the phalanges at this structure (NISP=11).

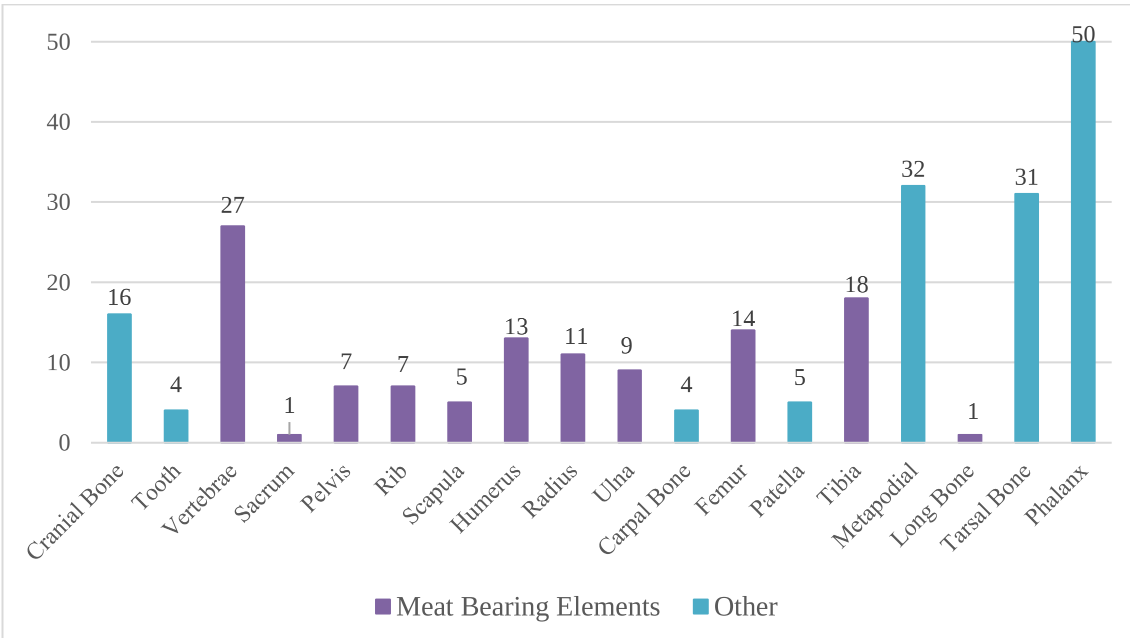

Figure 6.2 Meat Bearing Elements in Plaza of the Columns Complex

The first hypothesis of this study infers that an element bias will favor meat bearing elements that would be abundant if deer were sold as parts in a market system. With the prevalence of phalanges at Plaza of the Columns, this hypothesis is likely valid. Although deer was not seen as a primary source for meat consumption within Plaza of the Columns, the deer present likely was purchased for consumption. The outlier being the assemblage recovered from Structure 51-NE, which implies the acquisition of deer bones for tool making purposes.

Hypothesis Two

The dog (*Canis familiaris*) and the turkey (*Meleagris gallopavo*) are widely considered the only domesticated animals in the region, and some have advocated wild animals had to be a staple source of meat consumption (White et al. 2004). Traditionally, zooarchaeologists have suggested that larger game is preferred and targeted over smaller prey (Broughton 1994), as small animals are swift and are hunted opportunistically with low return rates (Munro 2004). However, the size of smaller animals does make them more viable for capture and management.

The second hypothesis this thesis posited that deer were not a necessary staple protein source at Teotihuacan. It was possibly more reasonable to breed smaller animals that were easier to grow and maintain than to travel outside the city to hunt (Sugiyama et al. 2017). A trend where smaller animals are preferred over larger game is not unheard of in the archaeological record. For example, in the Sabana de Bogota, the guinea pig was the most prevalent source of food and hunted more frequently than the white-tailed deer (Martinez-Polanco 2018). This preference for the guinea pig was likely due to their constant gestation periods and ability to produce multiple offspring at a time and is later supported by its domestication (Martinez-Polanco 2018). Deer reproduce roughly once a year, have a gestation period of 198 days, and rarely give birth to more than one offspring (Martinez-Polanco 2018), making them a less-viable and lower-return food source.

At Teotihuacan, a similar strategy was likely instilled in the acquisition of food. The Mexican cottontail rabbit has a breeding period of about eight months and bears offspring year-round, making rabbits a consistent and reliable food source (Chapman and Ceballos 1990; Vazquez et al. 2007). Additionally, garden hunting could have made the acquisition of rabbit much easier (Sugiyama et al. 2017). In an urban setting, purchasing from a market is likely to be the dominant means of food acquisition, as traditional hunting is not a viable option for many citizens. Thus, a compound specializing in meat production makes sense as a reliable source of commercial food distribution based on the research at Oztoyahualco (Somerville et al. 2017). Rabbit constitutes 37% of faunal remains from all published reports from Teotihuacan, with a high concentration within the ceremonial core (Sugiyama et al. 2017: 77). Therefore, Sugiyama et al. (2017) inferred that the reliance on rabbits might have resulted from the need for a reliable resource for significant public events like the feasting event of Offering D1.

The environmental changes involved in sustaining the large human population of Teotihuacan, such as deforestation, extensive irrigation, and large-scale agriculture likely impacted the availability of deer (Sugiyama et al. 2017). This meant that acquisition was a luxury good restricted to a small number of people acquired for special events, such as offerings and feasts like those seen in Offerings A1 and D1 in Plaza 50. The differences in element distribution between the two offerings show that deer were used in ritual spaces for two distinct purposes, as pelts and tools in Offering A1, and as a special meal for the feast in Offering D1 (Hsu and Sugiyama 2017). The lack of deer elements at Plaza of the Columns does not mean that the white-tailed deer was unimportant to the

Teotihuacanos and instead indicates that the species had a highly specialized role in ceremonial contexts rather than a staple food source.

Future Directions

This study serves as a foundation for a better understanding of deer representation at Plaza of the Columns. However, further studies into deer acquisition can illuminate more about foodways at Teotihuacan. As an urban center, hunting in forests could have been less viable than garden hunting (Sugiyama and Somerville 2017), thus isotope analysis on deer bone could reveal how deer were being acquired. Thornton et al. (2015) conducted a study to demonstrate how long-distance deer trade was possible in the Maya region, using isotope analysis to identify an individual deer's origin based on the bone's strontium level in comparison to oxygen isotopes reflecting water sources in the region. By utilizing strontium, it would be possible to characterize the origins of the deer at Plaza of the Columns and discover if they were hunted locally or acquired from a distant source.

Determining the origin of the deer bones would reveal much about the structures within Plaza of the Columns Complex for the acquisition and selling of deer. Furthermore, the study by Martinez-Polanco (2018) at Sabana de Bogota provides insight to how hunting strategies throughout the occupation of Aguazuque changed and relied heavily on the smaller guinea pig rather than the white-tailed deer (2018). A comparative statistical analysis between the rabbit and deer assemblages at Plaza of the Columns could reveal more about the food systems, especially in Plaza 50. By studying the patterns of animal use specifically at plazas, potentially a pattern of selling and acquiring deer and rabbit meat might be possible to understand how one part of the food system that existed in Teotihuacan.

Conclusion

Teotihuacan was one of the largest and most influential urban centers in Mesoamerica. Its urban environment was innovative and organized a complex food system sustaining a population of 100 thousand individuals. Interestingly, there is a lack of evidence of malnutrition originating from protein deficiency even in the low status residences (Widmer and Storey 2017). Confoundingly, zooarchaeological evidence at the city has discovered that the largest meat source in the Americas, the white-tailed deer, was nearly absent despite its staple status elsewhere in Mesoamerica. Using an assemblage at the ceremonial center of Teotihuacan, this study intended to discover what the deer was used for within this city and the reason for its absence. Based on the results of this study, it can be argued that deer were not a staple food source in Teotihuacan, but instead, had two distinct uses within the ceremonial center: as a raw material resource and as a specialized food source in ceremonial contexts.

Within close proximity to the Avenue of the Dead and the Sun Pyramid, Plaza of the Columns is a unique location with civic-ceremonial structures, pyramids, and plazas at the heart of the city. At this civic-administrative building, deer were primarily restricted to ritual contexts. The most prevalent use of deer was as a non-dietary raw resource, indicated by Offering A1 underneath Plaza 50. The large presence of phalanges in Offering A1 indicates that deer were left as hides at the ceremonial context. Additionally, metapodials were the largest group of elements found throughout the site, which implies that these straight bones were acquired as raw materials for toolmaking. Finally, Offering D1 was a unique context with a significant number of meat bearing bones in comparison to other locations at the complex. Offering D1 has an assemblage of bones found throughout the deer skeleton, which indicates the utilization of a whole deer as a special food in a feasting event. Cut marks found on the vertebrae, pelvis, and upper leg bones indicate that this deer was likely prepared for consumption.

Finally, this study can be expanded upon in future investigations, utilizing broader technical methodologies such as isotope analysis in order to discover more about the life of the deer and how they were acquired. The urban structure of the city likely impacted the need for deer acquisition as a food source. Thus, an analysis of the rabbit remains from Plaza of the Columns could reveal more about the procurement of food and how these animals were used in central Teotihuacan. Ultimately, foodways are a complex process that cannot be explained in one-dimensional terms (Sugiyama and Somerville 2017). However, by reconstructing deer usage in one specific area of Teotihuacan, archaeologists can continue to work towards better understanding different parts of the food systems and complex human-animal relationships that comprised Teotihuacan's foodways.

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