MULTI-ELEMENT SOIL ANALYSIS AT BURGAZ-DATÇA (PALAIA KNIDOS): A STUDY IN SETTLEMENT ARCHAEOLOGY

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ABSTRACT

MULTI-ELEMENT SOIL ANALYSIS AT BURGAZ-DATÇA (PALAIA KNIDOS): A STUDY IN SETTLEMENT ARCHAEOLOGY

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Human activities such as food preparation, cooking, garbage disposal, tool production leave their traces on surfaces by producing residues; some are physically collectible, while some residues get deposited within the soil, only to be identified through chemical analysis. The main purpose of this study is to generate additional, high-resolution data by combining geochemical and analytical analyses with archaeological evidence in order to interpret spatial organization documented through many years of excavation at the site of Burgaz, Datça.

Soil samples collected during excavations at Burgaz were subject to elemental analysis by using ICP-AES and other analytical methods; the results are interpreted with respect to human use of spaces and artefact distribution at the site.

Keywords: Activity areas, Multi-element Analysis, Classical households, Burgaz-Turkey

ÖZ

BURGAZ-DATÇA'DA (PALAIA KNIDOS) ÇOKLU-ELEMENT TOPRAK ANALİZİ: BİR YERLEŞİM ARKEOLOJİSİ ÇALIŞMASI

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Yemek hazırlamak, pişirmek, çöp çıkarmak, alet yapmak gibi faaliyetler mekan tabanları üzerindekalıntılar bırakır; bu kalıntıların bir kısmı fiziksel olarak görülebilir, bazıları ise sedimanlarda birikir ve ancak detaylı analizle tespit edilebilir. Bu çalışmanın ana amacı, Datça-Burgaz arkeolojik kazılarında uzun yıllardır belgelenmiş olan mekansal organizasyonu yorumlayabilmek adına jeokimyasal ve analitik toprak analizlerini arkeolojik bulgularla birleştirmek ve yüksek çözünürlüklü verilere ulaşmaktır.

Burgaz'da kazılar sırasında toplanan toprak örneklerindeki element birikimleri ICP-AES ve diğer analitik yöntemlerle analiz edilmiştir; sonuçlar mekanların insanlar tarafından kullanımı ve yerleşimdeki buluntu dağılımı göz önüne alınarak yorumlanmıştır.

Anahtar Kelimeler: Aktivite alanları, Çoklu-element Analizi, Klasik dönem hanehalkı, Burgaz-Türkiye

To Emine and Arif

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Human interaction with the environment mainly tends to change it; from very early times people have started shaping landscapes, building shelters, transforming their surroundings. What they leave behind are remains of past lives; built spaces, artefacts and burials, mostly visible to the naked eye. When people abandon a settlement or a way of life, nature does its job and covers the remaining traces in time.

Archaeology, as a discipline, basically aims to reconstruct these past lives by using whatever material that is left behind and available. During the past couple of decades theoretical thinking has left its mark on archaeology, as it did on any discipline within the social sciences; this intellectual process encouraged scholars to look behind the tangible evidence.

From the early years on, archaeological and public interest was on monuments, palaces; the mighty and the beautiful. Archaeology traditionally seeks the grand narratives. Synchronized with modern social movements and new trends in socio-economic theory in early 60s, this trend has started to shift towards the daily lives of the past common people, “What were they eating, where were they sleeping, what were their daily struggles like?”, as well as towards the nature of interrelations of

past social groups, “What were the settlements like, were they selling goods to each other, were some rich and some poor?” The answers to these questions needed a framework and a platform to be built on.

Excavation is archaeology’s main tool, but from very early on archaeology has been a discipline so flexible that it easily adopts techniques from other disciplines and makes them its own. As the need for answers grows, the need for research tools grows as well.

Geology and soil studies have always been an inseparable part of archaeology. Spatial analysis was primarily developed by geographers; its adaptation to archaeology did not happen until the mid-70s, which finally led to the widespread use of GIS in field archaeology. On the other hand, the interest in reconstructing past lives in detail pushed the researchers to look closely into soil and gradually paved the way to micro-artefact studies and soil analyses.

Early research on soil was usually based on analysis of one or two particular elements or minerals; during the last decade ICP-AES (ICP-OES), ICP-MS and XRF techniques proved significant results in terms of the use of soil and therefore past spaces and have been used as a standard form of analytical analysis, paving the way to “multi-element soil analysis for archaeology”.

In this first chapter, the scope of the study and its contribution to the field will be clarified, ways of studying the space and the contribution of ethnoarchaeology will be deliberated, the history of household archaeology and related research will be explained, houses and households will be defined with regard to social dynamics and material culture, feminism and politics of households will be discussed and practical issues of practising household archaeology will be mentioned.

In Chapter 2, Classical household will be examined with reference to the history of research, *oikos* as a physical and social concept, spatial organization of Greek households with case studies followed by a discussion.

Chapter 3 is dedicated to Burgaz and includes an introduction to the site, its historical background, settlement and household organization.

Chapter 4 explains the methodology used in this study, including a history of soil studies in archaeology, the history and principles of studying floors both in archaeological and ethnoarchaeological contexts, the contribution of phosphate analysis to archaeology, multi-element soil analysis as a technique for activity area research, case studies and elemental signatures pointing at human activities, and finally the sampling process at Burgaz.

In Chapter 5, chemical analysis results and applied statistical analysis results are presented followed by a discussion regarding use of space at Burgaz. A table with suggested elemental signatures for human activities at Burgaz is included in this chapter, followed by a summary of chemical elements as indicators of use of space in the site.

Final chapter is a discussion and conclusion pertaining to spatial use, daily activities and activity area research in Classical households with recommendations for future studies.

In this study, the term house refers to the physical, built structure while household embodies a web of activities in and outside the house and also a set of relationships with people as influencers and decision makers.

1.2 Scope of the Study

Human activities such as food preparation, cooking, garbage disposal, artefact production leave their traces on archaeological surfaces in multiple ways; some are visible to the naked eye and physically collectible, while some residues get deposited within the sediments, only to be identified through special analysis. These daily activities not only serve the purpose of survival and maintenance, but they also reflect patterns of social and economic interactions of people both as parts and influencers within the wider concept of social reproduction; they are records of human behaviour of all age, gender and social status.

Chemical analysis and chemical characterization of anthropogenic soils make it possible to identify certain activities through the chemical signatures they leave on floors. This study aims to classify these activities and accordingly reconstruct social and economic behaviours of Burgaz households through using data generated by geochemical analysis of lived-in soils. We will also attempt to combine and compare these chemically supported patterns with the previously produced analyses of architecture and other material evidence in an effort to provide insights into the diversity or homogeneity between households with an undercurrent of discussing traditional attributions and divisions of public/private and gendered space. By focusing on households in particular, we intend to explore a bottom-up approach towards society's smallest socioeconomic unit, to try to reconstruct past communities from the perspectives of the ordinary people. As a result, we hope to contribute to our understanding and interpretations of the multidimensional experiences of Burgaz people within their social context and in connection with the wider social world, namely the Greek world.

The research approach we lean towards consists of essentials as economic patterns of production and consumption, activity areas, food-related behaviour, architectural

evidence and spatial analyses. The findings of this research, supplemented with information produced at other classical sites with similar household analyses, will be examined within a theoretical framework of discussions revolving around place making and socioeconomic organization at different levels within communities.[1]

Understanding past organization of households in terms of space and the activity type usually depends on analysis of physical artefactual distributions; in some cases those distributions do not necessarily correspond with *in situ* locations of past activities. The reason for that includes biological processes of nature or erosion causing poor preservation of artefacts and architecture, disturbance by people both ancient and modern, disturbance by the settlers of the site while abandonment, or the speed and nature of abandonment. Sites which were abandoned rapidly have better preserved assemblages in their original locations of use, whereas planned and organized abandonments leave merely the "unwanted" artefacts behind. In this case the chemical elements deposited within the soil provide great aid to understand past activity areas.

Phosphate has been considered to be a substantial marker of anthropogenic sediments. Phosphate analysis has been tried at Burgaz before, the results generated three main activity areas at the site; little-to-none cultural activity, middle range, and main cultural levels; elevated levels of organic phosphorus pointed at ancient disturbance levels, floors/pathways and iron slag deposits as wells as three spaces: necropolis, ancient refuse area and the Hellenistic winery.[2] However, a wide range of elements have not been tried and the analysis results have not been interpreted with relation to function of particular spaces, especially domestic spaces; it is possible to widen the elemental collection with more elements that are sensitive to human activities and provide a broader and more accurate interpretation. Additional analysis will help to derive a synthesis for the combination of analysis of

[1] Chesson 2012, 46
[2] Akyol, Demirci and Akoğlu 2006, 163-4

multiple elements deposited in soil and human use of these spaces; this study is based on the hypothesis that different activity areas have different chemical signatures and therefore recognizable via analysis.

Burgaz house units are usually multi-functional in character according to artefact distributions and densities, most spaces have been used for a set of different activities; therefore, the element readings should be evidently high and point to the most active areas within the houses. The samples from street context and *peristasis* deposits will be interpreted in comparison to domestic space results of Burgaz and results from other sites with same open air/public context that were subject to geochemical analysis.

Spatial analyses, both in terms of artefact distribution and function of used spaces have been intensively studied at Burgaz[3]; the contribution of soil analysis is expected to aid help in three different levels:

To introduce fine resolution data that can specify what activities took place and where in the site. This is particularly important for Burgaz since the settlement was slowly abandoned and therefore the assemblages of artefacts left within the houses may not represent sufficiently the use of space. Additionally, Burgaz domestic units appear to be multifunctional and as such artefact analysis alone may not be sufficient to elucidate the use of space.

[3] See; Sakarya İ. 2003, Defining Spatial Distribution of Storage Vessels in Ancient Burgaz at the Fourth Century B.C., Unpublished MSc. Thesis, METU; Atıcı N. 2003, Defining Cooking Activity Areas of Burgaz Domestic Units in the 4th Century B.C., Unpublished MSc. Thesis, METU; Gökdemir Ö. 2006, The Classical Period Houses in Burgaz: An Archaeological and Architectural Overview, Unpublished MSc. Thesis, METU; Atıcı N. 2013, Household Organization in Classical Burgaz (Palaia Knidos): Domestic Assemblages, Space and Function, Unpublished PhD. Thesis, METU; Ioannidou E. And Baykara D. 2012, Zooarchaeological Studies at Burgaz: A Preliminary Report, 27. Arkeometri Sonuçları Toplantısı.

To see how adaptable this new set of data is to what has already been documented through excavation and spatial analyses at the site.

To raise new questions related with spatial use and function of house units and explore further applications of soil analysis at Burgaz.

1.3 Spatial Studies: Ethnoarchaeological Perspectives

Archaeological knowledge is mainly being produced through archaeological interpretation of remains. Answering questions, raising new ones and consequently aiming to reconstruct past living systems are possible by inferring from what we already know through previous archaeological data sets; by seeking out similarities and differences, then by using these arguments to develop models that would expectantly stand testing against the new data. This sort of an engagement requires a body of theory that will lead to the dynamics of living systems that were in fact alive one time and at the same time depends on the use of analogies.[4] However, our capacity for creating analogies concerning long-gone people and their cultures is often limited to our experience, to our cultural biases. Ethnoarchaeology, the study of living cultures from archaeological perspectives, started off as a research strategy to meet the need for ethnographic material to form a base for further analogies.[5]

Both archaeology and ethnoarchaeology work with material objects, by observing the ways these connect to the surrounding natural and social environments. The common aim here could be summarized as to analyse archaeological/ethnological units while referring to their provenance and representation -both culturally and physically-, since otherwise the results would move away from forming analogies

[4] David and Kramer 2001, 113
[5] David and Kramer 2001, 2

and get closer to simply producing assumptions with no respect to accuracy.[6] The emphasis is mainly on archaeological contexts as representatives of systematic and repetitive behaviour patterns and how these patterns were transformed time and again; searching for processes of production, use and maintenance, discard, abandonment, as well as deposit formation of archaeological remains.

Ethnoarchaeologists, along with geoarchaeologists, have argued that all component materials in depositional sequences, including sediments, are potentially informative about cultural behaviour and settlement history. In particular, during ethnoarchaeological research in Iran in late 1970's, Carol Kramer observed: "*the floor of each area within a house compound is peculiar to that kind of area and therefore diagnostic of primary function...*" and further added that it is quite possible for an archaeologist to distinguish between roofed and open spaces, and identify the different functions of the rooms by studying and formulating changes in floors.[7] Butzer agrees with this prediction by underlining that the type of material and to what extent this material accumulates in a particular floor varies according to the nature and use of that floor and therefore it is a key to define function.[8] These observations are the key concepts on which spatial analysis is based for reconstructing ancient households. Both, "household research" and "spatial analysis" have a long and fruitful history in archaeological practise while at the same time they have been the subjects of hot debate.

With the contribution of ethnographic analogies/ethnoarchaeology and the rising interest in social organization of past human groups, archaeological research in Europe and especially in Mesoamerica by North American scholars during late 1960s and 1970s has started to ask a new set of questions. Even though social and economic structure of the Ancient Maya had changed dramatically after the Spanish colonization during the 16th and 17th centuries AD, it still functioned as a living

[6] David and Kramer 2001, 91
[7] Kramer 1979, 148-9
[8] Butzer 1986, xiii

laboratory for ethnohistoric research. Maya people basically are still living in the region, under quite different circumstances but still as households of varying shapes, sizes and complexity. Moreover, the Spanish colonial period is well documented; those documentations have been widely used in ethnohistoric, ethnoarchaeological and archaeological research to provide more ground for further analogies. Explaining the origins of research interest in Mesoamerica, Joyce argues that it is not only a geographic definition of a region but also a cultural and linguistic concept that was shared by past social groups living there, that Mesoamerica as a term is quite similar to what we mean by "Western civilization".[9] Mesoamerican people had limited interaction with their northern and southern neighbouring societies, they shared and developed distinct characteristics within this contained geography including a basic, mostly agricultural economy, a belief system and material indications of a stratified society; all providing a useful work platform for research that is also easy to build on.[10]

Maya archaeology went through the same stages as any other region in the world did in terms of what the research interest was and how the material remains were interpreted. The lack of urban residential areas led scholars to argue that Maya centres could not be classified as "cities" until late 19th century, that is when Thompson figured out that the mounds around the Yucatecan centres were in fact ancient Maya houses.[11] For the impressive ancient centres of Mesoamerica, especially the Maya centers, being at the spotlight of archaeological attention did not necessarily mean that they were comprehended fully. Apart from being categorized as non-residential, they were labelled "empty"; empty of people maybe except for priests and a certain elite class, which caused the disappearing of the majority of ancient Maya people from the archaeological record and consequently from the cultural heritage as well.[12]

[9] Joyce 2004, 1-3
[10] Joyce 2004, 3-4
[11] Robin 2003, 309
[12] Ashmore and Wilk 1988, 8; Hendon 2001, 4

Even after it was recognized that there were indeed residential areas where the ancient working, producing common people had lived, the research interest -both for Maya and Aztec- did not immediately focus on them. In late 1980s, it was argued that Mesoamerican archaeology traditionally ignored households of the commoners and was drawn to the fascination of large economic, political and ritual centres; also the rich pool of ethnohistoric information had such an effect on archaeological research that excavating rural settlements/houses was considered unnecessary and consequently there was very little new data to work on regarding how "humble Maya people" had lived.[13]

Some archaeological work focusing intensively on social organization of Maya on the other hand, can be traced back to late 1950s and 1960s. Gordon Willey's systematic survey of the Upper Belize Valley particularly is responsible for the changing direction of archaeological emphasis in Mesoamerica and for further influencing future projects. Belize Valley project was revolutionary in its own way by concentrating on a region rather than on a single site, taking all these sites as operating parts of a larger economic and social system while focusing on cultural ecology.[14] This approach towards settlement patterns in the region inspired others to discuss diversity of past societies and the complexity of human adaptation which inevitably resulted in the identification of the household, the smallest units that form the settlement by echoing themselves, as fundamental to understand the social structure.

Two decades later, a group of archaeologists working in the same region were approving the questions asked back then but strongly criticizing that the answer was being sought in kinship systems and residence rules, that there was more than a fair amount of generalizations and that through this sort of interpretation the past people were reflected as mere products of kinship principles and other social rules instead

[13] Webster and Gonlin 1988, 169
[14] Joyce 2004, 35

of archaeological interpretation reflecting on patterns of past human behaviour.[15] This same group of archaeologists including Wilk, Ashmore, Rathje, although having mainly worked in East Africa and Switzerland Robert Netting as well, were among the scholars who had lead the discussions during 1980s and 1990s about what household research as an archaeological practice needed to be transformed into.

The Early Mesoamerican Village edited by Flannery, is a significant example of this transformation of approach. It is a thorough compilation of systematic research dealing with both household level and community/settlement level activity area analyses, settlement systems and sizes, social/religious interactions and exchange of goods within and between settlements.[16] This volume and the research attention it includes could also be regarded as a fine representation of what settlement archaeology wanted to achieve; to study the distribution of past human activities across the landscape, to include cultural ecology, to consider individual settlements as well as multiple settlements acting as networks and the workings of such networks. Settlement archaeology is argued to have provided a nest for household archaeology to grow in, through a wide range of research of cultural/ecological anthropology in Mesoamerica and environmental/landscape archaeology in Europe.[17]

The widely embraced notion of "householding as a verb" proposed by Netting in 1993 is praised based on two reasons; it distances households from kinship and residence rules and connects it to ecology and political economy, hence it gives archaeologists an effective work zone with material implications which enables studying households.[18] In other words, it encourages looking for the complex human behaviour by using material remains of a settlement rather than normative,

[15] Wilk 1988, 135; 147
[16] Flannery 1976
[17] Ashmore and Wilk 1988, 7
[18] Alexander 1999, 79

formal settlement studies.[19] The discussion revolved around household being an "activity group" in which different sets of activities overlap; the common aim has to be to refine and preserve a cross-culturally and historically useful working definition of this activity group instead of labelling one or another form of it as "universal" and ignoring all other forms as trivial.[20]

The turn Mesoamerican and particularly Maya household studies took included three distinctive trends; to focus on ordinary people, to recognize diversity between households, to understand households in connection with the wider social world.[21]

Thomas Killion's "house lot" model for ancient Mesoamerican households had a significant impact on how archaeologists define the physical borders of common households. While focusing on agricultural land use and economic production, Killion argued that for the most Maya people, besides the house structure itself, their household also included open yards, patios, terraces, gardens and agricultural fields where daily activities were practiced, daily work was done.[22] In a humid tropic region as Mesoamerica, Killion observed four spatial areas of farmstead households; structural core as a shelter for the household members and storage for their property, a clear area surrounding this shelter where most of the daily production takes place and leaves material evidence, an intermediate area of discard, and finally a garden area where household produce is grown that leaves artefact scatters and high phosphate levels in the soil.[23]

Killion's house lot approach, adding flexibility to the definition of activity areas and giving credit to multifunctional spaces, has also led to criticism of how we divide these spaces into two arbitrary categories: inside (implying

[19] Ashmore and Wilk 1988, 11
[20] Wilk 1986, 1-5
[21] Robin 2003, 309
[22] Killion 1992, 1-8
[23] Johnston and Gonlin 1998, 160-1

domestic/female/passive) and outside (implying public/male/politics/production). Research in late 1990s to early 2000s in Classic Maya settlements revealed that for both the humble households and the elite, it was not always possible to separate "domestic" from the "public" since public ritual activities and political meetings took place in houses as well; moreover, people were producing goods at these domestic contexts.[24] Additionally, since the inside, the structural core of the households and the production areas were regularly swiped clean by people, it was urged by many scholars that the extent of household analysis should not cover single structures only but entire architectural complexes, clear areas and especially refuse deposits as well, pointing to the need of large scale horizontal exposure of settlements and their immediate surroundings.[25]

This progress in methodology and approach, particularly including outside activity spaces into households, led to a re-classification of numerous Maya households as farmsteads and various cities as garden cities in late 1990s, giving the social and economic life of Mayas a brand-new perspective. These all-encompassing efforts to "people" the past Maya households found a much-needed push in the research techniques as well, new developments in scientific analyses such as soil and bone chemistry, palaeobotany helped to redefine both the already existing archaeological data and to create new datasets, as well as to start further discussions regarding the diversity of activities, division of labour, human agency, gender issues and so on.[26]

1.4 Household Archaeology as a Framework for Spatial Studies

Studying material culture by dividing it into units such as floors, rooms, streets, refuse areas and so on paved the way for new disciplines within archaeology. Household archaeology, also called domestic archaeology, when it took off in

[24] Robin 2003, 312
[25] Johnston and Gonlin 1998, 164
[26] Robin 2003, 312; Joyce 2004, 36-7

1980s formed a great base for studies of individual material culture features. Household by itself is regarded as a social unit that includes human activities related to function, where socialization principally starts. Main concern of the approach lies on the fact that based on the material evidence; it is possible to reconstruct the interaction between people and their environment. Tringham defines household archaeology as creating a context for a humanized reconstruction of the past, by exploring intra-settlement relations.[27] Household archaeology is also a platform to study social inequalities within domestic units and within a particular society.

Wilk and Rathje particularly have been accounted for introducing the phrase "household archaeology" in 1982 by implying that archaeological focus has to move towards specificity in order to fill the mid-level theory gap between theory and practice, towards the household unit specifically.[28] If the aim is to follow adaptation through economic and ecological processes, households provide a context to study on as the most common, basic social group of subsistence. Wilk and Rathje break down the household into three elements: social, material and behavioural. It is a demographic unit consisting of individuals and their relationships; it occupies space, creates activity areas and possessions; it is a web of activities. A household is a product of domestic planning and design that foresees production, distribution and reproduction according to the needs of the people living in it.[29]

Before becoming a research field by itself, scholarly interest in household initiated with a fundamental question: Why do households exist? Apart from the existential curiosity, this answer was also sought out in order to define the universality of the family as a social unit and/or the universality of residence rules. It has been assumed that household formations were the outcome of systems of marriage and

[27] Tringham 2012, 81
[28] Wilk and Rathje 1982, 617
[29] Wilk and Rathje 1982, 618

residence rules, instead of being a result of behavioural patterns. A following criticism, by using a concept that goes back to 1950s and compares household forms of domestic groups to the growth cycle of living organisms, pointed out to the activeness of the household as an entity and that its structure gets affected by various interacting factors.[30] This critical point of view received further criticism as well, due to its limited applicability since it handled household with efforts towards uniformity and generalizations, as well as its view of household as merely a kin-based family structure.[31] The fundamental question regarding the existence of households got altered, if kinship rules do not bring people together within a household, then what does?[32]

With the application of the pattern analyses and quantitative techniques, tools promoted by Processual archaeology in 1970s, research designs were adjusted accordingly and the general focus was moved onto subjects as how societies have worked, the variations within and between households, internal and external processes affecting domestic groups, intra-settlement relations. Material culture has started to be approached as evidence of past human behaviour, widely through ethnographic analogies like Kramer's work as mentioned earlier.

Souvatzi brings out an interesting criticism by arguing that the opposition of Processual archaeology's functionalist approach to Post-processual symbolic and structuralist approach dominated the 1990s and it was artificial.[33] Tringham explains that in late 1970s-early 1980s, the development of household archaeology was tightly connected to the growing interest in developing Middle Range theory, to the need of testing social evolutionary theories through hypotheses that resulted straight from archaeological data.[34] However, household archaeology did not become a vital part of Processual archaeology but of Marxist and Neo-Marxist

[30] Netting et al. 1984, xvi
[31] Parker and Foster 2012, 1-2
[32] Ashmore and Wilk 1988, 3
[33] Souvatzi 2014, 243
[34] Tringham 2012, 83

approach, with their shared interest in models of production and social inequality; household studies have become a focus point in 1980s.[35] Neo-Marxist archaeology underlines the significance of the function of households since they are the organizers of social reproduction including cooperative labour, production-consumption, passing of property and rights, forming and keeping alliances with other social units through all forms of exchange; yet this approach lacks input regarding the social questions about households such as who the people are within a household and how related they are to each other, this shortage was made up by social anthropologists and historians who study households.[36]

Tringham praises Post-processual/Interpretive archaeology, especially feminist anthropology and those studying social practice for sustaining the interest in household archaeology and pushing it towards the center of the discipline from the margins. These diverse set of theories helped households to go beyond the universal generalizations based on kinship and be recognized as social contexts that involve events and jobs with movement and embodiment "*by people with faces*", that host negotiations to create, maintain and transform ideologies concerning gender, status, labour, production and identity.[37]

Household archaeology today relies mainly on the principle that households can link theories of social change and material culture. Households are not uniform and static; on the contrary, they are dynamic in terms of function, form and activities on a diverse set of geographical and temporal contexts. There is a variety of approaches that include:

-Economic models of domestic production,
-Marxist ideas of social inequality, ideology and power,

[35] Tringham 2012, 83-5
[36] Tringham 2012, 85
[37] Tringham 2012, 86

-Post-processual or interpretive archaeologies; exploring the household social practice and embodied spaces,
-Feminist anthropology, gendered places.[38]

This small list of approaches is somewhat chronological as well, displaying how the archaeological interest has evolved in time. Recent scientific attention tends to involve all sex, gender and age groups in order to explain how household signifies social relations and identities rather than focusing on domestic production only or on women's role only. Fundamental questions are still part of the theoretical debate revolving around household archaeology, such as how to define what a house/household is. According to results discussed recently at the "Household Archaeology in the Middle East and Beyond: Theory, Method, and Practice" conference organized in Utah Middle East Center at University of Utah Salt Lake City, it has been suggested that a house is a multifunctional physical structure that provides shelter, space for daily activities, a separation of what is public and what is private, a central place for family life; houses are dynamic extensions of people who build and use them, people who share common life cycles.[39] House forms also differ according to the topography, climate, the type of building materials available, the preferences and means of the owner. With a similar perspective, households are diverse bodies of not just people who live as distinctive social units, but also of the web of relationships among and between these groups of people. These relationships might be kinship-based as well as economic, ritual or based on any other type of human-related organization; they can be permanent or temporary, long-term or short-term. What defines a household is not co-residence, kinship or the physical structure itself, it is the shared practices of production, consumption, distribution and social reproduction.[40]

[38] Parker and Foster 2012, 2
[39] Parker and Foster 2012, 4-5
[40] Souvatzi 2014, 241

Defining a house is also another current, ongoing matter of debate. Chesson argues in favour of closing the theoretical gap between archaeological houses (physical structures with material assemblages) and homes (hosts of sensual and lived experiences, social memory, safety, individual identity and belonging) by merging house and household into the idea of "home" as a concept of physical and social landscapes; suggesting that along with material objects and possessions, a home hosts hopes and dreams of people too. It can be a built structure, a tent, a river, a forest, a group of people; it is mostly about what holds people together, what forms their common culture and history.[41] While reconstructing hopes and dreams based on material evidence sets up a challenge for archaeology, the relationship between people and their natural environment is often overlooked apart from how landscapes were exploited by people. "Deep ecology" is a holistic view of the world that does not separate humans from their natural surroundings, it is not human-centered; everything including humans, flora, fauna, seasons, landscapes, etc. is interconnected and interdependent.[42] Human behaviour, both past and present, is not just a collection of objects, it functions within a network; it changes and evolves as the natural environment changes.

If we return to the roots of houses as lived-in architectural structures, Trevor Watkins draws together a number of archaeological, anthropological and ethnographical studies and discusses the changes to human experience with the transition from a mobile lifestyle to sedentism. Living in a village, in houses, brought new possibilities as well as challenges; architecture, since it materializes structure, becomes a permanent life feature and therefore introduces spatial organization into the lives of people. Consequently, people perceived the analogy between permanent houses and community relations, between houses and households. It is also no surprise that some early sedentary societies developed models explaining the organization of the cosmos based on the organization of their built environment.[43] Houses as architectural constructions are believed to represent

[41] Chesson 2012, 50
[42] Matthews R. 2012, 562-3
[43] Watkins 2004, 11

people's ideas about how the world is structured. Moreover, architectural forms and the ways they were used by people are not primarily related to the need of shelter and available building materials; the reason for architectural variety needs to be sought in statements of social and cultural values first, then in physical circumstances and limitations, Rapoport argues.[44] Watkins concludes that ever since the beginning, architecture is symbolically powerful since it establishes the way we live, it consolidates social institutions and creates a border for our perceptions; the built environment is the arena for social and other relations to be performed.[45]

Household, on the other hand, is a term that points to an economic and social cooperative according to Chesson; whether co-inhabiting or not, it is a group of people, their abilities and their resources.[46] A household consists of a shared identity and/or common plans, aims, behaviour. In her work at Early Bronze Age Numeira in Jordan, she groups "wealth" into two categories: material and immaterial. Material wealth includes possessions and resources such as houses, livestock, surplus, lands to cultivate, water sources, objects, goods both local and imported, even burials/human remains. Whereas immaterial resources are listed as: skills of household members, future productive and reproductive abilities of household members, specialization in rituals, rights to use the land and water sources, organizing projects to the entire community's benefit such as fortification, public structures and so on.[47] Households or homes comprise of privileges, responsibilities and commitments as well as material culture.

The term "diverse" is strongly emphasized when conceptualizing past houses and households; the idea is that households change according to time, geography and context; there is no uniformity. Human individuality in relation to small data groups is another matter that has been stressed, small elements and small "stories" are the

[44] Rapoport 1969, 46-7
[45] Watkins 2004, 15
[46] Chesson 2012, 49
[47] Chesson 2012, 60

parts that make the big systems operate. Daily activities and routines are not just meaningful by themselves; they also hold information about larger social processes. Archaeological research sometimes leans towards the known paths of interpreting the data rather than experimenting and trying approaches that have not been tried before or avoiding approaches that have not yielded expected results.[48] Besides, while reconstructing past lives, we use what is visibly left of them; less-materialized human behaviour mostly lacks from the whole picture. This is not necessarily a negative effect; on the contrary, it can be very much liberating to be able to discuss human individuality without trying to squeeze this "small" data into the mainstream narratives of archaeological interpretation.

Similarly, about how data is being processed, Souvatzi points out to a reoccurring flaw where questions regarding methodology are perceived as "theoretical"; instead of thinking about the validity of household models that we are producing, we usually question if our data is applicable to a certain household analysis.[49] She then criticizes how we tend to conceptualize household as a static and stable institution with emphasis on the physical structure, the land it occupies, and the material possessions. This eventually results in static and inflexible social relations, a stereotype of the household and leaves us with generalized models.[50]

Another theoretical inclination Souvatzi objects to is the idea of societal progress from simple to complex, claiming it has its roots in social evolutionism; it is limiting, it ignores historical context, has a one dimensional approach to change, and generalizes the complexity of both everyday life and households.[51] In addition, this complexity is often combined with hierarchy, centralised power and social stratification; social behaviour is defined mainly based on economic conditions, social diversity is explained through a basic division of simple/complex or equal/

[48] Matthews 2012, 560
[49] Souvatzi 2012, 17
[50] Souvatzi 2012, 17
[51] Souvatzi 2012, 17-8

unequal with no room for bottom-up societal change, variability, agency, and social dynamics.[52] In other words, such vital processes seem to happen somewhere outside the society, then brought to people and they simply react to these changes. Similarly, Özbal argues that Near Eastern and Anatolian research is still being dominated by generalizations as starting points to study these cultures, but bottom-up perspectives have started to penetrate; instead of projecting these societies as passing episodes of the grand historical narrative, household archaeology focuses on social and cultural changes, looks at daily lives from the same level which past people, households and communities used to stand.[53]

In terms of theoretical framework regarding the material culture and how social units are archaeologically reconstructed, Chesson suggests a toolkit that includes landscape and place-making, structured agency, embodiment and lived experience, and social memory.[54] As for research design, she designates the essentials of household studies as follows; economic patterns of production and consumption, activity analysis, food preparation, storage, subsistence, recording architectural phases, spatial analyses; all the while keeping in mind that all these data are also records of human behaviour of all age groups, genders and status.[55]

1.5 Social Dynamics and Material Culture in Households

In her cross-cultural, ethnographic/archaeological work, Hendon argues that mutual knowledge is both the reason and the outcome of social interaction since there is a dynamic interaction between knowledge and action; based on this argument, she explores storage spaces as elements of mutual knowledge to understand the interaction between material culture and built space, as well as social interaction

[52] Souvatzi 2007, 37-8
[53] Özbal 2012, 321
[54] Chesson 2012, 46
[55] Chesson 2012, 71-3

and moral authority.[56] In ancient Mesoamerica, different ways of storing belongings were recorded by archaeologists; whether pits dug into the ground around their houses, side rooms attached to houses or storage inside the houses, these storage practices imply an ethic of storage and reflect social status (from pits dug by lower status to inside storage by higher status) and this knowledge of how and how much somebody has stored would affect the social interactions of people.[57] According to a 16th century ethnographic research by Spanish friar Sahagún, a good father is someone who would store for himself and for others, who cares for his assets and saves for others, who saves for the future; a good farmer father fills the maize bin whereas women's role is seen as the managers, the wise users of stored goods and especially food since it was accepted as the sacred source of life.[58] Therefore storage is preserved household labour, future labour embodied and diverse contributions of men and women represented in a part of social landscape which also symbolizes the consistency and identity of a household.

Çevik carried out a similar research during 1990s in two contemporary villages in Kahramanmaraş Turkey, both part of Turkish peasant society. She defines a typical village house as living quarters and other elements like cellars, ovens, graves, stables, orchards; all together forming a household cluster which is dependent on the social and economic situation but also on the chronological context, household clusters vary over time.[59] Çevik noticed some household clusters missing a fireplace or a stable and therefore reliant on other clusters for baking bread or housing their sheep and goats; these households are usually newlyweds, trying to fulfil their independence from the groom's family by setting up a complete cluster.[60] She also demonstrates the role household clusters and material culture play in social interactions as weddings, guest hosting or running for mayor, the more extensive the cluster - the higher the social status, underlining that household clusters not only reflect spatial and social organization but they are also means to communicate

[56] Hendon 2000, 42
[57] Hendon 2000, 45
[58] Hendon 2000, 46
[59] Çevik 1995, 40
[60] Çevik 1995, 45

with the village community; they contribute to the production and maintenance of social relations, thus having a dynamic role regarding the interaction between the people and their environment.[61]

As for the role of individuals within societal context, current discussions revolve around agency. Agency is a theory of social reproduction; in other words, a theory of reoccurring social processes, structures and activities passed on from one generation to the other, according to Marxist sociology. Instead of tying human actions to human nature like it was commonly practiced before them, Marx and Engels examined human action/consciousness associated with social context and consequently expanded the role people played as agents within the network of social and economic interactions.[62] In archaeology, it is used for understanding the links between material culture and daily social actions, between material culture and cultural changes. Agency reproduces and changes society in a system of material, symbolic and social engagements. So, social reproduction and changes in culture are automatically linked to the junction point of agency and materiality; material things facilitate and establish the context of relationships between individuals and people establish relations with material things.[63]

Archaeological interpretations by tradition tend to isolate people from their actions, environmental and social settings or context. Yet it has been argued that agency is characteristically contextual and situated; agency therefore is not a representative of individuals but of actions within relationships.[64] In order to approach such a subject and especially to study particular aspects of agency including technology or embodied human experience, middle range interpretive methodologies are proposed to be useful.[65] Methodologies such as *chaîne opératoire*, the life-history approach and phenomenology along with others could be valuable in terms of intertwining

[61] Çevik 1995, 47-9
[62] Robb 2010, 494
[63] Robb 2010, 494
[64] Robb 2010, 494
[65] Dobres and Robb 2005, 162-4

theory, method and data in a nonlinear fashion, all the while fixing the missing piece in human actions: meanings.

What it means archaeologically and how scholars are interpreting agency within archaeological context are criticized as being too vague of a concept. The popular motto regarding agency, "putting people back in the past" or re-peopling the past -surfaced with the processual approach-, is seen as mudslinging instead of creating a solid body of theory since any envision of the past does involve human agents.[66]

Dobres and Robb suggest that questions as how to continue connecting material patterning to the agency of past social reproduction and how to recognize the role of material culture in a process as dynamic as this, remain under-explored and under-theorized in archaeology.[67] This is mainly due to agency being too large of a concept when not applied to specific parts of human practice with definitive material indications; the methodologies for exploring human conditions using agency as a philosophical foundation, are analytic research methods intended to cover an earlier group of archaeological questions, therefore not compatible with this new set of enquiries.[68] Elsewhere, Robb argues that the concept of agency in archaeology lacks analysis and needs to be developed into a functioning concept; if not, agency would end up being the newest fashion that everybody wants to talk about but in fact does nothing useful to answer questions.[69]

The true extent of application of these approaches to archaeological cases could be the subject of another debate. In real life, even excavating is limited with a variety of obstacles, some not dependent on the archaeologist; being able to fully explain social reproduction in relation with human agency seems to require a widely

[66] Robb 2010, 493
[67] Dobres and Robb 2005, 159
[68] Dobres and Robb 2005, 160
[69] Robb 2010, 493

exposed area of households where one can follow a number of lived-in building levels, renovations, expansions of houses to prove generational evidence, if social production is a matter of transferring social structure to next generations. Leaving aside the odds of following lives of several generations through archaeological context, how the preservation states of material remains and/or their abandonment conditions affect our capability of interpreting social activities are all issues in need of further discussion.

1.6 Politics of Households: Feminist Approach and Gender Archaeology

Ruth Tringham gifted archaeology with the phrase "*a lot of faceless blobs*". During a conversation she was having with another colleague at a conference, she was asked about how she imagines the people in the prehistoric southeast European households she was studying, it was her answer which later made her think about envisaging gender in prehistory, to imagine past people as human beings with social, ideological, political and economic lives.[70] Tringham quotes some early work discussing the role of women in prehistory, especially by Marija Gimbutas during 1970s and 1980s, regarding the "Civilization of Old Europe" and how this early group of scholars interpreted past European societies as matrilineal, equalitarian, peaceful, art loving people but fail to satisfy the archaeology community due to their unscientific reasoning and their lack of supportive archaeological data.[71] This fail also caused archaeological gender studies to be not taken seriously for a long period of time but Gimbutas earned herself a devout group of New Age Mother Goddess worshipping followers.

Feminist and gender archaeology started off in 1970s as a reaction to gender stereotypes and preconception in archaeology; how men are envisaged as active and

[70] Tringham 1991, 93-4
[71] Tringham 1991, 95-7

dominant while women are passive and dependant, how there is a static division of labour based on gender, how some human activities are always attributed to men but at the same time activities as food processing or parenting, traditionally attached to females, are ignored from archaeological interpretations of past societies.[72] These approaches were rightfully criticized for possibly creating incompetent reconstructions of past societies in terms of gender relations, based on the perception of modern day gender stereotypes. In 1980s several major contributions were published in the United States and in Norway, also in North America and South Africa, all containing fundamentally feminist approaches to archaeological theory and practice; first questioning the lack of women as active agents in the past and then the lack of diversity such as race, class, ethnicity, age –children in particular- in the past societies.[73]

Archaeologist with a feminist and gender perspective have been studying a large variety of subjects including female gatherers and toolmakers in early prehistory, female figures in history with roles that would not fit the modern stereotypes, all to be able to discuss that gender roles are not related to biology but they are socially constructed; also women's roles in food production and household economies; the extent of how life experiences vary based on gender within a society and how these engendered experiences differ from each other in relation to social classes and/or age; and how gender is constructed and further maintained.[74]

Binary gender systems with no room for flexibility are partly responsible for creating the division between male and female spaces, often with very strict uniformity such as the public spaces for men where lively economic and political organization was in motion and domestic life/production inside the house with little to no change throughout generations. This rock solid division started to shake when household archaeology began to focus on material evidence for activities, activity

[72] Brumfield and Robin 2008, 1-2
[73] Engelstad 2007, 217-8
[74] Brumfield and Robin 2008, 2

areas and how labour was organized to mostly conclude that public and domestic spaces are interconnected and interdependent; changes that occur in public spaces effect the households dramatically and at the same time households can modify the outside sphere, both are responsive to each other in a dynamic and reflexive system.[75] Where we are now regarding the wider perception of gender and how it is archaeologically explained, the passive female domestic sphere is not passive nor entirely female anymore and similarly the active male public domain is not the sole decision maker within a society.

Engelstad points to a practical issue among the scholars focusing on gender archaeology by arguing that even though gender-related critical questioning had developed from and usually influenced by feminism, that gender concerns are also feminist concerns, many gender archaeologists have distanced themselves from feminism and are avoiding any relations to feminism because it is considered as "political engagement".[76] Like all social sciences, archaeology is political action too. Some of the politics originate from the researcher, from the ideological conjectures behind the research designs and models; some are formed by manipulations according to the interests of secondary people, like the well-known example of Nazi Third Reich. As Castañeda explains it, once the archaeological interpretation of the past is produced, that piece of knowledge has a political life of its own.[77]

McGuire argues about three possible dangers if archaeology would continue being pushed into safer waters of politically unbiased interpretation. First of these is triviality, as in German archaeology after World War II, when archaeologists alienated themselves from theory and interpretations and focused on describing and classifying details as a reaction to Nazi regime manipulation of European prehistory; then the danger of complicity which could originate from one's effort of

[75] Brumfield and Robin 2008, 3-4
[76] Engelstad 2007, 218
[77] Castañeda 1996, 24

being objective without comprehending the political context they produce archaeological knowledge in, for example how some scholars supported the U.S. troops in Iraq in 2003, how the Western world took interest in and widely condemned the 2003 looting of the Baghdad Museum but ignored the lootings and burnings of other Iraqi libraries and archives such as the Koranic Library since these were not associated with Mesopotamian early cultures, therefore not associated with the foundations of Western civilization; the final danger is unexamined prejudice, producing knowledge without critically exploring the political nature of this knowledge would keep archaeological interpretations stuck in static ideologies.[78]

McGuire points to feminist archaeology as an example for critical examination of archaeological knowledge production, as long as gender is ignored in research, the assumption leads to men as social agents; and feminist archaeologist accomplished in gendering the past not by removing bias but, instead, by exploring the politics of gender in archaeological interpretation.[79] Regarding contemporary research, Engelstad argues that feminism is continuously being pushed away further from gender archaeology, feminist critique has turned into a cosmetic touch to traditional archaeology as yet another sub-discipline, a constricted field of study; decades after the first feminist inputs into archaeological interpretations and the start of a much needed progress, it is today still a process of adding women and in some cases children to our envision of past societies without the theoretical momentum it had at the beginning and the reason might lie in the fact that archaeology as an institution, still rewards androcentrism in many ways.[80]

As Conkey and Gero put it, one needs to "look" for women in order to find them in archaeological contexts and when done so, women appear in a very wide range of past human activities such as cave art, animal husbandry, organizing quarrying and

[78] McGuire 2008, 19-20
[79] McGuire 2008, 21
[80] Engelstad 2007, 219

tool making, practicing burial rituals, and even being buried in high elite graves themselves.[81] Adding human faces to past households and imagining the hopes, fears, wishes, the age behind those faces, could be possible through archaeological modelling and gathering information on gender relations within the households, Tringham suggests; pointing to anthropological, ethnographic and historical literature while hinting at their rich content of varying gender relations, domestic labour in household production and the social and political power women and families have besides the physical reproduction.[82] Studying domestic architecture and household organization with a feminist perspective, as a base for microscale archaeology of social relations and production could be the key to engender the past and reflect on human transformation.[83]

1.7 Household archaeology as Applied Research

Before pointing out to limitations to applied research, Rainville starts with building her work on two hypotheses; firstly, individuals of all classes and their daily lives are essential to understand larger social, economic and political processes, and secondly built spaces are both hosts and contributors regarding the construction and transportation of culture and ideas.[84] She then moves on to listing practical, on-site obstacles that prevent researchers from entirely exploring domestic contexts, starting with the basics; domestic spaces can be difficult to pinpoint since we are looking for particular artefacts like cooking ware and hearths to define such spaces and the remains of domestic activities are often disturbed and/or disposed away from the actual activity location, it is expensive to fully uncover structures on large scales, it is also more difficult than it is thought to explain material and behavioural analyses of domestic spaces.[85] Özbal claims that there is still a gap between theory and practice when studying households; there is great potential and a range of

[81] Conkey and Gero 1997, 415
[82] Tringham 1991, 118-9
[83] Tringham 1991, 125
[84] Rainville 2012, 139
[85] Rainville 2012, 139

possibilities however in practice, households are not easy to identify, isolate and analyse scientifically due to their flexibility of both structural and spatial organization.[86]

Matthews contributes to this list by pointing out to the need to recognize the presence of an upper story and/or a flat roof and thus the possibility of some activity traces being stuck in collapsed debris, the modifications structures go through within their life span, identification of individual spaces/rooms/divisions and the poor preservation of some building materials such as wood and reed.[87] Özbal adds some more limitations that are specific to Near Eastern and Anatolian archaeology by arguing that especially prehistoric societies in these regions frequently lack public structures such as temples, palaces and this does not necessarily mean that domestic quarters are being exposed in large scales and she also indicates the overall difficulty of identifying individual households in these regions since residential structures are usually packed together and settlements tend to grow organically.[88]

Besides being lived in, houses are also maintained; swept, cleaned, rebuilt, renovated, modified; domestic spaces can be multifunctional and used for a set of different activities during the day and/or depending on the season, during lifetimes; domestic activities can be performed both indoors and outdoors, even on streets and roofs. While some activities leave tangible traces behind such as tool making and butchering, others like washing, sewing, the actual cooking do not. Rainville stresses the importance of widening the field of household archaeology with relevant research strategies to involve this multidimensional nature of the human experiences in households, giving the example of our assumed division between

[86] Özbal 2012, 323
[87] Matthews W. 2012, 188
[88] Özbal 2012, 321

public and private spaces and how public is linked to men and domestic/private to women after years of feminist input to archaeology.[89]

What Rainville suggests as a broader strategy to explore houses is a combination of architectural approach, activity area analysis supported with ethnoarchaeology, ethnohistory if applicable, and microarchaeological techniques but she also underlines that ethnoarchaeology works better if it is used to explore life cycles and abandonment of buildings and settlements and technologies still in use; textual evidence can misrepresent or represent only a certain class of the society; and regarding architectural/spatial analyses, very few features were permanent in domestic spaces, even fewer are found *in situ*, a very small number of activities are performed in restricted areas.[90] Matthews draws attention to spatial distribution and deposition of artefacts as well by emphasizing that those very few *in situ* objects are often associated with isolated events, clutter refuse or with the time of abandonment/post-abandonment.[91]

Besides these above-mentioned limitations to practical approach to household studies, Burgaz presents a challenging case for use of space studies considering the overall cleanliness of the settlement in terms of organic and inorganic refuse; the partial slow abandonment and the following partial use of the settlement makes it difficult to explore the social reproduction, architectural trends and the extent of individual households. The nature of Burgaz households seem to be flexible at best, both structurally and spatially, as the physical spaces often lack permanent and/or *in situ* features, this state of material evidence complicates the identification of activity spaces as well. To be able to isolate and analyse households as units of economic and social production depends on the level of preservation, the nature of abandonment of the settlement, as well as how the structures were re-organized and re-used during the settlement's lifetime.

[89] Rainville 2012, 142
[90] Rainville 2012, 143-5
[91] Matthews W. 2012, 184

Even in cases that are not as extremely clean as Burgaz, research design aiming at household analysis is supposed to cover entire architectural complexes including refuse deposit areas and seemingly clean areas too. When special studies such as microartefact analysis or chemical analysis of the soils are not part of the main excavation research design but rather embedded to it later on as side projects, those studies focusing on particular issues usually are dependent on the main excavation plan and do not have much say on it. In these cases of embedded research, it could also be quite problematic to apply analysis to older data. The wide horizontal exposure of domestic levels, the amount of the excavated areas, whether those areas were excavated fully or not are all factors relying on the budget, schedule and research design of the excavation project.

CHAPTER 2

CLASSICAL HOUSEHOLDS

2.1. History of Greek Household Research

"*Left to his own resources man always begins again in the Greek way –a few goats or sheep, a rude hut, a patch of crops, a clump of olive trees, a running stream, a flute***."** Henry Miller; *The Colossus of Maroussi*, London, 1945, 164.

The research focus in Classical archaeology from the early years on has been on public structures and funerary sites, as well as revealing architectural layouts of cities through extensive excavation and providing detailed descriptions of architecture but not exactly on reconstructing contexts or interpreting what daily life might have been like in those cities. Classical archaeologists are often criticized for neglecting to include the entirety of artefact assemblages into their interpretations when it comes to publishing excavation results. This is even more so regarding domestic contexts; domestic architecture and artefact assemblages from those structures, if they were studied at all, were kept as isolated units and studied solely for categorical and typological purposes. The reconstruction of daily lives was left for scholars working with textual material which in fact represents a limited portion of these past lives and provides a very narrow perspective without the actual archaeological evidence.

It was not until Processual archaeology emerged with its discussions towards exploring social and economic nature of past societies that Classical archaeologists too started to realize the data and the material evidence they have in their hands can be used to generate a wider range of questions, to look into social and economic relations of the ancient world, compare geographical regions and evaluate long-term change in these societies. At the same time, this enlightenment highlighted the long-time neglect of domestic contexts in Classical archaeology.[92] As Allison argues, to study architectural remains alone may lead to an understanding of cultural patterns of space but it does not necessarily provide an understanding of the experience of people who built the structures or the behaviour of those who lived in them.[93]

Architectural descriptions in these cases usually consists of floor plans, windows, building materials, decorations only. It is quite a two-dimensional perception of lived-in spaces. Moreover, accepting architecture as the sole factor determining household behaviour seriously weakens the inhabitants and their activities as actors in structuring these buildings as social spaces. Reconstructing households should not be limited to the architecture or archaeology of individual structures since multiple households could occupy one structure or one household could spread their daily lives on multiple structures; household is more than often not an architecturally dominated phenomenon. In addition, a household and a family are not necessarily the same thing in every case, who lives under one roof might change over time and according to that particular house's social and economic context.[94]

The lack of detailed artefactual evidence from domestic contexts was pointed out often in late 1990s and early 2000s, along with the criticism that there were no models for artefact deposition processes.[95] Ceramics, for instance, are traditionally a widely studied find group in Classical archaeology, however information about

[92] Ault and Nevett 1999, 43
[93] Allison 1999, 4
[94] Nevett 2010, 19
[95] Ault and Nevett 1999, 44; Nevett 2005, 1

their consumption and discard is very scarce. How they were treated and used in households in terms of use-life, recycling, composition of assemblages, form and function comes mostly from ethnographic studies, not archaeological. Assemblages including ceramics, when they got the chance to be published in detail, were still mostly used for dating and phasing architecture or occupation. They lacked contextual information, making reconstruction of patterns of use within households impossible. Ault and Nevett give several examples where architecture and assemblages were recorded as isolated, studied only in terms of form and dating purposes, Delos and Athenian Agora excavations being two of these examples.[96]

Excavations at Delos have started in late 19th century with the main focus on architecture, a large number of well-preserved houses have been recovered, some of those were among the first Greek houses to have been excavated. However, the findings from these houses were not fully published since the excavators had little interest in reconstructing daily life and the nature of the city using these houses with their artefact assemblages. Publications of 1970s-1980s excavations at Agora in Athens are in a similar fashion. From the several dozen houses that have been found in and around the city center, architectural details of very few were published. Large numbers of everyday use pottery lack contextual information, assemblages of more than a hundred wells dating from the Classical period to the 4th century were not published, even though many of them are associated with domestic structures. Ault and Nevett argue that there was no platform created to ask and answer questions related to social structure and relationships, no space for interpretations, these houses are now "empty shells".[97]

A way to tackle this problem might be slow paced excavation with gradual publication, as it is the case at Halos and Thorikos, both with small number of excavated houses but detailed artefact assemblage publications. A pitfall of this could emerge as the difficulty to generate patterns of household organization and

[96] Ault and Nevett 1999, 44-46
[97] Ault and Nevett 1999, 44, 46

behaviour since the number of excavated houses are not that large. Halieis, a small Archaic to early Hellenistic polis excavated in 1960s and 1970s is shown as an example and a solution with its well documented domestic assemblages.[98] However, it needs to be noted here that the total number of excavated houses at Halieis are 11, only two of them are completely excavated and studied in detail with the entire assemblages regarding spatial use and activity areas.

Nevett underlines the benefits of using texts and inscriptions together with the whole archaeological domestic package in terms of understanding relationships between family members, however she states textual studies hardly ever overlap with archaeological evidence and these texts were usually written by elite, male members of the society reflecting their restricted perspective.[99] Allison includes pictorial and ethnographic material along with textual material and claims that these have the tendency to manifest the world view of their creators, not entirely representing the world views of those being depicted.[100] However, as she accurately states that archaeologists do not excavate households but material remains of houses and that household is actually an ethnographic aspect, ethnography is fundamental to the study of past households; as long as it is used as a signifier of complex, diverse and changing household behaviour rather than a prescriber of domestic life loaded with one's own domestic experience and bias.[101]

Cahill discusses textual sources in connection with household organization, using the part in Xenophon's *Economics* where the "ideal gentlemen" Ischomachos describes his house.[102] In this idealized house, facing south for winter sun and summer shade, spaces are assigned functions according to their physical qualities such as how secure, dry, warm and/or well-lit they are; the bedroom is the safest place, therefore accommodates the most valuable bedding and furniture while dry

[98] Ault and Nevett 1999, 46
[99] Nevett 2010, 5-6
[100] Allison 1999, 13
[101] Allison 1999, 2-3
[102] Cahill 2002, 148-50

rooms are for grain storage, cool rooms were for wine, bright rooms are to store products and utensils that need light. Another division is between male and female spaces, Ischomachos gives two reasons for this gendered division; one is that nothing would be removed from these spaces that should not be removed and the second reason is to keep slaves from breeding without permission since when bad slaves breed, they become more problematic. Then the contents of the rooms are sorted out according to the gender of the user, what purpose it will be used for and on what occasion; things used for sacrifices, male and female clothing for different occasions, beddings for male and female quarters, weapons, tools for spinning, tools for bread making, tools for other food making, kneading utensils, dining utensils and bathing utensils get arranged within the rooms. Finally, all are divided into two sets, the ones for daily use and the ones to be used only for feasts; things that would be consumed in a month are set aside, things that would last a year are stored separately. Everyday use tools for baking, cooking, spinning are handed over to slaves. However, in practice, ancient Greek houses were not this meticulously organized, spaces did not have a single function, most of the times one space was used for multiple purposes.

Roman author and architect Vitruvius is a valuable source regarding the interior organization of Greek houses, he also gifted Classical archaeology with the four type-houses of ancient Greek world that are still widely referred to by researchers while also widely criticized as being too limiting and exclusive. Baring in mind that Vitruvius had lived and produced work about 300 years later than the Greek houses were lived in and his "Greek house" appears as one belonging to upper classes, he describes a narrow front door into the house, stables on one side and the doorkeepers' room on the other, the entrance then leads to the colonnaded *peristyle*.[103] (Figure 1) On the south facing side of the *peristyle* courtyard there are two *antae* carrying an architrave, the space between the *antae* is called ether *pastas* or *prostas* Vitruvius cites from authors before him. The bedroom, *thalamos*, is to the right or left of the prostas, the inner sides of the house are female quarters called

[103] Vitruvius 1914, 186

gynaikonitis where women sit and spin wool; in this part of the house, around the colonnaded courtyard there are everyday dining rooms, chambers and rooms for the slaves. Vitruvius then describes more luxurious houses with multiple *peristyle* courtyards in which the large, square, southern rooms are for men's dinner parties; four sets of dining couches can be placed in these rooms, *the andronitis*, women of the house are not present for the parties.[104]

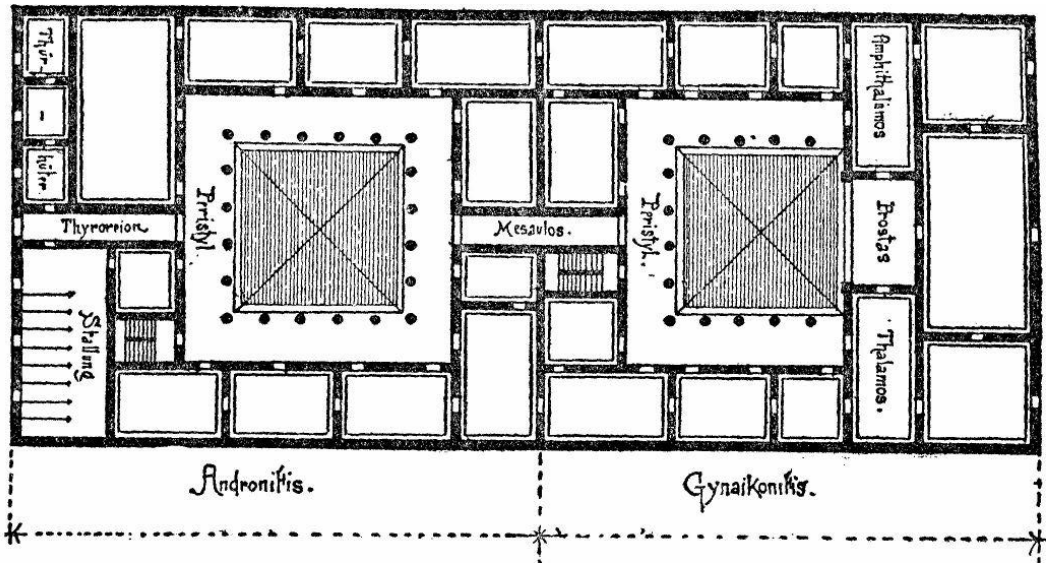

Figure 1: Vitruvius' Greek house. (Vitruvius 1914, 186; translated by M.H. Morgan)

Nevett explains that Greek and Roman household research has been mostly focusing on the organization, use and social dynamics of households while archaeological studies have aimed to define the physical layout and decorations of houses as architectural structures.[105] She argues that in cases when a house is studied as a lived-in space, the emphasis and the related archaeological debate have

[104] Vitruvius 1914, 187
[105] Nevett 2010, 5

been on explaining how the arrangement of rooms, the distribution of artefacts and decoration may have been originally planned to support certain kinds of social relationships, such as female space being separated from male gaze in Classical Greek domestic contexts.

Hoepfner and Schwandner's *Haus und Stadt im klassischen Griechenland*, first published in 1986, is seen as one of the most important contributions to ancient Greek urban studies. Their theory of *isonomia* as the primary principle in *polis* organization and the strict four type-houses they defined for the entire Greek world influenced by Vitruvius have since been criticized by others, however the detailed documentation of several sites together in one volume makes the book a valuable source. The type-houses in relation with case studies from the ancient Greek world will be further discussed in this chapter.

2.2. What Makes an *Oikos*?

Oikos is a Greek term defining the physical structure as well as the household members occupying it; a typical Classical period *oikos* consists of one nuclear family with children and possibly slaves, living in a distinct hierarchy regarding gender, status and residency. Though it has been recently discussed whether *oikos* could be a more complex unit that contained larger families with grandparents, aunts/uncles and so on, as well as non-family members and was perhaps stretched out beyond one single house structure.[106]

Besides nuclear families and extended families, what other types of residential compositions one can expect from households in Classical Antiquity? With new research, the answer might be more diverse than it used to be; since housefuls

[106] Trümper 2011, 33

(individuals not necessarily related to each other such as friends, servants, etc.) during Imperial Rome, house compounds and long-house communities (a village community living in one long-house) during Early Iron Age Greece have been proposed by scholars, there is possibility that at least some Greek households could have been more diverse than we acknowledge them to be.[107]

Cultural factors mainly determine the way domestic activities are organized and how and to what extent every individual household member would participate in these activities, as well as shaping the nature of how certain social groups based on gender, age and social status should interact; in other words, daily life in households with its entire monotony in fact designs relationships, social structure and customs.[108] Accordingly, households reflect the broader social and cultural settings they are embedded into; how societies identify themselves and how they change through time, what brings people together and what sets them apart in terms of politics, social norms and economic dynamics.

In this regard, it might be useful start with the broader settings by discussing Greek cities and society in chronological context briefly. In Iron Age Greece, two types of settlements are recognized; disorganized village plan with dispersed single room family houses, in some cases a faintly more complex chieftain house is present as well and a more townlike layout where unplanned hamlets were closely clustered with their own cemeteries and chiefs, indicating a chieftain-centered competitive oligarchy.[109] The period between 800-500 BC was marked by the explosion of city-states in the Aegean. A typical *polis* was inhabited by 2000 to 4000 citizens, they were core collective communities as urban hubs, surrounded by dependent villages and farmsteads spread out to small territories.[110]

[107] Nevett 2010, 16-7
[108] Nevett 2010, 4
[109] Bintliff 2014, 263-4
[110] Bintliff 2014, 265

Archaic period witnessed a decrease in the power of the aristocratic ruling class in favour of the middle class, even in favour of the free peasant class in a lesser extent; by Classical period, possibly half of the *poleis* had been living in a 'moderate democracy'.[111] These socio-political changes can be traced in domestic architecture and town planning of these *poleis*; starting with late Geometric-Early Archaic, there is an increase of room numbers, outside working areas are enclosed, an overall elaboration and focus pointing out to more private family residences as multi-roomed complexes around a courtyard with a certain importance attached to them.[112]

In Classical period, towns had two alternatives to grow; first was to evolve organically from their old core and/or fill the gaps in their clusters like Athens did - excluding its public spaces because those were planned- or like Olynthos, they were planned from scratch. For the organically grown old towns, there is little evidence for domestic houses, most of what we know are derived from textual sources which suggest a possible decline of large elite houses and a simplification of external and internal house displays. The limited number of houses that were excavated include smaller and larger versions of the typical 200-300 m² multi-roomed courtyard house, possibly reflecting the wealth of their inhabitants. These are suggested to have been designed for a nuclear family with their one or two slaves, providing privacy when the front door is shut, access to the multiple rooms is from the closed courtyard where work and socialization take place. Olynthus is the widest known example of newly planned settlements with its symmetrical, uniform house blocks which are interpreted as reflecting *isonomia*. [113]

However, according to inscriptions and texts, house values in Olynthos varied based on their location and even though secluded within the houses, luxury furnishings, wall paintings and metal tableware allowed Classical families to flaunt and add

[111] Bintliff 2014, 266
[112] Bintliff 2014, 266
[113] Bintliff 2014, 269

value to their estate; besides, different economies were dominant at houses with very similar plans according to artefact assemblage studies. Cahill agrees that there is in fact no "type-house" at Olynthos, although the houses do have common features and some houses maintain the standard plan, other houses were remodelled, modified and rebuilt, sometimes extensively. Even the houses that kept the standard plan, there is substantial variation in the number and size of the rooms, features and installations, wall and floor decorations.[114]

By the end of the Classical period, with community politics losing its impact, wealthy citizens in cities were back at building elaborate, prestigious houses. Following Hellenistic period brought the decline of autonomous city-states and citizen equality which manifested itself in urban public and private spaces as well, in the shape of absolute power displays of the rich and elite. Agora was full of new monuments, political activity slowly but steadily moved to large palace complexes with series of enormous reception rooms providing space for power display and negotiation, private houses -now slightly more public in form- were inspired by these elite palaces in size, plan and decoration. Hellenistic period was a time for middle and upper class to network with the new powerful elite class, to improve familial status socially and as well as economically; as a result, the traditionally private courtyard was reinvented as a display court with usually decorated reception rooms, peristyles complemented by fountains and statues, all these to be much easier accessed after one has entered the house from the street. [115]

In this sense, our perception of what was public and what was private in ancient Greece has lately become a widely discussed topic. This spatial distinction mostly stems from our modern, quite recent and mostly western definition; besides its problematic and rather static application to ancient societies, the concept of privacy is not a universal one. Nevett suggests exploring domestic contexts as single systems in which a set of activities are appropriate at that particular time and place;

[114] Cahill 2002, 84
[115] Bintliff 2014, 270-2

not every activity that took place in an ancient household would also take place in a modern house today, for instance the common practices of spinning and weaving at Greek and Roman households will not really fit into what we perceive today as the private house context, neither will storing crops and producing olive oil, wine, flour or small scale manufacturing of pottery. The boundaries of living together as a community shifts and changes through time too, Nevett points out to the noise and smells these types of production and manufacturing can cause and how it would be unacceptable in a modern western neighbourhood.[116]

As for social identities in a household, the roles and the importance appointed to them seem to be changing through time periods, and dependent on the geography, as well as the socio-economic status of a particular household. Gender relations and separation between the guests and the household members appear as a main design concern in Classical Greece.[117]

If we return to textual sources, as many scholars did to discuss gendered spaces in Classical households, we find ourselves again in a highly idealized place where women were strictly placed in female quarters, *gynaikonitis*, and kept secluded from the outside world. Cahill pulls out incidents that ended up in courts involving women, where the male defendants describe their living conditions in order to explain themselves. A speech by Lysias from early 4th century, tells about a citizen man breaking into women's rooms at another citizen's house to abduct a slave, highlighting how the privacy of home was breached by an uninvited stranger at night and how the women of the house are so modest that they are even ashamed to be seen by their male relatives not to mention a stranger.[118]

[116] Nevett 2010, 6-7
[117] Nevett 2010, 20
[118] Cahill 2002, 151

Another speech of Lysias, *On the Murder of Eratosthenes*, involves an alleged adultery, a wife cheating on her husband. The husband who has killed the man his wife was having an affair with, starts defending himself by describing his house; it is a two-storey house, both equal in size, the upper storey is occupied by female household members while the ground storey is the men's quarters. However, after the couple had a baby, to be able to wash the baby regularly and to avoid the stairs each time she wants to do so, the wife together with the entire female squad, moved downstairs. Men's quarters were moved to the upper storey.[119]

Cahill argues that these accounts at least point to the fact that seclusion of women was publicly recognized but also that *androne*s and *gynaikonitis* were not strictly located within the house, their locations could be switched to fit the needs of the household members. Even though it does not prove that *androne*s and *gynaikonitis* were used by men and women respectively, there are also records showing these two spaces could be rented out separately, implying that these might not have been used to define use or function but used as terms for specific parts of the house.[120] To identify *gynaikonitis* architecturally has been a long-time effort, suggestions for its location includes kitchen and surrounding rooms –"the kitchen-complex" that Cahill proposes for Olynthos-, the far back rooms or the larger living rooms. However, an opposing opinion is shared by many scholars; keeping the possibility of upper storeys as candidates for *gynaikonitis* -an assumption almost solely based on the adultery case mentioned above- and architecturally as well as assemblage-wise identifiable *androne*s aside, Greek houses do not reflect a strict division according to gender, neither archaeologically nor if the assemblages are considered.[121]

It has been debated that the women being secluded from outside world and spatially restricted in their homes in Classical period was something only the wealthy elite

[119] Cahill 2002, 151-2
[120] Cahill 2002, 152
[121] Cahill 2002, 152-3

could afford; without the means to own slaves, the poor would need all the productive members to be active to support the household. Trümper argues that men still must have had firm control over women which affected the domestic space organization considerably resulting in shaping the Greek society as well, based on the contrasts between female and male, inside and outside, private and public.[122] Cahill on the other hand, while acknowledging the general tendency of pairing seclusion of women with upper classes, points out to the evidence from Olynthos, where more elaborately built houses have open plans but the more modest houses have rooms with restricted access.[123] More recent perspectives about gendered domestic spaces discuss the possibility that to restrict contact with outsiders, domestic activities could have been scheduled within the house, rather than strictly enforced.[124] During Hellenistic period, although nuclear families were still more common, *oikoi* saw modifications in terms of structure and there were alternative household organizations; displays of social status became essential and women entered the public sphere as benefactors and property owners.[125] This significant social transformation affected how domestic spaces and daily life were organized as well.

2.3. Spatial Organization of Greek Households

Plotting domestic behaviour patterns spatially is a rather difficult task considering these ancient houses are mostly empty and partly preserved today, as well as lacking the structural separations according to function that we are accustomed to in our daily lives. It seems that even in one-room houses, the interior –quite possibly the surrounding open spaces too- is divided into activity areas, meaning particular domestic activities were carried out in particular and designated places regardless of the presence of dividing walls. Separate rooms for activities like eating, sleeping,

[122] Trümper 2011, 33
[123] Cahill 2002, 191
[124] Ault 2015, 2
[125] Trümper 2011, 34

caring for a baby, studying and so on are again related with modern western living, therefore it is only natural that ancient lived-in spaces were organized alternatively just like how some non-western modern societies organize their living spaces.[126]

Another aspect affecting ancient spatial organization is environmental factors. When modern technological means are not available, design and organization have to be adjusted to make use of the sun for lighting and heating/cooling purposes. There are Greek and Roman texts mentioning living spaces of a house facing south to get the warmth of winter sun, as well as spaces being flexible in terms of function which probably was also a climatic outcome.[127] While it was more comfortable to, for example, spin and weave in a closed space by the fire during winter, during summer months outside spaces or an open courtyard would have provided a cooler working environment.

The *pastas* type house design with rooms located around a usually open courtyard, is a common preference in Classical Greece; varieties of *pastas* houses are also widespread in the ancient Mediterranean. The difference between a *pastas* house and a *prostas* house could be considered trivial regarding spatial use and function, in both cases the mentioned space is a portico, usually with columns, acting as a separator between the courtyard and the rooms behind. (Figures 2 and 4) A *peristyle* house on the other hand, has a distinctively large and mostly central continuous courtyard formed by a colonnade. (Figure 5) *Herdraumhaus* plan had been commonly practiced in northwestern Greece and varieties of it can be found in Crete too; instead of a portico, this plan is characterized by a large internal space with usually a central hearth. (Figure 3)

It needs to be quickly mentioned here once more that there has been comments regarding the architectural typology of Greek houses, claiming the four type-houses

[126] Nevett 2010, 18
[127] Nevett 2010, 19

(*prostas*, *pastas*, *peristyle*, *Herdraumhaus*) are mostly drawn according to the descriptions of the Roman architect Vitruvius who has lived about 300 years after the Greek houses were constructed and lived in, a particular type-house could be the dominant type found during excavations but it would be not exactly a representative of the entire site or of every single house found anywhere falling into that type; sticking to this terminology strictly could be misleading and limiting.[128]

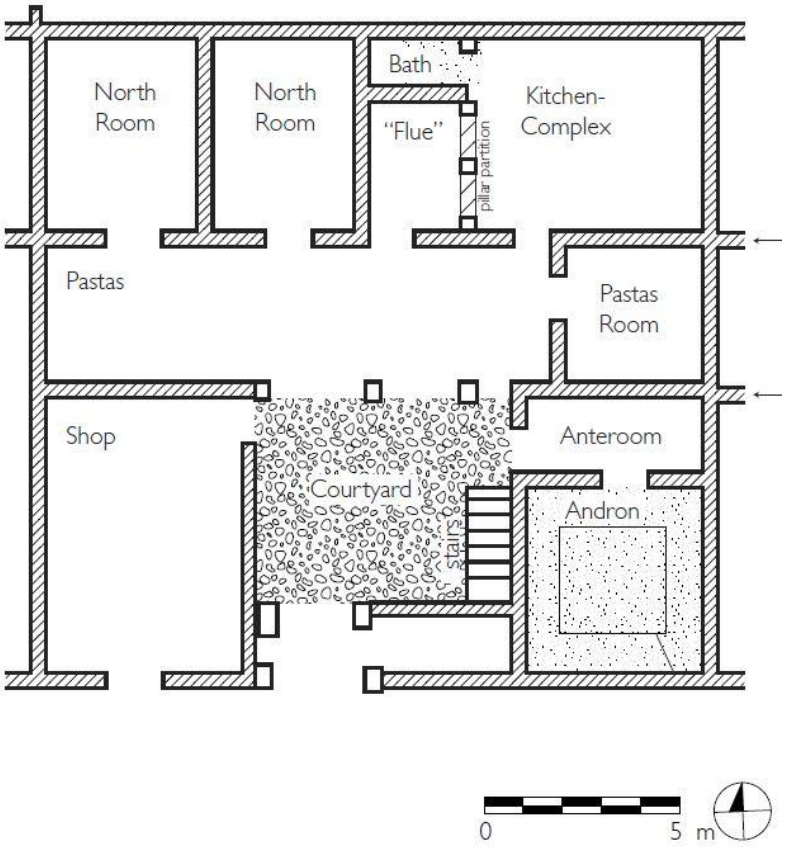

Figure 2: House A vii 4 in Olynthos, 4th century BC *pastas* plan. (Cahill 2002, 76)

[128] Nevett 1999, 22-3

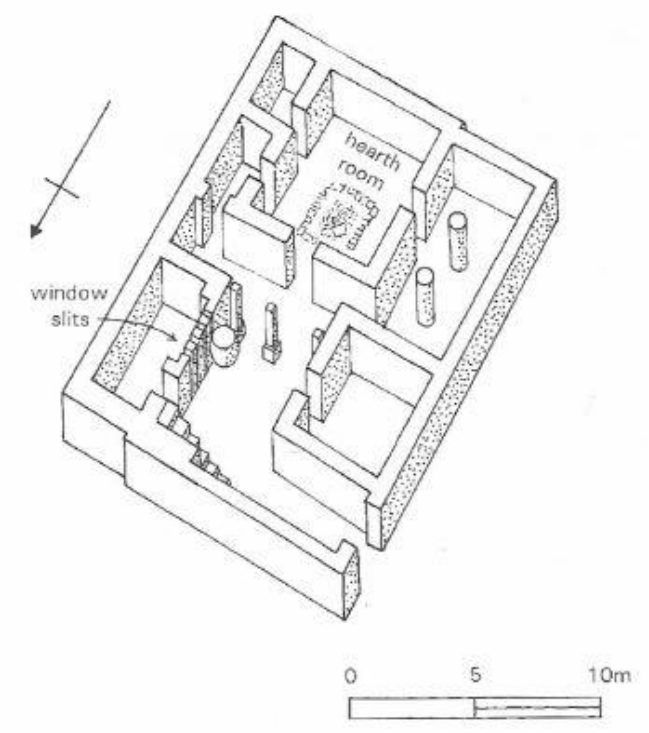

Figure 3: House 1 in Ammotopos, northwestern Greece; 4th century *Herdraum* plan. (Nevett 1999, 25)

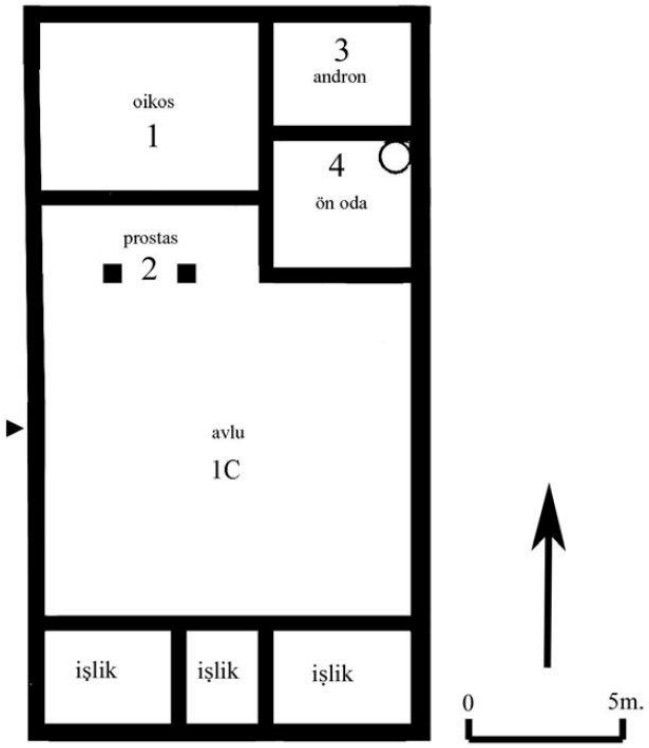

Figure 4: House 1C in Klazomenai, 4th century BC *prostas* plan. (Özbay 2010, 124)

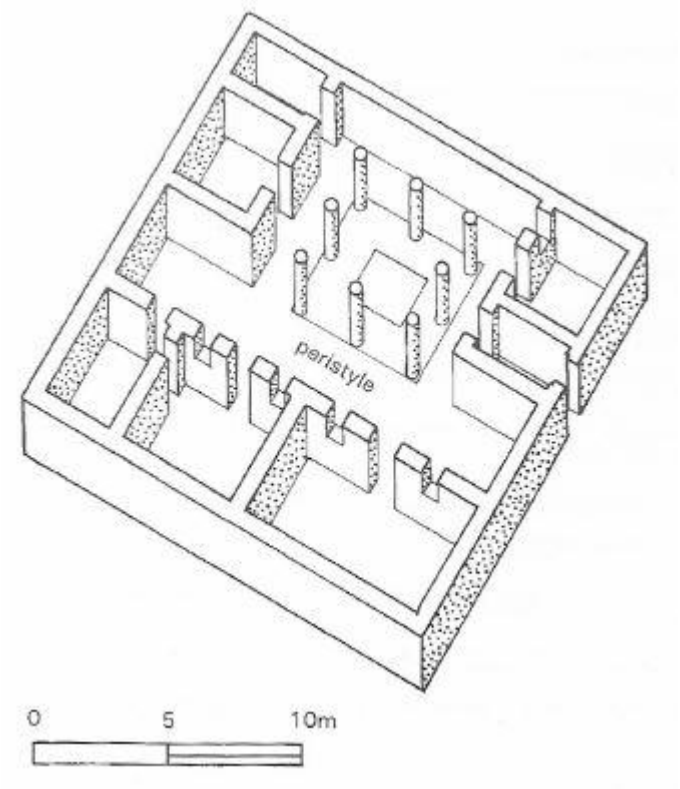

Figure 5: Maison de la colline in Delos, *peristyle* plan. (Nevett 1999, 24)

With that criticism in mind, lets discuss daily tasks and spatial organization of ancient Greek domestic spaces. According to texts, men were usually not at home but important male activities such as reception, *symposium* and entertaining guests were taking place at home; other daily domestic activities that could be traced in texts revolve around washing, storing, processing/producing, consuming of food and textiles, nurturing children and practising domestic cult.[129] Nevertheless, it should be kept in mind that these texts do not involve the fringes of Greek societies, neither socially nor geographically.

[129] Trümper 2011, 33

Andron, the male space of the house, is often used to describe living quarters of the men of the household, as well as the space where the *symposium* was held. *Symposium* is a formal yet intimate dining event with friends, acquaintances invited in for food, drinks, socializing and sometimes with the less familiar, lower-class men and women to provide the entertainment such as flute girls, prostitutes; perhaps it was also a setting for the host to display his taste and wealth. *Symposium* could be considered as a slightly public event too, since they were known to not be tame and quiet occasions, some *androne*s have windows opening to the street allowing perhaps the neighbours, by passers and any curious parties outside the house catch a glimpse.[130]

*Androne*s are usually easier to identify based on architectural features; a square plan, cement or mosaic floors with raised borders around the edge of the room for dining couches, painted walls, drains leading out towards the street. Naturally, not each and every *andron* fits this ideal description fully, however the artefact assemblages most of the time consists of particular drinking and serving wares; especially characteristic are kraters to mix drinks, then cups, jugs, ladles for serving and drinking, lamps, eating utensils, as well as special occasion wares like black-figure and red-figure pottery. There are of course houses without *androne*s but with assemblages including the above-mentioned *symposium*-special vessels or *androne*s that were completely empty of any artefacts when excavated.

Courtyards serve as navigation features for the surrounding rooms as well as providing light for the closed off rooms of the Classical houses and providing a well-lit workplace for daily household activities likewise since most houses have either no windows facing outside or very small ones high up towards the ceiling. Almost all courtyards in ancient Greek houses bare evidence of intensive daily work. Households usually produced their own cloths for their own use and weaving is traditionally a task attached to women, free women of the house and female

[130] Cahill 2002, 180

slaves as well. Unlike most of the food processing equipment, weaving tools, a vertical loom and terracotta loomweights, once set up are not easy to move around in the house. Ancient texts mention different rooms assigned for this activity including an upper chamber, the innermost room and an open room on the ground floor.

Evidence for food preparation, especially processing raw grain since cereals were widely consumed by ancient Greeks, includes grindstones, mortars, kneading utensils. Being heavy and not easy to move around, stone utensils are usually found *in situ* where they had been used; less expensive versions of the same food preparation equipment were made of wood and terracotta, moved around as the work spaces rotated within the houses. These were possibly stored like the other mobile household utensils, in most archaeological cases, food related objects including cooking equipment were not permanently fixed to their places. In this sense, kitchens are difficult to locate; like other daily work activities, food preparation and cooking also seem to have carried out in multiple locations, in rotation. As for storing food supplies, in theory according to texts, a Greek household would plan to store a year's supply, however in practice many households do not seem to have that kind of set up.[131] These daily activities and corresponding spaces are designated as female spaces, *gynaikonitis*, however archaeologically the gendered division is not evident in any of the excavated houses since most spaces in houses appear as functioned for multiple purposes.

Oikos, the primary living room, is often assigned to the largest room of the house where household members are thought to come together, do some work and spend time together. Archaeological evidence shows that the *oikos* is not always the largest room and was very likely a more busy and untidy space with *in situ* fires in some cases and usually with large artefact assemblages pointing at activities ranging from food preparation/cooking to small scale tool production.

[131] Cahill 2002, 169

Similar to work spaces, wet spaces do not have a fixed location in houses and not easy to pinpoint unless there is fixed equipment as stone basins and/or water resistant mortar floors. *Thalamos*, sleeping space, is another challenge since it is difficult to track down based on material evidence, any "empty" room could have been a sleeping space. Domestic cult on the other hand, can be proved with regard to altars and figurines usually recovered in courtyards and sometimes in separate rooms. However, not every site and not every house has evidence for practising religion.

Olynthos is proper example to further discuss spatial organization and daily activities in Classical households since it is one of the few sites that is excavated relatively in extensive fashion and published regarding spatial organization of its households and with attached discussions of social and economic aspects of life in the city; additionally, Olynthian houses with their plan, design, chronology and level of preservation make them stand out as comparison material for not so well preserved but mostly contemporary Burgaz houses.

A typical Olynthos house plot is more or less square, the house is divided into two almost equal parts in an east-west axis, then the northern part further into two sections with a second axis. The courtyard is frequently in the southern half, *pastas* and the main rooms in the northern half of the house, a design choice that Cahill discusses with reference to Xenophon's explanation of pleasant living arrangements where he argues that a south aspect to house could provide coolness in summer and warmth in winter; in addition, this south orientation could also be proceeding from administrative decisions of locating cities towards the cleansing winds of the south.[132]

[132] Cahill 2002, 75

A long *pastas* with pillars to support its roof that runs alongside the above mentioned east-west axis, together with the courtyard act as two main elements linking the rooms to each other, moderating daily activities and social life within the household. The rooms, located around the courtyard and *pastas,* seem to have no hierarchy; there are very few rooms on the ground floor with relatively restricted access.[133]

Regarding use of space, Olynthians, probably like other ancient households, appear to go beyond what was architecturally defined and use their spaces in a flexible fashion; according to artefact assemblages recovered from rooms and their distributions, cooking was not always limited to the kitchen space, courtyard and *pastas* was used for several different activities. Seasons and weather conditions were probably another factor affecting this flexible use of space.[134]

Cahill defines the kitchen space and a group of adjacent rooms as "the kitchen-complex". Roughly the same arrangement, one large room with a fire installation and smaller adjacent rooms, is called "*Dreiraumgruppe*" or an *oikos* by other scholars, whereas Cahill argues that this kitchen organization is peculiar to Olynthos since the pillar partition or the evidence of cooking in the flue are yet to be recovered at other Greek sites. Kitchen-complexes were located in 44 houses at Olynthos, they differ in size and are not always consist of the same features such as the pillar partition that separates the flue from the main kitchen space or an adjacent bathroom but almost all are modest spaces regarding decoration.[135] There is a great variation in terms of artefact assemblages recovered in these kitchen-complexes, however, it is suggested that there are still patterns to aid defining use of space.

[133] Cahill 2002, 75-7
[134] Cahill 2002, 78
[135] Cahill 2002, 153-4

16 of the above mentioned 44 kitchen-complexes have evidence of fire in their flues, sometimes accompanied by cooking utensils, bones or other food remains; flues, where the fire was possibly built immediately on the floor, are interpreted as primary cooking locations in some houses. Table wares or *amphorae* found in some of the flues might point to a possibility that these were stored here to use while cooking. The main room of the kitchen-complex has a built-in hearth in some cases, these hearths bare no evidence for cooking but contain pure ash, only one house had cooking utensils in the main kitchen room. It is suggested that these hearts were used for heating purposes.[136]

The main kitchen room is usually one of the largest rooms of the house, except for a few kitchens excavated at Olynthos that had a stone mortar or some cupboards, these spaces had no permanent features nor bare decoration characteristics of a dining/reception room. As food-related activities are associated with the women of the house and female slaves, the expectation is to find other artefacts hinting at female tasks such as loomweights for weaving and grinding tools for food preparation, however this is not the case in Olynthos kitchens either; out of the 44 kitchen-complexes, only one has evidence for weaving and one other has grindstones, suggesting that the female workspace had to be located elsewhere in the houses.[137]

Despite the main kitchen rooms' lack of corresponding artefact assemblages and their overall "emptiness", with referral to the evidence of fire and cooking in the adjacent rooms/spaces, Cahill defines the kitchen-complex as the primary female activity space.[138] He further explains that out of the 44 excavated kitchen-complexes, 32 of them were located on the side of the house which did not face the street; even though there is no evidence for locks, fixed doors or any architectural restrictions, the location of the kitchen-complex far from the entrance of the house

[136] Cahill 2002, 155-6
[137] Cahill 2002, 156-7
[138] Cahill 2002, 191

should be a deliberate design aiming at privacy.[139] Cahill justifies the artefactual issues with seasonality. Since the city was destroyed by Philip in late summer, the artefact distribution that does not fit with the architectural definitions and the "empty" kitchens must be reflecting the summer settings in Olynthos houses; instead of the kitchens with the cooking fire burning in nearby flues, the *pastas* and the courtyard would have provide more air and better light to do daily household tasks in warm summer days, a theory that correlates with the denser artefact accumulations in these open areas as well as the fact that the flue as a cooking space being easily accessed from the courtyard or *pastas* but not necessarily from the kitchen.[140]

Grindstones at Olynthos are recovered mostly in open spaces and in some cases in rooms adjacent to the courtyard, it is difficult to tell for certain whether they were just stored in these rooms or they were also used there. Grindstones were usually found together with other artefacts implying tasks as weaving, dough kneading, making it possible to identify these spaces as working spaces. Stone mortars and stone kneading troughs are very rare in houses except from one house that appears to have a bakery, most likely because these were expensive objects, their wooden or terracotta versions were found mostly in architecturally unspecialized rooms and never in association with grindstones. Louters were recovered together with grinding tools in a number of houses, usually in open or semi-open spaces; louters are multi-purpose objects, the range of activities that could be attached to them includes washing, ritual use if found in context with ritual objects like portable altars, kneading dough or other kinds of food processing.[141]

In any site, archaeological evidence for weaving almost fully consists of terracotta loomweights since the wooden looms do not survive, with careful consideration of how many loomweights as a group and in which setting could be representative of

[139] Cahill 2002, 192
[140] Cahill 2002, 160-1
[141] Cahill 2002, 163-8

an actual loom *in situ*, it seems any space that is not an *andron*, a flue, a bathroom or an entrance was used as the weaving space in Olynthos houses. 25% of these spaces are open spaces, the rest are closed or semi-closed spaces adjacent to a light source or the courtyard/*pastas*. Cahill explains this spatial preference arguing that closed spaces might have been safer to protect unfinished work and more predictable regarding weather conditions, cooler in summer and easier to heat in winter. Furthermore, he adds that these weaving spaces does not seem to be organized with privacy or seclusion in mind, some are quite close to the entrances of the houses.[142]

Androns were completely empty of any artefacts when excavated at Olynthos, very possibly a result of how the city was abandoned or as Cahill claims, symposium ware at Olynthos was made of metal and everything was either taken away by the fleeing Olynthians or looted by Philip's army.[143]

Olynthos is subject to a recent archaeological pilot project with the aim of trying to reconstruct patterns of household activities by using new methods and techniques accompanying the traditional study of architecture and artefact distribution analysis. As part of this aim, House B ix 6 on the North Hill of Olynthos has been selected as a representative of a typical Olynthian house with its features detected in geophysical survey and fully excavated.

Architectural evidence revealed that the house was organized around a cobble-paved courtyard, a *pastas* in the northern side and a series of rooms behind, a room on the left side of the entrance fits the previous descriptions of *andron* location and dimension-wise even though it does not have a cement or mosaic floor but does have ashlar walls facing the street, an L-shaped space was revealed on the right side of the entrance which might have had a roof but was not separated from the

[142] Cahill 2002, 169-78
[143] Cahill 2002, 180-90

courtyard by walls. This L-shaped space, although not preserved as well as the rest of the house, contained 51 loom weights. The large space on the far north of the house, on the left corner, is considered first to be a kitchen, then the main living space since the small structure made of terracotta panels at the centre of this space had no traces of burning, no ash or charcoal was visible that could be linked to it. Multi-element soil analysis of this structure is undergoing, to be able to discuss its function.[144]

According to preliminary observations regarding artefact distributions, pottery is the largest group found in House B ix 6, followed by loom weights, iron and bronze nails, and coins. The terracotta structure in the proposed main living space, even if it was not used for heating/cooking purposes, still could have had a similar function since a range of food-related ceramics were found around it. Another group of ceramics are red figure lekanis lids that were found together with bowl fragments, distributed across four different rooms on the northern part of the house, possibly fallen from the upper storey rooms.[145]

26 soil samples collected from a part of the *pastas* and from the corner of a room with direct access to *pastas* were subject to phytolith and starch extraction, geochemical multi-element analysis and spot tests. Starch was present in five of the 26 samples, almost all from the room whereas phytolith preservation was extremely poor, no morphotypes were identified. Geochemical analyses resulted in minimal differences between the room and the *pastas*; sodium was below detection limit in almost all samples; however, strontium concentration was higher in the room than it was in the *pastas*, suggesting preparation of foods rich in strontium such as dairy products, leafy greens but excluding legumes and sea salt since these two are rich in sodium as well. The team argues that spot tests might indicate different activity areas considering there is variety in the results, samples from the *pastas* are richer in fatty acids, protein residues or phosphates, however the sampled area is too small

[144] Nevett *et al*. 2020, 358-60
[145] Nevett *et al*. 2020, 360-1

to generate activity distributions at household level.[146] A preliminary observation based on micro-debris studies and faunal analysis suggests that *pastas* and flue were mostly used for food preparation, a range of meat was processed and consumed at the house.[147]

As for archaeobotanical evidence, the team selected a representative assemblage from trench TT23 to discuss environmental conditions and subsistence economies. The assemblage roughly consists of three groups; crops as cereals and pulses, fruits dominated by olive stones but also figs and grapes, and wild or weed taxa as small grasses and small legumes probably as parts of dung fuel. While some of these wild species indicate dry environments, some represent moister territory. The olive stones are found associated with pine nuts and sesame seeds, the latter two have not been recovered anywhere else at Olynthos so far.[148]

This new and integrated framework that approaches the city of Olynthos as a complex urban space and Olynthian households as active participants in social and economic production will surely provide new perspectives and create new platforms for further questions and interpretations which we will discuss in the following part.

Although most sites are poorly published, Crete provides a valuable perspective regarding housing in the fringes of the Greek world. In general, the mountainous landscape appears as the primary factor shaping the city planning and spatial organization, as seen in the linear architecture throughout the island. (See Figure 6 for house plans in Lato, Crete.)

[146] Nevett *et al*. 2020, 363-4
[147] Nevett *et al*. 2017, 202
[148] Nevett *et al*. 2020, 369-70

Trypitos in East Crete was occupied between the second half of the 3rd century to the first half of the 2nd, excavations revealed a number of building clusters each with two-three structures, set on a coarse grid settlement plan since the topography here is relatively flat and permitting.[149] Houses are smaller than the ones in mainland Greece and do not have interior courtyards; the ground floors are divided into two, living quarters and side rooms, some houses have evidence of stairways leading to an upper floor.

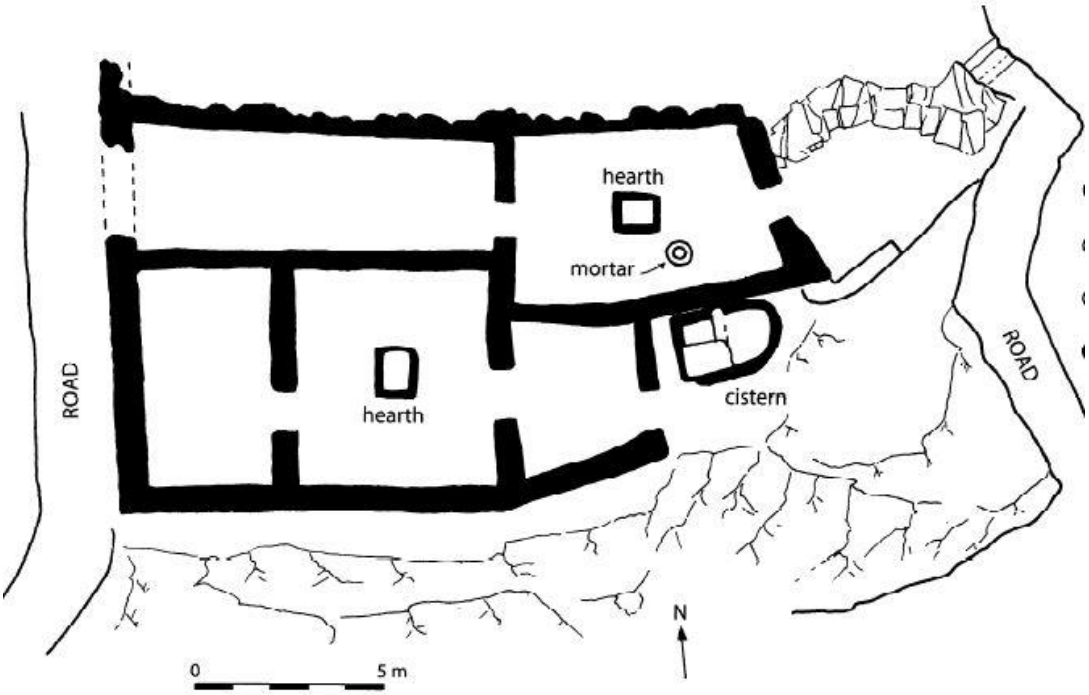

Figure 6: Two adjacent houses with central hearths in Lato, Crete. (Westgate 2007:431)

[149] Vogeikoff-Brogan 2011, 411

Living quarters consist of two interacting rooms with one of them as the main room usually with a hearth, side rooms are located at either end of the house; access to the living quarters is usually -though not always- either through an anteroom or a long narrow and sometimes angled corridor, suggesting an attempt at blocking direct access in some houses. However, there is no evidence for any gendered spaces.[150]

As for spatial organization, one cluster with three buildings hints at a small commercial quarter within what looks like a residential neighbourhood. All three buildings, one of them a single-roomed building, have direct access from the street; artefact assemblages include transport *amphorae*, large pithoi, loomweights, a stone grain mill. (Figure 7) Two rooms from two separate buildings have features which could be functioned as tables, one of these rooms also has benches along its east and west walls.[151]

A building within the neighbouring cluster has a stone paved area in front of it, an elaborately constructed doorway leads inside to the three rooms, the largest room with the highest tableware concentration of the site. Combined with the lack of storage ware in the largest room, the discussion about this house and especially the largest room questions whether this was an *andron*, whether this house was owned by a well-off person. Textual sources mention the communal dining traditions of the Cretans but there is not enough archaeological evidence to support it, this building at Trypitos might suggest a re-evaluation of social life backed up with further research.[152]

At Leukas, established as a Corinthian colony in 7th century BC in northwestern Greece and possibly slowly abandoned during the 1st century, several houses were excavated during the past couple decades and studied in detail in connection with

[150] Vogeikoff-Brogan 2011, 412
[151] Vogeikoff-Brogan 2011, 416-7
[152] Vogeikoff-Brogan 2011, 417-8

spatial use. The Hellenistic House AII.6, located near the center of the town, was built in late 3rd-early 2nd century with a two-part courtyard and seven rooms positioned east and west of it; the house later went through a modification in the 1st century when three rooms were added to its eastern side from the adjacent property.[153]

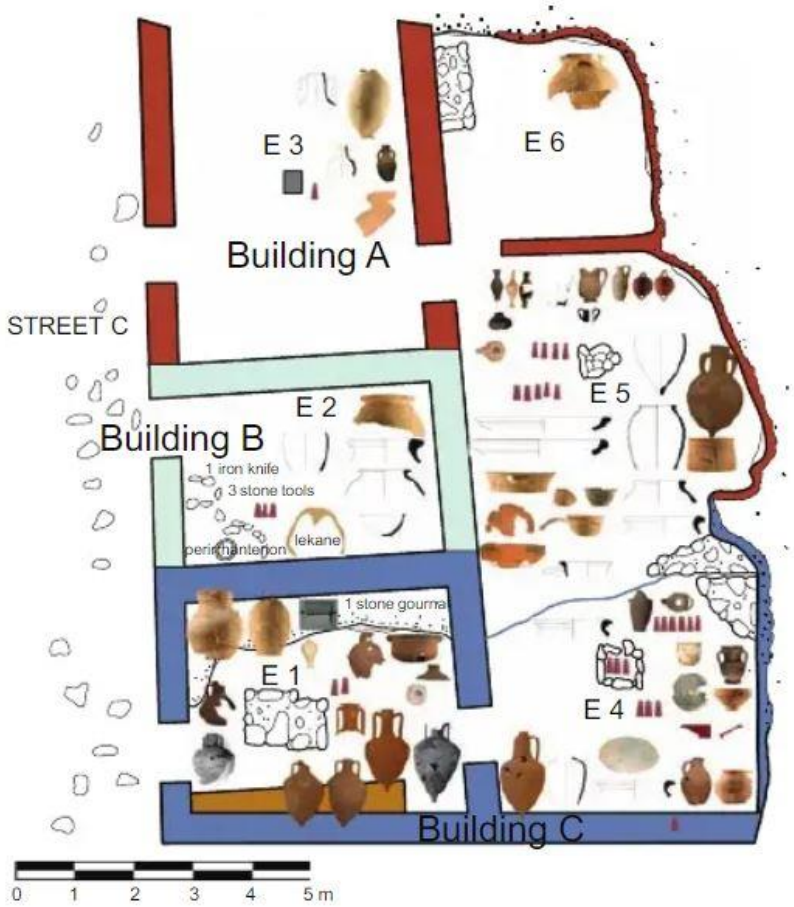

Figure 7: A building cluster in Trypitos Crete, with artefact distributions. (Voigekoff-Brogan 2011, 415)

[153] Fiedler 2005, 101-4

The study is based on architectural analysis, statistical analyses of artefact distribution room by room and artefact densities across the house. Pottery recovered from the house is divided into two groups; fine ware, cooking ware/plain ware, which is then used in determining the function of rooms.

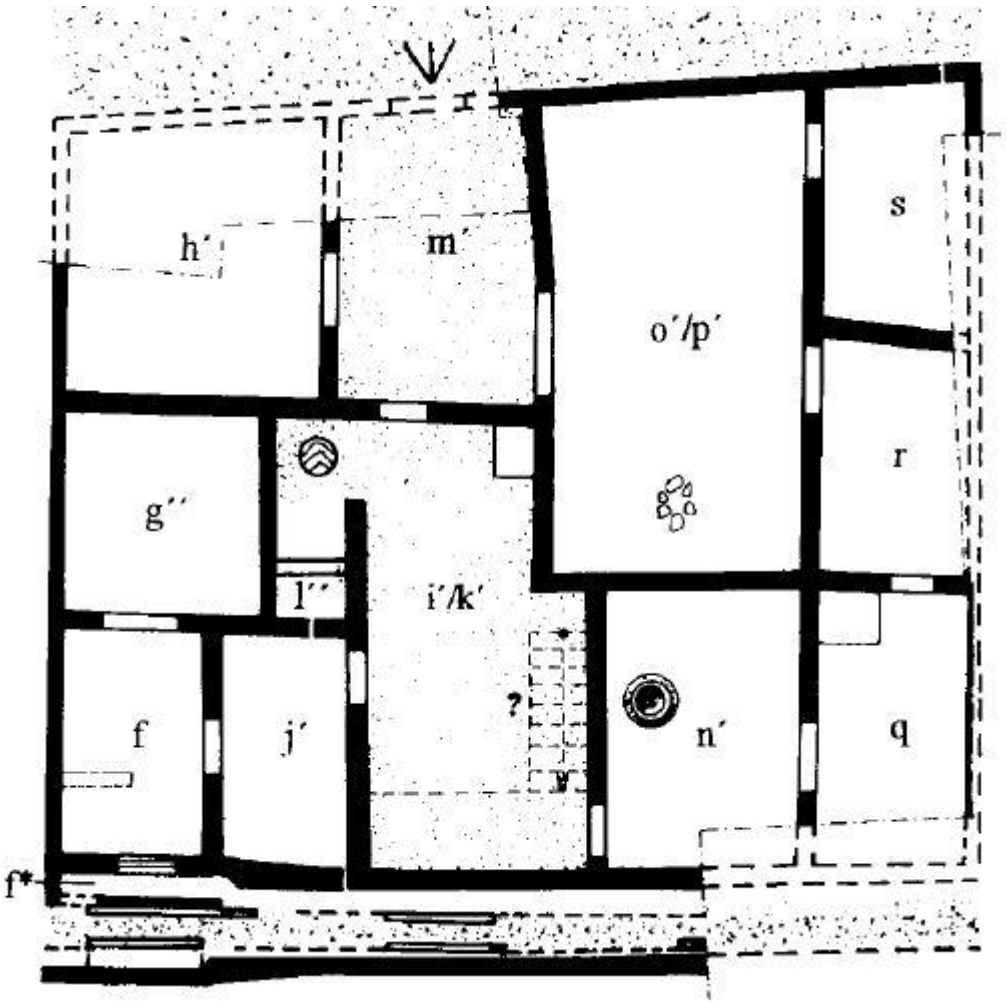

Figure 8: House AII.6 in Leukas. (Fiedler 2005, 105)

The largest room is identified as the *oikos* of the house. It contains a heart, a wide doorway, a large window facing the street, walls that are painted with coloured plaster and a series of artefacts hinting at possible daily activities. Loomweights, spindle whorls, bronze needles are associated with textile production; millstones, a finger-pestle, two mortaria, cooking vessels, all essential to food preparation; *amphorae,* jars, plain ware pots for storage; the highest percentage of fine wares in the house recovered in this room points at the room being used as a dining room; fishhooks, chisels, an axe and flint tools suggesting a space to store outside work tools.[154]

The study further identifies a bathroom since the room has a water resistant mortar floor, even though a basin is absent; the kitchen with a hearth in a corner and ashes mixed in its earthen floor, where cooking ware constitutes the highest percentage of recovered pottery followed by plain bowls, plain ware jars, flasks and *amphorae* but very few fine wares; a storage room at the back of the house, accessed through the kitchen, with a pithos and a high percentage of plain and cooking wares; a washroom with its entrance close to the well and a basin that is connected to the main drain; a second living room or a possible *thalamos,* a remote and very dark room with no access to daylight or fresh air, with painted plaster walls, bronze tool fragments, bronze vessels, fine wares such as small bowls and small jars as well as plain wares; the *andron* is identified solely based on the architecture since its assemblage classifies as post-abandonment, it is located near the street entrance, with red and white plaster walls, a double winged door and a stone threshold; the courtyard has a stone bench, a well, very few pottery but a high concentration of spindle whorls as well as bronze needles, loomweights and a few millstone fragments, suggested as an alternative work space in nicer weather.[155]

The rest of the rooms remain with no definite function attributed to them, mostly because they were found empty of artefacts or the distribution of very few artefacts

[154] Fiedler 2005, 107-10
[155] Fiedler 2005, 110-3

would not suffice for a definition. Lack of artefactual data, if the room has also no particular architectural feature that would aid the functional interpretation, creates "ghost rooms" in the houses.

Similar to mainland Greece, archaeological research focusing on 5th-4th century domestic contexts is very limited in western Anatolia. Very few sites have their residential quarters excavated, houses published with their entire assemblages are fewer, detailed spatial analysis of households is a rarity. 5th-4th centuries were a period of moving of the cities, rebuilding and reorganization. Persians captured Sardis in 546 BC, changing the dynamics in Western Anatolia dramatically. The reaction came as the Ionian Revolt between 499-494 which the Persians brutally quashed. Some cities shrunk and survived but some were heavily damaged throughout the Persian invasion in the 5th century; some Ionians abandoned their homes and resettled in different locations, some of the old cities were never reoccupied.[156] At the same time, Ionian cities in the Menderes Valley had to deal with massive alluvial accumulations and severe silting up. Some cities were affected significantly by neither but still moved their cities to a new location or reorganized their old cities following new grid plans, possibly due to new socio-economic developments.

Priene in the Menderes Valley is founded in mid-4th century BC with a grid plan and equal plots for north-south oriented *prostas* style houses. (Figure 8) There are recent debates about equal insulae not necessarily meaning identical houses; the initial phases might be identical, but Priene houses surely went through alterations later towards the end of Hellenistic period; neighbouring plots were added to houses, peristyle courtyards started to appear, at the same time some houses got smaller. A typical 4th century long and narrow Priene house has a central open courtyard bordered by a total of three to four rooms on its northern and southern sides, the south facing *oikos* is on the northern end of the house entered through a

[156] Ersoy and Koparal 2012, 27

prostas, a square plan *andron* is usually on the northern side as well with access through the *prostas*. On the southern side of the house one or two rooms are located, larger room is defined as a shop. Some houses have evidence for stairs, the second storey is thought to be placed above the *oikos* and *andron*, these two or three extra rooms upstairs were used as a *thalamus* and *gynaikonitis* as suggested by Hoepfner and Schwandner.[157]

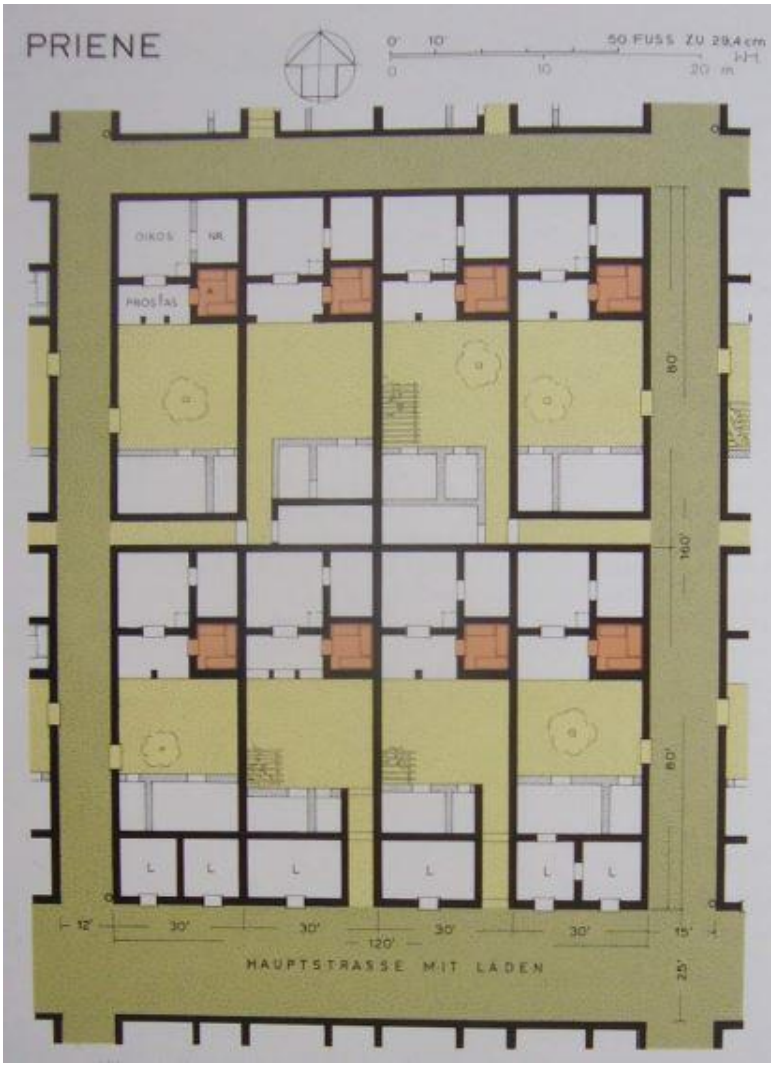

Figure 9: Reconstruction of an *insula* in Priene. (Hoepfner and Schwandner 1994, 176)

[157] Hoepfner and Schwandner 1994, 173-4

Priene's neighbour about 25 km south is Miletos, rebuilt after Persian destruction in 494 BC following a grid plan. As Greaves argues, the lack of modern excavations of domestic housing *insulae* causes a blackout regarding social and economic activities of households of post-Archaic period; there is very little data from any phase earlier then Hellenistic period.[158] Magnesia am Maeander is located 24 km northeast of Miletos, in Ionia as well, without belonging in the Ionian League. Both the 19th century excavations and the Ankara University excavations since 1984 have focused on non-domestic monumental buildings.

Latmos is a pre-Hellenistic Carian city, moved to a nearby location in 4th century, rebuilt and renamed as Herakleia. Both cities were extensively documented during a regional survey, not excavated. Buildings at Latmos are not well-preserved, the building materials were removed and reused at building Herakleia. The houses at Latmos are built in and on the rocks, the rocky environment was intensively incorporated in construction.[159] More than 100 houses are observed during the two-decade survey, all have rectangular plans with few exceptions, all have courtyards; there are single room and multi-room houses, as well as house complexes consisting of multiple houses. Most are single storey, some have second storeys; excluding the courtyard, the dimensions of the houses vary between 20 to 100 m².[160] The most striking contribution Latmos makes to what we know of late Archaic and Classical period housing are the "rock houses". Single room or multi-roomed with enclosed courtyard, these houses are built in between large rocks; rock façades are used as walls, conveniently involving the landscape into architecture.[161]

Ephesus was moved to its new location early 3rd century BC, older phases of the city are covered by thick alluvial deposits, below the modern water level or disturbed by later structures. New research has started to explore pre-Hellenistic

[158] Greaves 2005, 131-2
[159] Peschlow-Bindokat 2014, 99-102
[160] Peschlow-Bindokat 2014, 109-10
[161] Peschlow-Bindokat 2014, 111-16

Ephesus, including residential quarters, however no conclusive data is available yet.[162]

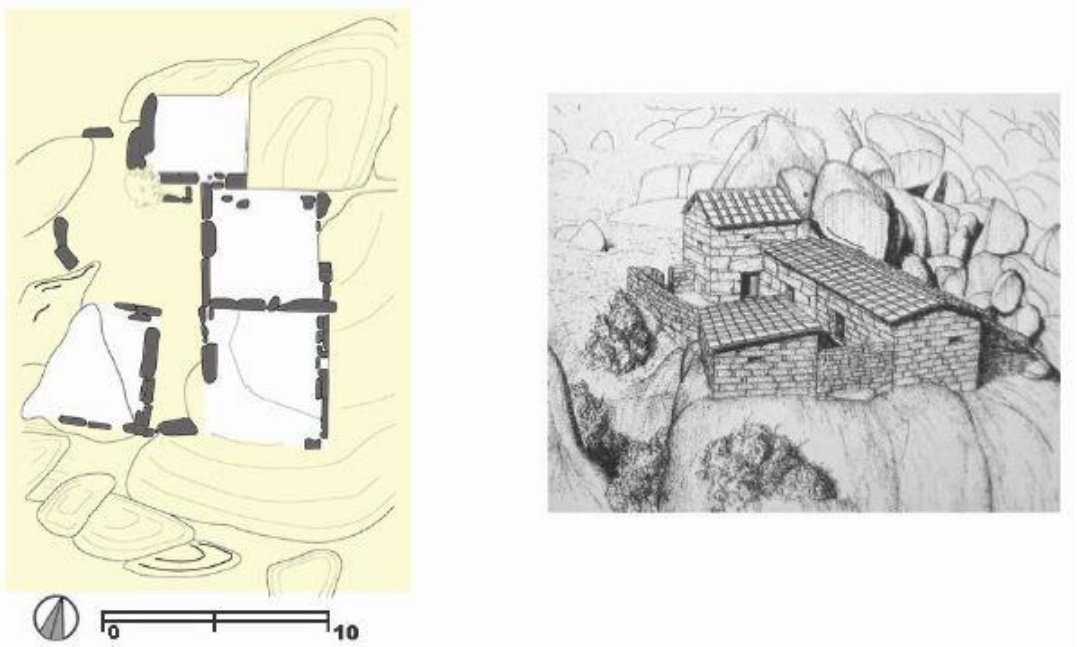

Figure 10: Latmos rock house plan and reconstruction. (Gönül 2008,138)

Kolophon, situated just north of Ephesus, was excavated in 1920s and published in 1940s; the main focus of this campaign was the acropolis, a portion of the residential quarters were excavated too revealing courtyard houses and paved regular streets.[163] Kolophon too was reorganized in late 4th century BC, houses were altered into *prostas* style, a grid system was explored while keeping the Archaic house plots, although the transformation seems to have left unfinished.[164] The few houses excavated 100 years ago are similar to other late Classical-early Hellenistic

[162] Kerschner 2009
[163] Gassner *et al*. 2017, 44
[164] Gassner *et al*. 2017, 77

houses of Priene; three-four rooms accessed from a central courtyard, a decorated *andron*, a second storey in some houses where *gynaikonitis* and *thalamus* is thought to be located.[165] Holland describes features made of clay bricks on the floor of *prostas* spaces in his 1944 article and suggests these were used as hearths or ovens.[166] Olynthos and Halieis too have evidence of cooking in their *pastas* and/or flues.[167] A survey project conducted between 2011-2014 at Kolophon mentions street grids with *insulae*, with houses possibly dating to late Classical-early Hellenistic considering the spatial organization of individual houses, although the overall organization of the quarter remains unclear.[168]

Old Smyrna (Bayraklı) has been continuously occupied from 11th century BC to 4th century BC and is being systematically excavated since 1948, except for a break between 1951-1966. The older periods are represented by curvilinear planned buildings, by late 7th-early 6th century square/rectangular planned buildings started to appear.[169] Akurgal mentions a large number of artefacts dating to 5th century but no structures/type-houses; dense occupation during the 4th century to be published in a following volume.[170] That volume was never published, the published material does not have artefactual information; 5th-4th century domestic housing does not seem to be of primary interest ever since, some architectural phases might have been excavated and removed to reach older levels. Even post-2015 studies still refer to Akurgal's very brief description of 5th-4th century Old Smyrna; the settlement has a grid plan, 7th century megarons have evolved to two-three roomed houses, one of these houses has a possible courtyard.[171]

[165] Holland 1944, 123-147
[166] Holland 1944, 136
[167] Nevett 1999, 171
[168] Gassner *et al*. 2017, 50,77
[169] Ertüzün and Tanrıver 2017, 519
[170] Akurgal 1983, 49-50
[171] Akurgal 1983, 50-1

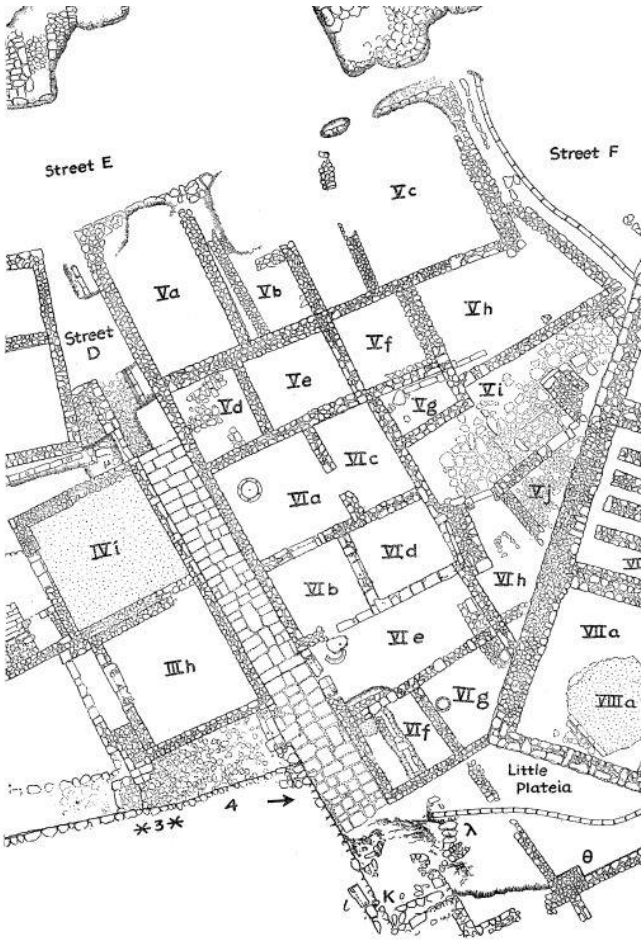

Figure 11: Kolophon residential quarter with paved street running along. (Holland 1944,175)

Klazomenai was also occupied continuously since the 11th century BC, its late 5th-4th century north-south oriented houses are of two types according to Özbay; type 1 is a rectangular plan *prostas* house with its almost equal sized *oikos* and plastered walled *andron* side by side on the north, a *prostas* separating *oikos* from the large central courtyard, a fore room providing entrance to the *andron*, workshops/storage rooms on the southern side. There is a well in the courtyard and the entrance to the house is a door located on the street facing wall of the courtyard. Klazomenai type 1

house are among the largest *prostas* houses with its 340 m² size.[172] Type 2 house is very similar in plan to type 1, a main difference is *oikos* being larger than *andron*, yet these two spaces are again side by side on the northern side of the house. Instead of a fore room before the *andron*, there is now a service room in this location, a large buried pithos in this service room is interpreted as the space being used as storage on usual days when there are no guests to entertain.[173]

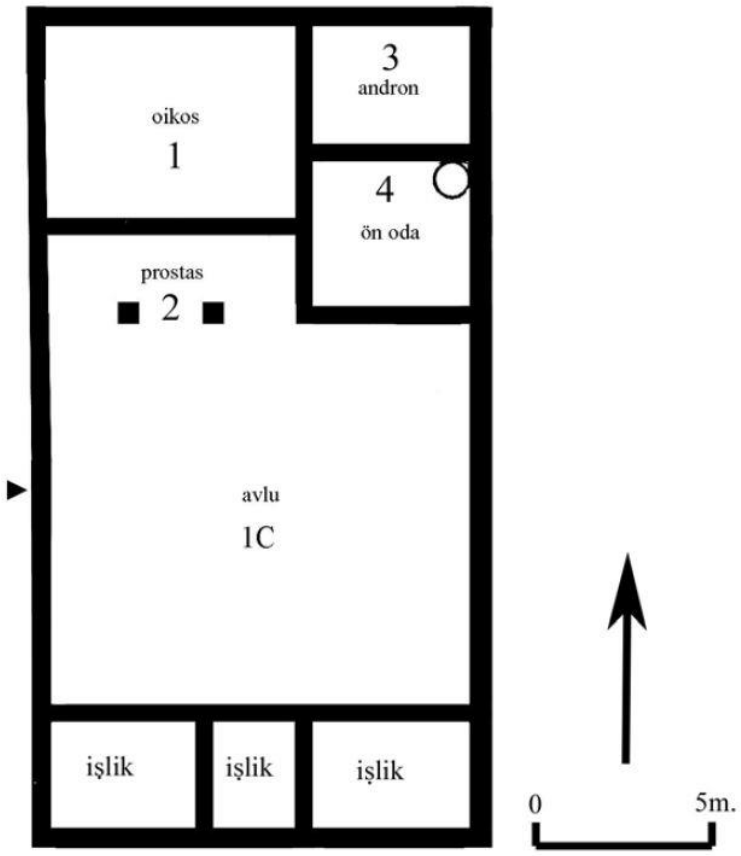

Figure 12: Klazomenai type 2 house plan. (Özbay 2018, 124)

[172] Özbay 2018, 112-14
[173] Özbay 2018, 114-5

Larisa (Buruncuk) was briefly excavated in 1902, then for three seasons in 1930s with a focus on the city's acropolis. Larisa has a long history of occupation dating back to Neolithic period, however in terms of built structures, the only evidence is the partially excavated building complex inside the acropolis, city walls and the Temple of Athena. Started as a detached megaron in late 6th century, the structure was altered with additions during the 5th century into a large building with several rooms surrounding a peristyle central court.[174] The residential quarters are believed to be located south of the acropolis, an İTÜ architectural survey since 2010 aims to explore and document the 6th to 4th century urban organization of Larisa.

Düzen Tepe, mainly occupied between 5th to 2nd century BC, is located 1,8 km from late Hellenistic-early Byzantine Sagalassos. The settlement appears to have a rural economy and does not seem to have a regular city plan, there are building clusters connected with a network of roads; the northeast-southeast orientation of buildings could be related to climate, not necessarily to city planning.[175] Three types of buildings are documented so far; single-room buildings and long buildings with several rooms in a row at the edges of the settlement, multi-room buildings in the center, the reason for this layout yet unclear.

A Classical-Hellenistic courtyard building at Düzen Tepe was excavated after an intensive survey of the settlement and studied in detail. The geochemical study results will be discussed in Chapter III. The courtyard building consists of 9 rooms surrounding an L shaped open courtyard, possibly nine single-room buildings from an earlier phase transformed into a courtyard complex. Almost every large room has a hearth in one corner, there is evidence of fire in the eastern part of the courtyard and in the southern open space; the position of fires within the spaces and carbonized grains found in some of them suggest inside and outside cooking activities. Two refuse pits, one in the courtyard and another one just outside of a western room, are interpreted as primary deposition places for butchering/food

[174] Gönül 2018, 60-1
[175] Vyncke and Waelkens 2015, 162-3

preparation since the pits contained large animal bone fragments and other fragmentary faunal remains. One room, Room K, has three holes cut into the bedrock, possibly for storage vessels; the rest of the rooms all bore artefactual evidence for all daily household activities as cooking, weaving, playing. The courtyard and the southern open space just outside the house should have been used as open-air workspaces.[176]

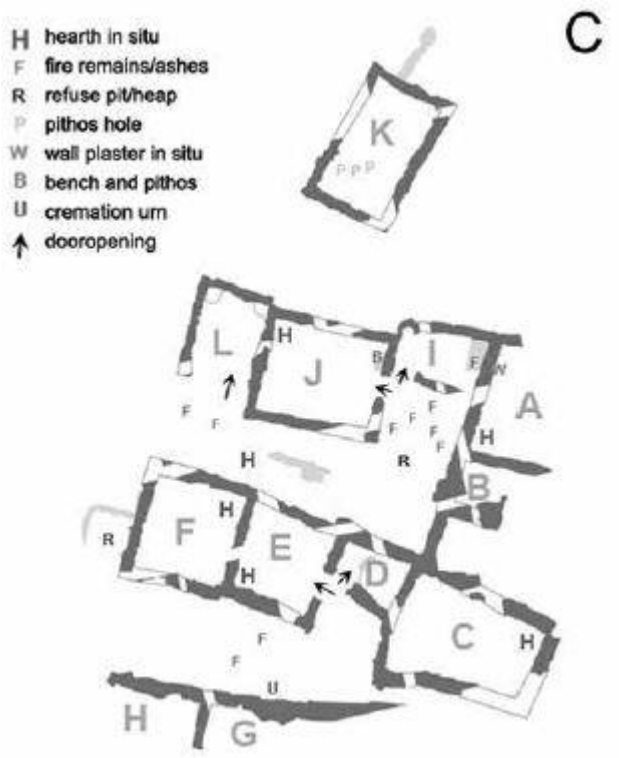

Figure 13: Düzen Tepe courtyard building with feature locations. (Vyncke and Waelkens 2015, 165)

[176] Vyncke and Waelkens 2015, 164-6

Considering the results of the geochemical analysis applied to Room F, as well as the general state of findings pointing to no functional division between the rooms except one storage room, Vyncke and Waelkens suggest that the courtyard building was not a single household, but a complex of several housing units and the courtyard served as a common space.[177]

While house designs are affected by a set of factors both physical and socio-cultural, social and cultural customs too determine a great deal about domestic architecture. Architectural design and elements, decorations, fixed/mobile furniture and findings reflect practical requirements, cultural values and behaviour, as well as functional use of particular spaces as work rooms, bathrooms, storage and *androne*s. Kitchens on the other hand, are usually difficult to pinpoint based on architectural features only.[178] What we achieve by architectural study of houses is a hierarchy of rooms relying on their size, location, decoration, accessibility and an evaluation of how the rooms are organized; are they placed around a courtyard, around two courtyards or are the rooms placed in groups? Studying artefacts and their distribution in spaces offer a significant comprehension regarding use of space although they are not really archives of domestic behaviour and they are affected by site formation and abandonment processes. Another aspect is the multifunctionality of objects; it is a challenging task to assign an object to a particular activity or user.[179]

2.4. Discussion

Although the roots of archaeological interest all over the world are to be found more or less in the same places: public buildings, palaces, temples, beautiful objects and grand narratives, compared to other fields in archaeology such as Mesoamerican

[177] Vyncke and Waelkens 2015, 167-8
[178] Trümper 2011, 35
[179] Trümper 2011, 35

studies or prehistoric research in Mesopotamia and Anatolia, Classical archaeology seems to be only recently picking up the pace regarding the application of new methods and techniques in combination with traditional methodology in order to answer social and economic questions, to search for the common people and their daily lives, as well as to widen the set of questions towards the reconstruction of past living spaces in their full vividness. Applying new methodology aside, many old and newer projects has ignored to properly excavate, record and publish domestic artefact assemblages in their entirety.

Instead of separations, strict divisions and bold oppositions regarding spaces, recent research of domestic architecture in Classical Greece tends to focus on the unity of the house, how the spaces were arranged and how those spaces were interacting with each other, as well as on the social use of space. The existence of a male space does not necessarily mean that there is a corresponding female space as an opposite, women seem to have used the rest of the house for daily activities, the separation probably was designed for male visitors preventing them from access past the *andron*. A similar re-thinking could be applied to kitchen spaces; it is possible that looking for kitchens based on what we perceive a kitchen is with our modern-day perspective might be misleading.

The lack of permanent, easily architecturally defined and uniform kitchens is a common phenomenon in ancient Greek houses. It appears that different rooms and spaces were used for cooking activities, probably according to weather conditions and depending on what type of dining it was going to be, a family lunch or a formal dinner with guests for instance.[180] This spatial flexibility dramatically decreases archaeological identification of cooking spaces/kitchens. Another feature that adds even more mobility to cooking is braziers or any other mobile fire installations which could be used for heating purposes too.

[180] Cahill 2002, 162

A comparison between approximately contemporary houses dating to early 5th century BC from Olynthos, Athens and Halieis suggest that while they are all structured to support the same social principles, they do it in different ways, even within the same city. Athens, keeping in mind that only a few houses near Agora have been entirely excavated, does not have *androne*s and bathrooms as frequently as at Olynthos but has a large variety of house sizes and plot shapes unlike Olynthos. Five published houses of Halieis are each of different sizes, two of these houses when excavated fully displayed different interior layouts but have very similar *androne*s and food processing features.[181] This diversity could be a result of socio-economic differences between households, the number of household members under one roof, whether the city was grown organically on old plots or built from scratch; however at Olynthos, a freshly built city, despite the very evident uniformity in grid planning and house plots, there is still a diversity, maybe not as apparent since the city had a rather short life, occupied only for two or three generations before it was destroyed. It is also argued that the uniform city planning seen in the newly built cities might be related to the building of a large number of houses in a short time period because of *anoikismos* instead of *isonomia*, at least in case of Olynthos.[182]

Regional and environmental factors also result in architectural and design related variation. Houses in western Greek mainland have a larger room with a hearth and an exterior courtyard, a design choice quite possibly due to the colder climate, higher elevation and heavier rainfall peculiar to this region. Courtyard houses are very rare in Crete too, hearth rooms are more commonly seen; house plans display a linear character, there is limited partition and a large main room usually with a permanent central hearth dominates the house. It is argued that the difference in house organization may imply a different way of life; with the absence of a courtyard, the hearth room providing heath and light possibly was the busiest room where the household did most of their daily work and spend their time. There is also

[181] Nevett 2015, 143-5
[182] Nevett 2015, 146

some evidence of female-related domestic work such as stone mortars for grinding found in front parts of the houses and sometimes even outside the houses. Guests were probably entertained in this hearth room as well, in most houses one has to pass through a number of rooms to reach the hearth room, in some houses the entrance directly opens to the main room; all suggesting that privacy and the social norms regarding women probably was perceived differently than it was in the courtyard houses of the same period. The linear organization of a small number of rooms and the lack of partitions could also imply the absence of slaves, or again the relationship with slaves was different. However, the modesty of Cretan houses and their plainness in terms of decoration possibly points out to economic conditions as well.[183]

A recent architectural study focusing on Olynthos and Priene houses argues that these houses were designed with consideration of local climates following principles of what is known today as passive solar architecture and the main source for heating at ancient Greek houses was the sun.[184] The houses are south facing at both cities; at Olynthos the southern side of the house is single-storey as opposed to the two-storey northern part whereas at Priene the northern part of the house, the main room is elevated, both design choices let the winter sun warm up the courtyard and the façade of the rooms. The *pastas* at Olynthos and *prostas* at Priene, the colonnaded semi-open spaces between the courtyard and the rooms act as climate control elements providing shade during warm months for daily work as well as preventing the sun from directly heating the rooms in summer when the sun rays hit with a steep angle but allowing winter sun with a shallow angle to heat the façade of the rooms.[185]

Research shows that at Priene the temperature usually does not drop under 3-4°C, the city is up to 5°C warmer all year than Olynthos; Sinou further argues that this

[183] Westgate 2007, 446-8
[184] Sinou 2011, 49
[185] Sinou 2011, 53-9

climatic difference resulted in subtle variations in architecture in these cities. Olynthos house plans are usually wider compared to deep and narrow Priene house plans, possibly because the hotter climate at Priene made the need for cooling during summer months a priority while Olynthos houses benefitted from their wide south façades during cold winter months. The building material reflects climatic conditions too; sun dried bricks at Olynthos would provide better insulation and thermal conductivity in winter than the stone walls at Priene.[186]

Old Smyrna still stands as a benchmark for discussions of evolution of domestic structures in western Anatolia, a pretty much linear progress from single-roomed curvilinear houses to rectangular, multi-roomed courtyard houses, parallel to social changes in the Greek world. However, pointing to Klazomenai as an example, Ersoy argues that this architectural transition did not happen simultaneously throughout the entire region, the single-roomed apsidal houses built in the Late Archaic at Klazomenai hints at a variety of processes at different sites, possibly a result of local traditions and conditions.[187] The suggestion Ersoy brings up is clear; instead of the linear model of development and the all-inclusive perspective towards these houses, a pluralistic approach with careful consideration of individuality is needed.[188]

Multiroomed houses with a courtyard appears as a frequently applied house plan in ancient Greek world but a more common aspect of these houses is how they were built to benefit from the climate and to adapt to their environment. Not all Burgaz houses have courtyards, some are smaller, linear houses with what looks like spatial divisions instead of enclosed rooms; settlements as Latmos and Düzen Tepe are examples for different housing strategies, alternative lifestyles. Another common aspect regardless of city layout and house plan seems to be how multifunctional these domestic spaces were throughout the Greek world; most rooms were used for

[186] Sinou 2011, 62-3
[187] Ersoy 2004, 59
[188] Ersoy 2004, 60

more than one purpose, mobile fire installations are almost present at every site as well as non-fixed domestic work appliances like grinders, basins. Ancient Greek domestic spaces appear as very busy, always rotating, not very tidy living contexts.

Another aspect that is traceable in most sites is the changes in houses towards assumingly a more public usage, from Classical period towards Hellenistic. The ancient Greek house, not immune to social status and social changes but a display case of them, seems to be a product of traditions, adaptation to topography and climate, individuality and choices. Type-houses and architectural categorization would perhaps be more useful if constructed as platforms to stimulate further discussion with plenty of space for variation. Or, as Ault has suggested, we need to separate type-houses from house types; type-houses are site-specific whereas house types are a broad occurrence.[189]

The conditions surrounding a city's abandonment plays a significant role on artefact distributions, ultimately affecting spatial studies of domestic spaces. Burgaz, as mentioned before, was abandoned gradually and slowly unlike Olynthos where the city went through a siege and then was sacked and consequently looted by soldiers and possibly later by survivors and neighbours as well. Cahill discusses the before and after of the sacking of Olynthos in detail related to the changes in house contents.[190] Some inhabitants foresaw the threat, sold their houses and moved away while some houses must have been abandoned in a rush just before the siege, very possibly turning into dumping areas and mixed contexts archaeologically. For the Olynthians who remained in the city during the siege, life must have been altered to fit the new conditions, some could have brought relatives, slaves and belongings from their countryside houses thus crowding the households. Food storage was highly likely the main concern. Immediate looting after the city's fall caused valuables as metal objects and coins to disappear from the archaeological context, food was possibly looted by the soldiers too, leaving most pithoi empty. In the

[189] Ault 2000, 484
[190] Cahill 2002, 48-9

meantime, some Olynthians were hiding their valuables in one last attempt, putting them in unusual contexts where these items would not be stored normally. Later lootings and salvage attempts involved moving of larger and sometimes permanent features from their original locations, grinding stones, pithoi, bathtubs and worked stone blocks were taken to be re-used elsewhere, leaving behind empty slots.

On a final note, even though their results are yet preliminary, and it is described as a pilot study, the new Olynthos project is a fine example of what Classical archaeology can aim for when equipped with up-to-date techniques and strategy. The questions raised by the project, concerning both the city with its entirety and individual households, propose an integrated framework. A long time and widely excavated city as Olynthos still possessing potential to answer questions is in fact very promising for other ancient Greek cities, old and new archaeological projects. The new project takes the city as a dynamic space and by using intra-site field surveys and geophysical surveys tries to explore flow of population, variations in the use of space of its different parts within its borders, city layout and function of larger areas, urban economy through markets and agora, social implications of spatial compositions from large scale city planning down to domestic structures, city boundaries, to what extent Olynthos river was controlled and exploited, a possible countryside and how densely populated it was if it existed, and finally the circumstances surrounding Olynthos' destruction.[191]

On the household scale, the questions revolve around subsistence practices, selection of consumer goods including their variety and origins, economic strategies by range and scale of production, patterns of activity in and around the houses and changes to these patterns through time. Houses are also being investigated in terms of their level of representation of their respective neighbourhoods and their ease of access to public facilities, communal spaces, religious buildings. The methodology for household research includes finds processing and analysis, faunal analysis, thin

[191] For project framework, see Nevett *et al.* 2017.

section soil micromorphology, ICP-AES multi-element soil analysis, floatation and micro-debris analysis. This archaeological tool kit could allow locating spaces of domestic activities and further investigating the possibility of matching particular activities with particular groups gender- and age-wise, along with exploring the use of space in upper storeys.

CHAPTER 3

BURGAZ

3.1 Introduction to the Site

Burgaz is located 2 km northeast of modern Datça İskele, in the Cnidian Peninsula. (Figure 14) The site is 12 m above the sea level and extends towards the plateau between the hills, opposite direction of the promontory. The promontory is about 400 m long, bordered by fortification walls dating to the 1st quarter of 4th century BC according to the masonry.[192]

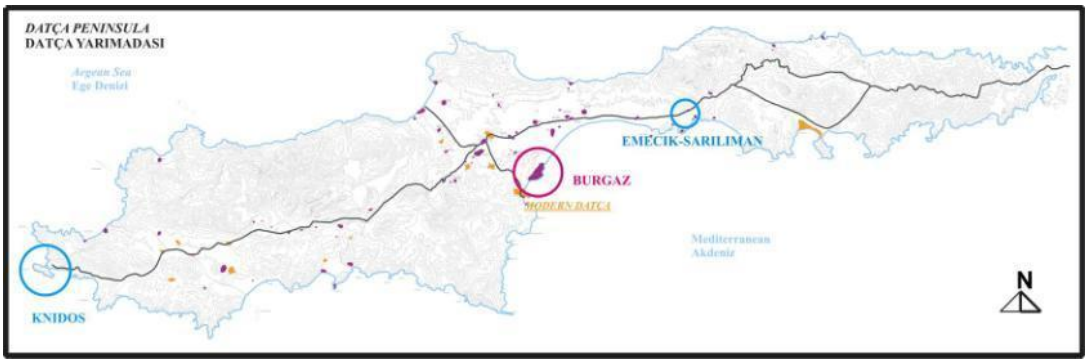

Figure 14: Map of Datça Peninsula. (Burgaz excavation archive)

[192] Tuna *et al*. 2009b, 519

Burgaz is located on a conglomerated formation that runs parallel to the sea and the surrounding hills are of calcareous formation. The Archaic necropolis is discovered on these hills, near Burgaz, however it was heavily disturbed by illegal digging. The Late Classical necropolis, situated on lower parts of the hills towards modern Datça, shared the same destiny and was destroyed by urban expansion in late 1980s.

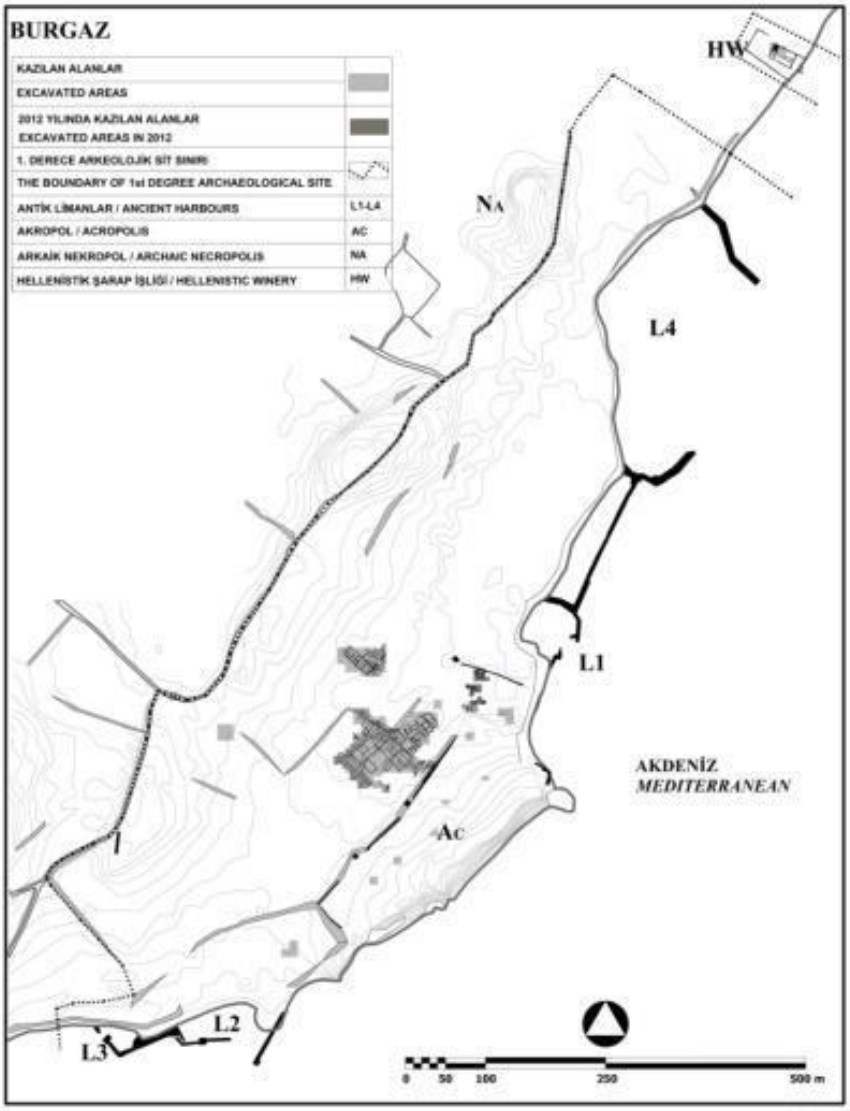

Figure 15: Site plan of Burgaz. (http://burgaz.metu.edu.tr)

After the survey G.E. Bean and J.M. Cook conducted in 1950s, N. Tuna carried out an archaeological survey in 1980s which ended up discovering dense pottery scatters from Archaic and Classical Periods.[193]

Excavations at Burgaz have been led by N. Tuna and his team since 1993 with support of the Centre for Research and Assessment of the Historic Environment (TAÇDAM)[194] and Middle Eastern Technical University (METU). The research has mainly been focused on the extent and chronology of occupation. As a result of 20 years of excavation a total area of 10975 m² has been exposed, 20 ha were investigated by geophysical survey. (Figures 15 and 16) Fieldwork is divided into four main sectors; Southeast Sector (SE), Northeast Sector (NE), acropolis and the area by the port L1 (B11). Excavations revealed occupational spaces connected through stone paved streets, courtyards, public structures and a fortification wall dating to about 400 BC.

Earliest remains from the site date to 8th century BC, archaeological evidence proves that the site was initially settled in 6th century BC. Until 4th century BC, the site went through changes and alterations in terms of city planning and architecture; streets added, walls torn down, walls erected, domestic spaces turned into workshops, all of which ended by the end of 4th century BC, when Burgaz was abandoned.[195] The site was used for sporadic habitation, agricultural activities and storage purposes in Hellenistic and Roman Periods.[196] The widely exposed sectors NE and SE yielded information about the residential areas of Burgaz with buildings dating to 5th and 4th centuries BC. Settlement layout is thought to be of an

[193] Tuna 1982, 358
[194] http://tacdam.metu.edu.tr/
[195] Atıcı 2003, 7
[196] Tuna 1999, 430

orthogonal plan starting from early 6th century BC since the Classical period houses align with the Archaic walls.[197]

Figure 16: Aerial photo showing excavated areas and port locations. (http://burgaz.metu.edu.tr/burgaz)

SE Sector so far, consists of two insulae, the western one hosts 12 houses and two possible public buildings on an area of 3.2 ha. West insula is closed by a 6 m wide stone paved street with northeast-southwest axis that connects to narrower streets

[197] Tuna *et al*. 2009b, 523

within the insula. (Figure 17) Northern and southern streets also tie two ports, L1 and L2 to each other. Eastern insula covers an area of 1.5 ha and gets narrower towards east. Six houses were excavated in this area, all with different shapes and sizes and mostly disturbed during the late 4th century by getting re-shaped and re-used for workshop purposes.[198]

Figure 17: Stone paved main street of SE Sector. (Burgaz excavation archives)

NE Sector is defined by one single insula, surrounded by three streets. Even though the excavated area here is smaller than it is in SE Sector, the layout appears to be more regular (Figure 18). From a total of four fully excavated houses, two are located on the southern half with a northeast-southwest axis, the other two on the east of the insula are located on a northwest-southeast axis.[199]

[198] Atıcı 2013, 32-3
[199] Atıcı 2013, 33

Figure 18: House walls at NE Sector. (Burgaz excavation archives)

Considering that it is an abandoned site, and not rapidly but as a slow process, Burgaz is a proper candidate to benefit from micro-scale studies and multi-element analysis in order to contribute to what we know about daily activities, economy, habits, functions of already defined spaces. Whether spaces/rooms were multifunctional or designed to serve one single purpose only, were they kept clean or not, how intensively were they used are other problems which could be addressed as well.

3.2. Historical Background

Prehistory of Knidos remains rather untouched except for two incidents; earliest information points out to evidence from 2nd millenium BC within the context of Cycladic Culture, whereas the name "*Ki-ni-di-ja*" first appears around Late 13th century BC on food distribution lists for slaves as an ethnic identity; which practically puts the Knidians on the peninsula before the Dorian Colonization in Late 12th Century BC.[200]

Knidian territory is known to lack arable land; Knidians lived on overseas transportation and unspecialized trade covering an area that reaches Western Mediterranean coasts, during 6th and 5th century BC Knidians were not trading olive oil and wine yet.[201]

Archaic Period was a time of population increase, colonization and trade networks. Knidians are known to have participated in colonization movements, settled cities in Sicily and Southern Italy during 6th century BC; mid-6th century BC, the erection of a treasury in Delphi, one of the earliest marble structures, clearly underlines the status of Knidians in the Aegean world.[202]

In the Late Archaic Period, when Persians took control of the Western Anatolian shoreline, Knidians surrendered without a fight and remained independent in terms of sea trade. In 411 BC, they allied with Spartans; after 412 BC, Knidia served as an important base for Sparta and stayed under Spartan protection until 390s BC according to literary evidence. After 360s BC, Knidians attempted to build a new settlement on the western point of Datça Peninsula, around Tekir, to be able to

[200] Tuna 2012, 10-1
[201] Tuna 2012, 12
[202] Atıcı 2013, 27

control transit sea trade. This development movement is considered to be in accordance with the urbanization projects seen both in Karia and in the heart of Ionia during the second quarter of the 4th century BC.[203]

The beginning of Hellenistic Period brought Macedonian and Seleucid influence on Knidia. Like many others, Knidia remained a *polis* first under the Ptolomian and then Rhodian rule. The Serapis-Isis cult in Knidia proves this Ptolomian existence; however, Ptolomies are known to treat their territories as allies, not as their dependent states. In 188 BC, Rome gave Rhodians the control of Karia and Lykia south of the River Meander, as a reward for the support they gave to Rome during the battles with Antiokhos. In the meantime, Knidia was also given its freedom in return for the collaboration during the battle. However, until 167 BC, Rhodian monopoly on wine production lasted on important wine producing free *poleis* such as Knidos and Kos. Knidian *amphorae* are to be found in open market Delos both during the Rhodian monopoly and after.[204]

Knidians appear to have stopped exporting wine in 88 BC, when Mithridates the Great was disturbing Greece and Anatolia by wars, Knidian *amphorae* suddenly disappears from archaeological contexts in Athens, Delos and Korinthos. They reappear in 85 BC with a different sealing method; names of two probably Roman officers were added to the Knidian Eponym. This period in general saw a decline in export. In 45 BC, Knidos joined *Pax Romana*, autonomous in its internal affairs. Following the establishment of the new Knidos in Tekir, a decline in overseas relations and export economy can be observed according to the circulation of Knidian coins. During Roman times Knidian coins became a rarity.[205]

[203] Tuna 2012, 14-6
[204] Tuna 2012, 18-9
[205] Tuna 2012, 19-21

Because of its advantageous location on the southeast entrance of the Aegean Sea, Knidos remained active in terms of maritime trade and piracy during Late Roman Period and after. The existence of Late Roman churches and public buildings are documented through excavations and surveys at Tekir and the rest of the Datça peninsula. In 7th century AD, Islamic army forces reached and destroyed Knidos among with many other cities in Eastern Mediterranean; after that destruction Knidos could not gain its glory back, life at the peninsula continues as small scale rural settlements.[206]

3.3. Settlement Organization

The stratigraphy of Burgaz has been investigated with test trenches and soundings intensively; the results pointed out to a 25 ha wide Geometric Period occupation which grew into 40 ha in later periods. Pre-Classical Period findings are not very common at the site; the earliest materials are dated to Geometric Period as mentioned in the previous chapter.[207]

Settlement pattern at Burgaz displays an irregular character within a non-modular system. Insulae dimensions do not have a standard, Tuna suggests that public authorities were to decide on that matter.[208]

Classical period planning traced the layout of the Archaic period settlement and resulted in an orthogonal plan. The structural remains of 6th century BC at the SE Sector were heavily destroyed by the building activities of Classical period; according to the information gathered from test trenches, Archaic occupation units

[206] Tuna 2012, 21-2
[207] Atıcı 2013, 34
[208] Tuna 2012, 63

were filled while levelling the surface for Classical period construction work.[209] Same phenomena applies to NE Sector as well, however the damage done by Classical construction is somewhat less dramatic here and the plan seems relatively less irregular compared to SE.

NE and SE sectors mainly consist of residential spaces, connected to each other and other parts of the settlement with a network of streets of different sizes; to this date, three insulae have been excavated, all with changing dimensions. The larger insula in SE is enclosed by a 6 m wide stone paved street that lies on a northeast-southwest axis. This street connects to a narrower, 1.8 m wide stone paved street on the northeast of the insula and form a junction. Both the northern and southern streets are well preserved, wide avenues linking port areas L1 and L2 together. The west of the insula is defined by a cobblestone paved street.

In NE Sector, one of the streets framing the large insula has been excavated and revealed a 6 m wide beaten floor filled with pebbles and sand which was levelled up in relation to the occupation layers as a standard practice at Burgaz.[210]

Burgaz houses are usually of courtyard-type, could be defined as "*pastas*-like" too, the interior spaces can be both closed and semi-closed with a roof construction and are frequently organized around a courtyard which opens to the street by a corridor. Storage spaces and *andron* are usually located on the sides of this corridor. Access to the rooms is usually provided from the courtyard, although there are exceptions in which some rooms can only be accessed from the adjacent room or from the courtyard but through an additional corridor. Some of the courtyards include a well as well.[211]

[209] Tuna *et al*. 2009b, 528
[210] Tuna 2012, 63
[211] Atıcı 2013, 42

House construction appears to be standardized practice at Burgaz. 20 to 25 cm thick foundation walls built of local limestone blocks were set into levelled and stabilized ground. Limestone blocks were either dry set or mounted with mud mortar; their irregular shapes were preserved and not rearranged. The upper structure consists of mudbricks set on a 40 cm high socle of limestone blocks, depending on the mudbrick wall found *in situ* in trench NE.6.8.B. Walls were finished with mud plaster, in some cases with lime plaster; there is no indication of painted decorations except for one space, the *andron* at the House 1 of SE Sector, where the walls were plastered in red. Floor surfaces are of compacted earth, there are very few cases of lime plaster use. The interior spaces were covered with terracotta roof tiles; so far there has been no indication of the presence of an upper floor that can be supported with archaeological evidence.[212]

The courtyard-houses vary in their dimensions, although the average size of each parcel can be calculated as 10 m – 15 m; the entrance from the street to the house is always on the narrow side of the building which has been applied as a strict rule all the time.[213]

Individual houses are separated from each other by *peristases;* about 80 cm wide gaps left intentionally between neighbouring houses to provide drainage, isolation and perhaps to make better use of daylight as well. *Peristases* are also areas that theoretically where the most of waste was actively deposited during daily life and not getting thoroughly cleaned since they are not entirely visible to the eye of the by-passers.

Some areas, especially domestic units, in both sectors underwent intensive reorganization of interior spaces during the 5th and 4th centuries BC. At the end of

[212] Atıcı 2013, 42-3
[213] Tuna 2012, 66

the 4th century BC, some of these spaces were turned into workshops for wine/olive oil, textile and metal production until the settlement was completely abandoned.[214] Public buildings can be identified from domestic spaces by their layout and building materials. The largest insula of the SE Sector has an open area with two wells, located in the center of the residential area. To the southwest and southeast of this public open space, two structures are identified as public buildings, dating to Late Archaic-Early Classical period. The foundation of the public building on southwest is constructed by using soft limestone blocks, a material uncommon for houses at Burgaz. Public building on the southeast was built following a basic plan; it has two main spaces, the open entrance is located on the southwest of the building.[215]

3.4. Household at Burgaz

The spatial distribution of artefacts within the houses at Burgaz has been studied in detail for the past decade.[216] The results indicated that there was indeed a differentiation between rooms related to the set of activities that took place there and how the rooms had functioned. However, different rooms were used for different sets of activities in each and every house, so there is not a way to appoint a particular room to a particular function. Spatial organization of interior spaces at Burgaz needs to be studied in the basis of individual houses.

The number of rooms around the courtyard differs from house to house and is not relevant to the size of the house, that is, there is no correlation between the size of the building and interior divisions. Atıcı suggests that the decision of how many

[214] Atıcı 2013, 35-6
[215] Atıcı 2013, 38-9
[216] See; Sakarya İ. 2003, Defining Spatial Distribution of Storage Vessels in Ancient Burgaz at the Fourth Century B.C., Unpublished MSc. Thesis, METU; Atıcı N. 2003, Defining Cooking Activity Areas of Burgaz Domestic Units in the 4th Century B.C., Unpublished MSc. Thesis, METU; Gökdemir Ö. 2006, The Classical Period Houses in Burgaz: An Archaeological and Architectural Overview, Unpublished MSc. Thesis, METU; Atıcı N. 2013, Household Organization in Classical Burgaz (Palaia Knidos): Domestic Assemblages, Space and Function, Unpublished PhD. Thesis, METU

rooms to have, should be associated with the needs of a particular household and perhaps with the availability of land based on the location of the house within the *insula*.[217]

According to artifact distributions, larger rooms and the courtyard revealed themselves as multi-functional areas; the rest of the rooms were also used for activities such as food preparation, cooking, storage, processing wine and olive oil and textile production.[218]

Courtyards are widely applied elements of Classical Greek houses and not surprisingly of Burgaz houses as well. It served as a main living space and the center for household activities; also provided a discreet and private space for the household members, offering more daylight and ventilation than the other rooms do and a nicer climate then it is at the outside, surrounded by high walls to keep the gaze of strangers away.

The size, positioning and orientation of courtyards at Burgaz are not uniform; the sizes vary from 10 m² to 95 m². They are mostly unroofed; however, the larger courtyards tend to have a partial roof. Similarly, courtyards without a roof have pebble floors or *horasan* floors with pebble inclusions, courtyards with partial roofing only have *horasan* floors. [219]

In addition to domestic activities like food preparation, cooking, storage and weaving, pottery sherd distributions pointed out to eating and drinking at courtyards as well. Other features associated with domestic activities within the household

[217] Atıcı 2012, 113
[218] Tuna 2012, 67
[219] Atıcı 2013, 116

besides pottery are wells, ashy areas, basins and grinding stones. These features are not regularly found at every courtyard at Burgaz.[220]

Zooarchaeological research has revealed aspects regarding the fauna and the diet of Burgaz people, especially during Classical period; with cattle being the most abundant of the group, sheep/goat, pig (all domestic) and a small number of wild animals form the faunal set at Burgaz.[221]

Weaving is one of the activities that is traditionally associated with women, terracotta loom weights are usually recovered either in courtyards or in *oikos* spaces in larger quantities, however one or two loom weights each have been recovered from other rooms regardless of the room's suggested function overall at Burgaz. Gender-based organization of spaces is not very evident at Burgaz.

Cooking spaces can be identified by tracing ashy areas, ovens and hearths; the lack of ovens and hearths at Burgaz is explained by the fact that such cooking appliances were portable (braziers, grills), and since the site was gradually abandoned, people took their appliances with them when they were leaving. That leaves us with ashy areas, traces of fire and cooking ware distributions to decide on the location of cooking spaces. Another theory on kitchen areas is that their location was changed within the house according to the weather conditions and therefore hard to track down archaeologically.[222]

House NE-2 of the NE Sector might be a better example to focus further on, since a set of soil samples were collected from this house for multi-element analysis. The contexts from where the samples were taken will be discussed later in detail. Here,

[220] Atıcı 2013, 117
[221] Aydın 2004; Silibolatlaz 2017
[222] Atıcı 2013, 122

the spatial organization of NE-2 will be defined as an example in order to discuss how spaces were used at Burgaz houses.

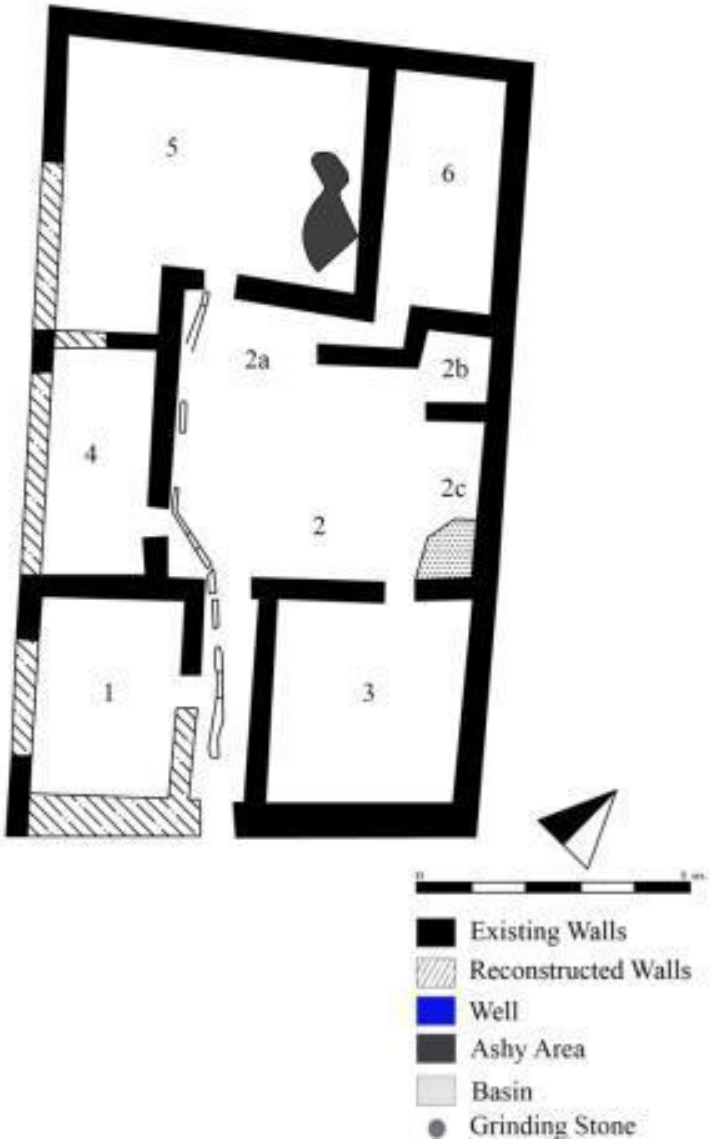

Figure 19: Plan of House NE-2 of NE Sector. (1. *Andron*, 2. Courtyard, 2b. Small courtyard room, 3. Large room, 5. *Oikos*) (Atıcı 2013, 100)

NE-2 is situated in the middle of the excavated area at NE Sector, to the south of the *insula* with a southeast-northwest direction. (Figure 19) The house is accessed from the street on the southeast and surrounded by neighbouring houses on its other sides. The total area NE-2 covers is 184 m² divided into six main spaces; the 39 m² courtyard in the center, 5 rooms are placed around the courtyard. All the rooms either have a *horasan* or *horasan*/beaten earth floor.[223]

The entrance continues into the courtyard by a 1.20 m wide corridor; two rooms are placed on both sides of this corridor. The entrance to *andron* (identified by its plan, location and artefact assemblage) is provided from the corridor, the rest of the rooms are being accessed from the courtyard. Room 4 covers 11 m², located on the south of the courtyard. *Oikos* on the northwest is the largest room of the house with an area of 31 m², though *oikoi* are not always the largest rooms at Burgaz.

On the eastern part of *oikos*, a large ashy area was excavated, very possibly related to a regular fire and perhaps a mobile fire installation. A channel made of terracotta tiles runs from this room, across the courtyard, to the street and suggested to be a drainage channel for grey water. Room 6 is in shape of a narrow rectangular that lies to the east of *oikos* and occupies an area of 12 m².

The excavators agree that the house was initially occupied in late 6th century BC; during early 4th century BC the courtyard was re-organized by adding new walls that separate the space into further units, probably for a variety of activities. At the end of the 4th century BC, House NE-2 was abandoned; the exterior wall on the northeast was torn down and this space was adjoined to another house, eventually transforming into a part of an iron workshop.[224]

[223] Atıcı 2013, 98-9
[224] Atıcı 2013, 99

Out of 262 sherds excavated from House NE-2, *andron* has the smallest percentage with 4.2% and largest group of pottery collected from this room are fine wares indicating food consumption and servicing of drinks. Moreover, according to quantitative analyses, coarse wares associated with food preparing, cooking and storage are under-represented in *andron*. This room also had plastered walls and stucco fragments in its assemblage, supporting its function as *andron*, a special space for men to meet, eat and drink.[225] *Androne*s are usually square in plan with elaborate floors and plastered and/or painted walls. They are positioned at either side of the entrance, close to the street. Archaeological deposit of an *andron* usually includes drink service and consumption wares and plaster fragments.

Due to different phases of use, the artefacts of the courtyard were collected in four separate loci. Southeastern part of the room goes under the number 2 and is represented by loomweights, lamps, oil wares and food preparation wares; this distribution leads to the conclusion that this space was used for textile production a domestic work traditionally assigned to women. A small terracotta figurine recovered on the floor, towards east might indicate domestic cult besides producing textile. Room 2a is designated as the western part of the courtyard; the highest percentage among the pottery excavated here is of cooking wares and drink service wares. Room 2b is small space on the northwest of the courtyard and samples as the "tiny courtyard room" for multi-element analysis; its pottery assemblage is rather small in number, however fine wares and drink service wares point to food and drinks consumption. Southeast of the courtyard is labelled as 2c and has the highest concentration of fine wares related to pouring and serving drinks within the courtyard. Together with the existence of the cement-like basin on the eastern corner of this area, this space could have served for producing olive oil or wine and for collecting and serving the product.[226]

[225] Atıcı 2013, 103
[226] Atıcı 2013, 103-4

Room 3 of House NE-2 falls to the east of the courtyard, sampled as the "large multiroom" for multi-element analysis. The results of pottery distribution yielded three distinctive groups in this room; fine ware for keeping oil, drinking wares and wares for food preparation indicating a multi-functional space, used for a set of different activities. Room 4 lies to the southwest and has the largest amount of pottery among the entire collection of the House NE-2. All pottery types are represented in this room, except for oil wares and pouring-dipping wares which makes it difficult to appoint only one function to this space; it might be another multi-functional area where food production, consumption and storage were simultaneously undertaken.[227]

Oikos is the largest space of House NE-2 with high concentration of cooking wares, food preparation and storage wares. Room 6, on the other hand, offers a large quantity of coarse ware, the highest concentration being storage pots with 31.1 %. This room is suggested to be the main storage area of the house.[228] Buried or semi-buried pithoi used for storage have never been documented at Burgaz so far, the lack of material evidence might be due to the slow abandonment process of the settlement.

It is worth noting that the entire collection of terracotta figurines excavated so far at Burgaz is associated with domestic contexts and there are no altars. The particular interior space assigned for daily ritual practices has not been defined yet, although it is thought that it must be either a corner of a room or of the courtyard.[229] Another factor to take into consideration about figurines is that all of them were found within fills, so they were in their secondary contexts and should be interpreted accordingly.[230]

[227] Atıcı 2013, 104-5
[228] Atıcı 2013, 105-6
[229] Tuna 2012, 67
[230] Atıcı 2013, 145

Thinking about social and economic ranking of households is challenging at Burgaz, the houses do not differ from each other in terms of building materials and interior decorations; although there are some variations in dimensions of houses and their organization of interior spaces.

CHAPTER 4

METHODOLOGY

4.1. Soil Studies in Archaeology

Geoarchaeology, archaeogeology, archaeological geology, archaeological sciences, as well as archaeometry are all fields of scientific research aiming to combine physical science with archaeological problems. The history of science collaborating with archaeology goes back to late 18th century; one of the earliest researches had been carried out by German chemist Klaproth who also discovered the element titanium, he published his results of chemical analyses of Greek and Roman coins and glass in 1796.[231] John Frere's report on stone hand axes in a stratified sedimental deposit in England published in 1797 and Alexander von Humboldt's archaeological field research between 1799-1803 in Mesoamerica and South America where he classified raw materials used in monuments and linked ancient deforestation and agriculture to environmental change are two pioneering cases of geological perspectives successfully adapted in archaeological research.[232]

An early collaboration of geology, archaeology and biology dates back to 1848 when Forchhammer, Worsaae and Steenstrup worked on mounds of discarded shells in Denmark and Sweden and as a result validated the Three-Age System developed by another Danish archaeologist Thomsen that is still used in

[231] Herz and Garrison 1998, 5
[232] Hill and Rapp 2014, 3012

archaeology.[233] This multidisciplinary team reconstructed the paleoenvironment, seasonal occupation sequences, the distribution of hearths, as well as proved that domestic dogs existed, by the Danish coastline.[234] Around the same time, in a different part of the Old World, the 1853 excavation reports of Nineveh and Babylon, directed by Austen Henry Layard, had an appendix containing artefact analyses by scientist T.T. Philipps.[235]

Influenced by these and several other innovative works, by the mid-19th century, archaeology has started to separate itself from historical written sources as reference points and moved on towards a direction that is systematically based on geoarchaeological framework. With the adaption of geological principles and strategies, by the end of the 19th century, archaeological field work had transformed a great extent. Soil, sediments and depositional stratigraphy were now of primal focus, along with chemical and physical analyses of artefacts, pigments, alloys, bones for the purposes of figuring out provenance, composition and age; new discoveries were almost rapidly applied to archaeological matters such as x rays to analyse pigments, aerial photography for surveys and also the basic yet the most precious principle proving that the age of human remains could be determined by the age of the sedimentary deposits they were found within, meaning that geological methodology was a tool to answer archaeological questions.[236]

These developments were followed by research interest regarding paleoenvironments and climate changes, ancient fauna and flora, the game-changing development of absolute dating using radiocarbon in late 1940s by Willard Libby; up to the recent point of almost routine and systematic geological studies at archaeology projects including site prospection/excavation planning aided by geophysics and geochemistry, reconstruction of past habitations and

[233] Hill and Rapp 2014, 3013
[234] Weiner 2010, 9
[235] Herz and Garrison 1998, 5; Layard 2010, 191
[236] Herz and Garrison 1998, 5-6

environmental conditions using geomorphology, studies of stratigraphy and sedimentology, determining past agricultural activities and climate as well as subsistence with the help of palynology and phytology, provenance and studies of ancient production technologies provided by geochemical and petrographic analyses. The theory behind incorporating geological research tools to field archaeology is to assure an integrated approach towards the questions at hand.

If we go back to the basics, the essence of archaeology is to derive past human behaviour from the material remains at hand, without the possibility to observe behaviour directly, making the entire process a major challenge. Along with pottery, soil is one of the most common material evidences; it is where human behaviour is recorded into. The purpose of soil analysis for archaeological interest can be grouped into two, site prospection and intra-site use of space. Site prospection studies investigate archaeological potential, relations between sites and in some cases human activity at the landscape with close proximity to sites whereas the latter focuses on function of spaces, both in and around structures.

The pioneer of linking element accumulations in soil to past human occupation was the Swedish chemist Olaf Arrhenius in late 1920s, with his research on elevated phosphorus levels as indicators of prehistoric activities, paving the way for sediment chemistry.[237] Phosphorus has been studied for archaeological purposes since 1950s and the potential was known, however chemical analysis in search for activity residues has not been widely applied until 1970s when it bloomed in Mesoamerica and then spread out to other parts of the world. This bloom resulted in a wide variety of methodologies, both for the analysis and the interpretation, and also a variety in types and quantities of data; in other words, even more potential for archaeological use.

[237] Middleton 2004, 47

Any archaeological material that indicates past human behaviour but requires more than the naked eye to be recovered, falls into a category of studies often referred to as microarchaeology. This data set consists of fragments of the macroscopic artefacts, traces of human activities and the sedimentary environment in which everything was buried through time. The strategy basically is to integrate traditional, macroarchaeological research with microarchaeological results in order to achieve better and comprehensive reconstructions of past lives, considering even the most well-preserved archaeological contexts preserve only a small portion of the actual complexity and diversity of the settlements when they were lived in by people.

The representation of the activity patterns these complex past lives had created in archaeological record is by itself a matter of theoretical debate, often accompanied by the metaphor "palimpsest". Is archaeological record a palimpsest where only the latest activity was recorded on and can be revealed? Or is it an accumulation of a set of repeated activities? Does time affect this accumulation more or does the intensity of occupation? Most often, as it is the case with domestic activities on mud and clay surfaces result in accumulations for instance; the archaeological record is a combination of several and repeated activities, instead of being a genuine palimpsest where traces of all previous activities have been erased and only the last activity is to see.[238] Moreover, the accumulation usually is not a complete record of uninterrupted strings of activities, it is fragmental, it is rather a superimposition than a true palimpsest. The "quality" of the record alters according to on a number of factors, intensity of occupation being one of them, another one is site preservation. Occupation intensity is suggested to be a greater impact on spatial deposition than time is.[239]

[238] Lancelotti *et al*. 2017b, 360
[239] Lancelotti *et al*. 2017b, 360

4.2. Studying Floors: Principles, Progress, Ethnoarchaeology

Floors, as occupied surfaces, contain much information regarding the people who used them. Think of our modern floors; the wear and tear, clean areas and dirty areas, the residues being accumulated on the surfaces and carpets, our choice of furniture and how we place them in our living spaces, tell a great deal about us and our daily activities. To reconstruct past lives, archaeology has been traditionally using floors as a source of information, through studying artefact distributions and architectural features. Chemical residues deposited in floors are the latest addition to this framework, as indicators of human activities carried out on floors.

Floors as an archaeological unit to study stems from the concept of spatial archaeology. Spatial analysis in archaeology seeks to define patterns of human behaviour and social organization that are expressed spatially, in reference to material evidence.

In late 1970s, ethnoarchaeological studies provided a very needed perspective concerning this archaeological problem, defining activity-specific areas of human use. People's repetitive use of particular spaces, both the landscapes and living areas, were observed and then documented through the distribution of macro-artefacts such as lithics and faunal remains. (See Kent 1987, Kroll and Price 1991 for ethnoarchaeological research; see Hodder and Orton 1976, Hassan 1978 for archaeological potential.) During the same time period, a group of scholars have started to apply the same strategy to Mesoamerican archaeological floors in order to aid the archaeological interpretation of past human activities; repetitive activities produce residues and chemical elements in such patterns that it is possible to identify certain activities through the study of these micro-remains embedded in deposits (see Barba and Bello 1978, Barba 1986, Manzanilla and Barba 1990,

Middleton and Price 1996.)[240] The technique used in Mesoamerican house floors in 1970s were spot tests which provide semi-quantitative results at best but are quick and cheaper to do at the field, they also kickstarted the interest in chemical research on activity areas.[241]

Late 1990s brought the advances in quantitative analysis, GC-MS (Gas chromatography-mass spectrometry) made identification of organic molecules more accurate, ICP-OES (Inductively coupled plasma-optical emission spectrometry) provided quick analysis of multiple elements for large numbers of samples. Quantitative methods were introduced to spatial/activity area research in ethnoarchaeological contexts as well, such as Australian hunter-gatherer sites and Anatolian nomadic campsites (see Spurling and Hayden 1984, Cribb 1991.)

Roger Cribb's research on households of nomadic camps in Taurus and Zagros Mountain regions of Anatolia and Iran is a significant combination of ethnoarchaeology/anthropology, middle range theory and quantitative spatial analysis. Regarding site structure, Cribb argues that instead of spatial distributions, the focus should be more on spatial relationships between features and between the factors and/or variables.[242] Besides subsistence, architecture, site plans and rules the nomadic life is regulated by, he went on studying the spatial patterning of tents as he argues that spatial organization is a reflection of social organization.[243] A portion of Cribb's study is his systematic surface collections from inside and around particular tents; statistical analyses, distribution maps, density maps of artifacts and discard.[244]

[240] Lancelotti *et al*. 2017a, 339
[241] Middleton *et al*. 2010, 184
[242] Cribb 1991, 3
[243] Cribb 1991, 100
[244] Cribb 1991, 122-32; 172-84

However throughout the 2000s, most ethnoarchaeological studies kept depending on observations to define patterns of spatial use and sediment analyses of ethnoarchaeological contexts mainly were to classify local activity markers and deposition processes, not spatial distributions of activities.[245] Even so, some very strong links between chemical residues and activities do stem from ethnographic studies that focus on isolated modern day people, hypothesizing these people still live their lives the way their ancestors did.[246]

After early 1990s, as chemical analyses of floors and deposits got spread from Mesoamerica to other parts of the world, different teams have applied different sample collection strategies, different extraction and quantification techniques, varying sets of residues have been analysed and interpreted in varying ways. Middleton *et al.* argued that there is not a single correct technique to do chemical residue studies, instead there are many and one, in order to decide, should consider their research question and design, data requirements, and the extend of the funding assigned to chemical research.[247] Floor studies are nowadays a combination of ethnological/ethnoarchaeological research -since most elemental data regarding human activities are derived from ethnological research- and traditional archaeology with the addition of geochemical/geoarchaeological applications.

4.3. The Pioneer: Phosphate Analysis

Phosphorous in the form of phosphate is a vital element of any living organism. It is a part of the DNA molecule and therefore associated with human activities. Visible evidence of human activities deteriorates through time, even disappear, but phosphorous stays in the soil and provides information about the existence or non-existence of organic material. This information then helps to identify and define

[245] Lancelotti *et al*. 2017b, 355
[246] Parnell, Terry and Nelson 2002, 380
[247] Middleton *et al*. 2010, 184

activity areas and interpret the function of spaces to a further degree. Spaces that are intensively exposed to organic material, such as garbage areas, pits; or burials since bones are extremely rich in phosphate hence are easily spotted by such analysis.

Phosphate analysis in archaeology can be grouped mainly into four areas of interest. Phosphate analysis is initially and still widely used to back up geophysical research such as ground penetrating radar, magnetometry and conductivity measurements; mainly known as "archaeological prospection" while surveying an area for archaeological potential. It is a complementary aid to the archaeological survey techniques in order to fill the data gap when geophysical methods are not sufficient or needed confirmation, as well as to define the limits of an archaeological site. Based on the same principal, phosphate can also contribute to ongoing excavations, pointing out to particular contexts individually, such as locating kitchen refuse areas. A third research area is landscape archaeology, phosphate analysis helps with locating past agricultural activities. And the final area of interest, generally in line with this study, is mapping out activity areas throughout the site and pinpointing features as middens, hearths through phosphate analysis.[248]

A set of human activities which increase phosphate in soil and hence can be recorded through analysis are as follows;[249]

- Burning of organic material
- Organic waste (plant and animal)
- Storage of organic material
- Faeces
- Food preparation
- Processing organic materials (non-food: wood, bone)
- Processing inorganic materials (in minerals: stone tools, beads, etc.)

[248] Parnell, Terry and Nelson 2002, 381
[249] Middleton 2004, 53-4

Phosphates originally stem from natural apatite which mainly all rocks contain; they get absorbed by all living organisms and eventually discharged from their systems. An experimental study conducted in 1976 indicated that a group of 100 people are capable of depositing 124 kg of phosphorus per year.[250] It has also been suggested that since animal products produce more phosphate than vegetables, analysis could be interpreted as to define the diet of the inhabitants living in the studied site.[251]

Accordingly, phosphate analysis can also be helpful to identify whether a particular space was occupied by people or animals; high phosphate levels both in and around a particular space emphasize human use, whereas high levels only inside a structure propose an animal shelter.[252]

The application of phosphate analysis to abandoned sites was first tried in Sweden during the 1930s, then started spreading through Europe after 1945, finally reached USA in 1950s.[253] Late 1990s saw the development of a practical and "easy-to-use at the field" test technique that allows the researcher to collect minimum amount of soil (5 gr.) and conduct the phosphate analysis right at the field.[254] This test kit is widely used to combine and test geophysical field survey results in Northern Europe on a wide range of sites. One very significant limitation to this phosphate test kit is that it has temperature restrictions and works only between +15°C to +25°C.[255]

The technique used in this study to measure phosphorous, after it has been extracted with citric acid, is Olsen spectrophotometric; a colorimetric method that applies a monochromator to narrow the spectral band width. By using a spectrophotometer, the light absorbance of the unknown solutions is measured and compared to a graph

[250] Clark 1997, 120
[251] Sjöberg 1976, 452
[252] Sjöberg 1976, 452
[253] Eidt 1977, 1327
[254] Persson 1997, 441-3
[255] Viberg, Berntsson and Lidén 2013, 2584

which matches measured absorbance with the known concentration. The element is extracted as "available phosphorous" (P av). An additional analysis to measure the percentage of organic material within a particular soil sample is performed using Walkley-Black method in which the organic material is dissolved in controlled acid and the loss is calculated in comparison to the mass of the sample.

It is worth noting here that chemical testing of phosphorous is more promising in calcareous soils; calcium ions and soil alkalinity condense phosphorous, iron and other metallic ions insoluble.[256]

4.4. Multi-element Soil Analysis

Since applications of geo-chemical analysis to archaeological questions, mainly in form of phosphate analyses, proved to be successful, an integrative approach towards soil studies has been adopted extensively since the beginning of 60s onwards. The last two decades saw an increase of interest in trace metal analysis, mainly of copper, iron, mercury, manganese, lead and zinc; both at surveys and at ongoing excavations all over Europe, USA and Mesoamerica. Early studies usually depend on a limited number of elements since each element required an individual analysis; the advancement in analytical technologies supplied easy and fast analysis for sets of multiple elements. As the techniques of analysis became easier and low-cost compared to earlier years of research with the advancement in ICP (Inductively coupled plasma) technologies, scholars have chosen to try out a larger set of elements to see how those are distributed in the selected archaeological contexts.

Multi-element soil analysis is an analytical method that uses ICP-AES (inductively coupled plasma atomic emission spectroscopy) and ICP-MS (inductively coupled plasma mass spectrometry) techniques to measure elemental concentrations of soil

[256] Terry *et al*. 2004, 1237

samples. These elemental concentration results are then studied regarding their highs-lows, distributions and correlations for archaeological purposes such as site prospection, excavation planning and/or interpreting activity areas within a settlement as it is the purpose of this study. Since the aim is to establish a holistic approach, multi-elemental analysis for studying activity areas is accompanied by traditional spatial analyses such as artefact distributions and also microarchaeological research. Comparing these different sets of data could help towards a more complete picture, elements could open up new discussions where artefacts are scarce and vice versa.

ICP techniques are proven to be efficient tools for sample characterization for they cut down the sample preparation and analysis time and allow examination of multiple elements simultaneously. ICP analyses multiple elements at the same time by dissociating them into their constituent atoms or ions, exciting them to a level where they release light of a characteristic wavelength. Then, a detector measures the intensity of the released light and calculates the concentration of that particular element in the sample. During the process, the sample gets heated up to 10 000 °C, as a result, detection limits are very sensitive. Simultaneous ICP instruments can process up to 60 elements in a single sample for less than a minute, sequential ICPs can provide analytical results for 5 elements per minute.

Elements like Potassium, Magnesium, Calcium and Sodium can be analysed through Atomic Absorption Spectroscopy (A.A.-A.A.S.) and ICP; some elements are better recognizable with A.A, while others are with ICP, therefore a combination of both techniques were used in this study. A.A. relies on atomic absorption process, ICP on the other hand, is an atomic/ionic emission spectroscopic technique and uses a plasma (a very high-temperature ionized gas composed of electrons and positively charged ions) instead of a combustion flame or graphite furnace as A.A. does.

A.A. is a method that measures the concentration of atoms or ions of an element in the sample by using the light these atoms release when heated to very high temperatures. Since the intensity of the light that is released by atoms or ions is proportional to their concentration in the original sample, A.A. is capable of providing quantitative and also qualitative information about the sample.

The extracting technique used on samples is adopted from agricultural tests widely used to define the level of nutrients available to plants, in other words to determine how fertile the soil is for cultivation. Heavy metals like Iron, Manganese, Zinc and Copper elements get extracted by using DTPA (diethylenetriaminepentaacetic acid), concentrations are determined in conjunction with ICP spectrometer. DTPA extraction, compared to total heavy metal procedures, is a safer and less expensive technique, also requires less specialized equipment. It is suggested that DTPA extractable metals are more strongly associated to cultural deposits and provide more ground for interpretations.[257]

All results, except Potassium, Phosphorous and Nitrogen, are in *ppm* (parts per million), as in 1 part in 1 000 000. Potassium and Phosphorous in this study are measured as kg/da, as in available material. Nitrogen and organic material are measured as percentage. All results in *ppm* were finally converted to base 10 logarithms and used accordingly in tables and basic statistics, as is the common practice in interpreting multi-element analysis results.[258]

All samples were subject to pH test as well; acidity of soil is sometimes the reason for the lack of organic materials preserved at sites, especially the lack of bones. A large and densely settled site as Burgaz should have provided more organic findings throughout the past years of excavation and through floatation processes of the soil, although that is never the case, the evidence is considerably limited.

[257] Parnell *et al*. 2002, 401
[258] Middleton 2004, 51

Saturation analysis gives information about the levels of sand and clay within the soil, even though it is a standard test for determining the type of soil in other scenarios, the results might point out to different matters at archaeological sites since there are a lot of cases when soil was brought to the settlement from outside areas, either to use as construction material or resource material for production.

All analyses were conducted at the Biyolab facilities in Ankara, their analysis packs are originally designed for agricultural purposes however the staff kindly modified both the analyses and the reports to fit the needs of this study.[259]

4.5. Case Studies and Elemental Signatures

Like many other recent research involving multi-element analysis of archaeological soils through ICP technology, the set of elements chosen for analysis for this study (phosphorus, potassium, iron, copper, zinc, manganese, calcium, magnesium, sodium; extracted with DTPA and analyzed through ICP-OES) have been derived from previous multi-element soil analysis studies and ethnoarchaeological/experimental research on chemical signatures of activity areas. (See Middleton 2004; Middleton *et al*. 2010; Middleton and Price 1996; Wilson *et al*. 2008; Wilson *et al*. 2009; Wells 2010; Rondelli *et al*. 2014; Terry *et al*. 2004; Parnell and Terry 2002; Luke *et al*. 2017)

It has been discussed widely that even contemporary research on multi-element soil analysis of anthropogenic soils tend to be somewhat experimental. Each region and therefore each archaeological site has its own geochemical "signature", particular

[259] Biyolab laboratories are part of Biyotar Organik Tarım Orman Kimya Sanayi ve Ticaret A.Ş., approved by the Turkish Ministry of Agriculture and Turkish Standarts Institute, holding a certificate of proof for selling lab-experiment services (TS EN ISO/IEC 17025).
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levels of element accumulations that define the region pedologically and also "archaeological soil signatures" based on the type of habitation, the duration of it and the nature of activities performed by the ancient inhabitants. Each scenario leaves different sets of elemental data within the soil and in different quantities. Multi-element analysis of soils in search for activity patterns and distributions is an ongoing exploration.

With that being said, there is a solid ground for archaeological interpretation, certain elements indicate certain types of human activities; it is possible to assign a set of element accumulations to a repeated human activity in a particular space. Middleton's proposal of chemically detectable activities is based on results of his and other scholars' research coming from a wide range of regions and it is commonly accepted as an outline, a starting point for interpretation.

According to Middleton, very high concentrations of phosphorus, potassium, calcium and iron indicate ***in situ*** **burning;** very high concentrations phosphorus, potassium and calcium but accompanied by high concentrations of other elements indicate **wood ash**; high phosphorus and calcium values indicate **food preparation areas**; high alkaline earth metals (beryllium, magnesium, calcium, strontium, barium, radium) point to general **activity areas or occupation**; high phosphorus and calcium concentrations point to **middens**; if you have low values in all elements but they are still somewhat higher than your control samples, it is probably a **utilized exterior area**; low values of all elements and they are even lower than control samples, it is a **high-traffic area.**[260]

As multi-elemental research continues, new sets, new markers for activities are being added to our repertoire. For example, high accumulations of phosphorous and calcium are very likely associated with organic remains and this can be applied to

[260] Middleton 2004, 56

any space that was or still is used by people to conduct activities involving organic materials; in most archaeological cases, resulting in organic material build-ups such as food preparing, butchering or waste disposal. Calcium, just like phosphate, implies the existence of past animal tissues; bones and shells. In some cases, zinc and even strontium turned out to be pointing at activities, strontium levels are usually high in areas with bone deposits related to butchering and in areas where activities involving minerals and rocks were conducted whereas elevated zinc accumulations are associated with grains and bones, therefore storage and butchering.[261]

Heavy metals like iron and copper, even though in inorganic form, are still indicators of human activity on a spatial level; both metals have been widely used to produce tools and artifacts in the ancient world and in cases where such objects were placed or stored within a domestic context for an extended time period, they are more than likely to cause element depositions on the floors. Moreover, activities involving mineral pigments and dyes tend to leave their traces on the floors in chemical levels as well, weaving and dyeing are archaeologically documented daily activities in Ancient Greek as well as in many other past cultures throughout the world.[262] In Mesoamerican, namely Mayan contexts, high Fe concentrations are documented in areas related to agave processing, animal butchering and kitchen activities, as well as pigment processing.[263]

It is worth noting here once again, chemical soil research, like any other microarchaeological research, is only useful when interpreted together with archaeological evidence and ethnoarchaeological observations of behavioural patterns.

[261] Wilson *et.al* 2008, 418-20
[262] Terry *et.al* 2002, 1244
[263] Parnell, Terry and Nelson 2002, 381

In this manner**,** Bintliff's research in Greece during 1990s is perhaps one of the earliest regarding its holistic approach to sites scattered around a vast landscape and using combinations of analyses of different elements. His aim, as a part of the regional survey the team was conducting, was to investigate whether particular pre-Industrial sites in Greece were to be determined by unusual accumulations of trace metals in soil and eventually assemble the information to form a regional database on the matter. [264] He chose copper and lead (Cu, Pb) for these two materials have been in use since late prehistory but also present at anywhere that is subject to human and animal faeces. His results concluded that levels of copper and lead were much higher at archaeological sites compared to regional mean, especially at the ancient city of Thespiae where the metal levels were the highest at the center within the surrounding stone walls.[265]

Another important conclusion yielded from Bintliff's survey was that the activity areas of Late Hellenistic-Early Roman farmsteads are in fact much larger than documented with pottery densities. The accumulation of copper and lead at high values around the farm points to "*a halo*" of intensive off-site activities, probably containing of manuring, farm animals and garbage disposal; therefore our understanding of what an ancient site is, should include this surrounding *halo* as well while modelling past human behaviour.[266]

Another pilot study in 1990s, based on multi-element soil analyses by using ICP-AES has been carried on by Middleton and Price in early 1990's. Their samples were collected from floors of both modern and ancient households in Canada and Mexico and yielded distinctive results in terms of chemical signatures. When cluster analysis was applied, samples have formed five clusters according to element accumulations. The most distinguishing division was between open interior and

[264] Bintliff, Gaffney and Waters 1990, 159-61
[265] Bintliff, Gaffney and Waters 1990, 163
[266] Bintliff, Gaffney and Waters 1990, 164; 169

exterior spaces.[267] The researchers concluded that potassium and phosphorous are indicators of burning, especially of wood; calcium and strontium point out to covered, roofed spaces; phosphorous and calcium indicate food preparing areas within spaces.[268]

Another research of multi-element soil analysis has been conducted in UK, aiming to interpret the consistency of soil element signatures between six small farm sites, abandoned between the late 1800's to 1940, with already known contexts and provide an assessment of the potential of such analysis in terms of archaeological questioning.[269] The main emphasis is on the function of specific areas and their ethno-archaeological interpretation. Samples were analysed using ICP-AES for 29 elements, the results underlined 6 elements (Ca, Ba, Sr, Zn, P and Pb) for being directly connected to past human activities including keeping animals, gardening and cooking/heating.[270]

Just like it is the case with household archaeology, chemical studies of anthropogenic soils have been intensively tried and applied in Mesoamerica from very early on. One of them is Parnell *et al.*'s study in early 2000s, focusing on activity areas in Maya regions of Guatemala. By studying chemical signatures of the Mayan site Piedras Negras through phosphate and heavy metal distributions, the team ran statistical analyses which suggested that elevated phosphate, barium and manganese levels imply organic refuse disposal areas, mercury and lead accumulations imply craft production areas.[271]

The team used alternating extraction methods (Mehlich II for P and DTPA for trace metals) for sample preparation and then conducted ICP-AES analysis, followed by

[267] Middleton and Price 1996, 675-7
[268] Middleton and Price 1996, 679-80
[269] Wilson, Davidson and Cresser 2008, 412
[270] Wilson, Davidson and Cresser 2008, 414; 423
[271] Parnell, Terry and Nelson 2002, 379

statistical analysis. Cadmium, copper, manganese and barium showed a strong correlation; this chemical signature also was in accordance with areas of elevated phosphate accumulations in areas where organic materials (leftovers from food preparation and craft production including paints and pigments) had been possibly continuously swept.[272] Another area that indicated high concentrations of manganese and copper are around the benches, suggesting a reception area for guests.[273]

Iron, mercury, lead and zinc are the other group correlating strongly in Piedras Negras, high concentrations of this group of metals pointing to sweeping patterns related to craft production.[274] Sweeping patterns, as well as the outlines of roofed areas and major activity zones are among features which could be identified by chemical analysis but not so much by artifact distributions at the site; chemical analysis also helped to refine spatial definitions such as higher P levels pointing to a kitchen refuse area whereas lack of P but higher levels of metals pointing to craft production refuse, Parnell *et al*. claim.[275]

Another research in Guatemala in early 2000s used geochemical analysis results in an ethnoarchaeological context in which the element results of Classic-period Mayan residences were compared to modern day residential quarters of the guards working at the archaeological park of Aguateca.[276] The addition of modern-day data is to generate a tool to refine the relationship between chemical signatures and activity areas. The results indicated high levels of phosphorous in kitchen areas of modern-day residential contexts where activities are related to food preparation, consumption and disposal. P levels were relatively low in pathways, porches and sleeping areas.

[272] Parnell, Terry and Nelson 2002, 387
[273] Parnell, Terry and Nelson 2002, 389
[274] Parnell, Terry and Nelson 2002, 390
[275] Parnell, Terry and Nelson 2002, 399-400
[276] Terry *et al*. 2004, 1237

Central rooms of two structures that are interpreted as meeting and visitor reception spaces yielded very low levels of both phosphorous and heavy metals. Same result was observed in modern day spaces with same functions. Activities involving pigments resulted in high levels of heavy metals in ancient contexts. Another significant observation from Aguateca is that waste areas where garbage is collected can also be classified according to analysis results; garbage areas purely containing food preparation and consumption waste are defined with high levels of phosphorous but very low levels of heavy metals whereas garbage areas with even higher levels of phosphorous and heavy metals are mixed garbage contexts with both food waste and craft-work debris.[277]

A group of mainly Spain-based scholars suggested the term "anthropic activity markers-AAM" as a framework for chemical analysis of archaeological floors; anthropic activity markers are models that connect particular chemical residue concentrations with specific activities.[278] Ethnographic contexts accompany most anthropic activity marker studies as they provide the possibility of correlation, being able to directly observe life rhythms with recurring activities and experimenting in a controlled environment.

In their 2014 article, they discuss the potential of such studies over an experimental/ethnographical context in Northern Gujarat in India, while carefully underlining that these markers still need to be further developed since human activities are immensely complex and there is also the possibility of the same activity resulting in a wide range of possible chemical signatures.[279] Different activities leaving the same residues is another issue; food preparation and food consumption practically leave the same traces apart from the fact that preparation generally includes a fire too, in the same manner food preparation and ritual

[277] Terry *et al*. 2004, 1246-7
[278] Rondelli *et al.* 2014
[279] Rondelli *et al.* 2014, 482-3

activities such as food offerings could be problematic to distinguish solely based on chemical results.[280]

Rondelli *et al.*'s ethnographic study is based on a traditional farmer's compound in Jandhala-India, two separate houses with closed and semi-open spaces sharing one courtyard for keeping animals and other activities. Beside observations, family members were interviewed regarding their daily activities and especially the floors; how the floors are constructed, maintained, how frequently they are replastered and with what kind of material. The samples were analysed with ICP-AES for 35 main elements, additional statistical analyses were conducted.[281]

Statistical analyses are noted as inconclusive in terms of appointing specific chemical signatures/markers to specific activities. Distribution maps of phosphates displayed differences between inner and outer spaces, especially a higher level of phosphate in the semi-open veranda. ICP-AES element results were compared with some suggested signatures published so far (Ca, P, K, Mg, Sr for food remains; P+K+Mg for living rooms; Ca+Sr for closed spaces; P+K for burning areas), although a separation between food production/consumption area and a storage area in the inner space was evident, there was not a clear differentiation between the veranda and the inner space. Another correlation that was visible appeared between the inside and outside fire places; the one in the veranda contained more dung (Al, Ba, Ca, Co, Cr, Fe, Mn, Mo, Ni, Pb) while the two inside fireplaces displayed high levels of wood ash (Ca+K+Mg+Al+P).[282]

Combining past couple decades of ethnoarchaeological and archaeological work in modern day village contexts in Mexico and Roman and Medieval contexts in Italy, Pecci *et al.* focus on floors and food production/consumption, stressing that even

[280] Pecci *et al.* 2017, 6; 7-8
[281] Rondelli *et al.* 2014, 484; 486
[282] Rondelli *et al.* 2014, 487-8

though objects could be moved from their original places, residues could not, they are sealed into where activities were carried out. Therefore, residues as "anthropic activity markers" are vital to studying the use of space and activity areas.[283]

Apart from the ethnoarchaeological studies that were conducted in the Mexican village San Vicente Xiloxochitla, all contexts were subject to spot tests in order to identify phosphates (organic material), protein residues (blood, meat; kitchen floors, butchering areas, ritual areas) and fatty acids (animal or vegetable oils, fats, resins; cooking and storing food, butchering, incense burning), as well as GC-MS analyses to identify lipids (liquid substances; wine, oil).[284]

In Mexico and in archaeological kitchen contexts in Italy, higher concentrations of phosphates, protein residues and fatty acids were found around the fireplaces indicating food preparation.[285] However, many food products are rich in these substances, a high accumulation of these would not help to separate, for instance chocolate -a widely consumed food in Mesoamerica- from milk products that were common in Europe; one has to have environmental and/or ethnographic information to support chemical analyses.[286] This study was also an experiment to see which technique would be preferable; according to the team, since spot tests do not clarify the origin or the quantity of chemical compounds, they are useful to pinpoint accumulations, distributions, patterns and activity areas when interpreted with other archaeological data; it is suggested that gas chromatography coupled with mass spectrometry, GC-MS, might be a better option as this technique can identify animal based residues.[287]

[283] Pecci *et al.* 2017, 1
[284] Pecci *et al.* 2017, 2
[285] Pecci *et al.* 2017, 3-4
[286] Pecci *et al.* 2017, 5
[287] Pecci *et al.* 2017, 6

The results from a Late Roman Site studied within the Laconia Rural Sites Project offers another chemical signature for human use. At this unexcavated site, calcium, phosphorous, lead, copper and potassium form a group that mirrors the presence of human activity in correlation with artefact distribution on the surface.[288] A soil research conducted in Maine, USA in order to aid magnetometric survey on Palaeo-Indian habitation pointed out to a strong connection between magnesium and hearths; their results were supported by material evidence as well.[289]

Multi-element analysis for defining activity areas in Anatolia has slowly started to bloom since the past two decades, even though the number of studies is not large, the results are quite promising.

The 2011 study of multi-element characterization of floor sediments at Düzen Tepe (a neighbouring settlement to Sagalassos) covered 18 elements in samples collected from a Classical-Hellenistic courtyard building. K, Mg, Fe, P and Sr are found to be reflecting anthropogenic residues; Cr, Mg, Ni, Pb and Ti are suggested as markers of the site's geological formation yet still a useful signature set to delineate activity areas.

The multi-roomed courtyard building at Düzen Tepe contained a very high number of artefacts, however the majority were from discard contexts and therefore no use to indicate activities. Again, remarkably similar to Burgaz, besides some hearth remains, any additional archaeological contexts that might represent particular activities were lacking as well. Chemical analysis of floors was an attempt to help defining use of space at Düzen Tepe.[290]

[288] James 1999, 1285-6
[289] Konrad *et al*. 1983, 13-28
[290] Vyncke et al. 2011, 2275

Elements for analysis were chosen based on W.D. Middleton's suggested selection of 12 elements (Al, Ca, Fe, K, Mg, Mn, Na, P, Sr, Ti, Zn) with an additional 6 (Cd, Co, Cr, Cu, Ni, Pb) the team has decided to try out. Ba, Cd, Co and Cu were later dismissed from the final interpretation since these were found in no relevance to anthropogenic residues.[291]

According to element concentrations, several zones were identified in the courtyard building: zone A with high values of K, Mg, Fe and P indicating *in situ* burning, a hearth for cooking since its location is not the center of the room; zone B with the same elemental signature but with lower Fe values is suggested to be a non-*in situ* fire burning area, possibly a portable heating feature; zone C displays very high values of P and Sr but low to average concentrations for the rest of the elements, possibly pointing to excremental residues, perhaps a toilet area with a portable feature; zone D with high values of P but low values of most of the other elements is interpreted as a high-traffic area, high P suggesting to a door opening; zone E resulted in high to very high concentrations of Ca, P and Sr which according to the literature is an indicator of food preparation although there are no further findings to back up this suggestion; zone F seems to be another high traffic area with very low to average concentrations of most elements or some other activity that caused intensive leaching or this could be a sleeping area, however there is no archaeological evidence supporting this activity here; zone G displays high values of geology related elements such as Pb and Ti, could not be assigned a function; zones H1 and H2 both showed low concentrations of the majority of elements and therefore interpreted as parts of the same high traffic area, possibly a passage.[292]

One last but not least aspect that needs mentioning about Vyncke *et al*.'s study is that it is also a down to earth, direct documentation of the practical side of a pilot study in multi-element analysis at an archaeological site with all the pitfalls, all the wrongs and rights, and valuable recommendations.

[291] Vyncke et al. 2011, 279-80
[292] Vyncke *et al*. 2011, 2287-90

Aşıklı Höyük is the latest addition to the group, a decade long systematic collection of soil samples was studied as part of a master's degree research. Kalkan indicates that her set of 12 elements (Al, Ca, Fe, K, Mg, Mn, Na, P, Sr, Ti, Zn) chosen for analysis is based on William D. Middleton's research and results.[293] Supported with and compared to other spatial and microarchaeological results at Aşıklı Höyük, the elemental characterizations point out to a range of activities; hearths/*in situ* burning/wood ash, food preparation, storage, keeping animals and a general category called human activites.[294] In Aşıklı's case iron, aluminium, zinc and especially titanium correlate with how the floors were built, as elements in soil that was used as floor building material, whereas the rest of the elements displayed various connections to human activities.[295]

Based on all these results and suggestions, we expect to shed some more light on Burgaz spaces in terms of how they had been used. Considering phosphorus concentrations, in correlation with high calcium, we expect to be able to interpret clean/dirty areas, garbage disposal areas both indoors and outdoors, possible areas for food preparation since permanent cooking features are scarce at Burgaz. Same goes for heating features, through elemental distributions of phosphorus, potassium, calcium and iron, we hope to suggest possible locations of *in situ* fires, speculating about how Burgaz people kept warm during not so mild Aegean winters by the sea. Elevated zinc values are suggested as an indicator of grain and/or bones related storage, iron and copper as indicators of manufacturing, low phosphorus and heavy metal values as an indicator of meeting/reception areas. Low concentrations of phosphorus points usually to pathways and sleeping areas in some cases; elevated phosphorus, potassium and magnesium are found to be characterizing living rooms. According to accumulations of these elements we expect to deliberate household activities, especially by using House NE-2 as a study ground. This also will push us to discuss the mobility of household features and multifunctional use of space in Burgaz, as suggested by archaeological evidence and artefact distribution studies.

[293] Kalkan 2017, 36
[294] Kalkan 2017, 450
[295] Kalkan 2017, 36

Table 1: Element signatures derived from case studies mentioned above.

Type of activity	Concentration	Element signature
***In situ* burning**	Very high	Phosphorus, potassium, calcium and iron
Wood ash	Very high	Phosphorus, potassium, calcium, sodium
Food preparation	High	Phosphorus and calcium
Cooking and burning	High	Magnesium, manganese, calcium
Food disposal (animal origin)	High	Magnesium, phosphorus
Food (vegetable origin)	High	Manganese, zinc, copper
General activity areas/occupation	High	Beryllium, magnesium, calcium, strontium, barium, radium
Middens	High	Phosphorus and calcium
Utilized exterior area	Low (but higher than control samples)	All elements
High-traffic area	Low (lower than control samples)	All elements
Storage and butchering (grains and bones)	High	Zinc
Production (tools and artefacts; weaving and dyeing)	High	Iron and copper
Metalworking	High	Copper, tin, lead
Butchering, kitchen activities and/or pigment processing	High	Iron
Shell accumulations	High	Calcium
Covered, roofed spaces	High	Calcium and strontium
Organic refuse disposal	High	Phosphate, barium and manganese
Reception area for guests	High	Manganese and copper
Pathways, porches and sleeping areas	Low	Phosphorus
Living rooms	High	Phosphorus, potassium and magnesium

Sets of low elemental values would aid us to discuss utilized exterior areas, combining this elemental prospection with microarchaeological findings, it would be likely to discuss what type of outdoor activities might have taken place at Burgaz and possibly suggest further about communal behaviour. Same low element values will point to high-traffic areas, making it possible to comment on density of spatial use. (Table 1)

By using multi-element soil analysis as an interpretative tool and combining our results with archaeological/architectural evidence and with previous spatial studies conducted at Burgaz, our aim is to further interpret Burgaz spaces, especially households, socially and economically. We expect to contribute to discussions of Burgaz people's multidimensional experiences within their social context and within the wider context, the Greek world.

4.6. Sampling Burgaz

In summer 2011, a total of 28 soil samples were collected at Burgaz, from the Southeast Sector.[296] (Table 2) To this set of samples, another 23 were added which were collected in 2010 from the House NE-2 of the Northeast Sector. (Table 3) Also, two reference samples were added to the collection. Our sampling strategy was a combination of grid sampling and judgemental sampling that was shaped according to our points of interest, the topography of the site and the direction the excavation planning was heading.[297]

While our main focus being on floors of well-defined houses, samples from streets, *peristasis*, workshops and public spaces were also taken. (Figures 20 and 21)

[296] SE samples are numbered from 1 to 29, however sample number 9 does not exist, the next sample after number 8 was labelled as "number 10" by mistake.
[297] See Luke *et al*. 2016 for a similar sampling strategy.

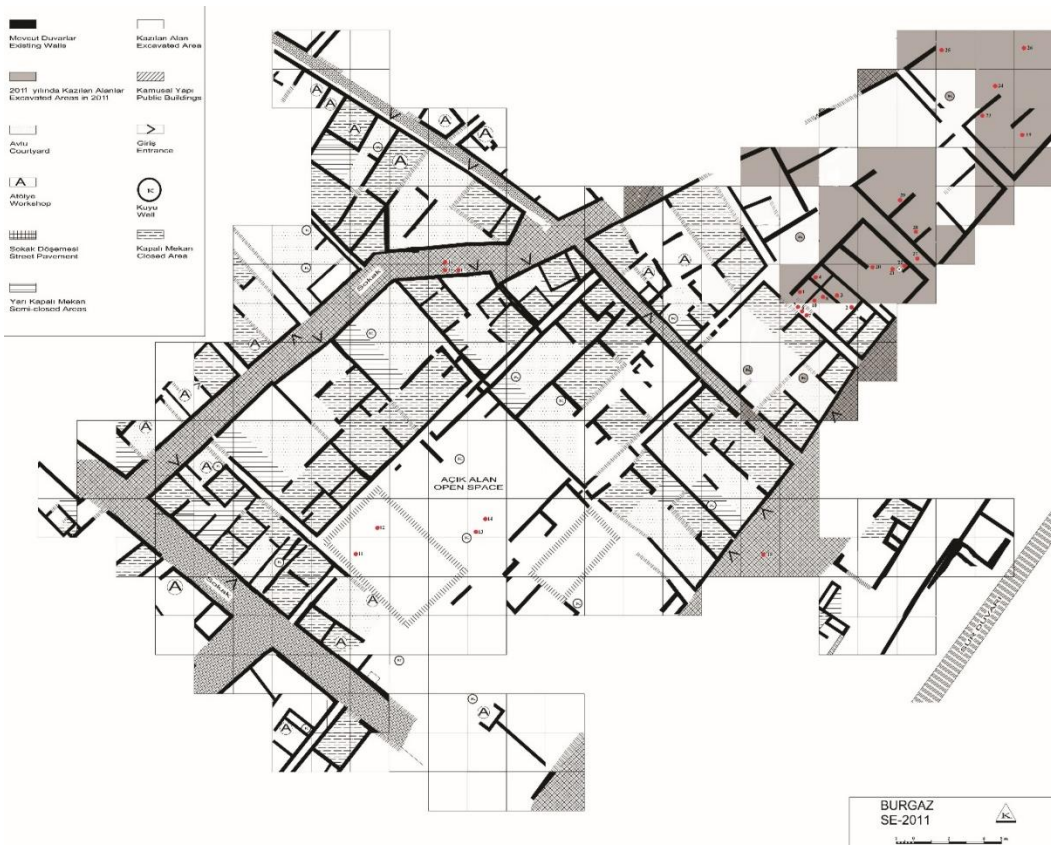


Figure 20: Plan of SE Sector showing sampling locations.

Throughout the three weeks of archaeological excavation, floors were sampled as they had appeared to eliminate the effect of contamination, continuous samples from the same floor were cut out systematically as long as the topography and stratification allowed us to do so. On the other hand, lime-like spots and/or ashy areas, both in sections and within floors were detected and thus shaped the sampling strategy. All samples were carefully cut out from the floors and deposits, wrapped up at the field, sketch drawings of the sampled area were made, photographed and levels taken.

Table 2: Samples collected from the SE Sector at Datça-Burgaz.

	SAMPLE	TRENCH/LOCUS	CONTEXT	ELEVATION
1	domesticA1	BZ.11.SE.10.4.A3	floor (domestic)	(+2.05 m.)
2	domesticA2	BZ.11.SE.10.4.B	floor (domestic)	(+1.88)
3	domesticA3	BZ.11.SE.10.4.B	floor (domestic)	(+1.92)
4	domesticA4	BZ.11.SE.10.4.A12	floor (domestic)	(+1.84)
5	peristasis1	BZ.10.5.D	*Peristasis*	(+1.67)
6	peristasis2	BZ.10.5.D	*Peristasis*	(+1.61)
7	peristasis3	BZ.10.5.D	*Peristasis*	(+1.38)
8	domesticA5	BZ.11.SE.10.4.B	floor (domestic)	(+1.80)
9	x	x	X	X
10	domesticA6	BZ.11.SE.10.4.B	floor (domestic)	(+1.89)
11	publicbuilding1	SE.4.8.C	floor (public space)	(+2.39)
12	publicbuilding2	SE.4.7.B	floor (public space)	(+2.36)
13	publicbuilding3	SE.6.7.A	floor (public /open- space)	(+1.87)
14	publicbuilding4	SE.6.7.A	floor (public /open-space)	(+1.83)
15	street1	SE.5.4.C	Street	(+1.86)
16	street2	SE.5.4.C	Street	(+1.81)
17	street3	SE.5.4.C	Street	(+1.86)
18	street4	SE.9.8.C	street	(+1.71)
19	domesticB1	BZ.11.SE.13.2.A	floor (domestic)	(+1.65)
20	domesticAcourt1	BZ.11.SE.11.4.A	floor (courtyard/open space)	(+2.00)
21	domesticAcourt2	BZ.11.SE.11.4.A	floor (courtyard/open space)	(+1.93)
22	workshop1	BZ.11.SE.11.4.B	floor (workshop)	(+1.93)
23	domesticB2	SE.12.2.A	floor (domestic)	(+1.53)
24	domesticB3	BZ.11.SE.12.2.B	floor (domestic)	(+1.57)
25	workshop2	BZ.11.SE.12.1.A	workshop	(+1.34)
26	workshop3	BZ.11.SE.13.1.A	workshop	(+1.65)
27	street5	BZ.11.SE.11.4.C	Street	(+1.80)
28	domesticC1	BZ.11.SE.11.4.C	floor	(+1.85)
29	domesticC2	BZ.11.SE.11.3.B	Floor	(+1.88)

Since the aim was to provide additional information about how the spaces functioned at Burgaz and how they were organized, sampling was intensified towards the corners of the rooms in domestic areas, where the floor must have been the dirtiest theoretically. Samples taken from the possible workshops were intended to produce results that enable us to speculate about the nature of work conducted in those spaces and the materials that have been used. Combined with on-going archaeo-botanical research, these 37 soil samples will contribute to the data related

with the use of space at Burgaz and provide an archive for future soil studies to benefit from.

A number of soil samples were collected during the 2010 excavation season; at the Northeastern Sector, the focus was on a particular house, NE-2. (Table 3) This well-defined house with multiple rooms was subject to decantation analysis, the results pointed out to *oikos* in terms of intensive scatter of carbonated microartefacts, preserved olive pits and possible sesame seeds.[298] 23 samples from this house were selected for multi-element analysis.

Figure 21: Plan of NE Sector showing House NE-2 and sampling locations.

[298] Unpublished Soil Report 2010, Burgaz Excavation Archieves.

Samples oikos7, oikos3, oikos2 are from the east of the room, associated with the ashy are exposed during excavations. Sample oikos1 is taken couple meters north of the previous three samples, close to the corner walls D53 and D47 form. Oikos6, oikos4 and oikos5 are collected as a group from the center of the room. Tiny courtyard room is in fact a small space on the northeast corner of the courtyard, the courtyard connection part of it possibly semi-sheltered with a roof construction. This space is represented by two samples selected randomly from a total of five. Tinycourtroom1 is cut off from the northeastern corner of the room where D151 and D91 meet, tinycourtroom2 is taken couple meters to the southwest of other sample.

These 23 samples are included in this study in order to investigate correlations between the domestic spaces of two designated sectors of Burgaz, NE and SE. As House NE-2 is a well-defined combination of spaces, the results from this area will also work as a control mechanism for the prospections drawn based on the results from SE Sector.

Table 3: Samples collected from House NE-2.

	SAMPLE	TRENCH/LOCUS	CONTEXT	ELEVATION
32	oikos1	BZ.09.NE.004.007.C	floor (domestic)	(+2.18 m.)
33	oikos2	BZ.09.NE.004.007.C	floor (domestic)	(+2.18)
34	oikos3	BZ.09.NE.004.007.C	floor (domestic)	(+2.18)
35	oikos4	BZ.09.NE.004.007.B	floor (domestic)	(+2.53)
36	oikos5	BZ.09.NE.004.007.B	floor (domestic)	(+2.53)
37	oikos6	BZ.09.NE.004.007.B	floor (domestic)	(+2.61)
38	oikos7	BZ.09.NE.004.007.B	floor (domestic)	(+2.41)
39	tinycourtroom1	BZ.09.NE.005.007.A	floor (domestic)	(+2.41)
40	tinycourtroom2	BZ.09.NE.005.007.A	floor (domestic)	(+2.41)
41	largemultiroom1	BZ.09.NE.005.007.B	floor (domestic)	(+2.32)
42	largemultiroom2	BZ.09.NE.005.007.B	floor (domestic)	(+2.18)
43	largemultiroom3	BZ.09.NE.005.007.B	floor (domestic)	(+2.32)
44	largemultiroom4	BZ.09.NE.005.007.B	floor (domestic)	(+2.18)
45	largemultiroom5	BZ.09.NE.005.007.B	floor (domestic)	(+2.18)
46	largemultiroom6	BZ.09.NE.005.007.B	floor (domestic)	(+2.32)
47	largemultiroom7	BZ.09.NE.005.007.B	floor (domestic)	(+2.17)
48	largemultiroom8	BZ.09.NE.005.007.B	floor (domestic)	(+2.17)
49	andron1	BZ.09.NE.005.007.A	floor (domestic)	(+2.28)
50	andron2	BZ.09.NE.005.006.D	floor (domestic)	(+2.28)
51	andron3	BZ.09.NE.005.007.A	floor (domestic)	(+2.32)
52	andron4	BZ.09.NE.005.006.D	floor (domestic)	(+2.28)
53	andron5	BZ.09.NE.005.006.D	floor (domestic)	(+2.28)
54	andron6	BZ.09.NE.005.006.D	floor (domestic)	(+2.28)

4.7. Limitations and Recommendations

Post-depositional processes and modern use might contaminate the soil and disturb cultural levels, load elements to soil concentrations. Cultivation, fertilizers, leaching and/or re-use of materials, as well as weathering can alter soil properties both physically and chemically.[299]

The geology of the site soils tends to affect natural phosphate levels, for this reason, sites with rather uniform geology are better candidates for phosphate analysis. Sandy and peaty soils are proved to be less satisfactory in terms of analysis since the level of phosphate loss increases with drainage.[300]

One particular limitation of phosphate analysis is that there are no standard values appointed to types of human activities; the accumulation of phosphate differs from sediment to sediment even though the same activity had taken place. The same issue goes with multi-element analysis as well. It is nearly impossible to derive activity patterns purely based on element distribution. The studied spaces either should be well documented artefactually and architecturally defined or as suggested, analysis results need to be supported by ethno-archaeological studies on modern day surfaces.[301]

For future soil studies regarding spatial studies at Burgaz, instead of measuring available phosphorus as it was the case in this study, analysing organic phosphorous (Po) or total phosphorous (Pt) might be other options to see the distribution of this element; the results may in fact be clearer and easier to interpret. Available phosphorous is easy to measure, however it varies from soil to soil and is heavily

[299] Wilson, Davidson, Cresser 2008:413
[300] Clark 1997:127
[301] Middleton 2004, 55-6

dependent on soil chemistry and structure. Moreover, the variety of extraction methods that is used for phosphorous affects the results and makes it almost impossible to compare them with other archaeological sites.[302] Same suggestion applies for calcium as well; further studies might consider extracting organic and inorganic calcium and calculate accordingly for more precise interpretations with reference to high concentrations that were yielded through analysis within this study.

Another concern is the abandonment process of Burgaz, since the end of the site was not a sudden, final cut; it is believed to be a slow process of people taking their valuables with them and moving away. Therefore, the material evidence consists of what Burgaz people did not want to take with them, everything that was not useful anymore; there is always the possibility that the artefacts have been recovered from where they were discarded, not from their original location of use. Such a case limits the extent of any spatial study aiming to discuss use of space and activity-related behaviour; further restricting the much-needed artefactual support for element-based activity area studies.

This interdisciplinary approach has become an integral part of modern archaeology practice; however, there has been certain criticism that there is a lack of communication between the archaeologists dealing with macroscopic contexts and the ones studying microscopic record. This gap seems to widen as often the microarchaeology researchers do not spend enough time at the field or at the excavation apart from collecting samples, making them unfamiliar with contextual and/or interpretative problems of that particular site; at the same time, as the analysis techniques used by this group are getting more and more sophisticated each day, the traditional archaeologists who are trained in humanities find it difficult to evaluate the data and the results of these analyses.[303]

[302] Holliday and Gartner 2007, 313
[303] Weiner 2010, 8-9

Studying soil is yet a developing field of research. Among other methods, chemical analyses and physical analytical techniques like micromorphology proved to be successful approaches to study anthropogenic soils and detect the changes of the context.[304] Considering sample preparation efforts, chemical analysis of soils seem to be a faster option than micromorphology thin sections. Some scholars, on the other hand, are experimenting with combinations of techniques. Spot tests, although not suitable to detect the origin of the residue, are favoured since they are very easy and cheap to do at the field enabling researchers to intensively sample large areas. Spot tests also provide quick results, making it possible to tweak the research plan while still at the field, redesign it if the need occurs. GC-MS (Gas chromatography-mass spectrometry) is used with spot tests, as an integrated method for activity area research. GC-MS separates and identifies substances including lipids and fatty acids, combined with spot test results, allowing to distinguish animal fats from vegetal fats, to identify olive oil and wine.[305]

ICP-AES is more sensitive technique in terms of detecting differences in chemical composition of samples and through producing large sets of data, allows a wide range of inferencing statistical analyses to be conducted to search for patterns. It is also more activity type-oriented, instead of pinpointing substances. However, ICP-AES cannot identify organic compounds and is not a field technique if one needs instant results for guidance during excavation and sampling. Which technique or a combination of techniques to utilize depends on the aims of the research.

Research design is an important factor that affects any specialized micro-research. Micro-archaeological research operates better when it is embedded as a permanent part into the excavation project and decision-making regarding excavation planning; it should not be a seasonal but a long-term intention, with proper funding assigned to it. This way, the results would have a better chance to be conclusive and to aid the archaeological knowledge of both the site and the discipline. Exposure and

[304] Dincauze 2000, 285
[305] Pingarron 2014, 2809

definition draw up another aspect for activity-area related research, to what extent spaces are being excavated and how these exposed spaces are being interpreted directly influences any further research as there is a significant need of referencing to archaeological evidence.

Although ICP technologies are a time-saving advancement, geochemical analysis is still a time consuming, as well as a serious learning process for researchers with pure traditional archaeology backgrounds. Establishing access to suitable lab facilities, to funding and to experts willing to spend time supporting the researcher are essential and should be planned in advance.

CHAPTER 5

ANALYSIS RESULTS AND DISCUSSION

5.1. The Aim

Chemical accumulations in soil which can be grouped together as elemental signatures to indicate a certain human impact are caused by **artefacts**, **architectural features** such as painted walls, benches, stucco and **human behaviour** as in repeated activities.[306]

The amount of organic material within the samples yielded very low percentages as well. The average is 0,77% and is surprisingly low for anthropogenic soils; on the other hand, is in accordance with phosphorous results. These lower than expected accumulations could be related to analysis methods but it also could be an outcome of the nature of the site itself. The slow abandonment process might have an effect, which is very evident on material evidence as well; or the physical and chemical conditions might have altered the element deposition.

The fact that Burgaz being a seaside settlement and the possible effect of seawater was also taken into consideration, however the salinity analysis of samples resulted as “very low salinity” in the soil.

[306] Parnell and Terry 2002, 382

The Ph level of Burgaz soil varies from 7,49 to 8,33 with an average of 7,9 which is slightly to moderately alkaline but not alkaline enough to have drainage problems that can lead to waterlogging; the element accumulations should have been preserved in their original levels of deposition. However, surface vegetation and their roots are observed to be considerably wide-spread, this might be causing some disruption in especially phosphorous levels. Yet it must be noted that the cultural layers at Burgaz are usually unaffected by such disturbance.

In accordance with Ph levels, the soil is extremely calcareous and also loamy. These are considered to be better conditions for element accumulations to stay undisturbed and give reasonable results related to human use of spaces.

For statistical analysis, we have used the base 10 logarithm converted elemental values for compatibility, however for the following element by element discussions and accompanying charts we used the original kg/da and ppm values since the log10 shrinks the values significantly and does not really allow to visually follow patterns when concentrations of a particular element and their distribution is being described.[307] As mentioned before, there is no standard in terms of elemental values, the level of accumulation differs from sediment to sediment and is associated with the soil type, its exposure to weather conditions, drainage and so on; therefore, the attempt here is to group, organize and interpret the results within themselves.

5.2. Phosphorous in Activity Areas

The available phosphorous levels are low, even for agricultural purposes; based on Datça Municipality's mapping of agricultural productivity in the peninsula, the P

[307] Wells 2004, 72

levels around Burgaz vary between 5 to 55 kg/da, Burgaz has an average of 2,974 kg/da.[308] It should be underlined here once again that the test kit we used measures available P instead of total P and is prone to give lower scores. However, the distribution of the element regarding different contexts would reveal patterns that could be interpreted in relation to human activities. (Table 4)

The lowest value came out as 0,938 kg/da, whereas the highest is 7,369 kg/da, with an average of 2,974 kg/da.[309] Three samples (one from a SE Sector domestic building, two from the same area but from *peristasis* contexts) strikeout as peak values among the entire selection, the lowest group of P values are from SE Sector domestic contexts including a courtyard.

There is no clear division between NE samples and SE samples, except the highs and lows coming from the *oikos* of House NE-2 which is in fact not that surprising since all NE samples are from one single building that is better preserved than the SE domestic buildings and SE domestic contexts. In general, the samples from the House NE-2 are higher in P with an average of 3,08 kg/da, SE Sector domestic contexts have an average of 2,222 kg/da of P with the exception of one sample with the highest value within the dataset as mentioned above.

Samples domesticA1-6 are collected from the same building; domesticA5 with the highest value (7,369 kg/da) and domesticA6 (2,908 kg/da), the second highest value in this group yet still below the average, are the two distinctive samples from this building. Both are from the same room which appears as a large central space on the eastern side of the building, domesticA5 is from the corner of two interior walls, domesticA6 is close to the eastern wall of the structure, close to the western corner

[308] For sample locations in Datça and elemental values, check https://muglacbs mugla.bel.tr/TarimsalVerimlilik_app/ (retrieved on 28.07.2021)
[309] Sample BZ.11.20 (domesticAcourt1) was too small in size to undergo the phosphorous analysis, therefore not included here.

of the room. Samples domesticA3 and 4 were collected from two different rooms from this building, revealing the lowest P values in this group. Even though it should be considered with some caution since the entire house was not sampled, the large central space with the two higher value samples would be a good candidate to be identified as the *oikos* or the courtyard of this house.

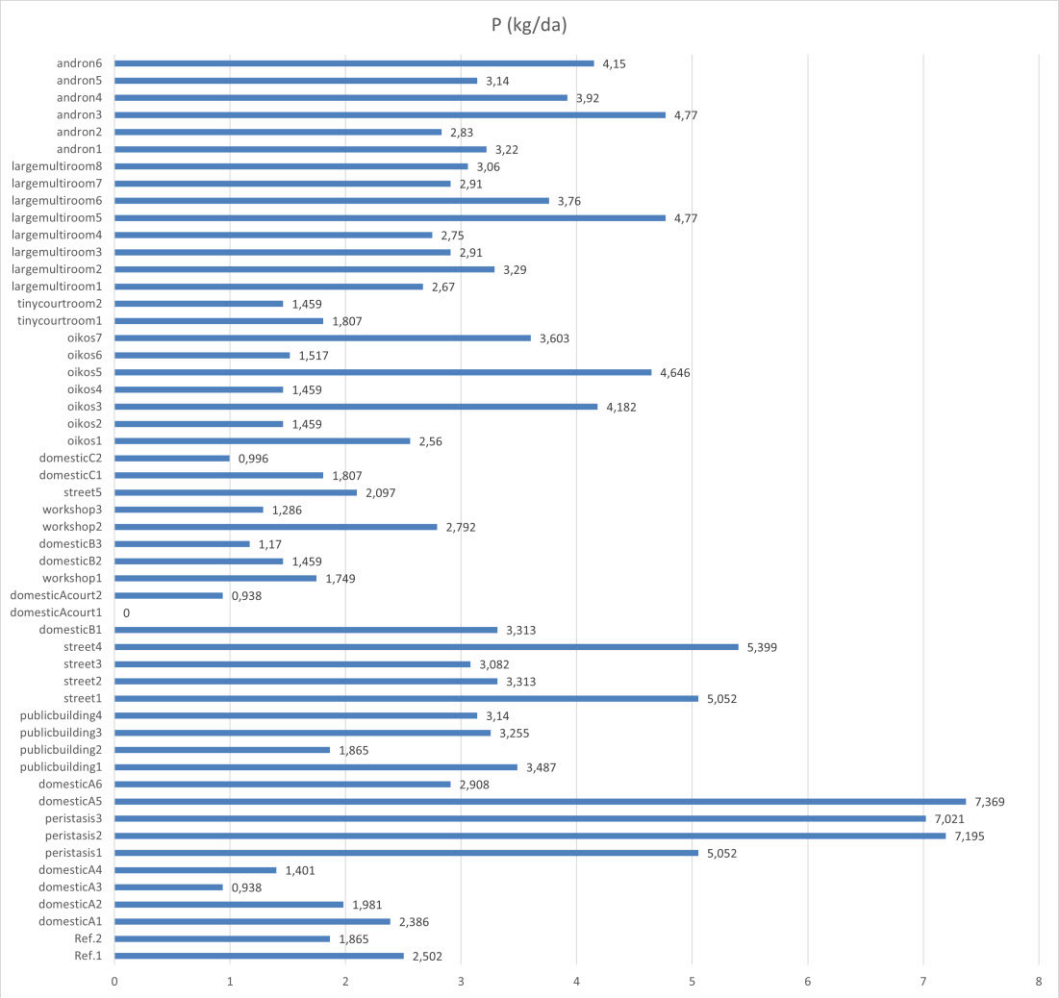
Samples domesticB1-3 are associated with one building divided by two interior walls, domesticB1 scored slightly higher than average while the other two are below. DomesticB1 was collected from the center of the eastern room of the building where ashy spots were observed on the floor, the other two samples were collected from a previous floor of the same building that is very badly preserved in an area where houses were intensively transformed into workshops. Samples domesticC1 and 2 were collected from spots by the walls of one room of another neighbouring building in the same area; a small, closed space that is also not well preserved. The values of these two samples are quite below the average.

The results from House NE-2 domestic spaces have an average of 3,08 kg/da within themselves, higher than SE domestic samples. Samples with considerably higher than average P are oikos3, oikos5, largemultiroom5, andron3 and andron6. Andron3 is collected from immediately to the right of the room entrance, andron6 is from the southwestern corner of the room. The next higher value comes from andron4 which is sampled from the central part of the *andron*, right across the entrance.

Largemultiroom samples are from the first room on the east after entering the house, opposite of the *andron*, accessed through the courtyard. Sample largemultiroom5 is from close to the room's western wall and displays a high P accumulation with 4,77 kg/da; another sample, largemultiroom6 closer to the center of the room scores 3,76 kg/da. The rest of the samples are slightly above and below

average regardless of their locations within the room. The overall picture seems as one of actively used and likewise cleaned space.

Table 4: Bar chart showing phosphorous distribution (mean: 2,97472 kg/da).



Samples oikos3 and oikos7 are from the large ash layer on the eastern side of the room, oikos5 is from towards the center of the room; these are the three highest scoring samples of this room. Oikos5, oikos6 and oikos4 are sampled from adjacent

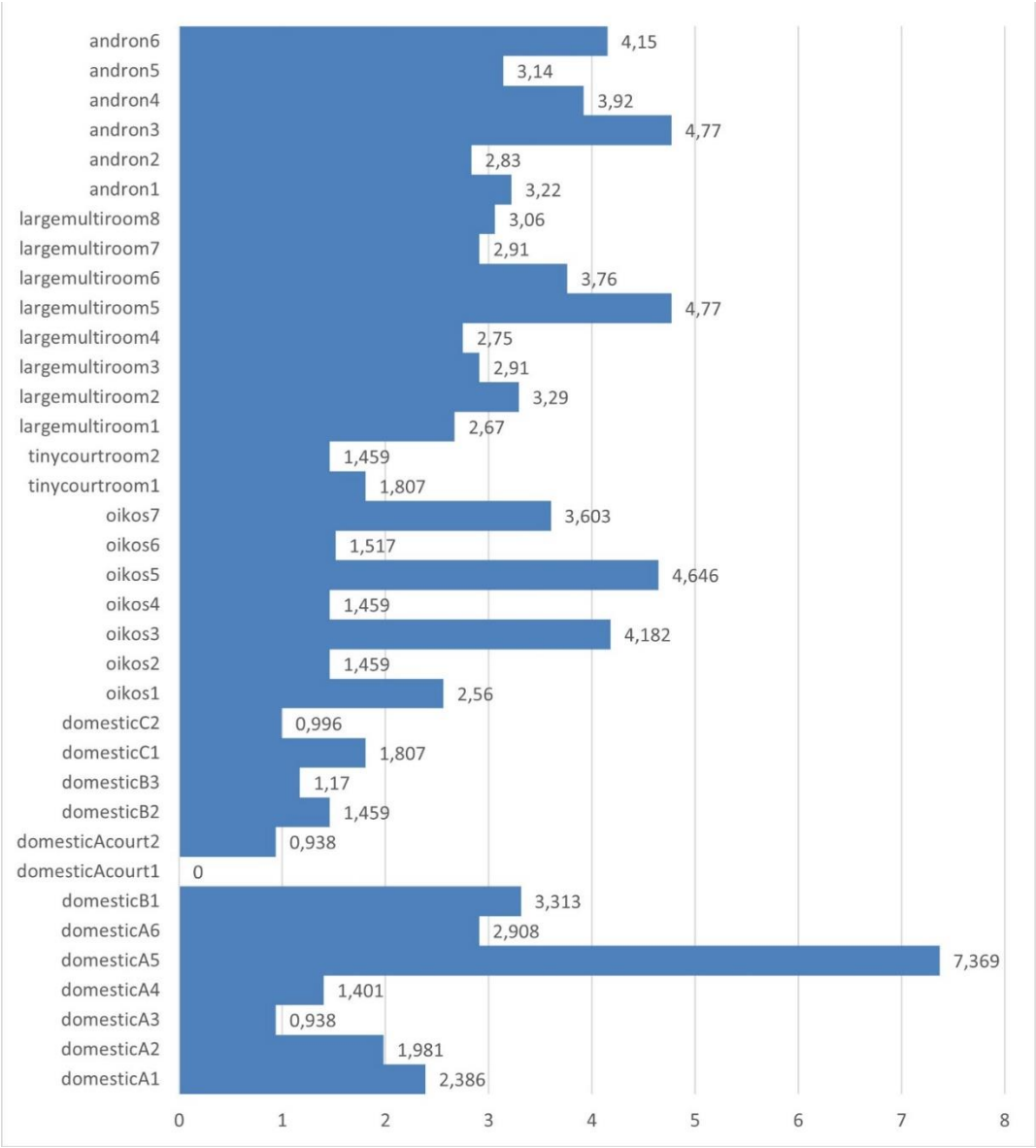
grids, however 6 and 4 are considerably below the average P while 5 is quite higher within Burgaz P range. This varied distribution could be hinting at different activities taking place in different spots in the *oikos* with a focus on the ashy area on the western side and some central spots within the space.

The tinycourtroom samples collected from the small room adjacent to the courtyard, are both categorized as low P value, making the spatial interpretation of this small space lean towards a storage unit if based on P accumulation only. However, the pottery distribution indicates food serving ware as the defining group in the inner room of this space, we will discuss the contribution of other elements into defining the use of space further below.

To sum up on domestic samples, the phosphorous accumulations are of a wide variety, possibly related to the presence of certain spots within the room being used for certain activities while some spots were used for purposes not involving organic materials. It is difficult to define dirty and clean areas or sweeping patterns based on P accumulations since higher levels are somewhat randomly distributed within rooms. (Table 5)

Two of the three samples cut from the *peristasis* between two houses in SE Sector yielded the second and third highest levels of phosphorous in this study with 7, 195 kg/da and 7,021 kg/da; sample peristasis1 is also very high in P with 5,052 kg/da. This result supports the known function of these architectural features as spaces where refuse gets accumulated, it is possible to say that in this case mostly organic refuse was accumulated in this small narrow space.

Table 5: P values of Burgaz domestic contexts, NE and SE Sectors.



Samples from the roofed and open public spaces are in the average P category; the two open public space samples are very close to each other with 3,255 and 3,14 kg/da of P while one roofed space sample is below average and the other sample is higher in P than the open public space samples with 3,487 kg/da. Based on ethnoarchaeological research literature, open spaces and high traffic areas are low in all elements including P, at Burgaz they represent connections to organic

material/waste more densely than some particular domestic spaces of both sectors of Burgaz; in other words, public building is dirtier than some rooms of Burgaz houses.

The reason beyond this relatively higher P values coming from open public space could be a specific activity in this area where there are two wells, as well as the exposure to animal manure frequently; open public spaces could have been exposed to more people passing by, gathering and consuming organic materials whereas roofed public spaces were in limited and controlled use by a smaller group of individuals and therefore display highs and lows regarding phosphorus.

Street samples are collected from three different locations. Samples street1-3 are from the large street running on a northeast-southwest direction, enclosing the large insula at the SE Sector from northwest, sample street4 is collected from another, partially exposed large street on the southwest of the same insula. Street1 and street4 are high in P with 5,052 kg/da and 5,399 kg/da respectively while the remaining two are 3,082 and 3,313 kg/da. Street5 is collected from a narrower, more pathway-like passage between two domestic buildings that were also subject to sampling in the SE Sector, its P value of 2,097 kg/da makes it slightly below average.

Samples from open (unroofed) units, including streets but excluding courtyards, consistently displayed higher phosphorous levels throughout the study. Samples collected from workshop areas, presented the lowest average accumulation of phosphorous with 1,942 kg/da.

As mentioned before, phosphorus is universally associated with human activities, it is one of the essential ingredients of the DNA molecule and when added to soil, it

accumulates *in situ* in a large variety of soil types. Elevated levels of P is linked to food and food preparation, as well as waste areas and middens. According to phosphorous accumulations, the most active/dirty/organic material related area seems to be the *peristasis*, followed by the streets. Open/public spaces are subject to less activity than streets but more than workshops, workshops do not appear as spaces where people cooked or did significant food-related activity. House NE-2, on the other hand, although P levels are around and moderately higher than average, paints are more diverse picture considering the fluctuation in P levels, some spots in the rooms are definitely used for organic material and/or food processing/cooking and possibly consumption.

5.3. Potassium in Activity Areas

High levels of potassium accumulations are related to wood, wood burning and ash; an element that would aid to define areas of *in situ* burning and also fireplace sweepings. This element is closely associated with household activities like food preparation/cooking and fires/ovens; a soil research in Post-Medieval abandoned farmsteads in Isle of Skye suggest potassium, along with rubidium and thorium, as indicators of human activity and that they are in fact more reliable compared to phosphorous since the latter tends to be affected by external conditions as human and animal manure or habitation.[310]

Average potassium score at Burgaz is 86,8344 kg/da, there are couple of peak scores coming from different contexts; sample workshop2 collected from a space that was interpreted as a figurine workshop revealed the highest accumulation with 175,9 kg/da. Other peak scores include one roofed and one unroofed public space, one *peristasis* and one domestic context from SE Sector. The lowest K sample is

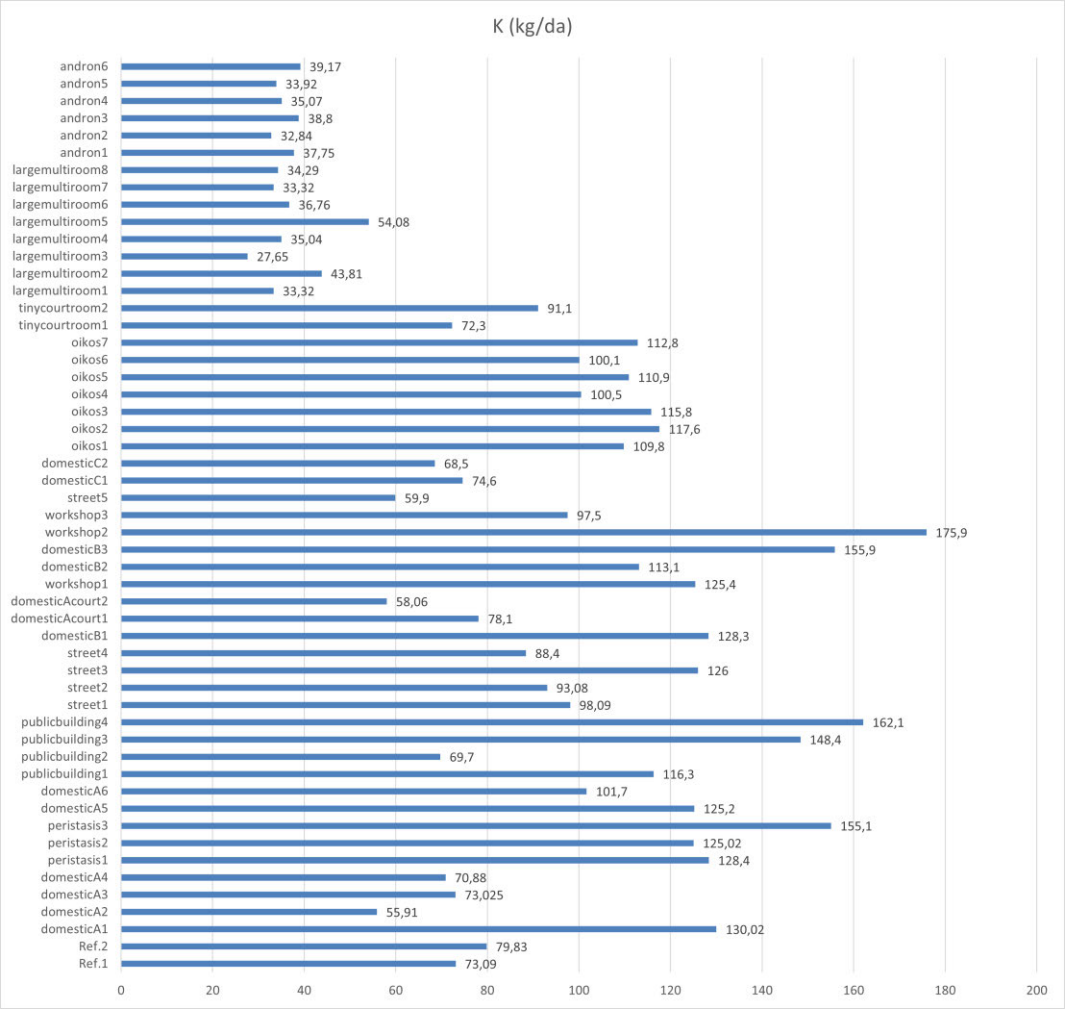
[310] Entwistle *et al*. 2000, 302

largemultiroom3 with 27,65 kg/da, this room of House NE-2 did not produce elevated K in general. (Table 6)

SE Sector domestic contexts display a variety of elemental results. The house we have sampled as domesticA revealed highs and lows, the small room on the northwestern corner of the house and the large central space we previously -and cautiously- suggested as the *oikos* or courtyard of the house scored the highest K values of this house ranging between 130,02 to 101,7 kg/da while the rest of the domesticA samples scored below average. These two rooms could be candidates for activities involving wood fire. The structure on the northeastern corner of the excavated area at Burgaz was sampled as domesticB reveals K accumulations between 155,9 and 113,1 kg/da, although the values are higher than the average, it is very difficult to interpret this space since it is a very poorly preserved structure with no distinct spatial divisions. DomesticC samples are from a neighbouring house and below the average K value.

In House NE-2, *andron* samples are well below the average K with scores ranging between 32,84 to 39,17 kg/da, pointing at the lack of *in situ* fires in this space. The large room on the right side of the entrance to the house also scored similarly low; the small room adjacent to courtyard, sample tinycourtroom1 collected from the northeastern corner of the room scored below average while tinycourtroom2 has 91,1 kg/da K. Even though it is still barely above average, it hints at the possibility that this corridor-like space in front of the room might be a semi-roofed working space for cold and wet months or another possibility is that this slightly elevated K value might be related to spills from wood burning activities that could have been taken place in the courtyard.

Table 6: Potassium distribution in Burgaz. (Mean: 86,8344 kg/da)



Samples from the *oikos* of House NE-2, although not the highest scores of the dataset, display a consistent high with a range of 100,1 to 117,6 kg/da of K over the average 86,8334 kg/da at Burgaz. The highest scoring three samples were all collected from around the ashy area on the northeast of the room. When interpreted as an independent unit and also while keeping in mind that the courtyard was not analyzed within the frame of this study, it is possible to claim that no *in situ* fires were installed in *andron* or the large room that is thought to have used as a multifunctional space but in *oikos* there was an *in situ* fire for a long enough time for K to accumulate around it.

All three *peristasis* samples scored well above average, between 125,02 to 155,1 kg/da, the most likely explanation could be accumulations of fireplace sweepings in this narrow space between two neighbouring houses. Public space samples, regardless of them being roofed or open spaces, scored quite high above the average with one exception, sample publicbuilding2 from the northern room of the public building scoring below average with 69,7 kg/da. While the other public building sample's 116,3 kg/da K score could be explained by an indoors fire for heating purposes, the public open space samples scoring this high above the average is difficult to interpret. They are collected from around a well that is located in the southern edge of the space, there is also a second well on the north of this space; it could be suggested here that this open space adjacent to a public building was not merely for gatherings but activities involving wood fire and organic material also took place here.

Street samples from the paved, large street west of the main insula are very close to the average K with a moderately high value sample of street3, sample street4 from the partially excavated street running along the eastern side of the insula scored average P. Sample street5 taken from a rather modest pathway between two rows of houses towards the northern edge of SE Sector revealed a more expected low score, compatible with the suggested elemental signature for high traffic exterior spaces and pathways.

Workshop samples scored between 97,5 and 175,9 kg/da of K. Workshop 2 and 3 are sampled from a possible figurine workshop, workshop2 with the highest K score of the dataset perhaps strengthens this suggestion as it hints to an *in situ* fire and/or wood ash. However, this space was not further excavated and not fully exposed.

4.4. Metals, A General Evaluation

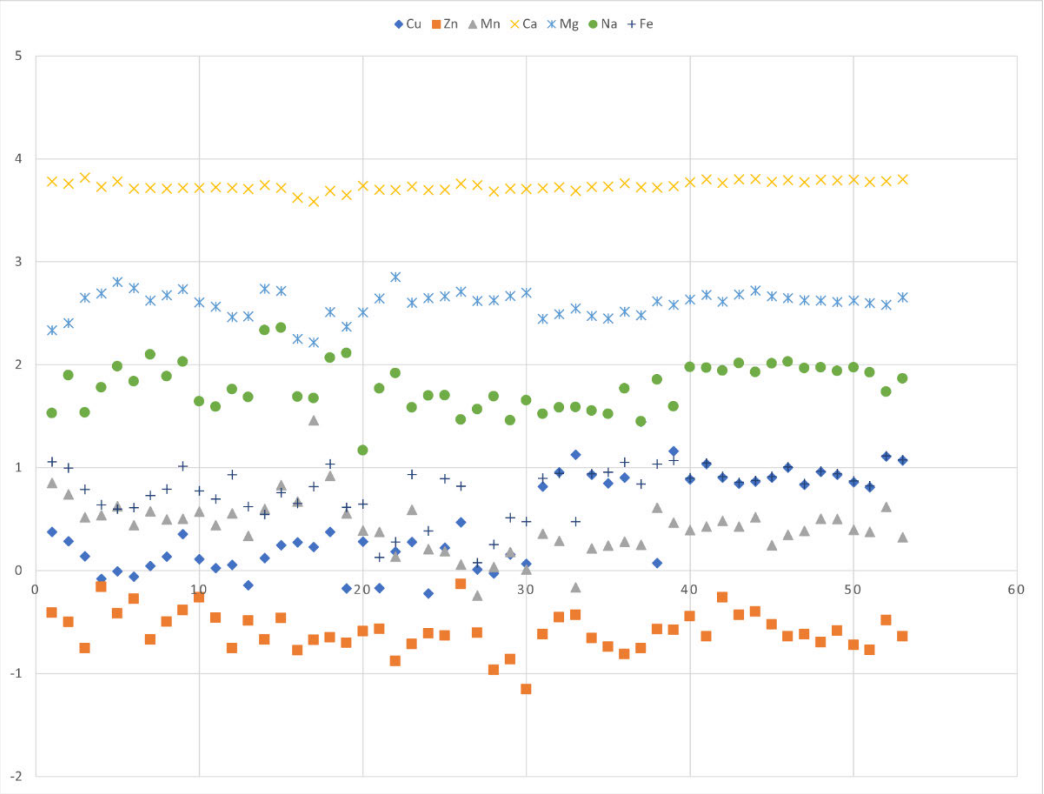
To see how our data correlates, we have started with a basic X-Y scatter chart using Microsoft Excel; the data includes all the heavy metals that were tested with the addition of calcium and sodium, excluding phosphorus and potassium since those were measured differently during the chemical analysis.

When the data is placed on a plot, two groups can be identified; copper, zinc, manganese and iron display a wider variation whereas sodium, magnesium and calcium are of a smaller variation. Calcium especially appears as in no relation with the other elements. Magnesium and sodium behave slightly correspondingly for street samples and most of the House NE-2 samples, especially for the large multifunctional room and *andron*, however these two elements do not heavily correlate with each other. (Table 7)

Iron and manganese behave similarly for a large portion of SE unroofed contexts samples but tend to fall apart from each other when it comes to the samples collected from House NE-2. In this house iron appears to be in correlation with copper instead of manganese, especially in *andron* and large multifunctional room, as well was in a couple samples from *oikos*. Iron and copper together hint at production of tools and artefacts, as well as weaving and dyeing.

In one of the houses in SE Sector and the adjacent *peristasis* where the first 10 samples were collected in the southwestern part of the exposed area, iron, copper and manganese display similar variations. Copper and manganese strongly correlate in three samples from two different SE Sector domestic contexts, one SE Sector domestic open courtyard sample and one street sample, the pathway between two

Table 7: Scatterplot for elements (excluding P and K) at Burgaz, all values LOG10.



SE houses; elevated values of these two elements is considered a signature for a reception/guest areas, however these samples scored below average for both elements, this small cluster is based on likeness only, does not really point to similar use of space.

Zinc and copper are in weak correlation when we look at the first group of samples collected as domesticA from the small rooms of a SE Sector house, which could point to storage spaces since these rooms scored below average in terms of phosphorus as well. Same overlapping happens for the street samples collected from the western paved street with levels of manganese and iron, however elemental scores of iron and manganese from these samples do not provide a clear explanation for this correlation.

Domestic spaces of NE and SE Sectors differ from each other in terms of chemical signatures; however the later rearrangements done to SE houses must be kept in mind when interpreting these element distributions. Streets and open public spaces appear to have specific combinations of elements as indicators, and so does some domestic spaces in SE Sector.

5.5. Zinc

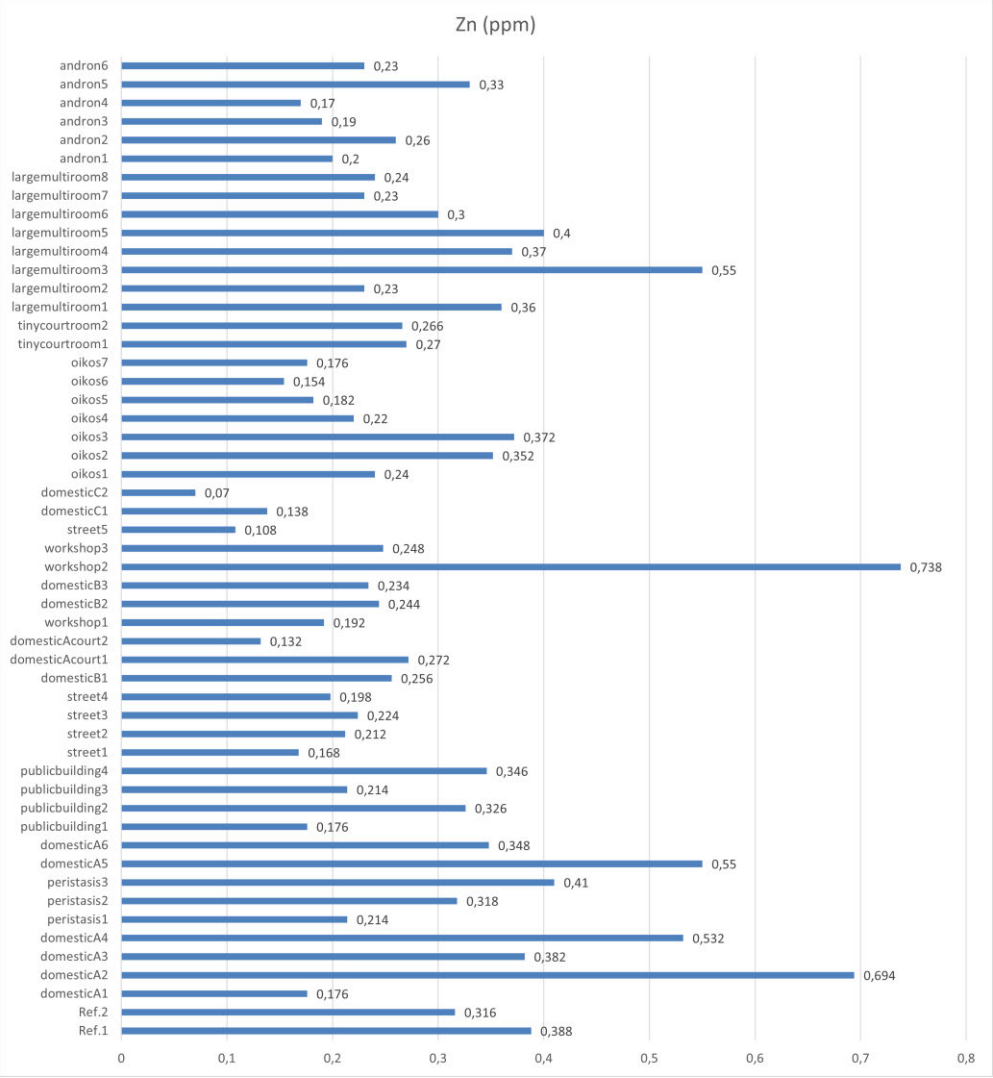
Elevated zinc accumulations are considered to be related to storing of grains and/or butchering and bones. The average Zn at Burgaz archaeological contexts is 0,28521 ppm, the highest score originates from the possible figurine workshop context with 0,738 ppm, the main group with elevated Zn values are domestic context samples from both sectors. (Table 8)

The only house with elevated Zn values from the SE Sector is the rather preserved building that was sampled as domesticA series, the other two contexts provided Zn below the average. The highest accumulation in this house originates from the long and narrow central room on the northern side, another high score is located in the adjacent central space; these two spaces could have been where meat preparation was done. The other high score comes from the small room in the northwestern corner of the house, given the size and location of the room, it is possible this Zn accumulation is related to grain storage.

Moving on to House NE-2, *andron* samples are grouped mostly quite below average with one sample slightly above it, making this space clean of storage or butchering activities. The small courtyard room samples are similar to *andron*; Zn appears as irrelevant to interpret the activities for this space, we need to consider the distribution of other elements. Two samples from the *oikos* scored slightly higher

than average Zn, both are associated with the ashy layer in this room; the Zn accumulation in *oikos* is not high enough to be indicating butchering or cooked bones.

Table 8: Zinc distribution at Burgaz. (Mean: 0,28521 ppm)



The highest score of the large room across the *andron* comes from a sample collected by the northern wall, sample largemultiroom3 with 0,55 ppm Zn. This high level Zn sample and other samples with above average Zn are all collected from the eastern half of the room, very likely indicating the more active food preparation area in this room. In association with this group of samples but scoring below average is the sample largemultiroom2, collected from the corner of the eastern and the southwestern wall, this corner was possibly used for some other purpose.

Peristasis and public space samples scored around the average, street samples are all below average. While the other two workshop samples are below the average Zn value, workshop2 scored the highest value of the dataset. It is difficult to translate this into a spatial function, this area was not further excavated and not fully defined. Elevated Zn values appear based on specific spots within domestic contexts at Burgaz, this element is very likely to define storage and butchering activities if paired with artefactual and ecological finds.

5.6. Iron

Elevated iron values are associated with butchering, kitchen activities, pigment processing and *in situ* fires in some cases; when paired with elevated copper values, it indicates production of tools and artefacts and/or weaving and dyeing. The average Fe at Burgaz came out as 6,89562 ppm, highs and lows are present in almost every spatial unit. The highest accumulation is andron5 with 12,99 ppm, the lowest score originates from a domestic courtyard sample from the SE Sector with 1,34 ppm. In the case of SE samples like peristasis3 and street3 with very elevated iron accumulations, the results might be associated with the long-time deposition of discarded artefacts, sweepings of activities involving pigments or a fire. (Table 9)

As for the domestic context samples, House NE-2 scored higher Fe than SE houses, only one SE domestic context scored above average, that is domesticB3 collected from the poorly preserved building on the northern edge of the excavated area.

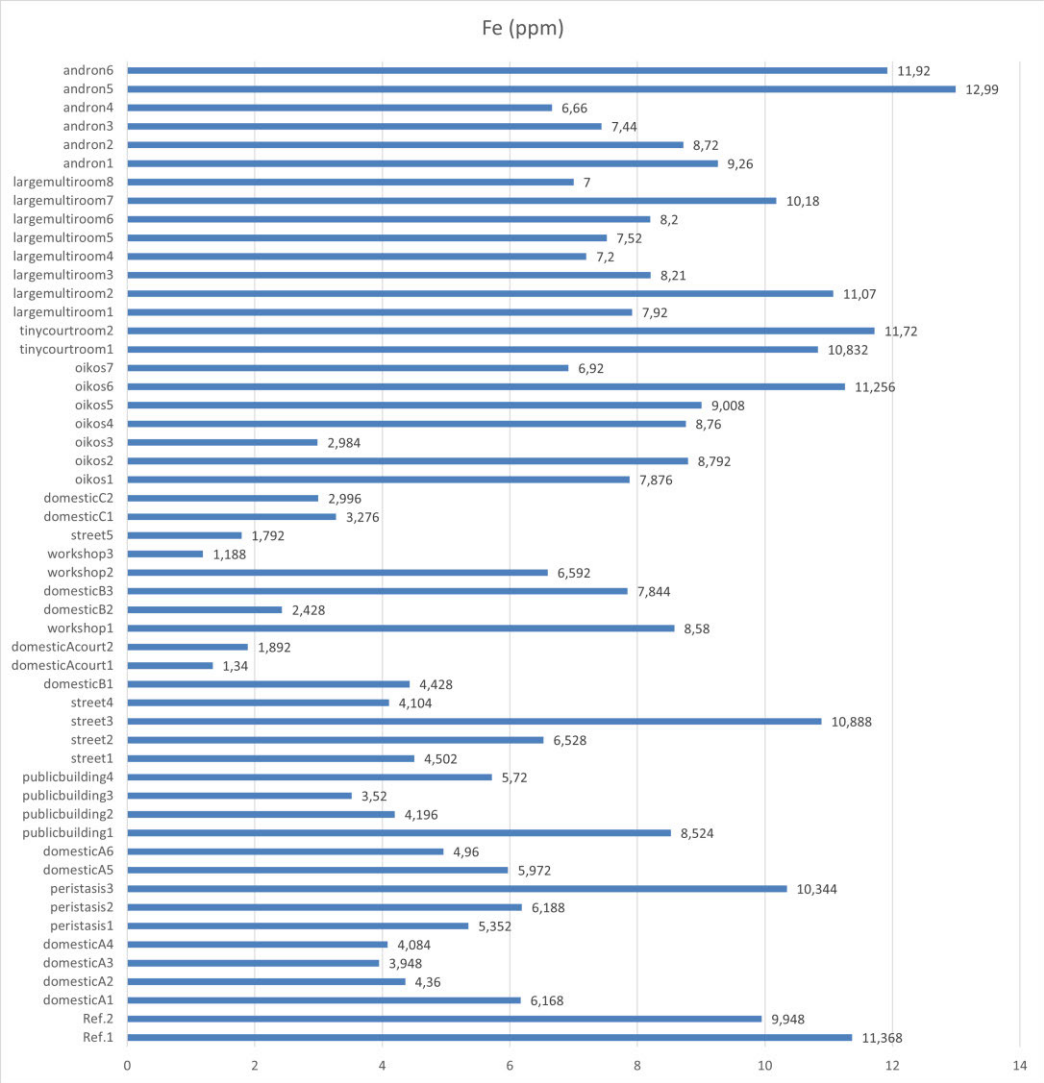
At House NE-2, *andron* samples that were collected from close to the room walls yielded high values between 9,26 to 12,99 ppm; even though the pottery groups recovered in this room are not related to cooking or food preparation, elevated Fe values indicate a lived-in *andron*.

The large room has two samples with elevated Fe scores, one sample from the southern corner of the room and another from the center, 11,07 ppm and 10,18 pmm respectively. The sample from the southern corner scored low for Zn while the adjacent samples were higher, it is possible that this elevated Fe accumulation was caused by an object or feature standing here for long enough to leave residues on the floor. The rest of the samples range between 7 and 8,21 ppm, moderately above the average. This room is characterized by drinking wares and food preparing coarse wares but no cooking wares based on the artefact distribution analysis, these two spots with elevated Fe scores are possibly associated with food preparation/kitchen activities and related equipment.[311]

Two samples from the tiny room adjacent to the courtyard both scored quite high with 10,83 and 11,72 ppm, well above the average. We have already speculated about the possibility of this space being a storage and work space combined, the small room as a storage space and the corridor-like space in front of the room opening up towards the courtyard as a workspace. These elevated Fe accumulations are very likely hinting at kitchen activities and/or small scale tool production, pigment involving activities.

[311] Atıcı 2013:105

Table 9: Iron distribution at Burgaz. (Mean: 6,89562 ppm)



Oikos of House NE-2 has several samples with elevated values ranging between 11,256 to 8,76 ppm Fe, one from near the ashy area on the floor, three from towards the center of the room but not far away from the ashy area. Since these samples do not have elevated copper scores, instead of tool production, weaving or dyeing, this part of the room very likely was used for kitchen activities.

One *peristasis* sample peaks with 10,334 ppm Fe and one street sample likewise with 10,888 ppm, while the rest of the *peristasis* and street samples are below average. Public building samples are similarly below average except sample publicbuilding1 which scored 8,524 ppm Fe, very possibly supporting our previous suggestion of a fire for heating purposes in this room.

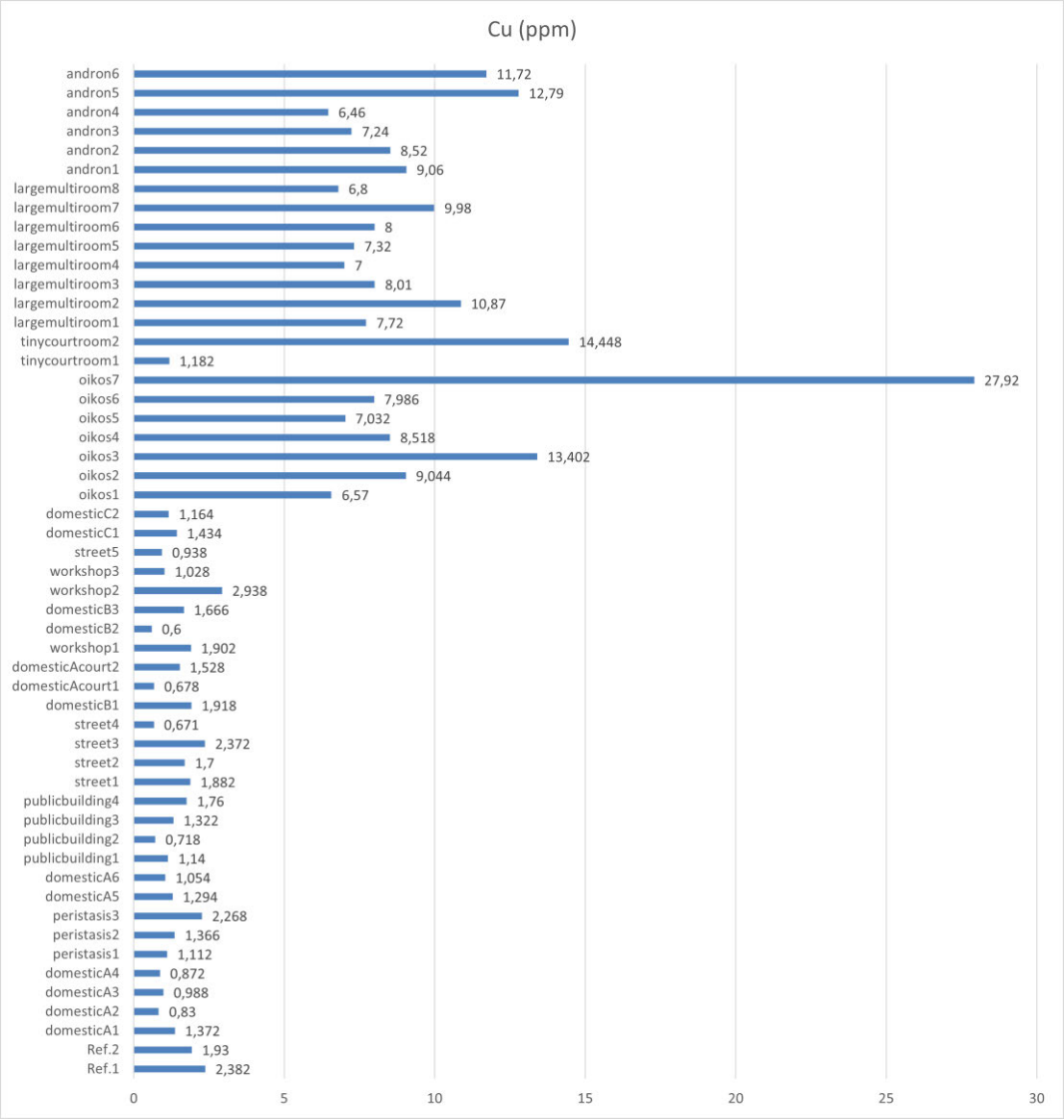
Workshop samples are from two different contexts, the northern workshop yielded below average Fe scores, sample workshop1 from the southern workshop context scored above average with 8,58 ppm Fe. Based on the sample's significantly below average copper accumulation, our suggestion would lean towards an activity involving pigments instead of tool production which elevated levels of Fe and Cu combined would have hinted at.

5.7. Copper

Elevated levels of copper in archaeological soils correlate with human occupation in general, it could also point to artefact distribution; when paired with elevated iron levels it is associated with tool and artefact production, dyeing, metalworking; when paired with elevated levels of manganese, it could refer to rooms with less use such as reception areas or guest rooms. Elevated copper in association with elevated manganese and zinc is observed to be related to plant origin food disposal as well.
At Burgaz, Cu is significantly below the average of 4,91357 ppm throughout the SE Sector samples regardless of the context, reveals a varied distribution among the rooms of the House NE-2 with sharp peaks. This element probably has a better chance of indicating spatial function in rather undisturbed contexts, these almost non-existent Cu accumulations in the SE Sector also raises a question of to what degree the severely transformed and modified into possible workshops spaces were used by Burgaz people. The highest score of the dataset belongs to oikos7 with

27,92 ppm, the next high peak is from the small courtyard room with 14,448 ppm. Lowest accumulation is from a domestic context in SE Sector, 0,6 ppm. (Table 10)

Table 10: Copper distribution at Burgaz. (Mean: 4,91357 ppm)



Andron samples, collected from near the room walls scored higher than the two samples taken from near the entrance to the room and from the center of the room.

The two highest samples are from the southwestern side of the room and interestingly they did not score high for Mn and do not fit into the elemental signature of Cu and Mn suggested for reception rooms but correlates with high Fe scores, in parallel with the signature for production derived from literature. However, considering the artefact distribution of this room, this combined accumulation of Cu and Fe here could possibly be explained by either artefact distribution or long-term standing furniture/features in this spot. Another possibility is that elevated Cu and Fe pairing explains the use of *andron* as in human occupation.

The large room has two samples from random spots with rather elevated Cu accumulations, largemultiroom2 from the southern corner of the room with 10,87 ppm and largemultiroom7 from the center with 9,98 ppm. The rest is moderately above the average. The two higher scoring samples also score high for Fe, could be pointing at small scale production of tools/artefacts or weaving/dyeing. The loomweight density is generally low at Burgaz; this room yielded one loomweight, the entire House NE-2 yielded 11 in total. Sample largemultiroom3 by the northern wall scored a fairly above the average 8,01 ppm for Cu, this sample scored high for zinc too, this spot could perhaps be a candidate for plant-based food preparation activities.

Oikos7, sampled from towards the northeastern corner of the room, to the right of the entrance scored a sharp peak with 27,92 ppm; another elevated score is oikos3 with 13,402 ppm, both are associated with the ash layer on the floor. The rest of the samples are not highly elevated as these two, but well above average. Paired with overall elevated levels of potassium and high levels of phosphorus from samples around the ash layer, cooking by the fire seems to be one of chemically supported activities in *oikos*. There is only one loomweight recovered in *oikos*, as it was the case in the large room; apart from the slow abandonment of the settlement, this could also be related to the rooms being used according to seasons, the final

location of archaeologically recovered items not necessarily limits their locations of use throughout their lifespans. With the evidence of fire present in this room, it could have been used in colder weather, then daily work was perhaps moved to the courtyard in warmer seasons.

Another elevated Cu accumulation comes from sample tinycourtroom2 with 14,488 ppm, this possibly semi-covered space connecting this small room to the courtyard scored high levels of Fe as well, supporting our proposal of this space for a daily work area.

5.8. Calcium

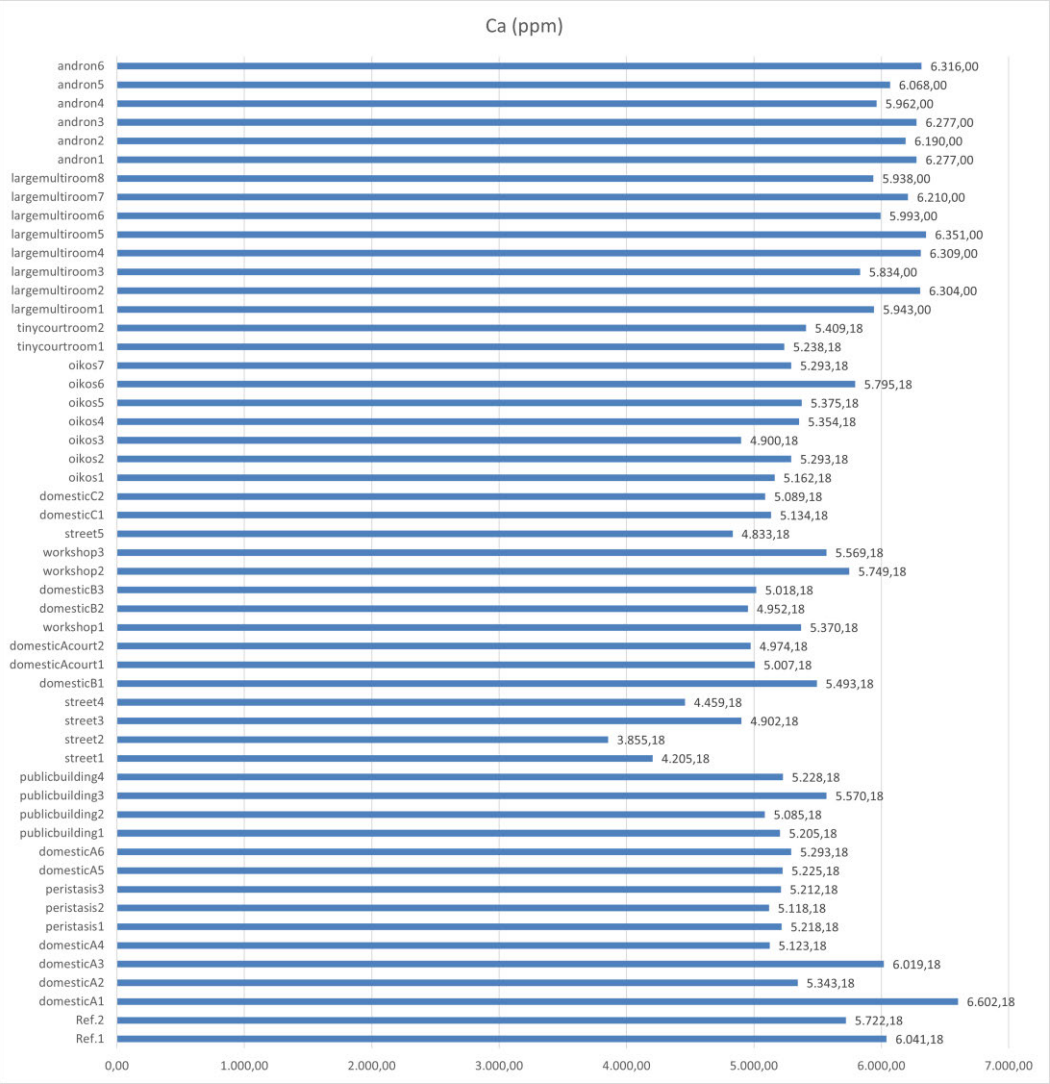
Elevated levels of calcium, as mentioned previously, can point at general human habitation, artefact spreads, shell accumulations, as well as middens or food preparation when paired with elevated phosphorus, cooking and burning when paired with elevated levels of magnesium and manganese. Ca appears in no relation with the other elements at Burgaz, the variation is of a narrow range and there are no significant peaks but an overall high calcium accumulation ranging from 3855,18 ppm to 6602,18 ppm with an average of 5479,45 ppm. (Table 11) Ca at Burgaz seems to be strongly associated with the extremely calcareous soil and less so with human activities.

5.9. Magnesium

Regarding human activities, elevated magnesium levels are usually linked to hearths, burning, cooking and food disposal along with phosphorus, manganese and

calcium; when paired with elevated P to meat-based food activities, when paired with elevated P and K to densely used living rooms.

Table 11: Calcium distribution at Burgaz. (Mean: 5479,45 ppm)



There is no significant difference in terms of the level of Mg accumulation between the SE and NE Sectors, however two peaks originate from the SE domestic contexts with 710,099 ppm and 636,699 ppm. The lowest score is a street sample with 164,399 ppm while the average Mg is 405,923 ppm at Burgaz. (Table 12)

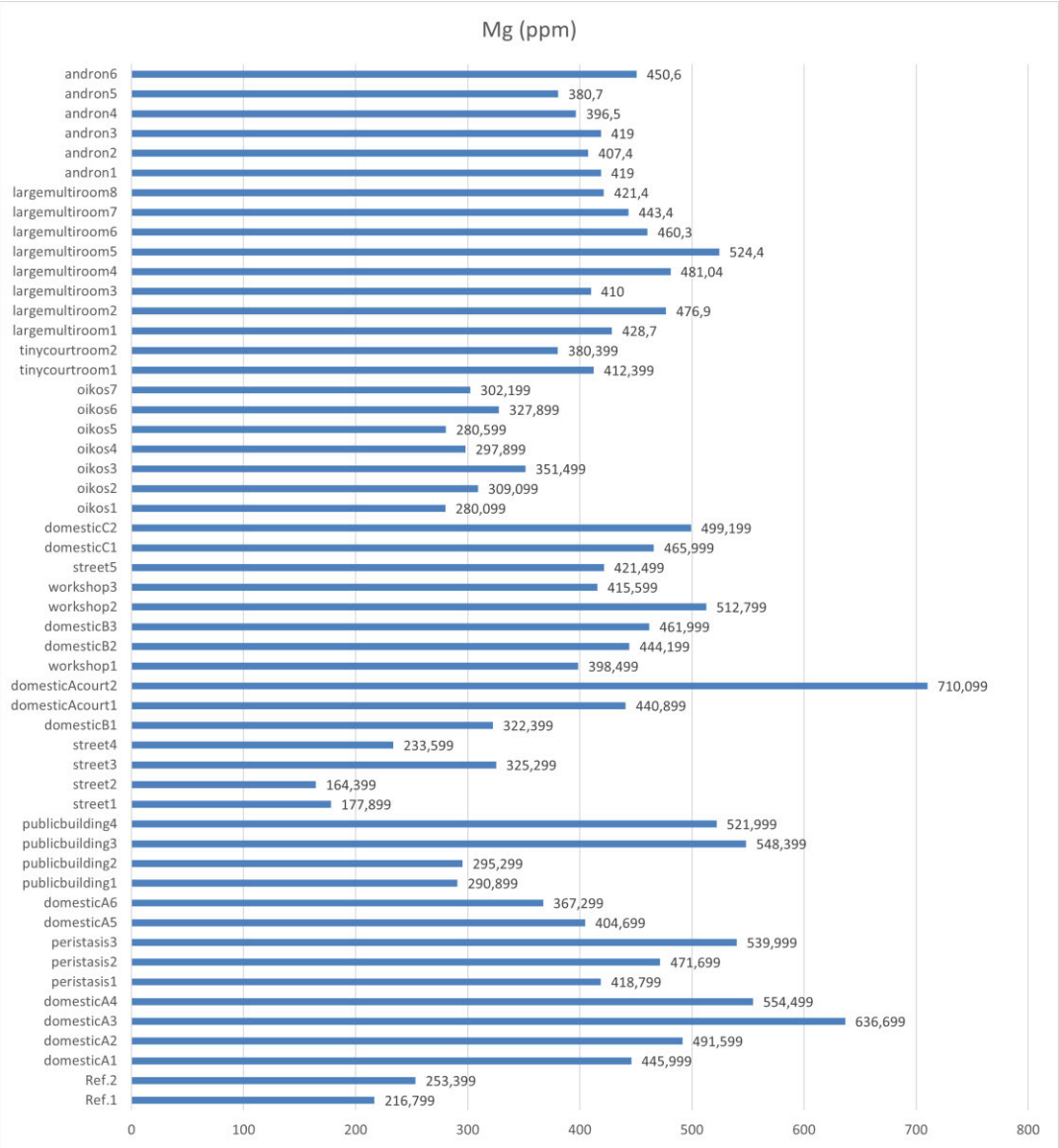
The house from SE Sector sampled as domesticA has two peak scores, one is domesticA3 located in its northwestern central room; this sample did not score significantly high for any other element except for calcium and slightly above average for manganese, sodium and zinc, low key hinting at cooking and burning. DomesticA4 from the northwestern corner room also scored higher than average for Mg, this sample scored high for Zn as well. The other peak and the highest scoring sample of dataset, domesticAcourt2 was collected from the adjacent courtyard, from near a well. This sample scored below or barely at averages for the other elements, except a slight high for sodium which does not explain this peak in Mg.

The rest of the samples from this house are moderately above average with very few lower exceptions, samples from the other two SE domestic contexts are in similar fashion; Mg accumulations are present in these houses pointing at human occupation; however they are not elevated enough to specify activity areas. Mg levels are significantly higher in domestic contexts including semi-roofed spaces compared to street samples, roofed public building samples and reference samples, hinting at a connection between Mg and domestic activities.

House NE-2 samples scored slightly lower than SE domestic samples, sample largemultiroom5 from the southwestern wall of the large room also scored quite high for Mg with 524,4 ppm, as well as for P. Two adjacent samples, 4 and 2 also scored higher than the other large room samples for Mg. Based on the artefact distribution analysis, this large room is characterized by drinking wares, oil wares and food preparation/preserving wares. Considering all this information, this room

seems like an actively used space where food was handled and prepared but not necessarily cooked there, since the very evident *in situ* fire in *oikos* is characterized by elevated levels of K, Cu and P and this signature is not present in the large room.

Table 12: Magnesium distribution at Burgaz. (Mean: 405,923 ppm)



Andron of House NE-2 has three samples scoring above average for Mg, andron1, 3 and 6 ranging from 419 to 450,6 ppm; all three are close to the room walls, andron 3 and 6 scored high for P as well, very likely pointing at subtle accumulations of food spill residues swept towards the walls. *Oikos* scored even lower ranging between 280,099 to 351,499 ppm below average. The reason behind a busy working place like *oikos* scoring low for Mg could be wood burning and daily cooking; *oikos* revealed cooking wares, *amphorae* and storage wares as its dominant pottery groups, this set of activities is very likely to create a different chemical signature including elevated K, P, Fe and Cu.

Peristasis samples are above the average with one sample scoring 539,999 ppm which could be related to animal-based food waste being dumped here. Workshop samples are slightly below and somewhat above the average, Mg does not look like a defining element for this context at Burgaz. While streets and roofed public spaces are scoring below and well below average, open public spaces scored fairly above average. Open public space samples scored the two peak scores for sodium and very high for potassium as well. This elemental group of Mg, Na and K for should be pointing at a specific activity that was taken place here out in the open publicly and near a well.

5.10. Sodium

Sodium is one of the less investigated elements regarding archaeological geochemistry, it is a highly soluble and mobile element, usually not expected to persist in archaeological contexts.[312] Elevated levels of sodium is generally associated with human activities as it is with calcium, particularly with ash *and in situ* burning when paired with high levels of phosphorus, manganese and potassium. In ethnoarchaeological contexts, elevated levels of Na is suggested as an indicator

[312] Middleton and Price 1996, 679

of biological by-products; geochemical studies in a prehispanic Classical site revealed a positive correlation between elevated levels of Na and Ca in soils and faunal remains, bones and shells in this case.[313] At Burgaz, Ca levels are very possibly affected by the natural composition of the calcareous soil as mentioned before, considering the mobility of Na as well, interpretations related to these two elements should be made with caution.

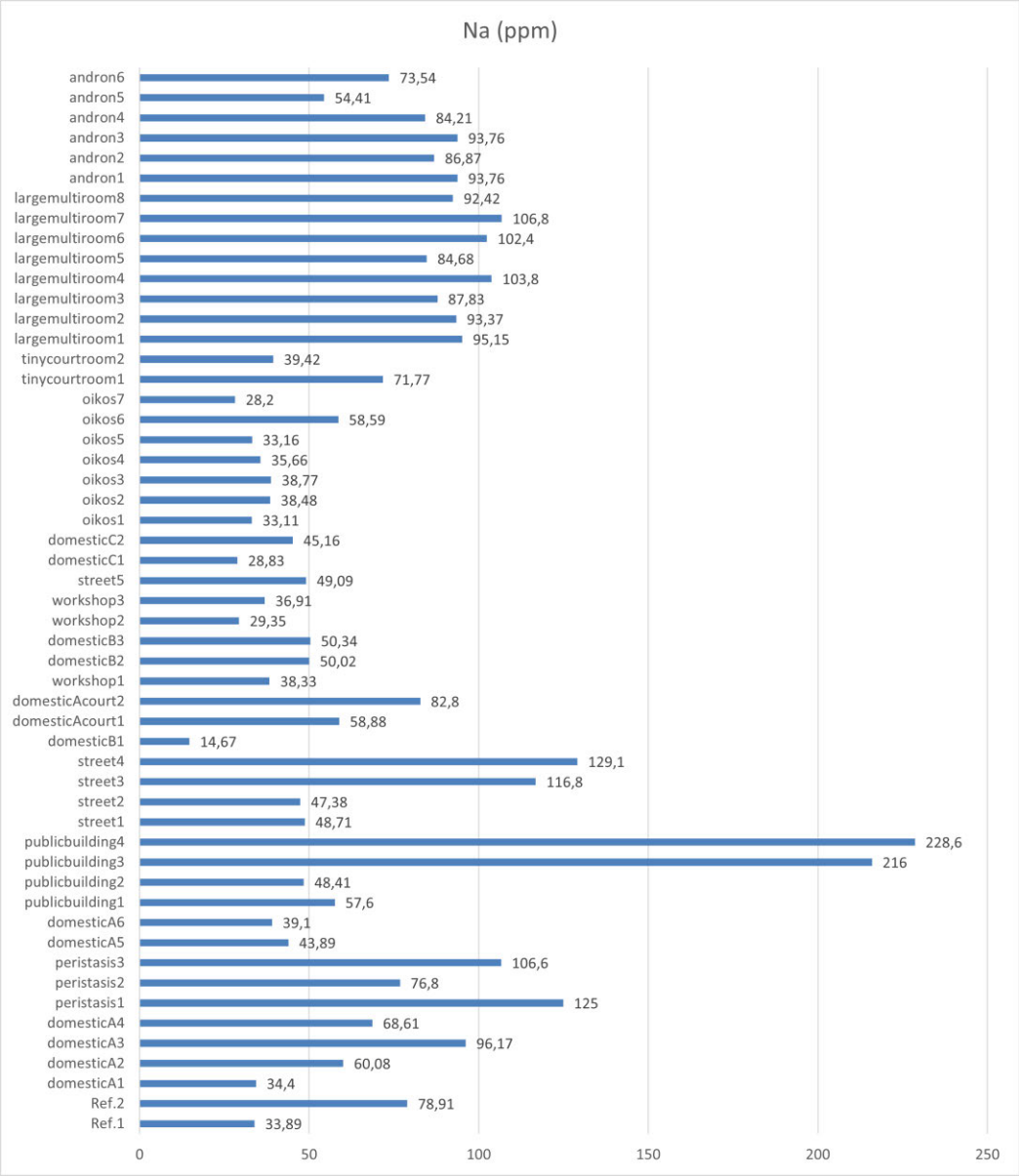
With that being said, the two peak scores of Na originate from two open public space samples with 228,6 and 216 ppm, followed by a street sample with 129,1 ppm and a *peristasis* sample with 125 ppm. The average Na of the dataset is 71,1432 ppm. The lowest score belongs to a SE Sector domestic sample with 14,67 ppm. (Table 13)

SE domestic context scores are significantly lower than the House NE-2's scores; the only context with scores above the average is the southern house sampled as domesticA, sample domesticA3 from the central northern room with 96,17 ppm and sample domesticAcourt2 associated with the well in the adjacent courtyard with 82,8 ppm of Na. These two samples also scored high for magnesium, domesticA3 scored high for Ca as well; no similar elemental signature in the literature and the lack of artefactual information regarding these two trenches prevents us from pinpointing a function to these two locations spatial-wise.

Oikos of House NE-2 consistently scored significantly below average, small courtyard room has one below and one barely average score, *andron* samples are somewhat above the average excluding one sample that is not; Na does not seem like an element to define any activity for these spaces. The large room scored higher than the rest of the NE-2 spaces but still not elevated, the three highest scores from

[313] Middleton and Price 1996, 679; Wells 2004, 80

Table 13: Sodium distribution at Burgaz. (Mean: 71,1432 ppm)



this room are all from the center. None of the elemental signatures with Na in the literature correlates with the scores of these central room samples, in this case high Na possibly indicates dense daily activities, general kitchen work involving biological material.

Workshop samples are very low below average. Two street samples scored considerably higher then average while the rest are below average, *peristasis* samples display a similar character between 125 ppm and 76,8 ppm. Open public space samples are the two peaks of the dataset. Leaving *peristasis* aside since it is a known refuse accumulation space, unroofed spaces revealed spots with elevated Na levels which is difficult to explain based on the literature since these high-traffic areas are usually low in element accumulations. The two open public space samples, since they are also high in Mg and K, interestingly hint at a possible fire.

5.11. Manganese

Elevated manganese levels are associated with organic resources used by the households, both as food and for craft production as well as burning and waterlogging based on a study conducted in a Roman settlement in UK.[314] At Datça, one sample from the street scored 28,856 ppm while the second highest peak is 8,332 ppm from another street sample. The lowest score is from a workshop context with 0,57 ppm. Apart from the very sharp peak sample and the rest of the street samples, the overall Mn levels have an almost uniform character with some highs and lows. The average is 3,40721 ppm, if the peak outlier is removed from the collection, it shrinks to 2,91780 ppm.

SE domestic contexts scored below average even when the outlier is removed except the southern house sampled as domesticA which scored usually around the main average. The two higher scoring samples are from the central northern room, domesticA3 and domesticA2; domesticA3 also scored very high for Mg and Ca subtly hinting at cooking and burning whereas domesticA2 scored high for Zn cautiously pointing at plant-based cooking or grain storage. The other two domestic contexts scored well below average for Mn.

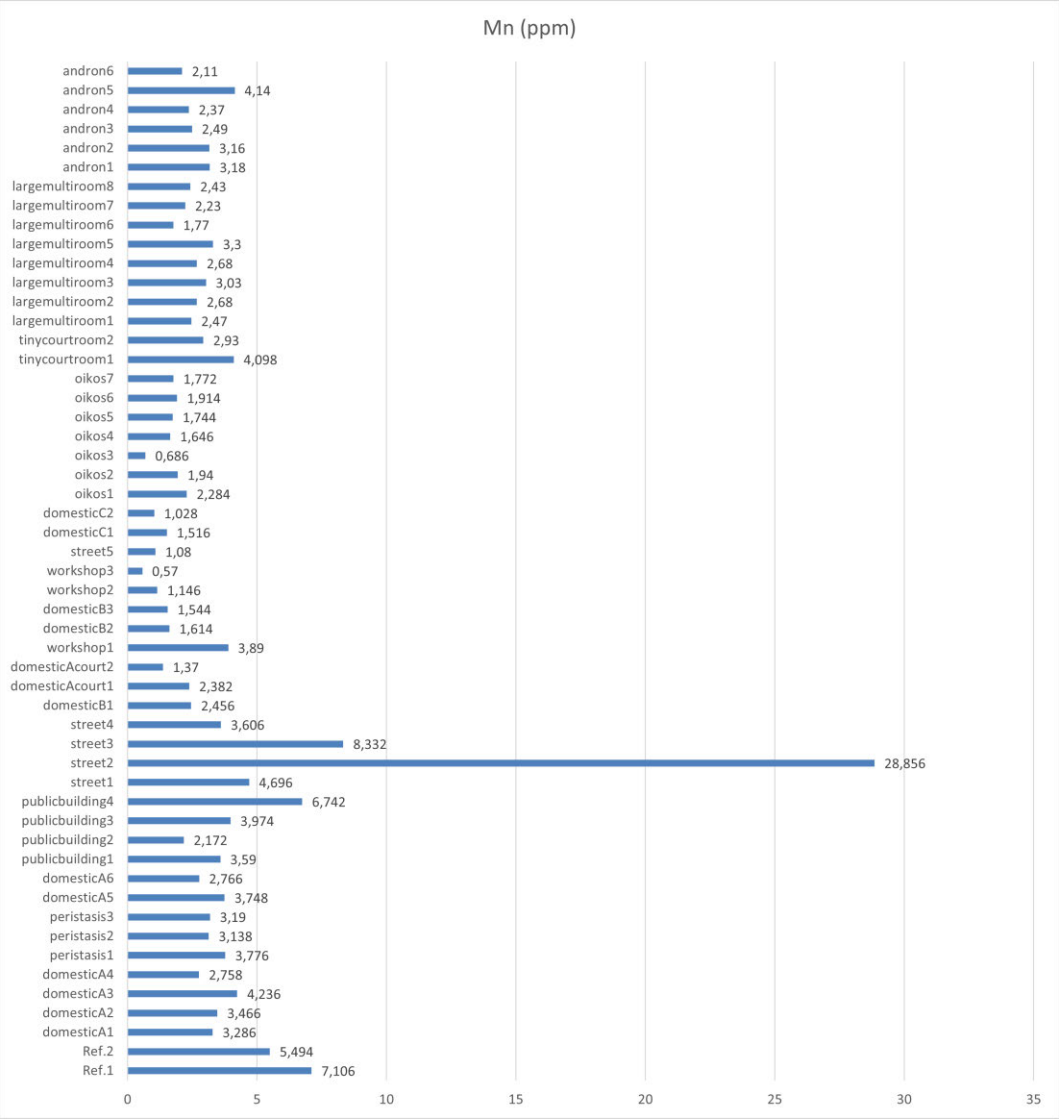
[314] Parnell and Terry 2002, 387; Wilson *et al.* 2008, 422

Oikos of House NE-2 also scored very low, Mn is does not seem to be an element to aid defining human activities in this room including cooking which is suggested by the cooking wares found as one of the two dominating wares in this room as well as by the ashy layer on the floor. The large room displays a similar character with below the average scores.

The inner courtyard room scored above average with 4,098 ppm while the sample taken from just outside this room scored below. Both samples scored elevated levels for Fe too, the artefactual analysis points to food serving ware as the dominant pottery group for this space, however one of the very few brazier fragments of Burgaz was recovered from this context. Given the sparce nature of artefact assemblages at Burgaz, a possible scenario for this small space could be that the semi-roofed corridor-like narrow space connecting the inner room to the courtyard was a work space (elevated Fe indicating butchering/kitchen activities and/or pigment involved activities; elevated Fe together with elevated Cu indicating tool/artefact production and/or weaving, dyeing), perhaps also a secondary cooking place (brazier fragment). The inner room could be where cooked food was brought in to be portioned here onto serving bowls that are kept in this space (elevated Fe, not elevated but higher than average Mn, Mg indicating kitchen activities and organic material) and finally full bowls were carried out to the eating spaces, perhaps to *andron* as well on special occasions.

Andron has one sample above the average, andron5 scoring 4,14 ppm was collected by the mid part of southwestern wall of the room, very possibly a leftover accumulation from the sweeping of the room.

Table 14: Manganese distribution at Burgaz. (Mean: 3,40721 ppm)



Peristasis samples are very slightly below and above the average, two workshop samples are quite below the average while workshop1 is slightly above. Three street samples from the large, paved street on the northwest scored high including the extreme peak of 28,856 ppm, this case could very likely be a sort of contamination and does not indicate an archaeological activity. The southeastern street sample scored barely above average, the pathway sample is considerably below. Public

building samples are higher in the open space, lower in the roofed spaces. Mn even though not significantly elevated, probably joins Na, Mg and K to define the activity that took place here by the well. Overall, Mn is somewhat difficult to interpret regarding human activities at Burgaz, especially domestic activities.

5.12. Multivariate Analysis

In order to test whether the element distributions create meaningful groups that are chemically similar to each other and to see if archaeologically and ethnoarchaeologically known patterns would match chemical patterns at Burgaz, as well as to organize and explain our data, we applied multivariate statistics.

To interpret the quantitative elemental data ICP-AES provides, we have used PAST Version 4 (PAleontological STatistics), a free software developed for scientific data analysis with functions for data manipulation, plotting and multivariate statistics.[315] The elemental values in ppm were transformed to LOG10 in order to shrink these wide range quantities into smaller scopes, to eliminate the scale difference between values.[316]

Principal components analysis (PCA) is a process for assessing relationships among variables through finding hypothetical variables, namely "components", that represent the most variance possible in a multidimensional/multivariate dataset. These new variables appear as linear combinations of the original variables. PCA reduces the dimensionality of the data, finds eigenvalues and eigenvectors (components) of -in our case- the variance-covariance matrix, since all variables are

[315] http://priede.bf.lu.lv/ftp/pub/TIS/datu_analiize/PAST/2.17c/download html, also see: Hammer, Harper and Ryan 2001
[316] Rondelli *et al*. 2014, 486; Vyncke *et al*. 2011, 2283-5; Konrad *et al*. 1983, 17

measured in the same unit, in ppm.[317] The eigenvalues provide a measurement of the variance represented by the corresponding eigenvectors/components, as well as the percentages of variance represented by these components. Ideally, most of the variance is supposed to be represented by the first one or two components instead of an even spread among the components, to consider the PCA a successful attempt. In our case, the first two components account for 74,763% of the variance, component 1 being an especially strong one. (Table 15)

PCA loadings are significant when looking for an "explanation" regarding the components since loadings describe how much each variable contributes to a particular principal component; in other words, this is where we can search for and interpret the "meaning" of the components. Large loadings, both positive and negative, imply a strong relationship between that variable and the principal component; in the form of positive/negative correlation between the variable and the principal component.

Table 15: PCA eigenvalues.

Principal Components

PC	Eigenvalue	% variance
1	0,232106	51,501
2	0,104837	23,262
3	0,0523121	11,607
4	0,0368816	8,1835
5	0,0165333	3,6685
6	0,00703743	1,5615
7	0,000976255	0,21662

[317] P and K results are not included in this analysis since they were measured in kg/da, not in ppm.

If we explore principal components 1 and 2 since they explain a large proportion of our data, based on the loadings, principal component 1 shows positive correlation for Cu, Fe, Ca, Zn and Na; from Cu with the score of 0,9286 a very strong correlation, followed by Fe (0,3643) to Na (0,005033) showing a weak but still positive relationship. Mn and Mg both have weak negative correlations with principal component 1. (Table 16)

As for principal component 2, Mn has the strongest positive correlation with a score of 0,7945, followed by Fe (0,4086) and Na (0,3773); Zn (0,1765) is also positively related to principal component 2 but weakly. Cu, Mg and Ca display negative correlations, and neither are significantly strong. (Table 17)

Based on PCA loadings, the elements that possibly would explain our data appear as Cu, Mn, Fe and to some degree Na. When the data is plotted onto a scatter diagram, we are provided with a visual of the structure of the data, of how particular elements create particular trends and how much importance we could attribute to these trends, as well as explore the reason behind why some samples are piled in clusters and some are outliers.

According to the PCA biplot scatter diagram, component 1 is defined with a strong positive association with Cu and Fe while component 2 displays associations with Mn, Fe and Na however except Fe, neither seem to have a strong influence on component 2 since they are pinned at the origin of principal components. Similarly, Zn, Ca and Mg do not have a significant weight on neither component. Vectors that are close to each other, forming a small angle is interpreted as two of them being positively correlated. In our case, Mn and Na, as well as Ca and Cu appear as positively correlated elements, yet as mentioned before their influence on the principal components is not very heavy except Cu.

Table 16: PCA loadings 1.

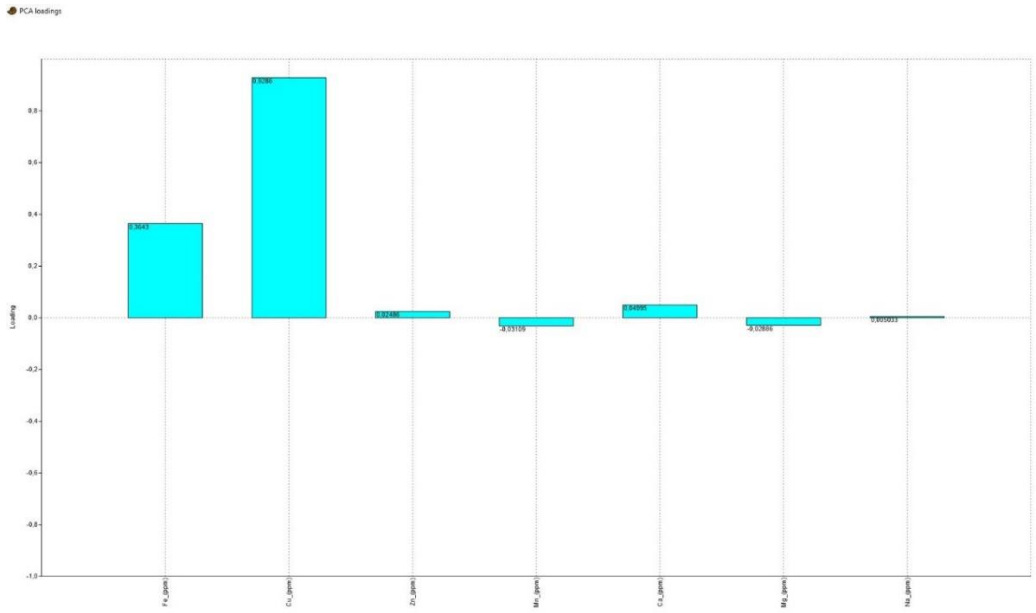
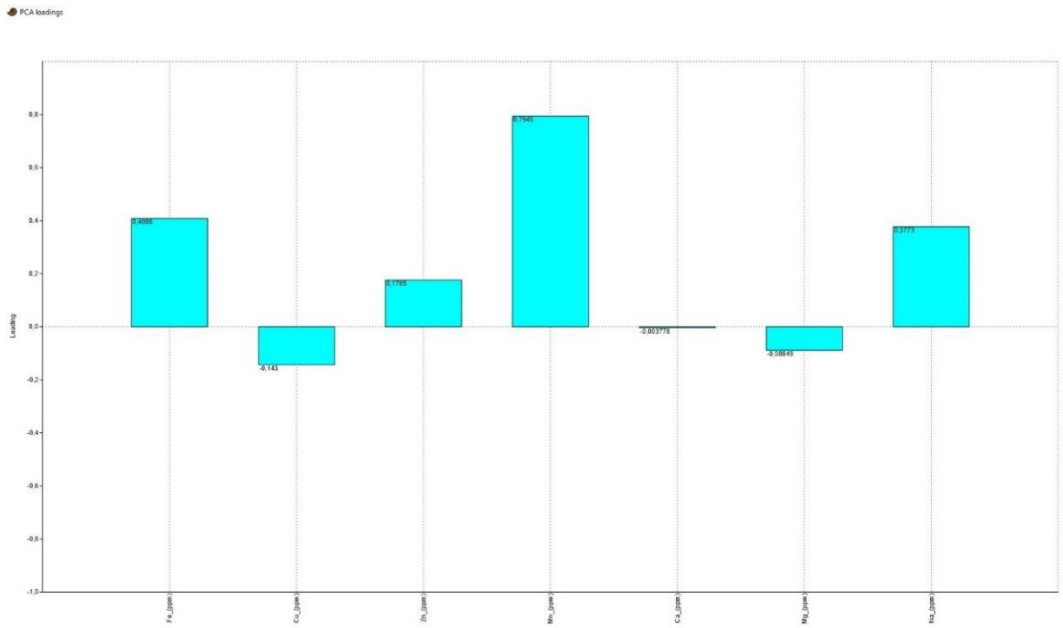


Table 17: PCA loadings 2.



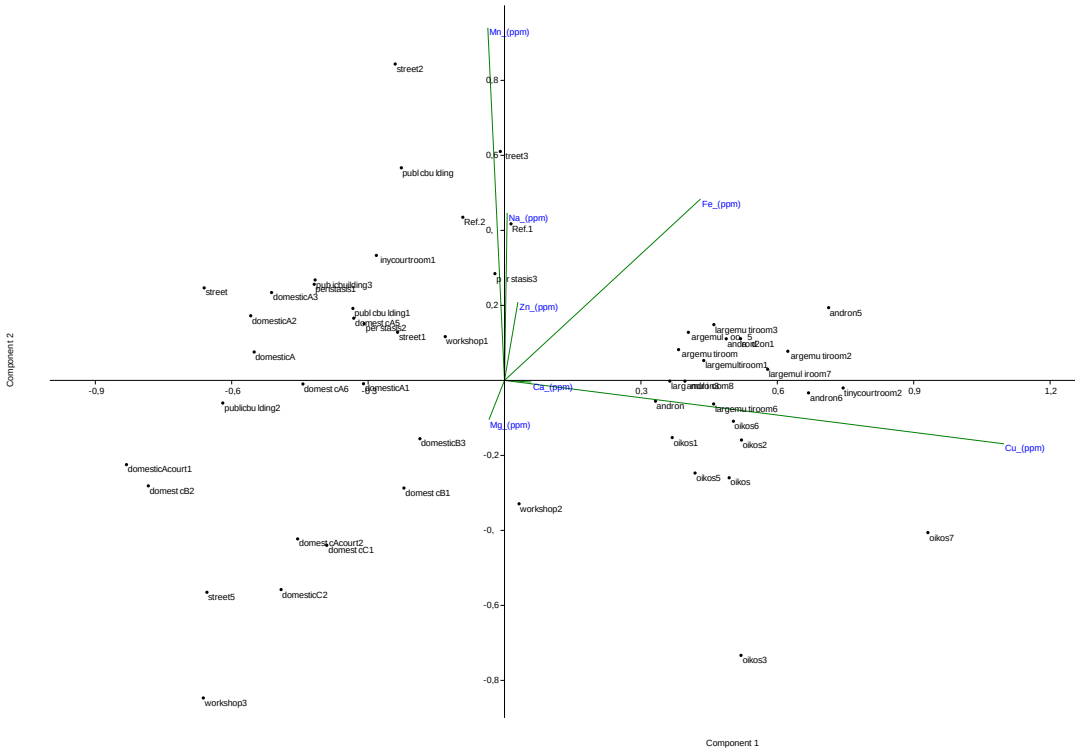
Cu and Fe are strongly related to human occupation, as well as artefact distribution; elevated levels of these two elements indicate a set of activities including tool/artefact production, weaving, dyeing, metalwork, pigment processing, kitchen activities and butchering. Mn and Na also are strongly connected to human activities; elevated levels of Na refer to biological by-products, Na paired with Mn (usually with P and K too) implies fire and ash. Mn is associated with organic residues, food and craft production.

PCA scatter diagram clusters points (samples) based on their similarity; at first sight we have two evident clouds with subdivisions. (Table 18) The first cluster is grouped on the component 1 axis and consist only of samples from different rooms of House NE-2. All samples from the large, possibly multifunctional room of House NE-2 are grouped close to each other with samples from the *andron* and the corridor-like semi-open area connecting the small room to the adjacent courtyard. Samples from the *oikos* are rather loosely grouped together with two outliers.

The closely clustered group of multifunctional room samples and *andron* samples are collected from spots closer to the room walls, away from the entrances. They are characterized by high Fe and Cu elemental values. The two samples falling slightly apart from this group, largemultiroom 2 and largemultiroom 7 are similar in Cu but more elevated in Fe, the former is collected from close to the southern corner of the room, the latter from the center of the room, closer to the entrance. Sample andron5, as vaguely an outlier, is even higher in Fe (almost twice the average value), higher in Cu, Mn but lower in Mg and Na compared to the closely packed group of samples.

Samples largemultiroom8 and andron3 are quite similar in their elemental values, making them cluster on top of each other; almost average Fe, lower than average Zn and Mn, above average Na. Both are collected from near room entrances.

Table 18: PCA scatter diagram.



The rest of this cloud consists of loose pairs with similar Fe and Cu values, values being above average every time, such as largemultiroom6 and oikos6 with oikos6 being higher in Fe. The state of *oikos* samples scattered around and not as tightly grouped as the multifunction room can be explained by how varied their elemental values are. Fe values range from 2,984 ppm for oikos3 making it an outlier to 11,256 ppm for oikos6, one of the highest values in the dataset with the average value being 6,89 ppm for Fe. The sample oikos7 is another outlier based on its Cu value, 27,92 ppm, the highest Cu value in the dataset with the average being 4,91 ppm.

The other outlier, sample oikos3 also has a high Cu value of 13,402 ppm. This variety very likely hints at a wider range of activities ending up accumulating a wider range of elements on the floor, as well as the possibility of artefacts kept in the same spot within the room for extended time periods.

Samples tinycourtroom2 and andron6 form another loose duo along the component 1 axis based on their similarity of Fe, Cu and Mn values, however andron6 is much higher in Ca and Na.

At the end, the large room, some areas of *oikos*, the courtyard space we proposed as a working space and some areas of *andron* group around their similarity in mainly Fe and Cu, weakly in Ca, Na and Zn. The other three spaces share an elemental signature of daily work revolving around kitchen activities with some spatial variety caused by the *in situ* fire in *oikos* and the lack of fire-related evidence in the large room.

The second cloud is even more subdivided with several two/three sample groups and more outliers, this cloud consists of samples from a variety of contexts including street, public space, possible workshop, *peristasis* and domestic spaces of the rather disturbed Southeast Sector of Burgaz. The only sample that made its way into this cloud is one from the small courtyard room of House NE-2 and stands as a medium outlier mainly because of its very low Cu value of 1,182 while the rest of the House NE-2 samples are at least twice the average of 4,91 ppm and also because of its higher than the rest Mn value of 4,089 ppm while the other samples are below the average of 3,4 ppm of Mn. Sample tinycourtroom1 is collected from the northeastern corner of this small room accessed through a corridor-like space connected to the courtyard.

We can see two close groups, one with a public building sample and a *peristasis* sample close to each other, another with public building, domestic building, *peristasis* and street clustered together. The open public space sample publicbuilding3 and peristasis1 are clustered together due to their similar, almost average Mn values (3,974 ppm and 3,776 ppm respectively, the average Mn being 3,4 ppm) and their identical Zn values of 0,214 ppm, a little under the 0,28 average. They are both very high in Na, 216 and 125 ppm, while the average Na is 71,14 ppm.

Samples publicbuilding1, domesticA5, peristasis2 and street1 are closely grouped. The common characteristic in this group appears as Cu and Mn values; this group's Cu values range from 1,14 ppm from the public building to 1,882 ppm from the street sample while the average Cu is 4,91 ppm, Mn values are around the average of 3,4 ppm except for the street sample which has scored 4,696 ppm for Mn. It should be noted here that especially *peristasis* samples and also street samples score very high above the average P which is expected for *peristasis* since these spaces are known to be refuse filled but is unusual for high traffic, active areas such as streets.

Four Southeast Sector domestic contexts are grouped into two; interestingly, two domestic courtyard samples from the same house appear in different groups, paired with samples from two other houses instead of being grouped together. Samples domesticB2 and domesticC1 are from two Classical period houses that were massively transformed into possible workshops in later periods, domesticAcourt1 and 2 are collected from the courtyard of a similar neighbouring building. Samples domesticA1-6 are from another neighbour building that went through the same transformation but slightly more preserved, scattered around on the plot with a not so strong relationship to each other. What they have in common seems to be average or little less than average Fe values, significantly lower than average Cu values, around average Zn and Mn values making this building more or less fit into

a utilized/high traffic space, even though we sampled the Classical floors, it is difficult to have clean-cut elemental results and interpretation with a building that is later deformed and reused as the buildings in South Sector of Burgaz.

The most evident outliers are street2, street4, street5 and workshop3. Sample street2 is set apart by its extremely high Mn value of 28,865 ppm over an average of 3,4 ppm and also its lower than average Mg value, 164,399 ppm over 405,92 ppm average. Street4 has more or less average values for all elements except for a 22,599 ppm value for Mg over an average of 405,92 ppm and a higher Na value of 129,1 ppm while the average is 71,14 ppm. Sample street5 is characterized by significantly lower than average Fe, Cu, Mn and Na. Overall, street samples do not really group together, however a general observation is that they tend to have lower elemental values with some peak values for particular elements which does not seem to follow a pattern throughout the street samples.

The other outlier, workshop3, is lower than average in Fe, Cu, Mn and Na values. What little in common workshop samples have could be explained as lower than average Cu and Na values, otherwise workshop1 has the highest Fe value among them, a 8,58 ppm over the average of 6,89 ppm while workshop3 has 1,188 ppm Fe. Workshops in this area are considered to be figurine producing and thus higher results were expected from these spaces, at least in terms of fire. However, they were sampled while they were being excavated and to a degree as the excavation plan allowed sampling, this workshop area was not further excavated in following seasons. Perhaps a more focused sampling would provide more concluding elemental results for these workshop spaces of Burgaz; an alternative question would be about how intensively these spaces were involved in production because even in their transformed-into-workshop states, they are not well-defined architecturally nor artefactually.

Another conclusion to be made here, in accordance with definition, is that the barely grouping together of SE Sector samples on the scatter diagram could have to do with poor preservation of these spaces. The effect of Classical houses transformed into work spaces frenzy during late 4th century BC is evident in almost all contexts in Burgaz including the NE Sector houses. Even so, House NE-2 is preserved enough to have its rooms architecturally defined, element accumulations are compatible with traditional data. With the addition of its categorized artefact assemblage (Table 19), the house ended up being a decent candidate for multielement analysis regarding use of space. Element distributions form one particular set of data; interpreting archaeological spaces in connection with human use is not complete without the traditional data such as artefact distributions, architectural descriptions, features present in these spaces, for instance evidence for burning/fireplaces, benches, wells.

Certainly, the final location of an artefact on a floor not necessarily corresponds to its original area of use because of discard or circumstances related to the abandonment of the house. Burgaz especially, seems like to have gone through a very slow abandonment process, evident in artefactual density.

Another factor to take into consideration is the “rotation” of spatial use. The rooms in Burgaz houses very strongly suggest a multifunctional character in terms of use based on artefact distributions and architecture; even though loomweights or kitchenware appear in several rooms, few in number. Climate, daylight and individual decisions very likely affected the locations of activity areas within houses. Seasonality in these houses should be considered when interpreting use of space, these factors surely influenced element accumulations.

Table 19: Pottery distribution in House NE-2 rooms mentioned in this study. (Redrawn after Atıcı 2013, 245)

	Andron	Small courtyard room	Large multifunctional room	*Oikos*
Closed ware rim	1			1
Open ware rim	1			
Bowl	3	5	1	10
Krater	1	1		2
Amphora		1	3	8
Mortar		1		1
Lekane		1	1	3
Daily use krater			2	2
Baking tray			1	
Cooking pot				7
Lekythos			1	
Loomweight		1	1	1
Pithos				2
Closed ware base			1	4
Brazier		1		
Saltcellar				1
Skyphos				2
Olpe				1
Kantharos			1	
Bolsal			1	1
Open ware base				3
Dominant ware	Drinking, food serving	Food serving	Drinking, oil, preparing/preserving food	*Amphora*/storage, cooking

One last aspect concerns sampling strategy; freshly excavated spaces provide better chances for element accumulations to indicate past human activities. Modern habitation and its infrastructure, modern agriculture, as well as surface vegetation are all potential sources of contamination and should be taken into consideration while sampling.

Keeping all these aspects in mind, our suggestions for elemental signatures to define activity areas at Burgaz are as seen in Table 20.

Representing SE Sector, the house domesticA has two busy activity areas; the large central space we suggested as the *oikos* or the courtyard appears as where a fire was present, food was prepared and cooked, perhaps bones and meat were handled here as well. This space bares evidence of dense organic material accumulations on an elemental level, making it one of the liveliest and perhaps dirtiest spaces at Burgaz. The adjacent large and narrow space hints at a similar use of space but was perhaps a less hectic cooking space with an additional grain storage function. It is possible these two spaces were used in rotation for cooking on fire. The adjacent courtyard space points to fire by the well that is located in this courtyard.

House NE-2's *andron* with its pottery assemblage of service ware only, revealed elemental accumulations indicating a very lived-in space. We interpreted the high levels of elemental residues as a signature for a mixture of leftover accumulations originating from food/drinks consumed here, artefact distribution and/or residues originating from furniture/features; human occupation in general.

Table 20: Elemental signatures for Burgaz contexts. (✓ indicates higher than average levels, ✶ indicates elevated levels and peaks) (For SE domestic context, the results of domesticA sample series were used since it is a better preserved house and provided workable analysis results.)

	P	K	Fe	Cu	Zn	Mn	Ca	Mg	Na	Activity
SE domestic	✶	✓			✓			✶	✓	Food preparation/disposal, cooking, wood fire, butchering/grain storage
SE domestic courtyard								✶	✓	Possible hearth, possible fire
NE *andron*	✓		✶	✶				✓		Food spills/organic residues, artefact distribution/furniture, human occupation
NE large room	✓		✶	✶	✶			✶	✓	Food preparation, kitchen activities, butchering/grain storage, production
NE inner courtyard room			✶			✓		✓		Kitchen activities, food serving, possible pigment processing
NE semi-open courtyard space		✓	✶	✶						Kitchen activities, production (tools, artefacts/weaving, dyeing), mobile fire
NE *oikos*	✓	✓	✶	✶						*In situ* burning, wood ash, kitchen activities, production
Open public space		✶				✓			✶	Fire, butchering, biological by-products
Roofed public space	✓	✓	✓							Meeting space with a possible fire
Peristasis	✶	✶	✶		✓			✓	✓	Refuse area
Workshop		✶	✓		✶					Possible fire, possible pigment involving activity
Street	✓	✓	✶			✶			✓	

The large room turned out to be a multifunctional space as its artefact assemblage of drinking ware, oil ware, preparing/preserving food wares suggested. Cooking was very likely not done in this space but kitchen activities, food preparation and very possibly small-scale domestic production of tools/artefacts or pigment involving activities were also performed. It is difficult to separate activity spaces in this space however, the eastern half of the room appears as a busier activity space compared to the western half where the entrance is.

The inner space and the outer partition of the courtyard adjacent tiny room share common activities such as relatively less intensive kitchen work and small-scale domestic production of artefacts and/or weaving, dyeing. However, they exhibit different elemental characters. The inner room emerges as a quick food preparation (noting the mortar recovered from this space) but mostly food serving space while the outside space comes forward as the location of the brazier based on having a higher potassium accumulation on its floor and seems a more frequently used work space for domestic production. Both spaces are cleaner regarding food spills and organic material residues compared to the large room and *oikos*.

Oikos of NE-2 is dominantly characterized by the large ashy layer on its floor, *in situ* burning and daily work related to both food and household production. *Oikos* is one of the primary locations (if not the primary location since highest density of coarse cooking ware and food preparation ware was excavated in this space, as well as the most evident *in situ* fire at exposed areas of Burgaz) where food was cooked and consumed by the household, by the fire. Considering the pottery assemblages food preservation and storage are among the activities defining *oikos* of House NE-2.

The open public space on the northeast of the public building revealed an unexpected elemental signature indicating fire and biological by-products, as well

as possible butchering. Suggestions for elemental signatures for open air public spaces are usually derived from Mesoamerican contexts, both from archaeological sites and modern villages, and usually point to very low element accumulations as a result of heavy traffic; this open space with two wells at Burgaz, in the middle of the insula surrounded by several domestic houses seems to have been used differently.

The public building itself indicates general human occupation and a possible fire in one of the rooms but no traces of heavy daily work. This was highly likely a place where occasionally food/drinks were consumed, however elemental data suggests a -significantly cleaner than domestic spaces- meeting place.

Peristasis is characterized by peak levels of elements that indicate organic refuse, an elemental signature that makes the *peristasis* the dirtiest space we have analyzed in this study. The refuse accumulated here quite possibly includes fire and ash sweepings, food disposal both plant- and meat-based, and other organic matters.

Workshop spaces are so poorly preserved that interpreting them is a difficult task. However, as a general assumption, the elemental accumulations suggest a general human use, possible fires by the two wells and perhaps a pigment involving activity in the northern workshop that was tentatively defined as a figurine workshop. This area of late 4th century workshops was not further excavated and investigated, limiting us with this interpretation based on element accumulations.

Finally, streets are similarly defined as low element accumulation-high traffic areas by the Mesoamerican research mentioned above. At Burgaz, the stone paved streets revealed high accumulations of phosphorus, potassium, iron, manganese and sodium whereas the narrower, pathway-like street between houses in the north of

SE Sector fits the literature with below average levels for all elements except a slight above the average for magnesium. At this point it is possible to think that the large, stone paved streets of Burgaz reveal a different signature, indicating organic material accumulated in them no matter how intensively they were used by the inhabitants.

CHAPTER 6

CONCLUSION

"*I would suggest that anyone could live in an ancient Greek house, for example, with the only needed adjustment being to the technological spaces*"[318]

"*…the Greek house was not necessarily a very tidy affair*."[319]

House spaces and household in ancient Greece share a common characteristic of being more than one fixed concept. Just as the multifunctional use of domestic spaces, households are flexible units too. A household could be one or more buildings with or without additional land; besides a nuclear family as Aristotle defines the foundation of *oikos*, could also include older and/or unmarried family members, half-siblings or stepchildren, slaves and freed slaves, animals and material possessions. This inventory was open to changes through time, it was not permanent.

In this manner, households are in fact ethnographic concepts; archaeologists do not excavate "households", but material remains, anything beyond physical/chemical evidence needs to be reconstructed, reimagined. As a web of activities, a household is not only defined by co-residence but also by shared practices of production, consumption and social reproduction, as well as by shared experiences. It is a physical and social landscape constructed by people.

[318] Rapoport 1969, 82
[319] Nevett *et al*. 2017, 183

A typical Classical house has been traditionally described as a multi-roomed courtyard house; the courtyard serves as a central feature, connecting different spaces and different sets of activities, providing light and air. The house is a nuclear network often reached by a single entrance from the street, the courtyard creating an enclosed open-air space to be used by the household members, very suitable to Mediterranean and Aegean climates.

Beyond this simple description, scholars divided the houses into types based on the architectural arrangements regarding the porticos in their courtyards; this typology, still widely referred to in literature, does not really aid in understanding activity patterns of reconstructing households. In Burgaz, as it is in many contemporary cities, house plans are of a wide variety, not every single house has a courtyard, houses are of different sizes and plans, some were modified into larger or smaller houses, interior designs were altered. The houses around Athenian Agora lack the typical divisions ancient Greek houses are supposed to have; the shapes and sizes are irregular, some of them lack an *andron*; the most common feature is central courtyards.[320] The five studied houses at Halieis display striking variance in terms of size and layout but courtyards are standard elements.[321]

What ancient Greek houses in every region have in common in the most basic sense is that they are designed in compliance with their environment and climate. South facing façades, open courtyards and climate-related building materials are elements of what is called passive solar architecture today; using house design to provide ventilation, light, heat, shade and insulation according to seasonal and climatic ryhtms. The rock houses of Latmos are fine examples of merging landscape into the house design, settling conveniently into a natural setting, making the most of what is available.

[320] Tsakirgis 2005, 67-82
[321] Nevett 2015, 144-5

Classical house research would benefit from including diversity as well as individuality into interpretations and perhaps focusing on common patterns of household practices instead of following rather arbitrary house-types that leave a large number of "irregular" houses out of the big picture. As there is no "universal" definition of household, there is more to the Classical houses than four strict types.[322] A recently discussed aspect to Greek houses is their economic value and agency for presentation; the economic value does not always depend on the size of the house but sometimes on its location. Similarly, besides providing shelter and being a functional space, a house can also be a symbol of status or lifestyle.[323]

Burgaz houses do not have strict building codes regarding planning and layout, room numbers and sizes vary greatly, some rooms are connected to each other while some are only to be accessed from the courtyard. Entrances are of two types, direct entrances from the street to the courtyard as seen in Klazomenaian houses and entrances provided through a corridor. The questions whether these corridors were roofed as it is the case in Olynthus and Halieis remains unanswered, upper structures and their remains are not preserved at Burgaz.[324] The layout of most Classical courtyard houses including Burgaz houses suggest a layered sense of privacy, the *andron* (if present) nearest to the house entrance, then the open courtyard and finally the rooms lined along or surrounding the courtyard; it is possible to propose that the social interactions between the household members and those between an individual household and the outside world was layered in this manner, accordingly. The single entrance to the house, exceptions of course exist, provided restriction and control over who enters from the outside world to the private realm.

Spatial divisions of rooms based on single functions appears as a modern expectance based on domestic spatial use in western cultures, Classical houses do

[322] Hoepfner and Schwandner 1986
[323] Nevett 2015, 146
[324] Atıcı 2013, 114

not fit those norms. Distinct division of rooms does not seem like the case; on the contrary household activities such as production, storage, consumption were flexible in terms of locations within the house and rooms; one room was used for several activities. Mobile fire and kitchen appliances are another important aspect, transforming the function of spaces constantly. Although house plans at Burgaz vary more than they do at Olynthos, domestic spaces were used in a similar fashion; cooking is not limited to one space only, rooms were used for several different activities. Food processing appliances were not permanently fixed to spaces at Olynthos either. When artefactual analysis is paired with our geochemical results, four spaces of House NE-2 appear as kitchen activity locations. Since it is very difficult to tell whether these spaces were simultaneously used for kitchen activities, the most possible explanation would be a seasonal rotation between spaces, following the natural cycle of climatic changes.

Food preparing and cooking activities are traditionally assigned to women and it might be the case for non-elite households but for the wealthy class these tasks were very likely performed by slaves, it is not impossible to imagine male slaves butchering meat and preserving food stuffs either. Weaving/dyeing could be considered in a similar concept, even it was in fact strictly a female task as traditionally suggested, female slaves very possibly were included in this domestic activity. Regarding inside the houses, men and women with different social status and roles timed and manoeuvred their activities daily in the same household spaces; the Greek house quite likely was not a tidy and calm affair. In terms of household activities in a broader setting, it is very possible that lower class women were more active as in going shopping or perhaps selling goods since making a living never was an easy thing. Households with less means needed all the labour and income they can provide, it is likely to think that in those cases social norms and rules were twisted and bent. There are also houses hinting at alternative social relations like the ones in Crete where houses usually have two-three interconnected large spaces. These houses do not give away a sense of strictly constructed guests versus women

of the house separation, on the contrary it appears as a more communal type of living without apparent gender divisions.

Same kind of thinking can be applied to the case of the courtyard house at Düzen Tepe. Several households sharing one large building with a common use courtyard, it is difficult to imagine women not seen by the other household men. Widening the research focus to include what is generally referred to as "fringes" of the Greek world, could aid reconstructions of women's role with a fresh perspective, moving away from generalizations. In other words, one still needs to look for women to find women in archaeological contexts, the struggle continues. Research strategies that focus on activity areas by studying material culture, its distribution within and around households, geochemical accumulations are proper tools to put women back to where they lived, worked, contributed to life as conscious agents of social production.

Regarding gendered divisions, the main difference might be in the taking of space and time by men and women. A woman's influence increased with age, managing at least three generations of her family and daily life in the household while men were relied on women to access this familial time scale and spatial knowledge around which the daily life revolved around. Men held a more formal kind of power over shared ancestors and were prone to gain public status and power, thus achieving larger scale and long-term concepts of past and future, "greatness" as in glory and reputation, as well as a concept of monumentality.[325] Women lacked formal independence compared to what we perceive as independence today, however this does not mean they lacked agency and decision making. Gendered divisions of built spaces might be related to how and when these spaces were used by women and men, rather than spaces strictly reserved to one gender only. The main aim could be to prevent respectable household women from unsolicited contact with non-kin men. Burgaz houses so far, do not display solid evidence for

[325] Gilchrist 2001, 88

strict gender divisions except the *androne*s in several houses; the *andron* that was subject to geochemical analysis in this study appears as lived-in as any other space in House NE-2 only to be separated based on its artefact assemblage and its location in the house.

Even though Burgaz houses are of a variety regarding size and plan, social status is not evident based on artefact assemblages. However, it seems that there was a diversity in terms of the living arrangements of Burgaz people and the size of households; one or two roomed houses compared to the multi-roomed large houses with courtyards very likely hosted either people with less means or they were households with a few number of members, perhaps people living together without any family ties. Renting is a practise that is mentioned in ancient records[326], being a busy port city, it is possible that some houses were rented as well at Burgaz. Perhaps it would not have dramatically changed the way spaces were used and how activities were organized within the house but it would be a quite different story from a house lived in by one or two families with daily lives described in this study.

The division between public and private activities perhaps needs some flexibility and reconsidering. Although the entire open public space was not subject to chemical analysis, it seems that a particular portion of it was used for an activity involving fire and organic materials. Perhaps this open space with two wells was used for activities otherwise thought as domestic by the residents of the households adjacent to this space, as an additional unit to their houses. Can we certainly conclude that political activities and decision making only took place in public buildings but never in private house gatherings? Or women of several households had never come together for rituals in a neighbour's courtyard? Is it possible to trace down communal gatherings archaeologically? It is always a possibility that public and domestic spaces are both interconnected and interdependent to at least some degree.

[326] Cahill 2002, 152

The harbours of Burgaz provide an exceptional perspective of how this seaside city interacted within the larger Aegean network acting as a busy hub in ancient maritime trade. The earliest port near the acropolis, dating to Archaic period was expanded during Classical period with an additional port complex southwest of the acropolis, very likely indicating the economic and physical growth of the city too; the harbour facilities kept being actively used for maritime exchange of agricultural produce even after Burgaz was partially abandoned and residential quarters were transformed into working spaces. The fertile lands around Burgaz, the easy access to the sea worked in the city's benefit, making it a crucial and lively economic center.[327]

Despite the busy harbours, excavated residential areas of Burgaz did not reveal any evidence for households that are commercially producing. Most households are thought to produce or process their food, clothing and such, for their own use. Cahill points out that a large number of houses at Olynthos were engaged in such activities.[328] However, there are also several shops at Olynthos as well as residential buildings with shops on their ground floors. Burgaz households appear as self sufficient compared to cities as Olynthos. Atıcı in her research concludes that the lack of artefacts indicating large scale production such as presses, grinders and basins underlines that inhabitants of Burgaz were producing materials for domestic use and were not providing mass needs.[329] In agreement with this, chemical analysis carried out in this study did not provide any evidence for mass production of any goods. Even if they were involved in mass production, the activity did not take place in domestic contexts, industrial quarters were separated from residential areas.

Spatial patterning, in Burgaz, tends to be flexible, mostly specific to individual houses and needs be studied in this manner, with respect to individuality, artefact distributions, element accumulations, and the simple principle of multi-

[327] Greene *et al*. 2019, 118-20
[328] Cahill 2005, 55
[329] Atıcı 2013, 135-6

functionality. Similarly, households need to be explored with respect to their wide geographical and social diversity.

In terms of how elements are used to identify human behaviour and spatial use patterns at Burgaz, starting with phosphorus in the form of available P, this element turned out to be best indicating heavy refuse accumulation areas as *peristasis*. It would be interesting to sample larger refuse areas or any suspected garbage area in the settlement to explore how densely phosphorus accumulates and how widely gets distributed in such contexts to reconstruct waste-related behaviour of Burgaz people.

As well as refuse areas, potassium at Burgaz revealed itself as a very useful element to also locate fires and general kitchen activities which made it not only possible to locate possible fire-related activities but also eliminate these types of daily work from some contexts such as the *andron* of House NE-2 based on the low levels of potassium in this space. According to potassium distribution, it was also possible to locate the *oikos* and very likely a corner of the small courtyard adjacent space as built on the floor type of fire locations among all the sampled spaces of the house. Fire is an important indicator of a set of activities, a future research topic could be to search for fire spots around the houses and in open spaces as well since Burgaz people seem to have built fires in a wide range of locations within the settlement according to the results coming from the open public space in the southern sector.

Zinc, indicating butchering and/or grain storage, is an element that works well at Burgaz, there are high and low levels of zinc distributed among different contexts. In domestic spaces, elevated zinc levels are usually associated with rooms that are identified as kitchen activity areas without fire traces. Of course more houses and spaces need to sampled and analyzed to be able to interpret patterns of butchering and storage with certainty, the interpretation also needs to backed up with

artefactual evidence and perhaps faunal remains. However, as the first ever zinc results from Burgaz, the element appears very promising to explore butchering and grain storing behaviour.

Iron is very a solid marker for human occupation at Burgaz, both by itself and in combination with other elements as copper, indicating a set of activities ranging from kitchen work to pigment processing. Elevated levels of iron occur in several contexts at Burgaz which needs to be interpreted with the support of architectural and artefactual data. Sampling and analyzing households with their entire activity areas (inside and outside) will help mapping not only iron-related activity zones but also identifying the density of these activities as zones even in individual rooms.

Copper levels seem to be very dependent on preservation of contexts at Burgaz, the less preserved-heavily disturbed spaces of southern sector consistently revealed very low below the average copper levels. In House NE-2, copper combined with elevated levels of iron indicate small scale production or weaving dying in the large room in the southern part of the room and food preparation in the northern part based on levels of copper combined with zinc. In the *oikos*, the fire dominates all other activities based on very elevated elemental results.

Magnesium at Burgaz provided more elevated scores in domestic contexts compared to streets and roofed public building hinting at a connection between the element and domestic activities, however it is not as precise of an element to allow pinpoint behaviour onto spaces even when combined with other elements forming signatures derived from other studies. Sodium is another element with rather difficult to interpret kind of results. It appears as a general human use indicator but in terms of identifying activity-specific areas by itself or combined with other elements, it does not provide much information as iron or potassium. Same argument is more or less valid for manganese too, this element is difficult to

integrate into activity area interpretations; the most evident result is that SE domestic contexts are higher in manganese than the House NE-2.

Chemical soil analysis results proved that the archaeological site of Burgaz is in fact a generous candidate for such studies, both in terms of its soil chemistry, structure and texture and also for its archaeological potential. Multi-element soil analysis results are compatible with traditional archaeological analysis and allowed us to define activity areas at Burgaz and assign elemental signatures to activity areas. The analysis results were also used to create a ground to interpret further, ask further questions regarding spatial use and function of Burgaz spaces. It seems a better inclination to define activity areas for individual rooms based on artefactual and elemental data and discuss spatial use rather than labelling rooms with a single function as kitchens, living rooms and so on. One supporting example found in this research is that of the *oikos* which evidently served both as a kitchen and a living room in the modern sense and needs to be defined in its entirety. The *andron* is an exception in terms of naming names since this room is usually architecturally identifiable and significant as a socio-culturally loaded element. However, it is a matter of further discussion whether *andron* was used for other activities besides *symposia* or not. Based on chemical element accumulations, the *andron* of House NE-2 appears as a regularly used space rather than a "special occasion every once in a while" type of room.

Geochemical analysis also demonstrated to be a method to explore spaces both open and roofed in terms of human use; potassium for instance, indicates fire and wood ash otherwise impossible to detect if there are no visible traces on the surface. Especially in open spaces, where artefacts are scarce, element accumulations point to a set of possible activities which are invisible to traditional archaeological methods.

Compared to phosphate analysis that was conducted at Burgaz before[330], multi-element analysis provided more sophisticated results making it possible to pinpoint a set of particular activities based on element combinations whereas phosphate levels could merely indicate the density of accumulation as a result of human use.

As for recommendations related to practical issues of the methodology, it would be interesting to see households with their entire activity areas including areas around the houses and empty lots, as well as common open spaces. A combined sampling strategy of soil samples to undergo ICP-AES analysis and also spot tests for protein, fatty acids and lipids could provide a very detailed reconstruction of spatial use. Spot tests do not specify quantity, but they make it possible to identify organic sources such as blood, meat, oils, fats, resin, wine and other liquids. ICP-AES analysis results are very specific about quantities in atomic levels, however ICP-AES cannot separate organic from inorganic.

Middleton *et al*. highlight the necessity of ethnoarchaeological and experimental studies focusing on geochemistry to document chemical residue formations based on human activities.[331] To be able to generate elemental signatures identifying activities one needs to know what residues that activity produces and how. An ethnoarchaeological study at Datça might add to what we know about floors and human use of them in this region particularly, both as a data set on its own and in comparison with the results of ancient floors. Modern villages that are still involved in household scale production of olive and grape products in Datça Peninsula would be interesting contexts to study in terms of chemical accumulations. Daily life cycles, seasonal preparations, the way open air spaces are used, the way traditional village house spaces are used throughout the year could be all chemically documented and mapped. Most multi-element soil studies do benefit from modern day data and in most cases modern chemical signatures of human use seem to match with ancient ones, therefore proven helpful for associating certain activities with

[330] Akyol, Demirci, Akoğlu 2006:163-164
[331] Middleton *et al*. 2010, 205

certain elements considering that the soil will have the same compounds within the same region.

Likewise, an experimental study set up in the region, exploring ancient ways of production, by-products, garbage and discard accumulations would provide the much needed analogies for spatial reconstructions regarding ancient households. As mentioned before, documentation of systematic and repetitive human behaviour is a useful tool to move away from assumptions and to form a platform for rather less biased interpretations of past social and economic patterns. Classical archaeology would very much benefit from opening up new windows that could steer away the narratives from traditional, mainstream interpretations and stereotypes.

Large horizontal exposure of archaeological contexts, entire neighbourhoods or insulae with their surroundings, would help fully define activity areas by increasing sample size and also allowing to comprehend lived-in human space in its entirety, open spaces, empty lots, pathways, refuse dump areas and so on included. Last but crucially not least, more domestic contexts need to be excavated, documented with their entire assemblages and published including their entire assemblages. After all, the house is "*the most powerful practical symbol until the invention of writing*."[332]

[332] Renfrew 2007, 144

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APPENDICES

A. CURRICULUM VITAE

PERSONAL INFORMATION

Surname, Name: Eroğlu, Mina
Nationality: Turkish (TC)
Date and Place of Birth: [redacted]
Marital Status: Married
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EDUCATION

Degree	Institution	Year of Graduation
MS	METU Settlement Archaeology	2005
BA	Ege Uni. Protohistory and Near Eastern Archaeology	2000
High School	Yunus Emre Anadolu High School, İzmir	1996

WORK EXPERIENCE

Year	Place	Enrollment
2016-Present	theblacksea.eu/EIC Network	Turkish Editor, Researcher, Fact-checker
2016	Çankaya Uni. City and Regional Planning	Part-time Instructor

2003-2014	METU Settlement Archaeology	Research Assistant
2009-2015	METU Settlement Archaeology “Arkeo-Lab” Project (TUBITAK Grant)	Coordinator, Instructor

PUBLICATIONS

1. Şentek M. "Akeramik Neolitik Güneydoğu Anadolu’da Kült Yapıları: Nevalı Çori Örnek Yerleşimi/Cult Buildings in Aceramic Neolithic Southeast Anatolia: A Case Study of Nevali Çori", in D.B. Erciyas (ed.) Güneydoğu Anadolu Araştırmaları Sempozyumu/Studies in Southeastern Anatolia Graduate Symposium, Settlement Archaeology Series 3, 37-53 (2010)

B. TURKISH SUMMARY / TÜRKÇE ÖZET

Multi-Element Soil Analysis at Burgaz-Datça (Palaia Knidos): A Study in Settlement Archaeology / Burgaz-Datça'da (Palaia Knidos) Çoklu-Element Toprak Analizi: Bir Yerleşim Arkeolojisi Çalışması başlıklı çalışmanın temel amacı, Datça-Burgaz arkeolojik kazılarında uzun yıllardır belgelenmiş olan mekansal organizasyonu yorumlayabilmek adına jeokimyasal ve analitik toprak analizlerini arkeolojik bulgularla birleştirmek ve yüksek çözünürlüklü verilere ulaşmaktır.

İlk bölümde çalışmanın amacı ve alana yapacağı katkı açıklanmaktadır, mekan çalışmalarının yöntemleri ve etnoarkeolojinin bu çalışmalara katkıları irdelenmektedir. Hanehalkı arkeolojisinin tarihi ve ilişkili çalışmalar, sosyal dinamikler ve materyal kültür bağlamında evler ve hanehalkları, hanehalkının politik bağlamı ve feminist bakış açısı incelenmektedir. İkinci bölümde Klasik hanehalkları çalışmaların tarihçesi aktararılırken bir fiziksel and sosyal konsept olarak *oikos* ve örnek çalışmalarla birlikte Yunan hanehalklarının mekansal organizasyonu tartışılmaktadır. Üçüncü bölüm, Burgaz antik yerleşiminin coğrafi ve tarihi özelliklerini, ayrıca yerleşim ve hanehalkı organizasyonunu içermektedir.

Takip eden dördüncü bölüm bu çalışmada uygulanan yöntemler hakkındadır. Arkeolojide toprak çalışmalarının bir tarihçesini, hem arkeolojik hem de etnoarkeolojik ortamlarda taban çalışmalarının prensiplerini ve tarihçesini, fosfat analizinin arkeolojiye katkısını, çoklu-element analizinin aktivite alanı çalışmaları için ne şekilde kullanıldığını, örnek çalışmaları ve bu çalışmaların sonucunda ortaya çıkarılmış element imzalarını ve son olarak da Burgaz yerleşiminden toplanan örnekleri içermektedir. Beşinci bölümde jeokimyasal toprak analizi sonuçları ve

bunlara uygulanan istatiksel analizler açıklanmaktadır. Bu sonuçları Burgaz'da mekan kullanımı üzerine bir tartışma izlemektedir. Bu bölümün sonunda Burgaz'da insan aktivitelerine denk düşen element imzalarını içeren bir tablo verilmektedir ve antik yerleşimlerde mekan kullanımını kimyasal element dağılımıyla açıklanması özetlenmektedir.

Son bölüm Klasik dönem hanehalklarında mekan kullanımı, günlük aktiviteler ve aktivite alanı çalışmaları üzerine tartışma ve sonuç içermektedir. İleriye dönük çalışmalar konusunda düşünceler ve tavsiyeler ile son bulmaktadır.

İnsanın doğayla ilişkisi genelde onu değiştirme yönündedir; en erken dönemlerden itibaren peyzaja şekil vermiş, barınaklar inşa etmiş, çevreleriyle ilişki içinde yaşamıştır. Geride bıraktıkları, eski yaşamların çoğu gözle görülebilir kalıntılarıdır; binalar, eserler ve mezarlar. Bir yerleşim ya da yaşam tarzı terkedildiğinde doğa devreye girer ve zaman içinde geriye kalanların üzerini örter.

Bir disiplin olarak arkeoloji, en genel anlamıyla bu eski yaşamları yeniden kurmayı amaçlar ve bunun için de geride ne tür malzeme kaldıysa onu kullanır. Geçtiğimiz birkaç on yıl boyunca teorik düşünce, tüm sosyal bilimler üzerinde olduğu gibi arkeoloji üzerinde önemli bir etki yaratmıştır; bu entelektüel süreç, biliminsanlarını elle tutulur bulguların ötesine bakma konusunda cesaretlendirmiştir.

Çok erken dönemlerden başlayarak arkeolojinin ilgisi anıtlar ve saraylar, güçlü ve güzel olan üzerine yoğunlaşmıştır. 1960'ların başında, toplumsal hareketlerle ve sosyoekonomik teorilerdeki güncel akımlarla eşzamanlı olarak bu ilgi, sıradan halka ve onların gündelik yaşamlarına yönelmeye başlamıştır: "Ne yiyiyorlardı, nerede uyuyorlardı, günlük sıkıntıları nelerdi?" Bunun yanı sıra sosyal grupların kendi aralarında ilişkiler, yerleşimlerin doğası, ticaret ve sınıfsal statüler de bilimsel

ilginin toplandığı sorular haline gelmiştir. Bu soruları cevaplamak için ise bir zemine, bir çalışma platformuna ihtiyaç ortaya çıkmıştır.

Kazı, elbette arkeolojinin temel aracıdır, ancak arkeoloji en başından beri başka disiplinlerin çalışma tekniklerini ödünç alıp kendine uyarlamak bağlamında esnek bir bilim dalıdır. Sorulan soruların sayısı arttıkça, araştırma araçlarına duyulan ihtiyaç da büyümüştür.

Jeoloji ve toprak çalışmaları, en başından beri arkeolojinin ayrılmaz bir parçası olmuştur. Mekan analizi, coğrafya uzmanları tarafından geliştirilmiştir, arkeolojide uygulanması ancak 1970'lerin ortasında gerçekleşmiştir. Buluntuların dağılımı ve bunun incelenmesiyle ortaya koyulan modeller, insan coğrafyası ve arkeoloji arasındaki bağın kurulmasını sağlamıştır. Diğer yandan, eski yaşamların tekrar ve detaylarıyla kurgulanması yönündeki ilgi, araştırmacıları toprağa daha yakından bakmaya sevketmiştir ve nihayetinde mikro-buluntu çalışmalarını ve toprak çalışmalarını doğurmuştur.

Toprakla ilgili ilk çalışmalar, genellikle bir ya da iki elementin analiz edilmesi şeklindedir; son dönemlerde ise ICP-AES (ICP-OES), ICP-MS ve XRF teknikleri, toprak kullanımı ve dolayısıyla mekan kullanımı açısından oldukça önemli sonuçlar vermiştir, arkeolojide çoklu-element toprak analizleri gittikçe yaygınlaşmaktadır.

Yemek hazırlamak, pişirmek, her türlü atık çıkarmak, alet üretmek gibi insan aktivitelerinin kalıntıları toprağa işler; bir kısmı fiziksel olarak toplanabilir fakat bir kısmı sedimanlarda depolanır ve ancak bahsi geçen analiz yöntemleriyle bilimsel olarak tanımlanabilir. Bu günlük aktiviteler hayatta kalma amacının yanı sıra insanlar arasındaki sosyal ve ekonomik etkileşimlerin örüntülerini de

yansıtmaktadır; günlük aktivitelerin izleri, her yaştan, cinsiyetten ve sosyal statüden insan davranışlarının kayıtlarıdır.

Antropojenik toprakların kimyasal analizi ve kimyasal karakterizasyonu, zeminler üzerinde bıraktıkları kimyasal imzalar üzerinden çeşitli aktiviteleri tanımlamaya imkan sağlamaktadır. Bu çalışma, bu aktiviteleri sınıflandırmayı ve üzerinde yaşanmış toprakların kimyasal analizi sonucunda ortaya çıkan datayı kullanarak Burgaz hanehalklarının sosyal ve ekonomik davranışlarını yeniden kurmayı amaçlamaktadır. Ayrıca bu kimyasal olarak desteklenen örüntüleri, daha önceden yapılmış olan mimari ve buluntusal analizlerle karşılaştırıp bir araya getirerek hanehalkının çeşitliliğini kavramayı; geleneksel yaklaşımları, kamusal/özel alan ayrımını ve cinsiyet odaklı mekan dağılımını tartışmayı amaçlamaktayız. Araştırmaya yaklaşımımız, üretim ve tüketimini ekonomik örüntüleri, aktivite alanları, gıda odaklı davranışlar, mimari kanıtlar ve mekansal analiz temaları etrafında şekillenmektedir.

Hanehalkının mekan ve aktivite anlamında nasıl organize olduğu, genelde eserlerin buluntuların mekan içindeki dağılımı üzerinden kurgulanır, ancak bu dağılımlar her örnekte aktivitelerin gerçek doğasıyla birebir örtüşmez. Bu örtüşmemenin sebepleri arasında doğal biyolojik süreçler, erozyon tahribatı, antik ve modern dönem tahribatları, yerleşimcilerin bizzat kendilerinin yerleşimi terkederken yarattıkları yıkım ya da terkedişin şekli ve hızı da bulunmaktadır. Ani olarak terkedilen yerleşimlerde eşyaları original yerlerinde ve iyi korunmuş olarak bulma ihtimali yüksekken planlı ve organize taşınmalarda geride kalan eşyalar genellikle işlevini yitirmiş, istenmeyen objelerdir. Bu gibi durumlarda toprağa depolanmış elementler, eski aktivite alanlarını anlama konusunda destek sağlamaktadır.

Fosfat, antropojenik topraklara işaret eden önemli bir elementtir. Burgaz yerleşiminde yapılmış olan fosfat analizine gore üç ana alan belirlenmiştir; az ya da

hiç kültürel aktivite, orta derece ve ana kültür tabakaları. Ancak bir dizi başka element test edilmemiş ve sonuçlar belli başlı mekanlarla ilintili olarak yorumlanmamıştır. Daha kapsamlı kimyasal analizle farklı aktivite alanlarının farklı kimyasal imzası olacağı hipotezini denemek ve mekan kullanımı ile kimyasal izler arasında bir sentez kurmak mümkün olacaktır.

Etnoarkeologlar ve jeoarkeologlar, sedimanlar da dahil olmak üzere dolgu silsilelerinin potansiyel olarak kültürel davranışlar ve yerleşim tarihi hakkında bilgi verir nitelikte olduğunu iddia etmektedir. Carol Kramer 1970'lerin sonunda İran'da yaptığı etnoarkeolojik çalışmalar sırasında "*her alanın tabanının, o tür alana mahsus özellikte olduğunu ve dolayısıyla öncel işlevi konusunda tanımlayıcı*" olduğunu gözlemlemiştir. Ayrıca bir arkeoloğun, tabanlardaki değişimleri inceleyerek çatılı ve açık alanları birbirinden ayırabileceğini, her odanın işlevini tanımlayabileceğini eklemiştir. Butzer, bu öngörüye katılır; materyalin türü ve belli bir taban üzerinde ne ölçüde biriktiği verisinin o tabanın doğası ve kullanım şekline göre değişiklik gösterdiğinin ve bu sebeple işlev belirlemek için bir anahtar olduğunun altını çizer.

Geçmiş insan gruplarının sosyal organizasyonuna yönelik detaylı çalışmalar 1960'lar ve 1970'lerde özellikle Mezoamerika'da yürütülen araştırmalarla başlamıştır. Etnoarkeolojik çalışmalarla da desteklenen antik Maya yerleşimi kazıları arkeoloji dünyasına yerleşim sistemleri, hanehalkı arkeolojisi, aktivite alanı analizi, kültürel ekoloji, materyal kalıntılar ile karmaşık insan davranışı arasındaki bağlar, mekan tabanlarının kimyasal analizi, kültür çeşitliliği gibi kavramları kazandırmış, ayrıca arkeolojinin başlangıcından bu yana süregelen geleneksel yaklaşımların eleştirilmesine, kemik kimyası ve paleobotani gibi yöntemlerin yaygınlaşmasına, aktivite çeşitliliği, iş bölümü, bir araç olarak insan ve cinsiyet gibi sorunların tartışılmaya başlamasına da yol açmıştır.

Materyal kültürü, tabanlar, sokaklar, odalar, çöp alanları gibi birimlere ayırarak çalışmak mikro-çalışmaların yaygınlaşması sonucunu doğurmuştur. Hanehalkı arkeolojisi, bu birimsel çalışmaların iyi örneklerinden biridir; hanehalkı bir sosyal birim olarak kabul görür, sosyalleşmenin başladığı yerdir, işlevle bağlantılı insan aktivitelerine sahne olur. Bu yaklaşımın ana ilgisi materyal kanıtlardan yola çıkarak insanlar ve çevreleri arasındaki ilişkileri yeniden kurgulamaktır. Tringham hanehalkı arkeolojisini geçmişin insani yeniden kurgusu için bağlam yaratmak üzerinden tanımlar. Hanehalkı arkeolojisi aynı zamanda sosyal eşitsizlikleri çalışmak için de uygun bir platformdur, cinsiyet çalışmaları da bu platforma dahildir.

Hanehalkı arkeolojisi, hanehalklarının sosyal dönüşüm ve materyal kültür teorilerini birbirine bağladığı prensipi etrafında çalışmaktadır. Hanehalkları durağan ve tektip değildir, tam tersine işlev, form ve aktiviteler açısından dinamiktirler ve geniş bir coğrafi ve kronolojik çeşitlilik gösterirler. Hanehalkını tanımlayan şey bir arada yaşamak, akrabalık bağları ya da fiziksel bir yapının sınırları değil, paylaşılan üretim, tüketim, dağıtım ve toplumsal yeniden üretim deneyimleridir.

Klasik arkeoloji erken döneminden bu yana dikkatini kamusal yapılar ve mezarlık alanları üzerine yoğunlaştırmış, şehirlerin geniş ölçekli mimari planını ortaya çıkarıp mimariyi detaylarıyla tanımlarken bu şehirlerde gündelik yaşamın niteliklerini ya da mekansal bağlamların yeniden kurgulanmasını ihmal etmiştir. Kazı sonuçları raporlarında buluntu topluluklarını ya hiç yayınlanmamış ya da bağlamlarından kopuk halde kataloglar olarak yayınlanmıştır. Bilhassa evsel alanlar ve bağlantılı buluntu toplulukları çok nadir olarak çalışılıp yayınlanmıştır. Gündelik hayatın kurgusu antik metinler üzerinde çalışan akademisyenlere bırakılmıştır, bu metinler ise çoğunlukla toplumun elit, erkek bireyleri tarafından yazılmış ve toplumun belirli bir kesimini bu bakış açısıyla anlatmaktadır. Antik Yunan dünyasının hem coğrafi hem de toplumsal çeperleri bu metinlerde yoktur.

Oikos, hem bir fiziksel yapı olarak haneyi hem de bu hanede yaşayan hanehalkı üyelerini tarif eden bir Yunanca terimdir. Aynı zamanda bir evin ana yaşam odası olarak da arkeoloji terimleri arasında kullanılır. Tipik bir Klasik dönem *oikos*'unun çocuklu bir çekirdek aile ile varsa kölelerden oluştuğu kabul edilegelmiştir ancak son dönemlerde *oikos*'un daha karmaşık bir yapı olabileceği, daha kalabalık aileleri barındırmış olabileceği, hatta aile dışı üyelerin de var olmuş olabileceği ve bir hanehalkının bir yapıdan daha geniş alana yayılmış olabileceği tartışılmaktadır.

Hanehalkları içinde bulundukları geniş toplumsal ve kültürel yapıyı yansıtan, toplumların kendilerini nasıl tanımladıklarını ve toplumsal kaideler ile dinamikleri de içeren birimlerdir. Cinsiyet ilişkileri ve hanehalkı üyeleri ile misafirleri birbirinden ayırmak Klasik Yunan konut tasarımının ana amacı gibi görünmektedir. Antik metinlerde hanehalkı kadınlarının dış dünyadan saklanması bir hayli idealize edilerek anlatılagelmiştir ve evlerin içinde kadınlara mahsus alanlardan bahsedilmektedir. Arkeolojik bulgulara baktığımızda ise böyle bir kati ayrımı tespit edebilmek mümkün olmamaktadır. Büyük ihtimalle sadece üst sınıflara mahsus bir ayrıcalık olan kadınların dış dünyaya karışmaması kaidesi, toplumun genelinde eve dışarıdan gelen erkek misafirlerin evlerin girişine yakın konumlandırılmış olan erkek alanları *andron* odalarında ağırlanıp evin iç dünyasına sokulmamaları yoluyla uygulanmış olabilir. Klasik dönem sonrası ev organizasyonları nispeten daha kamuya açık yöden değişim göstermiş, kadınlar hayırsever ve mülk sahibi gibi kimliklerle kamusal alana dahil olmaya başlamıştır.

Antik konutların bugün çoğunlukla boş ve kısmen korunmuş olduğu düşünülürse, domestik davranışları mekanlar üzerine yerleştirmek zorlu bir iştir. Bir yandan da işlevlerine göre ayrılmış odalar düşüncesi bizim modern yaşamımızdan kaynaklanan bir tür beklentidir. Antik konutlar daha ziyade aktivite alanlarına ayrılmış gibi görünmektedir, belirli domestik aktiviteler belirli alanlarda yapılmaktadır, bu alanların illa ki duvarlarla belirlenmiş olmasına gerek yoktur.

İklim koşullarına da uygun olarak planlandığı anlaşılan Klasik dönem konutları genellikle bir avlu etrafına sıralanmış odalardan oluşur. Sadece erkeklerin katıldığı (flüt çalan kızlar, fahişeler gibi eğlence sağlayıcılar da unutulmamalı) *symposium* adı verilen toplantıların yapıldığı andron odaları genellikle evlerin girişine yakın konumlandırılır. Evin diğer odalarından aşağı yukarı kare planı, boyalı duvarları ve ev dışına doğru uzanan atık su kanallarıyla ayrılır. Buluntu grubu ise ağırlıklı olarak içki ve servis kaplarından, yemek yeme kapkacağından ve siyah ya da kırmızı figür özel kaplardan oluşur. Elbette *andron*'u olmayan evler ve *andron*'u bu tanımlamalara uymayan evler de bulunmaktadır.

Avlular, evin odalarına giriş çıkışı sağlayan unsurlar olarak işlev görürken bir yandan da genellikle penceresiz olan bu evlerde ışık ve ısı kaynağı olarak da bulunurlar. Hemen hemen bütün Klasik ev avluları buluntu bakımından dokuma, yemek hazırlama, yemek pişirme, ufak tefek alet yapımı gibi gündelik işlerin burada da görüldüğüne işaret eder.

Dokuma, yemek hazırlama, pişirme, depolama gibi işler geleneksel olarak kadınlara atfedilen işlerdir, evlerde sadece bu işler için ayrılmış bir alandan ziyade bu işlerin evin çeşitli odalarına yayılmış olduğu, bir odanın birden fazla iş için kullanıldığı anlaşılmaktadır. Ana yaşam odası olarak kabul edilen *oikos* genellikle evin en büyük odası olarak tanımlanır, arkeolojik kanıtlardan yola çıkacak olursak genelde içinde ateş de yakılmış olan bu odalar yemek hazırlanan, pişirilen, tüketilen ve küçük ölçekte üretimin de yapıldığı bir hayli meşgul ve olasılıkla dağınık odalar olarak karşımıza çıkmaktadır. Ayrıca her örnekte evin en büyük odası da değillerdir.

Günümüzde Klasik dönem çalışmaları kati ayrımlar ve karşıtlıklar yerine konutların bütünlüğü, mekanların ne şekilde dağıldığı ve birbirleriyle olan ilişkileri ve aynı zamanda mekanların sosyal kullanımı üzerinde durmaktadır. Bir erkek alanının

varlığı, karşılığında bir kadın alanı olacağı anlamına gelmez; kadınların evin geri kalanını günlük işler için kullanmış gibi görünmektedir. Cinsiyete dayalı ayrımın erkek misafirlerin *andron*'dan ilerisine geçmemesi üzerine şekillenmiş olduğu düşünülmektedir. Benzer bir bakış açısı mutfak alanları için de geçerli olabilir, bir mutfak odası aramak büyük ihtimalle bugün mutfaktan ne anladığımızla ilişkili olup antik dönemde geçerliliği olmayan kriterler ortaya koymaktadır. Yerinde sabit, mimari olarak ayırt edilebilen, tektip mutfaklar antik Yunan evlerinde karşımıza çıkmaz. Farklı odalar ve alanlar yemek aktiviteleri için kullanılmış, iklimin ve mevsimlerin de büyük olasılıkla bu duruma etkisi olmuştur. Yemek hazırlama ve pişirme işleri için kullanılmış olan öğütücü ya da mangal türevi eşyaların taşınabilir olması mutfak alanlarını da devingen hale getirmiştir.

Bölgesel ve çevresel faktörlerin de mimari ve tasarım açısından farklılıklara etkisi çoktur. Batı Yunanistan'ın daha soğuk ikliminde ve denizden yüksek bölgelerinde evlerde iç avlu tercih edilmemiş, onun yerine büyük bir odanın merkezine yerleştirilen bir ocak sıklıkla kullanılmıştır. Girit'te de avlulu değil ocaklı evler daha sık görülür. Ev planlarındaki bu farklılığın hayat tarzında da farklılıklara işaret edebileceği önerilmiştir. Misafirlerin bu büyük ocaklı odalarda ağırlandığı kabul edilirse ve ocaklı odaya ulaşmak için başka odalardan geçilmesi gerektiği düşünülürse, bu bölgelerde toplumsal kaidelerin ve kadının konumunun farklı olduğu düşünülebilir. Evlerin gelişiminde ve dağılımında çoğulcu bir yaklaşımın faydalı olacağı görülmektedir.

Burgaz'da da bütün evler avlulu değildir, bazı evler daha küçük ve doğrusal dizilimli odalardan oluşur. Latmos'taki kaya evleri ve Düzen Tepe'deki komünal avlulu yapı, farklı barınma stratejilerinin de var olduğunu, alternatif hayat tarzlarının göz önünde bulundurulması gerktiğini hatırlatmaktadır. Klasik dönem konutlarının sık tekrarlanan bir ortak özelliği domestik mekanların birden çok işlev için kullanılmış olması ve bir çok ev eşyasının yerine sabitlenmemiş, taşınabilir

özellikte olmasıdır. Antik Yunan domestik mekanları çok meşgul, sürekli devinen ve pek de derli toplu olmayan mekanlar gibi gözükmektedir.

Knidos Yarımadası'nda, modern datça İskele'ye 2 km uzaklıkta bulunan Burgaz'ın genel yerleşim planı da düzensiz bir karakter göstermektedir, yapı adası boyutları değişkendir; Klasik Dönem yerleşimi, Arkaik yerleşimin planını izleyerek gelişmiştir ve ortogonaldir. Yerleşimin güney sektöründeki 6. yüzyıl yapıları, Klasik Dönem inşa hareketleri sebebiyle ağır tahribata uğramıştır. Sondaj çalışmaları sonucunda, Arkaik yapıların doldurulup zeminin düzeltildiği ve inşaya hazırlandığı anlaşılmaktadır. Kuzey sektörde de aynı durum gözlenir, fakat tahribat daha azdır ve yerleşim planı daha düzenlidir.

Kuzey ve güney sektörler genelde konut alanlarından oluşmaktadır; bunlar birbirleriyle ve yerleşimin diğer parçalarıyla sokaklar üzerinden bağlantılıdır, şu ana kadar kazılmış olan üç yapı adasının da boyutları birbirinden farklıdır. Güney sektörün büyük yapı adası, 6 metre genişliğinde, iyi korunmuş bir caddeyle çevrelenmektedir, bağlantılı bir diğer caddeyle birlikte liman alanları L1 ve L2'yi birbirlerine bağlamaktadır.

Burgaz evleri genelde avlulu tipte, "*pastas* benzeri" karakter gösterir. İç mekanlar bir çatı konstrüksiyonuyla tamamen kapalı ya da yarı kapalı olabilir ve bir koridor vasıtasıyla sokağa açılan bir avlu etrafında konumlandırılmışlardır. Depo alanları ve varsa *andron* bu koridor boyunca yer alır, odalar giriş ise çoğunlukla avludan sağlanır. Odadan odaya geçiş ve ikinci koridorlar gibi istisnalar da görülmektedir. Çoğu avluda aynı zamanda bir kuyu da bulunmaktadır.

Burgaz'da inşa faaliyetlerinin bir standardı olduğunu söylemek mümkündür, seviyesi düzeltilmiş zemin üzerine kireçtaşı bloklardan örülmüş, 20-25 santimetre

kalınlığında temel duvarları oturtulmuştur. Üstyapı kerpiç tuğlalardan inşa edilir, çamurla, bazı örneklerde kireçle sıvanır, bir örnek dışında duvar boyası iziyle karşılaşılmamıştır. Tabanlar sıkıştırılmış topraktır, çok az örnekte kireç sıva görülmüştür. Arkeolojik bulgularla desteklenebilecek bir ikinci katın izine rastlanmamıştır. Avlulu evlerin boyutları değişken olmakla birlikte ortalama parsel 10 metreye 15 metre kadardır, yapılara giriş her zaman yapının dar tarafından sağlanmıştır.

Konutlar birbirlerinden, iki ev arasında drenajı ve izolasyonu sağlamak amacıyla bırakılmış 80 santimetrelik *peristasis*ler ile ayrılır. *Peristasis* aynı zamanda büyük olasılıkla gün ışığından daha çok faydalanmayı da sağlıyordu ve çöplerin de biriktildiği bir alandı.

Başta domestik birimler olmak üzere bazı iç mekanlar 5. ve 4. yüzyıllarda çok kapsamlı şekilde yeniden organize edilmiştir. 4. yüzyılın sonunda bu alanların bazıları şarap/zeytinyağı, tekstil ve metal atölyelerine çevrilmiş ve yerleşimin terkedilmesine kadar bu şekilde kullanılmıştır.

Kamu yapıları, domestik mekanlardan yerleşim planları ve inşa malzemeleriyle ayrılır. Güney sektördeki konut alanının ortasında konumlandırılmış kamusal açık alanda iki de kuyu kuyu bulunmaktadır. Bu alanın güneyindeki iki yapı, kamusal yapılar olarak tanımlanmaktadır, güneybatıdaki yapının temelinde yumuşak kireçtaşı kullanılmıştır.

Hanehalkı aktivite alanlarını tanımlayabilmek için kuzey sektördeki NE-2 evi iyi bir örnek oluşturmaktadır. Buluntu tipleri, yoğunlukları ve dağılımları analiz edildiğinde, bir odasının depolamaya ayrıldığı, iki odasında yemek pişirme izleri olduğu, bir oda sıvı tüketimiyle ilişkiliyken diğerinin yemek yemekle tanımlandığı

ve son olarak iki odanın büyük olasılıkla tekstil üretimi için kullanıldığı anlaşılmaktadır. Ayrıca evin doğu ve batı kanatları arasında da belirgin bir bölümlenme gözlemlendiği, doğu kanatta yemek ve içmek aktiviteleri baskınken, batı kanatta gıda hazırlamak, yemek pişirmek ve depolama gibi aktiviteler ağırlıktadır.

Element birikimlerine dönecek olursak, öncelikle fosfat formunda fosfordan bahsetmekte fayda bulunmaktadır. Fosfor, yaşayan her organizmanın hayati bir unsurudur, DNA molekülünün bir parçasıdır ve bu sebeple insan aktiviteleriyle ilişkilidir. Bu aktivitelerin fiziksel izleri zamanla bozulsa ve hatta yok olsa dahi fosfor toprakta kalır ve organik malzemelerin varlığı ya da yokluğu hakkında bilgi sağlamaya devam eder. Organik maddelere nispeten daha yoğun maruz kalan çöp alanları ve çukurları, kemiklerdeki yüksek fosfat değerleri sayesinde mezarlar/gömüler bu tür analizle tespit edilmesi olası alanlardır. Aynen fosfat gibi kalsiyum da hayvan dokularının, kemiklerin ve deniz kabuklarının varlığına işaret eder.

Topraktaki fosfat yoğunluğu ile tanımlanabilecek insan aktiviteleri şöyle sıralanabilir; yanmış organik malzemeler, organik atık (bitkisel ve hayvansal), organik malzemelerin depolanması, dışkı, yemek hazırlamak, tahta ve kemik gibi organik malzemelerin işlenmesi, taş alet ve boncuklar gibi organik olmayan malzemelerin işlenmesi. Ayrıca 1976'da yapılan bir araştırmaya göre 100 kişilik bir topluluk bir yılda 124 kilogram fosfor üretebilmektedir. Hayvanların bitkilerden daha fazla fosfat ürettiği bilindiğinden, bu tür analiz, çalışılan bölgede yaşayanların diyetlerine dair bilgi de verebilir. Buna ek olarak, fosfat analiziyle belirli bir bölgenin insanlar tarafından mı hayvanlar tarafından mı kullanıldığını saptamak da mümkün olabilir; mekanın hem içinde hem dışında yüksek fosfat değerleri insane işaret ederken, sadece mekanın içindeki yüksek değerlerin hayvan barınağına işaret ettiği düşünülebilir.

Bu çalışmada fosfor ölçmek için kullanılan yöntem sitrik asitle çıkardıktan sonra Olsen spektrofotometriktir, elde edilen değer mevcut fosfora işaret eder (P av). Buna ilave olarak Walkley-Black metoduyla organic material kontrollü asit içinde çözdürülmüş ve kayıp hesaplanarak organik madde yüzdesi hesaplanmıştır. Fosforun kimyasal analizinin kireçli topraklarda daha iyi sonuç verdiğini de eklemek gerekmektedir.

Çoklu-element analizi ise, analiz tekniğinin erken dönemlere göre kolaylaşıp ekonomikleşmesi sebebiyle arkeoloji alanında gittikçe daha yaygın kullanım görmeye başlamıştır. 1960'ların başında kazılarda ve yüzey araştırmalarında sınırlı sayıda elementin test edilmesiyle başlayan adaptasyon süreci günümüzde çok sayıda elementin hızlıca analiziyle devam etmektedir. ICP teknolojilerindeki gelişmeler sayesinde farklı elementleri analize eklemek ve arkeolojik bağlamlardaki dağılımlarını test etmek kolaylaşmıştır.

Bu çalışmanın analizlerine dahil edilen elementlerin seçimi, örnek çalışmaların sonuçlarına dayanarak yapılmıştır. Günümüzde sürdürülen, insan kullanımı görmüş topraklar üzerindeki çoklu-element çalışmalarının dahi deneysel bir doğası olduğunun altını çizmek gerekmektedir. Her bölgenin ve dolayısıyla her arkeolojik alanın kendine has bir jeokimyasal imzası olduğu, belirli element dağılımlarının o bölgeyi toprak karakteri açısından tanımladığı, arkeolojik yerleşimin türüne ve sürekliliğine göre toprak yapısının değişebileceği, yerleşimdeki hayatın gerektirdiği aktivitelerin ve dolayısıyla element dağılımlarının bölgeden bölgeye farklılık göstereceği unutulmamalıdır. Her senaryo, toprakta farklı element kombinasyonları ve farklı miktarlarda element birikmesi bırakmaktadır.

Pilot çalışmaların ışığında genel bir bakış açısıyla arkeolojik bağlamlardaki elementlerden bahsedecek olursak, organik maddelerle ilişkileri dolayısıyla fosfor ve kalsiyumu tekrar vurgulamakta fayda bulunmaktadır. Bazı örneklerde çinko ve

hatta stronsiyumun bile aktivitelere işaret ettiği görülmüştür; kasaplıkla bağlantılı, kemik dolgularının bulunduğu alanlarda ve mineral ve kayaların dahil olduğu işlerin görüldüğü alanlarda yüksek seviyelerde stronsiyum ile, tahıl ve kemik depolanmış alanlarda yüksek seviyelerde çinko ile karşılaşılmıştır.

Demir ve bakır gibi ağır metaller, inorganik formda bile olsalar, mekansal anlamda insan aktivitelerinin göstergesidir. Her iki metal de antik dünyada yaygın şekilde alet ve eşya üretiminde kullanılmıştır ve bu tür eşyaların uzun sure depolandığı alanlarda, tabanlar üzerinde element birikmesine yol açmaları olasıdır. Ayrıca mineral pigment ve boyayla ilişkili aktiviteler de tabanlar üzerinde iz bırakmaktadır; Antik Yunan'da dahil olmak üzere pek çok geçmiş kültürde dokumacılık ve boyama, günlük aktiviteler arasında sayılır.

Potasyum da sabit ateşe ve ahşap külüne işaret etmektedir ve hem arkeolojik hem de etnoarkeolojik çalışmalarla desteklenmektedir. Yeri gelmişken, davranış modellerinin arkeolojik gözlemleri olmadan, bu tür disiplinlerarası analiz metodlarının sonuçları manasız veri yığınlarından başka bir şey olmadığını vurgulamakta fayda bulunmaktadır.

Bahsi geçen elementlerin analizinde kullanılan teknik, toprak verimliliğini araştırmak için geliştirilmiş tarımsal testlerden adapte edilmiştir. Potasyum, magnezyum, kalsiyum ve sodium A.A-A.A.S (Atomic Absorption Spectroscopy) ve ICP ile analiz edilebilmektedir, bazı elementler A.A. ile, bazıları ICP ile daha kolay tanımlanabilmektedir; bu sebeple her iki yöntem de denenmiştir. Demir, manganez, çinko ve bakır gibi ağır metaller DTPA (diethylenetriaminepentaacetic acid) ile çözülmüştür, konsantrasyonları ICP spektrometresi ile birlikte hesaplanmıştır.

Potasyum ve fosfor dışında tüm sonuçlar *ppm*'dir (*parts per million*). Potasyum ve fosfor kg/da, yani mevcut materyal hesaplaması üzerinden analiz edilmiştir. Sodyum ve organik maddeler yüzde olarak hesaplanmıştır. *Ppm* olarak alınan bütün sonuçlar base 10 logaritmasıyla dönüştürülmüş ve istatistik hesaplarında bu şekilde kullanılmıştır.

Avrupa, Mezoamerika ve diğer bölgelerde farklı dönemlere ait arkeolojik ve etnograifk mekanlarda gerçekleştirilmiş çoklu-element analizi çalışmalarından derlediği element imzalarına göre; çok yüksek yoğunlukta fosfor, potasyum, kalsiyum ve demir birikimleri *in situ* ateşe; çok yüksek yoğunlukta fosfor, potasyum, kalsiyum ve bazı diğer elementlerin birikimi odun külüne; yüksek yoğunlukta fosfor ve kalsiyum birikimi yemek hazırlama alanlarına; yüksek yoğunlukta magnezyum, mangan ve kalsiyum yemek pişirme ve yanan ateşe; yüksek yoğunlukta fosfor ve magnezyum hayvan kaynaklı yemek artıklarına; yüksek yoğunlukta mangan, çinko ve bakır bitki kaynaklı yemek artıklarına; yüksek yoğunlukta fosfor ve kalsiyum çöp alanlarına; düşük yoğunlukta elementler yoğun kullanılmış dış alanlara; yüksek yoğunlukta çinko depolama ya da kasaplığa (tahıl ve kemik); yüksek yoğunlukta demir ve bakır alet üretimi, dokuma ve boyama işlerine; yüksek yoğunlukta bakır metal işçiliğine; yüksek yoğunlukta demir kasaplık, mutfak aktiviteleri ve pigment işlenmesine; yüksek yoğunlukta kalsiyum kabuklu hayvan kabuklarına; yüksek yoğunlukta fosfor, baryum ve mangan organik madde artıklarına; yüksek yoğunlukta mangan ve bakır misafirler için resepsiyon alanlarına; düşük yoğunlukta fosfor yürüme yollarına, verandalara ve uyuma alanlarına; yüksek yoğunlukta fosfor, potasyum ve magnezyum oturma odalarına işaret etmektedir.

Bu çalışma kapsamında 2011 yazında güneybatı sektörden toplanan 28 toprak örneğine, 2010 yılında kuzeydoğu sektördeki NE-2 evinden toplanmış olan 23 örnek eklenmiş ve analiz edilmiştir. Araştırmanın odak noktasını oluşturan iyi tanımlanmış mekan tabanlarının yanı sıra sokaklardan, *peristasis* aralıklarından da

örnekleme yapılmıştır. Kazı sezonu boyunca mekan tabanları ortaya çıktığı anda örneklenmiş, aynı tabandan birbirini takip eden örnekler alınmıştır. Dolguda ya da kesitte seçilebilen kireçli benzeri alanlar, küllü alanlar izlenmiş ve örneklenmiştir. Taban örnekleri, domestik alanlar, kamu alanları, avlu/açık alanlar, olası atölyeler olarak dört kategoriye ayrılabilir. Örnekleme stratejisi çalışmanın ilgi alanına, alanın topografyasına ve kazı planının doğrultusuna göre şekillenmiştir.

Gelecek çalışmalar dahilinde organik fosfor (Po) ve total fosfor (Pt) analizi denenebilir, sonuçların daha kesin ve yorumlaması daha kolay olacağı düşünülebilir. Mevcut fosforun ölçülmesi bu ikisine gore daha kolay olduğu halde topraktan toprağa değişim göstermektedir, toprak kimyasına ve yapısına bağımlıdır. Fosfor çıkarmadaki değişik yöntemler sonuçlara da etki etmekte ve bir yerleşimin sonuçlarını başka bir yerleşimle karşılaştırmayı neredeyse imkansız hale getirmektedir. Aynı şekilde, bu çalışmada elde edilen yüksek ama değişiklik göstermeyen değerlerden yola çıkarak, kalsiyumun da organik ve inorganik olarak çıkarılması değerlendirilebilir, sonuçları daha kesin yorumlamaya olanak sağlayacağı tahmin edilmektedir.

Kimyasal analizleri değerlendirirken göz önünde tutulması gereken faktörlerden biri, dolgunun içinde bulunduğu durumdur. Modern tarım, gübreleme, su baskınları, antik malzemenin antik dönemde tekrar kullanılmış olması, hava koşulları gibi durumlar toprağın niteliğini fiziksel ve kimyasal olarak değiştirebilir. Yerleşimlerin coğrafyası doğal fosfat değerlerine etki edebilir. Kumlu ve turbalı topraklar, fosfat drenajla aktığından dolayı, bu tür analizlerde doğru neticeler vermeyebilir.

Analiz sonuçlarının değerlendirilmesini en çok kısıtlayan konu ise belirli insan aktivitelerine tayin edilebilecek belirli değerler olmayışıdır; aynı aktivite sürdürülmüş bile olsa, farklı sedimanlar farklı değerler verecektir. Sadece element dağılımlarından yola çıkarak aktivite örüntüleri oluşturmak neredeyse imkansızdır;

incelenen bölgenin çok iyi belgelenmiş ve tanımlanmış olması, mekanların buluntu dağılımlarının çalışılmış olması, analiz sonuçlarının etnoarkeolojik verilerle ya da modern benzerleriyle karşılaştırılması elzemdir.

Burgaz yerleşimine özel bir diğer kaygı ise yerleşimin yavaş bir süreç sonucu terkedilmiş olmasıyla bağlantılıdır. Burgaz sakinleri değerli ve işe yarar eşyalarını yanlarına alarak taşınmıştır, dolayısıyla geride bıraktıkları, önem taşımayan ya da işe yaramayan eşyalardır ve olasılıkla orijinal kullanım alanlarında değil, atıldıkları yerlerde bulunmaktadır.

Burgaz konutları çok fonksiyonlu karakterde kullanım görmüştür, çoğu mekan bir dizi farklı aktivite için kullanılmıştır, dolayısıyla element birikmelerinin yoğun olduğu alanların, mekanın en yoğun kullanılmış alanları olduğunu ifade etmek yanlış olmayacaktır. Görüldüğü üzere, ocak gibi sabit ateş kaynaklarının diğer elementlerin yanı sıra özellikle fosfor, potasyum, kalsiyum ve demir elementlerinin çok yüksek seviyelerde depolanmasına sebep olduğu anlaşılmaktadır. Yemek hazırlıkları yine fosfor ve kalsiyumu yükseltirken, genel kullanım alanlarında yüksek seviyede alkali toprak birikmektedir.

Analiz sonuçlarına göre, örneklerdeki organik malzeme yüzdesi de insan kullanımı görmüş topraklar düşünüldüğünde oldukça düşüktür, %0,77 gibi bir ortalama göstermektedir, fakat fosfor sonuçlarıyla uyumludur. Bu düşük değerler analiz yöntemiyle ilgili olabileceği gibi yerleşimin kendi doğasından kaynaklanıyor da olabilir. Daha önce bahsettimiz gibi yerleşimin yavaş bir süreçle terkedilmiş olması fiziksel buluntularda olduğu gibi kimyasal analizde de kendini gösteriyor olabilir; bir başka açıdan bakılacak olursa, fiziki ve kimyasal şartların dolguyu değiştirmiş olabileceği de düşünülebilir. Bir kıyı yerleşimi olmasına rağmen Burgaz topraklarının tuzluluk oranı “çok düşük” olarak görülmektedir. Ph oranı ise 7,49 ve 8,33 arasında, ortalama 7,9 değeri vermektedir. Bu değer toprağı hafif alkalin

özellikte tanımlasa da drenaj sorunları yaşandığına işaret etmemektedir, element dağılımlarının çok büyük olasılıkla original değerlerinde bulunduğunu düşündürmektedir. Yüzey bitkileri ve kökleri bir hayli yaygın şekilde gözlemlenmektedir, fosfor değerleri başta olmak üzere element dağılımlarına etki ettiği düşünülebilir, ancak Burgaz kültür tabakalarının genellikle bu tür tahribatlara maruz kalmadan korunmuş olduğu bilinmektedir. Ph oranıyla bağlantılı şekilde toprak oldukça kireçli ve killidir, bu özellik element birikmelerinin tahribata uğramadan korunmasında etkilidir.

Analiz sonucunda elde edilen fosfor değerleri, tarımsal faaliyetler için bile bir hayli düşük gözlemlenmektedir. En düşük değer 0,938 kg/da, en yüksek değer ise 7,369 kg/da olarak gözlemlenmiştir; ortalama değer 2,974 kg/da olarak hesaplanmıştır. Kuzey ve güney sektörler arasında anlamlı bir farklılık görülmese de kuzey sektör örnekleri kendi içlerinde daha tutarlı değerler sağlamıştır, bu örneklerin tek bir yapıdan toplandığı ve mekanların çok fonksiyonlu kullanılmış olması bu noktada akılda tutulmalıdır.

Domestik alanlardan gelen örneklere genel olarak baktığımızda, fosfor değerlerinin geniş bir aralığa yayıldığını görmekteyiz. Bu duruma sebep olarak belirli aktivitelerin, odaların belirli noktalarında yürütüldüğünü, belirli noktalarda organik malzeme içermeyen işler görüldüğünü göstermek mümkündür.

Peristasis'ten alınan iki örnek, çalışma dahilindeki en yüksek iki değeri vermiştir, bu durum da *peristasis* alanlarının çöp biriktirmek için kullanıldığı fikrini desteklemektedir. Domestik örnekler çeşitlilik göstermektedir, muhtemelen mekanların belirli alanlarının belirli işlere ayrılmış olması dolayısıyla aynı mekan içinde fosfor değerleri farklılık göstermektedir. Kamusal alan örnekleri ortalama fosfor değerleri vermiştir, taş döşeli sokaklar ise daha küçük bir yan sokağa göre

daha yüksek fosfor değerlerine sahiptir, olasılıkla daha çok organik atık maddeye maruz kalmışlardır. Atölye alanları ise en düşük fosfor değerlerini sağlamıştır.

Ateş yakılmış alanlara ve odun külüne, aynı zamanda mutfak işlerine işaret eden potasyum Burgaz genelinde insan aktivitelerine referans verme konusunda fosfordan daha uygun bir element olarak düşünülebilir. Burgaz için ortalam potasyum değeri 86,8344 kg/da olarak ortaya çıkmıştır. En yüksek değer figürin atölyesi olduğu düşünülen alandan gelirken, kamusal alanlar, *peristasis* ve bazı domestik mekanlar da yüksek değerler göstermiştir.

NE-S evinin *andron*'u ortalamanın bir hayli altında olduğundan bu alanda yemek hazırlıkları ya da *in situ* ateş olasılığı çok düşüktür. Hemen karşısındaki büyük oda da aynı şekilde sonuç verirken avluya bitişik küçük odanın dış kısmındaki potasyum değeri bu avlu kenarındaki alanın bir iş alanı olabileceğini ve burada ateş yakılmamış olsa bile yakındaki bir ateş kalıntılarının burada birikmiş olabileceğini düşündürmektedir. Oikos ise, bilhassa odanın kuzeydoğu kısmında taban üzerinde bulunan küllü bölgenin etrafından toplanan örnekler olmak üzere ortalamanın üzerinde ve mekana dağılım gösteren değerler vermiştir.

En ilginç durum, açık kamusal alan örneklerinin çok yüsek potasyum değerleri göstermesi olmuştur. Bu alanda bulunan iki kuyudan birinin civarından toplanan bu örneklerin sonuçlarına dayanarak bu alanda odun ateşi ve organik madde içeren bir aktivite yapılmış olabileceği düşünülebilir. Sokak örnekleri ortalama değerler vermiştir.

Basit bir X-Y dağılım diyagramı kullanarak datanın dağılımına bakmak istediğimizde kalsiyumun diğer elementlerle herhangi bir ilişki içinde olmadığı ve tüm örnekler boyunca aşağı yukarı aynı seviyede seyrettiği görülmüştür.

Kalsiyumun bu durumu büyük ihtimalle Burgaz ve bölgenin topraklarının çok kireçli olmasıyla bağlantılıdır.

PAST yazılımı kullanarak yaptığımız çok değişkenli analiz sonucunda (PCA) iki ayrı set poizitif korelasyon elde edilmiştir; ilki bakır, demir, kalsiyum ve sodyum elementleri arasında, ikincisi ise mangan, demir, sodyum ve çinko arasındadır. Bu sonuçlara göre Burgaz jeokimyasal datasını olasılıkla daha iyi açıklayan grup bakır, mangan, demir ve sodyum gibi görünmektedir. PCA ikili dağılım diyagramı üzerinde bir bileşen üzerinde bakır ve demir güçlü pozitif bir bağ gösterirken diğer bileşen mangan, demir ve sodyum arasında ilişki göstermektedir. Bakır ve demir güçlü şekilde insan kullanımına işaret eden elementlerdir; alet üretimi, dokuma, boyama, metal işçiliği, pigment işlenmesi, mutfak işleri ve kasaplık gibi işleri gösterirler. Mangan ve sodyum da aynı şekilde insan kullanımı bağlantılı elementler olarak biyolojik yan ürünlere, ateşe ve küle, organik atıklara, yemek ve zanaat işlerine işaret eder.

PCA dağılım diyagramı üzerinde iki belirgin küme oluşmuştur, birinde NE-2 evinden toplamış olan örnekler gruplanırken diğer küme geriye kalan örnekleri içerir ve dağınık alt kümeler halindedir. NE-2 evinin bulunduğu kuzey sektör, diğer örneklerin toplandığı güney sektöre göre daha iyi korunmuştur, diyagram üzerindeki kümelenme büyük ihtimalle bu durumdan kaynaklanmaktadır.

Element sonuçlarına göre, güney sektörünü temsilen domesticA mekanlarında *oikos* ya da avlu olabileceğini düşündüğümüz alanda ateş yakılmış, yemek hazırlanmış ve pişirilmiş, ihtimal dahilinde kemik ve et işlenmiş olmalıdır. Burgaz'ın en canlı ve olasılıkla en kirli alanlarından biridir. Hemen yanındaki geniş ve uzun alan benzer ama daha az yoğun bir kullanımın haricinde tahıl kilerine benzer bir nitelik taşımaktadır. Bu alana açılan avludaki kuyunun yakınında ise ateş yakıldığını düşünmek mümkündür.

NE-2 evinin *andron*'u buluntu dağılımına göre yalnızca servis kaplarını içerse de element sonuçları bir hayli yaşanmış bir alana işaret etmektedir. Yüksek değerdeki element birikimlerini burada tüketilmiş olan gıda ve içkilere, buluntu lokasyonlarına, sabit eşyalardan kaynaklanan birikmelere ve genel olarak insan kullanımına bağlamaktayız. Hemen karşısında yer alan geniş oda, içki kapları, yağ kapları ve yemek hazırlama/saklama kaplarını içeren buluntu grubu ve element sonuçlarına dayanarak birden fazla işleve sahip bir mekan olarak karşımıza çıkmaktadır. Element sonuçları burada yemek pişirilmediğini fakat hazırlandığını, olasılıkla ev kullanımı ölçeğinde zanat aktiviteleri ya da pigment içeren işler yapıldığına işaret etmektedir.

Avluya bitişik küçük oda daha az yoğun mutfak işleri ve domestik zanaat üretimi ya da boyama/dokuma işleri izleri barındırmaktadır. İç oda, burada bir öğütme aleti ele geçtiğini de akılda tutacak olursak, bir hızlı yemek hazırlama ve daha ziyade yemek servis alanı gibi görünmektedir. Dış alan ise yine burada ele geçen mangal parçası ve çok yüksek potasyum değeri de göz önüne alındığında, daha sık kullanılmış bir iş alanı olarak kabul edilebilir. Her iki alan da diğer odalara göre organik atık açısından daha temizdir.

NE-2 evinin *oikos*'u tabanı üzerindeki kül tabakasının yanı sıra elementlerle de desteklenen *in situ* ateş ve hem yemek hem de zanaat üretimi ile tanımlanmaktadır. Pişirme kaplarının yoğunluğu da göz önüne alınırsa bu evin birincil yemek pişirme ve yemek yeme alanı olarak önermek mümkündür. Bu mekanda yapılan diğer işer arasında gıda saklama ve depolama bulunmaktadır.

Açık kamusal alanlarla ilgili element imzaları genelde Mezoamerika kaynaklıdır ve düşük element değerleri içerir, Burgaz'daki açık kamusal alan beklenmedik ya da tam tersine beklenen şeklde başka türlü bir kullanıma işaret etmektedir. Element sonuçlarına göre biyolojik yan ürünler ve olasılıkla kasaplık işleri bu kuyuya

yakında alanda gerçekleştirilmiş olabilir. Bahsi geçen kamusal alan bir konut insulası ortasında bulunmaktadır, belki de açık alanı çevreleyen evler burayı zaman zaman kendi hanelerinin bir uzantısı olarak, normalde domestik olarak nitelenecek işler için kullanmaktaydı. Kapalı kamusal alan ise bir köşesinde olası bir ateş ihtimali dışında ara sıra gıda ve içkinin tüketildiği, domestik mekanlara göre daha temiz bir mekan olarak ortaya çıkmaktadır.

Peristasis organik atıklara işaret eden elementlerin çok yüksek seviyelerde ölçüldüğü bir alan olmuştur. Burada biriken atıklar içinde olasılıkla süpürülüp atılmış ateş kalıntıları, kül, hem bitkisel hem de hayvansal kaynaklı gıda artıkları da bulunmaktadır.

Atölye alanları yerleşimin en az korunmuş alanlarıdır, buraları yorumlamak bir hayli zordur. Fakat genel bir bakışla eşement birikimleri insan kullanımına, iki kuyunun yakınlarında muhtemel ateş yakılmış noktalara, olası bir pigment işleme alanına işaret etmektedir. Bu alan ilerleyen sezonlarda kazılmaya devam edilmemiştir.

Burgaz'ın taş döşeli geniş caddeleri yüksek yoğunlukta fosfor, potasyum, demir, mangan ve sodyum değerleri vermiştir. Evlerin arasında kalan daha küçük sokak ise magnesium dışında tüm elementler için ortalama değerlerin altında kalarak literatürdeki sokak element imzasına uygun özelliktedir. Taş döşemenin organik madde birikmesine olanak sağladığını ve literatürden farklı sonuç veridğini düşünmekteyiz, zira diğer örnek çalışmalarda sokak olarak tanımlanan alanlar taş döşeli değildir.

Antik Yunan dünyasında ev ve hanehalkı çalışmalarını Aristo'ya kadar takip etmek mümkündür, Aristo'ya göre karı-koca ya da efendi-köle arasında ilişki, yani *oikos*, *polis*'in en küçük yapıtaşıdır. Bireyler arasındaki ilişkiler günümüzde tartışılıyor

olsa da, köle sahibi ya da değil, ailenin Antik Yunan hanehalkının temeli olduğu kabul görmektedir.

Antik hanelerin mekansal bölümlenmesi ile ilgili fikirlerimiz genelde modern ve çoğunlukla batılı kültürlerden kaynaklanan algılarımızla şekillenmektedir. Son dönem çalışmaları bu bakış açısını eleştirir, bu mekanların organizasyon şeklinin büyük ihtimalle modern toplumların normlarından çok uzak olduğunun altını çizer. Aktivitenin kendisi benzer bile olsa, yürütülme şeklinin çok farklı olduğunu önerir; murtfak kaplarının bulunması, doğal olarak mekanın mutfak işlevine işaret eder fakat Burgaz'da hem kazılarla hem de bu çalışmanın sonuçlarıyla desteklendiği üzere yemek hazırlama/kasaplık gibi işlerin birçok farklı mekanda yapılmış olduğu örneğini bu noktada hatırlamak gerekmektedir. Taşınabilir ocaklarve taşınabilir mutfak ekipmanı büyük olasılıkla mekanların işlevlerini sürekli değiştirmekteydi.

Çoğu Klasik Dönem konutunda ve Burgaz'daki örneklerinde planlanmış bir mahremiyet izlemek mümkündür, eğer varsa *andron* girişin sağ köşesinde yer alır, daha sonra açık avlu ve bu avluyla aynı doğrultuda ya da onu çevreleyen odalar yerleştirilir. Hanehalkının kendi içlerindeki ve dışarıyla olan ilişkileri bu şekilde yapılandırılmıştır.

Burgaz'da işleve yönelik mekansal bölümlenmeleri gözle takip etmek çok kolay değildir, örneğin mutfak alanlarını pişirme kapları ve mutfak aletleri dışında tanımlayacak ocaklar ya da fırınlar bulunmamaktadır. En belirgin örnek NE-2 evinin *oikos*'udur, tabandaki küllü alanın yanı sıra analiz sonuçları da yemek hazırlanmasına, pişirilmesine ve ateşin varlığına işaret etmektedir. Antik Yunan'da çoğu hanehalkının kendi yemeğini ve giyimini kendinin ürettiği düşünülmektedir. Bu kendine yeten evler ile satmak üzere seri halde ve çok sayıda üretim yapan haneleri birbirinden ayırabilmek gerekmektedir, bu tür haneler çok sayıda belirli tip kap ya da dokuma tezgahı ağırlığı gibi hanehalkı eşyasını barındırmaları sayesinde

tanımlanabilir. Dokuma, Olynthus'ta olduğu gibi Burgaz'da da hanehalkı üretiminin bir parçasıdır, Burgaz'da genellikle yaşam alanlarında ya da avluya doğrudan çıkış olan odalarda az sayıda ele geçen tezgah ağırlıklarından yola çıkarak mekansal işlev tahmini yapmak zordur. Bu durumu yine yerleşimin terkediliş sürecine bağlamak mümkündür.

Şarap ve zeytinyağı gibi ekonomik değeri olan tüketim maddelerinin Burgaz'da hanehalkının kendine yetecek kadar üretildiğini ileri sürmekte sakınca yoktur, bu tür alanlar ve üretim malzemeleri çok az sayıda ele geçmiştir. Burgaz'ın mekansal örüntüsünün bir hayli esnek olduğunun, her eve özel olduğunun bir kere daha altını çizmekte ve çalışmaların bu prensip etrafında, bireyselliği düşünerek, eşya dağılımlarını, element birikmelerini göz önünde bulundurarak şekillendirilmesi gerektiğini belirtmekte fayda görmekteyiz. Genel kanı, yerleşik ve katı mekan bölümlenmelerindense hanehalkının ihtiyaçlarına, durumlarına ve mevsimlere göre değişiklik gösteren mekan işlevlerinden bahsetmek gerektiği yönündedir.

Toprak analizleri Burgaz'ın toprak kimyası, yapı ve doku ve aynı zamanda arkeolojik potansiyeli açısından bu tür çalışmalar için uygun bir yerleşim olduğunu ortaya koymuştur. Çoklu-element toprak analizleri yardımcı veriler sağlamış, geçmiş insan aktiviteleri üzerinden sentezlenecek mekansal analizlerle uyum göstermiştir.

Benzer şekilde, etnoarkeolojik çalışmalar, mekan tabanları ve insanların bunları ne şekilde kullandığıyla ilgili olarak bildiklerimize, hem kendi çapında bir veri grubu olarak hem de arkeolojik sonuçların karşılaştırılabilmesi açısından katkı sağlayacaktır. Çoklu-element analizleri günümüz örneklerinden bir hayli faydalanmaktadır, çoğu örnekte insan kullanımına işaret eden element kombinasyonları antik kombinasyonlarla uyum içindedir. Belirli aktivitelerle ilişkili

belirli elementlerin, antik ya da modern, aynı bölge içinde benzer sonuçlar vereceği göz önünde bulundurulmalıdır.

Arkeolojik bağlamların, bilhassa da konut alanlarının çevrelerindeki açık alanlar da dahil olmak üzere bütünlük içinde kazılması aktivite alanlarının tanımlanabilmesi açısından önemlidir. Klasik arkeoloji çalışmalarının anıtsal, kamusal yapıların, mezarlık alanlarının yanı sıra daha çok ev kazması, bu evleri bütün buluntularıyla birlikte belgelemesi ve yayınlaması gerektiğinin de altını çizmekte fayda vardır. Colin Renfrew'ün da belirttiği üzere ev "yazının icadına kadar görülmüş en güçlü semboldür."

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