Reconstructing Household Activities at Çatalhöyük:

A Paleoethnobotanical Investigation

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Introduction

A large part of archaeology consists of looking at people's refuse. Refuse can tell us much about people in the past by reflecting the activities that led up to its discard. During the 1997 and 1998 field season at the Neolithic site Çatalhöyük, the team from U.C. Berkeley excavated a large midden in Space 86 of the BACH area. This midden has great potential to illuminate the daily activities of the people of Çatalhöyük because of its extensive deposits and location. In this paleoethnbotanical study I seek to reconstruct these activities through the analysis of the botanical remains in the midden. Hopefully, this analysis will provide information on the activities that created the midden, and therefore shed light on the household activities of Çatalhöyük.

Paleoethnobotany

Since the beginning of human history, our species has relied on plants to fulfil most needs. Plants have had a central role in our economies as food, medicine and building materials. Besides filling basic subsistence needs, they have also been a part of our rituals and folklore. Because plants have been and are such an integral part of human life, they can tell us much about the past. Paleoethnobotany is the study of humankind's use of plants in the past. By examining preserved plants from archaeological sites, whether they be charred, desiccated, or micro fossils like phytoliths, we can learn about a wide range of subjects, from past economies, use of space, and the environment to interpersonal status and ritual activities. Besides helping archaeologists to understand

past plant use, paleoethnobotany can also aid in understanding depositional processes and site formation (Pearsall 2000:2).

Although paleoethnobotany has a history extending back to the nineteenth century, it has not been until recently that it has grown into a mature field of its own. Up until the later part of the 20th century, paleoethnobotany was, for the most part, concerned with the larger macroremains from sites, and limited to listing taxa present at a site and reconstructing past subsistence patterns (Pearsall 2000). With the development of flotation methods, the application of pollen analysis to archaeology and the introduction of phytolith analysis (Pearsall 2000:4), paleothnobotanists are now able to explore a wider range of research questions and issues. Today paleoethnobotany plays an important role in exploring the past. For example, recent studies have used paleoethnobotany to investigate gardens (Fish 1994), stone tool use (Kealhofer et al 1999), domestication (Smith 1997, Piperno et al. 2000), political change (Hastorf 1993) and stratigraphy (Asch and Asch 1988) in the archaeological record. In this project I will join in this paleoethnobotanical endeavor and investigate 15 soil flotation samples from a midden in the Neolithic site of Çatalhöyük, Turkey in order to answer questions about the household activities that took place in the area.

Site History

Around eleven thousand years ago, the Middle East was the site of great cultural change. The new cultural period that arose from these changes is known as the Neolithic. Sometimes viewed as a revolution and at other times as a gradual change, the Neolithic period is defined by the development of new technologies and lifestyles. During the

Neolithic, groups moved from a nomadic to a more sedentary lifestyle. They began to develop agriculture and animal husbandry. With a settled lifestyle and these new technologies, people also developed more complex social and ritual structures (Shaw and Jameson 1999). At Anatolian Neolithic sites such as Çayönu, Asiklihöyük and Nevali Çori, there is evidence for stratified society and the division of space into domestic and ritual. During the Neolithic the production of pottery began and there was a rise in art production in the forms of statues, figurines and wall paintings. The Middle and Near Eastern Neolithic period started in the Levant and then spread into Anatolia and eventually into Europe through a series of independent inventions, migration and the diffusion of ideas. Anatolia contains a variety of Neolithic sites with exhibit close connections and at the same time a great deal of variation. Çatalhöyük, located in the Konya plain, is one of the largest and most well known of the Anatolian Neolithic sites (See Figure 1 for Catalhöyük's placement in Anatolia).

Çatalhöyük means "fork mound" in Turkish. It was so named for the river that until recently ran down the center of the site, splitting it into two mounds. Around nine thousand years ago, the eastern of these two tells were inhabited by a Neolithic society with the new technologies of agriculture and animal husbandry (See Figure 2). These people lived in closely packed mud brick buildings, which were entered via ladders in the roofs (Tringham 1998:3). The mound itself is formed by layer upon layer of these buildings. This extended and long-lived settlement with over 1000 years of occupation, from 6800 to 5700 BC, relied upon a mixture of agriculture, animal husbandry, fishing and the exploitation of the surrounding wild marshes and grasslands for food. From what remains of the wall paintings and relief sculptures at the site, it seems the people of

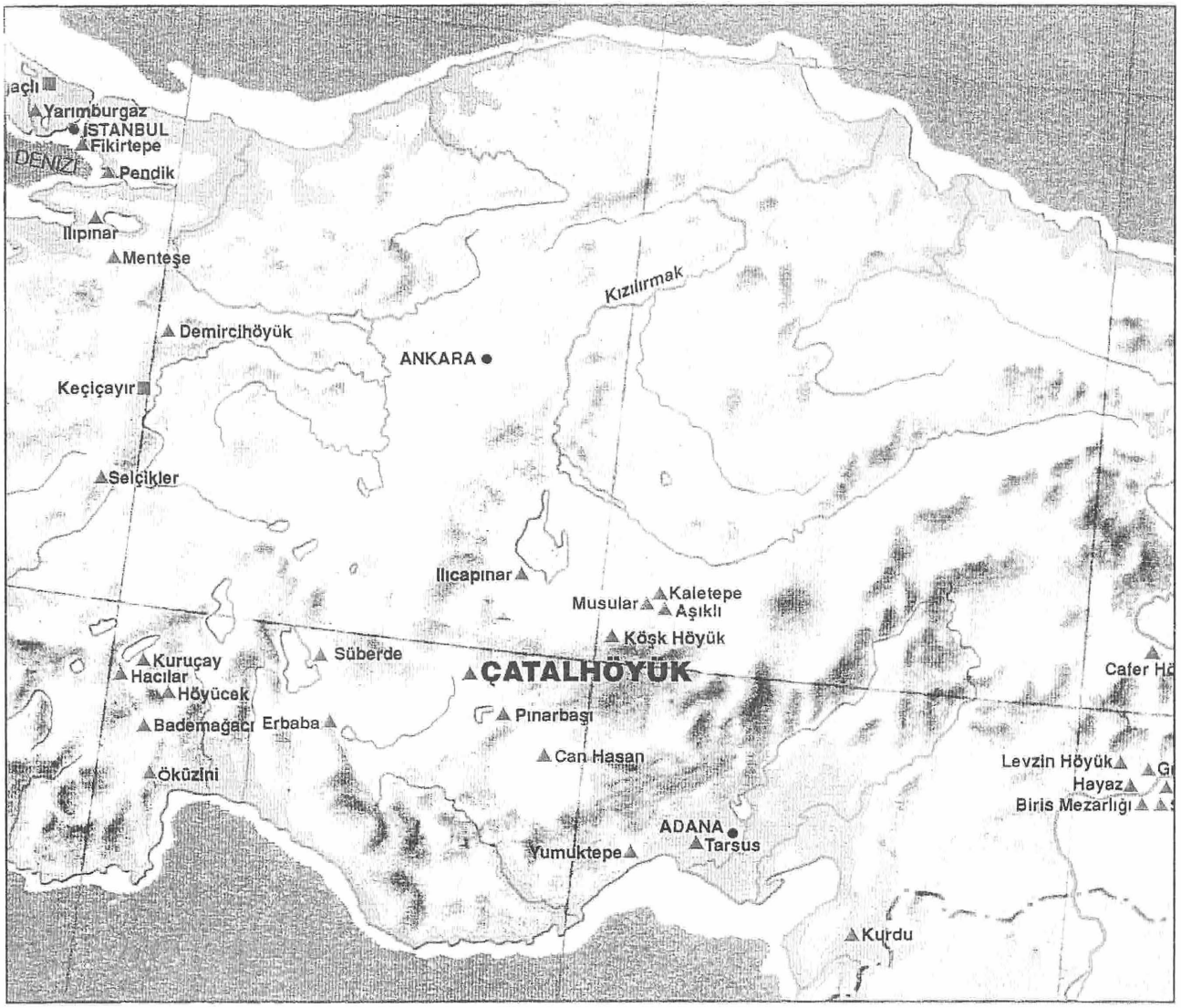


Figure 1: Map of Anatolia showing location of Catalhöyük

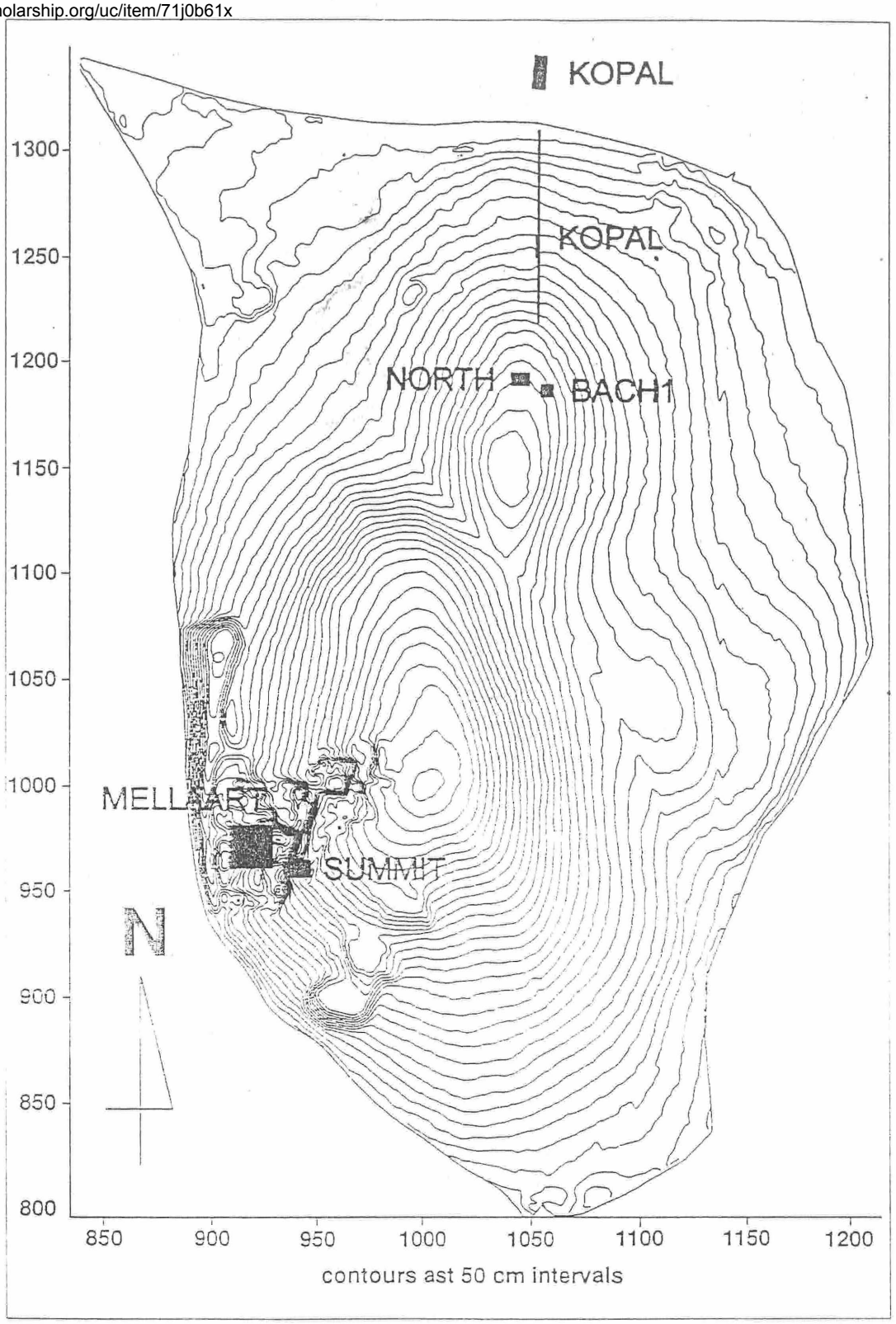


Figure 2: Contour map showing the areas under excavation on the East mound (Stevanovic and Tringham 1998).

Çatalhöyük had a complex ritual and symbolic tradition centered on female figures and bulls. Overall, the archaeological record at Çatalhöyük reveals a complex Neolithic society that presents a wide range of archaeological questions for study, including early sedentary, domestication and symbolic behavior (Hodder 1996, 1998).

Çatalhöyük was first excavated by James Mellaart from 1961 to 1965. Mellaart took a large-scale approach to Çatalhöyük, focusing on uncovering the extent and content of the occupation on the mound (Hodder 1996). His excavation revealed a large area of mud brick buildings in the southern part of the east mound. Some of these buildings were interpreted as shrines on account of their elaborate wall paintings and relief sculpture (Mellaart 1963:42). Other buildings with plaster ovens and storage bins were designated dwellings. A wide range of artifacts was recovered from these buildings, from female figurines, pottery and wooden vessels, to jewelry, worked obsidian and bone (Mellaart 1963). With Mellaart's excavations and the evidence for dense and long-lived architecture, Çatalhöyük became known as the world's first city (Shane and Kucuk 1998:43)

During Mellaart's excavations, paleoethnobotanical work was carried out by Hans Helbaek. He called the carbonized plant remains at the site "the largest and best preserved finds of their kind ever recovered from so early periods in the Old World" (Helbaek 1964: 122). His report from 1964, "First Impressions of the Çatal Hüyük Plant Husbandry", focuses on identifying the plant taxa found at the site and reconstructing the Neolithic diet at Çatalhöyük. It was not until the present excavations of Çatalhöyük however that the site's plant remains were used to address other issues such as use of space, ritual activities, crop processing and domestication. Helbaek's study of the

botanical remains at Çatalhöyük is considered unsystematic by today's standards. As was the trend during the 1960's he did not sample from all contexts on the site. Rather he focused on the more exciting remains such as large bins of charred seeds (Helbaek 1994:1-2). However, from his reports we learned that the farmers at Çatalhöyük grew several varieties of wheat, barley and bitter vetch, as well as exploited wild edible resources of Cyperaceae Scirpus, almonds, acorns, hackberries and pistachio (Helbaek 1964:1-2).

After the close of Mellaart's excavations in 1965, Çatalhöyük was left untouched by archaeologists until 1993, when Ian Hodder re-opened the site and commenced a new series of excavations that continue into the present. Christine Hastorf has taken up were Helbaek left off and is over-seeing the botanical analysis of this current project. Because James Mellaart has previously excavated the site and established a large-scale picture of the archaeological remains at Çatalhöyük, this current project is able to take a "more detailed and micro-approach" (Hodder 1998:3). The wide range of new archaeological and scientific techniques developed since the 1960's are being applied at Çatalhöyük to make this microanalysis possible. The main aims of the new excavations are field research, methodology, conservation and restoration, and heritage management (Hodder 1996). Currently four areas are being excavated, the South Area, previously excavated by Mellaart, the North Area, the BACH Area and the Chalcolithic west mound. Research has focused around "the paleoenvironmental and paleoeconomic reconstruction, the early development of the site, relationships with other sites, the degree of centralization and specialization of production, [and] the degree of social differentiation and its relationship with elaborate symbolic behavior" (Hodder 1996:2-3). There is also a strong emphasis on

recording during the excavation in order to better understand the excavation process. Daily journals are kept by the archaeologists, as well as video interviews, and there are a series of priority tours during each field season that allows the specialists and excavators to exchange thoughts and information during the excavation process. This series of new excavations and the discovery of new Neolithic sites in Anatolia since the 1960s have led to re-interpretations of the site. While it is no longer considered the world's first city, Çatalhöyük remains an important site for the understanding of the Neolithic because of its connections to other sites in Anatolia and because of its high level of complexity and size (Hodder 1996:3-4).

Berkeley Archaeology at Çatalhöyük (BACH) is one of the several groups conducting their own projects as part of the larger undertaking by Ian Hodder and Cambridge University (See Figure 3). Since 1997, Ruth Tringham, the project director of BACH, has conducted the excavation of Building 3, situated at the top of the east mound. She too has chosen a micro-scale approach to the archaeological record at Çatalhöyük. Unlike Mellaart's massive excavation of hundreds of buildings, the BACH excavation has focused on the life history of one building, Building 3. By linking Building 3 with other buildings in the North area, Tringham wishes "to consider the questions of life-histories of houses in a "neighborhood", the question of continuity and social formation of the East Mound..." (Tringham1997: 1).

Building 3 is an ideal space in which to address these questions because of its especially well-preserved architecture and artifacts. Also, as part of the later phases of occupation at Çatalhöyük, it is situated on the top of the east mound. This allows it to be compared to the contemporary buildings in the North area as well as the earlier buildings

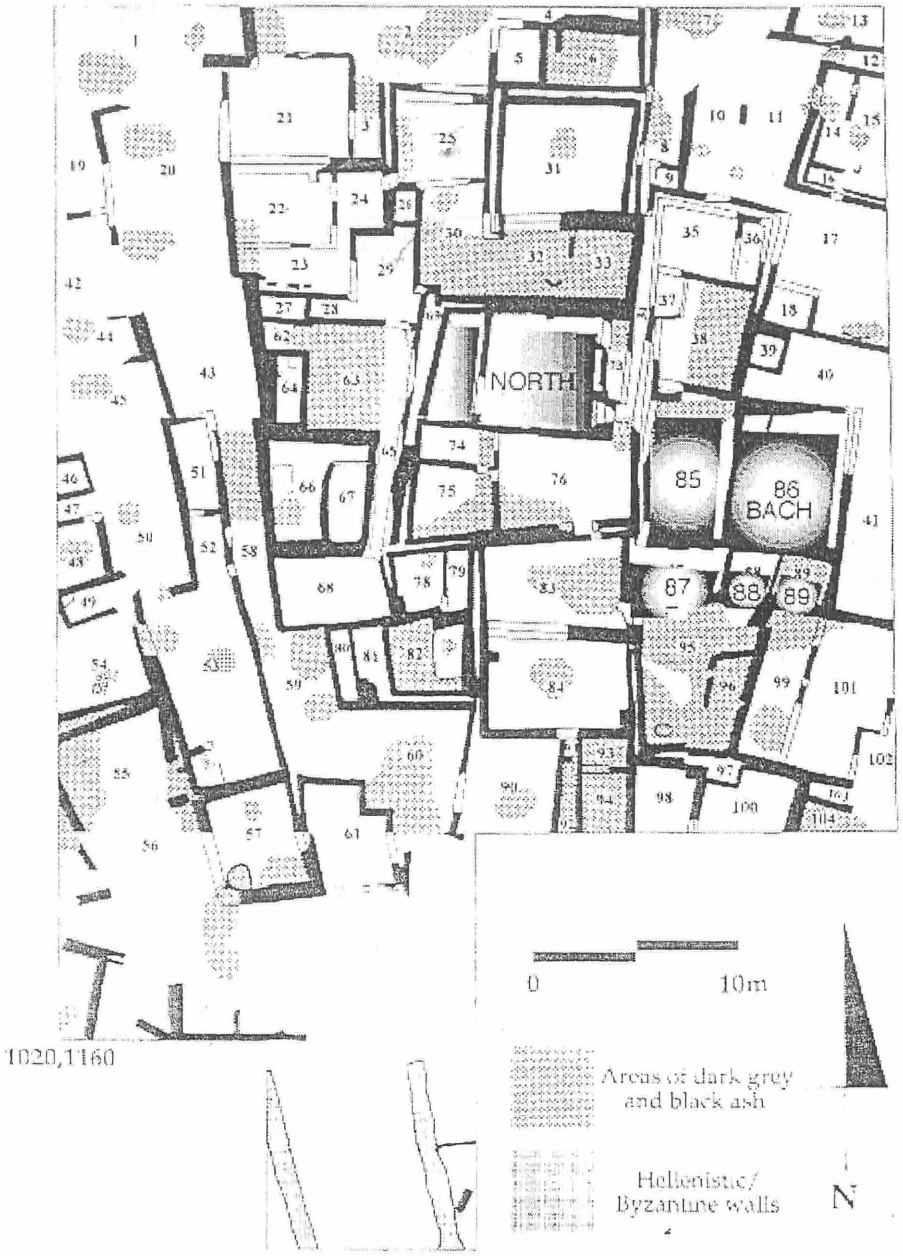
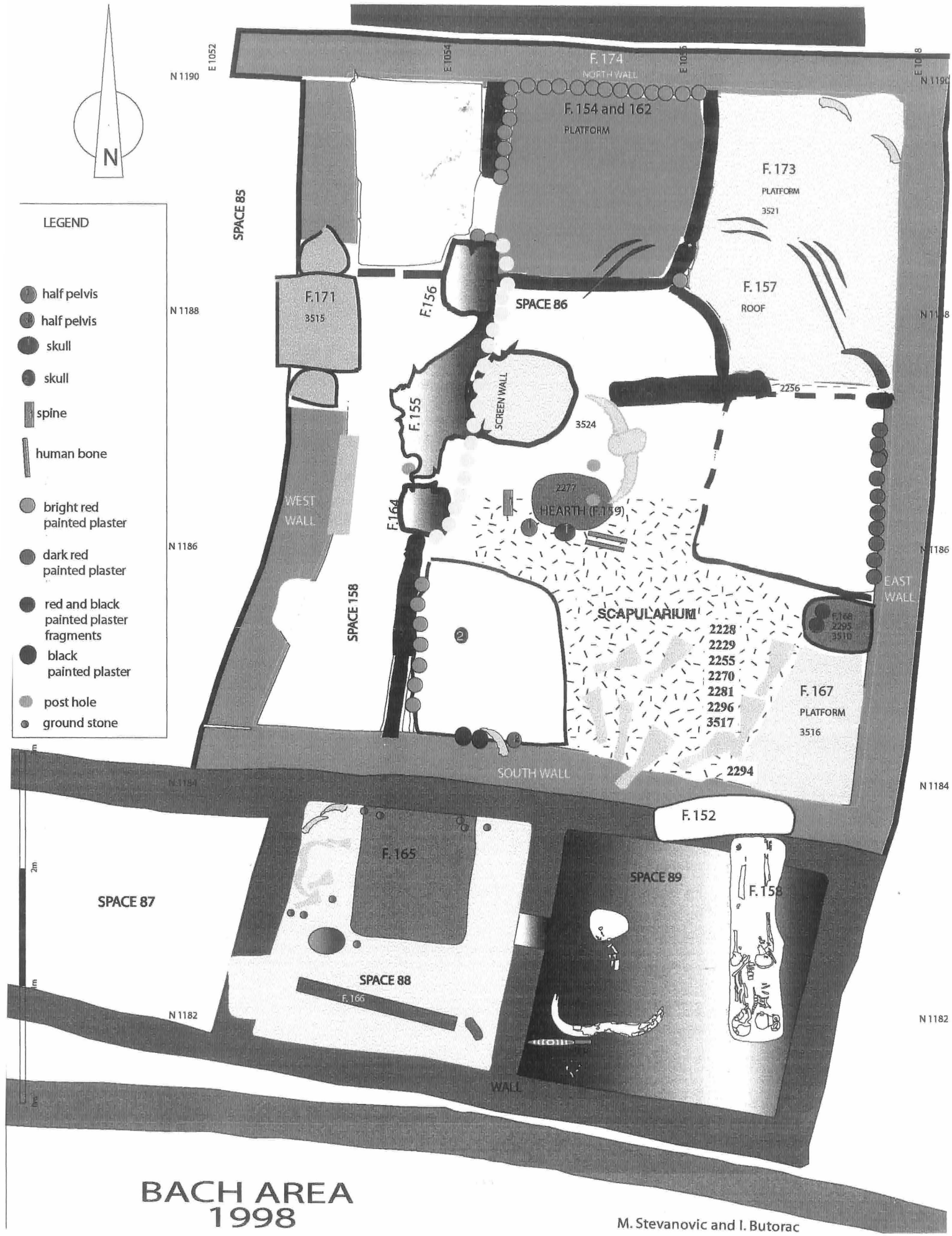


Figure 3: Map of surface scraping of East mound, showing the location of the BACH excavations, space 86, 87, 88 and 89 (Stevanovic and Tringham 1998).

in the South area. Building 3 covers an area of 11 x 7 meters and consists of Space 86, a large room, and Spaces 87, 88 and 89, three small "cells" along the southern wall of Space 86 (Stevanovic and Tringham 1998) (See Figure 4). Space 86 is composed of four mud brick walls, covered with many thin layers of white plaster. Plastered platforms line the walls of the space. To date three individual burials and one multiple burial have been found under these platforms. The floors have been carefully maintained with repeated plastering and are exceptionally clean. While no ovens have been found in the building, there are a series of hearths in the center of the room. Bukrania, plastered cattle skulls, hung on the southern wall. At some point in the building's history, the western part of the space was divided off from the rest of the building with a wall covered in red plaster. Artifacts found in the building include figurines, basketry, ceramics, lithics, bone tools, faunal and floral remains (Stevanovic and Tringham 1998). Space 86 evidently has a long history including complex symbolic behavior, economic activities and several re-organizations of its space.

After the building's abandonment, it was filled in through a variety of processes. The first stage of the abandonment was the collapse of its roof. The collapsed roof covered the Northern and central portion of the building.

> "At the same time, the southern part of the abandoned building was transformed into a midden area...the midden [shows] evidence of careful planning and organization in the disposal activities. In addition, the formation of the 'primary midden deposits' seem to have been carried out in a ritualized context...The southern part of building 3, in those parts not filled with midden, is characterized by



BACH AREA
1998

M. Stevanovic and I. Butorac

Figure 4: Schematic map of the BACH area, showing the location of the Scapularium and the units in the midden sequence (Stevanovic 1998)

> rapidly deposited building debris from the walls of this building and may include later debris from other buildings...We are surmising that the midden filled up relatively slowly after the collapse and infilling of the space with constructional debris, and presumably originated in a building in the neighborhood of building 3" (Stevanovic and Tringham 1998:2-4)

It is evident from the description above that the infilling of Building 3 was a complex process made up of a variety of activities and cultural material. The primary deposits, nicknamed the "Scapularium", contained many large animal bones, including 8 cattle scapulae, that had been wrapped in vegetal material, such as reeds or leaves (Stevanovic and Tringham 1998:5). Auroch scapulae were highly significant in Neolithic life and their presence in the midden indicates this was an exceptional place. After this initial deposit, the rest of the midden was slowly filled in with a mixture of materials. Because of these discrete levels, this area is an interesting subject of paleoethnobotanical study. The midden material allows us to look at the remains of household activities and therefore reconstruct these household activities that were taking place in the area.

Methodology

Since the beginning of the new excavations at Çatalhöyük, paleoethnobotany has played an important role in the interpretation of the site by developing a methodology for collecting and processing the site's plant remains (Matthews and Hastorf 2000). The paleoethnobotanical team has overseen blanket sampling at the site. This strategy insures that soil samples are taken "for flotation from all excavation contexts" (Pearsall 2000:66).

Therefore for each unit, one 30-liter bulk sample of sediment is collected. In addition to this, 30-liter scatter samples, samples that are made up of scoops of soil taken from different areas of a unit, are collected from units composed of mixed soil matrices (Hastorf and Near 1997:1, Popper and Hastorf 1988:6). Every sample is then floated. Water flotation is a recovery technique that utilizes "differences in density of organic and inorganic material to achieve separation of organic remains from the soil matrix" (Pearsall 2000:14). At Çatalhöyük the paleoethnobotanical team uses two mechanized flotation machines to do this. The smaller machine is based on the Ankara system design with a 55-gallon drum for a flotation tank (French 1971). The second larger machine is based on the SMAP design (Hastorf and Near 1997:1, Watson 1976). Both use a 0.5mm aperture mesh to recover the heavy residue and a 0.17mm aperture cloth for the light residue (Hastorf and Near 1997:1). The resulting light and heavy residue are then sorted. The heavy residue is first sorted by material type, such as plant, bone, pottery or bead, at the site by a team of local Turkish women. While some light residue samples are examined at the site, the majority of the light fraction and plant material from the heavy fraction are shipped to laboratories in the U.S., England and Turkey to be analyzed at a later date (Near 1998:2).

All of the samples used in this study were sorted at the U.C. Berkeley paleoethnobotany laboratory either by previous U.R.A.P students or myself. In the laboratory, the light fraction is divided into size fractions of >4mm, >2mm, >1mm and >0.5mm to facilitate sorting. One hundred percent of each fraction was sorted when possible. For some of the larger samples the fractions were split to a more manageable size using a riffle box to insure the randomness of the split. Sorting entails pulling out all

charred or mineralized plant remains from the sample (See Appendix 1 for the botanical materials pulled from each sample). After the heavy and light residue has been sorted, the data from both are combined to create a complete picture of the botanical remains in a sample.

In analyzing the samples for this project, I have used several paleothnobotanical procedures in order to best illuminate the botanical remains and allow for comparison across different samples. First, I have chosen to quantify the botanical remains by standardized densities. This is done by adjusting the absolute counts of each material by the volume of the soil floted. All of my comparisons, with the exception of density, are done using these adjusted counts. Standardized densities allow me to include very small remains, such as seeds, into my analysis that would be otherwise lost because of their negligible weight in calculations using weight. Density is calculated by dividing the total weight of the >4mm and >2mm size fractions by the total liters of soil from the sample. In order to make comparisons in density between the different samples, I use the Çatalhöyük paleoethnobotanical team's ranking system (Hastorf et al. 1999). This system was designed to enable the paleoethnobotanists to rank a sample's density in a way that is external and comparable to other samples. Table 1 shows the categories used to rank the densities of the botanical remains at Catalhoyuk.

Low	0.0 to 0.2 grams per liter
Moderate	0.2 to 1 grams per liter
High	1+ grams per liter

Table 1: Density Rankings

Refuse

In studying plant remains it is important to take into account the processes that led to their preservation and the history of their deposition. Plant remains can be moved about and re-deposited several times before they reach their final resting place in the archaeological record. Miksicek defines three types of refuse deposits that relate to plant remains as primary, secondary and tertiary refuse (Miksicek 1987). Primary refuse, in relation to botanical materials, is discarded plant remains deposited at the location of use. Secondary refuse is trash deposited at some other location than its use. Finally, tertiary refuse is trash that has been discarded at some other location than its use, and then again moved for such purposes as to fill in another space (Miksicek 1987:224-226).

This study focuses on a midden in Building 3. From the excavation records it is evident that this midden is not homogenous, but rather made up of several different types of refuse and deposits. The excavators refer to different units in the midden sequence as midden and fill. Midden deposits are "refuse deposit[s] resulting from human activities, generally consisting of soil, food remains such as animal bones and shell, and discarded artifacts" (Thomas 1989:659). Middens are composed of high concentrations of these types of refuse deposits. They are also frequently secondary refuse. Fill, on the other hand, contains a much lower density of refuse material in relation to soil. It often contains tertiary botanical refuse. Keeping these different types of refuse is important to interpreting the household activities and deposition processes that they reflect.

Sampling

The samples for this study were selected using the Harris Matrix for the excavation (Tringham and Stevonovic field notes 1997 and 1998, See Figure 5), to provide a stratigraphic picture of the midden in the southern portion of Building 3. Because the floors in the building were so clean of any sort of remains, I look to the midden to fill this gap and provide information on the range and variability of plants used in and around the household. In this way we can get a glimpse of the daily life of the people who lived around Building 3 at the end of the Neolithic phase of Çatalhöyük. As the post-abandonment deposits in Building 3 are extensive, I chose to focus on the Southeastern corner of the building where there is the highest concentration of midden material and where the Scapularium is located (Stevanovic and Tringham 1998:4). To be representative, I chose a flotation sample to represent each interpretive unit that composed the midden in this corner of the building. (see Figure 3). Because unit 2229, the black midden, is spread over a large area, I decided to sort 6 samples from it in order to determine the homogeneity of the unit. I attempted to choose samples as spatially related as possible, but in some cases the exact location of the samples within their perspective units was not available. Also, some units in the midden sequence are not represented because no flotation sample was collected from them. In total, 12 midden samples and one floor sample from the midden sequence were examined for this project. Also two samples from the collapsed roof in the eastern portion of building 3 are used for comparison, 15 samples in all. It is my hope that the samples selected will give insight into the plant composition of the midden and aid in answering questions about plant use at Çatalhöyük.

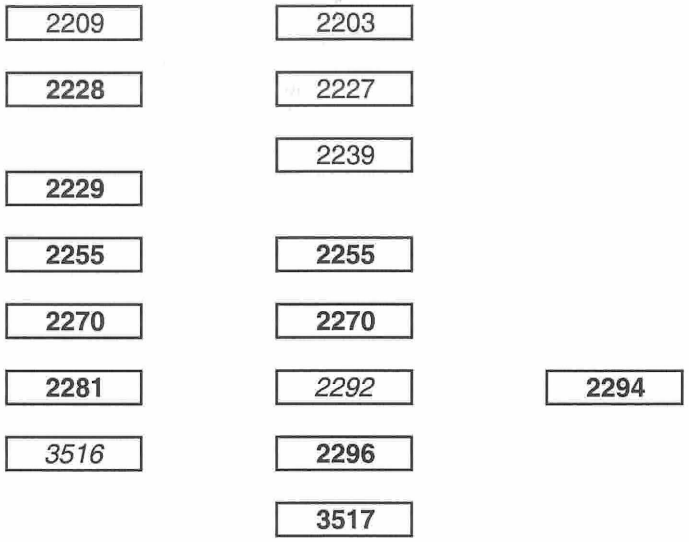


Figure 4: Harris Matrix of midden sequence from Space 86.
Bold font indicates units included in this project
Italicized font indicated units for which no flotation samples were available.

Analysis

In order to answer questions about the plant use at Çatalhöyük, I will approach the botanical remains in the midden sequence in several ways. First I will look at the botanical remains from each sample individually. This will give me an idea of their context and botanical composition. After this I will compare and contrast the samples in order uncover the similarities and differences between them. Specifically I will look at their densities, and the types of botanical remains in the samples, such as edible and non-edible, and wild and domesticated. Finally I will make some comparisons between the samples from the midden sequence and other contexts outside the midden, including a modern one, in order to elucidate the sources of the botanical remains. Hopefully this approach to the midden sequence will uncover patterns in the past plant use and taphonomy that will help reconstruct the household activities of Neolithic Çatalhöyük.

Analysis by Unit

Unit 3517 is the earliest unit in the midden sequence (See Figure 5 for placement n the Harris Matrix). It is part of the primary midden layers, sitting directly on top of the floor. I sorted one sample from this unit (See Figure 6). It has a low density of botanical remains. Its largest component is wood, followed by cereal, than chaff. There is also a small amount of hackberries and a very small amount of wild seeds. There is a range of 6 seed types in the wild seeds and all are weedy types such as *Chenopodaceae Chenopodium* and *Cyperaceae Scirpus*. The plant remains in this sample represent food and most likely fuel or utensil production.

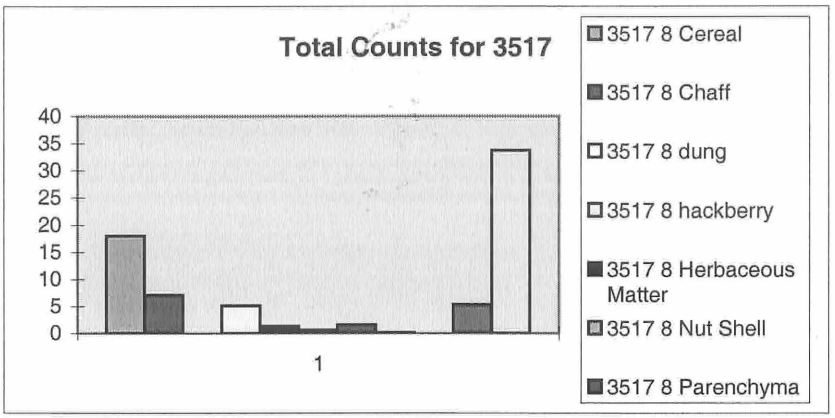


Figure 6: Floated and analyzed botanical remains from Unit 3517 S. 8
Botanical material is standardized by liters of soil.

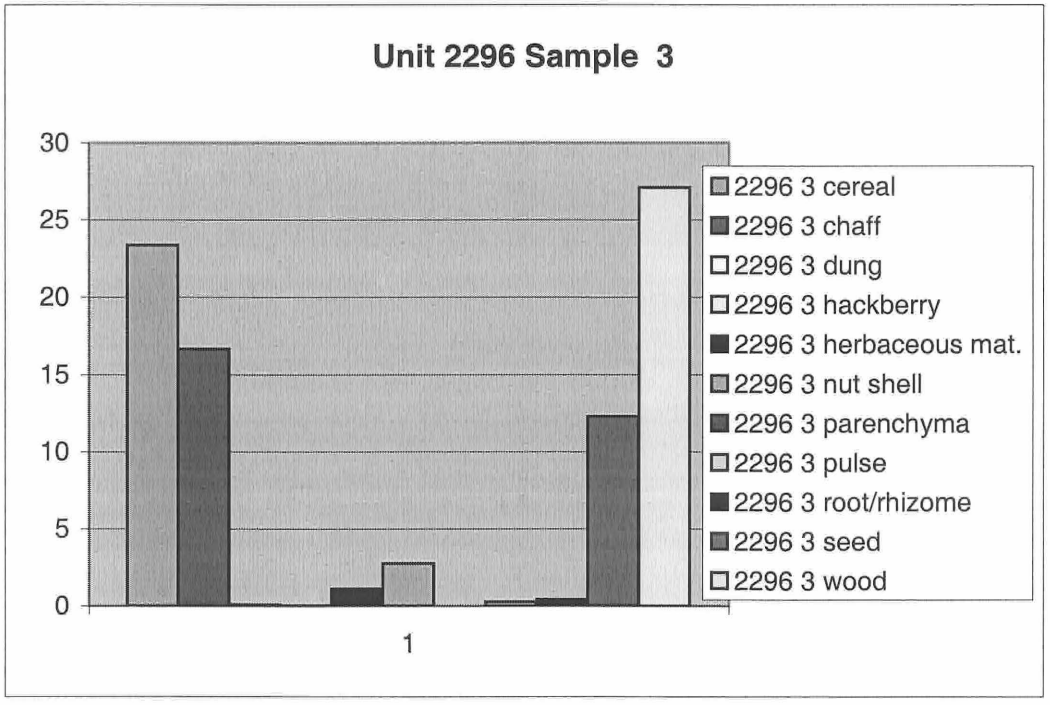


Figure 7: Floated and analyzed botanical remains for Unit 2296 S.3
Botanical remains are stardardized by liters of soil.

Unit 2296 is directly above Unit 3517 and contains the Scapularium (See Figure 7). This unit also has a low density of botanical remains. Its largest component is wood but there is almost as much cereal in the sample. There is also some chaff and a little wild seeds and nutshell fragments. There is a range of 7 unidentified wild seed types, all of which are weedy. Overall, this sample also contains mostly food and fuel remains.

Unit 2294 is part of a floor next to the Scapularium (See Figure 8). It has a low density, which is expected as it was taken from a floor context and the floors at Çatalhöyük are exceptionally clean. Its major component is cereal, followed by wood. There is also some chaff and wild seeds. The wild seeds are mainly Scirpus and Chenopodium. Finally there is a small amount of parenchyma in the sample. The botanical remains from Unit 2294 seem to represent food, such as cereals, and fuel, such as the wood.

Unit 2281 is categorized as bricky midden and building fill by the excavators. It is part of a midden layer "of fragmented and eroded building materials (brick, mortar and plaster)" (Stevanovic and Tringham 1998) above the Scapularium. One sample was sorted from this unit (See Figure 9). Unit 2281 has a low density and is dominated by cereal. Next comes wood and chaff. This unit has a very low level of wild seeds, only 0.5 seed per liters of soil. It also has a small range of seed types present, only 3, Chenopodium, Scirpus and *Cyperaceae Carex species*, which are all weedy types. Overall, this unit has a strong food component with its relatively high cereal count.

Unit 2270 is also part of the same layer of eroded building materials as Unit 2281. Its cultural context is bricky midden and building fill. While unit 2270 has a low density of charred plant remains, a variety of materials are represented (See Figure 10). Cereal

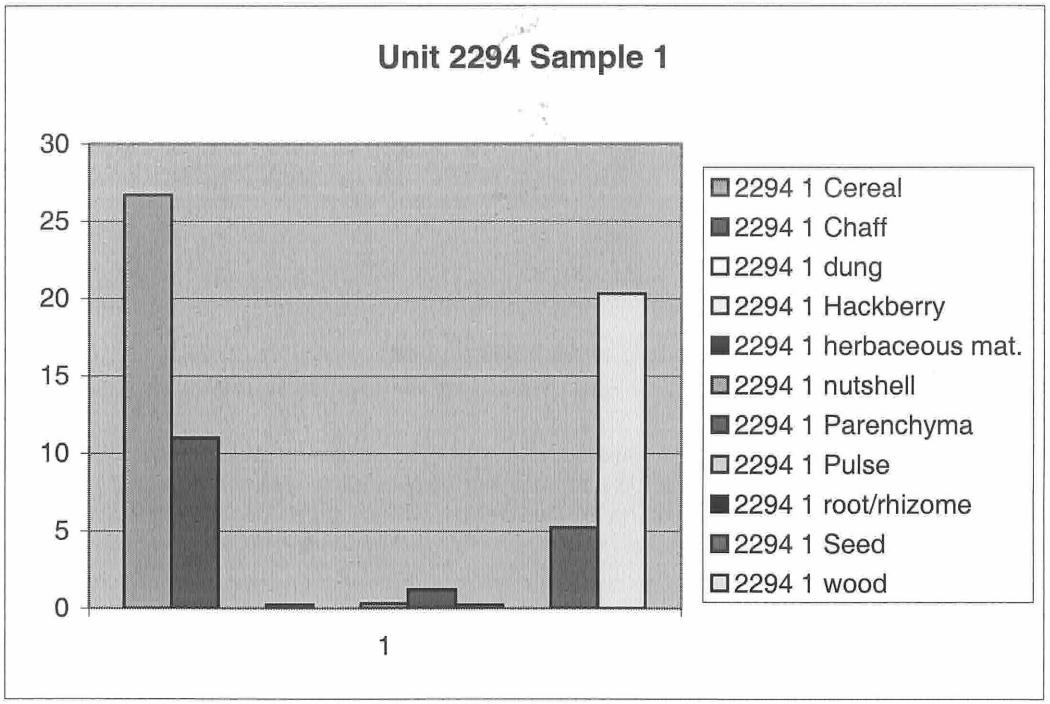


Figure 8: Floated and analyzed botanical remains for Unit 2294 S.1
Botanical material is standardized by liters of soil.

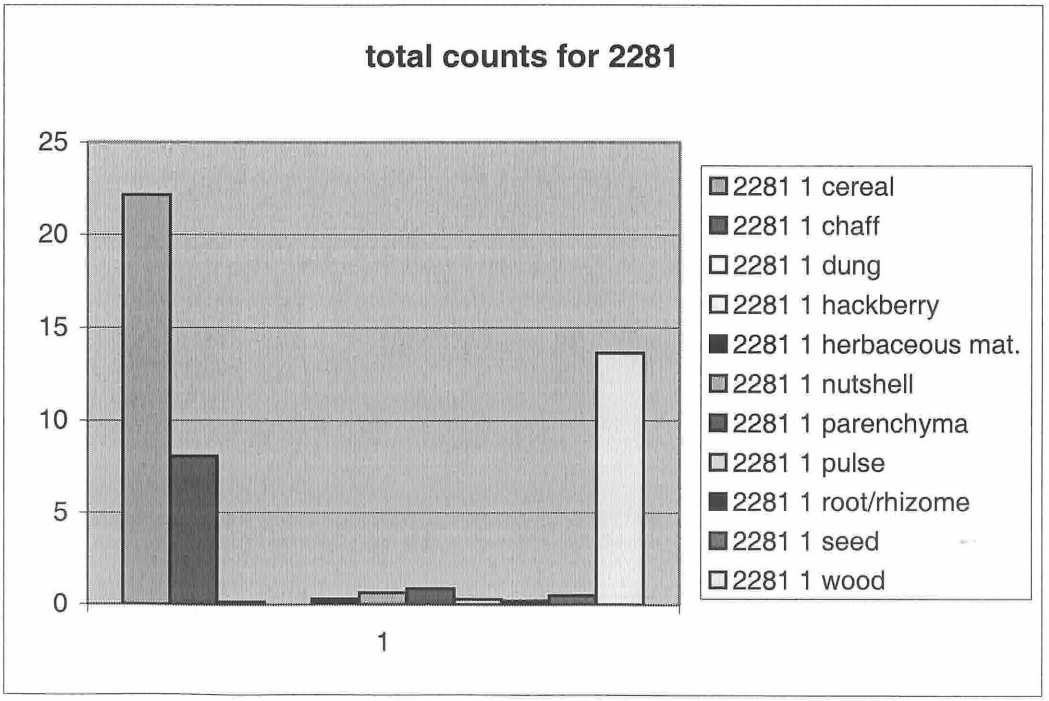


Figure 9: Floated and analyzed botanical remains from Unit 2281 S.1
Botanical material is standardized by liters of soil

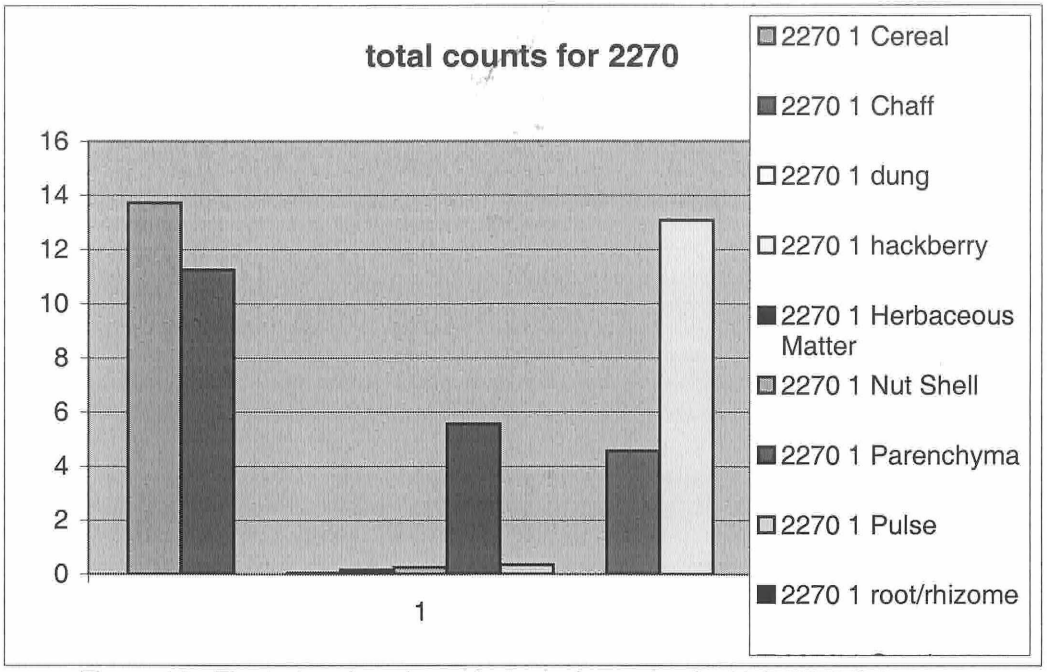


Figure 10: Floated and analyzed botanical remains for Unit 2270 S.1
Botanical material is standardized by liters of soil

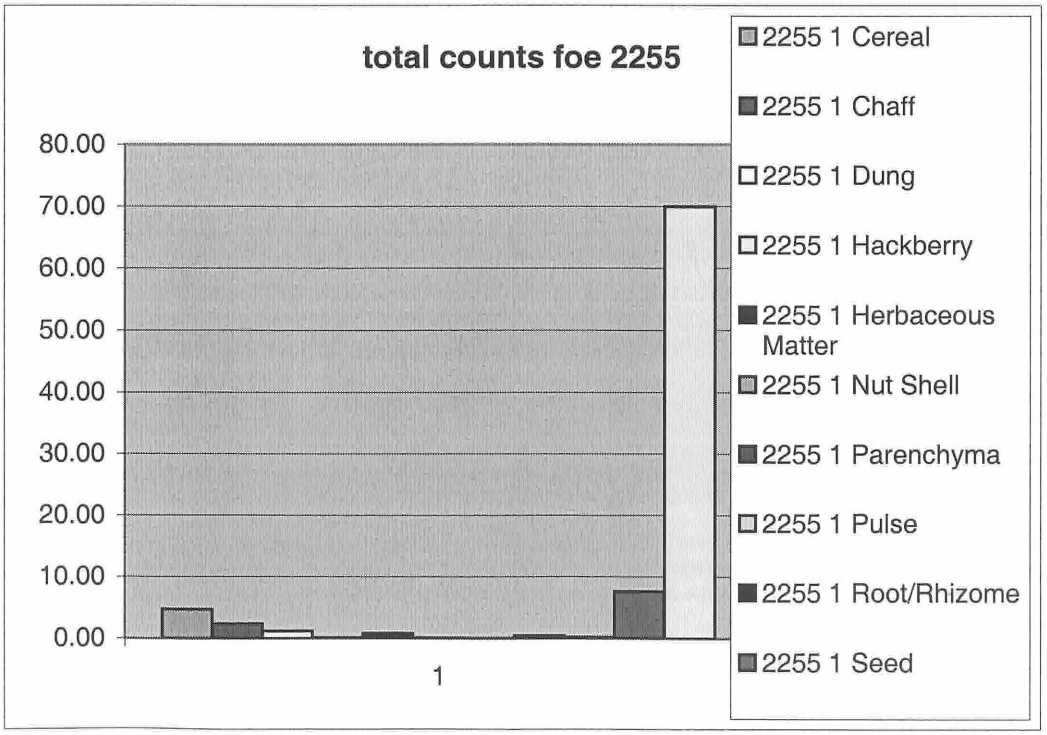


Figure11: Floated and analyzed botanical remains for Unit 2255 S.1
Botanical material is standardized by liters of soil

grains are the highest count, followed by wood, and then chaff. It also contains some parenchyma (storage tissue) and a little wild seeds. The majority of these wild seeds are Scirpus and they all weedy types. Like Unit 2281, Unit 2270 has a strong food component with both the cereal and the parenchyma present.

Unit 2255 is on top of Unit 2270 and also part of the bricky midden and building fill. It has a moderate density and its botanical remains are primarily wood (See Figure 11). While it has a low wild seeds count, there is a range of 9 different seed types, all of them weedy types. Chenopodium and Scirpus dominate these seeds. There is also a little cereal and chaff. The botanical remains from Unit 2255 seems to be mainly from fuel and little else.

Unit 2229 sits above these bricky midden layers. From his unit, called the black midden, I have analyzed 6 samples. To facilitate comparison with other units, I have averaged the botanical remains from these six samples. I was able to do this because of the overall similar densities and botanical contents of the samples. While there was some variation among them, I think there was enough homogeneity in the unit to justify this. The Unit 2229 was visibly rich in charred material to the excavators. It "comprises a 20-30 cm thick layer of dark richly organic soil that includes many thin layers of ash, burned earth, charcoal etc." (Stevanovic and Tringham 1998:4) and is believed to be the "remnants of food, fire making and floor sweeping..." (Stevanovic and Tringham 1998:4). Unit 2229 has both a high density and diversity of charred plant remains (See Figure 12). The 6 flotation samples are dominated by wood, but they also have a very high wild seed count. The rest of the sample is mostly composed of cereal and chaff. They also have

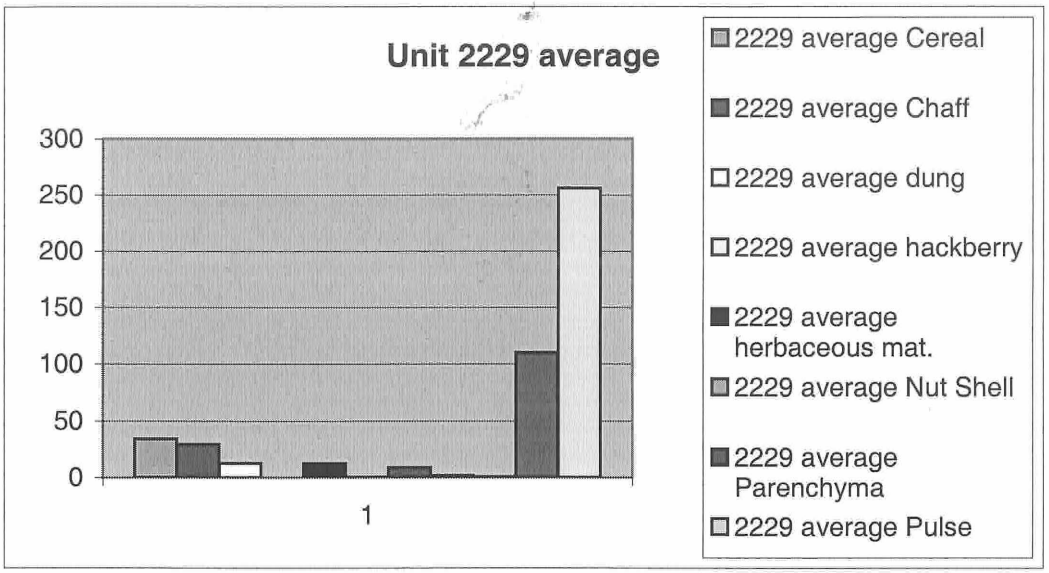


Figure 12: Average of floated and analyzed botanical remains from Unit 2229, S. 1,6,8,9,12 and 14. Botanical material is standarized by liters of soil

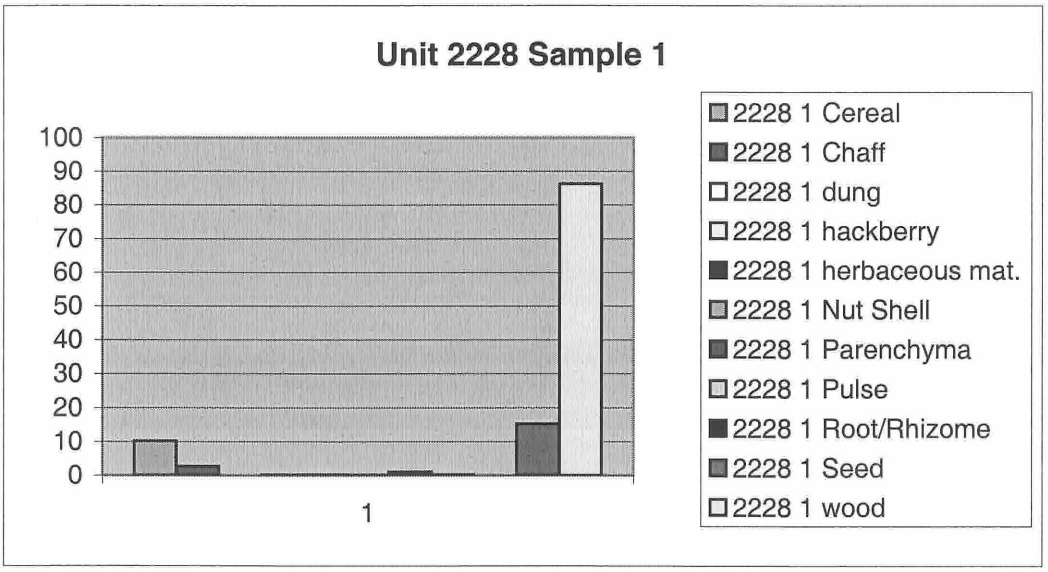


Figure 13: Floated and analyzed botanical remains from Unit 2228 S.1 Botanical material is standardized by liters of soil.

some herbaceous material and dung. The natures of these remains suggest an immense deposit of fuel in the black midden.

Unit 2228 is the latest event in the infilling of space 86 (Stevanovic and Tringham 1998:4) and the uppermost unit in this midden sequence. The excavators have interpreted it to be building debris or yellow midden (Stevanovic and Tringham 1998:4). I sorted one flotation sample from this unit. In terms of its plant remains, this unit has a moderate charred plant density and a low diversity (See Figure 13). The sample is dominated by wood. The second most abundant material is wild seed, followed by cereal, than chaff. . In total, there are 7 identified wild seed types in the sample. Scirpus and some Chenopodium dominate these wild seeds. Unit 2228 is very similar in composition to Unit 2255. Its composition is also like unit 2229, though unit 2229's density is much higher. The botanical remains from Unit 2228 suggest that it has low food content and high amounts of fuel.

Discussion and Comparison of Units

I consider the botanical remains that compose the filling of space 86 in several different ways in order to better understand the activities and processes that the plant remains in these units inform us about. First I have compared the densities of the different samples from the midden sequence.

Densities

Figure 14 shows the densities for the units in the midden sequence. There is a lot of variation in density between the samples. Units 3517, 2296, 2294, 2281 and 2270

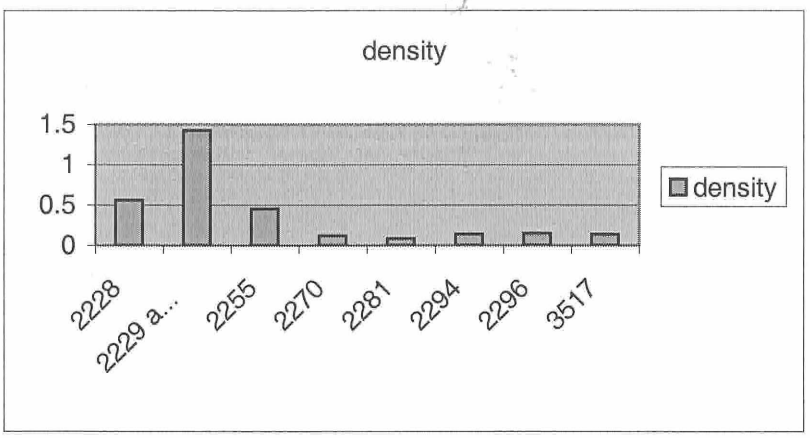


Figure 14: Density of botanical remains from the units in the midden sequence. Densities are standardized by liter of soil

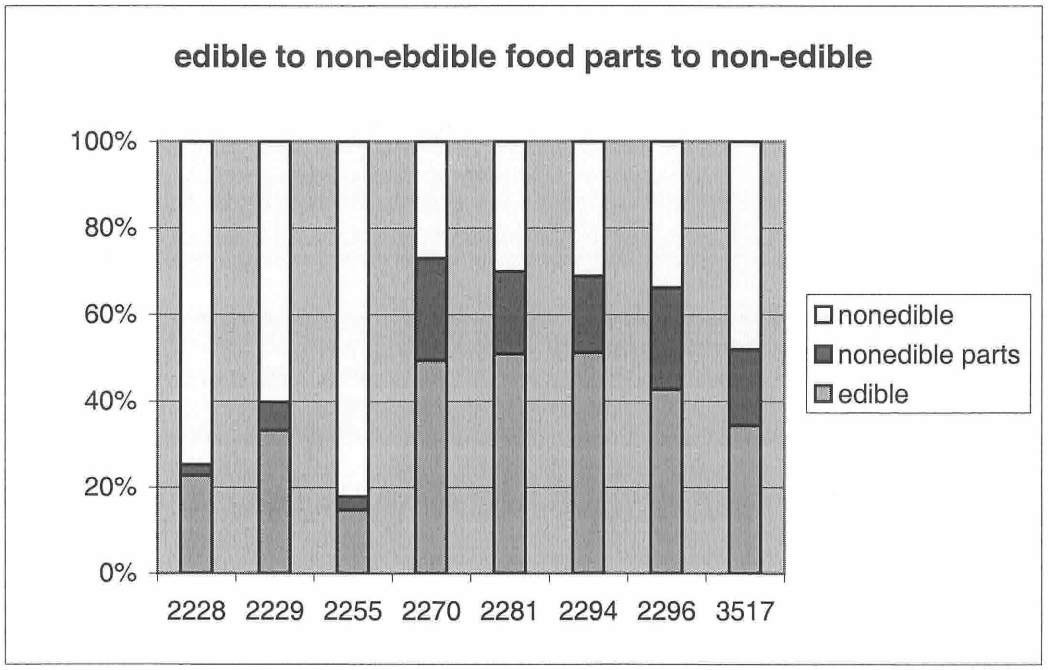


Figure 15: Proportion of edible to no-edible food part to non-edible plant remains in the units from the midden sequence.

have low densities according to the Çatalhöyük ranking system. Units 2255 and 2228 both have moderate densities. Finally, Unit 2229 stands on its own with a high density of plant remains. The variation in densities between the different units suggests that there are differences in their depositional history and the household activities that they represent. A look at the actual categories and types of plant remains in the units will allow me to explore these differences.

To do this, I have first divided the botanical materials into the categories of edible, the actual edible parts of a plant such as cereal or nut meat, non-edible food part, the botanical refuse from food and food processing such as nutshells, and non-edible material, such as wood (see Appendix 2 for a list of botanical materials in each category). This division of the botanical remains allows me to explore the types of activities that contributed to the units in a comparative way. Do the botanical remains represent food? Food refuse? Or maybe fuel? Or all three?

Edible and Non-Edible Analysis

Figure 15 shows the distribution of edible to non-edible food parts to non-edible materials across the units. There are definite differences in their compositions. Units 2228, 2229 and 2255 have similar ratios of these categories. These 3 units are largely composed of non-edible botanical material. The rest of these three units are made up of edible material, with very little non-edible food parts present. The five other units, 2270, 2281, 2294, 2296 and 3517 also fall into a group. They all have a higher percentage of edible and non-edible food parts in them.

This relationship of edible to non-edible food parts to non-edible material has several implications. First, the dominance by non-edible material, wood, herbaceous material and dung, of the Units 2228, 2229 and 2255, suggests that the botanical remains in these units represent one activity. The excavators interpreted the material in 2229 to be domestic debris such as sweepings and hearth rake-out, dumped into space 86 by the nearby building occupants. The large amount of non-edible material supports this, as it probably represents the fuel used in the hearths. Unit 2229 could be the result of repeated dumping of hearth rake-out, which accounts for the high amounts of non-edible botanical material and its high charred material density. Units 2228 and 2255, while they have a similar distribution of edible to non-edible food parts to non-edible material as unit 2229, have a much lower density of charred material. This means that they are not a continuation of the same high intensity dumping that formed unit 2229. Rather, the similarity in the composition of botanical remains could reflect a bleeding of materials from unit 2229 into 2228 and 2255, or the botanical remains could be tertiary deposits that were part of the material used to fill unit 2228 and 2255. If unit 2228 and 2255 are fill, they have a different depositional history than the fills below unit 2229, because of the differences in edible to non-edible food parts to non-edible material composition. These units below unit 2229,units 2270, 2281, 2294, 2296 and 3517, are all labeled with the interpretive category of building fill, with the exception of unit 2294, which is floor below these fills. The similarity of the fills' composition in terms of edible to non-edible food parts to non-edible material indicate that there is at least some similarity in their depositional histories. The relative distributions in each of these categories are more evenly distributed in these lower units, perhaps because they are tertiary deposits, in other

words, the botanical material in them comes from many different activities that has been moved around and mixed up quite a bit before ending up in these particular units. This fits well with the excavators' interpretation of fill and floor for these units.

Crop Processing

It is interesting that across all of these units there is a low amount of non-edible food parts. This category makes up less than 25% of the material in each unit. Non-edible food parts can be interpreted as food processing debris. Several paleoethnobotanists have studied the different types of botanical remains that result from processing free-threshing cereals (Hillman 1984, Jones1983). Through ethnographic research, Hillman and Jones have created a model for the processing of free threshing cereals (1984). Jones lists several stages in this process, including "threshing (to free grain from straw)", "winnowing (to remove light chaff and straw)" and sieving (Jones 1983:44). Each of these stages produces different botanical signatures that can be used for different purposes, such as fuel, fodder and food. As Çatalhöyük was occupied by an agricultural society, it is of interest where and how they processed their cereal. It has been hypothesized that the people of Çatalhöyük began the processing of their cereal off site, perhaps in a winnowing field. High quantities of cereal chaff have been found off site in the Kopal area, located north of the mound, suggesting that the area might have been partly used for plant processing waste (Boyer 1999:6, Hastorf et al.1999: 1). The lack of processing remains in the samples from the midden sequence of building 3 supports this theory as well. If processing were taking place on-site or at least near building 3, one would expect to find higher quantities of chaff in the samples than I have.

Wild Vs. Domesticated

Another useful dichotomy to look at within the botanical remains is wild vs. domestic. The balance between wild and domesticated plants at Çatalhöyük is still being explored. It is believed that there is a shift from the exploitation of wild plants to domesticated ones, demonstrated by the increase in domesticated plant remains and the decrease in wild plant remains from the early to later deposits. The paleoethnobotany team proposes that, with the decrease in everyday use of wild plants, the wild became more important in feasting activities. Caches of wild plant remains have been found on the site and in Building 3 and are believed to represent the remains of these feasts. Figure 16 shows the distribution of domesticated to wild taxa to wood. Even though wood is a wild resource, it has been separated here from the other wild remains so it does not overshadow them. Wood, because it is a harder material, has a higher preservation rate. As can been seen from Figure 16, discounting wood, wild plant species do not make up a large percent of the botanical remains in the midden sequence of space 86. This low level of wild plant remains supports the theory that domesticated plants were very important in this later occupation. Building 3 is in one of the later phases of the occupation of Çatalhöyük and therefore should be dominated by domesticated species. While the majority of the plant remains are domesticated or wood, units 2296 and 3517 do have a significant amount of wild remains. Unit 2296 has a small amount of nutshell, while unit 3517 has some hackberries. These two units comprise the primary layer of the midden, also known as the Scapularum. This area is considered the site of some sort of specialized activity, perhaps an offering, involving depositing bones wrapped in vegetal

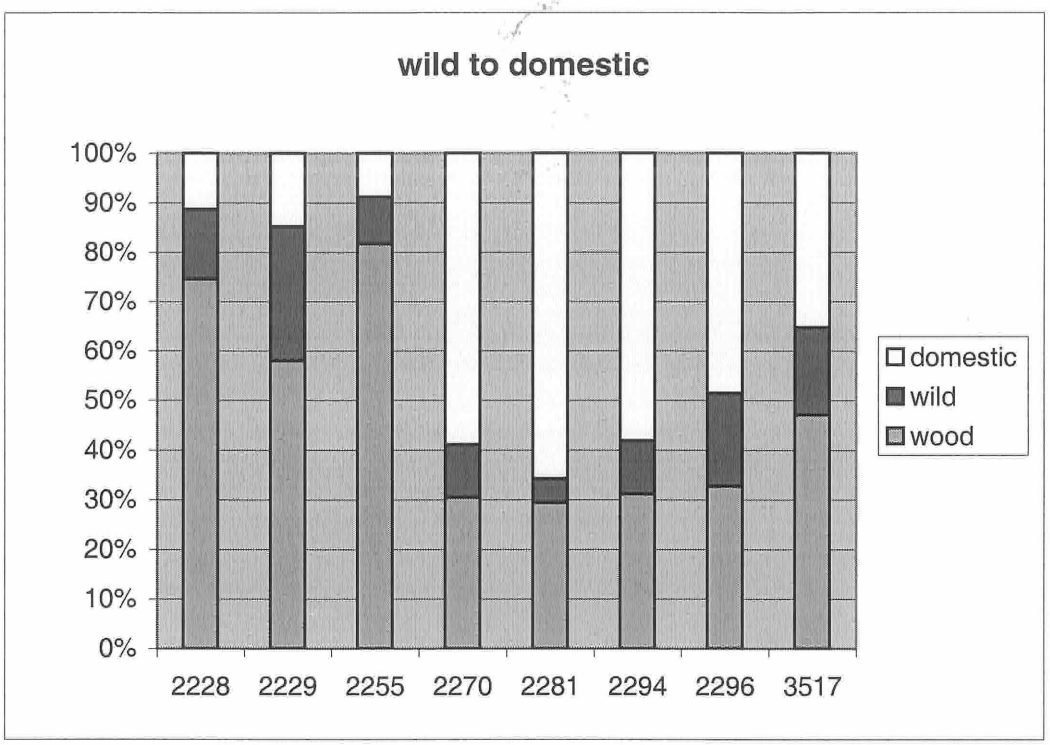


Figure 16: Proportion of wild to domesticated botanical remains in the units of the midden sequence.

material (Stevanovic and Tringham 1998). The wild material unit 2296 and 3517 could have come from this activity as well. Maybe the plants represent the remains of a feast that took place at the deposition of the Scapularium. Wild foods have been associated with feasting activities at the site and here we see this confirmed with the wild taxa in association with ritual acts.

Unit 2229 also has a significant amount of wild remains. On closer inspection, the majority of the wild remains in unit 2229 come from wild seeds. Unit 2229 has more seeds than any of the other samples in the project. Wild seeds can enter a site in any number of different ways. They can be intentionally brought on site for food, they can be the refuse from a plant whose other parts are being put to use, or they can be unintentionally brought on site clinging to a person or animal (Pearsall 1988). In considering the possible source of unit 2229 as hearth rake out, the possibly that these seeds come from animal dung burned for fuel arises.

Ethnographic Study of Dung

Animal dung has been used as a fuel in many places in the past as well as in the present. When large quantities of wood are not available, people often turn to dung as a replacement, especially in aid or treeless regions (Anderson and Ertug-Yaras 1998:99). At times burning dung can be preferable to wood because of certain properties it creates in the fire, such as a high temperature. Archaeological and ethnoarchaeological studies of dung use have been conducted in places like Greece (Charles 1998) Iran (Miller 1984), India (Reddy 1998) and Turkey (Anderson and Ertug Yaras 1998). At Çatalhöyük there

is evidence for dung used as fuel in the North area from micromorphological studies of hearths (Matthews 2000).

In order to determine if the dung was used as fuel and the charred remains dumped in the black midden, during the 2000 field season I made an ethnographic collection of animal dung in the village of Kücükköy. With the help of Hatice, Melut and the Ali family, local Turkish people that live in Kücükköy, I was able to make a collection of dung from cows, sheep and goats that included samples from each season. I collected 34 dung samples on the Konya Plain in all. Kücükköy is a traditional Turkish agricultural village outside of the major city Konya. While it uses modern technology, such as tractors and mechanized plows in the agricultural process, the village people still follow many traditional ways. Many still live in plastered mud brick houses and cook in plaster ovens located in their courtyards. They fuel their ovens with dung cakes. They collect their dung from their cows, sheep and goats throughout the year. Often the dung is processed into dung cakes, flat circles of dung mixed with straw and chaff that are easily stacked and stored. At other times they simply chop up the thick layers of compressed dung on the stable floor. This use of animal dung plays an important role in the Kuçukkoy villagers' lives and perhaps similar uses of dung in the past could be a source of botanical remains at Çatalhöyük.

	Cow	Sheep	Goat
Summer	Sample 6	Sample 20	Sample 23
Autumn	Sample 21		
Winter	Sample 24		
Spring	Sample 19		

Table 2: Source and season of dung samples selected for study

From my collection I selected 6 samples to use for this study (See Table 2) that represent the four seasons and all the animal types. I first compare one sample from each animal across one season, summer. I also looked at the sheep dung through the four seasons. I selected sheep over the other two species for several reasons. First, I was unable to obtain a full collection of goat dung, as only small numbers of goats are kept in Kücükköy and they are often not separated from the sheep. It was more difficult to choose between sheep and cow. Both are part of the archaeological record at Çatalhöyük and played a part in the culture there. Sheep were domesticated by this time and there is now evidence for possible penning of sheep in the South Area (Matthews 2000). Because of this, it would have been easy to collect their dung, possibly in the manner of the Kuçukkoy villagers. Cattle were not yet domesticated by the people of Çatalhöyük, but they do play an important role in their symbolic life and were a source of food and other materials. Cow pats are easy to collect because of their size, but one would have to leave the settlement to collect them. In the end I decided to focus on the sheep dung because it is used regularly in Kuçukkoy, the people of Çatalhöyük had easy on-site access to it, and

finally once I began sorting the samples, I found that the cow dung had very little material in it for comparison.

In order to examine each sample I first broke up it up into crumbly powder. In this way it was possible to find the smaller seeds contained in the matrix of herbaceous material. I then examined the samples under a microscope and pulled out all botanical material in the samples with the exception of herbaceous material. Herbaceous material made up more than 95% of all the samples and therefore it would have been an endless task to remove and count all of it. The materials I did pull from the samples include seeds, cereal, chaff, and unidentifiable material of an organic origin. Because there were differences in the sample sizes, I standardized the sample sizes so that all the counts represent the number of items per 15 grams.

Figure 17 compares the contents of one cow dung sample, one sheep dung sample and one goat dung sample. The cows and goats who produced these samples grazed on grasses during the summer, while the goats both grazed and were fed cereal and beet leaves. As Figure 17 illustrates, the sheep sample has by far the highest density of material. It is largely made up of *Amaranthaceae Amaranthus* seeds with a little Chenopodium, and Rumex. These are all weedy species that the sheep would have found grazing. The goat sample has a small amount of the same seeds, while the cow sample has hardly anything in it at all.

By comparing the sheep dung samples from different seasons it becomes evident that there is variation in the content of the dung from season to season (See Figure 18). This is of course a reflection of their seasonal change in diet. The summer and autumn sheep grazed out in pastures on wild grasses during their growing seasons when the

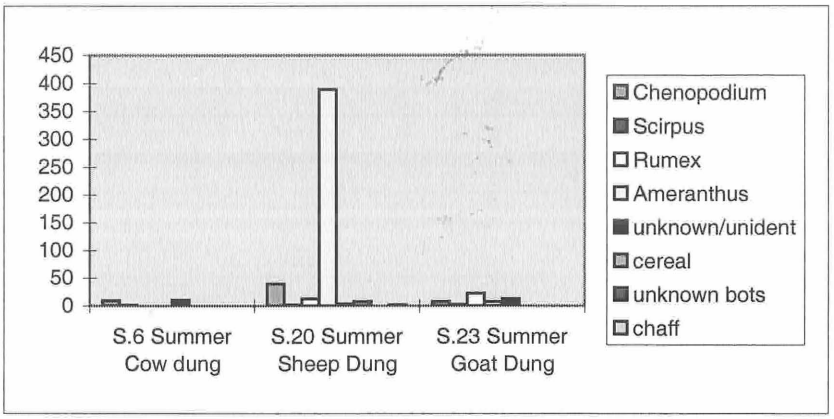


Figure 17: Comparison of summer cow, sheep and goat dung

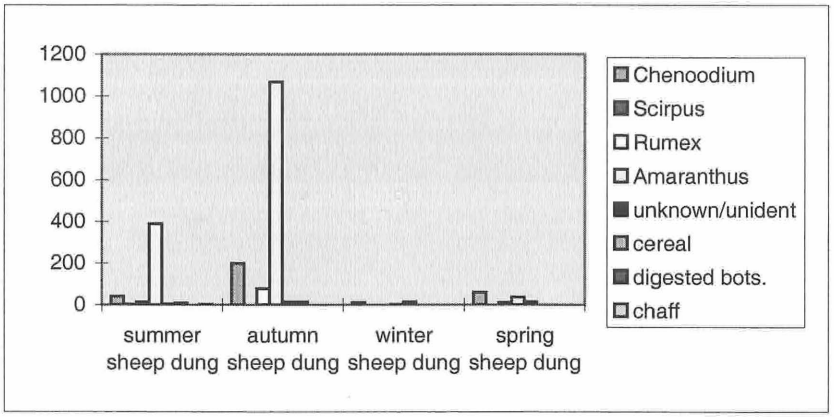


Figure 18: Comparison of sheep dung from the four seasons

grasses are in abundance. This explains the high amounts of seeds such as Amaranthus, Chenopodium and some Rumex in these seasons' samples. The winter sheep dung has very few seeds in it, 25.32 seeds in all, mainly a few Chenopodium and small unknown seeds. The winter sheep were keep in a stable and fed straw, cotton stocks, barley chaff and bought meal, which accounts for the large amount of herbaceous material and lack of seeds in the sample. Like the summer and autumn, the spring sheep also grazed on wild grasses. In comparison to the summer and autumn dung, the spring dung has very few seeds. At first this seems contrary to what one would expect, given the similar diet, but when the growing season is taken into account, the lack of seeds makes more sense. While the sheep grazed on the same types of plants in the summer, autumn and spring, by spring they would have depleted the supply of wild grasses and not enough time would have passed for new growth. By the spring, only nubs of grasses would have been available for grazing. Therefore, the sheep would have been ingesting minimal amounts of seeds. Looking at the four sheep dung samples, there does seem to be a biannual seasonal pattern to their botanical contents. Dung from summer and autumn have high wild grass seed content, while winter and spring sheep dung have very low amounts of wild grass seeds. Because this study only includes one modern dung sample from each season, there is the possibility that the apparent seasonal pattern is only due to variation among the modern samples. Analysis of further modern samples from the different seasons will help confirm whether the apparent pattern holds true.

Evidence for Dung in the Past

After examining the modern dung samples, I now can make several hypotheseses about what to look for in the midden from space 86. If there is charred dung from fuel in the black midden of space 86 the botanical remains could reflect this. Actual pieces of charred dung would of course be one indication. Also herbaceous material and wild seeds could indicate the use of dung for fuel. Identifying what season the dung came from is more difficult. From my analysis of the modern dung samples, it seems that winter and spring dung would not leave a strong profile in the archaeological record, since their main component is herbaceous material, with no other identifying seed patterns. Summer and autumn dung on the other hand could be visible in the archaeological record because of their high seed content. If the black midden had large amounts of wild seeds, along with other evidence for dung, this might indicate that the black layer of the midden was deposited during the summer or autumn.

In order to compare the modern dung samples to unit 2229, the black midden, I have chosen two samples from the six I sorted from unit 2229 to represent the unit as a whole. I chose to use sample 12 and 14 for two reasons. First, these samples are the only samples from the unit that I have done detailed taxonomic analysis on. This analysis allows me to compare the seed taxa present in the samples as well as just their total seed count. Second, sample 12 and 14 were taken each as a bulk sample, representing one location in the unit and therefore hopefully each represent one event. Finally I chose sample 12 and 14 because they were one of the only samples taken from unit 2229 with exact provenience. In comparing the black midden to the modern dung samples it must be kept in mind that the samples are not directly comparable because they are from

different sources. But because the archaeological samples and dung samples are each standardized internally fruitful comparisons can be made between them.

In comparison to the modern sheep dung samples, the black midden has a much higher diversity of seeds types present (See Figure 19). Some of the seed types are present in both the archaeological sample and the modern ones. Both have Chenopodium, Rumex and Scirpus. Amaranthus, the seed family that dominates the modern sheep samples, is not present in the black midden samples, and has not so far been found anywhere else in the archaeological record at Çatalhöyük. It is possible that the Amaranthus were introduced to the area at a later time. Although there is variation between the seed species in the black midden and in the modern sheep dung samples, for the most part, they are composed of weeds, grasses and herbs, plants that grow in grazing areas.

While wild seeds can enter a site in a variety of ways, the high density of these types of seeds in the black midden makes it likely that dung was being used as fuel and the charred remains were dumped into unit 2229, the black midden. The presence of actual charred dung fragments and relatively high amounts of herbaceous material in unit 2229 supports this. Although herbaceous material is present in unit 2229, the amounts there are in no way comparable to the thousands of pieces in the modern dung samples. This can be explained by the fact that the herbaceous material is not very hardy and would be one of the first things to burn away in a fire. Overall, taking the seeds, dung fragments and herbaceous material into account, I feel there is enough evidence to believe dung was one of the sources of fuel at Çatalhöyük, at least during the later phases of the site around Building 3.

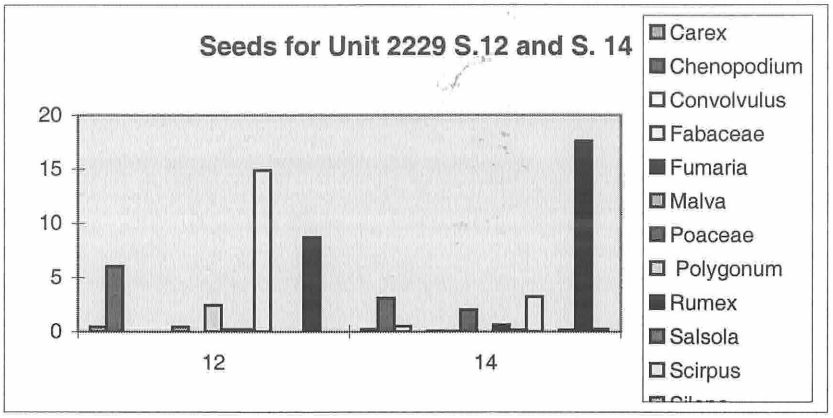


Figure 19: Seeds for Unit 2229 S. 12 and S.14

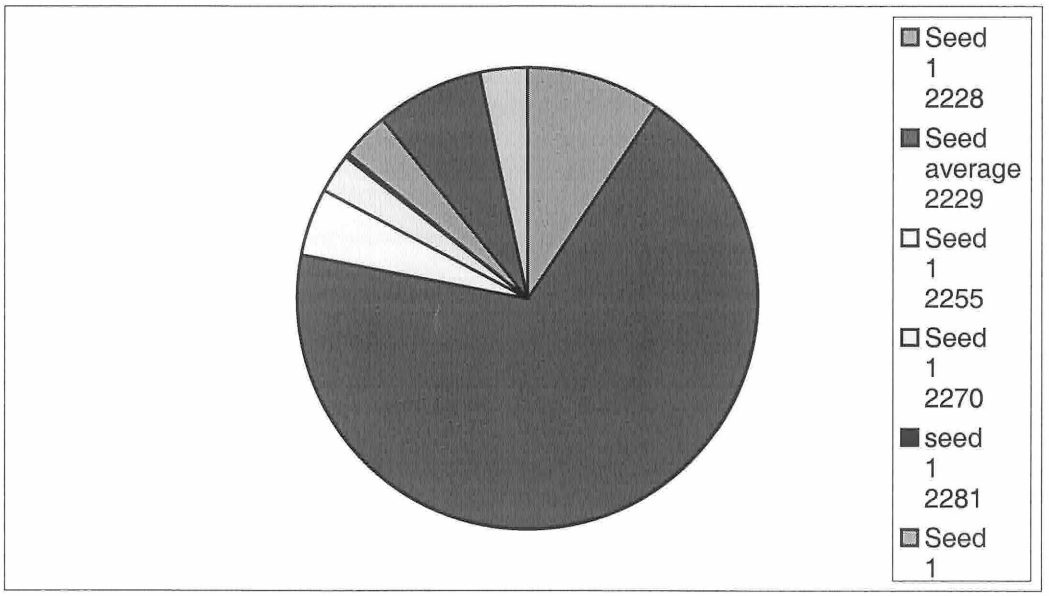


Figure 20: Total seed counts for units in the midden sequence

From the comparison between Unit 2229 and the modern dung samples, I think it is possible to make a guess at the seasons during which the midden material was deposited. As discussed above, Unit 2229 has a very high wild seed count. In comparison to the other units in the midden sequence, one finds that the average number of seeds in Unit 2229 samples, 110 seeds, is more than the number of seeds in all the other units combined (See Figure 20). The presence of so many wild grass seeds hints at the possibility that summer and autumn dung was being burned in ovens and then the hearth rake out deposited in space 86.

Comparison to Roof Samples

The midden sequence in space 86 presses up the collapsed roof deposits that were part of Building 3's abandonment process in the middle of the room. The archaeologists at Catalhoyuk have hypothesized that roofs at Çatalhöyük were possibly the main area of domestic activities (Stevanovic and Tringham 1998:3). The northern "roof surfaces are smudged and burned and discolored…", (Stevanovic and Tringham 1998:3) while the southern ones are "yellow, beige, and gray" (Stevanovic and Tringham 1998:3). These two different roof surfaces have been referred to as 'dirty" and "clean" respectively. Because these surfaces are possibly the site of domestic activities, and therefore plant use, it is possible that their botanical composition is similar to units in the midden, particularly units 2228, 2229 and 2225. These units have moderate to high densities of botanical remains and these remains probably came from activities such as fuel burning and food preparation that could have taken place on the roofs of Çatalhöyük.

In order to make a comparison between units 2228, 2229 and 2255 and the clean and dirty collapsed roof, I have examined two samples from the roof sequence. These samples come from units 2238, the dirty roof and 2273, the clean roof. Figure 21 compares the remains from Unit 2229, the black midden and 2238, the dirty roof. Looking at the botanical remains, there seems to be some major differences between the two contexts. The dirty roof is dominated by cereal with a little parenchyma and nutshell, all food related materials, while wood and seeds dominate the black midden. This indicates that the botanical remains from the two units represent different types of activities and depositional histories. The high amount of edible material in the dirty roof perhaps is the result of an accidental food spill, while the high seed and wood counts in the black midden is probably from burnt fuel deposits. The low seeds and wood counts for Unit 2238 suggests that roof contexts were not the source of the burnt fuel deposited in the black midden. Overall, the differences in the botanical remains suggest that there is not a direct relationship between the dirty roof and the black midden.

There are also major differences between the botanical remains from Unit 2273, the clean roof and Units 2228 and 2255. Like the dirty roof, the clean roof sample has a high cereal count. Unlike the dirty roof, the clean roof also has a high amount of chaff. This combination of chaff and cereal might be the remains of food that had not yet undergone final preparation for a meal. Often cereal is not completely cleaned of chaff until right before use. Unit 2273 also has some nutshell and parenchyma which are related to food and food preparation. It seems that the plant remains in the clean roof come from food and food preparation. The botanical materials in Units 2228 and 2255 do not seem to have the same source. Rather they are the result of burnt fuel. From this

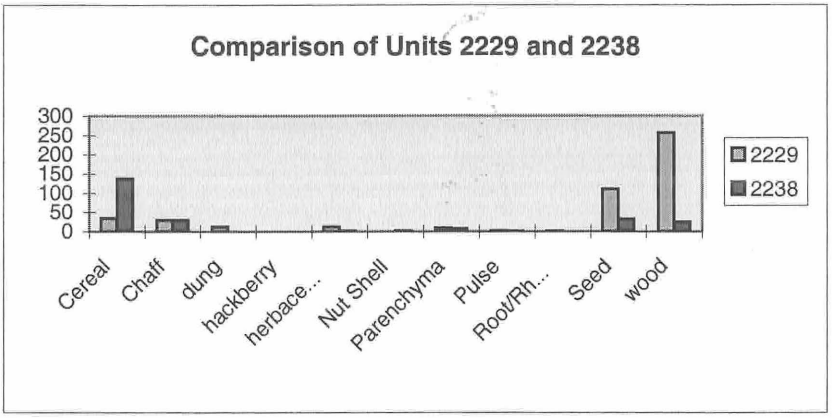


Figure 21: Comparison of the botanical remains from the average of the Unit 2229 samples and Unit 2238

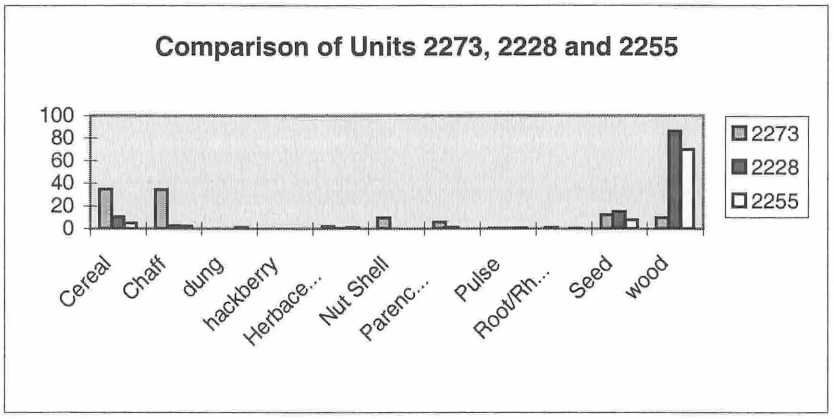


Figure 22: Comparison of the botanical remains from Units 2273, 2228 and 2255

comparison of the midden units to the clean and dirty roof, it seems that the activities reflected in the roof remains can be eliminated as a source for the botanical remains in the midden.

Discussion

During this analysis of the midden sequence units from space 86, a pattern in the units has emerged. It is possible to divide them into three groups on the basis of their botanical components. The first group is composed of the five earliest layers of the midden. These are units 3517, 2296, 2294, 2281 and 2270. They all have similarly low densities and contain similar amounts of edible material to non-edible food parts to non-edible material. While there is some variation in their wild remains content, on the whole they are made up of mostly domesticated food remains and wood. The similarities in the botanical compositions of these units indicate that they have similar taphonomical histories and reflect similar types of household activities. The density and the mixed nature of the botanical remains in these units suggest that they are tertiary deposits and are not the result of one type of activity. Rather they are the results of multiple activities and taphonomic processes that have ended up mixed in with the soil used to fill in the abandoned space 86. Every context at Çatalhöyük has a low level of plant remains because of their small size and how easily they can be moved around the site. Units 3517, 2296, 2294, 2270 and 2281 exhibit this general level of botanical presence. The only exceptions to the evidence for mixed activities and tertiary deposits in these units are the pockets of wild remains in units 2296 and 3517. It is possible that these wild remains were part of an offering or feast made in the building at the beginning of the

abandonment process. These ritual deposits would be primary refuse since they are food refuse, nutshell and hackberry pits.

Units 2255 and 2228 form a second group of units. These two units have similar moderate densities and distribution of materials. It is interesting that the excavators of the midden sequence grouped Unit 2255 with Units 2270 and 2281 as a layer of bricky midden. The botanical remains indicate that Unit 2255 is more closely affiliated with Unit 2228 at least in terms of the plant activities it represents. Both Units 2228 and 2255 are dominated by wood, a non-edible material, with a small amount of seeds and cereal. The large amount of wood and little else indicate that the botanical remains in these to units probably come from one type of activity. The very low amounts of food related material indicated that these remains come from some sort of non-food related activities, such as construction. The clean roof has been ruled out as a source for the botanical remains but perhaps they come from wood fires or whose remains were dumped in with the construction debris that was used to fill the space. Or the construction debris already included moderate amounts of charred wood. This would make the remains either secondary or tertiary deposits. There is no evidence that the botanical remains in Units 2255and 2228 are primary refuse.

Finally, unit 2229 stands on its own. While it has similar proportions of botanical remains as units 2228 and 2255, it has a much higher density of them. This unit is incredibly rich in botanical remains, and also a range of different types. Overall the materials in the unit support the excavator's conclusion that it is secondary refuse and the site of repetitive dumping of hearth rake-out. The botanical remains are dominated by what is probably summer and autumn dung used as fuel in the hearth. The rest of the

remains, such as the cereal, chaff, and pulse are probably material that fell into the fire during food preparation. It is unlikely that the botanical remains come from actual food such as that found in the dirty roof. Unlike the tertiary and secondary deposits in the other units in the midden sequence, Unit 2229 clearly represents the specific household activities that created it.

Conclusion

In this project I have used paleoethnobotany to examine the midden sequence in Building 3 on a micro-scale. This detailed approach has allowed me to follow a two-fold path of investigation. First, it has given me information on the taphonomical history of the botanical remains in the midden sequence and therefore of the midden itself. The botanical evidence suggests the midden represents a series of primary, secondary and tertiary refuse. This supports the excavators' hypothesis that the midden was deposited in a planned and organized way, using different types of deposits to stablize the terrain for future construction (Stevanovic and Trignham 1998: 4). This type of infilling has been seen in other parts of Catalhoyuk, such as in Bulding 4 in the South area (Martin and Russell 2000). Therefore the botanical remains in Building 3's midden provide more information on this building trend at Catalhöyük as well as shed light on the sources of the botanical remains in the midden material.

Second, the analysis of the botanical remains from the midden uncovers the household activities that took place in the area. Besides the evidence to support construction activities involved in the deposition of the midden, there is evidence for special activities, such as offerings or feasting, fuel use, seasonality, locations for crop

processing, and the exploitation of wild and domesticated resources. This microanalysis has revealed the depositional processes and the activities that created the botanical remains in the midden sequence. At the same time, it also ties the midden to the larger scale of the site and draws connections between Building 3, and the North, Kopal and South areas. Through these botanical remains we can start to see the daily household activities of Çatalhöyük.

>4mm	>2mm	>1mm	>0.5mm	<0.5mm
Everything Wood Cereal Chaff Pulse Seed Parechyma Fruit Nut Nutshell Hackberry Herbaceous Material Dung Root/Rhizome Bones Other - interesting botanical remains	Everything Wood Cereal Chaff Pulse Seed Parechyma Fruit Nut Nutshell Hackberry Herbaceous Material Dung Root/Rhizome Bones Other - interesting botanical remains	Cereal Chaff Pulse Seed Parechyma Fruit Nut Nutshell Hackberry Herbaceous Material Dung Root/Rhizome Bones Other - interesting botanical remains	Seed Bones Other - interesting botanical remains	Nothing

Appendix 1: Botanical remains pulled from each size fraction

Definitions for selected categories (taken mostly after Renfrew 1973) 3 and Carp enter 1999)

Wood includes all woody remains such as buds, knots and twigs
Cereal is the grain portion of domesticated grasses
Chaff is the by-product rachis and glume portions of the cereal spikelet that remains after processing
Pulse is the pod remains of domesticated Leguminosae Family plants
Seed includes all other seeds and generally implies seeds from wild plants
Nut refers the the edible nut-meat
Parenchyma is the water filled sto portion of roots.
Herbaceous Material is any stalk or leafy remains from plants
Root or Rhizome is the non-edible nutrient transport roots that grow out of parenchymous material

Appendix 2

Edible Remains	Non-edible Food Parts	Non-edible Remains
Cereal	Nutshell	Wood
Pulse	Root/Rhizome	Herbaceaous Material
Parechyma	Hackberry	Dung
Seed	Chaff	

Table a: List of material in edible, non-edible food part and non-edible categories

Wild Remains	Domesticated Remains	Undetermined
Wood	Pulse	Dung
Hackberry	Cereal	Herbaceous Material
Nutshell	Chaff	
Seed		
Root/Rhizome		

Table b: List of wild and domesticated botanical remains

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