Plain of Plenty

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Farming Practices, Food Production, and the Agricultural Potential of the Late Bronze Age (1600 – 1200 BCE) Argive Plain, Greece

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Nederlandse samenvatting

De Argolis in het noordoosten van Peloponnesos, Griekenland, was een van de kerngebieden van de Myceense cultuur die de laatste eeuwen van de Bronstijd (*c.* 1600-1200 v. Chr.) in Griekenland omvat. Het gebied staat bekend om zijn opmerkelijke nederzettingsconcentratie, waarbij verschillende centrale plaatsen op korte afstand van elkaar lagen op een relatief kleine vlakte. Hoewel de centrale nederzettingen op de Argolis grondig zijn onderzocht, was niet goed bekend hoe het gebied in staat was deze centra en hun bewoners van voedsel te voorzien. Bovendien is de aard van de landbouw in het gebied nooit goed onderzocht.

In deze studie wordt onderzocht welke landbouwstrategieën de Myceense bevolking gebruikte om in hun levensonderhoud te voorzien, en hoe de landbow verknoopt was met de samenleving van de Argolis. In dit onderzoek wordt onderzocht hoe groot de bevolking kon zijn opbasis van het voedsel dat in dit gebied werd geproduceerd. Het onderzoek is onderdeel van het bredere SETinSTONE project. Dit project onderzoekt of de arbeidskosten van monumentale bouwprojecten die op het Myceense vasteland werden uitgevoerd, zoals de bouw van vestingmuren en uitgebreide graven, een uitputting van de werknemers- en milieubronnen veroorzaakte, wat mogelijk heeft bijgedragen aan de sociaal-politieke crisis - de ineenstorting van de Bronstijd - in ca. 1200 v. Chr.

Om de voedselproductie op de Argolis in de Late Bronstijd te bestuderen, is een model gemaakt van het lokale landbouwpotentieel. Het model bevat de reconstructie van de Myceense landbouwpraktijken in relatie tot de Myceense politieke organisatie: een complex, hiërarchisch systeem onder toezicht van paleisbesturen. De modellering beslaat uit een reeks berekeningen voor een schatting van het soort en de hoeveelheid voedsel die door de plaatselijke bevolking werd geconsumeerd, hun energieverbruik en de hoeveelheid land die nodig was voor het cultiveren van gewassen en het houden van dieren. De voor het model benodigde gegevens zijn gebaseerd gepubliceerde archeologische, geografische, en etnografische studies. Deze aanpak van het combineren van gegevens uit verschillende bronnen in een samenhangende analyse is essentieel voor het onderzoek van boerengemeenschappen uit de Bronstijd, waarvan de materiële resten schaars zijn.

De resultaten van dit proefschrift tonen aan dat de landbouw van de Myceense boeren duurzaam was en dat zij goed bestand waren tegen bedreigingen zoals droogte en plagen. De Argolis vlakte in de Late Bronstijd was ideaal voor landbouwgemeenschappen die streefden naar duurzaamheid zonder hoge productiviteit. Dit proefschrift bespreekt de bestaande schattingen van de ruimte die nodig is om één persoon in het Neolithicum en de Bronstijd van de Egeïsche Zee van voedsel te voorzien. Eerdere schattingen van deze 'bestaansruimte' hebben geen rekening gehouden met de ruimtelijke behoeften en arbeidsbehoeften van de veestapel. Zuivel- en vleesproductie kunnen echter een dramatische invloed hebben op het landbouwpotentieel.

Daarom draagt dit onderzoek bij aan een beter begrip van de landbouwpraktijken en het bestaanssysteem van de Myceense samenlevingen in de eeuwen vóór de ineenstorting van de Bronstijd. Het illustreert hoe de vorming van de Myceense elites een diepgaande invloed kan hebben gehad op de plaatselijke landbouwgemeenschappen en via hen op de gehele samenleving.

Curriculum vitae

Riia Timonen was born in Mikkeli, Finland in 1985. She attended upper secondary school at Mikkelin Yhteiskoulun lukio between 2001 and 2003. In 2005 she began her Bachelor's studies in Art and Culture Studies at the University of Jyväskylä, Finland, specializing in Classical Greek and Roman art, museology, and heritage studies. During her BA and MA studies, Riia participated in archaeological 3D-recording projects in Greece, organized by the Finnish Institute at Athens. She also completed a semester in Milan, Italy, where she studied Art History and Egyptology. She completed her MA studies in Art History at the University of Jyväskylä in 2012. Her MA thesis focused on the depictions of mythical bear in Finnish prehistoric and early historical art. After graduation, Riia participated in several archaeological excavation and geophysical survey projects in mainland Greece, Crete and Sicily, organized by the Finnish Institute at Athens, University of Helsinki, and the Institute for Mediterranean Studies (IMS-FORTH). In 2016, she was selected as a PhD Candidate in the SETinSTONE project at Leiden University, Faculty of Archaeology, headed by Prof.dr. Ann Brysbaert who was her initial supervisor. She completed her PhD under the supervision of Prof.dr. Bleda Düring and Dr. Amanda Henry. Riia investigated the food production potential of the Mycenaean Argive Plain, northeastern Peloponnese, Greece. Her dissertation, on which this book is based, presented a systematic study of the local agricultural practices and landscape resources, resulting in the estimation of the area's agricultural potential. During her PhD studies, Riia participated in excavation projects in central mainland Greece, took on various teaching and administrative tasks at the Faculty of Archaeology, and enjoyed being an active member of the PhD community. Riia is interested in studying rural lifeways in the Bronze Age Aegean, with a special focus on dietary and cultivation practices and tracing past agricultural activities in modern landscapes.

Chapter 1

Introduction

This monograph investigates the agricultural economy of the Mycenaean society of the Late Bronze Age (*c.* 1600-1200 BCE) Argive Plain, located in the north-eastern Peloponnese, Greece. The study consists of three main topics. Firstly, it offers a reconstruction of the local agricultural practices which formed the main subsistence strategy of the local population. Secondly, it performs an evaluation of the potential of the environment for food production through crop and animal husbandry. Thirdly, on the basis of a combination of environment and cultural aspects, it establishes an estimation of the population that could be sustainably fed. These three aspects will give new insights to the Late Bronze Age Argive Plain society, and the relationship it had with the environment.

The Late Bronze Age in southern mainland Greece and the Aegean islands has traditionally been referred to as the Mycenaean period (Maran and Wright 2020; Shelton 2012; Shermeldine *et al.* 2008). The Mycenaean period is known for its monumental sites, such as fortified settlements with walls of 'Cyclopean' masonry, burial architecture consisting of grave circles and beehive-shaped tholos tombs, and skilfully crafted gold and bronze items recovered in burial contexts (e.g. Crowley 2010; Hitchcock 2012; Laffineur 2012). The accomplishments of the Mycenaeans also include an early writing system called the Linear B script (e.g. Killen 1984; Nakassis 2013; Palaima 2012). These assemblages have triggered a long tradition of archaeological research dedicated to the deciphering and interpretation of the Linear B texts (from their first published translations by Bennett Jr. in 1953 to the most recent works by Judson 2020; Salgarella 2020; Zurbach 2020, and others), and understanding Mycenaean societal and political organization (e.g., the collective papers of Redistribution in the Aegean Bronze Age 2011, published in American Journal of Archaeology).

The Late Bronze Age Argive Plain has been associated with Homer's epic works, and considered as the place of origin for heroes such as king Atreus and his son Agamemnon (see Deger-Jalkotzy and Lemos [eds.] 2006; Gill 2008: 67). Inspired by epic tales, and the visible remains of the Bronze Age fortified settlements, the area became a popular destination for aristocratic travellers in the 18th and 19th centuries. Traveller's stories stimulated academic research interest in the area (e.g. Kotsonas 2020; Morris 2000). The first archaeological excavations were conducted in the Argive Plain as early as the latter half of the 19th century (Kotsonas 2020). Famous scholars such as Schliemann and Tsountas were first to work at the Late Bronze Age sites of Mycenae and Tiryns. In the early 20th century, their work was continued by scholars such as Wace and Pendlebury, representing the newly established British School at Athens (Muskett 2014: 41-48; Webster 2008: 20). Today, many foreign and local archaeological schools, universities, and cohorts continue to excavate at Argive Plain sites, their work representing the continuum of more than a century of scholarly interest in the area.

From the beginning, the work at the Late Bronze Age sites of the Argive Plain focused on recovering the riches that could connect the sites with the ancient legends of kings, gods, and adventurers. Over time, this interest developed into a focus on the political organization of the plain and its neighbouring regions. It is only in recent years that the focus of Mycenaean studies in general has shifted from the palatial centres and their elites towards the broader society and local political systems (Feuer 2011: 68; Lupack 1999; 2011; Nakassis 2013; 2015; Sjöberg 2004; Wright 2004). How Mycenaeans related with their environment and sustained themselves are topics much less investigated. The deciphered Linear B texts, and the archaeobotanical and zooarchaeological data collected from the Late Bronze Age sites have shed limited light on local agriculture. However, little is known about how agriculture operated. Furthermore, quality estimates of the sustainability of the local agricultural production are lacking. Research tradition has mostly focused on palatial activities and the elites, and farming systems remain poorly understood.

This study contributes to the study of the Late Bronze Age rural communities of mainland Greece by investigating how they practiced agriculture. In this study, the term rural refers mainly to the people and areas located outside more densely inhabited settlements with administrative functions, but without directly contrasting it with urban, as urbanization in the Aegean context is seen to have taken place later, from the Early Iron Age onwards, perhaps beginning as early as the post-Mycenaean period (de Polignac 2005; Haggis 2015; Lemos *et al.* 2009). Rural further refers to people who resided in communities whose main livelihood came from agriculture, and to areas where agricultural activities took place. The case study area, the Argive Plain, is a first-rate example of a region where previous research has almost exclusively focused on the activities of the local Mycenaean elite. Thus, the

plain is recognized by many as one of the Mycenaean core areas (Bennet 2011: 157; Kilian 1988), and it is home to some of the most imposing Late Bronze Age settlements: Mycenae, Tiryns, and Midea. At the end of the Late Bronze Age, during the Mycenaean period, the Argive Plain was characterized by a unique settlement pattern, with several large settlements located within a few kilometres from each other. A few of these settlements, Mycenae, Tiryns and Midea, were fortified with defence walls, some of which were assembled from massive, unworked stone blocks so astonishing in size and appearance that they became commonly known as the Cyclopean style. Due to their walled character, these settlements are sometimes referred to as citadels, which points to their likely use as strongholds, places of potential refuge for the population living in their surroundings (Iakovidis 1983). In addition, they are often defined as Mycenaean palaces or palatial centres, inhabited by the local elites, administrative bodies, and specialist workers (see §2.2.1 and 3.4 in this volume).

The Argive Plain also included other large Late Bronze Age settlements such as Argos, Nafplion, and Argive Heraion, which were not walled and whose function and status has remained undefined due to the absence of evidence. The question of the relationship between the most notable settlements of the region has never quite been solved. Perhaps because of this, the land use of the plain has not been discussed in great detail, with the notable exception of John Bintliff, who conducted a detailed study of the area and its environment for his PhD dissertation (Bintliff 1977a). Archaeological investigations in the area, such as the Mycenaean Survey (Iakovidis *et al.* 2003), the Western Argolid Regional Project [1] (e.g. Caraher *et al.* 2017) and the geological studies of Zangger (e.g. 1993, 1994) have continued apace since Bintliff's dissertation, creating new data of the local environment. In addition, new methods such as Geographic Information Systems and remote sensing enable more careful analysis of the landscape and its changes (e.g. Bonnier *et al.* 2019; Galaty *et al.* 2014; Knitter *et al.* 2019; Pullen 2022). Such studies have created great potential for new investigations that can significantly expand the knowledge of Late Bronze Age subsistence strategies.

This study has three main aims. The first is to develop a comprehensive understanding of the agricultural practices in the Argive Plain area, specifically in the last centuries of the Late Bronze Age, in the Late Helladic III (1420/1410-1330/1315-1200/1190 BCE)[2] period, when the Mycenaean culture experienced a peak in wealth and power. The second aim is to estimate the potential of the region to sustain its populations. This analysis of the agricultural potential consists of a series of calculations of the crop productivity, environmental affordances, and food consumption. The calculations result in a number of people who could be sustained by the region and by the specific methods and knowledge that was available to produce food. The third, wider aim is to better understand the Mycenaean society as a whole and relate the agricultural practices to the social and political organization of the region. The societies in the Late Bronze Age Aegean region were in a state of transformation, from small subsistence communities towards larger state-like societies, with a more distinguished hierarchy. Most of the population consisted of non-elite members, farmers and simple workers, whose lifestyle likely resembled that of their ancestors. Therefore, Mycenaean societies cannot be understood only based on the newly established elite, even though their activities are much better recorded in the archaeological evidence. Studying the Late Bronze Age farming practices can help to place the emphasis on the non-elite. In addition, the establishment of the maximum size of the population that could be sustainable in a region enables more realistic observations of the potential of the local communities to adapt to major changes in their lives. In the Late Bronze Age, these could be sprouted for example by emerging elites and increasing social stratification, new foreign connections, and environmental changes.

Through these aims, this work touches upon a few key elements of the wider research tradition of the Bronze Age societies of the Eastern Mediterranean. Reconstructions of food production processes produce information on the environmental exploitation and resilience of the local population. These two themes, sustainability and resilience, have become increasingly important in recent archaeological research (specifically for Greece, see e.g. Lantzas 2016; Marston 2015; Timonen and Brysbaert 2021; Weiberg and Finné 2018), not least because they resonate with the pressing issues of our modern societies. In relation to the end of the Bronze Age, which is characterized by a major societal and political crisis, it is reasonable to ask whether Mycenaean communities were thriving in the given environmental conditions, cultural practices, and with the available technology, or if they were on their way to a subsistence crisis. A growing, developing

[1] Up to date, and to the best knowledge of the current author, the Western Argolid Regional Project has completed their survey in the Western fringes of the Argive Plain, but has not yet published their Bronze Age finds. Findings of other periods can be found for example in Erny and Caraher 2020, Gallimore *et al.* 2017 and Tetford *et al.* 2017 and 2018.

[2] This chronology is based on the presentation of Manning (2010: 23, Table 2.2). However, see section 2.1 of this book for further discussion about Helladic chronology. See also Friedrich *et al.* 2020, Manning 2014 and 2022, and Pearson *et al.* 2018 and 2022 for the most recent dating for the Thera eruption, which is the key determinant in the Aegean Bronze Age chronology.

population such as the Mycenaean population of the Argive Plain would ideally have reached a state of balance between its immediate needs and the available resources. By tracking down maximum population capacities through the analysis of food production, it is possible to see whether this was, in fact, the case. While the maximum capacity of the environment to sustain a population does not equal actual population numbers formulated by demographic methodologies, a comparison of these two approaches can shed light on regional sustainability, and potentially on its causality to population growth and decline (see Chapter 4 pp.50-54 for further discussion).

Moreover, by focusing specifically on the human-environment relationship, it is possible to get a better understanding of how much the resource availability was dependent on the increasing modification of the local landscape. This is particularly relevant in a context where the local economy was transforming from subsistence farming into gathering wealth through specialized agricultural production such as wool and oil. The study of the size of the population of the Late Helladic III Argive Plain can further help to examine its position in the wider Mediterranean network, which, at the time, was dominated by the prominent Near Eastern and Egyptian civilizations. Finally, determining the local population sizes helps to examine the development of Mycenaean monumental architecture. In the Argive Plain context, the end of the Late Bronze Age was a period of high activity in large-scale construction projects. Most of the massive Cyclopean fortification walls were constructed at this time. Simultaneously, large tholos and chamber tomb cemeteries were dug in hillslopes (Hitchcock 2012; Voutsaki 2012), and a road system characterized as 'Mycenaean highways' emerged on the eastern side of the plain (Brysbaert 2013; 2020; 2021; Hitchcock 2012; Janssen 2002; Lavery 1990; Voutsaki 2012). These projects required a substantial workforce and organizational skills (Brysbaert 2013). Whether these workforces and the resources used for the construction became depleted in this period, as suggested in earlier literature, is now being analyzed in great detail (Brysbaert 2020; 2021; Timonen and Brysbaert 2021). Most recently, these themes were investigated in 2016-2021 by the SETinSTONE project (ERC grant agreement no. 646667), to which this study contributes by examining the capacity of the Argive Plain to sustain its population.

One of the main research interests of the Argive Plain has been its Late Helladic III settlement pattern which, due to the aforementioned abundance of large, fortified settlements, is considered rather unique in the Late Bronze Age Aegean context (e.g. Shelmerdine 1997, 1999a). At the same time, the plain is lacking systematically collected evidence (i.e. survey data) of small rural sites which would prove the presence of agricultural communities and households (e.g. Wright 2004). This is one of the main reasons why Argive Plain agriculture or the agricultural labourers have not been examined intensively. The concept of agricultural potential can provide an alternative method to study regional subsistence strategies when there is a scarcity of settlement data (see section 4.2. in this book for more details). The process of formulating the agricultural potential examines the relation between the input and output efforts of food production. These consist, for example, of the available environmental conditions, species, and technology, and the basic subsistence needs per capita, household, and other units such as the local administrative elite. Due to a long history of research in the Argive Plain region, a vast amount of data is available from the local fortified settlements (see Chapter 3 with references). Besides rich material finds of ceramics and metals, excavations have yielded botanical, faunal, and skeletal data (see Chapter 5).

This study approaches the Argive Plain subsistence activities through a literature review of these and other published data sets. The data is divided into six groups based on geography and soils, climate, flora, fauna, material and agricultural objects (limited to storage and agricultural installations), and human remains. Through comparative, interdisciplinary analysis, it examines local agriculture as an integrated system of intensive farming and animal husbandry. These data sets are combined with published data from similar contexts in the Middle and Late Bronze Age mainland Greece. ArcGIS will be used to analyze and visualize the data obtained. Literature analysis is supplemented with observations made during site visits. More importantly, studies of recent farming communities following traditional (i.e., mostly pre-industrial, non-mechanized methods without extensive use of fertilizers) practices are used as analogies for agricultural practices in semi-arid environments. A great deal of research has been devoted to the examination of Linear B tablets found at various sites (e.g. Aranvantinos and Vasilogamvrou 2012; Nakassis 2013; Palaima 2012; Shelmerdine 2008b). However, due to their emphasis on elite activities, the information they include is only partially relevant to the topic of this monograph. Therefore, textual evidence will not be central to this study.

This monograph consists of eight chapters of which this introduction is the first. The second chapter provides an overview of the universal characteristics of the Late Bronze Age Aegean societies and the economic systems. Much of the evidence of the societal stratification, land and other ownership, and the regional and overseas flow of products derives from the Linear B records, and will be summarized. Third chapter introduces the

reader to the Argive Plain in the LH III period, right before the end of the Bronze Age. The focus of the chapter is on determining the local settlement pattern, based on the scattered data available. The chapter also provides an overview of the recent excavations and surveys in the Argive Plain sites and its surroundings. Fourth discusses the methodological background for the reconstructions of early agricultural systems and introduces the analysis of the agricultural potential. The data collected for the analysis are presented in the fifth chapter, which is divided into six subchapters, each presenting one type of data. The reconstruction of the Late Bronze Age agricultural practices and the analysis of the agricultural potential of the Argive Plain are presented in the sixth chapter. Finally, the seventh chapter discusses the results in relation to the population estimates presented for the area and examines the yet unanswered questions concerning the subsistence strategies and land use organization of the Argive Plain. The conclusions are presented in the final chapter.