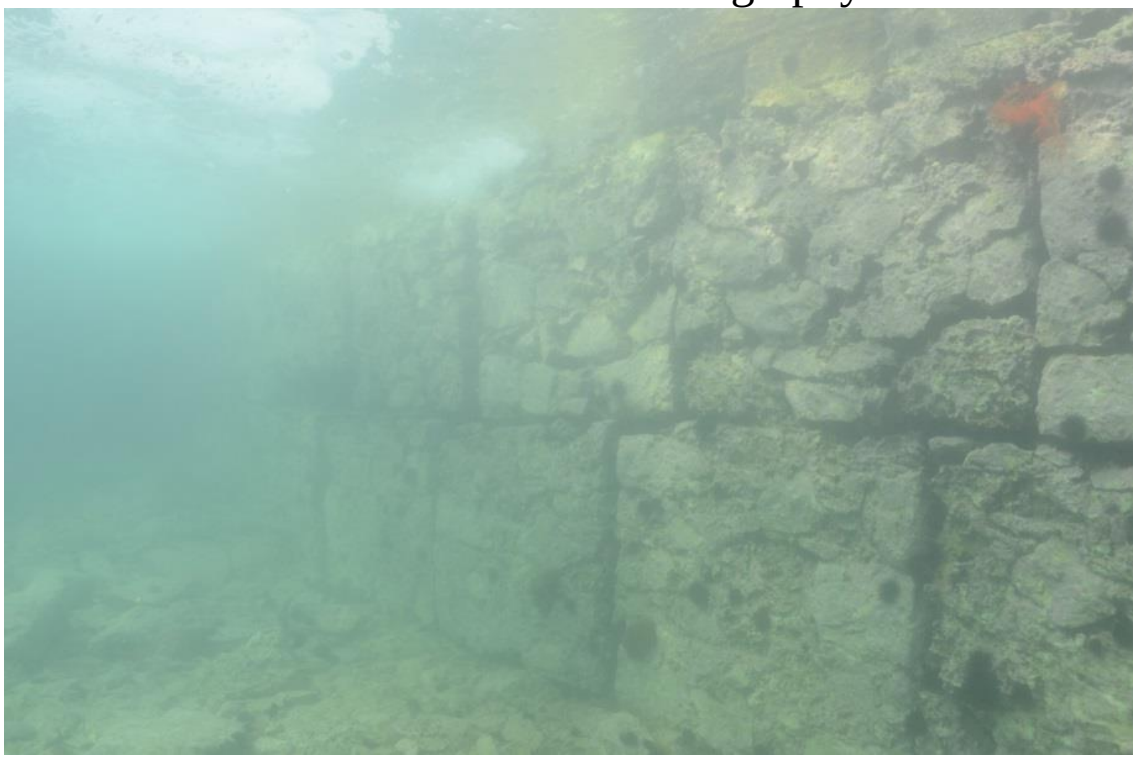
BYZANTINE PORTS

Central Greece as a link between the Mediterranean and the Black Sea

Vol. I.: Text and Bibliography



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Submitted for the degree of Doctor of Philosophy in Archaeology

Hilary Term 2014

This thesis was examined by Prof. Michael Vickers (Jesus College, Oxford) and Dr. Archie W. Dunn (Birmingham) on July 24, 2014 and was recommended for the award of Doctor of Philosophy in Archaeology, which was officially granted to the author on October 21, 2014.

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ACKNOWLEDGEMENTS

This thesis owes a lot to the endless support and love of my family, who above all constantly kept encouraging me. I am particularly greatly indebted to my parents, Michalis and Monika, not only for making it financially possible but also for believing in me, and the way I chose to go. This gave me the incredible chance and strength to take the opportunity of getting the highest academic degree from one of the world's best Universities. The 3 years I spent at Oxford, both inspired and enriched my academic knowledge, and became an unforgettable and unique personal experience of which I will profit my entire life. Furthermore, they gave me the necessary encouragement, as well as, made me think from different points of view.

For support and thoughtful, as well as, dynamic and energetic guidance throughout my thesis my deepest debt is to my supervisors, Dr. Marlia Mango (St. John's College) and Dr. Damian Robinson (Brasenose College). I always felt very lucky to have both supervisors, which form an ideal combination for beneficial suggestions, advice and help in all matters. I feel highly honoured that it is particularly due to the assessment and evaluation of my research by Dr. Marlia Mango, as well as her personal interest and commitment that I got accepted by Oxford University. Therefore, in first instance it is to Dr. Marlia Mango's credit that I started working on the *terra incognita* of Byzantine ports. Beyond supervision, I would like to thank Dr. Damian Robinson for supporting my survey project. Without his dedication and the diving equipment provided by himself and the Oxford Centre for Maritime Archaeology (OCMA), the documentation of my site could not have been of such high level and the photographic material of such high quality. My special thanks go to Dr. David Blackman. He is not only a highly revered scholar, but moreover has become my mentor. Without his enormous kindness, support and personal

commitment, I would not have been able to initiate and realize my survey project. His personal visit to my site highly honoured me and I would like to say a wholehearted "Ευχαριστώ" for his endless time, sharing with me his expert knowledge on ancient harbour studies and providing me with information on the Mediterranean and particularly Greek world of archaeology.

Further, I am greatly indebted to the Greek Archaeological Services, the Greek Ephorate for Underwater Antiquities, the 13th Greek Ephorate for Prehistoric and Classical Antiquities and the 7th Greek Ephorate for Byzantine Antiquities for giving me the opportunity to work in Thessaly. For that, I would like to thank deeply Dr. Angeliki Simosi (Director of the Greek Ephorate for Underwater Antiquities), Dr. Argyroula Doulgeri-Intzesiloglou (Director of the 13th Greek Ephorate for Prehistoric and Classical Antiquities) and Dr. Stavroula Sdrolia (Director of the 7th Greek Ephorate for Byzantine Antiquities) for trusting in me and the important outcome of my work. Despite the incredibly difficult situation in Greece caused by the economic crisis, they have personally fought for me, for which I will always be in their dept. It is extremely rare to have the pleasure to meet and work with such open-minded, understanding and trustworthy directors. Under the leadership of Dr. Simosi, Dr. Doulgeri-Intzesiloglou and Dr. Sdrolia, it is a pure pleasure to work in Greece and to cooperate with the Greek Archaeological Authorities. As such, I look forward to continue our fruitful joint programme and future cooperations.

Of course the results would not have been the same without my dear colleagues Ms. Magda Athanasoula and Ms. Eleni Chrysopoulou, as well as the highly experienced divers of the Archaeological Services. I am very grateful for their help, support and their commitment for a wonderful cooperation. Further, I would equally like to thank my international team of specialists in underwater and Roman archaeology, Ms. Katia

Schörle (Oxford) and Mr. Eric Carlsson, Mr. David Abella, Mr. David Santos and Mr. Nacho Crespo (from the Spanish underwater archaeological company "ARGOS Underwater Services") for accompanying and assisting me during my survey project. Their highly professional work and great experience as divers and archaeologists helped me making this project that successful. I look forward to continue working with them and to learn from their expertise.

My personal gratitude is expressed to the local party of the "Anexartiti Kinisi Politon Skiathou" (Independent Movement of Skiathos' Citizens), and particularly to the dedication and financial as well as personal support of its leader Anastasia Filaretou. She spared no effort to solve any kind of obstacles and to ensure smooth and great working conditions on the island of Skiathos.

Finally, I would like to thank my dear friend Pavlos for sharing my interest on Greek archaeology and tirelessly driving me around to archaeological sites throughout Thessaly, thus making my work a pure pleasure.

My understanding of the Thessalian topography and archaeology benefited also greatly through personal observations and the useful discussions I had with my dear colleagues, the archaeologists and other scholars such as Dr. Grigoris Stournaras (Volos), Dr. Dimitris Drakoulis (Thessaloniki). Particular gratitude is also expressed to my Oxford colleague and friend, Dr. Anna Kouremenos for her useful comments and help in the final stage of my thesis, and my colleague Ms. Carmela Franco for helping me with the ceramics.

Concerning financial assistance, I would have been unable to undertake my survey project without the financial support offered by the Alexandros S. Onassis Foundation (Research scholarship 2011-2012), as well as Merton College (Simms Grant, Travel Grant and Supplementary Research Grant 2012 & 2013), the University of Oxford (Thomas

Whitcombe Greene Grant 2012 by the Craven Committee) and the Institute of Archaeology (Meyerstein Research Award 2012), which enabled me to meet the costs of my fieldwork in Thessaly.

BYZANTINE PORTS

Central Greece as a link between the Mediterranean and the Black Sea

A thesis in two volumes
(Vol. I.: Text, Vol. II.: Illustrations, Plates, Catalogue of finds, Maps, Permission)

Submitted for the degree of Doctor of Philosophy in Archaeology
Hilary Term 2014

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Abstract

This thesis presents a first archaeological introduction to the study of Byzantine ports, harbours and other coastal installations in the region of Thessaly. Thessaly not only constitutes an ideal region to gain equal information for the Early- to the Late Byzantine periods, but also to compare independent regional and imperial central building activities. However, in particular Thessaly's maritime connectivity has never been studied in detail before. As such, a first step into a *terra incognita*, the thesis is divided into two main sections:

In order to conceptualize the study of harbour sites, the thesis first sets up a framework for the definition, understanding and interpretation of the physical features of harbours and their function and purpose. Taking into account influencing environmental conditions, such as natural, economic, social and political components, this helps to

determine an accurate hierarchical model and to illustrate the interrelationship between different types and forms of harbour sites.

Subsequently, comprehensive archaeological investigations around the island of Skiathos and other harbour sites in Thessaly, executed in 2012 and 2013, are set against this theoretical groundwork.

In contrast to the common approach of regional studies, where a first general overview is followed by individual detailed case-studies, the opposite methodology is undertaken in order to achieve a systematic study of the Thessalian harbours and the complexity of their network system. Consequently, the collection of data starts from the analysis of a distinct area of a region and continues with the broader regional picture of primary ports, secondary harbours and staple markets. Functioning as an important junction of the Aegean shipping lanes and being involved in regional as well as supra-regional trade and port networks, focus is therefore primarily dedicated to the island of Skiathos. A joint survey project in cooperation with the Greek Ephorate for Underwater Antiquities (EEA), the 13th Greek Ephorate for Prehistoric and Classical Antiquities and the 7th Greek Ephorate for Byzantine Antiquities was initiated by the author in 2012. A number of sites, including harbour installations and other coastal infrastructures, have been detected, documented and subsequently verified by geophysical prospections, using a Sub-bottom profiler and Side-Scan Sonar, in 2013. These have allowed to draw a clear historical picture of architectural developments, port networks and changes in the socio-economic connectivity of the area.

Followed by a close investigation of further harbour sites throughout the entire region of Thessaly during two field seasons between 2012 and 2013, the detailed picture gained from the Skiathos survey project is brought to a wider context. This comparison finally

allows an overall picture of the history and architectural developments of harbour structures and associated coastal sites, as well as general conclusions concerning the hierarchy and port network in the region during the Early to Late Byzantine periods. This has allowed a comprehensive understanding of the growth, use and decline of various ports, harbours and staple markets within Thessaly and has important repercussions for our understanding of wider social and economic changes that were occurring during these periods, such as the rise of the church as a powerful economic institution or the increasing activities of private entrepreneurs.

In this way the submerged maritime heritage of Thessaly has provided a rich new resource with which to understand the cultural dynamics of the region as it emerged from its peripheral location to comprising major ports within the Roman maritime network and to stand out of the heart of the commercial route ways to and from Constantinople, as well as being part of the emergent networks of the western maritime states at the end of the period, such as Venice.

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ABBREVIATIONS USED IN THE TEXT

ARS(W) – African Red Slip (Ware)

CAT – Catalogue(s)

CWW – Constantinopolitan White Ware

DOC – Document(s)

ESC(W) – Eastern Sigillata C (Ware)

FIG – Figure(s)

FN – Footnote(s)

ILL – Illustration(s)

PL – Plate(s)

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INTRODUCTION

1. The purpose and methodology of this study

Christianity, Roman tradition and ideology as well as Greek cultural heritage have been assigned as the pillars of the Byzantine Empire.[1] In fact, the real crux and enabler of power in an empire which combined the occident with the orient was the control over the seas. As such, seafaring constituted the formula of success for the control over the Mediterranean, playing a key role in communication, military activities and economic exchange. However, it is often overlooked that the meeting point and main gate for commercial, political as well as cultural and social interactions and connection formed the harbour.

Since the study of harbour sites constitutes a relatively new field in archaeology, both the terminology used in their descriptions and the scientific approach in their investigation still lack fundamental knowledge and methodological groundwork, such as a clear definition of different infrastructures and their facilities and how they are used and interconnected with each other. Therefore scholarly interpretations of harbour sites often face the problem of diversity and inconsistency. This makes it difficult to investigate the coastal sites of late antique and medieval Byzantium, which are characterized by their historiographical complexity. Classical Antiquity, and especially the Roman period, is considered as the golden era of harbour architecture. In contrast, the centuries after the Roman Imperial period are seen as a time of sweeping changes, showing decay,

[1] C. Wells, Sailing from Byzantium. How a Lost Empire Shaped the World. New York 2006, xxix-xxx.

deterioration and downfall, as well as lacking in finesse, as well as in previous expenditure and complexity in harbour architecture.[2]

Even within the discipline of Byzantine studies only limited interest has been paid to harbour facilities. Furthermore, wherever Byzantium's coast and its infrastructures were subject of investigation, such as by Ahrweiler,[3] any conclusions were mainly based on historical and textual sources. As such, these provide only general and inconclusive information.

Therefore, the present thesis on "Byzantine ports - Central Greece as a link between the Mediterranean and the Black Sea" attempts a first archaeological introduction to Byzantine harbour studies. However, a correct understanding and interpretation of harbour features has to be given in order to set the results into a framework corresponding to studies of Classical harbour sites. Accordingly, the thesis is divided into two sections:

Section I aims to conceptualize the study of harbour sites and provides a systematic analysis of their associated structures. The correct interpretation and understanding of different features and their functional characteristics is essential for putting harbour sites into a historiogeographical context. Regarding their functions and hierarchy, one has to take into account influencing environmental conditions, such as natural, economic, social and political components allocated and classified into various types of hinterland or

[2] S. A. Kingsley, Barbarian Seas. Late Rome to Islam (*Encyclopedia of Underwater Archaeology* 4). London 2004, ix; B. Ward-Perkins, The Fall of Rome and the end of civilization. Oxford 2005, 60.

[3] Hélène Ahrweiler, Byzance et la mer. La marine de guerre, la politique et les institutions maritimes de byzance aux VII-XVe siècles. Paris 1966; Hélène Ahrweiler, Les ports byzantins (VII^{e}-IX^{e} siècles), in: La navigazione mediterranea nell´alto medioevo, I-II (*Settimane di studio del centro italiano di studi sull´alto medioevo* 25). Spoleto 1978, 259-298; Sophia Aidoni – Jenny Albani – Natasha Balaska – Despoina Evgenidou – V. Sakelliades – Nancy Selenti – F. Stavroulaki – Y. Vitaliotis, Journeys on the Seas of Byzantium. Athens 1997.

foreland. Additionally, setting up a hierarchical model helps us understand socio-economic developments and the influence of coastal infrastructures on commercial patterns.

Section II intends to provide a comprehensive archaeological, rather than textual, study of a Byzantine maritime façade. At present it is impossible to write a general archaeological synthesis of Byzantine harbourworks without the existence of a coherent body of well collected regional data. Consequently, this thesis concentrates on central Greece and particularly on the region of Thessaly,[4] which later formed the heartland of the Byzantine Empire. This fact makes Thesssaly an ideal region to gain equal information for the Early- to the Late Byzantine periods. Furthermore, the region combined strategic importance with economic wealth, which presents a full picture of various harbour types with different functionalities. Additionally, its rich urban history and economic exploitation during the preceding Roman and the successive Ottoman periods provide useful comparative information. Finally, Thessaly shows not only independent regional but also imperial central influences due to its geographic proximity to Constantinople.

The study of Thessaly's coastal sites is divided into two main sections. The first and main focus of the thesis is the island of Skiathos. On the one hand it functioned as an important junction of the Aegean shipping lanes, being involved in supra-regional trade and port networks. On the other hand it is part of Thessaly's regional connectivity. Consequently,

[4] Coastal sites and even bigger port-cities around the Black Sea, such as Cherson on the Crimean peninsula, Trabzon and Sinope on the northern Turkish coast or Tomis-Constantia in Romania, are still highly understudied and face the problem of diversity and inconsistency. Therefore, within the scope of this thesis a connection to the Black Sea has to be limited to trading goods. The latter, however, show the importance of central Greece as a link for the trading connections between the Mediterranean and the Black Sea.

a survey project in co-operation with the Greek Archaeological Services was initiated by me in 2012 for the purpose of investigating the importance of different local coastal sites and economic entities in order to determine the hierarchy and pattern of regional port networks. During the first survey season a number of sites, including coastal infrastructures, harbour installations and wreck sites as well as other underwater sites, have been detected and documented. In a second season some of the sites were verified by a Sub-bottom profiler and Side-Scan Sonar. As a result the Greek Ministry of Culture issued a 5-year permission for starting test trenches and excavations in the harbour area.

This second section forms the investigation of further harbour sites along the Thessalian coast conducted during two field seasons between 2012 and 2013. A broader regional picture of primary ports, secondary harbours and staple markets serves as comparison and complement of the results gained from the Skiathos survey project.

Finally, in comparison with other major Byzantine harbour sites such as Constantinople, or Thessaloniki, a comprehensive picture of Thessaly's coastal infrastructures and their architectural developments within a historical context provides a starting point for the study of ports and the understanding of coastal developments in the Byzantine east.

2. The geographical and chronological framework

Based on the traditional periodization of the Byzantine Empire by Ostrogorsky,[5] the present thesis follows the chronological framework of the 4th to the 15th century AD. Byzantine history is sub-divided into the

- Early Byzantine period (AD 330/395 – AD 642)
- Middle Byzantine period (AD 642 – AD 1204)
- Late Byzantine period (AD 1261 – AD 1453)

which is used as basis for this thesis. However, for a better understanding of the early centuries as a period of transition and change within the general continuity of Roman Imperial culture and tradition,[6] according to Karagiorgou's work on the archaeological evidence of the "Urbanism and Economy in Late Antique Thessaly (3rd – 7th century AD)",[7] attention is also paid beyond the actual chronological framework. Therefore, where necessary and applicable for the detailed analysis of archaeological material within their historical context and development, the chronological limits extends from the 2nd to the 16th century AD.

Concerning the geographical limitation of this thesis, the area under investigation is defined according to the volume "Hellas und Thessalia" of the Tabula Imperii Byzantini, as well as Karagiorgou's and Drakoulis' recent works on Thessaly's settlement network.[8]

[5] Olga Karagiorgou, Urbanism and Economy in Late Antique Thessaly (3rd–7th cent. AD): The Archaeological Evidence, Oxford 2001, 3; G. Ostrogorsky, Geschichte des byzantinischen Staates (*Handbuch der Altertumswissenschaft* 12.1.2). München [3]1963, 22.

[6] P. Brown, The world of Late Antiquity. AD 150-750. London 1971, 7.

[7] Karagiorgou, Urbanism and Economy, 2-4.

[8] D. Drakoulis, Η ΠΕΡΙΦΕΡΕΙΑΚΗ ΟΡΓΑΝΩΣΗ ΤΩΝ ΟΙΚΙΣΜΩΝ ΤΗΣ ΕΠΑΡΧΙΑΣ ΘΕΣΣΑΛΙΑΣ ΣΤΗΝ ΠΡΩΙΜΗ ΒΥΖΑΝΤΙΝΗ ΠΕΡΙΟΔΟ, in: ΑΓΙΟΣ ΔΗΜΗΤΡΙΟΣ ΣΤΟΜΙΟΥ, S. G. Gouloulis – Stavroula T. Sdrolia (eds.). Larisa 2010, 375-390; Karagiorgou, Urbanism and Economy, 6-7; J. Koder – F. Hild, Hellas und Thessalia (*TIB* 1). Vienna 1976, 37-38.

In respect to the region's coastline, the relevant area is limited between mount Ossa in the north and the gulf of Pteleos in the south (ILL CONCLUSIONS.5, VOL II). Thus, within the scope of this thesis, the archaeological investigation includes and differentiates between the three coastal areas of the Pagasetic gulf, the Pelion peninsula and the archipelago of the Northern Sporades.

SECTION I

BYZANTINE PORTS – TRADITION OR INNOVATION

1.1. Introduction

Maritime archaeology is a relatively young discipline within the broad field of archaeology. Nevertheless, shipwrecks and other underwater material remains have been extensively studied in order to gain information on aspects of navigation and maritime trade in the Mediterranean. However, maritime archaeology still lacks fundamental knowledge of the crucial inter-connection between the study of shipwreck assemblages and specific archaeological sites on land such as production centres particularly for the Byzantine period, which provide a full picture and better understanding of commercial and cultural as well as social interactions. But how does one get from the production (the hinterland) to the distribution (the foreland) of products? The links are coastal installations such as ports, harbours and staple markets. These function as economic hubs, cultural and social meeting points, as well as gateways for communication and connection (ILL I.10, VOL II).

The studies of Arnaud, Blackman, Frost, Hohlfelder, Nieto and Raban already provide fundamental pieces of work for the understanding of harbour structures and the general pattern of their developments from the Bronze Age to the the Roman period.[9] However,

[9] P. Arnaud, Ancient sailing-routes and trade-patterns: the impact of human factors, in: Maritime Archaeology and Ancient Trade in the Mediterranean, D. Robinson – A. Wilson (eds.), (*Oxford Centre for Maritime Archaeology* 6). Oxford 2011, 61-80; D. J. Blackman, Ancient harbours in the Mediterranean. Part 1. *IJNA* 11/2 (1982) 79-104; D. J. Blackman, Ancient harbours in the Mediterranean. Part 2. *IJNA* 11/3 (1982) 185-211; Honor Frost, Ancient harbours and anchorages in the eastern Mediterranean, in: Underwater Archaeology: a nascent discipline, UNESCO (ed.), (*Museums and Monuments* 13). Paris 1972,

while so far emphasis is laid particularly on Classical and Roman times, information becomes meagre towards the Late Roman and even non-existent for the Byzantine East. As such, Byzantine coastal facilities are still completely understudied. Only in the 1990's and later in 2004, Günsenin and Kingsley made the first attempts to combine maritime and land archaeology in order to deal with economic questions of the late antique and medieval periods; they, however, ignored the role of harbour facilities.[10]

What was the role and function of specific harbour facilities and how did these interact? The study of coastal installations is a complex topic, for which many factors have to be considered. As such, before one can deal with the various harbour features *per se* in specific time periods, it is necessary to clarify first their basic characteristics within the historical background. Consequently, the present chapter will provide a necessary framework for the interpretation of sites and simultaneously set up a model for the hierarchy of Byzantine coastal structures that will subsequently be tested against the evidence from the surveys of Skiathos and Thessaly in section II.

95-114; Honor Frost, Harbours and Proto-Harbours. Early Levantine Engineering, in: Cyprus and The Sea. Proceedings of the International Symposium on Cyprus and the Sea, Nicosia 1993, V. Karageorghis – D. Michaelides (eds.). Nicosia 1995, 1-22; P. A. Gianfrotta - X. Nieto – Patrice Pomey – A. Tchernia, La navigation dans l'Antiquité. Paris 1997; A. Raban (ed.), Harbour Archaeology. Proceedings of the first international Workshop on ancient Mediterranean harbours Caesarea Maritima, Haifa 24th – 28th June, 1983, *(BAR Int. Series 257)*. Oxford 1985.

[10] Nergis Günsenin, Les amphores byzantines (Xe-XIIIe siècles): typologie, production, circulation d'après les collections turques. Paris 1990; S. A. Kingsley, Shipwreck Archaeology of the Holy Land. Processes and Parameters. London 2004.

1.2. Function, purpose and hierarchy of coastal installations

In order to be able to talk about the typology and hierarchy of coastal installations and above all their historical development, it is necessary to consider the factors which define and affect their differentiation in function and purpose. Since the beginning of maritime activity, coastal installations have been strongly and continuously influenced by various components. Primarily geographical and physical conditions played a major role, not only for the development of coastal structures but also for their selection and foundation in specific areas.[11]

Physical conditions are mainly formed by the consistence and configuration of a specific coastline, affected among many other aspects by the waves, currents, tides and winds, whereas geographical conditions characterize the location itself and its close relationship to the surrounding area. Both conditions vary quite often in the course of time, being the "primum mobile" for the survival or even success of certain coastal structures. Very often different criteria have driven architects and engineers to decide which of these two conditions had been more important; choosing a favourable coastal site with physical advantages or rather a profitable geographical location.[12]

Since profitable geographical locations create demand and stimulate certain amounts of traffic, many other crucial influencing components, which again rely on the physical and geographical conditions, had to be considered as well. Like any other form of human building, coastal structures cannot be seen as individual and isolated features. Vice versa, they depended very much on the political, social and economic aspects of their area and

[11] Y. Karmon, Geographical Components in the Study of Ancient Mediterranean Ports, in: Harbour Archaeology. Proceedings of the first international Workshop on ancient Mediterranean harbours Caesarea Maritima, Haifa 24th – 28th June, 1983, A. Raban (ed.) (BAR Int. Series 257). Oxford 1985, 1-6.

[12] Karmon, Geographical Components, 1.

therefore had been built in association with their region.[13] It is of huge importance to understand the economic aspects of the surrounding geographical area itself and their development under certain circumstances. At the same time it is essential to put the coastal structures in context to the wider economic system and its patterns, in order to be able to reconstruct the nature of the different installations and their local, regional or even supra-regional activities. As Yehuda Karmon correctly stated, these economic concepts, which influence coastal sites in either ways, can be summarized and divided into two designative models: the "Hinterland" and the "Foreland".[14]

While the hinterland refers to the region around the coastal site with its inland communication and social, political as well as economic activities in connection with the coast, the foreland denotes the sea itself as a platform for communication and networking.[15] Since these two models correlate, the coastal structures play a key role for the interrelation and connectivity of traffic, demanding sources of the hinterland and the shipping lanes and sea routes of the foreland and providing connection and communication with other regions.[16]

The hinterland can range from the coastal site itself, such as ports, harbours and other types of coastal installations, to its surrounding areas or even up to a whole region and

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[13] Katia Schörle, Constructing port hierarchies: harbours of the central Tyrrhenian coast, in: Maritime Archaeology and Ancient Trade in the Mediterranean, D. Robinson – A. Wilson (eds.), (*Oxford Centre for Maritime Archaeology* 6). Oxford 2011, 93.

[14] These terms derive from the German definitions of "Hinterland" and "Vorland": Duden. Deutsches Universalwörterbuch, G. Drosdowski u.a. (eds.). [3]1996, 717, 1694; Karmon, Geographical Components, 1ff.

[15] Karmon, Geographical Components, 2, 5.

[16] P. Arnaud, Diocletian's Price Edict: the prices of seaborne transport and the average duration of maritime travel. JRA 20 (2007) 325-329; for the seafaring per se as well as its contribution to the communication and economy of Byzantium and its regions in conjunction with the history of shipbuilding technology see A. Ginalis, The impact of Byzantium's political and economic history on Mediterranean seafaring (forthcoming).

beyond. Each part of it affects the coast in a different way. Karmon's suggested model needs therefore a more elaborate and detailed definition, by subdividing it into a "Closer Hinterland", forming the immediate vicinity, and a "Wider Hinterland", whose expansion depends very much on the geographical conditions of the region (ILL I.1, VOL II). Furthermore, based on this simple model, one has to distinguish between four types of hinterland (ILL I.2a, VOL II): the so-called local, districtal, regional and supra-regional or continental hinterland.[17]

While the district includes a whole small area surrounding the sea coast, the local hinterland identifies just a distinct sector within its closer vicinity. These two types of hinterland form the most common in the Mediterranean and the Black Sea, especially along the mainland coast. In some provinces and particularly on islands or peninsulas, the hinterland covers a wider region or even beyond (ILL I.2b, VOL II). Moreover, islands sometimes appear as a separate hinterland as well and therefore form a special case, being then confined probably only to a local or districtal hinterland. In contrast, a supra-regional influence on the selection, foundation and typology of coastal structures occurs rarely.[18]

Besides the fact that the foreland represents very different influencing factors, it follows the same principle with the exception that the nature of the Mediterranean and Black Sea allows, in most cases, a slightly simpler pattern. Nevertheless even the sea-based communication and networks have to be configured in local, districtal, regional and supra-regional forelands (ILL I.2b, VOL II). Here the regional and supra-regional types often dominate. In contrast to the coastal hinterland, the shipping lanes and sea routes of the foreland rely not only on geographical, but rather on physical conditions.

[17] Karmon considers the recognition of continental or semi-continental, regional and local types but with different interpretations: Karmon, Geographical Components, 2.

[18] Karmon suggests for the local/districtal hinterland an extension of 20-30 km and for regional hinterlands an usual extension of 30-40 km and a maximum of 60-80 km, depending on the coast: ibid., 3.

Of course the pattern of the models and the degree of their influence on coastal installations changed over time. Especially due to political circumstances, economic developments and due to the technological progress in later centuries, humans managed to overcome and resolve different natural restrictions. As seafaring people in all regions and times had to cope with political or economic difficulties, sometimes coastal structures had been erected even without favourable physical conditions if a certain hinterland demanded a sea-based network. Thus, even in the case of existing excellent anchorages or natural harbour areas, facilities were not necessarily taken into consideration for use, unless the regional or supra-regional trade or traffic of different kinds, as well as political circumstances, made harbour constructions valuable.[19]

But which types of installation did the various categories of hinterland require? There definitely existed a connection between the hinterlands and different types of coastal installations.

This thesis distinguishes mainly between ports, harbours, anchorages and roadsteads, landing stages, staple markets and private facilities like "Villae Maritimae" as well as various military installations such as bases.[20] All these represent the various types of coastal structures around the Mediterranean. In order to set up a model of hierarchy and

[19] A very good example is the construction of the artificial Herodian harbour of Sebastos at Caesarea Maritima, which was built mainly based on political and economic considerations: R. L. Hohlfelder, The Building of the Roman Harbour at Kenchreai: Old Technology in a New Era, in: Harbour Archaeology. Proceedings of the first international Workshop on ancient Mediterranean harbours Caesarea Maritima, Haifa 24th – 28th June, 1983, A. Raban (ed.), *(BAR Int. Series 257)*. Oxford 1985, 81; Schörle, Port Hierarchies, 93.

[20] While private coastal facilities such as *villae maritimae* or later monasteries and their Metochia took part both in commercial and travel-orientated activities, staple markets acted as small-scale transhippment centres. Without being connected to any infrastructural facilities, the latter were used exclusively for agricultural and industrial exploitation of their closer or wider hinterland.

interrelation between these various functional forms of coastal sites, a detailed definition of their purpose has to be given.

1.2.1. Port[21]

> A port is by definition "a place for the loading and unloading of vessels for maritime purposes. The term includes a city for the reception of mariners and merchants and therefore denotes something more than a harbour. A port possesses a harbour but a harbour is not necessarily a port. To make it a port, in the accepted sense of the word, there must be in addition accommodation and facilities for landing passengers and goods and some amount of overseas trade".[22] So "a port is made up of one or more harbours plus the freight and passenger structures, forming a location on a coast or shore where ships can dock and transfer people or cargo to or from land".[23]

As aforementioned, the port acts as a hub for short- and especially long-distance traffic between the land and the sea. The port forms mainly a platform for regional and supra-regional commerce and trade. Therefore Schörle correctly argues that, "the development of ports is driven by trade, but also enables it to grow accordingly. As such, ports are to

[21] The English term "Port" derives from the Latin "*Portus*", which has the meaning of a "Gateway"; H. F. Cornick, Dock and Harbour Engineering, I. London 1958, 1; Paulys Real-Encyclopaedie der klassischen Altertumswissenschaft, G. Wissowa - W. Kroll (eds.), XIII. Stuttgart 1927, 547.

[22] R. de Kerchove, International Maritime Dictionary. An encyclopedic dictionary of useful maritime terms and phrases, together with equivalents in French and German. New York [2]1961, 354, 598; for a further detailed definition see: G. E. Rickman, Towards a Study of Roman Ports, in: Harbour Archaeology. Proceedings of the first international Workshop on ancient Mediterranean harbours Caesarea Maritima, Haifa 24th – 28th June, 1983, A. Raban (ed.) (*BAR Int. Series* 257). Oxford 1985, 105.

[23] The American Heritage Dictionary of the English Language (Copyright 2000 and updated in 2009 by the Houghton Mifflin Company).

a certain degree indicators of trade and facilitate its development".[24] According to its definition, a port consists, in contrast to other types of coastal structures, of various facilities and installations to fulfil its role within the trade network.

The first and main feature is the existence of a harbour (containing and including all necessary components), which forms one of the two major parts of a port. Depending on the era and region but also on its importance (based on the type of hinterland and defined through its specific function), a port can have more than one harbour or parts of harbours.[25] In fact most ports, at least from Classical times onwards, possessed and used several harbours for different purposes.

Directly associated with their harbours, ports were usually equipped with infrastructural facilities and monumental buildings. These of course depended on the function of the harbour or a certain part of it. Commercially oriented harbours provided warehouses, granaries, water-tanks and machineries such as cranes as well as other facilities.[26] Analogously to Kerchove's definition, a port has to be associated with the existence of a so-called *Emporion*, which is located around the harbour and forms the second major part of a port. The emporion denotes a distinct sector or district around the harbour dealing with function-orientated traffic and commercial activities. Originally it derived from independent trading posts of foreign merchants reserved for their business interests during

[24] Schörle, Port Hierarchies, 93.

[25] The ports of Alexandria and Rhodes demonstrate the operation of at least four to six harbours: Kalliopi Baika, Greek harbours of the Aegean, in: Arqueologia Nàutica Mediterrània, X. Nieto – M. A. Cau Ontiveros (eds.), (*Monographies del CASC* 8). Salamanca 2009, 438, Fig. 9; D. Fabre – F. Goddio, The Development and Operation of the Portus Magnus in Alexandria – An Overview, in: Alexandria and the North-Western Delta. Joint Conference Proceedings of Alexandria: City and Harbour, Oxford 2004 and The Trade and Topography of Egypt's North-West Delta, 8th century BC to 8th century AD, Berlin 2006, D. Robinson – A. Wilson (eds.). Oxford 2010, 53, Fig. 5.1.

[26] A detailed study of commercial orientated harbour facilities will be given in chapter 1.3.1.6. "Warehouse, Granary and other facilities".

Classical times. With the development of port-cities, the harbour district occupied a separate area of the city with its own infrastructure and markets. Finally, during Late Antiquity the emporion often merged with the city's industry aimed at export and import and became the most flourishing and pulsing zone of the city. In Byzantine times the emporion finally became a synonym for the city's marketplace or trading centre. With the establishment of western merchant-colonies, Byzantine cities such as Constantinople or Thessaloniki often possessed several separate emporia which dealt with specific commodities.[27]

Although some ports became important hubs due to the export or import of specific commodities of demand,[28] a port was not intended to function exclusively as an economic platform. Moreover it was a gateway for traffic and communication – and so connectivity in general. Nevertheless, only very few ports dealt with organized passenger transportation in Antiquity and the Middle Ages.[29] Private shipping and ferries dominated the world of traffic, with some exceptions.[30]

In Antiquity the cities were often situated inland and therefore apart from their ports. That so-called "Out-Port" was a characteristic feature of Greek cities, known as "Epineion".[31]

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[27] H. G. Liddell – R. Scott, A Greek-English Lexicon. Oxford 1843 (With a revisited supplement 1996), 548: "ἐμπόριον"; Paulys Real-Encyclopaedie, 553; Marlia Mundell Mango, The Commercial Map of Constantinople. *DOP* 54 (2000) 189-207, Fig. 4, 22, 27.

[28] Blackman, Harbours, II, 188; Gianfrotta-Nieto-Pomey-Tchernia, Navigation, 146-159 (especially 154-158).

[29] Blackman, Harbours, II, 188.

[30] Michael Choniates confirms for example the existence of private ferry services in central Greece in 1208 AD: Sp. Lampros, Μιχαήλ Ακομινάτου τοῦ Χωνιάτου τὰ σωζόμενα, II. Athens 1880 (Gröningen 1968), 275, Nr. 135; Koder – Hild, Hellas und Thessalia, 103.

[31] The Epineion ("ἐπίνειον") describes a classical Greek invention and formed at that stage a harbour area outside of its associated city. But even though it formed an out-port, it cannot be seen as an independent city but as a part of its inland city: Liddell–Scott, A Greek-English Lexicon, 647: "επίνειον"; Blackman, Harbours, II, 193-194; Lehmann-Hartleben, Hafenanlagen, 24.

The development of independent cities or towns around the Emporion of such Epineia in later centuries, as well as the incorporation of the harbours into the urban plan, subsequently formed port-cities.

1.2.2. Harbour

> A harbour is interpreted as "any place which affords good anchorage and a fairly safe station for ships, or in which ships can be sheltered by the land from wind and sea. The term itself applies only to the area of water with the works necessary for its formation, protection and maintenance. It is not necessary that it be landlocked or absolutely safe for ships. It is enough that it affords a reasonably safe place of retreat from wind and storms. Furthermore it is a place where ships are brought for commercial purposes to load and unload goods and passengers. Any natural creek or inlet on the sea shore with adequate depth of water and sufficient shelter for ships fulfills the essential conditions of a harbour".[32]

As the above-mentioned definition already outlines, a harbour is designed in the first instance to ensure that a certain area provides protection for ships against bad weather and that the water and depth stay calm.[33] Unlike Cornick's study of dock and harbour engineering,[34] this thesis distinguishes mainly between two harbour classifications: artificial and natural.

An artificial harbour has to be understood as "a harbour which had to be created where there was little or no pronounced natural feature to afford any protection and the desirable

[32] Kerchove, International Maritime Dictionary, 354, 598; Rickman, Roman Ports, 105.

[33] Honor Frost, Ancient harbours, 95.

[34] Cornick, Engineering, II, 4-8.

shelter from wind and sea had to be obtained artificially", whereas a natural harbour possesses to a large degree a natural shelter and was often formed entirely by inlets.[35]

A harbour consists of a complex of interdependent components such as breakwaters, moles, quays, piers, jetties, etc.[36] In contrast to the artificially and deliberately constructed breakwaters and moles of artificial harbours, natural harbours required only installations like quays, piers and jetties.

Beyond a classification of harbours into artificial and natural, harbours have to be differentiated by category, type and function according to geographical and functional attributes. By doing that, a whole model can be set up (ILL I.4, VOL II). Blackman and Ruegg convincingly suggest three categories of harbours based on location: Sea-harbours, River-harbours and the so-called River-Sea-harbours.[37]

Each of these categories includes different types of harbours with specific purposes. As mentioned above, ports could have had more than one harbour, and therefore included several or even all harbour types. The main types to be distinguished are economic or commercial harbours, strategic harbours, private harbours and finally travel harbours. Again depending on the time-period and geographical conditions, not all types always formed an independent harbour by themselves but took over a certain part or place within a harbour.[38]

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[35] Kerchove, International Maritime Dictionary, 24, 528; ibid., 4.

[36] Frost, Ancient Harbours, 95; the various harbour installations will be discussed in the following chapter 1.3. "Characteristics and elements of harbour structures".

[37] D. J. Blackman, Bollards and Men, in: Mediterranean Cities: Historical Perspectives, I. Malkin – R. L. Hohlfelder (eds.). London 1988, 11-12; S. D. Ruegg, Minturnae: A Roman River Sea-Port on the Garigliano River, Italy, in: Archaeology of Coastal Changes, A. Raban (ed.), *(BAR Int. Series 404)*. Oxford 1988, 209-228; latter category represents Sea-harbours placed at a mouth of a river.

[38] In contrast to travel oriented shipping, particularly up to the Early Byzantine period military and commercial functions sometimes have been split up within the same harbour, such as at Thessaloniki, Alexandreia or Demetrias.

Despite the fact that the various harbour types already indicate certain activities, they fulfilled different tasks. Except for strategic harbours (from fleet stations to great military bases) which were dedicated exclusively to military duties, all other types can be associated at least with two different functions. As such harbours with commercial purposes can either be for export and import of commodity, or acting as fishing harbours. Harbours fulfilling organized passenger transportation had been mainly harbours close to religious sanctuaries or those involved in official business. The latter ones may have varied depending on the political and social development and activities of a region.[39] Only very few harbours possessed a specific area or facilities dedicated to passenger transportation.

In fact, sometimes certain harbours owed not only their origin or importance to their proximity to specific sanctuaries, including pilgrimage centres, but also to private foundations. Such private harbours were associated with private residences along the sea coast. These could have been either private villa estates called "Villae Maritimae" or various coastal installations of palaces.[40] Private harbours form a special harbour type and generally appear throughout all periods and regions, from Classical and Hellenistic Greece to Roman Italy up to the Byzantine era and beyond. However, a shift from private villae to Imperial harbours connected to palaces can be observed. Up to the 2nd to 3rd century AD *villae maritimae* dominated the image of private coastal structures, whereas palace harbours emerged increasingly after the 3rd century AD.[41]

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[39] Some harbours, like that of Constantinople or Venice for example, remained important for passenger shipping throughout all periods.

[40] Blackman, Harbours, II, 188; private Villae Maritimae will be discussed separately.

[41] The two best known examples are the palace harbour at Spalatum (Split) of the Roman emperor Diocletian and the Byzantine Boukoleon harbour at Constantinople: Blackman, Harbours, II, 188-189; P. Magdalino, The maritime Neighborhoods of Constantinople - Commercial and Residential functions, 6th to 12th century. *DOP* 54 (2000) 210; C. Mango, The Palace of the Boukoleon. *CahArch* 45 (1997) 47.

1.2.3. Anchorage and Roadstead

In the context of commercially oriented coastal installations, anchorages sometimes represent also a special form of "harbours". They can be defined simply as "a place where a ship anchors or may anchor due to its advantageous place, with a circle radius equal to the combined length of anchor and ship and a depth of at least 7 fathoms".[42] Since anchorages are situated where a part of a body of water is protected and deep enough, they can appear also as "an area set apart for anchored vessels in a natural harbor".[43] Therefore a distinction in "temporary anchorages" and "permanent anchorages" has to be made in order to define their various functions.

A temporary anchorage place appears wherever a suitable shelter for anchoring is provided in case of bad weather. Especially along the north coast of the Mediterranean and increasingly in the Aegean Sea such places are numerous and formed a crucial factor for sea routes and shipping lanes. Acting as harbours of refuge, they just provided protection for travelling ships. Different from this well-known type, so-called permanent anchorages were situated in specific protected bays with harbour facilities. Directly associated with harbour traffic, they were able to act as an area for ships waiting to get a mooring place for loading and unloading in the harbour. In some cases permanent anchorages formed a kind of harbour extension themselves but without providing any major facilities. Such anchorages can be identified as roadsteads. A roadstead is a sheltered anchorage area for ships outside the harbour. It is "an area of water (open anchorage) where ships can ride safely at anchor affording less protection than a harbour".[44] It can be assumed that like today, in such areas, while ships were waiting for

[42] Kerchove, International Maritime Dictionary, 14.

[43] Ibid.

[44] Ibid., 656.

new orders, in the meantime small scale commodity and passenger loading, unloading and transshipping were carried out. In fact, as a result of a tendency towards monumental harbour installations, roadsteads most probably have not been a characteristic feature in Antiquity. Their development seems to have started rather in later centuries and in the east not until Constantinople gained importance, and increasingly with the establishment of western merchant colonies, which caused a change of the Byzantine economic system and maritime trade during the Middle and Late Byzantine periods.[45] Consequently, since the area of a permanent anchorage or roadstead had to be connected or ideally enclosed by the infrastructure or activities of a port-city, secondary harbour or staple market with its industrial facilities, this type forms a rare phenomenon in the Mediterranean and Black Sea even in the early Byzantine period. Only with the development of ecclesiastical staple markets and western merchant-colonies did the use of open roadsteads became common.[46]

1.2.4. Landing Stage

A landing stage represents a platform structure from which passengers can be embarked and disembarked or cargo loaded and unloaded. Often it forms a place which simply provides space for boats to land people or goods. Such so-called landing stages or places could have been constituted by various harbour structures, depending on their precise function and purpose in conjunction with the traffic demanding facility or hinterland.[47]

[45] Blackman, Harbours, II, 193; The inlet of the Golden Horn represents the most important and well known example of a roadstead, which forms together with the two harbours of Neorion and Prosphorion a huge port of Constantinople and conducts important commercial and traffic related functions.

[46] See the harbours of Thessaly in section II "The coastal infrastructures of Thessaly".

[47] Cornick, Engineering, II, 238ff; Kerchove, International Maritime Dictionary, 433.

They appear in different shapes and designs, mostly at staple markets or smaller private and ecclesiastical installations such as Villae Maritimae and monastic units, where no proper harbours were needed. During the Byzantine era increasingly also ecclesiastical foundations were equipped with landing stages.[48] Religious complexes such as monasteries and their so-called "Metochia"[49] possessed almost exclusively landing stages for the transportation of their goods and other travelling purposes.[50]

Concerning travelling purposes, in exceptional cases these small infrastructures were also used for organized passenger transportation. Apart from being a separated component within a port or a harbour, landing stages were also used independently, to serve ferries over a short distance. Such a specific function can be attested for landing stages at Constantinople, crossing regularly the Bosporus during the Byzantine period.[51]

As such, they represented the smallest type of coastal installation acting as a linking point between the hinterland and foreland of tiny independent agricultural or social areas. Thus, they could have consisted either of independent jetties or piers, leading out into the sea. At bigger coastal complexes these jetties or piers sometimes might have been attached even to a quay or wharf[52] alongside the coast, providing permanent accommodation for smaller private ships.

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[48] For examples of such installations see section II.

[49] During the Byzantine period a *Metochion* constituted a small monastic establishment with landownership, which was subordinated to a bigger independent monastery; A. Ginalis, The Northern Sporades from Late Antiquity to the end of medieval times. An important junction of the Aegean trading routes. *Graeco-Arabica* 11 (2011) fn. 9.

[50] Michael Attaleiates mentions a landing stage at the Mangana: I. Bekker, Michaelis Attaliotae historia (*CSHB*). Bonn 1953, 73; Magdalino, Neighborhoods, 210.

[51] O. Seeck, Notitia Dignitatum, accedunt Notitia Urbis Constantinopolitanae et Latercula Prouinciarum. Berlin 1876 (Frankfurt am Main 1962), 5.15, 233-234.

[52] For the analysis of the specific components of harbour structures see Chapter 2.4.1. "Commercial harbour installations".

1.2.5. Base

Similar to harbours, military installations appeared in different ways, depending on their function and purpose for a certain region. They could have formed either a separate section or an independent harbour within a port.[53] But where strategic points did not meet commercial junctions to execute both functions, bigger fleet stations were necessary. Since such military installations needed infrastructure and harbour facilities, they often got replaced by small military bases or so-called "Ναύσταθμοι" which were sufficient for the surveillance of shipping lanes in certain regions and fulfilled the requirements of patrolling warships.[54] As such, military bases consisted mainly of single shipsheds or so-called "Νεώσοικοι" in order to conduct repairs and provide protection.[55]

1.2.6. Coastal hierarchies

As stated above, a harbour was not an independent and separate structure acting as an isolated phenomenon, but rather a linking gate for communication and the economy as well the decisive factor for their control. The degree and pattern of communication and economy vary between local, regional and supra-regional activities. The various above-defined coastal installations and their functional context indicate a kind of model of hierarchy and of interrelation between coastal sites.

Nieto suggests a trading pattern based on the principle of differentiating harbours and their functions. By proposing the existence of primary and secondary ports, executing a

[53] D. J. Blackman, Sea Transport, Part 2: Harbors, in: Oxford Handbook of Engineering and Technology in the Classical World, J. P. Oleson (ed.). New York 2008, 654; Blackman, Harbours, II, 189.

[54] Such small military bases played a major role in the Aegean and particularly central Greece during the Byzantine period, acting against the problem of piracy in order to protect the coastlines, as well as to secure the trading routes and shipping lanes from raids.

[55] Blackman, Sea Transport, 657-658; for detailed analysis of shipsheds and other military facilities see chapter 1.3.2. "Military harbour installations".

combination of a direct distribution and a coastal cabotage[56] redistribution networks, he abandons the traditional concept of the coastal tramping[57] network for the late antique and medieval periods. In fact, Nieto's progressive model only scratches the surface, trying to explain the Mediterranean distribution system by the reflection of a symbiotic relationship between the "local" production centres, the "regional" secondary harbours and the "supra-regional" primary ports (ILL I.5, VOL II, 1-4).[58]

Nieto's attempt to conceptualize port hierarchies suggests a more organized commercial system and corrects the view of a random tramping from port to port. However, especially for Late Antiquity and the Middle Ages and even more for Eastern Mediterranean Byzantium, the economic and communication system reflects a much more complex picture. Despite Nieto's accurate general hierarchical organization, which suggests staple markets to supply harbours as well the latters to supply the ports, additional factors influenced that pattern. Particularly private activities and installations such as villae maritimae have acted independently between the different coastal sites disregarding any hierarchical patterns.[59] Furthermore, one has to distinguish between private commercial

[56] For a new approach to the definition and analysis of the terminology in contrast to the classical interpretation of Horden and Purcell (P. Horden – N. Purcell, The Corrupting Sea: a Study of Mediterranean History. Oxford 2000, 140ff) see: Arnaud, Sailing-Routes, 61-80.

[57] See ibid.

[58] Gianfrotta-Nieto-Pomey-Tchernia, Navigation, 154-159 (especially 156-157); Arnaud, Sailing-Routes, 61; Schörle, Port Hierarchies, 93.

[59] E. Kislinger, Verkehrsrouten zur See im byzantinischen Raum, in: Handelsgüter und Verkehrswege: Aspekte der Warenversorgung im östlichen Mittelmeerraum (4. bis 15. Jahrhundert). Akten des internationalen Symposions Wien, 19.-22. Oktober 2005, E. Kislinger – J. Koder – A. Külzer (eds.). Vienna 2010, 170; Peregrinationes tres. Saewulf, John of Würzburg, Theodoricus, R. B. C. Huygens (ed.), (*CCCM* 139). Turnholt 1994, 60-61, 76-77.

shipping and Imperial purchase orders such as the so-called "Annona", providing for example Constantinople with grain directly from Egypt.[60]

While merchants used a number of ports of call to fulfil the needs of regional markets profitably by looking for their supplies and demand during the journey, the Imperial grain ships may have followed Nieto's model, namely collecting grain from the local production centres and harbours, transporting it to a supra-regional port from where it finally got shipped towards the capital.

Furthermore, ecclesiastical activities changed the pattern of Byzantine sea trade and the model of port hierarchies from the 4th century AD onwards. Monasteries and their metochia acted as independent staple markets and executed commercial and inter-connective travel-orientated activities through their landing stages or small harbours, supplying and communicating, both with regional harbours, agricultural/industrial staple markets[61] and bigger ports within a closer and wider foreland.[62]

Although no particular model, such as that proposed by Nieto (ILL I.5a-d, VOL II), is able to express the complexity of the economic interrelationships between various coastal installations at that time, it is nevertheless a useful tool to explain the hierarchy of those structures. It may define a hierarchy between different types of coastal installations and their functional context but not illustrate the differences between structures of the same type or function.

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[60] L. Casson, Ships and Seamanship in the Ancient World. Baltimore-London [2]1995, 297; R. W. Unger, The Ship in the Medieval Economy 600-1600. London 1980, 36; Ersu Pekin, Gün işiğinda. Istanbul"un 8000 yili. Marmaray, Metro, Sultanahmet kazilari. Istanbul 2007, 188-189; A. E. Müller, Getreide für Konstantinopel. Überlegungen zu Justinians Edikt XIII als Grundlage für Aussagen zur Einwohnerzahl Konstantinopels im 6. Jahrhundert. *JÖB* 43 (1993) 9-10.

[61] For examples of such agriculturally and industrially confined staple markets see section II.

[62] E. L. Vranousi, Βυζαντινά Έγγραφα της Μονής Πάτμου, I-II. Athens 1980, Nr. 7, 8, 9, 11; Kislinger, Verkehrsrouten, 170; Th. Goudelis – D. Tsougarakis, The life of Leontios, Patriarch of Jerusalem. Text, translation and commentary, (*The Medieval Mediterranean* 2). Leiden 1993, Ch. 12-13 (46 Tsougarakis).

However, since harbours were able to carry out several functions, the harbour space with its necessary function-orientated facilities provides size data, which of its own indicates a hierarchical pattern (ILL I.6, VOL II). Therefore since size data reflect certain functions of coastal installations, it allows, in combination with their geographical and physical conditions, to differentiate and connect sites of the same type within a certain hinterland or region. Anyway, as Schörle proposed for the Roman Tyrrhenian coast,[63] sizes from 1-30 ha were the norm also for harbours in the East; at least during the Early Byzantine period. Harbour sites (*scalae*) of the later period do not exceed the size of 2 ha (ILL I.6, VOL II and compare with Tab 2).

[63] Schörle, Port Hierarchies, 95-97; Fig. 5.1.

1.3. Characteristics and elements of harbour structures

This chapter presents a clear definition and necessary historical analysis of nautical terminology concerning harbour architecture and associated facilities. This forms not only the groundwork for the correct understanding of the function and purpose as well as the setting up of a hierarchical model but also for the study of the various features, which will be presented in section II.

1.3.1. Commercial harbour installations

1.3.1.1. Breakwater[64] and Mole[65]

The breakwater is not only the most characteristic, but also the most important feature of harbours and roadsteads. Initially the main purpose had been to provide protection to unsheltered harbours against the prevailing strong sea-waves, currents and tides to secure a safe anchorage place for loading and unloading ships.[66] But beyond its role of preventing destruction or disruption by the sea, especially from the late Archaic period onwards the breakwater fulfils also various other purposes. Contemporaneously it

[64] Definition: "An artificially placed construction in or around a harbour designed to break the force of the sea and to provide shelter for vessels lying within" (Ships and the Sea, 65); nowadays it can consist even of other structures or contrivances such as moles or walls themselves (Kerchove, International Maritime Dictionary, 96).

[65] Definition: "A substantial masonry structure often serving as a breakwater on its outer side while offering facilities on its inner side for the loading and discharging of ships" (Kerchove, International Maritime Dictionary, 516); in the course of time it could have been built either connected to the shore or in the form of a detached mole constructed entirely in the sea (Ships and the Sea, 368).

[66] Blackman, Harbours, II, 196; Blackman, Sea Transport, 647; Cornick, Engineering, II, 116; Lehmann-Hartleben, Hafenanlagen, 54-55.

functioned as an instrument to deal with the problem of siltation,[67] but additionally, especially during the 5th and 4th century BC, breakwaters were fortified and used for protection against enemy or pirate attacks.[68]

As such, both its alignment and type of construction played significant roles for fulfilling and dealing with various purposes and functions. Simple breakwaters appear for the first time in early Levantine harbourworks already during the Bronze Age.[69] At that time harbours still had to follow natural reefs or rocks which could have been improved. Although the technological advance did not allow yet dictating the line of the breakwater, improvements such as the strengthening and forming of the structure with rubble stones had been carried out. Architects soon realized that the sloping of the outer face of the structure reduces the force of the wave and subsequently breaks the strength of the sea.[70] Corresponding to the general development of harbour structures, at regions without suitable natural reefs artificially built breakwaters of piled stones of any available rocks had to be constructed. Therefore one has to distinguish between two main types of breakwaters: the so-called "Mound Breakwater" and the "Composite Breakwater".[71]

The earlier and most common type from Antiquity throughout Late Antiquity to Medieval times was the mound-formed type (ILL I.7a, VOL II). The biggest and probably earliest with certainty datable rubble breakwaters of this type are from the 7th-6th century BC, such as Eretria, Cenchreae, Cnidus, or that of Samos from 530 BC. At the very early stage these breakwaters still consisted of huge raw rock boulders which had been dumped into the sea. Nevertheless, careful planning and design were essential. Depending on the

[67] See chapter 1.3.1.7. "Anti-siltation and dredging methods".

[68] Blackman, Harbours, II, 196; Blackman, Sea Transport, 647.

[69] Frost, Sidon, 75-94.

[70] Ibid.; Blackman, Harbours, II, 196; Blackman, Sea Transport, 647.

[71] Cornick, Engineering, II, 116, 118ff.

conditions of the area, mound-breakwaters of rubble stones had been constructed in cross-sections - starting from the core to the outer protective covering. The core usually consisted of a mixture of quarry rubbish and small stones in order to gain maximum compactness. The purpose of its external part was to prevent the movement and washing out of the rubble material. According to the stone size used for the core part as well as the thickness of the outer covering, sometimes a second layer of stones was required to cover the whole mound. Its efficiency and stability depended not only on the size, thickness of the stones and the weight of the composition but also on the grade of the slope. The slope provided stability to the construction material by preventing a possible undermining by waves. Despite the high reliability of mound-breakwaters in general, numerous examples such as the north breakwater of Cnidus, the south breakwater of Phaselis and the outer breakwater of Caesarea Maritima show evidence of subsidence.[72]

The rubble-mound breakwater had been used particularly in regions with either a small tidal range or even almost tideless seas such as the Mediterranean and the Black Sea.[73] Therefore architects were able to use breakwaters also to prevent siltation by letting the waves to break over them in order to create currents within the harbour basin.

In regions with a wide tidal range and where the depth of water was too big to construct a full mound-breakwater, the second type and so-called composite breakwater was preferred (ILL I.7b, VOL II). Either due to architectural restrictions or for economic reasons sometimes the required quantity of rubble stones had been too large to realize the construction of the mound type. In this case the rubble mound formed only a kind of a

[72] Blackman, Harbours, II, 196-197, Fig. 4b and 5; Blackman, Sea Transport, 647; for more details see: D. J. Blackman, The harbours of Phaselis. *IJNA* 2/2 (1973) 358.

[73] D. J. Blackman, Evidence of sea level change in ancient harbours and coastal installations, in: Marine Archaeology, Proceeding of the Twentythird Symposium of the Colston Research Society, D. J. Blackman (ed.), Bristol 1971 (*Colston Papers* 23). London 1973, 115-139.

foundation for vertical walls built on top of it. The degree of protection offered by this artificial superstructure depended very much on the height of the mound in relation to the current water level. Under water artificial structures probably did not exist prior to the Roman period. Only with the invention of hydraulic concrete, were engineers able to build entirely independent and free-standing solid structures under water such as the composite breakwater.[74]

Other than the wall of the composite breakwater, the latter in general bore walls for fortification purposes as early as the late 6th century BC, increasingly during the 5th and 4th century and mainly in the Hellenistic period. The fortification walls of the city had been extended along the breakwaters of the harbour, including the basin to the city walls.[75] The extension of the walls on the breakwaters ended in towers on either side of the harbour entrance, forming a gate such as the one shown on the 6th century AD mosaic at the Basilica Sant' Apollinare in Classe in Ravenna (ILL I.8, VOL II).[76] Especially during Classical times this gate was kept as narrow as the maximum of 100 m, whereas

[74] The most famous examples are the harbours of Patras, Alexandria and Sabratha: Blackman, Harbours, I, Fig. 1F; II, 198; Lehmann-Hartleben, Hafenanlagen, 211-212, 216; R. A. Yorke, Les ports engloutis de Tripolitaine et de Tunisie. *Archéologia* 17 (1967) 18-24.

[75] The fortification surrounding the harbour basin, known as closed or closable harbour ("λίμην κλειστός"), formed an extension of the city walls along the breakwaters of the harbour. At the end of the breakwaters the harbour entrance ("κλειθρία") was secured by towers. Often it was closed with walls even within the fortification, forming a separate restricted area as at Athens (comparable with the later Arsenal of Venice). For the development of the *limen kleistos* see Baika, Harbours, 435-436; Baika, Naval Bases, 183; Blackman, Harbours, II, 189, 194; Lehmann-Hartleben, Hafenanlagen, 65-74.

[76] Remains of such towers can still be seen at the harbours of Athens, Naupactus, Aegina, Akko, Halieis, Samos and Thasos: Angeliki Simossi - Aglaia Argyri - J. Y. Empereur, The underwater excavation at the ancient port of Thasos, Greece. *IJNA* 18.1. 1989, Fig. 3; Blackman, Harbours, II, 194, Fig. 3, 6; M. H. Jameson, Excavations at Porto Cheli and vicinity. Preliminary report, I: Halieis 1962-1968. *Hesperia* 38/3 (1969) 331ff; Lehmann-Hartleben, Hafenanlagen, 65-66; N. A. Lianos, The area of the ancient closed port of Thasos (A preliminary report). *Tropis* 5 (1999) (=Proceedings of the 5th International Symposium on Ship Construction in Antiquity, H. Tzalas (ed.). Athen 1993) 261-272.

in later centuries the distance could have reached up to 300 m.[77] Where the geographical and physical conditions supported more sophisticated defence measurements such as at the harbours of Athens, there the breakwaters with the walls and towers had been set back from the shore to improve the defensive position. Moreover, a common practice was the use of chains or booms to close the harbour entrance. But this defence method did not only exist in Antiquity but continued to be used until early modern times. Beside the classical example of Halieis, the most famous examples for the usage of chains to close the harbour are Constantinople and Thessaloniki.[78]

Even though the need of fortified *Limenes kleistei* had been great in the course of constant warfare and threat of the Classical and Hellenistic era, as well as later during the early Byzantine period, the breakwater was not used exclusively for protection and fortification purposes. The breakwater was also used to increase the mooring space within the harbour basin. This had been achieved by constructing moles along the inner side of the breakwater which consequently formed extensions of the quay and fulfilled commercial and traffic related functions. While the earliest moles must have adopted only a very narrow space due to the fortification walls, the ratio of space changed by about the 2nd century BC when the defensive role became less important in favour of its increasing

[77] With exception that the harbour entrance of Lechaeum measured only about 14 m and that of Halieis at Porto Cheli was narrowed from originally 20 m to about 7 m: Blackman, Harbours, I, Fig. 7; II, 194; Jameson, Porto Cheli, Fig. 5, 6; M. H. Jameson, Halieis at Porto Cheli, in: Marine Archaeology, Proceeding of the Twentythird Symposium of the Colston Research Society, D. J. Blackman (ed.), Bristol 1971 (*Colston Papers* 23). London 1973, 222-238, Fig. 1, 4; for entrances of Byzantine harbours in Thessaly see section II "The coastal infrastructures of Thessaly".

[78] Barbaro Nicolo, Diary of the siege of Constantinople, 1453, J. R. Jones (transl.). New York 1969; Ayse Ercan, Yenikapı, A late antique and Byzantine harbor in Constantinople: A historical, archaeological and architectural study of the newly discovered remains. Istanbul 2010, 13, Fn. 26; Marina Leivadioti, Το λιμάνι της Θεσσαλονίκης από την ίδρυση της πόλης μέχρι την κατάληψή της από τους Τούρκους (1430). Thessaloniki 2009, 23-28; S. Turnbull, The walls of Constantinople AD 324 – 1453. Oxford 2004, 16, 18.

commercial importance. At the latest during the time of the *Pax Romana* more and more moles replaced the fortification walls in order to form more space for the loading and unloading of trading commodities.

Finally, Roman architects tried to find a way to use composite breakwaters supporting moles to act against the problem of siltation. Therefore the design of moles began to be remodelled and the familiar technique of arched construction was introduced. While so far no examples outside Italy can be documented for the Roman period, in the later centuries the Byzantines adapted this technology, which has been revealed for the Constantinopolitan harbours or Ravenna.[79]

Together with the adoption of arched structures also as ornamental elements for quays in the 1st and 2nd century AD, architects and engineers started experimenting with various shapes of breakwaters and moles, favouring the regular polygon, circular and oval shapes. Concerning the construction material, including both the masonry and the type of clamp, evidence for dating and use is much harder to gain since some types had been used widely and for a long time. In general ashlar or rubble faced and paved with ashlar was used for the masonry. Only the use of mortar as a binding material for the blocks or in a rubble filling indicates a feature of Roman harbour works. Beyond that, the already mentioned invention of hydraulic concrete allows a more precise dating. In the Late Roman and Byzantine period concrete was often used in combination with ashlar and primarily brickwork.[80]

[79] See Aidoni et alii, Journeys, 22, 27; fig. 17.

[80] Blackman, Harbours, II, 197; Blackman, Sea Transport, 648.

1.3.1.2. Quay[81] and Wharf[82]

The main purpose of a harbour is to load and unload goods and passengers. As mentioned above, it acts both as a hub between the land-based industry and the sea-based traffic and as a pivotal linking point for social networking; therefore, it forms a place where ships are brought for communicative and commercial activities.

Apart from the breakwater, which localizes and defines the harbour area in general, another essential harbour facility is the landing place itself. The main docking area is always located along the shore of the harbour and connected with the road system of the hinterland. This shoreline structure to load and unload cargo or passengers can be identified either as a quay or as a wharf.

The quay is a "projection along the shore-side boundaries of the harbour to provide accommodation for ships to load and unload cargo or embark and disembark passengers. It forms a solid structure, usually constructed of stone masonry". However, a wharf fulfills the same function. Although it displays almost the same structure, in contrast to a quay the wharf forms a piled platform and is primarily built of timber.[83]

Since quays and wharves most likely existed contemporaneously with the earliest stage of seafaring,[84] their construction methods developed together with other harbour facilities, especially with those of moles. Therefore the same stage of development can be observed: apart from artificial cut embankments which served as quays along the Indus, Euphrates and Nile already in the 3rd millennium BC, proper rock-cut quays appear for the first time

[81] Definition: "A landing place consisting of a solid masonry wall filled in behind at which vessels receive or discharge cargo" (Kerchove, International Maritime Dictionary, 623).

[82] Definition: "A wooden projection along an anchorage or in a harbour to provide accommodation for ships for loading and unloading of cargo or embarking and disembarking of passengers" (Ships and the Sea, 631).

[83] Cornick, Engineering, I, 72; Kerchove, International Maritime Dictionary, 914; Ships and the Sea, 450.

[84] Frost, Sidon, 75-94.

during the Middle and Late Bronze Age, such as that of Sidon. While engineers started constructing roughly faced and paved rubble quays during the Archaic period such as at 8th century BC dated Delos,[85] the use of well-dressed ashlar revetments can be dated back to the classical or Hellenistic period. During the latter period and continuing into the Roman period, a trend to experiment with circular and various other forms (favouring the regular polygon-, circular- and oval shape), and also for the construction of quays, can be observed.[86] But similar to the construction of moles, only hydraulic concrete structures allow a more precise chronological correlation. In the Late Roman and Byzantine periods the concrete was often faced with ashlar or small stone blocks forming an *Opus reticulatum*. Sometimes the concrete had been used in combination with brick or even timber.[87] Following the introduction of arched moles, architects started facing also quays with brick arches as ornamental elements.[88]

Beside the use of timber as the formwork for concrete structures,[89] there is no doubt that entire wooden built structures existed in the Mediterranean. However, no archaeological remains of wooden wharves have been recovered so far. Nevertheless, although the famous wall painting of Stabiae confirms the use of wharves for the 1st - 2nd century AD harbour of Puteoli,[90] it can be assumed that wharves at that time had been used mainly for staple markets, landing stages or small harbours. Since wharves relied on wooden piles,

[85] Paris, Delos, 34ff.

[86] Blackman, Harbours, II, 202-203, Fig. 8 and 10; fn. 96 and 97.

[87] Blackman, Harbours, II, 202ff; Blackman, Sea Transport, 649.

[88] The only example of this tradition represents the south quay at Puteoli: ibid.

[89] Blackman, Sea Transport, 649; A. Hesnard, Vitruve, De architectura, V, 12 et le port romain de Marseille, in: Le strutture dei porti e degli approdi antichi. Atti del II Seminario ANSER, Roma-Ostia Antica, Z. A. Gallina – R. Turchetti (eds.). Soveria Manelli 2004, 175-204: a more elaborate timber structure filled with rubble and clay included a double row of pine piles with horizontal planking of reused timber between the piles.

[90] For further examples see: Blackman, Harbours, I, 83-85.

it is very unlikely that they supported any structure such as warehouses or other necessary facilities like quays of bigger ports.

Concerning their function as docking areas, both shoreline structures were equipped with mooring stones, bollards or rings.[91] Due to the change of water level up to today, the exact height of quays can often not be accurately determined. Nevertheless, it can be estimated that the distance between the quay surface and the water level had not been more than 1m in order to provide the same level with the deck of the mooring ships, as shown on the Torlonia Relief.[92] However, another relief of the 3rd century AD, depicting the harbour of Portus, shows a gangway at a steep angle, therefore giving a different picture.[93] Indeed, most quays possessed one level, except for Leptis Magna which had two levels.[94]

1.3.1.3. Pier, Jetty and Pontoon as well as other harbour components

In addition to the mooring space provided by quays and wharves as well as moles along the coastline and the internal side of breakwaters, growing maritime communication and traffic, as well as the expression of prestige and power, led to an increased technical development and monumental shape of harbours as early as the Archaic- but mainly from the Classical period onwards. Along with industrial activities, commercial interconnectivity and the establishment of emporia, it became necessary to exploit the harbour basin in order to make the best possible use of its space and improve its economic

[91] See chapter 1.3.1.4. „Bollard, Boundary and Mooring stone".

[92] The relief from about 200 AD depicts the harbour of Portus showing a merchant ship unloading goods to the quay: Blackman, Sea Transport, 651, Fig. 25.1.; Casson, Ships and Seamanship, Fig. 144; Ch. Picard, Sur quelques representations nouvelles du phare d'Alexandrie. *BCH* 76 (1952) 90.

[93] Casson, Ships and Seamanship, Fig. 174.

[94] Blackman, Harbours, I, Fig. 4; II, 203, Fig. 11: the harbour of Leptis Magna shows a two-stepped quay with mooring stones projecting from the upper step.

efficiency. For this purpose jetties or piers were constructed to provide additional mooring space for ships and accommodation for harbour facilities within the basin.[95]

A jetty is considered to be "a solid structure built out into the sea as a part of a port or dockyard alongside which ships could lie for loading cargo, repair work, etc.".[96] It was built in a sheltered location perpendicular to the quay to provide an optimal place for ships to berth along both sides.[97] The earliest recorded jetty is that of Levantine Tabbat el-Hammam, dated back to the 9th century BC.[98] But although the first artificial harbourworks were built at that time, the construction of jetties did not yet take place within the harbour. During the Late Iron Age jetties appeared as single structures, leading from unapproachable shallow shores into the deeper water of the sea, to provide anchorage for ships along shallow coasts, as shown by Tabbat el-Hammam or Leptis Minor.[99] However, jetties were not only used as independent coastal installations during Antiquity. Mainly late antique and medieval staple markets and private harbour installations used landing stages, consisting either of single jetties or piers, or sometimes also being attached to quays or wharves.[100] While bigger staple markets were equipped with permanent solid structures such as jetties and sometimes quays, private coastal complexes usually were provided with wooden piers, sometimes connected to wharves.

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[95] Blackman, Harbours, II, 202; G. E. Rickman, The archaeology and history of Roman ports. *IJNA* 17/3 (1988) 263.

[96] Ships and the Sea, 290-291.

[97] Cornick, Engineering, II, 179; there were for example a number of jetties (the so-called *Diazeugma* or *Choma*) in the Cantharus harbour of Piraeus: Blackman, Harbours, II, 202, Fig. 3; Blackman, Sea Transport, 650; W. Judeich, Topographie von Athen (*Handbuch der klassischen Altertums-Wissenschaft* 3. Bd., 2. Abteilung, 2. Hälfte). Munich 1905, 445.

[98] See DOC 12 "Iron Age", VOL III.

[99] Ibid.; Blackman, Harbours, II, 202; R. A. Yorke, Les ports engloutis de Tripolitaine et de Tunisie. *Archéologia* 17 (1967) 22-23.

[100] For examples see the staple markets of ecclesiastical and private coastal facilities in central Greece: chapter 2.4. "Secondary harbour sites and Staple markets of Thessaly".

Different to the jetty, which like the quay is considered to be a solid structure, the pier is "a structure of timber and supported on wooden piles".[101] Wooden infrastructures such as piers provide certainly the earliest artificial coastal installations in the Mediterranean and the Black Sea, dating back at least to the early to mid-2nd millennium BC. Although no remains of wooden structures of that period have yet been found and it is generally assumed that boats may have been beached for loading and unloading goods at that time, there is no doubt that primitive infrastructures such as simple wooden piers would have existed. Especially from the Classical period onwards, piers were used equally to jetties within harbour infrastructures, leading into the harbour basin at a right angle to the shoreline.[102] The best example of preserved wooden piers has come to light at the excavation of the Constantinopolitan harbour of Theodosius at Yenikapi.[103]

Different to the modern general allocation of wooden piers exclusively for the use of embarking and disembarking passengers and jetties exclusively for the use of loading and unloading cargo,[104] there is no evidence for such a distinction during Antiquity and the medieval period. Until the invention of the hydraulic pozzolana concrete, stone structures of that type were built of rough ashlar blocks. Therefore, especially in regions where timber was plentiful, piers were not only easier and faster to build but economically profitable as well, since material and labour costs were small. As such, the construction and use of piers, particularly for small coastal installations, was certainly preferred both

[101] Ships and the Sea, 427.

[102] During excavations of the harbour area in the years 1999 to 2001 parts of long vertical pier stakes, leading into the sea at a right angle to the shoreline, were recovered together with 11 shipwrecks alongside, dating to the 1st – 5th and 9th – 14th century AD: R. D´Oriano – E. Riccardi, A lost fleet of ships in the port of Olbia, in: Barbarian Seas. Late Rome to Islam, S. A. Kingsley (ed.), (*Encyclopedia of Underwater Archaeology* 4). London 2004, 89-90.

[103] Ercan, Yenikapi, Fig. III. 8, 37, 41-42.

[104] Cornick, Engineering, II, 181-182.

for loading and unloading cargo as well as for embarking and disembarking passengers. However, the life expectancy of wooden structures for marine purposes is quite short compared to stone structures, since at least in the Mediterranean wood is vulnerable to the attack of marine fouling and mollusca.[105] Therefore the invention and use of the more cost- and time efficient as well as architecturally favourable concrete construction changed the preference of material for projecting mooring infrastructure. During the Roman Imperial and Byzantine periods both piers and jetties together and contemporaneously formed the characteristic picture of harbour basins. Apart from recent archaeological results from the Theodosian harbour of Constantinople, uncovering wooden piles, the best-known example is the wall painting of Stabiae from the 1st – 2nd century AD.[106] This depiction of the Roman harbour of Puteoli shows not only a wooden piled pier, but as already mentioned above also an arched jetty, characterizing the introduction and experiment with architectural techniques in order to act against the problem of siltation.

Especially in regions with a wide tidal range or where the depth of water was too big to construct piers or jetties without being supported by marine structures such as composite breakwaters, so-called "pontoons" fulfilled the purpose of providing ships access to the coastline for loading and unloading goods. A pontoon is "a floating structure frequently used at the ends of piers or quays so that it rises and falls with the tide".[107] Different to fixed harbour elements like the pier, this broad and flat-bottomed rectangular construction is an independent loose harbour feature.[108] Although no archaeological traces support the

[105] Ibid., 180; A. J. Parker, Ancient Shipwrecks of the Mediterranean & the Roman Provinces (*BAR Int. Series* 580). Oxford 1992, 27.

[106] Blackman, Harbours, I, 87, Fig. 5.

[107] Ships and the Sea, 437.

[108] Kerchove, International Maritime Dictionary, 596-597.

existence of any such structure, it is well-known that boats served as temporary roads or footbridges across rivers already during Antiquity. Such boats of special design are called pontoon as well. Furthermore, it is well attested that these pontoon ships were frequently used for harbour activities, not only to block harbour entrances during the Classical period, but mainly to construct new harbour elements and areas such as moles during the Roman period.[109] Therefore it can be assumed that low flat vessels were used as floating extensions of piers or jetties as well.

1.3.1.4. Bollard, Boundary- and Mooring stone

One of the most striking and important aspects connected with harbour structures, is the question of mooring and berthing ships to quays, moles, jetties etc. The system and method of berthing itself, however, still challenges scholars and the different characteristics and ways of use of specific architectural elements often remain a mystery. Material and iconographic remains show the use of various techniques and devices. The very first mooring method was probably just by cutting a hole through rock-cut harbour facilities.[110] During Antiquity and the medieval period primarily bollards, so-called mooring stones, or metal rings, were used for berthing ships to harbour installations.

A bollard is nowadays defined as a "vertical piece of timber or iron, fixed to the ground, to which a ship's mooring lines are made fast when alongside".[111] In contrast, an exact and appropriate definition of antique and medieval bollards is often problematic and sometimes wrongly identified and allocated. In Antiquity and the medieval period the

[109] Blackman, Sea Transport, 649; D´Oriano – E. Riccardi, Olbia, 91; Lehmann-Hartleben, Hafenanlagen, 188-189.

[110] Blackman, Harbours, II, 203.

[111] Ships and the Sea, 57.

Mediterranean used apart from timber mainly stone and later probably concrete for the construction of bollards.[112] Different to some modern standardized and simple cylindrical examples, the antique counterparts varied in shape and size. In the majority of cases the short wooden or stone posts possessed a cylindrical form with a larger diameter on the top of it, which ended in a bulb shape in order to prevent the loosening of the mooring rope.[113] Bollards were certainly placed primarily on the horizontal upper surface of the quay, jetty or mole.[114] Nevertheless there are examples of bollards projecting out of the vertical face of the quay of Lycian Phaselis, Terracina or Illyrian Apsorus.[115]

The most typical devices for berthing ships, at least in the Hellenistic and Roman period, and presumably also having been a common feature for Classical harbours, were mooring stones.[116] Mooring stones are dressed stone blocks with holes pierced either horizontally or occasionally also vertically.[117] Like bollards, mooring stones appear in different shapes and sizes, depending on their function and use. But since their usage ranged from the 3rd century BC at least to the Roman Imperial period and from the Eastern Mediterranean and the Aegean Sea to the Central Mediterranean, archaeological records allow the assumption that apart from a differentiation in use, the shape and size might have varied between east and the west or traditions changed together with the architectural progress

[112] Blackman, Harbours, II, 204.

[113] Blackman, Phaselis, Fig. 17; on some sites cylindrical bollards on a square base have been recorded: Paula F. de Coetlogon Williams, Roman harbours. *IJNA* 5/1 (1976) 75; M. Guy, Les Ports Antiques de Narbonne. *Rivista di Studi Liguri* 21 (1955) Fig. 5, 6.

[114] As seen clearly on the quay of the inner harbour of Caesarea Maritima: Kingsley, Barbarian Seas, 133.

[115] Blackman, Phaselis, 360, Fig. 17; R. de la Blanchere, Le port de Terracine. Histoire et archeologie. *Melanges d'archeologie et d'histoire* 1 (1881) 333, Pl. X; Aleksandra Faber, Osor - Apsorus iz aspekta antickog pomorstva. *Diadora* 9 (1980) 311.

[116] Blackman, Bollards, 9.

[117] Coetlogon Williams, Roman harbours, 75.

over the centuries.[118] Ancient harbours such as that of Teos in Western Turkey tended to use a series of wedge-shaped mooring stones set on the upper horizontal face of the quay.[119] In contrast, Roman artificial harbours were often provided with a new type of pierced stone blocks incorporated into the wall as a single architectural unit with the quay, jetty or mole. However, unlike ancient examples, these new types projected out of the vertical face. As such, they could exist as either a loop with a horizontal hole as at Portus,[120] or of rectangular stone blocks with vertical holes.[121] The best-known harbour, showing a series of such rectangular mooring stone blocks, is the Libyan port of Leptis Magna.[122] These loop-like or rectangular mooring stones were fixed or incorporated at the lowest face of the harbour installations above the water level.[123] An exceptional form is the two-stepped construction, such as the east mole of Leptis Magna and the river quay of the Tiber in Rome, where ships berthed at mooring stones along the wall of the upper level.[124] A 19th century drawing of the excavation of the Roman river quay allows the

[118] A number of different mooring stones have been recorded from the Hellenistic harbour of Teos until the Late Roman port of Leptis Magna: Blackman, Sea Level, 115-118.

[119] Other ancient harbours are Paphos or Apollonia ad Rhyndacum: Ibid., 115, Fig. 2; Paulys Real-Encyclopaedie, XIII, 562.

[120] Other examples show the river quay of the Tiber in Rome, the seaward castle wall of Naupactus or the harbours of Terracina and Cnidus: G. F. Bass (ed.), A history of Seafaring based on underwater archaeology. London 1972, 107, Fig. 19; Blackman, Harbours, I, Fig. 2; Blackman, Harbours, II, 203, Fig. 2; Blackman, Sea Level, 122, Fig. 8 (1.), 11-12; Iris C. Love, Knidos-Excavations in 1967. *TürkArkDerg* 16/2 (1967) 147, Fig. 14.

[121] Some sites such as Rome or Terracina show also examples of mooring stones in the shape of a lions' head or fore-paws: Blackman, Harbours, II, 203; Coetlogon Williams, Roman harbours, 75, Fig. 2; de la Blanchere, Terracine, 335, Pl. XI.

[122] Bass, Seafaring, 108-109, Fig. 21-23; Blackman, Harbours, II, 203, Fig. 11; however, Leptis Magna possessed apart from rectangular mooring stones also some horizontal pierced wedge-shaped stones at the south-eastern corner: Blackman, Sea Level, 117.

[123] Blackman, Sea Level, Fig. 8 (1. and 2.); Coetlogon Williams, Roman harbours, 75.

[124] Blackman, Harbours, II, Fig. 2; Blackman, Sea Level, Fig. 8 (3.); Coetlogon Williams, Roman harbours, 75.

assumption that the various positions and forms of mooring stones probably resulted from different functions and way of use or for ships of different size. Leptis Magna and Dor in Libya and Israel, as well as further examples, confirm not only a historical development of such devices, but support even more the afore-mentioned assumption of their different functional purpose. For example the single-stepped quay on the northern shore at Leptis Magna possesses vertical pierced rectangular stones projecting from the kerb, whereas its two-stepped east mole provides vertical pierced rectangular stones as well but projecting from the upper level. Like the quay of Dor's northern bay, the south-east corner of the harbour of Leptis Magna is equipped with horizontal pierced wedge-shaped stones along the kerb.[125]

The Torlonia relief from around AD 200, showing a merchant ship tied up to a loop-shaped mooring stone at the harbour of Portus, gives clear evidence that the ropes of ships of that time were directly fastened to the blocks. Since the edges of these blocks are very sharp, which would have chaffed the ropes, it has generally been suggested that they possessed metal rings. Apart from the fact that the holes of the mooring stones are too big to provide a proper use of metal rings, however, there is no evidence from any archaeological context, iconographic or written sources.[126] Nevertheless, mooring rings have been attested at numerous sites throughout the Mediterranean.[127] They were made of iron and either set directly into the quay or fixed to mooring posts. Since metal rings were easier and cheaper to produce, it can be assumed that they have dominated primarily smaller provincial harbours and staple markets. Moreover, such iron rings could be used

[125] Blackman, Sea Level, 117-119; Kingsley, Barbarian Seas, 139; S. A. Kingsley – K. Raveh, A reassessment of the northern harbour of Dor, Israel. *IJNA* 23/4 (1994) 292-293, Fig. 1, 4-6.

[126] Ibid., 120; Blackman, Harbours, II, 203.

[127] Blackman, Bollards, 10; Coetlogon Williams, Roman harbours, 76; Paulys Real-Encyclopaedie, XIII, 562.

also at wooden structures such as wharves and piers.[128] Therefore, as at modern harbours, it is possible that iron rings were also used for small ships in a specific area within a bigger harbour or port.

As such, the harbour layout related to the organization of docking must have been a very complex task. In particular, ports and bigger harbours were frequented by many different ships with different purposes. Consequently the harbour and mooring facilities had to cope not only with a range of functions and duties, but also with various ship sizes and lengths.[129] According to the function of a certain harbour area and the length of the ship, mooring devices were set at different intervals. The shortest distance so far has been registered at the harbour of Phaselis with 2.7 m, whereas the highest distance so far shows Terracina with 17-18.5 m and Aquileia with 21.3 m and 24 m.[130] Based on the distances of single and groups of mooring stones and their pattern, Rickman deduces that ships were berthed with the prow first to the shore.[131] But Blackman correctly argues that, ships presumably moored broadside to the quay for the procedure of loading and unloading cargo and not until the operation finished, the ship switched to the "typical Mediterranean mooring" and possibly even changed its place of location to make space for other ships.[132] In order to organize harbour activities and to ensure the proper and efficient functioning of trade operations in the port, the berths in the harbour-basin possessed individual numbers. This was achieved by numbered columns or so-called "boundary stones" along

[128] Coetlogon Williams, Roman harbours, 76.

[129] Rickman, Archaeology, 262-263.

[130] Further distance measurements are: Leptis Magna: 3 m, Teos: 3.4-3.5 m, Phaselis: 2.7-6 m, Ventotene: 4.10-17 m, Portus: 14-16 m and Aquileia: 14-18 m: Blackman, Bollards, 12; Coetlogon Williams, Roman harbours, 75.

[131] Rickman, Roman Ports, 112.

[132] Blackman, Bollards, 11; Blackman, Sea Transport, 649.

the quays, jetties and moles.[133] Such boundary stones were found at several sites throughout the Mediterranean such as at Akko, Kition, Portus or Phthiotic Thebes.[134] They consisted either of stone or marble columns labelled with numbers and berthing marks. Some boundary stones may have fulfilled also other functions at the same time, for example tall columns probably served as architectural elements, supporting roof constructions of coverings and other facilities. Therefore one meets boundary stones of different sizes, varying from 0.74 m at Phthiotic Thebes to as tall as 7 m, as at Kition.[135]

1.3.1.5. Lighthouse, beacon and landmark

In the Mediterranean and the Black Sea seafaring people knew and used various navigational aids as early as the Archaic period.[136] The earliest type used in Antiquity was the beacon. A beacon is defined as "a prominent erection on shore that indicates a safe line of approach to a harbour or a safe passage clear of an obstruction".[137] In fact beacons were used for various purposes and therefore fulfilled several functions. Numerous sources attest their adoption for military use during the Classical period and they continue at least until Late Antiquity. Being used as warning signals, they warned about the attack or fall of a city and about military actions and the approach of enemy troops.[138] Although

[133] Blackman, Harbours, II, 204.

[134] Blackman, Bollards, 10-11; Blackman, Sea Transport, 651; Olga Karagiorgou, Urbanism and Economy, 54, Pl. 40 (unpublished doctor thesis); G. A. Soteriou, Αι χριστιανικαί Θήβαι της Θεσσαλίας και αι παλαιοχριστιανικαί βασιλικαί της Ελλάδος. *AE* (1929) 12, fig. 9.

[135] Blackman, Bollards, 11; V. Karageorghis, Kition: Mycenaean and Phoenician discoveries in Cyprus. London 1976, 17-18; Soteriou, Thebai, 12, Fig. 9.

[136] J. Morton, The role of the physical environment in ancient Greek seafaring. Leiden 2001, 211, fn. 94.

[137] Ships and the Sea, 38.

[138] Further, they were used to irritate and mislead enemy ships sailing during the night: B. Giardina, Navigare necesse est: Lighthouses from Antiquity to the Middle Ages. History, architecture, iconography

coastal towers do not necessarily have to be associated with beacons, in terms of military communication so-called "beacon towers" were used.[139] The archaeological remains of such towers are documented at the central Greek island of Skiathos, dating to the Persian wars at the beginning of the 5th century BC and at Carthage from the 4th century BC.[140] These mainly round towers of stone operated with fire signals. Apart from military purposes, beacons played a much greater significance as indicators for important or dangerous coastal areas at night. They provided ships with crucial marks to change course in order to avoid dangerous rocks and reefs.[141] Ships must have encountered such beacons at, for example, the entrances to the Hellespont and the Bosporus throughout Antiquity and the medieval period, which is confirmed by written sources of all periods as well as modern beacons and other installations.[142] Nevertheless, although strong currents made sailing extremely difficult and dangerous and the existence of lit beacons indispensable, especially during the night, there is no archaeological evidence for the use of lit beacons during the Byzantine period so far.

Finally, lit beacons were used to guide ships safely into harbours. Such leading harbour lights start as early as the 6th century BC and were a quite common method from the 5th century BC onwards.[143] They often appeared in the shape of gigantic figures marking the

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and archaeological remains (*BAR Int. Series* 2096). Oxford 2010, 1-4, 23; Morton, Environment, 211-212, fn. 95-98.

[139] Ibid., 214.

[140] All of them are cylindrical in shape and the one from Carthage shows three storeys with window-like openings for the fire signals: Doulgeri-Intzesiloglou, Skiathos, 104-105; Giardina, Lighthouses, 5, Fig. 3a; S. Medas, La marineria cartaginese. Sassari 2000, 24, Fig. 10.

[141] Giardina, Lighthouses, 6ff; Morton, Environment, 212-214.

[142] Anne P. Burnett, Hekabe the Dog. *Arethusa* 27/2 (1994) 159ff; Morton, Environment, 212.

[143] One example of shore fire signals presumably of such purpose, show the remains of a beacon tower at Piraeus: Burnett, Hekabe, fn. 44.

entrance of ports.[144] As already mentioned, these impressive statues or so-called "Colossi" acted as landmarks indicating the position of harbours. The best-known example certainly demonstrates the Colossus of Rhodes.[145] Contrary to suggestions that *colossi* were standing across the harbour entrance, it has to be assumed that these constructions were rather located beside entrances. Statically and architecturally is very unlikely that they could have reached a sufficient height for ships to pass and simultaneously function as a lit beacon.[146] Although the tradition of colossi fell into disuse after the 3rd century BC and probably disappeared in the Roman period, small lit statues continued to function as beacons for small local harbours, staple markets and private coastal structures, such as villae maritimae, at least until Late Antiquity. This is attested by archaeological remains such as the Colossus (sitting female statue) of Porto Raphti and the statue of Santa Marinella, near Civitavecchia both from the 2nd – 3rd century AD.[147]

Beacons and *colossi* were replaced with the introduction of proper lighthouses in the early Hellenistic period.[148] A lighthouse is interpreted as "a building on some conspicuous point of the coast, a pier or jetty, an island or rock, from which a light is exhibited at night as an aid to navigation".[149] It is generally assumed that the very first lighthouses developed from afore-mentioned lit beacon towers.[150] Nevertheless, different to beacons and modern

[144] Giardina, Lighthouses, 8.

[145] For detailed information on the colossus of Rhodes see: W. Hoepfner, Der Koloss von Rhodos und die Bauten des Helios: neue Forschungen zu einem der Sieben Weltwunde. Mainz 2003.

[146] Blackman, Sea Transport, 661; Giardina, Lighthouses, 9.

[147] Giardina, Lighthouses, 9, 23, Fig. 11a-b; Hoepfner, Der Koloss von Rhodos, Fig. 109; C. C. Vermeule, The Colossus of Porto Raphti in Attica. *Hesperia* 31/1 (1962) 62-81.

[148] Blackman, Sea Transport, 661.

[149] See "lighthouse" at: http://www.ngs.noaa.gov/RSD/shoredata/c_coast_def.htm#num7.

[150] Ships and the Sea, 318; such a tower, dating to the 6th century BC, was recorded for example for the harbour of Thasos: Giardina, Lighthouses, 10, 23.

lighthouses, antique and medieval ones were used exclusively as navigation marks to guide ships to harbours and indicate their position.[151] The best-known example is the famous lighthouse or so-called "Pharos" at Alexandria, built during the reign of Ptolemy II around 280 BC.[152] The Pharos of Alexandria was not the prototype of lighthouses but it definitely functioned as a model for the construction of later types and developments.[153] Post-Alexandrian and especially Roman lighthouses were not identical but show very similar characteristics. They consisted of a number of storeys, varying between 2 and maximum 12 and each decreasing in width and size towards the top.[154] Concerning the shape of lighthouses, supported by a quadrangular base, the Pharos of Alexandria possessed 3 storeys, the first being rectangular, the second octagonal and the third cylindrical in shape. Different to that, the storeys of the Roman examples were mostly constructed in a consistent shape with interior stairs and supported again by a quadrangular base. Alongside octagonal and rectangular forms such as the lighthouse of Leptis Magna, the most common and preferred shape in the Eastern Mediterranean was the cylindrical form, such as the lighthouse of Patara.[155] However, numerous mosaics and other illustrations such as coins indicate that, regardless of the design and height of the lighthouse, the last storey was always cylindrical in shape and finished with either a cupola or a pitched conical tiled roof.[156] Nevertheless, since no archaeological records

[151] Blackman, Sea Transport, 661; Ships and the Sea, 318.

[152] Ships and the Sea, 319; for more details about the Pharos of Alexandria see: Giardina, Lighthouses, 12ff.

[153] The Pharos of Alexandria possessed already all necessary features of modern lighthouses: ibid.

[154] Giardina, Lighthouses, 25; D. B. Hague, Lighthouses, in: Marine Archaeology, Proceeding of the Twentythird Symposium of the Colston Research Society, D. J. Blackman (ed.), Bristol 1971 (*Colston Papers* 23). London 1973, 293.

[155] However, a round shaped base was not common for lighthouses but rather used for watching- or fortification towers: Giardina, Lighthouses, 24-25, 53-54, 71-72; Morton, Environment, 214; B. Yildirim - Marie-Henriette Gates, Archaeology in Turkey, 2004-2005. *AJA* 111/2 (2007) 315.

[156] Giardina, Lighthouses, Figs. 13-14, 16, 18; Hague, Lighthouses, 303, Fig. 4.

survive beyond the base and lower part, it remains hypothetical if the top part was open and supported by columns or closed with windows. Both iconographic depictions and archaeological remains document rectangular and semi-circular windows at lighthouses from Antiquity onwards.[157]

Another important feature of lighthouses at ports and bigger harbours are the addition of statues on the top of the roof. But different to the lit statues of small harbours, statues on lighthouses do not function as beacons anymore but rather as dedications and decoration. While it seems that this tradition fell into disuse in the west, there is a continuity in the Byzantine east at least until Late Antiquity.[158] In contrast, small harbours of the west rather used columns standing in a visible position, which probably provided a fire lit on top at night, shown by a mosaic from Praeneste.[159]

[157] Giardina, Lighthouses, 25, Fig. 12.

[158] For example the Italian harbours of Ostia, Puteoli or Ancona relocated such statues on triumphal arches near the mole or the lighthouse already during the Roman period, whereas the 6th century AD text of John of Ephesus refers to a statue of the Byzantine emperor Justinian II on the top of the Zeuxippo lighthouse at Constantinople: Ibid., 19, 24, 90-91, 99-100, 102-104; C. A. Mango, The art of the Byzantine Empire, 312-1453: sources and documents, (*Medieval Academy reprints for teaching* 16). Toronto 1986, 125-126.

[159] Coetlogon Williams, Roman harbours, 74-75, Fig. 1; O. Marucchi, Nuovi studi sul Tempio della Fortuna in Preneste e sopra i suoi mosaici. *Bullettino della Commissione Archeologica Comunale di Roma* 32 (1904) Plate VI-VII.

1.3.1.6. Warehouse, Granary and other facilities

A harbour consists not only of components providing a safe anchorage place and accommodation for ships. Apart from important architectural features for mooring like quays, moles and jetties etc., harbours possess various facilities for the operation and supervision of trade, the transfer of cargo, re-fuelling and supplying ships as well as many other activities. As Rickman correctly emphasizes,[160] it is even more difficult to understand the logistics, administration and coordination of ancient and medieval harbour activities than the harbour architecture itself. In order to be able to deal with complex activities in busy harbours and especially in those fulfilling multiple functions, it was necessary to have a good and well organized architectural infrastructure. One of the most important and essential facilities required in harbours is the warehouse.

A warehouse can simply be defined as a "commercial building in which goods are stored".[161]

Usually located directly behind or alongside the quay[162], warehouses were connected both with the harbour and with the numerous markets, shops and taverns within the Emporion via roadways.[163] Apart from quayside warehouses, particularly bigger harbours from the Late Roman period onwards also possessed storage buildings located alongside the moles.[164] After unloading the ship, the goods were carried first to the warehouses and deposited for initial storage and then further distribution. But in addition to their function

[160] Rickman, Roman Ports, 111.

[161] J. B. Sykes (ed.), The Concise Oxford Dictionary of current English. Oxford [6]1976, 1311.

[162] As known for example from Portus: G. Rickman, Roman Granaries and Store Buildings. Cambridge 1971, 125ff., Fig. 27; G. Rickman, Rome, Ostia and Portus: The Problem of Storage. *MEFRA* 114 (2002) 353-362.

[163] Blackman, Harbours, II, 204.

[164] The most well-known and preserved example are the storerooms stretching out on the east mole of Leptis Magna: Rickman, Granaries, 132ff., Fig. 29.

as short- or long-term storage buildings, they also served as places where customs duties were levied for tax payment and the control of cargo.[165] Consequently warehouses played a significant role for the administration and execution of the import-export procedure. In contrast to smaller storage rooms or warehouses for specific purposes such as granaries, large warehouses were used to store all kinds of merchandise. Goods for short-term storage probably remained in their original containers, whereas it can be assumed that for long-term storage purposes the merchandise was transferred to large permanent containers such as *Dolia* or *Pithoi*.[166]

Storage rooms with such containers were used at the great palaces in Minoan Crete, the Levant, Mesopotamia and Egypt as early as the 2nd Millennium BC, such as Knossos, Phaestos or the palace of Mari in Syria.[167] Except for small storage rooms, storage houses or magazines (*ἀποθήκη*)[168], the commercial structure par excellence during the classical Greek period was the *Stoa*.[169] Apart from surrounding the Agora of the adjacent Emporion, it also formed a main architectural element of harbours, flanking the quayside,

[165] Aidoni et alii, Journeys, 27; J. Patrich, Warehouses and Granaries in Caesarea Maritima, in: Caesarea Maritima. A retrospective after two Millennia, A. Raban – K. G. Holum (eds.), (*Documenta et Monumenta Orientis Antiqui (DMOA). Studies in Near Eastern Archaeology and Civilisation* 21). Leiden - New York - Köln 1996, 146.

[166] Patrich, Warehouses, 146, 149.

[167] Ibid., 149; A. Parrot, Mission archéologique de Mari, II. Paris 1958, Plan; J. Pendlebury, The Palace of Minos. London 1954, Fig. 2; L. Pernier, Il palazzo minoico di Festos, II. Rome 1951, 77ff; Rickman, Granaries, 151-153.

[168] In contrast to the Stoa, the so-called *Apotheke* was according to its etymological signification, a store house, room in a house or magazine for keeping goods of all kinds, especially wine and olive oil: Liddell-Scott, A Greek-English Lexicon, 199; Paulys Real-Encyclopaedie, 2 (1), 183-184.

[169] The Stoa was a long colonnaded building surrounding the marketplace, the so-called Agora. The covered walkways either flanking an open marketplace or lining a central building were used for multiple public purposes such as commerce, storage, entertainment and other social activities: Paulys Real-Encyclopaedie, 7, 1-47; Rickman, Granaries, 149.

such as at Piraeus, Miletus or Delos.[170] The Roman equivalence was the so-called *Porticus*,[171] fulfilling the same function. But although the Portico remained an important feature of harbour architecture at least until the Byzantine period, their role as great storage and distribution facilities was replaced by the end of the 2nd century BC by warehouses *per se*. These new public architectural structures for commercial purposes were taken by so-called *Horrea*.[172]

Although the horreum, as an independent structure for storing goods, is a Roman invention, its concept derived from eastern, possibly Hellenistic influence. Increasing contacts with the Greek world resulted in the adoption of the afore-mentioned Portico by Roman architecture, like for example the construction of the great Porticus Aemilia within the Emporion along the quayside of the Tiber around 193 BC. But also, as a result of the Roman expansion towards the east, the first horrea (presumably the Horrea Sempronia)[173] appeared around the last half of the 2nd century BC.[174] Except for a basic ground plan of a row of deep narrow rooms (*cellae*), horrea followed very different architectural designs

[170] Patrich, Warehouses, 149; Rickman, Granaries, 149, 155.

[171] L. Richardson Jr., A New Topographical Dictionary of Ancient Rome. London 1992, 310-320.

[172] A "*Horreum*" (ὡρεῖον) was a public warehouse used for various purposes. Etymologically it was used specifically for storing mainly grain but also fruits, olive oil and wine. During the Roman Imperial period the Horrea were used to store many other types of merchandise and defined as a general place for the safe keeping of money and goods of any kind. For further information, see: Paulys Real-Encyclopaedie, VIII, 2458-2464; Richardson, Topographical Dictionary, 191; W. Smith, A Dictionary of Greek and Roman Antiquities. London ^{2}1875, 618.

[173] The Horrea Sempronia or also called Horrea Aemiliana were warehouses exclusively for grain storage probably built by Scipio Aemilianus or Gaius Gracchus between 142 and 123 BC: F. Coarelli, Rome and Environs. An Archaeological Guide. Berkley – Los Angeles – London 2007, 315-316; Richardson, Topographical Dictionary, 195; Rickman, Granaries, 149-150, 173 fn. 4.

[174] The slightly later Horrea Galbana (also Horrea Sulpicia) of the end of the 2nd or 1st century BC (maybe 108 BC) were the first horrea built within the Emporion adjacent to the Porticus Aemilia alongside the quay and provide the first evidence of a ground plan for horrea: Patrich, Warehouses, 149; Paulys Real-Encyclopaedie, VIII, 2460; Richardson, Topographical Dictionary, 193; Rickman, Granaries, 97-104, 148-150, 155.

depending on their functions. However, one can distinguish between two main types: the courtyard or quadrangular type and the so-called corridor type.[175] The typical and most common type, not only within the Emporion itself, but also partly spread throughout the city, existed of rows of *cellae* around a central rectangular or square courtyard. Since at least early horrea were run by and the property of mainly private entrepreneurs, their architecture is influenced by private courtyard houses of that time.[176] In contrast, harbour warehouses consisted more of corridor horrea. Due to a lack of space, the courtyard design was abandoned and the *cellae* were often arranged simply back to back on either side of a narrow corridor, forming two regular rows of small rooms that opened towards the corridor.[177] A possibly third type emerged from the latter one in the 2nd century AD. Here the rows of rooms were literally built back to back, using a main central wall instead of a corridor. Consequently, this new type consisted of two separated rows of much deeper *cellae*, which were again divided into 2-3 small compartments (*armaria*).[178] Harbour horrea particularly in Asia Minor, the Levant and Africa followed a more Middle Eastern tradition. Their ground plan reflects only one single row of very great and deep rooms, all opening to the same side, as can be seen at Leptis Magna.[179]

Concerning their interior design, horrea possessed at least two or more storeys for storage purposes. These were connected with ramped stairways, consisting of up to 5-6 steps followed by a ramp of slight gradient.[180] Great emphasis was put on the strength, security

[175] Rickman, Granaries, 148, Fig. 2, 27, 30, 31; Rickman, Storage, 23-24; Patrich adds a third type for Caesarea Maritima: the so-called vaulted type: Patrich, Warehouses, 149-153; Granaries (Grain Horrea or "*Granaria*") will be discussed separately as an independent type.

[176] Paulys Real-Encyclopaedie, VIII, 2460; Rickman, Granaries, 155, 291.

[177] The best example for such corridor horrea can be seen at the harbour of Portus; see fn. 113; for further information and illustrations of Portus see http://www.ostia-antica.org/portus/plan-trajan.htm.

[178] Rickman, Storage, 354.

[179] Patrich, Warehouses, 149; Rickman, Granaries, 132-136, 148.

[180] Rickman, Granaries, 22, 82, 129-130, Pl. 3 and 24.

and protection against thefts and in particular against fire. As such, horrea were built at a safe distance of up to 100 feet from other buildings and their walls consisted of thick brick-faced concrete with narrow entrances and high placed windows.[181] Archaeological remains show three types of roof-construction for warehouses: vaulted or gabled roofs, built with beams and tiles or flat roofs, using a combination of beams and mortar. Especially harbour horrea of later periods were constructed mainly with barrel-vaulted or gabled and tiled roofs, as can be seen on numerous mosaics and at Caesarea Maritima.[182] Concerning the purpose of the various Roman horrea, indicating the commodities they stored, etymologically at least 6 different types of warehouses can be identified and distinguished for the storage of various kinds of merchandise:[183] the *Horrea Candelaria* for storing and selling wax tapers and tallow candles; the *Horrea Chartaria* for storing and trading paper, particularly from Egypt; the *Horrea Piperataria* for storing primarily Egyptian and Arabian goods and known as the oriental spice market; the so-called *Horrea Privata*, either for storing various private artifacts or being used for private purposes; the so-called *Horrea Publica* for storing different kinds of furniture or acting as a bank or safe for money; and finally the *Horrea Sulpicia* for storing primarily oil and wine, such as the horrea Galbana.[184]

[181] Paulys Real-Encyclopaedie, VIII, 2461; Rickman, Storage, 354.

[182] The 2nd century AD mosaic from the Villa of the Nile at the National Archaeological Museum in Tripolis (Libya) and the 5th-6th century Byzantine mosaic of Kelenderis depict gabled and tiled roofs used for their horrea, whereas Patrich identifies vaulted warehouses at Caesarea Maritima: ibid., 83; Patrich, Warehouses, 149, 153.

[183] Of course there must have existed numerous other types.

[184] For more detailed information on the various types of Roman warehouses: Paulys Real-Encyclopaedie, VIII, 2458-2460; Richardson, Topographical Dictionary, 192-195.

A type of horreum which needs to be discussed separately is the granary or so-called "*Granarium*" or "*Σιτοφυλακεῖον*".[185] As for the Byzantine period, the most important type of horreum during the Roman period was the one dedicated to grain storage. The idea of constructing granaries *per se* dates back to as early as Neolithic Mesopotamia and first appeared as independent structures in Egypt around the 4th Millennium BC with the intention of preserving grain.[186] As main features for the *annona militaris*, beside other horrea for oil and wine, granaries played a major role during the Roman Imperial and even more during the Byzantine period. Consequently, they were organized and controlled by the state and formed the main element of harbour installations, irrespective the various functions and purposes of harbours. Concerning their architectural characteristics, granaria were, unlike other horrea, constructed as long narrow and rectangular or sometimes even quadrangular buildings with raised ground floors. While the ceiling of the lower storeys or underground granaries consisted of horizontal revetted wooden beams with an opening in the middle for the filling of the grain,[187] the roofs of granaries were usually barrel-vaulted.

Finally, Marlia Mundell Mango etymologically identified another independent type of horreum, namely the so-called *Horrea Olearia*. This type, exclusively for storing oil, is mentioned in the 5th century *Notitia Dignitatum* for being used at Byzantine Constantinople.[188] Consequently it seems that, in contrast to the Roman state-controlled

[185] The Granarium was a specific type of Horreum, particularly for the storage of grain. It was a purpose built house or room always at the driest and coolest location. For further information on its characteristics and the keeping and practice of preservation of grain see Liddell–Scott, A Greek-English Lexicon, 1602; Patrich, Warehouses, 167.

[186] I. Kuijt - B. Finlayson, Evidence for food storage and predomestication granaries 11.000 years ago in the Jordan Valley. *PNAS* 106 (2009) 10966-10970.

[187] Rickman, Granaries, 2-3; like for example at the harbour granaries of Caesarea Maritima: Patrich, Warehouses, 164-167, Fig. 21.

[188] Mundell-Mango, Commercial Map, 193; Notitia Dignitatum, 5.13, 233.

warehouses which were storing provisions like grain, olive oil and wine together, warehouses of later periods and especially during the Byzantine period, were separated not only between private-run and state-controlled horrea, but also according to their purpose.

1.3.1.7. Anti-siltation and Dredging methods

Different factors such as geographical and physical conditions as well as architectural aspects affected the foundation and the development of coastal installations. Consequently, harbour engineers had, as in modern times, to take various influencing circumstances into consideration. Apart from the problem of arranging structural stability with architectural functionality or restrictions, one of the biggest problems and concerns ancient and medieval engineers had to face was the siltation of the harbour basins. The continuous accumulation of sand on the sea bottom sometimes even caused the abandonment or movement of coastal structures in the course of time, such as happened at Ephesus, Smyrna etc.[189] Therefore the harbours had to be cleaned from time to time by dredging the sand from the sea bottoms. But despite the use of specific machines and dredging methods, however, the nature of their results would have been relatively short-lived. Consequently, although dredgers and dredging activities are archaeologically and textually attested for Antiquity and the Byzantine period,[190] harbour engineers aimed to prevent the problem of siltation by various precautionary measures as early as the Bronze Age.

[189] Blackman, Harbours, II, 186, 199; Honor Frost, Under the Mediterranean. London 1963, 92-93.

[190] For example the Byzantine emperor Anastasios I (491-518 AD) ordered the dredging of the harbour of Julian in AD 509: Aidoni et alii, Journeys, 20, 22.

The various measures depended on the geographic, physical and architectural characteristics of each harbour.[191] One of the main attempts to counteract against siltation was the deflection of silt-bearing or silt-causing currents. This could be achieved for example by the careful placement of specific harbour structures such as breakwaters, moles and jetties.[192] As such, in the 2nd century AD and later on, some harbours were provided with offshore breakwaters if geographical and physical conditions allowed and required it. Harbours provided only with offshore breakwaters had the advantage not to be forced to avoid any silt-bearing currents. This protection method rather allowed coastal currents to pass through the harbour without obstructing any structure such as at Patras.[193] Ports with two or more harbour entrances were favoured with a similar effect. The interconnected entrances maintained currents constantly to flush the silt out of the harbour basin. In order to achieve the same result, ports with several separated and independent harbours with one entrance at each of them were occasionally artificially interconnected by channels or so-called "Εύροποι" or "Διορυγαί".[194] Ports with only one harbour and a single entrance used another sophisticated feature to attempt de-siltation. At ports like Caesarea Maritima or Sidon, rows of underwater ashlar-lined tunnels, so-called "sluice

[191] In general, harbours with only one entrance and especially harbours close to or on a river mouth had to face serious problems which quite often could hardly be solved. Among numerous harbours which suffered from silt-laden river-waters and consequently had to be given up or re-located in the course of time, the best-known examples are probably Leptis Magna, Ephesus or Pagasai; Blackman, Harbours, I, 88 and II, 187, 199, 202.

[192] Ibid., 199.

[193] Blackman, Harbours, II, 198; Blackman, Sea Transport, 648-649; Lehmann-Hartleben, Hafenanlagen, 211-212.

[194] The best-known examples for this method are the ports of Alexandria, Knidos, Mytilene, Halicarnassus and Myndos as well as Sidon: Baika, Harbours, 432; Blackman, Harbours, II, 199; Fabre-Goddio, Portus Magnus, 53, fig. 5.1.; Frost, Sidon, 76, fig. 1.

channels" or flushing tanks through the moles of the harbour, helped to achieve the prevention of siltation by flushing the silt out of the harbour basin.[195]

In almost tideless regions such as the Mediterranean and the Black Sea and especially at harbours with two entrances, a further effective de-silting method could be practiced by letting waves continuously break over rubble-mound breakwaters in order to create controlled currents within the harbour basin.[196] But this was not possible at breakwaters supporting further structures such as moles or fortification walls. Consequently, during the Roman period, architects tried to find a way to use breakwaters supporting moles to act against the problem of siltation. Therefore during the period of the *Pax Romana* the design of moles started to get remodelled by introducing the Arch construction to the architecture of harbour features.[197] The use of such permanent arched elements in moles, jetties and quays or even the construction of wooden piled piers or wharfs was intended to maintain silt-flushing currents. But this design is not only illustrated for the Roman period;[198] according to Byzantine written sources such as Procopius (500 – 565 AD) and Pachymeres (1242 – 1310 AD), this design is also attested for Constantinopolitan and other harbours during the reigns of Justinian (483 – 565 AD) and Michael VIII Palaiologos (1223 – 1283 AD).[199]

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[195] Blackman, Harbours, II, 202, Fig. 9; J. I. Boyce – E. G. Reinhardt, Marine Magnetic Survey of a Submerged Roman Harbour, Caesarea Maritima, Israel. *IJNA* 33/1 (2004) 124, fig. 2.

[196] See chapter 1.3.1.1. "Breakwater and Mole".

[197] Ibid.

[198] Confirmed by the harbour of Puteoli and the wall painting of Stabiae.

[199] The Byzantine historians Pachymeres and Procopius describe among other Constantinopolitan harbours possessing rows of arches, also the architecture and shape of the harbour of Kontoskalion: Aidoni et alii, Journeys, 22-23.

1.3.2. Military harbour installations

1.3.2.1. Shipshed, Shipyard and Arsenal

The main and most important features of naval harbours are the shipsheds or so-called "νεώσοικοι". Ships had to be hauled out of the water constantly for maintenance and occasionally needed repairs, as well as for their protection against various weather conditions. In contrast to merchant vessels, military ships were normally out of use for long periods, especially during the winter months. However, since these ships had to be kept ready for deployment for any military emergency, during that time they had to be dried out and protected against rotting, brittleness or corrosion by the much feared shipworm or so-called "Teredo navalis". Consequently, in order to maintain a naval fleet, purpose-built permanent installations for the covering of the ships had to be constructed.[200] Shipsheds provided this much-needed protection.

A shipshed or νεώσοικος is characterized as a long and narrow roofed hall, which is open towards the sea and closed on the back towards the land. Its floor, or so-called "slipway", is slightly sloping from the back of the building towards the water, forming a ramp for the ships to be launched quickly.[201] Since shipsheds had to be large enough in order to accommodate a military ship, these architectural features took up large areas of the quay or mole area.[202] At harbours which had to accommodate and maintain a large number of military ships, several shipsheds were built next to each other in a row with a common front-line.[203] From the 5th century BC onwards, when various naval powers started raising

[200] Baika, Harbours, 434; Blackman, Harbours II, 204; Blackman, Sea Transport, 657.

[201] For more details on slipways see next chapter 1.3.2.2. "Slipway".

[202] Blackman, Harbours II, 204; Blackman, Sea Transport, 655.

[203] Baika, Harbours, 434, fig. 6; Blackman, Sea Transport, 656-657, fig. 25.5.

large fleets in order to struggle for naval supremacy, the construction of large-scale military infrastructures such as big shipshed complexes needed a structural organisation.[204] In contrast to single shipsheds or small groups of two to three at most, which could have occupied only a certain harbour sector or functioned individually as small bases to fulfil the requirements of patrolling warships for the surveillance of shipping lanes,[205] bigger installations with their facilities had to be separated from commercial structures and operated independently. Consequently, this led to the formation of self-contained military harbours (*Neoria*) with a secluded basin and infrastructure.[206] Apart from docking facilities, shipyards, storerooms and other necessary

[204] The biggest fleet of the 5th and 4th century BC with around 400 ships in service was held by Athens. Correspondingly, inscriptions attest about 372 shipsheds for its three harbours. Other written accounts from the 1st century BC to 2nd century AD such as Diodorus (14.42.5), Strabo (12.8.11) or Appian (Pun. §96) report similar numbers for Syracuse (with 310), Carthage (with 220) and Cyzicus (with more than 200 shipsheds) as well as other medium-sized complexes of up to 100 shipsheds at Thasos, Samos, Rhodes, Chios, Aegina and other harbours; IG II^2 1604-1632; Baika, Harbours, 434; Blackman, Harbours II, 204, fn. 107; D. Blackman, Progress in the Study of Ancient Shipsheds: a Review, in: Boats, Ships and Shipyards. Proceeding of the Ninth International Symposium on Boat and Ship Archaeology, C. Beltrame (ed.), Venice 2000 (*International Symposium on Boat and Ship Archaeology* 9). Oxford 2003, 81-84; Blackman, Sea Transport, 658; I. Dragatsis, Έκθεσις περί των εν Πειραιεί Ανασκαφών. *PAE* 1885, 63-71; Simossi, Samos, 59-63.

[205] Conducting repairs and providing sufficient protection; the best-known examples of shipsheds functioning as bases are at Sounion, Trypiti in Crete, Matala and bigger ones at Oeniadae, Atalante or Kos: Blackman, Ancient Shipsheds, 84-85; Blackman, Sea Transport, 658; Kalliopi Baika, Operating on Shipsheds and Slipways: Evidence of Underwater Configuration of Slipways from the Neosoikos "Trypiti", in: Boats, Ships and Shipyards. Proceeding of the Ninth International Symposium on Boat and Ship Archaeology, C. Beltrame (ed.), Venice 2000 (*International Symposium on Boat and Ship Archaeology* 9). Oxford 2003, 103-108; for further information on military bases see chapter 1.2. "Function, purpose and hierarchy of coastal installations".

[206] Baika, Harbours, 434-435; A. Raban, Ancient Slipways and Shipsheds on the Israeli Coast of the Mediterranean, in: Boats, Ships and Shipyards. Proceeding of the Ninth International Symposium on Boat and Ship Archaeology, C. Beltrame (ed.), Venice 2000 (*International Symposium on Boat and Ship Archaeology* 9). Oxford 2003, 95.

military installations such as arsenals, long rows of shipsheds were located along the harbour basin as mentioned above.

These shipsheds shared a continuous back wall and were apportioned by rows of columns, pillars or posts leading down to the sea. Instead of the columns, which supported not only the roof but also provided a fairly good ventilation to the open structure, at intervals of usually two sheds a continuous and solid wall divided them into pairs. The pairs, however, were interconnected by openings through these walls. Concerning the ceiling construction, in general two types of roofing systems can be identified for ancient shipsheds: on the one hand gradually descending roofs[207] and on the other hand horizontal roofs descending in steps.[208] In any case, both types consisted of gabled roofs of a wooden ceiling construction covered with brick tiles. In contrast to the classical gabled roofs, for the Roman and Byzantine period the typical architectural feature of the arch found its way also in terms of the construction of shipsheds. Depictions on mosaics or coins as well as written sources attest the construction of vaulted buildings of brick and stone blocks.[209] The only remnant of this tradition are the Venetian shipsheds at Heraklion from the 16th century AD. Elsewhere the Venetians combined the classical gabled roof with the Roman arch as can be seen at the so-called "Grand Dockyard, Arsenali" of Chania from the beginning of the 16th century AD as well.[210]

[207] The best-known examples for this type of roofing are the shipsheds of Munichia and Zea at Piraeus, Rhodes and Oiniadai, where the bases of the columns and therefore presumably also the tops are descending towards the sea: Baika, Harbours, 434, fig. 5; Blackman, Ancient Shipsheds, 87, fig. 14.6.

[208] Clear examples for this type of roofing show the shipsheds of Kition, Naxos and probably Marseille: Ibid, 87-88, fig. 14.7.

[209] Aidoni et alii, Journeys, 24-27, fig. 10-12; Blackman, Harbours I, 81, fig. 1. H; B. Rankov – O. Grimm, Grossbootshaus, Zentrum und Herrschaft: Zentralplatzforschung in der nordeuropäischen Archäologie (1.-15. Jahrhundert). Berlin 2006, 249-264; for possible archaeological remains of Roman to Byzantine shipsheds at Caesarea Maritima see: Raban, Ancient Slipways, 95-101.

[210] Aidoni et alii, Journeys, 27.

Closely connected with the question of the above-mentioned typology of shipshed complexes is the study of their dimensions (Tab. 1). Blackman suggested various categories, differentiating them at least between three types: large, medium/large and medium/small.[211] But apart from the difficulty of an exact and detailed recording of their numbers, the task of documenting their measurements is even harder due to their badly preserved archaeological remains. Only the width and length of very few shipsheds can be taken or at least estimated so far.[212] Until recent years scholars dealt only with a single "traditional type", measuring about 6 m in width and housing the classical trireme such as the ones at the harbours of Zea, Oeniadai and most of Carthage as well as some at Rhodes.[213] But in addition to the 6 m wide ones, at Rhodes narrower shipsheds were also found. As at Dor, Antikyra and Phalasarna, the narrow shipsheds at Rhodes do not exceed 5 m.[214] The question of shipshed types gets even more complicated with the shipshed-dimensions of the ones of Carthage and the Greek island of Alimia. There much bigger widths of up to at least 10m were registered.[215] The same dimensions are provided by

[211] Large with over 200 shipsheds, medium/large with 100-200 or rather 50-100 shipsheds and medium/small with no more than 10-50 shipsheds: see fn. 258.

[212] Among these are the classical shipsheds of Zea at Piraeus, Oeniadai, Rhodes, Antikyra, Sounion, the Hellenistic shipsheds of Carthage, Emporio and Aghios Georgios on Alimia and the late medieval to early modern sheds at Chania and Heraklion on Crete; Aidoni et alii, Journeys, 27; D. J. Blackman, New Evidence for ancient Ship dimensions. *Tropis* 4 (1996) (=Proceedings of the 4th International Symposium on Ship Construction in Antiquity, ed. H. Tzalas. Athens 1991) 113-125.

[213] Ibid.; Blackman, Ancient Shipsheds, 82.

[214] The shipsheds at Dor measure between 3.80 and 4.50 m, at Phalasarna around 4 m, at Antikyra from 4.20-4.70 m and at Rhodes between 4.20 and 4.40 m. At Sounion shipsheds have been documented with widths even as small as 2.60 m; Blackman, Ship Dimensions, 113; D. J. Blackman, Some Problems of Ship Operation in Harbour. *Tropis* 3 (1995) (=Proceedings of the 3rd International Symposium on Ship Construction in Antiquity, ed. H. Tzalas. Athens 1989) 74; D. J. Blackman, Triremes and Shipsheds. *Tropis* 2 (1990) (=Proceedings of the 2nd International Symposium on Ship Construction in Antiquity, ed. H. Tzalas. Athens 1987) 42.

[215] The two shipsheds of Carthage are measuring between 7.1-8 m, whereas the ones at Alimia vary between 8.50-8.70 m, 9.50-9.80 m and 10.80-11 m for Emporio and 9.60-9.90 m and 10.80-11 m for Aghios

Venetian shipsheds. The early to late 16th century AD dated ones at Chania and Heraklion show measurements of between 10-13.70 m and 10-12.70 m in width.[216] Unfortunately the documentation of the lengths shows even much more restricted and vague results. In general it is assumed that ancient shipsheds had an estimated length of 37 m to about 45 m.[217] The Venetian shipsheds at Chania and Heraklion confirm similar lengths for the Late Medieval and Early Modern periods. They vary between 48-54 m at Chania and that of Heraklion reach even up to 60m in length. In contrast, however, the Hellenistic shipsheds of Aghios Georgios and Emporio are much shorter, measuring just between 14-20 m and 16-21 m.[218] Accordingly, besides the large shipsheds of Heraklion, some small ones show about the same dimensions as Aghios Georgios and Emporio, measuring about 23-24 m. It can therefore be assumed that according to the types of ships, different categories of shipsheds were used for their accommodation. Accordingly, the changes of ships in time were also a factor for the change of shipsheds' sizes. Nevertheless, there possibly existed at least 3 main categories of ancient to medieval shipsheds: small ones for local guarding ships etc., middle ones for provincial lighter ships and finally large sheds for the main naval ships.

Georgios. The three examples with widths of 13-13.20 m or even 18m may consist of double-shipsheds; Blackman, Ship Dimensions, 113, 116 (see table of widths); for double-shipsheds see: D. J. Blackman, Double Shipsheds?. *Tropis* 5 (1999) (=Proceedings of the 4th International Symposium on Ship Construction in Antiquity, ed. H. Tzalas. Athens 1993) 65-78.

[216] Their exact function, however, is not clear. Some of them might represent double-shipsheds as well: Double Shipsheds, 68-69.

[217] While the Zea shipsheds have an estimated length of 37m, the ones at Rhodes measure between 40-45m, the big ones at Carthage even around 48m; Blackman, Ship Dimensions, 113; Blackman, Triremes, 42; Ginalis, Byzantinische Seefahrt, 56, fn. 233.

[218] For Emporio Blackman estimates more conservative measurements of 14-18m: Blackman, Double Shipsheds, 66; Blackman, Ship Dimensions, 115-116; A. Sampson. *Deltion* 35 (1980) Chron. 561-3.

Site	Length	Width	Dimension
Zea	37 m	6 m	6:1
Oeniadae		6m	?
Rhodos	40-45 m	4.20-4.40 m	9.5-10:1
Dor		3.80-4.50 m	?
Carthage	48 m	7.1-8 m 6 m	6-6.8:1
Aghios Georgios	14-20 m	9.60-9.90 m	1.5-2:1
Emporio	16-21 m	8.50-8.70 m	1.9-2.4:1
Alimia		9.50-9.80 m	?
Phalasarna		4 m	?
Antikithyra		4.20 m 4.50 m 4.70 m	? ? ?
Sounion		2.60 m	?
Chania	48 m 47.86 m 50.29 m	13.76 m 11.43 m 10.63 m	3.5:1 4.2:1
Heraklion	10.60-12.32 m 23.72 m 24.10 m	60 m 12.70 m 10.33 m 10 m	1:4.9-5.66 1.9:1 2.3:1 ?

Tab. 1

Although the study of shipsheds is progressing fairly quickly and written accounts as well as archaeological material of sheds as early as the 5th to 6th century BC and as late as the 15th to 16th century AD show many promising examples throughout the Mediterranean like Samos, Cnidus, Corfu, Halicarnassus, Athens, Thasos, Cos, Aigina or Rhodes in the east and Syracuse, Carthage, Marseille, Venice and others in the west,[219] a lot has to be

[219] D. Blackman – B. Rankov et alii, Shipsheds of the Ancient Mediterranean. Cambridge 2013; further see the latest conference on "Harbors and Harbor Cities in the Eastern Mediterranean from Antiquity to Byzantium" at Istanbul from the 30th May-1st June 2001.

done yet. Its study is not only important for the understanding of ancient and medieval military installations but also an important impact upon the research of shipbuilding and ships' dimensions.

1.3.2.2. Slipway

Besides the slipways used as floors and ramps for hauling and launching ships to and from shipsheds, these structures also appeared as independent installations.[220] Unlike shipsheds where only minor repairs could have been carried out, such self-contained slips were mainly used for the building and repairing of ships. Additionally, although there is no archaeological or literary evidence, it can be assumed that like nowadays wooden slips were also used for the beaching of ships when they were out of use for a longer period.[221] A slipway is a flat platform cut into the natural rock or ground, which gently slopes towards the sea into the water.[222] The slope of the slipway was achieved by layers of sand, clay and loam on which timbers, forming horizontal sleepers, were laid in order to build a ramp.[223] Since ships had to be hauled and launched in a controlled way without being damaged, the timbers were laid in a uniform grid of longitudinal stringers and crossbeams as can be seen at the slipway of Thurii.[224] Such a grid enabled the ships to roll or slip easier on the timber. In contrast to some modern flat-bottomed ships, the main and supporting element of both ancient and medieval ships was the keel, which therefore took the weight during the hauling operation. As such, ships slid on their keels and consequently needed support on either side of the slipway in order to prevent their

[220] Raban, Ancient Slipways, 94.

[221] Blackman, Harbours, II, 204.

[222] Ibid., 206.

[223] Blackman, Ship Operation, 74.

[224] See drawing after Zancani Montuoro: Blackman, Harbours, II, 205, fig. 12; Blackman, Triremes, 38.

tipping.[225] The gradient of its slope varied depending on the use of the slipway. Unlike modern slipways, however, which usually have a gradient of about 1 in 20,[226] ancient ones were built much steeper. The timber runners of Apollonia in Cyrenaica measure a gradient of 1 in 14 and the slips at Zea harbour have a gradient of 1 in 10, whereas the slipways at Oiniadai have a gradient of just 1 in 6, that of Rhodes 1 in 4.6 and that of Sounion even only 1 in 3.5.[227] Apart from the overall gradient, the lower part towards the sea was always steeper than the upper part. The ramp was stepped along its edges with cut slots at the lower steps for the hauling of the ships.[228]

[225] Blackman, Triremes, 39; J. Coates, Long ships, slipways and beaches. *Tropis* 5 (1999) (=Proceedings of the 4th International Symposium on Ship Construction in Antiquity, ed. H. Tzalas. Athens 1993) 104; unfortunately we have no archaeological evidence for such elements. Therefore it still has to be proven.

[226] Only the slipways of Thurii seem to have had the same shallow gradient: Blackman, Triremes, 37; for the slipways of Thurii see: Blackman, Harbours, II, 205-206, fig. 12, fn. 109; Coates, Slipways, 106.

[227] Blackman, Triremes, 37-38, 42-43.

[228] Ibid., 42.

SECTION II

THE COASTAL INFRASTRUCTURES OF THESSALY

2.1. Introduction

After a theoretical analysis of the general architectural characteristics and historical development of coastal facilities, this chapter will discuss a series of harbour sites, which have been the subject of archaeological investigation and research within the author's fieldwork in the years 2012 and 2013. Since the study of Byzantine harbour installations still forms a *terra incognita*, it is impossible to write a general synthesis of Byzantine port characteristics and developments within the scope of this thesis. As such, this chapter concentrates on the region of Thessaly; but why central Greece specifically?

Thessaly formed one of the cradles of seafaring and consequently constituted a major platform for communication and maritime trade in the Mediterranean at least since the 3rd millennium BC.[229] Due to its strategic geographical position and rich hinterlands, Thessaly and particularly its islands played a decisive role as junction of the N-S and E-W axis in the Aegean as early as Classical times. But also influencing and being influenced by the late antique and medieval history of the Mediterranean, later Thessaly

[229] C. Broodbank, The making of the Middle Sea: a history of the Mediterranean from the beginning to the emergence of the Classical World. London 2013; E. H. Cline, Sailing the wine-dark sea: international trade and the late Bronze Age Aegean. Oxford 1994; Charikleia Papageorgiadou-Banis – Angeliki Giannikouri, Sailing in the Aegean. Reading on the economy and trade routes, (*Meletimata* 53). Athens 2008; A. Sampson (ed.), Archaeology in the Northern Sporades, Greece. Alonnisos 2001.

was one of the most important and wealthiest agricultural and industrial provinces of the Byzantine Empire, providing various kinds of merchandise. Thessaly is also one of the few regions that remained part of the Byzantine Empire throughout its entire history of over 1000 years. The region consequently forms the ideal area for the study of Byzantine harbours and other coastal infrastructures and their continuous development from Roman and Early Byzantine traditions to the complexity of markets and *scalae* during the Late Byzantine period. The investigated coastlines can be divided both geographically and topographically in the following three main areas:

1. The archipelago of the Northern Sporades[230]
2. The Pagasetic gulf, which forms a natural inlet of the Aegean Sea
3. The eastern coastline along the Magnesian or Pelion peninsula, which envelops the Pagasetic gulf

The historical-archaeological documentation of coastal facilities in this region follows the hierarchical model which has been set up for Byzantine coastal sites in the previous chapter. Accordingly, the analysis is sub-divided between ports, primary harbours and then going a step down to secondary harbours and smaller installations such as staple markets, roadsteads and individual landing stages.

In contrast to the common approach of regional studies, where a first general overview is followed by individual detailed case-studies, in this section the opposite methodology is

[230] Since Skopelos and Alonnesos have been subject of underwater archaeological investigations in past, the research within the scope of this thesis will concentrate on the case study of Skiathos. As such, the two islands will be discussed only briefly as stations (in the case of Alonnesos as roadstead) of the trading routes and shipping lanes towards and from Constantinople. However, future cooperative archaeological projects for the investigation of coastal structures on Skopelos and Alonnesos are in prospect by the present author and the responsible Greek Ephorates for Antiquity.

undertaken: the focus of fieldwork is dedicated to a detailed analysis of the island of Skiathos. This is achieved by a survey project (henceforward “field survey”) conducted in 2012 and 2013, which forms the main part of this thesis. The survey intends to verify the complexity of coastal structures within a distinct area of a region throughout time. This is then followed by a close investigation of further harbour sites throughout the entire region of Thessaly, which have been visited and studied during field seasons in 2012 and 2013 (henceforward “field season”).

Apart from Skiathos, which will be separately analyzed as a geographical entity, the various harbour sites will not be discussed individually, but a general discussion will follow at the end of this chapter. This aims not only at a comparison but also an interconnection of the different harbour installations in order to look at the regional harbour network and port hierarchy. Finally, a general picture of the Thessalian port system may allow a first attempt to indicate possible characteristics of Byzantine harbour structures beyond central Greece and provide a valid chronological overview for their developments throughout Byzantium.

2.2. The coastal infrastructures of Roman and Byzantine Skiathos – A joint Survey project

The case study of Skiathos allows for a comprehensive study of harbour installations, taking into account the impact of geographical and physical conditions,[231] as well as the influence of the economic background and the historical development of the area. The following analysis of different interconnective coastal sites on the island aims to show the role of staple markets, landing stages and small harbours within the hierarchy of central Greek coastal structures for the economy and the social life of late antique and medieval Byzantium. The results from Skiathos will be subsequently compared with other coastal sites throughout Thessaly and in the subject of discussion at the end of this chapter.

Additionally, the study of Skiathos forms an illuminative example of the importance of islands as regional and supra-regional stations for trading routes and shipping lanes, influenced and controlled by new powers such as the church and private entrepreneur. Consequently, through setting up a model for the function and hierarchy of Byzantine ports, harbours and staple markets from the 4th to the 15th century AD in Skiathos, together with the study of other Thessalian harbour areas, the region can be used as a guide also for investigations of harbour sites in other parts of the Byzantine Empire.

[231] For the understanding of geographical and physical conditions see chapter 1.2. "Function, purpose and hierarchy of coastal installations".

2.2.1. Geographical and economic background

The Greek island of Skiathos is situated in the Northwest Aegean Sea and ranges in latitude from 39° 07´ 39´´ North to 39° 12´ 40´´ North and in longitude from 23° 23´ 13´´ East to 23° 30´ 51´´ East. It belongs to the Northern Sporades archipelago, also called the *Magnesian islands* or even *Skopeloi*.[232] These further encompass the islands of Skopelos (ancient Peparethos), Alonnesos (ancient Ikos and later Chelidromi or Dromon), and the so-called *Erimonisia* or *Demoninisia*.[233] As the westernmost and closest island to the mainland, it heads the archipelago, which forms a bow leading from Southwest to Northeast from 39° 09´ 40´´ North to 39° 29´ North and 23° 30´ 52´´ East to 24° 11´ East. With a distance of just 2 nautical miles (4 km) to the southern coast of the Magnesian or Pelion peninsula and 7 nautical miles (13 km) to the northern coast of the island of Euboea, Skiathos lies off the northern entrance to the Pagasetic and Euboean gulf. The island itself has a north-eastern to south-western direction with an irregular shape and a total area of almost 50 km^2.[234] While the northeastern part of the island has a round shape, the southwestern part generally forms a triangular shape.[235]

Skiathos has a rich and complex countryside (see ILL II.I.2, VOL II). Both, the northern and the southern shores are very multifarious with many coves, inlets and bays, leading to sandy beaches. The island has nine bays of which the main ones are situated along the

[232] N. A. Bees, Beiträge zur kirchlichen Geographie Griechenlands. *Oriens Christianus* 5 (1915) 248.

[233] Including the uninhabited islands of Peristera, Kyra Panagia (ancient Pelogonnisos and later Limen or Gymnopelagesion), the Adelfi islands, Gioura, Psathoura, Skantzoura and Piperi: K. G. Fiedler, Reise durch alle Theile des Königreiches Griechenland in Auftrag der Königl. Griechischen Regierung in den Jahren 1834 bis 1837, II. Leipzig 1841, 1; A. Philippson, Beiträge zur Kenntnis der griechischen Inselwelt. Frankfurt 1901, 123; Philippson-Kirsten, Aegaeische Meer, 40.

[234] Both, Philippson (1901) and Evangelides (1913) provide wrong information by giving an area of around 61 km^2, which was later corrected by Philippson in 1959.

[235] Philippson, Inselwelt, 124.

southern coastline. The easternmost and most important is the harbour bay of Skiathos, followed by Siferi Bay, Tzanerias Bay, Platanias Bay and Strofilias Bay as well as Aghia Eleni Bay in the west and Elias Bay and Kechrias Bay in the north. These are formed by various promontories and capes. The most noteworthy of them is the Pounta promontory with the homonymous cape as well as cape Plakes in the east, together framing the harbour area of Skiathos. These are followed in the west by cape Mitikas, the Kanapitsa promontory with cape Kalamaki, cape Amoni, the Pounta promontory with cape Tourkovigla, cape Aghia Eleni and in the north by cape Elias, cape Aghios Sozon and the Kastro promontory with the homonymous cape. The only relevant promontory along the eastern side is the Kefala promontory with its homonymous cape. The inland is characterized by a hilly terrain mainly concentrated in the central and eastern part, starting with the hilltop at Elatos (323 m) in the centre of the island. Other hilltops appear further east at Katavothra (388 m) in the centre, Stivoto (395 m) and Kouroupi or Molocha (403 m) in the far north and the highest mountain peak of 433 m at Karaflitsanakia.[236] While the south-north alignment of the mountains terminate at an abrupt and rough rocky northern shore, the southeastern and southwestern shore face gentle slopes ending in the promontories. The mountains rise in shape of plateaus with numerous deeply cut valleys and canyons in between, which on the eastern part of the island form an amphitheatre.[237] In the western part, the island possesses two big valleys before the last foothills end in a plain, dominating the western triangular shaped part. These almost connect the areas of

[236] Philippson and Evangelides give a height of 435 m and the British Admiral Chart Nr. 1556 a height of 442 m.

[237] T. E. Evangelides, Η ΝΗΣΟΣ ΣΚΙΑΘΟΣ και αι περί αυτήν νησίδες. Μελέτη τοπογραφικό-ιστορική μετά χάρτου τῆς Νήσου καί εικόνων. Athens 1913, 11-13, 15; Philippson, Inselwelt, 126.

Platanias at the southern with Ligaries at the northern and Troullos at the southwestern with Aselinos at the northwestern shores.[238]

As one of the greenest Greek islands, Skiathos has numerous rivers and streams (ILL II.I.2, VOL II). The most important are the Ntoumas or Cheirimonas River in the far north flowing out at Kastro, the Lechouni River in the northeast, the Kechrias River in the north and the Acheila River in the centre, both flowing out at Kechrias Bay and finally the Kydonia River in the centre, which ends in the Platanias River and flowing out at the homonymous bay. The most notable streams are that of Kanaki or Ochtapodi and the Kakorema in the northeast, Aga in the north, Ganoti in the southeast, Ftelias and Mamous in the south and the Xydorema in the southwest.[239]

Apart from rivers, streams and wells, Skiathos further possesses three lakes, all along the southern coastline (ILL II.I.2, VOL II). The easternmost and biggest is the Lake of St. George or Kvouli, situated northeast of the harbour bay. Today, it is connected to the harbour bay just by a small effluent at its southeastern end, the development of sedimentation as well as historical charts suggest that it may previously have acted as a sheltered lagoon, continuing the bay towards northeast. Also archaeological remains at its northern end point to the importance of that lake for the island's maritime life.[240] The lake of St. George has an almost even round shape, measuring an area of 11 ha with maximum distances of 326 m (SW-NE) and 339 m (SE-NW). The shallow lake is separated from the sea by a 65 m wide promontory just leaving a 5 m wide outflow. The

[238] Evangelides, Skiathos, 14; Philippson, Inselwelt, 127.

[239] Evangelides, Skiathos, 15-16; http://www.skiathos.gov.gr/index.php?option=com_content&task=view&id=207&Itemid=244.

[240] See chapters 2.2.3. "The Archaeological sites of the Survey area" and 2.2.4. "Evidence of other relevant archaeological sites".

second lake, Lake Strofilia, is situated at the southwestern edge of the island north of Strofilias Bay. Similar to the lake of St. George, it is connected to the sea by a 462 m long and 20 m wide channel at its eastern end. Lake Strofilia, however, is not a pure salt lake, since it is simultaneously fed by sweet water. It has an oval shape with a SW-NE direction and a maximum length of 487 m and maximum width of 152 m. Including the channel, it measures an area of around 7 ha.[241] The third and smallest lake is called Vromolimnos and situated at the western side of the Kanapitsa promontory. Separated from the sea just by a 30 m wide beach line, Vromolimnos is also a salt lake. It has a SE-NW orientation and measures an area of 1.1 ha with a maximum length of 217 m and maximum width of 65 m.

Apart from its rich orographic and hydrographic features, Skiathos is also characterized by a great geomorphologic variety and complexity. The western area differs from the eastern area even regarding to its sedimentation. The western triangular shaped part consists of crystalline foliate with mica slate and gneiss aligned towards east. In contrast, the eastern part consists of various ordinary green and black slates and metamorphosed quartzite, incorporating grey and mica marble which are aligned towards north. These metamorphic layers of slate are covered by a massive layer of grey limestone.[242] In the southeast the black and yellow slate and marl limestone includes layers of dolomite.[243]

Skiathos is surrounded by numerous uninhabited rocky islets and reefs of which the biggest and most important are located along the eastern and southern coast (ILL II.I.2,

[241] Evangelides, Skiathos, 17.

[242] Ibid., 9-11, 13-14; Philippson-Kirsten, Aegaeische Meer, 42; Philippson, Inselwelt, 123-126.

[243] For more detailed information on the geology of Skiathos, see: J. Papastamatiou – G. Marinos, Geologische Beobachtungen auf den Nördlichen Sporaden. (*Praktika tis Akadimias Athinon* 13). Athens 1938, 45-49.

VOL II).[244] Except for Tsougria Island, most of them are bare of vegetation or just covered with dense maquis and very sporadic tree growth. The easternmost of the main six islets are the flat and scant islands of Asproniso and Trypiti or Repi, consisting of slate and marble. Trypiti is followed westwards by Arkos island. The island with a maximum height of 90 m and an area of 0.414 km^2. It has a rough north and north-eastern coast and a favourable south-western and southern coast with three sheltered bays. While the northern side is mainly covered by dense Maquis, sporadic pine trees grow on its southern side. The next island, called Maragos, is located just outside the harbour bay south of the Pounta promontory. The small island has a maximum height of 60 m and especially its harbour facing side is covered with dense maquis, often used for the grazing of goats. Towards the south it is followed by the islands of Tsougria and Tsougriaki. Tsougriaki is a small rocky islet east of the Kanapitsa promontory, covered with dense maquis. Finally, the biggest and most fertile islet around Skiathos, is Tsougria, just east of Tsougriaki. The north-south orientated island has a total area of 1.14 km^2 and a maximum height of 82 m. The island of Tsougria possesses two lakes, situated just 86 m and 50 m behind the beach lines of its two main bays of Floros and Lalarias along the western coast. It is densely covered by pine trees and on its western side by olive groves. It is the only island having been agriculturally cultivated and exploited by a farming unit at the southern bay of Lalarias, owned by the 17th century Evangelistria monastery and acting as its

[244] Leading from east to southwest, these consist of the islands of: Asproniso, Trypiti or Repi, Arkos, Maragos, Tsougria and Tsougriaki, Tourades or Troulonisia and the Kastronisi islet in the north as well as the Daskalio islet at the entrance of the harbour bay. Other for this thesis relevant islets and reefs are the Prasonisi and the Marinos reef along the south coast and the Aghia Eleni and Myrmix or Leftheri reef along the west coast.

Metochion.[245] Apart from the intensive production of olive oil, Tsougria also allowed the cultivation of grain and the grazing of goats.[246]

There has been little fundamental change in the climate of this area since Antiquity.[247] The climate of Skiathos is temperate, characterized by humidity and a high total annual precipitation from autumn to spring, which results in a rich hydrographic network also during the dry summer months. This consequently allows strong vegetation and the growing of forests and dense maquis on Skiathos and its islets. As such, the island of Skiathos has a thick covering of evergreen hardwood, mainly formed by pine forests (*Pinus Halepensis*, *Pinus Maritima* and *Pinus Pinea*) but also types of oak (*Quercus ilex* and *Quercus coccifera*), poplar (*Populus*), plane tree (*Platanus*) and maple (*Acer*).[248] Despite the huge native range and spread of various types of pine throughout the Mediterranean, Skiathos, together with its neighbouring island of Skopelos, was famous

[245] Remains of an 18th and 19th century oil press and farmhouses are still surviving. For further ecclesiastical possessions on the islands of the Northern Sporades, see: P. Lemerle – A. Guillou – N. Svoronos – D. Papachryssanthou, *Actes de Lavra*, I (*Archives de l'Athos* 4). Paris 1970, 57, 60f., 73, 122-130 (Nr. 10,11); Koder – Hild, Hellas und Thessalia, 107, 165, 168, 243, 247 (Map 1).

[246] Evangelides, Skiathos, 9, 20-21.

[247] Koder – Hild, Hellas und Thessalia, 41.

[248] Fiedler, Griechenland, 4-5, 8-9, 11; C. Fredrich – A. J. B. Wace, Skiathos und Peparethos, (*Mitteilungen des Kaiserlich Deutschen Archäologischen Instituts, Athenische Abteilung* 31). Athens 1906, 99, 129-130; N. Efstratiou, Agios Petros, a neolithic site in the Northern Sporades. Aegean Relationships during the Neolithic of the 5th Millennium (*BAR Int. Series* 241). Oxford 1985, 3; Leonardos, Chorografia, 175; Philippson-Kirsten, Aegaeische Meer, 41; Philippson, Inselwelt, 127; E. P. Tsachalides et alii, Habitats and avifauna on the Island of Skiathos, in: Sustainable Management and Development of Mountainous and Island Areas, Proceedings of the 2006 Naxos International Conference, E. I. Manolas (ed.). Heraklion 2006, 155.

for their abundance of pine forests throughout history,[249] which was used and traded for shipbuilding.[250]

The diverse landscape with the simultaneous existence of rocky mountains with fertile plateaus, valleys and plains not only provides rich forest resources but also good conditions for a wide range of agriculture, including granoculture, horticulture and viticulture. As such, the countryside of Skiathos is known for the cultivation of olives, wine, grain, vegetables and a lot more as well as a fairly high number of goats.[251] Since the island's main attribute was its excellent harbour with its important role for shipbuilding, as well as its crucial strategic position, historical sources mention Skiathos

[249] A. Ginalis, Materielle Zeugnisse der byzantinischen Seefahrt unter besonderer Beachtung der Unterwasserarchäologie, Vienna 2008, 38-39, 127-128. (unpublished Master thesis); Philippson - Kirsten, Das Aegaeische Meer, 44, 46; Philippson, Inselwelt, 124, 128.

[250] One of the main sources of livelihood of Skiathos was shipbuilding and seafaring, which lasted until the decline of shipping under sail in the late 19th century. As one of the biggest and most important shipyards at least in the eastern Mediterranean, it launched big sailing ships and still had its own fleet counting 110 ships of over 5000 tons capacity in 1887: Evangelides, Skiathos, 9, 21; Philippson, Inselwelt, 124, 127-128, 163; Efstratiou, Agios Petros, 3; but also wood analysis of ancient and medieval wreck sites in the area, such as that of the 12th century AD Pelagonnisos – Aghios Petros wreck, show the use of pine wood for the ship's planking: Ch. Kritzas, Το βυζαντινό ναυάγιον Πελαγοννήσου Αλοννήσου, *AAA* 4 (1971), 176-182; P. Throckmorton, Diving for Treasure, London 1977, 43-45; Evangelia Ioannidaki-Dostoglou, Les vases de L'épave byzantine de Pelagonnèse-Halonnèse, in: Recherches sur la Céramique Byzantine (*BCH Supplement* 18), V. Déroche and J.-M. Spieser (eds.). Paris 1989, 157-171; P. Throckmorton, Exploration of a Byzantine Wreck at Pelagos Island near Alonnessos, *AAA* 4/2 (1992), 183-185; A. J. Parker, Ancient Shipwrecks of the Mediterranean & the Roman Provinces (*BAR Int. Series* 580). Oxford 1992, 306; Εφορεία Εναλίων Αρχαιοτήτων, Βόρειες Σποράδες. Νήσος Φαγκρού, Νήσος Περιστέρα, *AD* 49 (1994), 853-866; K. Mavrikes, Άνω Μαγνήτων Νήσοι, Alonnesos 1997, 311-317; Ch. Agouridis – Katerina Delaporta – M. E. Jasinski – F. Soreide – M. Wedde, The Greek-Norwegian Deep-Water Archaeological Survey. Athens 1999, 6-9; Ginalis, Materielle Zeugnisse, 127; further see ILL 24.II, VOL II and for archaeological remains of shipbuilding facilities see chapter 2.2.4. "Evidence of other relevant archaeological sites".

[251] Evangelides, Skiathos, 9, 13-14; Fiedler, Griechenland, 4; Fredrich-Wace, Skiathos und Peparethos, 101, 130; Karagiorgou, Urbanism and Economy, 222; Leonardos, Chorografia, 175; Philippson-Kirsten, Aegaeische Meer, 43; Philippson, Inselwelt, 126-128; Efstratiou, Agios Petros, 3.

almost exclusively in the context of military activities. The earliest literary evidence concerning the island's agricultural wealth and in particular that of grain, both widely traded and used for the Athenian navy, comes from the Greek statesman Demosthenes in the 4th century BC.[252] Also later in the 1st century BC, Livy (Titus Livius) emphasizes in his written account "*Ab Urbe Condita*" the existence and importance of the grain fields of Skiathos.[253]

Finally, Fiedler and Philippson confirm a continuation of the cultivation of grain especially in the south-eastern part and the plains up to the early 19th and 20th centuries. Skiathos has been particularly famous for producing and exporting high quality olives and olive oil, which were cultivated in high quantity in the eastern and partly in the southern and northern part, where olive groves today still cover the cultivated areas. However, there is neither literary nor clear archaeological evidence of olive oil production in Skiathos, unlike the mainland along the coastal area of Nea Anchialos, Echinos and Lamia where olive presses have been discovered[254] or a written account by Ovid (Publius Ovidius Naso) for the island of Skopelos in the 1st century AD.[255] Nevertheless,

[252] Demosthenes, Orationes, F. Blass – w. Dindorf (eds.), I (*Bibliotheca Scriptorum Graecorum et Romanorum Teubneriana*). Leipzig 1885, IV. 32 (p. 91-92):....ὑπάρχει δ᾽ ὑμῖν χειμαδίῳ μέν χρῆσθαι τῇ δυνάμει Λήμνῳ καί Θάσῳ και Σκιάθῳ καί ταῖς ἐν τούτῳ τῷ τόπῳ νήσοις, ἐν αἷς καί **λιμένες καί σῖτος καί ἃ χρή στρατεύματι πάνθ᾽ ὑπάρχει**·; Evangelides, Skiathos, 27; A. Sampson, Η Σκιάθος. Από τους προϊστορικούς Χρόνους μέχρι τών αρχών του 20οῦ Αιώνος. Athens 1977, 15.

[253] Titus Livius, Ab Urbe Condita, Lib. 31. 45: ....per agros palati milites frumentum et si qua alia usui esse ad uescendum poterant ad naues rettulere....iam enim et graues praeda naues habebant - retro unde uenerant Sciathum et ab Sciatho Euboeam repetunt.

[254] Karagiorgou, Urbanism and Economy, 172, AP5: 3-4, 7-9, Pls. 109, 166-167a-b.

[255] Ovidius Naso Publius, *Metamorphoses*, E. Rösch (ed. and trans.), Munich [13]1992, VII, 469-471: At non Oliaros Didymaeque et Tenos et Andros et Gyaros nitidaeque ferax Peparethos olivae Gnosiacas iuvere rates….; Argyro Doulgeri-Intzesiloglou - Y. Garlan, Vin et amphores de Péparéthos et d'Ikos. *BCH* 14/1 (1990), 363.

participating to the Thessalian economy,[256] it can be assumed that the cultivation of olive plantations on Skiathos date back at least to Late Antiquity and probably earlier. The 2012 survey season discovered archaeological material indicating the existence of such agricultural infrastructures for the Roman Imperial and Byzantine periods.[257]

Besides grain and oil, numerous vines thrived in the south-eastern part and the plateaus of the island. Like its neighbouring islands Skopelos and Alonnesos, which were widely famous for their so-called "Peparethian" and "Ikian" wines, exporting them around the Aegean Sea as far as the Black Sea coast throughout the Classical period and in slightly declining dimension during the Hellenistic, Roman and Byzantine periods,[258] Skiathos also produced remarkable wine.[259] Even though the wine of Skiathos was not as famous as that of its neighbouring islands, the 2nd to 3rd century AD Greek rhetorician and

[256] Karagiorgou, Urbanism and Economy, 213-214, 222.

[257] See chapter 2.2.3. "The Archaeological sites of the Survey area".

[258] Doulgeri-Intzesiloglou - Garlan, Vin et amphores, 361-364, 367-368; Elpida Hadjidaki, Underwater Excavations of a Late Fifth Century Merchant Ship at Alonnesos, Greece: the 1991-1993 Seasons. *BCH* 120/ 2 (1996), 563; Mavrikes, Ano Magneton, 71; S. Raptopoulos, Ένας πεπαρήθιος αμφορέας στο Μουσείο Πειραιά: Εμπόριο οίνου, Αθηναϊκό κράτος και Σποράδες in: Archaeology in the Northern Sporades, Greece, A. Sampson (ed.), Alonnesos 2001, 161-167; A. Sampson, Η Νήσος Σκόπελος. Ιστορική και Αρχαιολογική Μελέτη. Athens 1968, 79, 172-173; Karagiorgou, Urbanism and Economy 172-173.

[259] While there is only the 2nd to 3rd century AD textual source of Athenaeus of Naucratis referring to wine from Skiathos, the wine of Skopelos was even highly praised by Western travellers like Bernard Randolph (1675), the French missionary Braconnier (1706) and the German Friesemann (1787) up to the 17th and 18th century. In contrast, a 12th century AD extract and comment on Athenaeus' *Dipnosophisticarum* by the Byzantine bishop Eustathios of Thessaloniki indicates that at that time Skiathos was no longer producing or at least trading its own wine: G. Stallbaum, Eustathii archiepiscopi Thessalonicensis commentarii ad Homeri Odysseam, II. Leipzig 1826, 85. 45-46; Doulgeri-Intzesiloglou - Garlan, Vin et amphores, 367; Karagiorgou, Urbanism and Economy, 173; for wine production and trade in Byzantium and particularly Byzantine Thessaly, see: Anna Avramea, Η βυζαντινή Θεσσαλία μέχρι του 1204. Συμβολή εις την ιστορικήν γεωγραφίαν. Athens 1974, 65-66; Karagiorgou, Urbanism and Economy, 172-174, AP5: 2, Pl. 165; E. Kislinger, Graecorum vinum nel millennio bizantino, in: Olio e vino nell'alto medioevo, I, (*Settimane di studio della fondazione centro italiano di studi sull´alto medioevo* 54). Spoleto 2007, 631-665; E. Kislinger, Zum Weinhandel in frühbyzantinischer Zeit. *Tyche* 14 (1999), 141–56.

grammarian Athenaeus of Naucratis informs us about the remarkable "Skiathitian" black wine, which was mixed with water and traded as early as the 4th century BC.[260] Apart from kiln sites excavated at Nea Anchialos or Echinos on the mainland of Thessaly, four kiln sites (three of them on Skopelos and one on Alonnesos) have been identified on the islands of Skopelos and Alonnesos, indicating the production of amphorae that were probably used for the transportation of local wine.[261] Although no wine production facilities of any kind have been found or identified thus far with certainty on Skiathos, recent archaeological investigations (including the 2012 coastal and underwater archaeological survey project "*The coastal infrastructures of Roman and Byzantine Skiathos*) documented various kiln sites and other relevant artefacts possibly used for that purpose.[262] However, additionally coins, like the 4th century BC dated bronze coin minted on the island of Skiathos and showing the head of Hermes on the Avers and the word "CKIAΘI" (Skiathi) on the Reverse (PL XXXVIII, 1-2),[263] reveal a period of financial prosperity deriving from the involvement of the islands in commercial activities such as the trading of wine.

[260] Athenaeus of Naucratis, Dipnosophisticarum, I. G. Kaibel (ed.) (*Bibliotheca Scriptorum Graecorum et Romanorum Teubneriana*). Leipzig 1887, 71 (I. 56. 16):".....Στράττις **δὲ τὸν Σκιάθιον ἐπαινεῖ· οἶνος κοχύζει τοῖς ὁδοιπόροις πιεῖν μέλας Σκιάθιος, ἴσον ἴσῳ κεκραμένος**."; Argyro Doulgeri-Intzesiloglou, Η αρχαία Σκιάθος μέσα από τα κείμενα και τα μνημεία της. Τελευταία συμπεράσματα και προοπτκές της αρχαιολογικής έρευνας της νήσου, in: Archaeology in the Northern Sporades, Greece, A. Sampson (ed.), Alonnesos 2001, 114-115.

[261] Doulgeri-Intzesiloglou - Y. Garlan, Amphores, Vin et amphores, 368-371; for evidence of amphorae production and circulation in Thessaly, see: Karagiorgou, Urbanism and Economy, 196ff., 213-214; Mavrikes has identified another amphora production centre on Alonnesos (site of Vamvakies); Mavrikes, Ano Magneton, 44.

[262] For the sites see chapter 2.2.3. "The Archaeological sites of the Survey area".

[263] Doulgeri-Intzesiloglou, Skiathos, 114; E. Rogers, The Copper Coinage of Thessaly. London 1932, 183-185; Sampson, Skiathos, 32-34; D. R. Sear, Greek Coins and their values. London 1978, 213.

Based on the concept of a coastal cabotage trading system (see chapter "Function, purpose and hierarchy of coastal installations"), in addition to its role as a strategic base and shipbuilding area, Skiathos would also have provided the bigger ports of the Pagasetic and Euboean gulf with local goods.[264] Beside grain, wine and olive oil, also other agricultural products like fish,[265] salt, meat, raisins and wax were traded in exchange for import goods.[266] As documented for the island of Skopelos by the memoires of the Byzantine patriarchal official ("*Megas Ekklesiarches*") Sylvester Syropoulos in the 15th century AD,[267] Skiathos also must have provided passing travellers and merchants with provisions and other supplies. Although there are no written sources directly referring to it, associated with its strategic position and important harbour, the island provided shelter and provisions for various fleets, either temporarily anchoring or overwintering at Skiathos.[268]

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[264] Fiedler not only confirms economic ties with Volos (modern Demetrias) but also the importance of Skiathos as station and quarantine for merchants coming from the Levant to central Greece up to the 19th century: Fiedler, Griechenland, 3, 5.

[265] Not only its surrounding sea but also the lakes of Skiathos were used for fishing, probably functioning as fish ponds: Evangelides, Skiathos, 9, 17, 53; Efstratiou, Agios Petros, 3; furthermore, archaeological material identified as fishing weights show the agricultural exploitation of the sea: see Chapter 2.2.4. "Evidence of other relevant archaeological sites".

[266] Demosthenes, Orationes, IV. 32:....τήν δ᾽ ὥραν τοῦ ἔτους, ὅτε καί πρός τῇ γῇ γενέσθαι ῥᾴδιον καί τό τῶν πνευμάτων ἀσφαλές, πρός αὐτῇ τῇ χώρᾳ καί **πρός τοῖς τῶν ἐμπορίων στόμασιν ῥᾳδίως ἔσται**; Sampson, Skopelos, 80; Koder–Hild, Hellas und Thessalia, 102-103; Koder, Negroponte, 43-44; Karagiorgou, Urbanism and Economy, 222ff.

[267] PLP 27217; V. Laurent, Les «Memoires» du Grand Ecclesiarque de l´Eglise de Constantinople Sylvestre Syropoulos sur le concile de Florence (1438-1439), Paris 1971, XI, 19 (p. 540-541): Ἡμεῖς δὲ ἀναχθέντες ἐπλέομεν, **Σκίαθόν τε παραμείψαντες** καὶ Σκῦρον καὶ Σκόπελον, εἰς τοὺς Διαδρόμους κατήραμεν. Πάλιν ἐκεῖσε τοῦ ἀνέμου δεινῶς ἀντιπνεύσαντος, ἀπεκλείσθημεν πολλὰς ἡμέρας, **κατεδηδωκότες σιτία πάντα, καὶ οὐδὲ ὕδωρ ηὑρίσκομεν. Διὸ καὶ ἔστειλαν τὸ κάτεργον τῆς βίγλας εἰς τὸν Σκόπελον ἵνα φέρῃ σιτία, καὶ μεθ᾽ ἡμέρας δύο ἐκόμισεν ἄρτους ἑπτακαίδεκα καὶ ἕνα ἀγρίονον, σύβαριν τῶν κυνῶν·**

[268] The earliest evidence goes back to the 4th century BC when Demosthenes informs us about the stationing of the Athenian fleet and an army of 350 soldiers in around 360, 354/3 and 351 BC. In 334/3 and 325/4 BC the Athenian fleet stayed at Skiathos under Cephisodotus (Kephisophon). In 199 and 169 BC the Roman

2.2.2. History

The island of Skiathos has a very extensive and varied history. A variety of peoples from different cultures and civilizations passed through the island, leaving behind them rich material evidence. Although the earliest evidence of human presence in the region of Thessaly as well as particularly on the archipelago of the Northern Sporades[269] dates back as early as to the Mesolithic era,[270] the only trace of Skiathos from that period is its original prehistoric *Pelasgian* name.[271] The actual first tangible human traces on the island are the archaeological remains of the Dark Age and Late Archaic site of Kefala on

fleet under Marcus Figulus overwintered at Skiathos. In 192 BC the fleet of the Seleucid king Antiochus III stationed at Skiathos and in the BC 88 Mitrophanes, the admiral of king Mithridates VI, used the harbour of Skiathos as base for his fleet. Probably around AD 680 a Byzantine fleet under the *strategos* Sisinnios reached the island and in AD 758 the Byzantine Imperial fleet anchored at the harbour of Skiathos. The Byzantine admiral and later Megas Dux Licario passed by the island in AD 1276/7. In AD 1278 around 90 Genoese pirate ships are documented to have anchored at the harbour. In 1470 a Venetian fleet under admiral Nicolo La Canale was stationing at Skiathos. In Post-Byzantine time among others the stationing of the Ottoman fleet under Hayreddin Barbarossa in 1538, the Venetian fleet under admiral Francesco Morosini in AD 1660 and the Greek fleet in 1897 are documented: Arvanitopoulos, Demetriados – Pagason, 96, 103; Doulgeri-Intzesiloglou, Skiathos, 113; Evangelides, Skiathos, 29, 37, 43-44, 46-47, 57; I. N. Fragkoulas, Σκιαθίτικα, I. Athens 1978, 45, 47; Fredrich-Wace, Skiathos und Peparethos, 106; Koder – Hild, Hellas und Thessalia, 257-258; Philippson-Kirsten, Aegaeische Meer, 44; Sampson, Skiathos, 15-19, 38.

[269] See A. Sampson, The Cave of the Cyclops. Mesolithic and Neolithic Networks in the Northern Aegean, Greece, I, (*Prehistory Monographs* 21). Philadelphia 2008.

[270] See Neolithic sites on the mainland, such as Dimini and Sesklo. Further information see: D. R. Theocharis, Neolithic Greece, Athens 1973, 101ff; Y. Liritzis – J. Dixon, Cultural contacts between Neolithic settlements of Sesklo and Dimini, Thessaly. *Anthropologika* 5 (1984) 51-62; in particular for Dimini:
http://odysseus.culture.gr/h/3/eh351.jsp?obj_id=2501,
http://www.perseus.tufts.edu/hopper/artifact?name=Dimini&object=Site&redirect=true.

[271] Skiathos is the only island of the archipelago with its existing original toponym, mentioned in the 1st century BC Pseudo-Scymnus, Ad Nicomedem regem, 586.

the north-eastern side of Skiathos, located on a promontory east of *Xanemos* bay.[272] Pottery of the proto-geometric period, dating as early as to the 10th century BC, clearly testify that the fortified site forms the oldest and only prehistoric settlement on the island. The earliest literary evidence referring to the island is Herodotus' 5th century BC *Historiae*, describing the Persian war and the role and importance of Skiathos as a crucial naval station.[273]

It is not before the 5th century BC that a new classical city was founded on the promontory at cape Plakes in the place of the present homonymous city.[274] In contrast to later written sources, the 4th century BC *Periplous of Pseudo-Scylax*, however, informs us about the existence of two cities.[275] The 5th-4th century BC pottery provides a *terminus ante quem* for Kefala, which suggests that the site lasted until the classical period and was finally abandoned shortly after the foundation of the new city at the entrance of the harbour bay.[276] Due to increasing commercial activity, heightened maritime trade and a larger

[272] The site is currently under excavation by the Greek University of Thessaly and the 13th Greek Ephorate for Prehistoric and Classical Antiquities since 2009. For further information, see: Doulgeri-Intzesiloglou, Skiathos, 101-103; Sampson, Skiathos, 7, 11; http://extras.ha.uth.gr/skiathos/gr/index.asp.

[273] Herodotus, Historiae, VII. 176, 179, 183; VIII. 7; Evangelides, Skiathos, 25; Sampson, Skiathos, 12.

[274] Archaeological remains of the city walls and houses with an incorporated inscription of the 5th century BC, as well as bronze coins, classical black-glazed pottery and other finds, which were brought to light during rescue excavations and test trenches, reveal a terminus post quem for the town: AD 40 (1985), 193-194, 335-336; Doulgeri-Intzesiloglou, Skiathos, 111-112; fig. 17; I. N. Fragkoulas, ΑΞΙΟΛΟΓΕΣ ΤΟΠΟΘΕΣΙΕΣ ΣΤΟ ΝΗΣΙ ΤΟΥ ΠΑΠΑΔΙΑΜΑΝΤΗ. Skiathos 1995, 7-12; Fragkoulas, Skiathitika, I, 27-34; A. Sampson, 'Αρχαῖα ἀμυντικά ὀχυρώματα στή Σκιάθο. *Βόρειοι Σποράδες* 34 (1973); Sampson, Skiathos, 23-25.

[275] Pseudo-Skylax, Periplus maris mediterranei, § 58.4: ".....Σκίαθος, αὕτη δίπολις καὶ λιμήν."; this is supported by two epigraphs from BC 408/7 and BC 378/7, giving a differentiation in toponym by referring to a possible older city of *Palaiskiatho*: IG, I, Suppl., 62b; II 2, 43; Doulgeri-Intzesiloglou, Skiathos, 112-113.

[276] The excavators suggest that the site of Kefala possibly coincides with the older city, identifying it with Palaiskiathos. Later Roman authors, such as Strabo, Titus Livius (both 1st century BC/AD) or Claudius Ptolemaeus (2nd century AD), however, refer only to the city at the harbour bay anymore: Strabo,

volume of sea traffic at the beginning of the classical period, the island and particularly its favourable harbour bay gained importance as crucial strategic position. Although Skiathos shows maritime life since Mycenaean times,[277] by virtue of an offshore navigation, which lasted until the late Middle Ages, from classical Antiquity onwards the island constituted a significant axis of north-south and east-west connections among Athens, Troy, the Black Sea, Ephesus and later Thessaloniki as well as Rome. This led to the movement from the old city of so-called "Palaiskiathos" to the new classical one, resulting in a peak of coastal life after the resettlement in the 4th century BC. It is no surprise therefore that historical sources of the classical period refer to Skiathos almost exclusively in the context of military activities,[278] either functioning as a key station to control the passing trade routes and shipping lanes or as an important naval base for the Athenians.[279]

Unfortunately not much is known about Skiathos during the early Hellenistic period. Except for an inscribed funerary stele[280] no written sources exist for that period. The lack

Geographica, IX. 5. 16; Titus Livius, Ab Urbe Condita, Lib. 31. 28; Claudius Ptolemaeus, Geographia, Lib. 3. 12. 44.

[277] Mavrikes, Ano Magneton, 254-257.

[278] Demosthenes, Orationes, IV. 32, 37; Herodot, Historiae, VII. 176, 179, 183; VIII. 7; Phaedimus, Epigrammata, VII. 739; Phaenias, Historica, Fragmenta 24, 3; Pseudo-Skylax, Periplus maris mediterranei, 58. 4.

[279] Its strategic importance is further shown by the remains of two watch towers or beacons of the classical period; one on the Pounta promontory at the southwestern edge and one at the site of *Anastasa-Pyrgi* in the northern part of the island: AD 40, 339; Doulgeri-Intzesiloglou, Skiathos, 104-105; Fragkoulas, Aksiologes Topothesies, 19-24; Fragkoulas, Skiathitika, I, 34-37.

[280] The funerary Stele can be seen in the archaeological Museum of Volos. For the inscription, see: Fragkoulas, Skiathitika, I, 61-62; Sampson, Skiathos, 31.

of records is also confirmed by very meager and inconclusive archaeological data for the Hellenistic period.[281]

Skiathos returns to the centre of historical events around 200 BC when the island played a major role especially in the second and third Macedonian wars (200-196 BC and 172-168 BC), the Roman-Syrian war (192-188 BC) and the first and second Mithridatic wars (88-84 BC and 83-81 BC). According to written sources, during these conflicts between the Roman Empire and the Macedonian kingdom, the Seleucid Empire and the kingdom of Pontus, Skiathos served as a strategic outpost and an important base for fleets acting in the Aegean Sea. Consequently, it was frequently plundered and even partly destroyed in order to render it useless for the enemy.[282] Despite the great extent of the destruction throughout the 2nd and 1st century BC, the island and its city quickly recovered, so that epigraphic testimonials show a very rich social picture by the 1st century AD.[283] The fast social revival of the island goes along with the beginning of a time of prosperity under Roman hegemony and especially during the period of the *Pax Romana* from the 1st to the 3rd century AD. The frequent mentions of Skiathos in written sources of that time demonstrate a long lasting period of social and economic growth.[284] In contrast, very little

[281] Doulgeri-Intzesiloglou, Skiathos, 115; only scattered surface finds appeared sporadically at the site of Kefala. For further archaeological material see chapter 2.2.3. "The Archaeological sites of the Survey area".

[282] Titus Livius, Ab Urbe Condita, Lib. 31. 28, 45; 35. 43; 44. 13; Appianus, Mithridatica, 114; Plutarchus, Themistocles, VII. 5; Evangelides, Skiathos, 28-31; Sampson, Skiathos, 18-19; Lucius Annaeus Seneca refers to Skiathos even as deserted island, probably indicating a poor and harsh place of exile: Seneca Minor, Consolatio ad Helviam, VI: "Deserta loca et asperrimus insulas Sciathum.....".

[283] See the dedicatory inscriptions to the emperors Nerva, Hadrian and Septimius Severus from the 1st to the beginning of the 3rd century AD: IG XII. 8, 631-639; Doulgeri-Intzesiloglou, Skiathos, 114-116; Evangelides, Skiathos, 32-33; Fragkoulas, Skiathitika, I, 57-60; Sampson, Skiathos, 27-30.

[284] Athenaeus, Dipnosophisticarum, 56; Claudius Ptolemaeus, Geographia, III. 12. 44; IV. 5. 35; Plinius Secundus, Naturalis Historia, IV. 72; Pomponius Mela, De Chorographia, II. 7,8-10 (106); Strabo, Geographica, IX. 5. 16; Doulgeri-Intzesiloglou, Skiathos, 115-117; Mavrikes, Ano Magneton, 73-74.

information has been gained from archaeological data concerning Roman Skiathos, due to the lack of excavations and systematic studies.[285] Although among various incidental finds eight new sites, possibly dating from Roman Imperial to Early Byzantine, have been detected around the whole island during the last two decades, they do not allow accurate interpretations nor precise conclusions concerning the urban history of Skiathos.[286] The available information, however, harmonizes with the written and epigraphic sources, indicating a boom in urban life and economic prosperity throughout the 1st to 3rd and possibly even until the 4th century AD. Further, during that time Christianity spread on the islands of the Northern Sporades, most probably establishing itself towards the end of the 3rd century AD: apparently without affecting Roman traditions.[287]

Administratively integrated to the *Theme* of Hellas (and later to the naval Theme of Aigaion Pelagos),[288] the islands of the Northern Sporades belonged to the wealthy province of Thessaly.[289] As such, the history of Skiathos was closely linked to the history of the mainland. However, in contrast to Thessaly, Skiathos and its neighbouring islands

[285] For recent archaeological activities and results, see chapter 2.2.3. "Evidence of other relevant archaeological sites".

[286] For the archaeological sites, including a destroyed Roman floor mosaic at the western side of the church of *Panagia i Limnia* or the possible villa maritima at Vasilias and the site of Loutraki north of lake St. George, see: AD 20 (1965), B'1, 336; AD 52 (1997), 470-472, Πίνακα 182c; Doulgeri-Intzesiloglou, Skiathos, 104-109; Evangelides, Skiathos, 31; Sampson, Skiathos, 24-26; for more details see chapter 2.2.3. "Evidence of other relevant archaeological sites".

[287] In AD 343 the bishop Reginos of Skopelos is witnessed at the Synod of Sardica, attesting an independent diocese for Skopelos already for the early 4th century AD.

[288] The *Theme* was the main administrative and military division of regions in the Byzantine Empire and replaced the provincial system in the 7th century AD. For the history of Thessaly and evolution of the Theme of Hellas see Avramea, Thessaly, 17ff.

[289] Information about archaeological activities in the province of Thessaly, see: Doulgeri-Intzesiloglou, La Thessalie. Quinze années de recherches archéologiques, 1975-1990, in: Actes du Colloque International 2. Lyon 1990, 71-92.

were of only marginal political importance, especially throughout the early Byzantine period, and therefore often lacked military control and were left at the mercy of raids from pirates.[290] Accordingly, like the island of Skyros (which in Byzantine times geographically belonged to the archipelago of the Northern Sporades but administratively to the Thema of Aigaion Pelagos) the islands of the Northern Sporades and Skiathos in particular had been known to serve as places of exile.[291] Hence no precise urban activities are known, although the foundation of a diocese on the island suggests a dense population with a rich social life at least until well into the 7th century and possibly the 8th century AD.[292] Archaeological finds, such as columns and other architectural artefacts of white marble confirm the picture of economic prosperity and flourishing trade during Late Antiquity.[293]

[290] A. Ginalis, Byzantinische Seefahrt, 109-110.

[291] A. Failler – V. Laurent, Georges Pachymeres Relations Historiques. Einführung, Edition, Übersetzung und Indices, II. (*CFHB* 24). Paris 1984, 3, 31-501, 499; J. Koder, Aigaion Pelagos (Die nördliche Ägäis) (*TIB* 10). Vienna 1998, 280; Mavrikes, Ano Magneton, 75-76; Skiathos has been associated as place of exile in Roman times: Evangelides, Skiathos, 31.

[292] Evangelides, Skiathos, 35; I. N. Fragkoulas, Η ΕΠΙΣΚΟΠΗ ΣΚΙΑΘΟΥ ΔΙΑ ΜΕΣΟΥ ΤΩΝ ΑΙΩΝΩΝ. *EEBS* 11 (1935) 106-107, 112; Koder-Hild, Hellas und Thessalia 79-81, 257-258; Sampson, Skiathos, 38; Skiathos is first mentioned as diocese with the bishop Demetrios as suffragan of the metropolis of Larisa under the reign of Justinian, named by the Byzantine geographer Hierocles in his work *Synekdemos* in around AD 531: Hierocles, Le Synekdèmos d'Hiéroklès et L'opuscule géographique de Georges de Chypre: texte, introduction, commentaire et cartes, E. Honigmann (ed.) (*Corpus Bruxellense historiae Byzantinae. Forma imperii Byzantini* 1). Brussels 1939, 643, 2-5; J. Darrouzès, Notitiae Episcopatuum Ecclesiae Constantinopolitanae (*Institut Français d'Études Byzantines*). Paris 1981, III. 684, XXI. 149; T. E. Evangelides, L'éveché de Skiathos. *Échos d'Orient* 15 (1912) 506-509;

[293] Probably imported from the nearby mainland. Thessalian marble quarries around Larisa, Thebes, Tissaion or Kastrion had been famous production areas of white marble in Late Antiquity: Karagiorgou, Urbanism and Economy**,** 179-180; Mavrikes, Ano Magneton, 76-77.

Following that thriving period,[294] it seems that Skiathos fades from history in the following centuries, especially from the end of the 8th to the beginning of the 13th century AD.[295] In the absence of strong Imperial control during the reign of Constantine IV (668-685), piratical expeditions consisted of raids and pillages by Slavic tribes as well as the naval depredations of Arab fleets in the Aegean, which supposedly destroyed the island and caused even a temporary depopulation sometime after AD 655.[296] According to the textual source of the *Vita et Miracula Sancti Demetrii*,[297] the Byzantine *strategos* Sisinnios found the island uninhabited when he anchored with his fleet at the harbour of Skiathos in AD 680.[298] Finally, the island gains importance during the anti-iconoclast revolt of the Theme *Hellas* in AD 726/7, most likely playing a prominent role both as regional and supra-regional station for seafaring as well as for requisitioning, supplying

[294] Both Evangelides and Sampson argue that the island is falling into oblivion after the 6th century: Evangelides, Skiathos, 36; Sampson, Skiathos, 38.

[295] However, even during that period written references of Skiathos do not become entirely silent. The island did not go unnoticed by Patriarch Photius and the Constantinopolitan lexical encyclopaedia *Etymologicum Genuinum* compiled in the 9th century AD, by the *Suda* and the *De thematibus* of Constantine VII Porphyrogenitus of the 10th century AD and finally by the bishop Eustathius of Thessaloniki and the *Etymologicum Symeonis* of the 12th century AD.

[296] P. Charanis, Kouver, the chronology of his activities and their ethnic effects on the regions around Thessalonica. *Balkan Studies* 11/2 (1970) 236ff; Karagiorgou, Urbanism and Economy, 27; Koder-Hild, Hellas und Thessalia, 56, 257-258; Sampson, Skiathos, 38; Evangelides suggests a date around AD 675 based on the Arab expeditions prior to the first Arab siege of Constantinople: Evangelides, Skiathos, 36-37.

[297] Sancti Demetrii Martyris Acta, PG 116, 1081-1426.

[298] P. Lemerle, Les plus anciens recueils des Miracles de Saint Démétrius. Et la Pénétration des Slaves dans les Balkans, I. (Éditions du Centre National de la Recherche Scientifique). Paris 1979, 230-231: "....στρατηγός Σισίννιος....ἐξεισιν ἀπό τῶν τῆς Ελλάδος μερῶν καί καταλαμβάνει την Σκιαθίαν....Προσορμήσας οὖν ἐν τῇ λεχθείσῃ νήσῳ, **ἀοικήτῳ οὔσῃ ἐκ πλείστων τῶν χρόνων**, καὶ εὑρηκὼς ἕνα τῶν γενομένων ἐκεῖσε παναγίων ναῶν ἀλσώδη καὶ ἔνυλον καθεστῶτα, τῶ ἐυηκόω στρατῶ ἐπέτρεψεν ἐν μέρος αὐτου καθαίρειν, κἀκεῖσε την θείαν λειτουργίαν ἐκτελεῖν".

and equipping the fleet of the revolutionary leaders Agallianos and Stephanos in the first quarter of the 8th century AD.[299]

It was not till AD 758, when the Imperial fleet called at the harbour of Skiathos when fighting piracy in the Aegean Sea,[300] that Constantinople managed to restore Byzantine military control over the Northern Sporades. However, Byzantine rule was rather nominal, as local and Saracen pirates continued pillaging the island and using it as a base for their raids along the Thessalian coast from the 9th century AD onwards.[301] In fact, these intense piratical activities throughout the middle and late Byzantine period as well as trade agreements with Venice that resulted in the establishment of merchant-colonies in central Greece possibly as early as the 9th and up to the 12th century AD,[302] suggest high levels of commercial activity in the area and consequently the increasing importance of Skiathos to the passing shipping lanes. This is supported by a late 11th century AD

[299] Nicephori archiepiscopi Constantinopolitani opuscula historica, C. De Boor (ed.). Leipzig 1880, 57f; Theophanis Chronographia, C. De Boor (ed.), I. Leipzig 1883, 405; Koder-Hild, Hellas und Thessalia, 57-58.

[300] Evangelides, Skiathos, 37; Fredrich-Wace, Skiathos und Peparethos, 106; A. Sampson, Περιηγητές και Γεωγράφοι στις Βόρειες Σποράδες. Skopelos 1997, 32; Sampson, Skiathos, 39.

[301] Damian of Tarsus used the Northern Sporades (most probably Skiathos with its favourable harbour bay) as base for his Saracen pirate fleet raiding the central Greek coastline by the end of the 9th and beginning of the 10th century AD: Caminiates, De expugnatione Thessalonicae, 14.6-7 (506-507); Kekaumenos, Strategikon, II.31, 33; Evangelides, Skiathos, 37; Mavrikes, Ano Magneton, 76; Papathanasiou, Saracen pirates, 89; Sampson, Skiathos, 39.

[302] Tafel-Thomas, Urkunden, III. 161, 199, 269 (Nr. 370); Miklosich-Müller, Acta et Diplomata, III, 338; Koder-Hild, Hellas und Thessalia, 257-258. Based on surviving documents concerning trade agreements and privileges of mainly Venetian and Genoese merchants within Byzantine territory, it is generally suggested that the establishment of western merchant colonies started in the 11th century AD. However, the author believes that these documents suggest the existence of already well established merchant colonies with well organized trading connections. This would push the establishment of merchant colonies further back, probably as early as the 9th century AD. This is further supported by the sudden growing importance of Almyros and Pteleos from the 9th century AD onwards (see chapters 2.3.3. "The Port of Almyros" & 2.3.4. "The Harbour of Pteleos"), as well as heightened piratical activities.

funerary inscription mentioning the bishop Anastasius of Skopelos.[303] Even though this shows that Skiathos probably was united with the diocese of Skopelos under the reign of emperor Nikephoros III Botaneiates, it shows nevertheless a reviving social life.

With the conquest of Constantinople by the Western crusaders of the 4th crusade (1202-1204), the former Byzantine Empire was apportioned between Venice and the crusade's leaders. According to the so-called "*Partitio Terrarum Imperii Romaniae*"[304] Skiathos, like the other islands of the archipelago, Skyros and Euboea fell under Venetian control and became property of the Ghisi family in AD 1207.[305] In the period of the first Venetian rule and especially under Philip Ghisi, the Northern Sporades acquired temporary glory again from AD 1259.[306] Acting against piracy, the Venetians defended Skiathos and particularly its harbour area, which can be seen by the construction of the harbour fortification of the so-called "Bourtzi".[307]

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[303] The inscription was found during renovation works and the construction of the spire of the church of *Panagia i Limnia* on the acropolis of the town in the early 19th century: A. D. Alexiou, ΣΚΙΑΘΟΣ. Η αρχιτεκτονική των μεταβυζαντινών μνημείων. Thessaloniki 1996, 65; Evangelides, Skiathos, 38-39; I. N. Fragkoulas, Τα Χριστιανικά μνημεία της νήσου Σκιάθου. Thessaloniki 1955, 28; Sampson, Skiathos, 39.

[304] Treaty between the crusade's leaders, concerning the partition of the Byzantine Empire: A. Carile, Partitio Terrarum Imperii Romaniae. *Studi Veneziani* 7 (1965) 125-305.

[305] Koder-Hild, Hellas und Thessalia, 257-258; R.-J. Loenertz, Les Ghisi. Dynastes vénitiens dans l'Archipel 1207-1390, (*Civiltà Veneziana Studi* 26). Florence 1975, 26-30, 55f., 315ff.; Elisabeth Malamut, Les Iles de l'Empire Byzantin. VIIIe-XIIe siècles, I. (*Byzantina Sorbonensia* 8). Paris 1988, 124; Mavrikes, Ano Magneton, 86-88; S. A. Oikonomos, Η Νήσος Πεπάρηθος. Skiathos 1883, 28-29; Sampson, Skiathos, 40-41; Sampson, Skopelos, 185-187.

[306] Here it has to be mentioned that Sampson wrongly interprets the *Chroniques Gréco-Romanes* (edited by Ch. Hopf in 1873), arguing that "Ad futuram memoriam scripte fuerunt Insula infra scripte et sunt insulae dell' Arcipelago exeuntes,...." (p. 175) is referring to the islands of the Northern Sporades as having been considered as one of the most prominent islands of the Aegean Sea, while it is clear that with *Sporades* the source lists islands of the Dodecanese: Sampson, Skiathos, 40

[307] Evangelides, Skiathos, 42-43; for more information on the Venetian fortification "Castelli di San Georgio" see: AD 20 (1965), B'1, 334-342; Fragkoulas, Aksiologes Topothesies, 25-28; I. N. Fragkoulas,

Finally during the reign of the Byzantine Emperor Michael VIII Palaiologos (1259-1282) the Byzantine admiral and later *Megas Doux*[308] Licario reconquered the island in 1276, ending the first Venetian period.[309] Although the Northern Sporades remained under Byzantine control until 1453, the 14th century AD in particular is characterized by raids of local pirates and various naval depredations. As such, Skiathos and the other islands suffered from attacks from Catalans in AD 1308 and Bohemund Brienne in AD 1310.

Furthermore, Ottoman fleets acting in the Aegean Sea raided the island between AD 1326 and 1328 and again in AD 1332, under the admiral Umur Paša. The Ottomans finally conquering Skiathos temporarily in AD 1392/3, and caused terrible destruction on the island.[310] These events led to the foundation of and population movement to the medieval fortified settlement of Kastro on the northern edge of the island around the middle of the 14th century AD, seeking protection from the constant threat of military activities.[311] This did not, however, result in the total abandonment of the city and harbour bay of Skiathos.[312] Finally, with the conquest of Constantinople by the Ottoman Empire and consequently the end of Byzantium in 1453, Skiathos and the other islands of the Northern

Τα Χριστιανικά μνημεία της νήσου Σκιάθου. Thessaloniki 1955, 5-7; chapter 2.2.3. "Evidence of other relevant archaeological sites".

[308] During the late Byzantine period the Megas Doux (Grand Duke) denoted the commander-in-chief of the Byzantine navy.

[309] PLP 8154; Oikonomos, Peparethos, 28-29; Loenertz, Les Ghisi, 48-52, 52ff; Koder-Hild, Hellas und Thessalia, 71; Koder, Negroponte, 47-50; Sampson, Skopelos, 187-188.

[310] Evangelides, Skiathos, 45-47; Fredrich-Wace, Skiathos und Peparethos, 106; Koder-Hild, Hellas und Thessalia, 75, 257; Koder, Negroponte, 52; Sampson, Skiathos, 41-43; Sampson, Skopelos, 189.

[311] For the medieval fortification of Kastro see: Evangelides, Skiathos, 39-41; Fiedler, Griechenland, 10-12, fig. 1-3; Fragkoulas, Aksiologes Topothesies, 29-59; Fragkoulas, Mnemeia, 7-12; Fragkoulas, Skiathitika, 41, 43-45, 87.

[312] Sampson, Skiathos, 43.

Sporades became Venetian property again.[313] Skiathos in particular remained under Venetian control until 1538, when the Ottoman admiral and later Pasha Hayreddin Barbarossa took the island by conquering the Kastro on the northern side. This shows that the key to the island moved to the Kastro. The harbour bay on the southern side, however, was still as important as it used to be during the Byzantine period. A Venetian naval expedition under admiral and later Doge Francesco Morosini besieged and took the Kastro, trying to regain control over the island in AD 1660. During this attack he destroyed the old Venetian harbour fortification Bourtzi, attesting again the importance of the harbour for any military activities.[314]

2.2.3. The Archaeological Sites of the Survey Area (ILL II.I.1 and KS, VOL II)

A joint survey project in cooperation with the Greek Ephorate for Underwater Antiquities (EEA), the 13th Greek Ephorate for Prehistoric and Classical Antiquities and the 7th Greek Ephorate for Byzantine Antiquities around the Greek island of Skiathos was proposed and a campaign of surface investigations around the island started in May 2012 and continued in 2013.[315] With the permission of those authorities the survey data was

[313] In 1454 the island favoured the patronage of Venice to the Ottomans and signed a treaty under the same conditions as with the Ghisi family in the 13th century AD: Leonardos, Chorografia, 174.

[314] Evangelides, Skiathos, 58; Fragkoulas, Aksiologes Topothesies, 34, 39; Fragkoulas, Mnemeia, 6; Fragkoulas, Skiathitika, 45; Koder-Hild, Hellas und Thessalia, 78; Leonardos, Chorografia, 175; Sampson, Skiathos, 49-50, 55.

[315] After oral and electronic communications with the directors of the responsible Greek Archaeological Services Dr. Simosi, Dr. Doulgeri-Intzesiloglou and Dr. Sdrolia, the present author submitted a written application concerning the planning, targets, methodology and model of field research on the 18th of August 2011, which has been approved by the authorities with the Protocol number Φ9/2/3935/6-10-2011; see SURVEY PERMISSION AND OTHER LEGAL DOCUMENTS, VOL II.

incorporated into the present work. The entire data, including architectural studies, and ceramic analysis was looked at by the author himself, consulting specialists such as Hayes, Franco, Vroom and Poulou for particular issues of the ceramics for approval of the correctness of the results.[316]

Based on the geographical and economic background, previous archaeological reports (see chapter 2.2.4. "Evidence of other archaeological sites"), information and material provided by locals, as well as historical accounts, promising research areas for the study of coastal facilities were expected along the southern and northern coastline of the island. As such, according to the submitted long-term research proposal,[317] the following areas of interest will be focused on: the harbour bay of Skiathos, including the lake of St. George, the old harbour with the Bourtzi and the shipyard areas of Tarsanas, the entire Siferi Bay, Platanias Bay, Troulos with the Troulonisia (Tourades) Islets and Marinos Reef, Strofilia Bay with the homonymous lake and Mandraki (the harbour of Xerxes) and finally the eastern Kechria Bay in the north. Additionally, the numerous reefs and islands off Skiathos have been included as research targets.[318]

Differentiating coastal structures according to the model of classification, category, type and function (see ILL I.4, VOL II), the choice of area was based upon the identification of four different types of harbours: commercial, strategic, travel and private, executing various functions for commercial or military purposes.[319] Based on a preliminary study, the chosen sites listed below and investigated during the first survey season in 2012, were

[316] Here the author wants to express his gratitude to those people and in particular Carmela Franco and Natalia Poulou for their comments.

[317] Ibid.

[318] For the geography of the island see chapter 2.2.1. "Geographical and economic background".

[319] On the characteristics of coastal structures see chapter 1.2. "Function, purpose and hierarchy of coastal installations" and ILL I.4, VOL II.

interpreted as showing examples of one or even more of the aforementioned commercial, strategic, travel and private types of coastal installations:

1. The broader area of the harbour bay of Skiathos, including the site of the "Old Harbour", "Bourtzi", the bay of Tarsanas in the area of "Plakes", the sites of "Karnagio" and "Mylos", the modern shipyard, the site of "St. George" and the homonymous lake and the area of "Lazareta".
2. The site of "Aghia Paraskevi" at Platanias Bay.
3. The bay of Troulos, including the "Troulonisia" (Tourades islands), the Marinos reef and Cape Amoni.
4. The site of "Tarsanas" at Kechrias Bay.

2.2.3.1. The broader harbour area (ILL II.I. 3-45 and KS 1-4, VOL II)

The main area of research during the 2012 season of the coastal and underwater survey project at Skiathos was the broader area of the harbour bay. This included the whole area between the town of Skiathos and the peninsula of Pounta with the border line from Cape Pounta to Cape Plakes. Both, for logistic reasons and its differentiation in typology and functionality, the area has been divided into the sites of the "Old Harbour", the bay of "Tarsanas", the "Karnagio", "Mylos", "St. George" and "Lazareta". Consequently, the archaeological discussion of the survey area follows the same methodology.

THE OLD (SOUTHERN) HARBOUR (ILL II.I.3-15 and 28-33, VOL II)

For the survey activities at the southern harbour area, the so-called "Old Harbour" of the town of Skiathos, the research team divided the harbour into a western and an eastern basin, using the centrally located jetty as the border line.

The western harbour basin

Starting to investigate the western harbour basin, the western breakwater (CAT 2 & PL II, VOL II), located opposite of the Venetian fortification of Bourtzi, could be verified and documented. The existence of the breakwater has been known and used by local fishermen for centuries[320] until it was officially reported by the German professor Ulrichs in 1863.[321] Apart from a brief 5 line description by Fragkoulas in 1995,[322] it has not been the subject of detailed investigation prior to the present survey. Despite the fact that in modern times the breakwater has been frequently used for anchoring fishing boats (PL II, 4, 5, 9, VOL II), its structure is almost entirely preserved. It has an east-west orientation, starting from a group of rocks protruding from the water surface and limiting the harbour to the west. With a total length of around 47 m, it closes approximately one third of the harbour entrance from the west. Its width of 50 m, however, lends the structure a more uniform symmetry. The breakwater has a current height of 1.40 m at its western starting point and reaches a height of 5 m at its eastern end. It consists of two different construction parts; an internal and an external. The internal core section is built of a mixture of quarry rubbish and small stones, while its external part consists mainly of huge raw rock boulders (ILL I.7a). The breakwater is currently situated 0.50 m below the present water level. Despite the change in sea level since Antiquity,[323] the breakwater probably did not protrude a lot from the sea even at the time of its construction. Nonetheless, the breakwater can be identified as of type "Mound Breakwater" (ILL I.7a).[324] The grade of

[320] Numerous modern anchors, particularly along the northern slope of the breakwater, attest that latter provided good and sheltered anchorage for the western quayside even in modern times.

[321] H. Ulrichs, Reisen und Forschungen in Griechenland, Bd. 11. Berlin 1863, 239.

[322] Fragkoulas, Aksiologes Topothesies, 13.

[323] Blackman, Sea Level, 115-139.

[324] For "Mound Breakwater" see chapter 1.3.1.1. "Breakwater and Mole".

the slope differs between its northern, southern and eastern end. While the northern end drops quite abruptly with a steep angle, the angle of the slope becomes slightly flatter at the eastern end and increasingly towards its southern end. The gentle inclination of the breakwater towards the south starts nearly from the middle of the structure, which thus gives the construction a high stability against the strong southern winds and to absorb the force of the waves from the open sea. Simultaneously, this would have allowed the waves to break over, creating currents within the harbour basin in order to prevent siltation. The whole inner side of the breakwater from the central area up to its northern end possesses an approximately 35-40 m long and 28-30 m wide flat surface. Big parts of that surface show residues of mortar,[325] encrusted with the rubble filling of the breakwater's core, which acted as binding material for blocks. This suggests the possible existence of a mole construction of an estimated length of 27-35 m and an estimated width of 26-28 m. In fact, at the southern end of the surface as well as on the southern slope, structural remains bedded into mortar could be verified. Although partly fallen off the slope, these still form the southern line of the mole.

Additionally, at the bottom of the breakwater's eastern end, big concreted blocks (CAT 3 & PL III, VOL II) attest the former construction of a mole, which probably broke off and fell down from the surface of the breakwater.[326] The concrete blocks of the mole were bound to the breakwater by the use of mortar as well as additionally fixed with metal rods, pierced through the blocks. Thus, the mole architecture provided strength and resistance against the forces of nature (PL III, 5, VOL II). Further, the breakwater is covered by scattered ceramic fragments, concentrated on the surface and particularly on its inner

[325] Laboratory analysis of samples still needs to be done and has been suggested for future seasons.

[326] For moles see chapter 1.3.1.1. "Breakwater and Mole".

(northern) side and the edge as well as the upper part of the northern slope.[327] However, due to the steady washing out by the sea no characteristic pottery could be identified. Finally, no signs of a harbour fortification could be found. This shows that apart from supporting the mole construction, the initial purpose of the breakwater was to act against siltation. Consequently, based on these architectural and functional characteristics,[328] a *terminus post quem* of the Roman Imperial period and especially the time of the *Pax Romana* can be suggested.

On the easternmost of the rocks forming the western end of the harbour, an Early Byzantine rock inscription (CAT 1 & PL I, VOL II) is located at the beginning of the western breakwater. Determining both the beginning of the mole and its southern end, the inscription, roughly dated between the 6th and 8th century AD, reads:

«Ο ΑΓΙΩ
ΤΑΤΟC ΚΕ
ΜΑΚΑΡΙΩ
ΤΑΤΟC ΑΙ
ΠΙCΚΟΠΟC
CΤΡΑΤΩΝ
ΑΙΚ ΤΩΝ Ι
ΔΙΩΝ ΑΙΚΤΙCΕ
ΤΟΝ ΜΩ
ΛΟΝ»[329]

Although the inscription was first noted together with the breakwater by Ulrichs in 1863, it was first published by Fredrich and Wace in 1906.[330] Only about 30 years later Fragkoulas provided a first critical edition and short analysis of its impact on the church

[327] For the distribution of the ceramic fragments see PL II, VOL II.

[328] For the characteristics of breakwaters and moles see chapter 1.3.1.1. "Breakwater and Mole".

[329] "The most saintly and blessed bishop Straton built the mole from his own resources" (transl. by the author).

[330] Fredrich-Wace, Skiathos und Peparethos, 106; Ulrichs, Griechenland, 239.

history of the island.[331] The roughly polished and eroded front face provides limited space for writing, which in turn goes below the water surface. The lines of the text constantly underwater are not preserved.[332]

Investigating the western starting point of the breakwater an ornamental marble object (CAT 5 & PL V, VOL II) was detected north of the rock inscription. The approximately 0.30 m long and 0.15 m wide fragmentary piece possibly functioned either as an ending piece or as a framing ornament for an architectural unit, showing one side folding to a point. Unfortunately, no conclusions can be drawn, neither concerning its origin nor its original purpose. It would have been initially traded and imported to the island as a structural element, before ending up either being re-used as spolia for the mole or as waste material for the construction of the breakwater.

Another puzzling artefact forms a peculiar round stone object (CAT 4 & PL IV, VOL II) situated just north of the breakwater's inner side. The stone artefact shows four distinctive and evenly spaced rectangular shaped notches around the edge. Neither its purpose nor its functionality can be determined. It has been suggested that one possibility might be a column drum with the notches providing lateral support for fitting into projecting teeth or tenons of a lower or higher column drum. However, believing that the notches may have featured attached timber structures, an association with an olive or wine press is suggested. Indeed, objects with similar characteristics have been found at so-called "Lever and Drum" or "Screw" type oil presses, constituting the lid of press beds called

[331] Fragkoulas, Aksiologes Topothesies, 13-14; Fragkoulas, Episkope, 111-112; further see Anna Avramea, Les Constructions profanes de l'Éveque d'après l'Épigraphie et les textes d'Orient, in: Actes du XI[e] Congrès International d'Archéologie Chrétienne, Lyon, Vienne, Grenoble, Genève et Aoste 1986, F. Baritel – N. Duval – Ph. Pergola (eds.), I (*Collection de l'École française de Rome* 123). Rome 1989, 833.

[332] For a linguistic discussion and further information concerning the inscription see CAT 1, VOL II.

"Orbis".[333] Compared to Byzantine press facilities such as the 4th-5th century AD dated wine-presses in Israel[334] or the 5th-6th century AD dated oil-press excavated at the site of Kassandra in Chalkidiki,[335] as well as further ones in the limestone massive of Syria,[336] as well as object could possibly be identified as a circular crushing stone used for the industry of olive oil or wine production.

A well preserved small iron anchor (CAT 7 & PL VII, VOL II) is located at the foot of the breakwater's eastern end. The shaft is broken with the remaining part measuring a length of 0.55 m and a diameter of 0.060 m. One anchor arm is broken with a remaining length of 0.17 m, while the second arm is entirely preserved with a length of 0.34 m, providing a total span of 0.68 m. Although the proportions of the current measurements and hypothetical reconstructed dimensions show particularly high similarities to the remains of the anchors II and III from the late 4th/early 5th century AD Dramont F shipwreck off the southern coast of France[337] and the ones from the early 6th century AD Tantura A shipwreck in the harbour of Dor,[338] the angle of the arms is slightly different. The Tantura A anchors are set in a perpendicular T-shaped arrangement to the shank and

[333] For "Lever and Drum" and "Screw" oil presses see: M. Decker, Tilling the hateful earth: agricultural production and trade in the late antique East (*Oxford Studies in Byzantium*). Oxford 2009, 158-159, Fig. 5.1-5.4; A. G. Drachmann, Ancient Oil Mills and Presses. Copenhagen 1932, 50-121 (in particular 50-51, 63-71 and 119), Fig. 12, 14, 16, 39; D. and Noelle Soren, A Roman villa and a Late Roman Infant cemetery. Excavation at Poggio Gramignano Lugnano in Teverina (*Bibliotheca archaeologica* 23). Rome 1999, 208, Fig. 153.

[334] Kingsley, Shipwreck Archaeology, 86-92.

[335] Elizabeth B. Tsigarida – Sp. Vasiliou – Elpi Naoum, Νέα στοιχεία για την οργάνωση και την οικονομία της Κασσάνδρας κατά την ελληνιστική και ρωμαϊκή περίοδο. *Το Αρχαιολογικό Έργο στη Μακεδονία και στη Θράκη* 23 (2009). Thessaloniki 2013, 386.

[336] Kingsley, Barbarian Seas, 16-17.

[337] J. P. Joncheray, Mediterranean hull types compared 2. Wreck F from Cape Dramont (Var), France. *IJNA* 6/1 (1977) 7.

[338] Kingsley, Barbarian Seas, 83; S. A. Kingsley – K. Raveh, The Ancient Harbour and Anchorage at Dor, Israel. Results of the underwater surveys 1976-1991 (*BAR Int. Series* 626). Oxford 1996, Pl. 57.

do not have a clear cruciform shape with pointed flukes but show a regularly extending slight curve. Therefore, optically as well as concerning its proportions of an estimated length of the shaft of 1.10 m and length of the arms of 0.68 m, the anchor could also be compared with another iron anchor found in the bay of Dor and dated to the 1st-2nd century AD.[339] However, a closer look at the arm profile reveals that the angle of incline is higher than the MA 08 bow-shaped anchor of the 1st-2nd century AD and therefore might actually indicate a rather transitional feature between the Roman Imperial and Early Byzantine periods. As such, it is suggested that even though the arm profile is not fully developed, at least its placement perpendicular to the shank is deliberate and therefore typologically the anchor can be categorized as an early stage of a cross-anchor. As the main anchor type of the Early Byzantine period, the T-shaped cross-anchor had been commonly used throughout the Mediterranean from the 4th to the 9th/10th and increasingly during the 6th and 7th century AD, reaching as far west as Seville or Valencia and Dor or Tomis Constantia in the east.[340] Consequently, despite its different size, considering a transitional stage the anchor can typologically be compared with anchor MA 10 at Dor and may therefore roughly be dated between the 2nd and 4th century AD.[341]

Off the north-eastern end of the breakwater a second iron anchor (CAT 6 & PL VI, VOL II) is preserved, sticking out from the bottom of the harbour basin at an angle. Although the anchor is encrusted, due to the chemical reaction of the iron with the underwater environment, its dimensions can be recognized and roughly reconstructed. Unfortunately the anchor arms are buried in the sand. However, the beginning of the arms from the shaft

[339] Kingsley-Raveh, Ancient Harbour, 22 (MA 08), Fig. 19, Pl. 18; S. A. Kingsley – K. Raveh, The Status of Dor in Late Antiquity: A Maritime Perspective. *Biblical Archaeologist* 54/4 (1991) 198, 200-201.

[340] For the Early Byzantine cross-anchor see: Ginalis, Byzantinische Seefahrt, 74-77

[341] Kingsley-Raveh, Ancient Harbour, 23 (MA 10), Fig. 22-22, Pl. 18.

is visible, therefore providing information concerning the typology of the anchor. Consequently, four arms leaving the shank in bow indicate a four-pronged anchor, typologically widely known as Grapnel anchor. Although the AD 1237 dated *Maqamat* manuscript by al-Hariri attest the use of that anchor type for Arab ships already the latest by the 13th century AD,[342] the earliest archaeological evidence for substantial grapnels in the Mediterranean probably goes back to the 14th century AD, found both at Caesarea Maritima in the east and Catalonia in the west. However, the grapnel anchor was probably also used during the Ottoman period and became common in the 18th century again at the latest.[343]

Continuing the investigations in the western harbour basin, the research team recorded a quay (CAT 8 & PL VIII, VOL II), stretching from the western breakwater toward north and further towards east running along the northern coastline. With a total length of around 277 m it covers the entire western and northern coastline of the harbour bay, forming five sides of a hendecagon. These five sides of the quay line are divided into a western part with three sides and an eastern part with two sides by a jetty in the middle of the harbour, leading into the basin. Only the three sides of the western part to the jetty, with an approximate total length of 137 m and an average estimated width of 5.50 m, seem to be preserved in their original phase.[344] The quay is built of huge blocks of broken rubble stones. The shape of these blocks, consisting of a mixture of quarry stones and mortar, vary mostly between rectangular but also some nearly square shaped cubes with

[342] V. Christides, Two parallel naval guides of the tenth century. *Graeco-Arabica* 1 (1982) 64-66; fig. 17-18, 23.

[343] Based on personal communication with G. Votruba.

[344] Unfortunately the eastern part of the quay line is totally overbuilt by modern metal pillars, entirely covering any previous structure. Since the harbour has continuously been used and is still active as a touristic and fishing harbour, it has been overbuilt, using the ancient structures as base for the new additions. At least two more phases can be recognized, probably from the early 19th and the 20th century.

average lengths of 1 m and heights of 0.60 m. Despite the use of irregular shaped and random placed uncut rubble stones, the quay does clearly not consist of rubble masonry forming a so-called *Opus incertum* or *Opus antiquum*, since the stones are set into a core of mortar forming regular shaped blocks. However, it does not consist of ashlar masonry forming a so-called *Opus quadratum* either, since the blocks are formed by quarry stones and mortar. In fact, the extremely smooth surface suggests that the blocks were produced by using a formwork, possibly made out of wood such as at Constantinople and Caesarea Maritima.[345] Compared to the jetty and mole structures at the Theodosian harbour at Constantinople and the Herodian harbour of Sebastos at Caesarea Maritima,[346] the wooden formworks were neither sunk prior to the filling with the rubble-mortar mixture, nor was the use of hydraulic concrete necessary for features along the coast. In contrast, the blocks seem to have been produced individually in uniform formworks on land and subsequently used for the construction of the quay by putting them on top of each other in a slightly displaced order. This consequently shows a mixture of various different masonry techniques: the *Opus quadratum* as a basic form, added to with blocks of *Opus incertum*. Despite the resistance and high consistency of the masonry, parts of the mortar got washed out, causing the breaking away of the rubble stones particularly at the corners. Finally, due to the continuous use of the harbour, the surface of the original phase is covered by the modern level. This fact makes it impossible both, to reconstruct its interior composition and architectural characteristics, and to investigate whether the quay was entirely built of those rubble-mortar blocks or if it possessed transversal walls as retainers

[345] For the use of wooden formworks in context with the technology of harbour architecture see chapters 1.3.1.1. “Breakwater and Mole” and 1.3.1.2. “Quay and Wharf”.

[346] For more information on these harbours see Ercan, Yenikapi, 121-126; Fig. III. 10-11, 163; Fig. III. 46; Raban, Caesarea Maritima, 64ff.

for non-consolidated fillings, such as at Larymna, Aegina or Anthedon.[347] Considering the similar total widths of maximum 5.30m for Anthedon and 5.80m for Larymna,[348] however, it can be suggested that the quay structure at Skiathos (with an approximate width of 5.50m according to the provided width of its southwestern end) may have possessed retaining elements as well.

The centrally located jetty (CAT 9 & PL IX, VOL II) protrudes from the quay into the harbour basin, dividing latter in a western and an eastern basin. Similar to the quay, the jetty is only partly preserved in its original phase, exclusively at its western side. Early pictures and drawings (ILL II.I.8, VOL II) as well as architectural maps of the harbour (KS 3, VOL II) already show that the dimensions of both, the length and the width of the original phase of the jetty were much smaller than the modern slightly trapezoid shaped superstructure. While the current jetty measures a length of 38-40 m and a width of 16-17 m, the original jetty possessed a length of 30m and a width of 12 m. The 2012 survey revealed that the jetty is only fully preserved at a length of 15 m and was extended by modern concrete blocks. Nevertheless, as the jetty continues into the harbour basin to a depth of more than 5m, the original structural remains still consist of one to two rows of blocks, so that the modern concrete blocks are actually just set on top of the ancient remains, using them as a substructure and base. The architectural map together with the pictures and drawings suggest that the jetty was extended both in length towards south and in width towards east in the 19th and 20th century, providing its modern face (ILL

[347] P. Knoblauch, Neuere Untersuchungen an den Hafen von Ägina. *Bonner Jahrbücher*169 (1969) 104-116; P. Knoblauch, Die Hafenanlagen der Stadt Ägina. *AD* 27 (1972), A, 50-85; Raban et alii, Sebastos, 65-66; J. Schäfer, Beobachtungen zu den seeseitigen Mauern von Larymna in der Lokris. *AA* 82/4 (1967) 531-535, Abb. 7 and 10; Schläger-Blackman et alii, Anthedon, 52-64.

[348] Schäfer, Larymna, 535; Schläger-Blackman et alii, Anthedon, 64.

II.I.8, VOL II). This is further supported by the fact that the original phase is visible only at the western side of the jetty.

Concerning the original construction blocks, the material is identical with that of the quay, consisting of huge blocks of broken rubble stones mixed with mortar. The blocks of the jetty are roughly square shaped cubes with average lengths of 0.90 m and heights of 0.72 m. In contrast to the quay façade, large parts of the jetty are heavily damaged, resulting in entire blocks breaking away.

Throughout the entire western harbour basin quantities of ceramic material were found scattered over the bottom of the harbour (PL X, VOL II). Apart from numerous unidentifiable sherds (PL X_{III}, VOL II), the recognizable material mainly consists of broken pieces of amphorae, plates, bowls, jars and lamps as well as further domestic ware and other types of pottery. The area between the western breakwater and the jetty revealed one fragment of type LR 1 amphora, three fragments of type LR 2 amphora (one can be associated with type LR 2/13 variant or better known as simply Globular Amphora), one fragment of possibly either type LR 3 or LR 7 and one fragment of a spouted jug (PL X_I, VOL II). Except from the LR 3/LR 7 fragment, which consists of a tapering closed base, all other amphora pieces comprise necks with intact rims and sometimes shoulder fragments with either both or only one preserved handle.[349] Similarly, the spouted jug

[349] Although the LR 1 piece is fairly fragmented, quite narrow and delicate right-angled handles and a relatively tall, narrow neck can be recognized, which suggests a dating to the 5th century AD. The LR 2 pieces show a quite characteristic developed shape with one preserved round-shaped handle, a narrow high neck and a sharply everted rim, consequently suggesting a late 6th to 7th century AD dating. The globular amphora fragment can be compared with the Saraçhane 35, 38-39 and 41-42 types and may consequently date between the end of the 7th to the beginning of the 8th century AD. Finally, although the tapering closed base fragment cannot be assigned with certainty to a specific amphora type such long pointed amphorae with a tapering solid foot and closed toes appear particularly during the 6th century AD. For information concerning those amphora types see: M. Bonifay, Etudes sur la céramique romaine tardive d'Afrique (*BAR*

with bricklike reddish-brown clay possesses a fragmented shoulder, a completely preserved straight long neck with a slightly everted rim, a curved handle which connects the shoulder with the upper part of the neck and a spout which starts from the beginning of the shoulder and reaches the same height with the neck and the handle. Since the existence of that type of spouted jugs goes back to the Classical and Roman periods but becomes even more popular during the Ottoman period, it is very difficult to determine that type of coarse ware. Later Ottoman examples, however, show quite elaborate artistic necks, a right-angled handle and a spout often reaching to the rim.[350] The only comparative examples represent one early 10th century AD dated example from Saraçhane with a similar fabric but different rim and position of the handle,[351] as well as an almost identical piece found on the Caspian coast, dating to the 12th-13th century AD.[352] Consequently, it is suggested that the example from Skiathos dates to the Middle Byzantine period; possibly between the 10th and 12th century AD.

Besides the scattered material in the western harbour basin, along the western side of the jetty two ceramic accumulations, one at the end of the jetty and one towards the corner to the quay, can be distinguished (PL X_{II}, VOL II). Among the jumble of unidentifiable material, the accumulation at the end of the jetty includes one body sherd of type LR, another one with an incised "X", two fragments of type LR 2, one fragment of a conical

Int. Series 1301). Oxford 2004, 151-153; J. W. Hayes, Excavations at Saraçhane in Istanbul, II (The Pottery). Princeton 1992; Joanita Vroom, Byzantine to modern Pottery in the Aegean – 7th to 20th Century. An Introduction and Field Guide. Utrecht 2005, 52-61; http://archaeologydataservice.ac.uk/archives/view/amphora_ahrb_2005/index.cfm.

[350] See examples from Saraçhane: Hayes-Harrison, Saraçhane, II, 348 (Fig. 106), 369-370 (Figs. 127-128), 375 (Fig. 133.1-4).

[351] Hayes-Harrison, Saraçhane, II, 58-59 (Fig. 21.1), 223.

[352] P. A. Azizbekova (ed.), Archaeological Finds on the Caspian Coast. Monuments of Material Culture of Azerbaijan. Baku 1989, Fig. 35.

shaped flask and one large plate of type African Red Slip Ware (ARSW). Both, the two LR 2 and the flask fragments comprise necks with an intact rim and shoulders with both handles preserved. The conical shaped ceramic flask shows a short straight neck with a likewise short straight rim and two round handles, connecting the conical shoulders with the neck. Filled with oil and stamped on one side and inscribed on the other side, such flasks were commonly used in context of pilgrimage. Unfortunately, the body is missing. Based on the shape, however, the flask can be compared with the ceramic pilgrim's flasks of the shrine of St. Mena in Abu Mena, Egypt and therefore may date to the 6th-7th century AD.[353] The ARS plate fragment (CAT 10 & PL X_{IV}, VOL II) of bricklike reddish-brown fabric embodies a large shallow dish with a diameter of 0.42 m and a high ring foot with a diameter of 0.24 m. While the interior base and its foot are entirely preserved, only a small part of the thick rim is still existent. The plate shows an outer grooved circle at the edge of the base and two grooved circles at the centre, surrounding a large stamped medallion of a central standing figure flanked by four heads. The plate can be assigned to form 104 after Hayes and in particular with type A14 and decoration type 252.[354] Therefore the plate represents a later product of North African Ware, which dates between the third quarter of the 6th and the mid-7th century AD.[355]

[353] For the Abu Mena flasks see: K. M. Kaufmann, Die Ausgrabung der Menas-Heiligtümer in der Mareotiswüste. Bericht über die von K. M. Kaufmann und I. K. E. Falls veranstaltete Ausgrabung des Nationalheiligtums der altchristlichen Ägypter. Cairo 1906-1908, 1906: Fig. 46-47; 1907 (zweiter Bericht): Fig. 22; 1908 (dritter Bericht): Fig. 29-31; K. M. Kaufmann, Die Menasstadt und das Nationalheiligtum der altchristlichen Ägypter in der Westalexandrinischen Wüste: Ausgrabungen der Frankfurter Expedition am Karm Abu Mina, 1905-1907. Leipzig 1910, Fig. 96.12; Kingsley, Barbarian Seas, 24; D. Krueger, Byzantine Christianity, (*People's history of Christianity* 3). Minneapolis 2006, 92, Fig. 4.4; G. Vikan, Byzantine Pilgrimage Art. Washington 1982, 16, Fig. 9 and 11.

[354] Hayes, Pottery, 162-163, 268-269, Fig. 30 A/B 16, Fig. 52.252 (i).

[355] Bonifay, Céramique romaine, 181-183, Fig. 97; Hayes, Pottery, 160-166 (in particular ibid.); Vroom, Pottery, 32-35.

The second accumulation close to the corner of the western quay, includes besides unidentifiable material, one body sherd of type LR, one Spatheion-shaped base fragment and two possible type LR 3 or Keay 25G,[356] one handle fragment of possible type LR 3, one fragment of a Globular Amphora, one fragment of an Askos and two Middle Byzantine bowl fragments of type Slip-painted Ware as well as Ottoman bowl fragments of the same type. Apart from the Globular Amphora fragment, of which the entire upper part with the shoulder, two handles and the neck with the rim is preserved, an accurate identification of the other amphora fragments can only be assumed. The Askos fragment comprises a relatively flat basket-shaped handle which reaches the straight upwards facing spout. The spout is funnel-shaped, following a short neck. Although Askos vessels were very common particularly during the Classical period and the spout shows high similarities with examples from the Hellenistic period, its dimensions, the handle and the fabric are different. Similar to the ARS plate and the spouted jug, the fragment possesses a bricklike reddish-brown fabric. Consequently, an assignment to North African Ware, dating roughly between the 4th and the 7th century AD, is suggested. The bowls comprise rim and outer body fragments. The bodies show a white slip painting on reddish-brown fabric in the shape of loops or four circles with an attached vault pattern just inside the rim. The latter also shows a wave pattern on the outwards everted rim (compare with CAT 16 PL XVI, VOL II).[357] Representing characteristic Middle Byzantine Slip-painted Ware, the fragments can be dated to the 11th-12th century AD.

[356] For comparisons see: Bonifay, Céramique romaine, 118-122; Kingsley, Shipwreck Archaeology, 107, Fig. 26.2; Vroom, Pottery, 54-57; http://archaeologydataservice.ac.uk/archives/view/amphora_ahrb_2005/index.cfm.

[357] Compare further down with the entirely preserved example at the wreck site 1 at Tarsanas.

Just south of the end of the jetty three ceramic lamps (CAT 11 and 12 & PL XII, VOL II), of which two are almost entirely preserved, were detected. Although the third one is highly fragmented, consisting just of the handle and part of the body, it shows very distinctive characteristics. The body is of bricklike reddish-brown fabric and suggests a circular form with a diameter of 0.08 m. It has a round base with two grooved circles, which surround possible carvings of an incised inscription.[358] A pierced handle starts from the base, projecting in the shape of a simple swallowtail. According to the characteristics it is comparable with lamps of the so-called (Roman) North African type. Also based on the dimensions it shows particularly high similarities with the type Deneauve VIII.1 and VIII.4.[359] If the fragment indeed shows an inscription on the base, the closest comparison can be found in the circular shaped Deneauve VIII.1 type lamps from the ports of Carthage and Caesarea, dating to the 3rd-4th century AD.[360]

Although the second lamp shows a similar reddish-brown fabric, the dimensions and the handle are quite different. While the first one has an estimated total length of around 0.11-0.12 m and a width of around 0.08 m, the latter shows a total length of just 0.9 m and a width of 0.06 m. It has no decoration and a rather small swallowtail-shaped handle starts from the edge of the body. Both, the back and the front part possess an even inclination upwards, leaving just a fairly small simple rounded shaped base. Being associated with

[358] The author believes to identify the letter "F". However, unfortunately without restoration it is impossible to confirm and identify an inscription.

[359] For Roman North African lamps and the type Daneauve VIII see Bonifay, Céramique romaine, 312-430 (317-337).

[360] Ibid., 328-329, Fig. 184.9; J. Bussière, Lamps antiques d'Algérie (*Monographies Instrumentum* 16). Montagnac 2000, 147, Pl. 92.3322; H. R. Hurst – M. G. Fulford – D. P. S. Peacock, Excavations at Carthage: the British mission, II.2. Sheffield 1994, 33-34, No. 64, Fig. 2.3.64.

North African lamp types, it may be suggested that the lamp is an imitation from the Black Sea, roughly dating to the 5th-7th century AD.[361]

The third lamp is the by far the most elaborate and artistic type of the three lamps. Despite a similar reddish-brown fabric, it has a much flatter section. The simple swallowtail converges to a sharp point, starting from the back part of the body, which in turn shows an even inclination on both sides, leaving just a small round base. The lamp is highly decorated, both around the single hole in the centre of the body and the ridge around the whole body, forming a rim.

Considering the measurements and characteristics, the lamp shows high similarities with the later Atlante X types and in particular with the linear decorated type 70 (after Bonifay) dating to the 6th-7th century AD,[362] although the Skiathos lamp differs in the arrangement of the holes. While the lamp features a single central hole in the middle of the cross, the North African ones have two central holes arranged around the cross. In fact, the lamp can be best compared with finds of Attic lamps from the Athenian Agora. Particularly lamps 2591 (dating between the 5th and the 6th century AD) and 2924 (dating to the 7th century AD) show identical characteristics – the one in shape and the other in decoration.[363] Consequently, a general typological assignment to Attic lamps seems possible, however, representing a developing stage between the Athenian examples of 2591 and 2924. Therefore a date between the 6th and 7th century AD is suggested.

[361] Compare with lamp finds from Saraçhane: Hayes-Harrison, Saraçhane, II, 80-83, Fig. 29, Pl. 18.

[362] Bonifay, Céramique romaine, 413-415, Fig. 231.9. Further see group 4 at Hayes-Harrison, Saraçhane, II, 80-83, Pl. 25.38.

[363] Judith Perlzweig, Lamps of the Roman Period. First to Seventh Century after Christ (*The Athenian Agora* 7). Princeton 1961, 184, 198, Pl. 41 and 46.

The eastern harbour basin

Coming to the eastern harbour basin, the research team verified and documented another breakwater, located at the western side of Bourtzi just opposite the western breakwater (CAT 13 PL XIII, VOL II). Like the western one, the eastern breakwater has an east-west orientation, consequently closing the harbour entrance from the east. Although the breakwater is not completely preserved, similar to its western counterpart the remains suggest a uniform symmetric structure. The breakwater is currently situated 1.50 m below the present water level and has a current maximum height of 2.90 m at its western end. The eastern breakwater shows the same type of construction as the western breakwater, consisting of two different parts; an internal and an external part. Similarly, the internal part or core section is built of a mixture of quarry rubbish and small stones, which is subsequently covered by large rock boulders.

Further, the grade of the slope differs between its northern and southern end. While the northern end drops abruptly with a relatively steep angle, the southern end slopes in a flat angle. The gentle inclination of the breakwater towards the south gives the construction high stability against the strong southern winds and additionally absorbs the force of the waves of the open sea. In contrast to the western breakwater, much bigger parts of the surface show residues of mortar, heavily encrusted with the rubble filling of the breakwater's core. The eastern breakwater also demonstrates a thicker concrete composition, both at the breaking point and at another part of the breakwater, which broke off the western front part and now forms a separate chunk of that solid rubble-mortar composition.[364] With a current depth of 1.5 m the eastern breakwater is set around 1 m

[364] Like for the western breakwater, laboratory analysis of samples still needs to be done and has been suggested for future seasons.

lower than its western counterpart. So, taking into account the change of the water level, the rubble mound construction did not protrude from the sea. Consequently, the eastern breakwater does not represent a "Mound Breakwater" but has to be rather identified as of type "Composite Breakwater" (ILL I.7b, VOL II).[365] Although similarly to the western breakwater, a sharp linear northern edge towards its inner side would imply the construction of a mole.

Apart from a big column-like object (PL XIII$_I$, VOL II) no signs of superstructures could be detected. The broken object is made of very compact concrete and located just north of the breakwater's inner side.[366] But since it is too large in relation to the structure of the breakwater, it is doubtful that it could have been related to the breakwater. Being reused as a part of the construction of the breakwater itself, however, can also be excluded as well. Consequently, even though its function remains unclear, it is possible that it was a bollard or boundary stone.[367] Thus, mounted on the breakwater's inner side it would have protruded from the water as a single feature which could have been used either for anchorage or for defining the entrance of the harbour. As a result, even though ceramic fragments are scattered on the surface, in contrast to the western breakwater, the eastern one probably just acted as a protection for the eastern harbour basin by simply allowing the waves to break over in order to create currents within the harbour basin for the prevention of siltation. Accordingly, it may not have played any active role in the operation of the harbour. Unfortunately, neither the ceramics nor any construction part could provide any dating evidence. However, in comparison to the western breakwater, the eastern shows a much rougher construction method and weaker characteristics as well

[365] For "Composite Breakwater" see chapter 1.3.1.1. "Breakwater and Mole".

[366] It consists mainly of rubble stones with mortar and some ceramics. See ibid.

[367] For bollards and boundary stones see chapter 1.3.1.4. "Bollard, Boundary- and Mooring stone".

as a totally different concrete composition, which in addition to its relationship with the Venetian fortification of Bourtzi suggests a much later date, possibly to the foundation of Bourtzi at the beginning of the 13th century AD.

Approximately 30 m to the northeast, another peculiar circular structure (CAT 14 & PL XIV, VOL II) was recorded. The structure is situated southwest of the walkway and west of the southern entrance tower of Bourtzi. Its location at a depth of just 0.40 m as well as a thick cover of *posidonia*, makes it immediately visible. Situated off the line between the entrance towers and the fortification wall of Bourtzi, the initial hypothesis of it representing a tower base belonging to the fortification complex has been dismissed, as has the theory of a lighthouse since the diameter is too small for supporting such a structure. However, even though its function and purpose remains unclear and needs further investigation, it can be interpreted as a base of a round-shaped building or other harbour feature such as a small lighthouse or beacon.

In contrast to the western harbour basin, in the eastern basin the archaeological material (PL XI, VOL II) concentrates along the mooring areas of the quay and the eastern side of the jetty. Further, ceramic material is recorded also along the western shoreline of Bourtzi. Apart from numerous indefinable pieces scattered along the quay side (PL XI$_{III}$, VOL II), the recognizable material generally consists again mainly of broken pieces of amphorae, plates, bowls and jars as well as further domestic ware and other types of pottery. Accordingly, the prospection of the surface of the harbour bottom along the eastern quay line revealed one body fragment of type LR, two amphora fragments of type Globular Amphora, four of type LR 2, one of possibly of type LR 4 or LR 5 and two fragments of

type Saraçhane 61 or simply known as Günsenin type 3,[368] one fragment of a dolium, one fragment of a terra sigillata bowl, two eastern sigillata bowls and one fragment of Slip-painted Ware (PL XI_{II}, VOL II).

Additionally, due to the anchoring of ships in that area and the constant running of their large engines, the thick layer of sediment gets continuously dredged about 0.60-0.70 m (PL XI_{V}, VOL II). Consequently, during the survey project three black-glazed jars and one plate of the Classical period (PL XI_{IV}, VOL II)[369] were uncovered from one day to the next. Finally, an architectural stone fragment complements the collection of archaeological material. While, both the globular and the LR 2 amphorae show parts of the neck with their characteristic rims and one to two handles, the LR 4/5 as well as the two Günsenin type 3 fragments just comprise the small looped and the heavy high-slung handles, respectively. Since those amphorae types possess quite characteristic handle features, they can be easily assigned to the corresponding amphorae of the 6^{th}-7^{th} and 12^{th}-13^{th} century AD. In contrast, the dolium fragment consists of the round-shaped bottom part which is ending in a knot and both on the inside and on the outside lined with a thick coating. In conjunction with harbour activities, dolia are often found in warehouses for the temporary storage of goods, which might allow the assumption of the existence of such harbour facilities on Skiathos. However, the knot at the bottom of the fragment rather suggests a presence on a ship, which allowed the required positioning and fixing of the round-shaped vessel in order to prevent shifting during the journey. Such dolia are

[368] For information concerning those amphora types see: Nergis Günsenin, Les Amphores, 29-30; Nergis Günsenin, Medieval trade in the sea of Marmara: the evidence of shipwrecks, in: Travel in the Byzantine World. Papers from the Thirty-fourth Spring Symposium of Byzantine Studies, Ruth Macrides (ed.), Birmingham 2000 (*Society for the Promotion of Byzantine Studies* 10). Aldershot 2002, 125-127; Hayes-Harrison, Saraçhane, II, 62, 64-65, 74, 76, Fig. 22.4-5 (Type 6), Fig. 26.10 (Type 61); Vroom, Pottery, 56-60, 98-101.

[369] The Classical material will not be discussed within this thesis.

attested for the Le Grand Ribaud D wreck,[370] aligned along the keel and serving as fixed receptacles for the transport of goods such as wine or olive oil. According to Parker, dolia have been documented as overseas transport facilities on the ships on around eighteen Roman wreck sites of the 1st century BC to the 3rd century AD so far; most of them dating to the 1st-2nd century AD.[371] Consequently, a rough dating of the dolium fragment at Skiathos to the Roman Imperial period can be suggested.

The terra sigillata fragment (CAT 17 & PL XVII, VOL II) in turn comprises a body part with an intact rim, implying the shape of a bowl. The fragment is decorated on the exterior side of the 0.03 m high rim. The decoration consists of a so-called appliqué ornament, depicting a female head or possibly Medusa. The terra sigillata bowl has a bricklike reddish-brown fabric, which is still partly coated. In contrast to the ARSW, the slip is of significantly darker brown colour than the fabric. In terms of typology, the closest comparative examples can be found at the Athenian Agora. The flanged bowls form 34 with applied motifs, in particular, and type 631 (P8143) and 635 (P22296)[372] show high similarities. This consequently would identify the fragment as imported Italian Sigillata, dating to the 1st-2nd century AD.

[370] For the eleven dolia on bord of the ship see: A. Hesnard – M. B. Carre – M. Rival – B. Dangreaux, L'Épave romaine "Grand Ribaud D" (Hyères, Var). *Archaeonautica* 8 (1988). For further reading on the shipwreck see Parker, Ancient Shipwrecks, 203-204.

[371] Beyond the above-mentioned Le Grand Ribaud D wreck on following sites Dolia have been found: Argentario, Cala di Li Francesi, Cap Bénat B, Capo Testa B, Circeo D, Colonia de Sant Jordi A, Cova del Infern, Diano Marina, La Garoupe A, Ile Rousse, Ladispoli A, Ostia, Le Petit Conglové, Punta Ala, Rhone Delta, Sorres C and at Caesarea Maritima: Parker, Ancient Shipwrecks, 59, 88, 98, 125, 147, 149, 155, 163, 187, 214, 233, 296, 309, 345, 367, 409, 413.

[372] J. W. Hayes, Roman Pottery. Fine-Ware Imports (*The Athenian Agora* 32). Princeton 2008, 183, Fig. 21, Pl. 36.

Although the two completely preserved eastern sigillata bowls (CAT 15 & PL XV, VOL II) have a very similar shape, they consist of a totally different fabric. However, generally imitating the earlier imported Italian sigillata Ware, it is suggested that both bowls represent types of eastern sigillata C Ware (ESCW) or also called "Çandarli Ware".[373] Çandarli Ware forms mainly red-slipped table ware from Asia Minor and especially in the Pergamum region, which was dominant particularly between the 1st and the 3rd century AD and even well into the 4th century AD until it was replaced by Phocaean and African Red-Slip Ware. In terms of shape both can be identified either as type 3 by Hayes or type 19 by Loeschke (also known as Knipovich type 13/14), roughly dating to the mid-2nd to mid-3rd century AD. Their slips, however, allow a more precise chronological differentiation in an earlier 2nd-3rd century AD production for the bigger red-slipped bowl and a later 3rd-4th century AD production for the small maroon-slipped bowl.[374] Comparative examples of similar Çandarli Ware are widely spread throughout the Eastern Mediterranean and therefore cannot only be found on sites in Asia Minor such as Pergamum or Ilion (I17.0893, P0241), but also in the Aegean such as at the Athenian Agora (P2005 and P18418), Amphipolis and even at Goritsa in Thessaly.[375]

The body-rim fragment of Slip-painted Ware consists of a white slip and pale yellow glaze on its interior side, showing a decoration of curved and straight lines. The shape probably suggests an originally open hemispherical bowl with a ring foot and a plain rim. Even though Slip-painted Ware was established since the end of the Middle Byzantine

[373] For Çandarli Ware see: Hayes, Pottery, 316-322; S. Loeschke, Sigillata-Töpfereien in Tschandarli. *Mittheilungen des Kaiserlich Deutschen Archäologischen Instituts, Athenische Abtheilung* 37 (1912) 344-407, Tafel XXVIII.15 and 19.

[374] Hayes, Pottery, 316-317.

[375] Archaeological Museum at Volos K1268. Further examples have been excavated also in the Olbia region, at Sidi Khrebish Benghazi (Berenike) in Libya and at Knossos in Crete: ibid., 321; for the material from Amphipolis see D. Lazarides, Amphipolis. Athens 1997.

period, in contrast to the above-presented slip-painted finds comparative examples suggest a rather 13th-14th century AD dating for the fragment.[376]

The triangular-shaped fragment of an architectural stone decoration of marble (CAT 18 & PL XVIII, VOL II) found in front of the eastern quay line shows some ornamentation on its front side. This depicts a simple acanthus leaf decoration lined by a horizontal outer band and a small part of an inner circular band. Continuing the pattern, it can be suggested that the fragment represents a corner part of a bigger ornamental composition or at least a section of one, framing a circular medallion. The fragments' much rougher back side allows the assumption that the piece was initially used as a wall decoration. Unfortunately, neither the original size and its exact position nor for which type of architectural unit or building it was intended for can be reconstructed. In terms of dating, marble and other high quality stones were widely used for structural elements and architectural decorations during the entire Roman and Byzantine periods. However, a date to the Roman Imperial or possibly also to the Early Byzantine period seems most reasonable.

Another significant accumulation of archaeological material consisting of scattered pottery can be distinguished at the end of the jetty's eastern side (PL XI_I, VOL II). Among the ceramic conglomerate, this includes one unidentifiable jug which might be of Late Byzantine date, another base of a dolium, one fragment of a ceramic container, one LR body sherd, five amphorae fragments of which three can be recognized as of type LR 2, one as globular and one belonging to the Roman Late Republican period. Concerning the dolium fragment, it is worth mentioning that similar to the one found in front of the

[376] D. Makropoulou, Byzantine and Post-Byzantine ceramics, in: Sylloge Dimitriou Oikonomopoulou. Athens 1995, 22; Vroom, Pottery, 124-125.

eastern quay, this one comprises just of the round-shaped bottom part ending in a knot. However, no coating could be verified and the knot is of much broader and flatter shape, providing much better stability. The ceramic container consists of a funnel-shaped plain body fragment with an intact triangular-shaped everted rim. Close to the rim the stub of a single handle can be recognized. Suggesting its identification as a bailer, either for pouring water or wine. A comparative example can be found in Commune type 71 by Bonifay dating to the 3rd century AD.[377] Among the amphora fragments, similar to the already analyzed LR 2 and globular types, the Late Republican amphora fragment shows a part of the neck with its characteristic thick and straight everted collar rim and preserved parallel running straight handles. Even though this amphora is very fragmented, its upper part can be identified with the type Dressel 1B and can therefore probably be dated to the Augustan period of the late 1st century BC to early 1st century AD. Although the Dr. 1B amphora type has been identified at Eastern Mediterranean sites on land such as Athens, Corinth, Amphipolis and Ephesos,[378] out of in total 50 wreck sites the 1st century BC dated Croatian Palagruža A shipwreck represented the only example in the Eastern Mediterranean so far.[379] The piece revealed at Skiathos confirms the distribution of Dressel 1B amphorae also to the eastern provinces, being part of the trading network from Italy to Asia Minor.

[377] Bonifay, Céramique romaine, 209 (Fig. 167), 301.

[378] J. Lund, Transport Amphorae as Evidence of Exportation of Italian Wine and Oil to the Eastern Mediterranean in the Hellenistic Period, in: Between Orient and Occident, J. Lund – P. Peniz (eds.). Copenhagen 2000, 83; for Amphipolis see Lazarides, Amphipolis.

[379] Parker, Ancient Shipwrecks, 298; all other relevant underwater archaeological sites are located along the coast of southern France, Spain and the western Tyrrhenian coast, dating to the mid-1st century BC.: ibid., 43, 50, 88-89, 97, 100, 103, 123, 128, 130-1, 165, 167, 181, 183, 188, 198, 204, 206, 216, 221, 235, 249, 270, 283, 285, 294, 298, 313-4, 316-7, 322, 327, 351, 360, 376, 380, 385, 394, 409, 433, 442, 445-6, 451.

Finally, the area west of Bourtzi and specifically south of the eastern breakwater revealed plenty of scattered ceramics, mainly forming piles of indefinable waste deposits from different periods.

THE BAY OF "TARSANAS" (ILL II.I.16, 34-36 and KS 2-3, VOL II)

Leaving the the so-called "Old Harbour" and surveying the bay of Tarsanas, the research team was able to determine scattered archaeological material concentrated in two areas. These consist exclusively of ceramic accumulations which cover a wide typological and chronological range. Although in this case it is difficult to identify them as shipwrecks, it is nevertheless possible that they indicate two distinct wreck sites.[380]

Site 1

The material of site 1 (PL XIX, VOL II), located just south of the old harbour's western breakwater, comprises among numerous scattered unidentifiable pieces (PL XIX$_V$, VOL II), mainly finds of the medieval period.[381] This includes Byzantine tableware,[382] consisting of different types of jugs, three small containers, two fragments of pots, three

[380] The author distinguishes between the definition of "shipwreck" and "wreck site". While in the first case wooden remains of the ship itself are preserved and allow a secure identification of the site, in the second case no ship remains are preserved and only the characteristics of the cargo allow such an assumption. The latter may include also a number of different shipwrecks.

[381] For the scope of this thesis, not all finds of the wreck site will be analysed and studied in detail but only relevant material.

[382] Except for some very characteristic pieces, typological classifications and chronological dates are hypothetical, based on the suggestion of the author.

bowls and two fragments of small amphorae.[383] Due to the urgent necessity of salvaging archaeological material, selected finds were recovered from the site. Among the recovered material there is one Middle Byzantine bowl of type Slip-painted Ware and two bowls probably representing imitations of Constantinopolitan White Ware. The completely preserved slip-painted bowl (CAT 16 & PL XVI, VOL II) is of bricklike reddish-brown fabric and decorated just on the 0.26 m (interior diameter) long interior with a white slip painting. It also shows a wave pattern on the 0.03 m wide outwards everted rim. Identical to the slip-painted fragment found to the west of the jetty in the old harbour (see PL X_{II} fig. 8, VOL II), the bowl can be dated to the 11th-12th century AD.

The other two recovered bowls show much smaller dimensions to the slip-painted bowl. One (CAT 19 & PL XXI, VOL II) is suggested that it represents an imitation of Constantinopolitan White Ware (CWW) and therefore can be dated to the 11th-12th century AD, the same period as the slip-painted ware. Probably manufactured outside of Constantinople, possible production sites therefore could have been the central and southern Greek mainland such as Corinth or Athens but also the Marmara Sea or the eastern coast of the Aegean such as Iznik or Ephesos, respectively.[384]

In contrast, the second and entirely preserved bowl (CAT 20 & PL XXII, VOL II) shows a much brighter red bricklike fabric, which similarly to the previous one shows the remains of the white slip exclusively on the interior. However, while the body has an open hemispherical shape, its rim is entirely everted and therefore differs completely from the

[383] The precise classification of the ceramic material is based on the differentiation of shapes suggested by the author: Vroom, Pottery, Fig. 5-6; however, this lies beyond the scope of this thesis and therefore has to be studied by ceramicists.

[384] However a connection to Thessaloniki or maybe even to Thessaly should not be excluded. For information on imitations of Constantinopolitan White Ware and their origins see: K. Dark, Byzantine Pottery. Gloucestershire 2001, 63, 125-126.

CWW. Furthermore, beyond the white slip on the bottom, it is possible to recognize the remains of a dark paint that initially would have covered the interior of the bowl. Consequently, it is possible that the bowl could be either Middle Byzantine Polychrome Ware or Islamic Glazed Ware, dating to the 10th-12th century AD.[385]

A pot of another possible imitation of CWW was recovered, which was also inscribed (CAT 21 & PL XX, VOL II). Similar to the bowls, the interior is covered with a white slip, showing a painted inscription around a central black-painted circle. The inscription reads as follows:

«*ΓΚΕΚΑΣ · ΞΗΡΟΧΩΡΙΟΝ*»

In terms of chronology, the pot does not show any distinctive features beyond the painted inscription that may allow one to determine a particular typology. However, although the first part of the inscription is missing and may have provided the name of the owner or producer, the second part reveals the place of origin – either the origin of its production site or more likely that of its owner and used as his byname. Xirochorion or Xirochori refers to a toponym equated with the city of Histiaia on the northern coast of Euboea, located around 5 km inland the coastal settlement and harbour of Oreos. Since Oreos played a crucial strategic role, first as *epineion* of Histiaia and as a naval base and commercial station for the shipping lanes during the Byzantine period, at least by name it controlled and dominated the northern part of Euboea. As such, the designated name Xirochorion for Histiaia is first mentioned independently in written accounts dating to the

[385] Vroom, Pottery, 78-79; comparable material can be found at the cargo material of the 11th century AD dated Serce Liman shipwreck: G. F. Bass – Sheila D. Matthews – J. R. Steffy – F. H. Van Doorninck Jr., Serce Limani: An Eleventh-Century Shipwreck. The Ship and Its Anchorage, Crew, and Passengers, I. Austin, Texas 2004, 269 (Fig. 15.4).

Ottoman conquest of Euboea in the second half of the 15th century AD.[386] There is also the possibility that the name may go back well into the Byzantine period, at least concerning the existence for a designated production site in that area. Therefore, in case the toponym refers to a production site the pot may represent a locally produced imitation of CWW.

A rather peculiar object (CAT 22 & PL XXXIII, VOL II) is a 0.27 m high almost completely preserved tripod jug with a pear-shaped body. Its frontal part is decorated with an appliqué ornament on the upper part, depicting a head on a strange shaped decoration. This is flanked to its right, left and beneath by the same unidentifiable decoration. The handle itself is upwards sloping and decorated on the top with a loop ending in an upwards turning curl. The base of the handle also shows the same upwards turning curl. Unfortunately, no parallels could be found. Loop decorated handles can be found as early as the 7th-8th century AD such as at the deposits from Saraçhane. Based on the upwards curling handle bases the closest comparison probably can be found both, at Saraçhane and Corinth, dating to the 12th century AD.[387]

Another almost entirely preserved conical-shaped jug with dark brown fabric (CAT 23 & PL XXIV, VOL II) was recovered. Its conical body resembles the shape of Knidian type amphorae with a ring-shaped bulge foot. The neck, however, is much different, showing an onion-domed shape with one partly preserved vertical straight handle. Unfortunately, without parallels its dating to the late Middle Byzantine or early Late Byzantine period is purely circumstantial and based upon the other ceramic finds in the site 1 assemblage.

[386] The characteristics of the pot also allow an assignment to Ottoman pottery. As such, a precise chronology is very difficult with a possible date as late as the 18th century.

[387] Hayes-Harrison, Saraçhane, II, 32-33 (Fig. 12.11), 100-101, 160 (Fig. 39.26), 170 (Fig. 50.6); Ch. H. Morgan, The Byzantine Pottery (*Corinth* XI). Harvard 1942, 84.

Finally, the small containers (PL XIX_{IV}, VOL II) consist of two bulbous jars of brick-like reddish fabric with maximum height of 0.17 m and a maximum diameter of 0.09 m. The third container shows not only a different shape but also smaller dimensions. It has a straight body with a flat bottom and measures a total height of just 0.10 m and a symmetrical diameter of maximum 0.08 m. Although different in fabric, two of these containers show almost identical characteristics to some small jars found at the Çamalti Burnu I wreck, dated to the early 13th century AD.[388]

Among the other ceramic artefacts (PL XIX, VOL II), two different types of jars also have to be mentioned here. One features a conical body with a high slanted neck widely opened outwards (PL XIX_{II}, VOL II) and the second is a cream-greenish slipped globular body fragment with a high narrow neck, a folded rim and two upwards sloping handles (PL XIX_{III}, VOL II). Although similar forms appear much earlier, allowing a comparison to 6th-7th century AD dated North African or central Greek material of type Plain Ware,[389] both types actually find their best comparisons with the plain pottery assemblage from the 11th century AD Serçe Liman ship but also with the late 9th century AD Bozburun wreck, both off the Turkish coast, and the locally produced jugs of type Undecorated Ware from Corinth, roughly dated to the 12th century AD.[390]

[388] Nergis Günsenin, A 13th century Wine Carrier: Çamalti Burnu, Turkey, in: Beneath the Seven Seas. Adventures with the Institute of Nautical Archaeology, G. Bass (ed.). London 2005, 123.

[389] Bonifay, Céramique romaine, 188 (Fig. 100), 283 (Fig. 157), 285; Vroom, Pottery, 44-45.

[390] Bass et alii, Serce Liman, 268-269; F. Hocker, Sampling a Byzantine Vintage: Bozburun, Turkey, in: Beneath the Seven Seas. Adventures with the Institute of Nautical Archaeology, G. Bass (ed.). London 2005, 101; Morgan, Corinth, 58-59, Fig. 41.

Summarizing the assemblage of the site, a rough dating to the 11th-13th century AD is suggested. Since the material represents a limited range of forms with a tight chronology, the site allows the assumption of interpreting the site as wreck site.

Site 2

Site 2 (PL XXV, VOL II) is located north of Cape Plakes, shows a much more complex cargo. Together with an accumulation of ballast stones consisting of cobbles, a large quantity of scattered Byzantine roof tiles were detected (CAT 24 & PL XXVI, VOL II), documented and a sample taken for further studies. The tile fragment recovered from the site shows a mostly rough thin dark red fabric and a concave profile. It possesses more or less a conical shape, which suggests that the roof tile assemblage represents cover tiles, "Imbrices" or "Kalyptires". It can be assigned to the "Laconian" type, manufactured in the Aegean.[391] However, no stamps were discovered that could give an indication for dating.

Additionally, apart from a small glass beaker, the wreck site comprises of exclusively ceramic material. These include both amphorae and different types of table ware. The amphorae consist of an unidentifiable body fragment, two fragments of type Günsenin 3. Similar to wreck site 1, the main part of the table ware can be associated with late Middle to early Late Byzantine cooking ware, including three fragments of pots, fragments of three different types of jugs either with upwards slanted or straight handles,[392] one

[391] Claudiu Munteanu – Andrei Vochiţu, Roof Tiles from the Ancient Greek Shipwreck 'Mangalia B', Black Sea Coast, Romania. *IJNA* 39.2 (2010) 408-410, Tab. 1, Fig. 5; V. I. Kac et alii, Tiles and ceramic containers, in: Panskoye I, Volume I, The Monumental Building U6, Text, Lise Hannestad – V. F. Stolba – A. N. Sceglov (eds.), I. Aarhus 2002, 101.

[392] Most of the jugs can be compared with the kitchen ware and storage jars from the Çamalti Burnu I wreck, dated to the early 13th century AD: Günsenin, Çamalti Burnu I, 119; http://www.nautarch.org/cms/archives/19; one of them, however, may also be dated to the early Ottoman

fragment of a small container identical to those of wreck site 1 and identified as a small jar, and one fragment of a jar as well as one plate of type Incised Sgraffito Ware.[393]

Although it only consists of a small shoulder part, its shallow combed arc and straight grooved decoration allows the identification of a Middle Byzantine Fine Unglazed Cooking Ware type 6 from Saraçhane.[394] The other two pots consist of flat bottoms and straight vertical bodies. One can be identified as Red-Bodied Ware, showing a brown fabric with a reddish painting at its bottom and the lower part of the body. The body ends in a slightly everted and thickened rim with one preserved horizontal strap handle located at the neck.[395] Both, the Middle Byzantine Fine Unglazed Cooking Ware and the Red-Bodied Ware can be roughly dated to the 12th century AD.[396] The fragmented jar has a bricklike reddish-brown fabric and its shape, with a rather small straight vertical rim rising from the ridged shoulders, is similar to the globular amphorae type LR 5. One horizontal strap handle is preserved.

Finally, a deep plate of Incised Sgraffito Ware (CAT 25 & PL XXVII, VOL II) was found completely preserved with a diameter of 0.285 m and a height of 0.10 m. The interior slip is sharply incised with a fine decoration, which shows an eagle at the bottom, encircled by four wavy lined spirals, probably representing tailed vegetal motifs. Forming a well-known example of Aegean Ware, based on Vroom the dish can be associated with category 1 (human and animal figures) and group 3 (freely engraved style) of Incised

period and compared with the Ottoman coarse ware at Saraçhane: Hayes-Harrison, Saraçhane, II, 321, Pl. 49b.

[393] The plate was detected south of the widely scattered material of wreck site 2 and may therefore not belong to the ship's cargo.

[394] Hayes-Harrison, Saraçhane, II, 56-57, 222-223, Fig. 20.10-11.

[395] Ibid., 47.

[396] Vroom, Pottery, 104-105.

Sgraffito Wares and consequently be dated to the 12th-13th century AD.[397] Similar examples have been found on numerous land sites around the Aegean such as Corinth, Chalkis, Ephesos and even as far as the Crimean site of Cherson in the Black Sea as well as on the shipwrecks of Skopelos, Çamalti Burnu I and Kastellorizo, which date again to the second half of the 12th and early 13th century AD.[398] Summarizing the main assemblage of wreck site 2 at Tarsanas, a rough dating to the 12th-13th century AD can be suggested.

THE MODERN (EASTERN) HARBOUR AND THE AREA OF "KARNAGIO" (ILL II.I.17-25, 37-40 and KS 4, VOL II)

The survey along the eastern and northern side of Bourtzi as well as towards the modern breakwater of the eastern harbour (which forms the southern end of the eastern harbour) revealed plenty of scattered archaeological material (PL XXVIII, VOL II), including fragments of amphorae and other pottery mainly of the Roman period. The identifiable material found around the breakwater consists of two fragments of funnel-shaped bailers (identical to that in the old (southern) harbour) with intact triangular-shaped everted rims and stubs of single handles. The amphorae comprise at least two fragments of globular amphora and one fragment of Dressel 1B, showing a part of the neck with its characteristic thick and straight everted collar rim and preserved parallel running straight

[397] Vroom, Pottery, 90-91.

[398] Pamela Armstrong, A Group of Byzantine Bowls from Skopelos. *OJA* 10/3 (1991) 335-336, 343, Fig. 1.2 and 8.2; Günsenin, Çamalti Burnu I, 118-123; http://www.nautarch.org/cms/archives/19; Demetra Papanikola-Bakirtzi, Byzantine Glazed Ceramics. The Art of Sgraffito. Athen 1999, 48; A. H. S. Megaw, An early thirteenth-century Aegean glazed ware, in: Studies in Memory of David Talbot Rice, G. Henderson – G. Robertson – D. T. Rice (eds.). Edinburgh 1975, 34-45; for information on the shipwrecks see: Parker, Ancient Shipwrecks, 224-225, 407-408.

handles. Although the whole area shows rich archaeological material, since the eastern harbour area functions as the modern commercial harbour of the present town, no further archaeological investigations could be carried out.

The survey continued in the area around the remains of the so-called "Karnagio", the old shipyard at the northern end of the eastern harbour (PL XL, VOL II). It did not reveal any architectural or material remains of Byzantine or older periods, unlike the northeastern end of the harbour bay. This suggests that the shipyard area was not in use in Antiquity and probably transferred from the silted northeastern end of the harbour bay during the Ottoman period.

THE AREA OF "MYLOS" AND "ST. GEORGE"
(ILL II.I.26-27, 41-43 and KS 4, VOL II)

The survey in the areas of "Mylos" and "St. George" revealed very rich archaeological remains. At Mylos the remains of coastal infrastructure could be identified despite the heavy siltation of the bay's northern coastline. Two separate and possibly independent features (CAT 26a & PL XXIX, 1-11, VOL II) situated next to each other extend from a modern windmill eastwards straight into the harbour bay. While the clearly visible remains of the smaller feature measure 6.5 m in length and an average width of 1 m, the bigger structure measures a total length of 41 m with a varying width between 2 m and 5 m. Although the two structures, and in particular the larger, can be identified as jetties, unfortunately apart from a clearly visible alignment of border stones along the southern line of the smaller jetty no other characteristic architectural remains or associated archaeological material could be verified due to siltation. As such, the identification and chronological as well as typological classification is impossible. Nevertheless, a Byzantine origin is possible. Due to the changes of harbour tradition during the Middle

and Late Byzantine period and the increasing use of independent landing stages along a roadstead (compare with the ports, primary harbours and secondary harbours of Thessaly in chapters 2.3. and 2.4.), a Late Byzantine date is suggested. The jetties can be compared with the ecclesiastical facilities of the Metochi Aghia Trias at Nies (see chapter 2.4.1.2. "Nies").

North and south of the jetties, further parallel running jetties of independent landing stages (CAT 26b & PL XXIX, 12-18, VOL II), as well as additional surface lines that may belong to associated structures of unknown type and purpose, were detected stretching along the coastline. Similar to the feature above, aerial photographs indicate that two of them possess lengths of approximately 40 m and maximum widths of around 4m. Unfortunately only lengths of 2-5 m and widths of 1-3 m of stone accumulations could be verified. For the preserved parts only rough alignments of border stones could be verified during the 2013 season due to siltation. Therefore no further information can be provided at this stage.

Along the Pounta promontory on the other side of the harbour bay, just south of the present shipyard area, the survey revealed the physical remains of three shipwrecks – one situated north of the coastal infrastructures at Mylos and two at the so-called site of "St. George" (PL XLI, VOL II). Since the wreck remains and their associated ceramics, including Slip-painted Ware from Didymoteicho or the Dardanelles (PL XLI$_I$, VOL II), date to the Ottoman period and probably as late as the 17th-18th century,[399] they will not be subject of discussion within the present thesis. They, however, indicate that the area was still in use well into the Ottoman period.

[399] Hayes-Harrison, Saraçhane, II, 276, 389 (Fig. 147.1-7); Vroom, Pottery, 186-187.

THE AREA OF "LAZARETA" (ILL II.I.44-45, VOL II)

At the southern end of Pounta promontory at the entrance of the harbour bay, the research team investigated the area of Lazareta, documenting a jetty (CAT 27 & PL XXX, VOL II) facing the Venetian fortification of Bourtzi.

Jetty

The approximately 14 m long and 7 m wide jetty is currently functioning as a private mooring facility, leading from a marble staircase west towards the islet of "Daskalio". The jetty shows two rows of stones - one almost entirely below the water surface and a second above the water surface. While the lower consists of massive uniform ashlar blocks, the upper row is made of stone blocks of different sizes mixed with mortar and faced with ashlar spolia, which, apart from phases of later repairs and reconstruction of the surface layer, is typically of the Roman Imperial and Byzantine periods.[400] In addition, the jetty is equipped with two stone bollards of unknown date.[401] The ashlar blocks of the modern structure are sitting on a solid and homogenous base with a preserved length of around 15 m, a width of 8 m and a visible height of maximum 1.10 m, which is currently situated 0.50 m beneath the present water level. The base shows a very compact composition of mortar, mixed with rubble stones and ceramics, which allows the assumption of a certain type of hydraulic concrete. This is further supported by its symmetrical uniform and linear shape. As such, although no remains of a wooden

[400] For the construction techniques and traditions of harbour facilities and in particular of Jetties see chapters 1.3.1.1. "Breakwater and Mole", 1.3.1.2. "Quay and Wharf" and 1.3.1.3. "Pier, Jetty and Pontoon as well as other harbour components". However, petrographic analysis of the current structure still needs to be done.

[401] The bollards allow a dating range from the Roman to the Ottoman period.

framework could be detected and material analysis has to be carried out,[402] it is likely that an identical or at least similar construction method of an *Opus caementicium* was applied and adapted for the construction of the hydraulic concrete jetty base as that described by the Roman architect and engineer Vitruvius Pollio and later by the Byzantine scholar and historian Procopius of Caesarea.[403] Around the structure, ashlar blocks (CAT 28 & PL XXXI, VOL II) were documented that probably belonged to the original jetty. The remains of the original building material of the superstructure are concentrated especially at the western end of the concrete base. The destruction of the jetty may either be attributed to influences of natural forces such as its constant exposure to the southern winds, currents and waves, or to renovation works in the 18th or 19th century. The better protected eastern part probably was re-used, whereas the exposed frontal part of the western end was just left at the sea bottom.

Concerning the dating of the original jetty at Lazareta, both the nature of construction and the use of hydraulic concrete provides a *terminus post quem* of the Roman period. In fact, compared with the archaeological remains at Yenikapi in Istanbul, the concrete substructure as well as the stone blocks of the jetty show striking similarities with two jetties at the Constantinopolitan commercial harbour of Theodosius, dating back as early as to the 4th-5th century AD.[404] Additionally, the jetty shows a clearly different

[402] The concrete structure may possess a greater height continuing into the ground, which would imply the possible preservation of formwork remains covered by sand.

[403] Vitruvius Pollio, De Architectura, V. 12. 3; Procopius Caesariensis, De aedificiis, I. 11. 18-20.

[404] For the jetties at the Theodosian harbour and the use of hydraulic concrete for the construction of the substructures see: Ercan, Yenikapi, 121-124 (Fig. III.10-11), 163-164 (Fig. III. 46, 48); While Ercan refers to a late 8th century AD date, based on the unpublished dendrochronological analysis of its wooden formwork remains made in 2010, suggesting an AD 786 date (122, Fn. 417), P. I. Kuniholm informed the author about an Early Byzantine date: P. I. Kuniholm et alii, Dendroarchaeology of the mid-first millennium AD in Constantinople. *JAS* 39/11 (2012) 3402-3414. Instead, another base supposedly forming the foundation of a lighthouse is dated to the 8th century AD.

composition and construction method from the late Early Byzantine to early Middle Byzantine structures at the old harbour, which provide a *terminus ante quem*, suggesting a date prior to the 6th-7th century AD. Consequently, in context with the associated coastal villa complex close by (see below), a date between the 3rd and 5th century AD can be suggested.

Villa maritima

Along the beachfront 70 m south of the jetty, the remains of a large building complex (CAT 29 & PL XXXII, VOL II) detected in 1996, were verified and were the subject of the survey activities on the last day of the season.[405] After cleaning away the ground vegetation, the frontal facade revealed, apart from collapsed areas, in total one staircase partly covered by sand of the beach, two preserved wall sections running almost parallel to the line of the beach as well as several cross-sections of transverse walls leading inland and the interior of the complex. The archaeological traces, including the visible parts of the building complex, stretch over a total distance of approximately 60 m with a northeast-southwest orientation. While the remains of the northern part with a length of around 10 m seem to be mostly destroyed, the first clearly identifiable architectural element is the staircase. The remains of the staircase (PL $XXXII_{II}$, VOL II) consist of two exposed steps and a further one visible at the lower stratigraphic layer of the facade. It measures a preserved length of approximately 1 m and a width of 3.20 m – showing exactly the same dimensions as the staircase leading to the Byzantine jetty north of it. While the upper part of the steps themselves are formed by three big rectangular shaped marble and local stones per row, the lower part comprises a mixture of compact mortar or possibly even

[405] Doulgeri-Intzesiloglou, Skiathos, 108.

hydraulic concrete with small to middle sized rubble.[406] Above the steps, the stratigraphy shows a disturbed layer of brick tiles followed by a 0.30-0.47 m thick layer of destruction presumably from collapsing walls, consisting again of a mixture of mortar or hydraulic concrete with rubble.

The staircase is confined by two 0.50 m thick transversal walls built of the same mortar-rubble stone mixture and leading from the lowest step towards the interior. Next to the northern transversal wall, the façade bares a part of a marble column, which originally might have stood on the wall. After a 2 m long section of collapsed stones towards south of the staircase, the first well preserved wall section appears (PL XXXII$_I$, VOL II). The 3 m long and 0.70 m high wall again shows the same possible hydraulic concrete mixture with irregular shaped and randomly placed uncut stones. At the end of the preserved wall section there seems to appear another 0.50 m thick transversal wall with a total distance of 5 m to the transversal wall defining the staircase. After the preserved section and the transversal wall, the seaside wall continues for another approximately 3.40 m. The continuation of this, however, is destroyed leaving just the foundation of the stone alignment and a 0.50 m high stratigraphy of destruction, comprising bricks and rubble stones. Finally, further in the south the second visible wall section appears with a length of 2.95 m and a maximum height of 0.50 m. In contrast to the first wall section, this part does not show any use of mortar/concrete and therefore may either belong to another part of the building complex or to a different construction phase. However, similar to the stratigraphy above the staircase, a 0.75 m long layer of brick tiles is preserved sitting on

[406] Material analysis still needs to be done in order to identify the nature of the binder as well as a possible comparison to the hydraulic concrete composition of the jetty.

top of the wall section, either allowing a possible interpretation as belonging to the floor level or forming part of an *Opus mixtum*.

In conclusion, despite scant archaeological and architectural remains, it is suggested that the building complex was a Roman villa; and, due in particular to its location next to the sea, as maritime villa or so-called "Villa Maritima". In fact, even though almost no characteristic pottery could be found during the survey activities, the features of the site show high similarities with those of another coastal building complex at the site of Vasilias on Skiathos (PL XXXIX, VOL II), again interpreted as a possible *villa maritima*.[407] These include identical marble columns located next to a wall (originally standing on it), leading from or towards the beach line. The walls in turn show the same masonry of *Opus mixtum* with a layer of brick tiles included to the masonry or sitting on top, showing the original floor level, respectively. Unfortunately, since only the frontal façade could be documented, it remains uncertain whether the *villa maritima* belongs to the peristyle or the portico type as well as whether the visible remains represent a residential area, a so-called "pars urbana", or an agricultural area, a so-called "pars rustica".[408] However, the arrangement of the visible architectural elements not only show identical dimensions, but also suggest a similar layout to the seaside front of the Roman Imperial maritime "Villa del Discobolo" of the 2nd century AD, located south of the Roman harbour of Portus,[409] and villa estates in Epirus, such as the 1st-5th century AD dated site of Diaporit.[410] Another possible comparison can be found in the 1st century AD

[407] For the site of Vasilias see chapter 2.2.4. "Evidence of other relevant archaeological sites".

[408] McKay, Villas, 115.

[409] The seaside front of the ground plan includes a 3.20 m long central and two 2 m long side staircases, each flanked by transversal walls leading towards the interior and forming the ground walls of the building complex. The walls defining the central staircase have a distance of around 5 m to the next ones, which in turn have a distance of 3.40 m to the outer walls; Lafon, Villa Maritima, 356, 358 (Fig. 83).

[410] W. Bowden, Epirus vetus. The archaeology of a Late Roman province. London 2003, 62-63.

dated wall-painting at the Villa "Casa della Fontana Piccola" in Pompeii, depicting a peristyle *villa maritima* next to a harbour,[411] or in house D and E at the Peloponnesian site of Halieis.[412] Consequently, this offers a first interpretation of the site as well as precise expectations concerning the detection of further architectural elements. As such, taking the architectural and visual characteristics of these parallels into consideration, the remains at Lazareta may indicate the possible existence of a peristyle type *pars urbana*. Additionally, the around 11 m-long area between the staircase and the end of the first preserved wall section corresponds exactly to one half of the 22 m long seaside facade of the Villa del Discobolo. While most of the preserved parts may be identified as a *pars urbana*, the second wall section further south may belong to the *pars rustica* of the villa complex.

The working area of the villa is confirmed by the existence of three circular kilns (CAT 30 & PL XXXIII, VOL II) at the southern end of the beach. While kiln 2 and 3 are situated around 10 m inland, kiln 1 is situated next to the water at a distance of just 1-2 m. Using the natural rock formation at the southern end of the beach, kiln 1 (PL $XXXIII_I$, VOL II) is the best preserved, however, due to its close vicinity to the sea the kiln suffers from the waves, constantly washing out material and slowly destroying the construction. Consequently, only the lower chamber and the floor as well as the back and side parts of the kiln's upper chamber are preserved, consisting of a brick and rubble stone construction creating the shape of a vaulted dome between the rock. Unfortunately, the floor of the upper chamber is covered by the collapsed vault and earth washed down from the hillside, therefore, the holes to the lower chamber could not be detected. Further, the

[411] McKay, Villas, Fig. 47.

[412] B. A. Ault, The Excavations at Ancient Halieis. The Houses. The Organization and Use of Domestic Space, II. Bloomington & Indianapolis 2005, 39-57; fig. 18.

narrow fire pit or furnace in front of the entrance to the lower chamber is not preserved. Two parallel running rock stones in front of the entrance, now almost entirely covered by the sand, may indicate the use of a tunnel for connecting the fire pit with the lower chamber.[413] Since the kiln is embedded into the natural rock, the structural remains allow an accurate reconstruction of the kiln with an inside diameter of 1.70 m, an outside diameter of 2.50 m and an approximate height of 1.50 m as well as a 0.55 m wide and 0.40 m high entrance from the fire pit to the lower chamber. These characteristics correspond exactly with the Middle Byzantine circular kilns excavated at Corinth and the Athenian Agora.[414] Kiln 2 and 3 are situated next to each other. Kiln 3 is heavily degraded with only the interior floor dividing the lower and upper chambers remaining in the stratigraphy on the beach. Kiln 2 (PL XXX_{II}, VOL II) is almost entirely preserved, including the fire pit, and has the same dimensions as kiln 1; again with a 2.50 m diameter and a preserved height of 1.50 m. In contrast to kiln 1, however, the fire pit represents a semi-circular structure directly connected to the kiln. As such, it can be compared particularly with the Byzantine kiln at the Athenian Agora N. E., next to the church of St. John.[415]

Even though, similar to the 2nd-4th century AD dated kilns excavated at the villa site of Kassandra neither of the two preserved kilns revealed any characteristic pottery, it has been suggested that these types of kilns were used for the production of coarse pottery such as ceramic containers for the transportation of wine and olive oil produced at villa

[413] Excavations need to be carried out in order to verify this interpretation.

[414] Morgan, Corinth, 14-19, Fig. 1 and 9-10; Ch. H. Morgan, Excavations at Corinth, 1935-1936. *AJA* 40/4 (1936) 467-470.

[415] Ibid.

sites,[416] which has been confirmed by the aforementioned villa estate of Kassandra and Halieis.[417]

Concerning the dating of the villa complex and its kilns, after the Mithridatic wars in the 1st century BC, only the period of the so-called *Pax Romana* allowed an expansion of private estates throughout the Aegean, which therefore may form a *terminus post quem* for the foundation of the *villa maritima*. Accordingly, based on a comparison with the earliest phases of the villa maritima of Diaporit and that of the villa estate of Kassandra,[418] as well as the wall-painting at the Villa "Casa della Fontana Piccola" and the maritime Villa del Discobolo, a dating to the 1st-2nd century AD can be suggested. Due to the high similarities to the maritime villa site at Vasilias (see chapter 2.2.4. "Evidence of other relevant archaeological sites"), however, it is suggested that the foundation of the villa at Lazareta is unlikely to be dated before the 3rd-4th century AD, which would also correspond with the second and third construction phase and the kilns documented at the site of Kassandra.[419] Finally, based on the associated jetty at Lazareta a date as late as the 5th century AD is also conceivable. In any case, based on the kilns and their comparison with the Athenian Agora, the 11th century AD at the latest forms a *terminus ante quem* for any agricultural and industrial use of the site of Lazareta.

Mirmingia wrecks

At the so-called "Mirmingia Reef" off Cape Pounta, around 250 m south of the *villa maritima*, the research team determined scattered archaeological finds, indicating a wreck

[416] A. Marzano, Roman Villas in Central Italy. A social and economic history. Leiden 2007, 63-65; Morgan, Corinth, 17.

[417] Ault, Halieis, 39-57; Tsigarida, Kassandra, 380.

[418] Ibid., 396; Bowden, Epirus Vetus, 62.

[419] Tsigarida, Kassandra, 380, 396.

site (PL XXXIV, VOL II). The material of the accumulation distinguishes cargo of 2-3 possible shipwrecks of different periods. Apart from numerous scattered unidentifiable body, handle and base pieces of different tableware, the main cargo of at least one of the wrecks consisted of piles of dishes.

Further, apart from an unidentifiable jar, at least two fragments of Late Byzantine jugs as well as one completely preserved deep plate, the assemblage also comprises numerous fragments of different amphora types, including an indefinable Spatheion-shaped body and base fragments similar to that revealed in the old harbour, one fragment of a Globular amphora, one fragment of an LR 1, one completely preserved and two fragments of LR 2, several LR body sherds possibly belonging to LR 2 amphorae, one round handle from either LR 4 or 5, as well as several amphora and jug fragments of Günsenin types; in particular type 3. Finally, the wreck site also revealed a part of a column.

Although the plates and/or bowls are heavily encrusted to the rock of the reef and, therefore, almost entirely unidentifiable, one fragment of a plate could be verified as African Sigillata (CAT 31 & PL XXXIV$_I$, VOL II).[420] Based on its preserved stamped decoration of two palm leafs with a double circle between their tips, the plate is a Hayes form 60 type 24.[421] While the only known example in the Aegean so far is an uncatalogued plate at the archaeological museum of Heraklion, Crete, comparison can mainly be found in North Africa, such as Leptis Magna or Sidi Jadidi in Tunisia, suggesting a date between the end of the 4th and the end of the 5th century AD.

[420] The plate, however, shows quite different characteristics than the rest of the dishes and therefore may not be related to that cargo.

[421] Hayes, Roman Pottery, 100. Bonifay provides an alternative typology of Sigillée Africaine D type 70: Bonifay, Céramique romaine, 199-200, Fig. 106.

Despite the thick covering of plants and heavy encrustation, an African origin for the bowl, possibly ARSW, can be suggested. While one of the jug fragments is identical to one piece from Tarsanas wreck site 2 and can be again compared with the storage jars of the Çamalti Burnu I wreck, unfortunately no comparison for the second fragment could be found. This vessel has a conical-shaped neck with a high everted rim with a straight handle connecting the body with the neck just beneath the rim. Its form suggests a Late Byzantine dating. The last artefact worth mentioning from the ceramic assemblage is a completely preserved deep plate (PL $XXXIV_{II}$, VOL II). This possesses a flat bottom, a straight vertical neck and an outwards horizontal waved rim. Large parts of the interior and the rim still show a white glaze with a blue painted decoration of unrecognizable design. Although no accurate classification and typological assignment can be provided a rough date between the 13th and 15th century AD can be suggested. As such, the artefact may represent either Spanish Lustre Ware or Maiolica from Italy, possibly imported by western traders towards the end of the Byzantine period.[422]

In conclusion, the ceramic assemblage indicates that there is a clear distinction between three different shipwrecks, ranging from the Early Byzantine to the Late Byzantine periods. The earliest shipwreck included North African Sigillata Ware, an LR 1 amphora and probably the column fragment and can be dated to the 4th-5th century AD. The second shipwreck was carrying mainly LR 2 and globular amphorae as well as ARSW, dating to the 6th-7th century AD. Finally the third shipwreck can be roughly dated to the 13th century AD based on Günsenin type and other Late Byzantine amphorae and tableware. The cargo of plates and/or bowls may have belonged either to the second or the third shipwreck.

[422] For information on those two types of pottery see Vroom, Pottery, 134-135, 146-147.

2.2.3.2. The site of "Aghia Paraskevi" at Platanias Bay (ILL II.I.46-47, VOL II)

Moving from the harbour bay of Skiathos west to its southern coast, the research team discovered archaeological remains at Aghia Paraskevi (PL XXXV, VOL II). These consisted of another kiln site around 40 m from the beach line, located next to the Platanias River (PL XXXV$_{I}$, VOL II). Unfortunately, the site is completely destroyed due to modern agricultural activities. As such, only surface remains as well as scattered stray finds could be detected around the kiln and the wider area of Aghia Paraskevi, particularly stretching east towards the area of Kolios. Even though no detailed information could be gained, however, the scatter included both coarse pottery handles and body sherds of Roman Imperial or Early Byzantine periods.

Apart from the potential industrial area, a peculiar geological platform (PL XXXV$_{II}$, VOL II) was detected in the western half of the coastline at a depth of 0.20-0.50 m with an approximate length of 66 m and width of 1.5-2 m. Interestingly, the feature is composed of a compact sand formation with ceramic inclusions. Taking into consideration the change of sea-level of around 1m and accordingly the shift of the present coastline of approximately 5 m further into the sea since Antiquity, the sand formation may therefore represent the ancient to medieval coastline. As a result of lacking infrastructures which would explain the ceramic conclusions, the geological platform indicates the practise of beaching ships.

Finally, numerous roof tiles were found underwater (PL XXXV$_{III}$, VOL II), scattered all over the bay. Most of the pieces include pan tiles or so-called "Keramides"[423] and cover tiles of modern date. Some of the roof tiles, however, share identical characteristics and

[423] Kac et alii, Tiles and ceramic containers, 101.

dimensions with those found at the Tarsanas wreck site 2, and probably are medieval Laconian type cover tiles.

2.2.3.3. The site of Troulos and the Troulonisia islets (ILL II.I.48-49, VOL II)

In contrast to Aghia Paraskevi, the bay of Troulos did not reveal any remains of coastal structures. The research team, however, was able to determine scattered archaeological material in two areas under water: at the rocks of Cape Amoni at the western end of the bay and at the Troulonisia (Tourades islands) south of the bay.

At the southern end of Cape Amoni, around 110 m from the shore, a dense accumulation of ceramics was detected at a depth of 3-4 m. The accumulation has an east-west orientation and stretches from the rocks towards west over a distance of around 35 m. The preserved ceramic material (PL $XXXVI_{I}$, VOL II) includes not only widely scattered unidentifiable fragments, but also one base part of a Spatheion type amphora and concentrations of quite large piles of dishes heavily encrusted to the rocks over a total distance of around 10 m. Showing high similarities to the dishes at the wreck site of Lazareta these are unfortunately no longer identifiable. Furthermore, due to its close vicinity to the coastline and shallow location, the site has become an easy victim of looting. Nonetheless, the preserved assemblage suggests an identification of a wreck site with a main cargo of dishes. Concerning the dating, no characteristic artefacts could be revealed for providing an accurate date of the site. However, two looted containers, supposedly originating from the site, were shown to me by a local fisherman (PL $XXXVI_{II}$, VOL II). One of them is a small two-handled container or mug, showing a bulging body and an outwards everted rim. It has a dark brown fabric and its exterior appears as if the vessel was coiled. The second vessel is a small jar of lighter bricklike

reddish-brown fabric with a bulbous body and was identical to the containers found at the wreck sites at Tarsanas bay. Even though the vessels lack a context, they nevertheless indicate a possible date to the Middle-Late Byzantine period.

Further, also the so-called Troulonisia or Tourades islets revealed archaeological material. Unfortunately only the main islet could be investigated during the 2012 season. The material detected (PL XXXVI, VOL II) consists of loosely scattered ceramic fragments, such as indefinable handles and body parts of amphorae or jugs, as well as of some plates or bowls encrusted to the rocks. Although the deposition of the unidentified pottery could suggest that it once belonged to a ship's cargo, no wreck site could be verified. The material may also represent material washed away from a potential wreck site at one of the other smaller islets in close vicinity.

2.2.3.4. The site of "Tarsanas" at Kechrias Bay (ILL II.I.50-52, VOL II)

Dedicating one day of survey to the island's northern side, the research team identified traces of human activities at the site of Tarsanas along the northern bay of Kechria (PL XXXVII, VOL II). A small promontory divides the site into a northern beach with a northwest orientation and a southern beach with a southwest orientation. Besides generally scattered unidentifiable stray finds all over the coastline and the closer inland, the southern area revealed a particularly high amount of ceramic material. Furthermore, the documentation of its stratigraphy (PL XXXVII$_I$, VOL II) verified the indication of intensive coastal activities in this area. Apart from an approximately 0.50 m thick stone layer followed by a layer of earth with ceramic inclusions above the geological natural soil, the archaeological layer also shows the remains of walls. The visible wall sections run both alongside the beach and inland. Nevertheless, no harbour or other coastal

installation could be determined with certainty. Documenting the natural rocks off the southern beach line, no artificially built structures could be detected in the water. Its formation suggests the existence of a small channel leading to a small basin (PL $XXXVII_{II}$, VOL II), which reaches the wall remains and the beach line and may have been used for an anchorage.

2.2.4. Evidence of other relevant Archaeological Sites

This chapter briefly discusses further relevant coastal sites on the island, which are of great importance for the overall picture of the coastal life on Skiathos, as well as for the study of harbour infrastructures in central Greece.[424] Additional information pertaining to the survey areas from previous archaeological works in the 1990s and onwards is also included.

THE TOWN OF SKIATHOS (PL XXXVIII, VOL II)[425]

The present town of Skiathos at the promontory of the western entrance of the harbour bay occupies the site of the classical to medieval town of Skiathos. This consequently resulted in the destruction of the earlier settlement phases, with the occasionally appearing physical remains mainly belonging to the Roman Imperial and Byzantine

[424] Structures and sites of previous and later periods are not included in this thesis. Futhermore, although the chronologically relevant fortified settlement of Kastro, dating to the Late Byzantine period, reflects important historical aspects in context with Aegean seafaring and maritime networks, it has no direct impact to harbour installations and other coastal infrastructures and will therefore not be analysed in the present chapter.

[425] AD 20 (1965), B'1, 334-341; Alexiou, Skiathos, 58-67; Doulgeri-Intzesiloglou, Skiathos, 103-104; Evangelides, Skiathos, 31ff.; Fragkoulas, Aksiologes Topothesies, 14-18, 25-28; Fragkoulas, Mnemeia, 16-18; Leonardos, Chorografia, 175; Sampson, Skiathos, 24-26.

periods. Apart from sporadic architectural remains, such as 3rd-4th century columns and other decorative elements of the Early Byzantine period, particularly relevant are the remains of the 13th century harbour fortification of Bourtzi.

The fortification of so-called "Bourtzi" (PL XXXVIII$_I$, VOL II) is located on a rocky islet off the town. Forming the eastern end of the southern harbour, it naturally divides the harbour area of the town into an eastern and southern section. In order to act against the threat of piracy,[426] it was constructed by the Venetian brothers Andrea and Jeremy Ghisi in AD 1207. The fortification itself consisted of an approximately 326 m long defensive wall, surrounding the islet. The wall was built of simple rubble stones with mortar and sand (width of 0.80-0.90 m). Unfortunately, even though parts of the original phase of the wall are still preserved, the exact height cannot be ascertained. The gate faces the town with which it was connected by a small 40 m long footbridge. The gate was flanked by two still visible round towers with a diameter of around 5 m. Originally known as "Castelli di San Georgio", the Bourtzi also included a small church dedicated to the Venetian patron of St. George. The preserved foundations of the church were uncovered during excavations in 1874, which finally were overbuilt by the construction of the former school and present concert and exhibition hall in 1906, without any documentation. However, written accounts of travellers as early as the 17th century attest its Venetian origin.[427]

During the Byzantine period, the settlement was concentrated mainly around the ancient Acropolis at the south-western tip of the promontory. Among various traces of Late Antiquity, mainly ecclesiastical infrastructures – in particular that of the church of

[426] Tafel-Thomas, Urkunden, III, 161, 199, 269 (Nr. 370); Miklosich – Müller, Acta et Diplomata, III, 338.
[427] M. Boschini, L'Arcipelago con tutte le isole, scogli secche, e bassi fondi, : con i mari, golfi, seni, porti, citta', e castelli. Venice 1658, 94; Fragkoulas, Aksiologes Topothesies, 25.

"Panagia i Limnia" (*I gennisi tis Theotokou*) or also known as the church of "St. John of the Mole" and the church of "Aghia Triada" (Holy Trinity) (PL XXXVIII$_{II}$, VOL II) – have to be mentioned here. At the church of Aghia Triada, which is situated close to the ancient city wall and the Necropolis, ruins of an Early-Middle Byzantine three-aisled basilica were found. The remains of its wall sections with a maximum preserved height of 3.50 m measure an outer length of 14.90 m (inner length 14.40 m) and a width of 13.55 m (inner width 12.07 m) and its semi-circular apse measures a diameter of 5 m. The masonry is reported as consisting of limestone with a very compact and strong mortar of lime and sand.[428]

Situated further to the east at the centre of the Acropolis, is the church of Panagia i Limnia. Probably associated with the Early-Middle Byzantine church of so-called "St. John of the Mole" mentioned in textual sources, it functioned as the bishopric of the island. West of the church a mosaic floor, depicting birds on a white background, was still visible until the 1980ies, dating to the Roman Imperial or Early Byzantine periods. Additionally, a dedicatory inscription to Emperor Trajan dating to the beginning of the 2nd century AD,[429] and 11th century AD Byzantine inscriptions are located in the eastern wall of the present church tower (PL XXXVIII$_{II}$, 1, VOL II). Although it is not certain whether the Byzantine inscription originates from Skiathos,[430] it is probably connected with renovation works of the church since Skiathos was united with the diocese of Skopelos during that period.

[428] The archaeological report of 1965 needs to be revised and the remains need to be re-investigated and compared with the building material of the harbour. The author believes a possible use of hydraulic concrete.

[429] IG, XII 8, 633.

[430] The inscription refers to Anastasios, the bishop of Skopelos and Skiathos during the reign of emperor Nikephoros III Botaneiates: Evangelides, Skiathos, 38.

This consequently shows an economic recovery and revival of urban activities on the island towards the late Middle Byzantine period.

THE SITE OF VASILIAS (PL XXXIX, VOL II)[431]

In 1997 rescue excavations revealed the remains of a big building complex around 2 km southwest of the town of Skiathos at a distance of approximately 35 m from the coastline. Running slightly inclined to the beach of Vasilias, it has a northeast-southwest orientation. Unfortunately, due to the illegal construction of a hotel, the entire northern part of the building is destroyed. As a result, the archaeological documentation was limited to the eastern and southern area of the hotel.[432] Nevertheless, the excavation revealed a total length of 27 m in East-West axis and a total length of 16 m in North-South axis, distinguishing the area in two main parts. Among the in total eight verified rooms, one situated at the eastern area could be identified with certainty as a tank or reservoir with a connected channel for water supply (PL XXXIX$_{I}$, VOL II). However, whether this indicates its use as a bath or as fish tanks or ponds remains uncertain. The approximately 0.50-0.80 m thick walls are partly preserved up to a height of 2.50 m at the southern area. The masonry of the southern area is constructed with a strong *Opus incertum* with levelling courses, consisting of rubble stones, mortar and brick tiles (PL XXXIX$_{II}$, VOL II), while the walls in the eastern area do not use brick tiles. The mortar composition of the eastern wall section shows the use of hydraulic concrete. Next to a transverse wall of the southern area, leading perpendicular to the beach line from east to west, one entirely preserved and two base fragments of columns were found belonging to

[431] AD 52 (1997), 470-472, Πίνακα 182c.

[432] Doulgeri-Intzesiloglou, Skiathos, 106-108.

the wall section. Furthermore, scattered pottery, including both indefinable body sherds and handles of type LR, were documented and roughly dated to the 3rd-4th century AD.

Finally, along the beach line further traces of the same building complex are visible in the stratigraphy of its frontal facade. Just briefly mentioned in the reports of 1997, the site was reinvestigated as part of the current survey in 2008 and 2013 with the permission of the responsible archaeological services. The investigation discovered an extension of the site, both towards northeast and southwest, with the building complex stretching in total over a distance of approximately 160 m. The up to 1.50 m high stratigraphy northeast of the excavated area reveals numerous remains of wall sections, leading both along the beach line and towards the water. In contrast to the excavated area, except for one wall section leading towards the sea (PL $XXXIX_{III}$, VOL II) most do not show any use of mortar or hydraulic concrete and, therefore, probably belong to a different part of the co mplex or a different construction phase. Additionally, a thick layer of brick and ceramic including fragments of fine ware are visible. Indicating the remains of floor levels belonging to a construction unit, this further supports the interpretation of a building complex. Further south, possible kilns were also identified, which indicate an agricultural and industrial unit associated with the building complex. This is supported by a small stream close by, originally running through the site ending into Siferi bay. This would consequently also argue in favour for an interpretation of the above mentioned tank or reservoir as fish tank or pond, corresponding to a production site next to a small river. Little, however, is visible of the kilns and systematic excavations need to be carried out in order to understand the function of the site. But its close connection to the sea is not only attested by its location along the beach line with parts of walls obviously leading towards the water, but even more by a rock used as a mooring stone for ships (PL XXXIX,

5, VOL II). The latter is located on the beach southeast of the kiln and possesses two nicely man made holes.

In conclusion, rather than the initial interpretation of the site as representing a Roman bath, it should now be identified as a huge villa maritima of the Roman Imperial or Early Byzantine period. Both, its geographical location and the physical remains and other archaeological material suggest the existence of two parts – a *pars urbana* and a *pars rustica* for the agricultural and industrial exploitation of the area. The products were then probably shipped to the local harbours for export.

TROULOS[433]

In the area of Troulos, wall remains of an Early-Middle Byzantine church complex known as "Aghia Sofia" (St. Sofia) are still visible up to a height of 0.25-0.60 m. Located around 700 m northeast of the bay, it is situated next to a river connecting the church with the sea.

Apart from the remains of the church itself and its adjacent structures, architectural elements also include a spacious enclosure, as well as a big cylindrical tower around 50 m east of the church. The church measures a total length of 9.40 m and width of 5.70 m with an aps of 3.70 m in diameter. Even though the 0.65 m thick walls of the church and its annex are mainly built of simple rubble stones, particularly the eastern sections show the use of *Opus mixtum*. Furthermore, Leonardos still recognized the marble altar with an inscription dedicated to the bishop of Skiathos under the Metropolis of Larisa, however, without transcribing and publishing the inscription.[434] The cylindrical tower measures

[433] AD 20 (1965), B'1, 341; Fragkoulas, Mnemeia, 15-16.

[434] Leonardos, Chorografia, 175.

14.30 m. Its 1.42 m thick masonry is still partly preserved at the northern and western side, again showing phases of both *Opus mixtum* and a simple rubble wall. Consequently, based on the architectural characteristics, Fragkoulas dates the church complex of St. Sofia at Troulos to the reign of emperor Justinian I. That would correspond with the first mention of Skiathos as diocese under bishop Demetrios in AD 530, which during the Early Byzantine period was still a suffragan of the metropolis of Larisa.[435] A study of the different masonry revealed according to Fragkoulas at least two phases of destruction – the first during the period of iconoclasm in the 8th century AD, when Skiathos played a prominent role during the anti-iconoclast revolt of the Theme Hellas under Agallianos and Stephanos in AD 726/7,[436] and a final destruction probably during the second Venetian period in the 15th-16th century AD.

STROFILIA[437]

According to reports from the 13th Greek Ephorate for Prehistoric- and Classical Antiquities, northeast of the lake Strofilia at the island's south-western end, traces of a Late Roman or Early Byzantine agricultural installation were detected in 1998. Its location next to the lake suggests a close maritime connection, both to the lake, which may have also functioned as a fish pond, and the sea since they are interconnected via a channel. However, no archaeological investigation has been conducted since then in order to determine the exact character and function of the site.

[435] Le Synekdèmos d'Hiéroklès, 643, 2-5; Fragkoulas, Episkope, 107, 111.

[436] See chapter 2.2.2. "History".

[437] Doulgeri-Intzesiloglou, Skiathos, 105.

KECHRIA (PL XXXVII, VOL II)[438]

In close vicinity to the site of Tarsanas at the northern side of Kechria bay, further traces of a Late Roman to Byzantine installation were discovered in 1996. The remains, which are mainly graves, wall sections and other architectural elements such as columns, suggest the existence of a settlement or again an agricultural production site, spreading from the site of Tarsanas up the Kechrias River. Additionally, the numerous stray finds, collected during the survey in 2011 and 2012, confirm and support the results from the previous Greek survey project concerning human activities and an intensive agricultural exploitation of the area especially during these periods. Both, stone anchors and another stone object containing two holes (PL XXXVII, 13-16, VOL II), which might be interpreted as a fishing weight, also point to fishing activities and intensive maritime agricultural exploitation as one of the main activities of the island and therefore support the historic-economic evidence. The site seems to continue in later centuries, which is also attested by the monastery of "Panagia Kechrias". Even though most parts are currently showing phases of the 16th and 17th century as well as wall paintings of the 18th century, the catholicon of the monastery is still preserved in its original typical Late-Byzantine or early Post-Byzantine shape as a one-aisled triconch domed church.[439]

LOUTRAKI (Kvouli)[440]

Northeast of the Lake of St. George at the north-eastern end of the harbour bay, material remains of the Roman period came to light at a depth of 1.50 m. Taking the toponym of

[438] Ibid., 108.

[439] For more information regarding the architecture and art of the monastery see: Alexiou, Skiathos, 106-117.

[440] Doulgeri-Intzesiloglou, Skiathos, 109; Sampson, Skiathos, 25-26.

"Loutraki" into consideration, the site indicates the possible existence of a Roman bath. Similar to the site of Vasilias, however, the remains may also belong to another villa complex with a bath or a similar installation, exploiting the lake as fish pond. Finally, spolia used for the construction of the church of "St. John the Theologian" close by,[441] probably also originate from that area and may even belong to the same site. Consequently, a systematic geophysical prospection needs to be carried out in the area in order to detect possible structures and to determine their function.

2.2.5. Concluding Interpretations of the Island's Archaeology and History

After studying all architectural, archaeological and textual data gained from the 2012 survey season and analysing the results from previous archaeological, historical and philological investigations, it is possible to revise the history of Skiathos. Through this overview of the island's economic and social history it is also possible to place a further *tessera* in the puzzling mosaic of knowledge about the late antique and early medieval periods in the Aegean and beyond. The decisive link of the chain towards an overall regional and supra-regional picture comes from the study of the island's harbour installations and other coastal infrastructures, which functioned as a main gateway for communication and economic, cultural as well as social interconnection. But what information do the individual features and sites provide?

[441] For the church and its architecture see: Alexiou, Skiathos, 215-219.

THE CLASSICAL TO ROMAN PERIOD

The survey results confirm the increasing importance of Skiathos as a key station for the control of passing trading routes and shipping lanes, due to the increase of commercial activity, heightened maritime trade and with it the volume of sea traffic from the 5th century BC onwards. During these first centuries it seems that the eastern harbour area and partly the eastern part of the southern harbour constituted the harbour of the town. Unfortunately, due to the construction of the modern harbour facilities, no remains of previous harbour structures have been preserved. However, old photographs and drawings of the early 20th century (ILL II.I.19-23, VOL II) still show the earlier formation of the coastline with its harbour features. Based on these, the ancient coastline was situated around 32-55 m further inland and consisted of a sandy beach line, leading in a bow from the eastern part of the southern harbour to the southern part of the eastern harbour. Ships used the harbour bay as an anchorage and probably, apart from a quay at the northern end of the eastern harbour, it can be assumed that beaching was practised.[442] The use of that area particularly from the Classical to the Roman period is also confirmed by numerous scattered archaeological materials, documented north of the Bourtzi and around the modern breakwater.

Concerning the southern harbour, apart from a probable early cross-anchor, the Classical to Roman Imperial material is limited to the eastern basin and its quay line. The southern harbour demonstrates that Skiathos was part of a wide maritime trade network, with artefacts such as the Çandarli Ware and the Italian Sigillata fragment showing a connection both to the Asia Minor coast and Italy. Finally, the round structure detected

[442] This was a common practise up to the 20th century and attested also by a ramp for hauling up the ships (ILL II.I.19-20, VOL II).

north of the eastern breakwater, which may be interpreted as the base of a lighthouse or beacon, probably dates to that period as well, warning the approaching ships of the rocks of Bourtzi and securing a safe passage to either side of the harbour.

The dedicatory inscriptions of the Roman Imperial period indicate a certain economic and social prosperity during the time of the *Pax Romana* from the 1st to the 3rd century AD.[443] Apart from the main harbour infrastructure, the archaeological remains of private facilities around the island show a peak of social life in connection with coastal activities and a rich maritime network. Installations like the Late Roman villae maritimae at Vasilias and Lazareta testify an intensive agricultural and industrial exploitation and export by sea.[444] Verifying the textual evidence,[445] kilns, such as those at Lazareta, probably produced ceramic containers for the production and export of wine and olive oil, which were transported to the harbour for further distribution. At least a seasonal agricultural production site for olive oil, wine, grain and fish can be demonstrated for the rough northern part of the island, at the area of Kechria.

THE EARLY BYZANTINE PERIOD

During Late Antiquity and especially the first centuries of the Byzantine period, the settled area of the town seems to retreat to the promontory itself – the former Classical

[443] For the dedicatory inscriptions see: IG XII. 8, 631-639; Doulgeri-Intzesiloglou, Skiathos, 114-116; Evangelides, Skiathos, 32-33; Fragkoulas, Skiathitika, I, 57-60; Sampson, Skiathos, 27-30.

[444] It seems the villa estates on Skiathos follow the observation by Rossiter that, in contrast to the high number of luxurious, villa estates in the west, their eastern counterparts were mainly industry orientated and nucleated around rural settlements or towns (κῶμαι) which provided a secure base for the exploitation of the surrounding countryside. However, a luxurious purpose of their *partes urbanae* should not be excluded: J. J. Rossiter, Roman villas of the Greek east and the villa in Gregory of Nyssa *Ep*. 20. *JRA* 2 (1989) 101-102.

[445] See chapter 2.2.1. "Geographical and economic background".

Acropolis (PL XXXVIII, 15, VOL II). However, in contrast to the general picture of the late antique and early medieval periods, which are considered a time of decline, Skiathos still shows a flourishing coastal life. The *villae maritimae*, whose existence has long been totally ignored for the Roman East,[446] provide together with recent works such as that of Bowden for Epirus, Tsigarida for Chalkidiki or Kouremenos for Crete a new point of view.[447] Unlike the study of Roman villae in the western Mediterranean, the material remains of Vasilias and Lazareta indicate a continuation of the sites as agricultural production centres far into the 4th century AD at least.[448] This is also supported by the villa estates of Kassandra and Diaporit.[449] the jetty at Lazareta, which was probably functioning as a landing stage for the adjacent and closely connected villa. Although the feature shows characteristics going back as early as the Roman Imperial period described by the Roman architect Vitruvius, its hydraulic concrete base (*Opus caementicium*) and superstructure of ashlar spolia are almost identical with the Early Byzantine jetty at the Theodosian harbour of Constantinople and may therefore also date between the 4th and the 5th century AD. One of the identified shipwrecks at Lazareta, which based on the material assemblage (including North African Sigillata Ware, a LR 1 amphora and a

[446] Rossiter, Roman villas, 101

[447] Only very recent excavations and detailed field surveys conducted throughout Greece start closing the gap for the systematic study of villa estates in the east: Bowden, Epirus Vetus, Anna Kouremenos, Houses and identity in Roman Knossos and Kissamos, Crete: a study in emulative acculturation, I-II. Oxford 2013. (unpublished doctoral thesis); Tsigarida, Kassandra.

[448] Not to forget that the phenomenon of villa sites developed quite late in the Eastern Mediterranean: Rossiter, Roman villas, 102.

[449] While the sites of Kassandra and Diaporit show a continuation of building and agricultural activities way into the 5th century AD and latter even up to the end of the 5th/beginning of the 6th century AD, other investigated rural sites in Epirus indicate possible phases of villa estates up to the 7th century AD: Bowden, Epirus Vetus, 63, 79-81, 201; Tsigarida, Kassandra, 386, 396.

column fragment), dates to the 4th-5th century AD, seems to have come to grief approaching the jetty at the villa, indicating its continued use.

Connected with the shift of the residential area during the Byzantine period, the town's main harbour facilities move towards the western basin of the southern harbour. This is clearly shown by exclusively Byzantine material in the western harbour basin, indicating activity after the Roman Imperial period. While the eastern basin shows signs of use from the Classical to the Late Byzantine period, the western basin only revealed signs of use starting in Byzantine times, but at what point? The documented ceramic artefacts all date roughly between the 5th-6th and the 8th-9th century AD, including fragments of both amphorae and table ware. The table ware reveals a strong connection to North Africa, which may be associated with its annexation to the Byzantine Empire under Justinian I, and Skiathos' location on the trading route between it and Constantinople.

The harbour installations of the quay and the jetty, which are also limited to the western harbour basin, also support a 6th century AD date. Even though, they show a similar construction technique of *Opus caementicium* with the harbours of Constantinople, Caesarea Maritima, or the jetty at Lazareta, the method of use is totally different. The construction of architectural features along the coastline did not require the use of a uniform hydraulic concrete structure by the sinking a wooden formwork. Instead, the formwork was used for the production of individual stone blocks on land. Furthermore, the filling consists of raw quarry stones, which may be waste material originating from a quarry on the mainland, possibly from the nearby Pelion peninsula. Consequently, we may see a transition period, reflecting a continuing Roman tradition but a different adaption for harbour architecture, providing a more efficient, faster and lower-priced "mass production" using waste material. Looking at Procopius' descriptions of harbour

construction techniques in Byzantine harbour architecture, a continuation of Roman traditions is attested at least until the 6th century AD. Consequently, similar to Pigadi and Afyssos, the quay and jetty may also be associated with the extensive building activities in central Greece under emperor Justinian I at the earliest. If that is the case, Justinian's building programme not only included the improvement of fortifications and water supplies or the construction of churches but also the construction of harbour infrastructures.

Concerning the construction of churches, the establishment of Christianity as the state religion establishes the institution of the church as a new cultural and social centre, resulting in the construction of the churches of the Holy Trinity and "Panagia i Limnia" in town and St. Sofia at Troulos. Moreover, beyond its cultural and social role, the church also becomes involved in commercial activities – both as an important part of the state organ and as a private entrepreneur. Similar to the coastal site of Chorto on the Pelion peninsula, the church St. Sophia probably shipped the agricultural products of its surrounding properties to the bay of Troulos from where they were transhipped to small merchant vessels. Its impact on maritime trade as well as its influence on the construction of the island's harbour facilities and other coastal structures, however, is first and foremost shown by the rock inscription at the western breakwater of the southern harbour. But how is the inscription, which says that the bishop Straton built that mole, to be interpreted?[450] Did the bishop construct the mole or just repair it? Is the construction of the breakwater to be associated with that of its superstructure or was it a later addition? The lost last lines of the inscription, which probably also included the date, clearly lead below the present water surface and suggest that the original purpose of the breakwater

[450] For the inscription and its translation see chapter 2.2.3.1. "The broader harbour area".

was to act simply as protection against the strong southern winds as well as against siltation of the western harbour basin. Even though the architectural characteristics of breakwaters are common since the Roman period, its location and purpose suggests a strong connection to the western quay and jetty. As such, it seems that the construction of the mole was an initiative by the church, either as a later addition or most probably as a "private" dedication or donation, a so-called *Philotimia*, to the contemporaneous Imperial works, such as shown by numerous other inscriptionsdating to the reign of Justinian.[451] If we are dealing with a later addition, how much later do we have to place it? Although the date of the inscription (if it ever existed) is missing, the first bishop of Skiathos, Demetrios (mentioned in AD 530), probably sets a *terminus post quem* of the reign of Justinian, while both the characteristics of the letters and the existence of an independent diocese of Skiathos suggest a *terminus ante quem* of the anti-iconoclast revolt of the Theme Hellas in AD 726/7.[452] Based on other examples of dedicative inscriptions from the 6th century AD, however,[453] a date to the reign of Justinian is suggested.

Additionally, among the archaeological material in the western harbour basin, artefacts such as the flask and the ARS plate show a strong ecclesiastical connection and its strong influence in maritime trade activities particularly during the 6th-7th century AD. Furthermore, the ornamental marble fragment detected at the very beginning of the breakwater next to the inscription, is reminiscent of the late 6th century AD Marzamemi

[451] Avramea, Epigraphie, 830-834; D. Feissel, L'Éveque, titres et fonctions d'après les Inscriptions Greques Jusqu'au VIIe Siècle, in: Actes du XIe Congrès International d'Archéologie Chrétienne, Lyon, Vienne, Grenoble, Genève et Aoste 1986, F. Baritel – N. Duval – Ph. Pergola (eds.), I (*Collection de l'École française de Rome* 123). Rome 1989, 821.

[452] Fragkoulas, Episkope, 111-112. For the events in AD 726/7 see chapter 2.2.2. "History".

[453] Avramea, Epigraphie, 833-834; Feissel, Inscriptions, 820-823.

B shipwreck, shipping Proconnesian church marble and the Thessalian stone "verde antico" from Constantinople, the Marmara Sea and central Greece for the construction of a basilica or another episcopal building either in Sicily or Northern Africa.[454] As a result, the mole structure may be dated to the mid- to late 6th century AD, which, considering the almost identical breakwater constructions at the sites of Achilleion (Pteleos) and Koutsoupia as part of Justinian's building programme (see chapter 2.3.4. "The Harbour of Pteleos" and 2.4.2.7. "Velika and Koutsoupia"), seems also most likely for the western breakwater itself.

Beyond an ecclesiastical influence, the construction of the mole and the subsequent increase of mooring space within the harbour basin, together with the pottery remains, attest to a lively general commercial connectivity for the society at least into the 7th century AD; numerous globular type amphorae even indicate a flourishing trade until the 8th century AD. During this period it is likely that Skiathos probably was not only involved in regional trade but also strongly connected with Thessaly's interregional trade relations. Accordingly, although no characteristic pottery could be identified at the breakwater due to the steady washing out by the sea, the space shows the activity of loading and unloading of trade commodities. This is not only confirmed by one of the shipwrecks at Lazareta dated to the 6th-7th century AD or by the aforementioned marble fragment, but also by the circular crushing stone situated just north of the breakwater's inner side. Probably as part of an olive oil or wine press, the latter signifies the role of Skiathos as an important production area for agricultural goods. Lying directly next to the

[454] For the Marzamemi or so-called "church wreck" see: Anke Bohne, Das Kirchenwrack von Marzamemi. Handel mit Architekturteilen in frühbyzantinischer Zeit. *Skyllis* 1/1 (1998) 6-17; G. Kapitän, Schiffsfrachten antiker Baugesteine und Architekturteile vor den Küsten Ostsiziliens. *Klio* 39 (1961) 300-302; G. Kapitän, The Church Wreck off Marzamemi. *Archaeology* 22 (1969) 122-133; G. Kapitän, An Ancient Roman "Yacht"? *MM* 59 (1973) 229-230; Parker, Ancient Shipwrecks, 267.

western end of the quayside and the beginning of the mole, however, there is a possibility that the stone may even show a re-used context as ballast for a ship having moored at the mole. This would further demonstrate that the construction of the mole along the inner side of the breakwater formed an extension of the quay and fulfilled commercial and traffic related functions.

Concerning the island's historiographical information, the archaeological data stands in conflict with the picture drawn by the textual sources and particularly by the *Vita et Miracula Sancti Demetrii*, which states that Skiathos suffered a lot from raids and pillaging by Slavic tribes, resulting in its depopulation already long before the Byzantine *strategos* Sisinnios arrived on the island in AD 680.[455] Consequently, the results gained from the 2012 survey support Karagiorgou's argument that despite the threat by certain turmoil on the Balkan peninsula during the 6th-7th century AD, it seems that the miracle is not only exaggerating for hagiographic purposes but is also contradictory, since the same source also indicates intensive trade relations between the Byzantines and the Slavs.[456] Furthermore, as already mentioned Skiathos played a prominent role during the anti-iconoclast revolt of the Theme Hellas just some 40 years later, which is considered unlikely if Skiathos had not had a strong and active secular and ecclesiastical society – much less if it would have been deserted.[457] Nevertheless, in line with the economic regression and cultural stagnation of the Greek peninsula, the destruction of St. Sofia on Skiathos shows the social disruption of the period of Iconoclasm, but this needs to be set

[455] See chapter 2.2.2. "History"; for the Slavic and Arab "invasion" and its impact to Thessaly and the islands of the Northern Sporades during the 6th and the 7th century AD see: Karagiorgou, Urbanism and Economy, 24-32.

[456] Karagiorgou, Urbanism and Economy, 29; it can be assumed that Skiathos even profited from this interrelation, both due to its decisive strategic position and its role as trading station.

[457] As such, the island's maritime cultural heritage once more shows that the so-called "Dark Age" (if at all applicable) probably has to be chronologically limited to the 8th century AD.

against the harbour infrastructure and presence of shipwrecks that also suggest economic continuity up to the 8th century AD.

THE MIDDLE BYZANTINE PERIOD

It is only towards the end of the 11th century AD that the island appears to recover from social disruption caused by Iconoclasm and the historical events of the late 8th to 11th centuries; this is shown by the repair of its churches and first traces of an economic revival. By the 12th century AD at the latest, Skiathos had entered a new peak of social life in connection with coastal activities. The 11th-13th century AD dated wreck sites of Tarsanas and Lazareta show a very rich maritime network. Particularly the Incised Sgraffito Ware documented at the sites verifies a connection to the 12th-13th century wreck sites of Camalti Burnu I, Kastellorizo and Skopelos, confirming trading routes to the Marmara Sea and Constantinople, the coast of Asia Minor and Cyprus. Apart from its involvement in the supra-regional maritime network, the sites of Aghia Paraskevi, Troulos and Kechria also attest Skiathos' contribution to the regional economy as an agricultural and industrial hinterland for the central Greek mainland of Thessaly. Although the remains of kilns at Aghia Paraskevi indicate industrial activities in that area since the Roman Imperial to Early Byzantine period, the widely scattered roof tiles also suggest a very active medieval production site. Similar to the sites of Tarsanas at Kechria and Troulos, however, no permanent harbour installations could be detected. Instead, the ceramic inclusions at the geological platform along its beach line indicate the practise of beaching ships for the loading of agricultural and industrial products. While in the case of Aghia Paraskevi it is uncertain, for Troulos and Kechria the material remains indicate a seasonal agricultural exploitation of the area. While at Kechria probably simple coastal facilities appropriate to the weather conditions such as a landing stage including wooden

piers and a wharf had been used. At Troulos the commodities were transhipped directly from the river coming from St. Sophia to merchant ships such as that documented at Cape Amoni. Consequently, an interpretation of these sites as seasonal staple markets is suggested, which would have provided the mainland with agricultural products exported via the harbour of Skiathos.

THE VENETIAN PERIOD

During the first period of Venetian hegemony the Skiathos harbour was fortified by the construction of the Bourtzi. This changed the character of the southern harbour decisively, as apart from the fortification itself, the Venetians closed the southern harbour basin by the construction of the eastern breakwater.[458] In contrast to the western breakwater, however, the primary purpose of the eastern one was not to provide additional space for commerce and traffic related functions, but simply to act as a protection for the eastern harbour basin.[459] Consequently, the construction of the Bourtzi results in the use of the entire area of the southern harbour. A resumption of the use of the eastern harbour beyond the eastern breakwater can only be assumed, but it was probably used as anchorage. Concerning the harbour bay of Skiathos, although its use and important role as anchorage is attested as early as the 4th century BC and increasingly following the Roman period,[460] the 2012 survey season revealed no conclusive evidence due to the heavy siltation of the northern coastline. Apart from the architectural remains of the shipyard at Karnagio (ILL II.I.40, VOL II), which attests the role of Skiathos as an important roadstead and

[458] However, it cannot be identified with a "Limen kleistos".

[459] Nevertheless, the circular column-like structure next to the breakwater's inner side, which may be compared to Venetian bollards and therefore also date to the 13th century AD, possibly indicates its secondary use as mooring facility for ships anchoring in the eastern harbour basin.

[460] See chapter 2.2.2. "History".

shipbuilding centre of the Aegean until the 19th century (ILL II.I.24-25, VOL II),[461] the detection of another jetty further north indicates a rich coastal infrastructure. Although early photographs show that it may still have been functioning for smaller boats until the beginning of the 20th century (ILL II.I.27, VOL II), the Ottoman dated wreck site on the eastern side of the harbour bay indicates that the siltation process had already progressed so far that by the 17th century AD at the latest it became impossible for big ships to approach the northern coastline.

THE LATE BYZANTINE PERIOD

Owing to the foundation of Kastro in the 14th century AD, which resulted in the population retreating to the northern side of Skiathos, the capital facilities cannot date to a later period. The original phases of the coastal facilities along the harbour bay may, however, date back to the Early or Middle Byzantine, if not the Roman Imperial period. Even though the southern harbour remained important in later centuries, especially for military actions, the only uncertain evidence of 14th-15th century AD activity in the harbour area is shown by a single grapnel anchor. In contrast, with the foundation of the Kastro on the northern side of the island, the area of Kechria and the site of Tarsanas gained in importance as the closest connection to the sea. These will have functioned as a landing stage and staple market for the Kastro. Finally, Skiathos has functioned as a major shipbuilding area since Classical Antiquity. Unfortunately, apart from the shipyard of Karnagio so far only the toponym of "Tarsanas"[462] testifies possible earlier

[461] Philippson – Kirsten, Aegaeische Meer, 128; Sampson, Skopelos, 199; Sampson, Skiathos, 57, 70; Efstratiou, Agios Petros, 3; further see chapter 2.2.2. "History".

[462] Deriving from Ottoman, together with the Venetian equivalent "Arsenale" it indicates a shipbuilding area, which often is confined to military installations.

shipbuilding facilities on the island – one just outside the southern harbour and one at Kechria.

In conclusion, the case-study of Skiathos shows the role that maritime archaeology can play to enhance harbour studies and elucidate the economic, cultural and social history of the Aegean and beyond. Its close commercial ties to Euboea and Thessaly, but also to Constantinople and the West during the Byzantine period, confirms the island's importance both as agricultural hinterland for the central Greek mainland and as a major gateway for communication and connection within the wider Mediterranean maritime network.

2.3. The ports and primary harbour sites of Thessaly

All of the major port-cities and coastal settlements of Thessaly are located within the Pagasetic gulf, which forms a circular lagoon of the Aegean Sea with a diameter of around 31 km, connected to it by an approximately 5 km wide passage.[463] Continuing from Roman times, the main coastal urban centres of Thessaly during the Byzantine periods were Demetrias, Thessalian Thebes, Almyros and Pteleos. Geographically all of them are situated along the western coast of the Pagasetic gulf, connecting the fertile and rich coastal plains and central Greek hinterland with the maritime foreland.

While Demetrias and Thessalian Thebes constituted major port-cities particularly during the Early Byzantine period, Almyros and Pteleos were principal trans-shipment centres from the Middle to the Late Byzantine period.[464] Although systematic studies of those sites go back as early as the beginning of the 20th century, archaeological investigations do not pay attention to harbour areas and often ignore port-related facilities. Demetrias, and to some extent Thebes, form the only exceptions. The works of researchers such as Apostolides, Arvanitopoulos, Stählin or Marzolff provide excellent photographic material but only vague information, which often lead to premature conclusions. In the case of Thessalian Thebes the long-term excavations at Nea Anchialos even unearthed

[463] For the geography of the Pagasetic gulf see: G. Koulouras, Η περιοχή του παγασητικού κατά τους μέσους χρόνους (Δ΄-ΙΔ΄ αι.). Ioannina 1997, 11-17; P. Magdalino, The history of Thessaly. 1266-1393. Oxford 1976, 81-82 (unpublished doctor thesis); A. Philippson - E. Kirsten, Das Aegaeische Meer und seine Inseln (*Die griechischen Landschaften* 4). Frankfurt 1959, 207; F. Stählin, Das hellenische Thessalien. Stuttgart 1924, 79ff.

[464] While a port includes not only a city for the reception of mariners and merchants, but also extensive harbour installations, a trans-shipment centre constitutes simply an economic hub for maritime commerce without necessarily have to be equipped with major harbour infrastructures.

various harbour features. However, even Soteriou devotes only brief descriptions and obvious conclusions.[465]

Consequently, the study of the archaeological material and discussion of architectural remains is mainly based on the results of the present author's fieldwork, conducted in two seasons during the years 2012 and 2013.

[465] See chapters 2.3.1. "The Port of Demetrias" and 2.3.2. "The Port of Thessalian Thebes".

2.3.1. The Port of Demetrias (ILL II.II.1, 5, 12, VOL II)[466]

The Hellenistic port-city of Demetrias was founded by the Macedonian king Demetrius I Poliorcetes in 294 BC.[467] By amalgamating the populations of existing settlements at Mycenaean Iolkos[468] and the classical port-cities of Pagasai and Goritsa[469] surrounding the innermost bay of the Pagasetic gulf (today the gulf of Volos), he created a large city directly on the promontory enclosing the gulf of Volos from the south. As such, in contrast to Pagasai,[470] which was founded as an *epineion* of the classical inland city of Pherae (located 3.5 km south of Iolkos) in the 5th century BC,[471] Demetrias is located just 1.5 km

[466] *AD* 1 (1915) 56ff; 18B (1963) 139f; *AE* (1908) 1, 6, fig. 1; (1909) 145; (1914) 269; (1916) 121; *BCH* 27 (1903) 334; 44 (1920) 181ff, 397; 46 (1922) 518; 89 (1965) 786; 96 (1972) 723-724, fig. 317; 97 (1973) 336, fig. 171.

[467] A. S. Arvanitopoulos, Γραπταί στήλαι Δημητριάδος – Παγασών, (*Vivliotheke tes en Athenais Archaiologikes Hetaireias* 23). Athens 1928, 83; Anthi Batziou-Eustathiou, Δημητριάδα. Ιστορικά στοιχεία – Ίδρυση της πόλης, in: Archaia Demetriada, 11; H. R. Reinders – W. Prummel, Housing in new Halos. A Hellenistic town in Thessaly, Greece. Exton 2003. (rev. ed. of New Halos. Utrecht 1988), 11.

[468] The Homeric city of Iolkos was long thought to be located at the western part of the present city of Volos, called "Palia". The recent well-argued suggestion by Intzesiloglou locates Iolkos close to the Neolithic settlement of Dimini further west of Volos. Nevertheless, the name was transferred to the area of "Palia", recorded by Byzantine sources: Stephani Byzantii, Etnicorum quae supersunt, A. Meineke (ed.), Berlin 1849, 343; Tzetzes, Historiae, 9.693; B. F. Intzesiloglou, Ηστορική τοπογραφία της περιοχής του κόλπου του Βόλου, in: La Thessalie. Quinze annees de recherches archeologiques 1975-1990. Bilans et Perspectives II, R. Misdrahi-Kapon (ed.). Athens 1994, 31-56; Olga Karagiorgou, Demetrias and Thebes: the fortunes and misfortunes of two Thessalian port-cities in Late Antiquity, in: Recent Research in Late-Antique Urbanism (JRA *Supplement* 42), L. Lavan (ed.). Portsmouth 2001, 203, fn. 109; Reinders-Prummel, Halos, 13, 15, Fig. 1.8.

[469] The site of Goritsa is located on a hill at the eastern outskirts of modern Volos. For further information about the site see: S. C. Bakhuizen et alii, Goritsa, a new survey. *AD* 27 (1972) 347-374; S. C. Bakhuizen, A Greek city of the fourth century B.C. Rome 1992.

[470] For the geography, history and cultural as well as demographic development of Pagasai and Demetrias see: F. Stählin – E. Meyer – A. Heidner, Pagasai und Demetrias: Beschreibung der Reste und Stadtgeschichte. Berlin 1934, 8ff.

[471] P. Ch. Apostolides, Αι Παγασαί εξεταζόμεναι διά των αιώνων. Athens 1912, 18; Arvanitopoulos, Demetriados – Pagason, 80, fn. 4; Stählin et alii, Pagasai und Demetrias, 7, 94. Pagasai is mentioned as

south of the modern city of Volos, extending along the southern shoreline of the gulf between the rivers Xerias and Aligarorema (ILL II.II.4, 6, 8, VOL II).[472] This location is not accidental. With this advantageous position the new city of Demetrias could not only use the already existing classical harbour of Pagasai (see below "The southern harbour" nowadays so-called "Alykes") south of the promontory, but also the entire gulf of Volos (ILL II.II.3-4, 6, 10, VOL II). Consequently, combining all harbour infrastructures along its northern and southern shorelines, a large and sheltered harbour and roadstead was established.[473] It grew to become one of the main harbour areas in the Aegean in the Hellenistic and particularly the Roman Imperial and Byzantine periods. Although the harbour infrastructures of Demetrias remained in use until 14th century AD, the city's era of prosperity lasted until the end of the 6th or the beginning of the 7th century AD, which is then followed by a period of transformation until Demetrias faced declining urban activity from the end of the 9th century AD onwards.[474]

THE NORTHERN HARBOUR (ILL II.II.11, 13-17, VOL II)

The northern harbour of Demetrias is located within the gulf of Volos. The innermost bay of the Pagasetic gulf was used as harbour area as early as the Neolithic Dimini culture and formed one of the most important roadsteads for central Greece from at least the

epineion of Pherai during the 4th century BC, both by the Greek historian Theopompus in book 5 of his Philippika and by Strabo's Geographica, Lib. IX, Chapter V, 666.15; Strabo, Geographica, 374.

[472] Arvanitopoulos, Demetriados – Pagason, 11; Karagiorgou, Demetrias and Thebes, 197; Stählin et alii, Pagasai und Demetrias, 7.

[473] Stählin et alii, Pagasai und Demetrias, 95, 171.

[474] For Byzantine Demetrias see: Avramea, Thessaly, 136-141; Karagiorgou, Demetrias and Thebes, 197-215; Karagiorgou, Urbanism and Economy, 63-83; for a short overview see: Koder-Hild, Hellas und Thessalia, 144-145; Koulouras, Pagasitikou, 239-240, 244-258; Magdalino, Thessaly, 82-86.

Bronze Age.[475] The area faced strong geographical alterations caused by numerous rivers flowing into the gulf, leading to changes in the shoreline due to the rivers Xerias, Seskouliotis, Krausidonas and Aligarorema,[476] slowly silting up the gulf and continuously shifting the coastline towards the east (ILL II.II.1-2, VOL II).[477] This resulted in frequent relocations of surrounding settlements and their harbour installations. During the Bronze Age the northern coastline of the gulf still formed a big open roadstead along which the harbour facilities of Iolkos at the estuary mouth of the river Krausidonas were situated.[478] Unfortunately, since the whole northern coastline is silted up and nowadays densely settled as the modern city of Volos, very few archaeological remains of coastal structures have been detected that would provide indications for locating the harbours of Iolkos and Goritsa.[479] Later in the Classical period, however, both Pagasae and the 4th century BC hill site of Goritsa,[480] together with their main harbour facilities, had to be located outside the gulf moving either to the promontory and in particular its southern coastline (Alykes), or further east close to the estuary mouth of the river Anavros (ILL II.II.5, 12, VOL II). Nevertheless, despite the confinement by the river Aligarorema, with the foundation of

[475] E. Zangger, Prehistoric Coastal Environments in Greece: The Vanished Landscapes of Dimini Bay and Lake Lerna. *JFA* 18/1 (1991) 1-15.

[476] Similar to the other ones, the river Aligarorema was originally flowing northwards and ending into the southern bay of the gulf as well: P. Marzolff, Η πολεοδομική εξέλιξη και τα κυριότερα αρχιτεκτονικά έργα της περιοχής της Δημητριάδας, in: Archaia Demetriada, 53.

[477] For the shift of the coastline see: Zangger, Prehistoric Coastal Environments in Greece, 1-15.

[478] Ibid., 3, Fig.1; Stählin et alii, Pagasai und Demetrias, 93.

[479] Both, the northern coast of the gulf of Volos and the southern harbour at Alykes were destroyed for the construction of the modern harbour installations in 1881. Arvanitopoulos, Demetriados – Pagason, 88; Stählin et alii, Pagasai und Demetrias, 93-94.

[480] It has been suggested that Goritsa probably possessed its own small harbour installation, which consisted of a quay or wharf along the shore: Aikaterini Kalantzi-Smpiraki, Περίστυλο αίθριο στην πόλη του Βόλου. *DChAE* 16/4 (1992) 114.

Pagasai the gulf of Volos continued to be used as roadstead[481] and its southern coastline provided space at least for smaller coastal infrastructures such as the shipyard (for the shipyard see "Tarsanas" below).[482] However, it was not until the diversion of the river Aligarorema away from the gulf of Volos to the south of the promontory (ILL II.II.7, VOL II) that the southern coastline generally proved to be favourable again. This allowed the city of Demetrias to occupy the promontory and finally to use the gulf for the city's main harbour installations (ILL II.II.9, VOL II). As such, the structures of the northern harbour are located along the crescent-shaped southern coastline of the gulf, which in addition to its shelter against northern winds provided a natural shelter against the sea from the east and the southeast due to the rocks of the northern headland of the promontory, known as "Pefkakia".[483] Due to its safe and easily accessible position not only the area of Pefkakia (today used as a shipyard) at the eastern end of the bay, but the whole southern coastline from the lighthouse east of the northern headland to the ancient theatre towards "Bourboulithra" at the river Xerias was functioning as a station for numerous ships (ILL II.II.4, VOL II). Accordingly, especially during the Roman Imperial and the Byzantine periods, the settlement activities of Demetrias concentrated along the northern coastline of the promontory. This included living quarters, public and

[481] Arvanitopoulos even believes that Plutarch's account about the stationing of the Greek fleet under Themistocles at Pagasai after the battle of Salamis in 480 BC probably refers to the roadstead at the gulf of Volos, arguing that the fleet must have overwintered at the roadstead since the southern harbour was accessible only through a small channel which would have been quite inconvenient for a whole fleet. Furthermore, the closed harbour area would have posed risks of arson. In contrast, the gulf of Volos provided an open space and a sandy coastline ideal for an immediate reaction to arson: Arvanitopoulos, Demetriados – Pagason, 71, 78.

[482] Apostolides, Pagasai, 12; Arvanitopoulos, Demetriados – Pagason, 88, 95, 108. According to Arvanitopoulos Demetrius and his Macedonian successors Philipp V and Perseus used the shipyard and the gulf for equipping and supplying their ships, rather than the southern harbour at Alykes.

[483] Apostolides, Pagasai, 17; Arvanitopoulos, Demetriados – Pagason, 11 Stählin et alii, Pagasai und Demetrias, 94.

commercial buildings such as shops, the marketplace, basilicas and workshops spreading around the northern harbour area and stretching to the city walls north of Alykes (ILL II.II.4, 8-9, VOL II).[484]

Today there are no clearly assignable archaeological traces of facilities from the northern harbour. Thus, the current study of harbour structures and the following attempt to reconstruct the shape and architecture of it relies upon brief descriptions and photographic material of remains still visible at the beginning of the 20th century and the author's field season conducted in 2012.

In the 1930's Stählin reported a single remaining ashlar or boundary stone in situ at the western end of the bay where nowadays a jetty leads 300 m into the sea from west to the east (ILL II.II.8, VOL II). Stählin interpreted the boundary stone as forming part of the ancient harbour. Interpreting Apostolides' description from 20 years earlier of a row of

[484] Amongst others already Arvanitopoulos, Stählin and Apostolides identified and studied traces of settlement along the northern coastline of the promontory as early as the beginning of the 20th century: Apostolides, Pagasai, 46ff; ibid., 13-14, 106; Stählin et alii, Pagasai und Demetrias, 140ff, 151ff; moreover, Arvanitopoulos reports the existence of wall remains and towers leading along the northern coastline from the shipyard to the area of Bourboulithra at the river Xerias, surrounding the harbour: ibid., 12, 87. Archaeological excavations, revealing early Byzantine construction or restoration phases, confirm the earlier studies and reveal the importance of the southern coastline of the gulf as merchant harbour. For historical and archaeological investigations see: AD 1 (1915) 56f; 18 (1963), B'1, 139f; AE (1908) 1, 6, Fig. 1; (1909) 145; (1914) 269; (1916) 121; Archaia Demetriada; Anthi Batziou-Eustathiou – Pelagia Triantafyllopoulou, Ρωμαϊκό κτιριακό συγκρότημα στην αρχαία Δημητριάδα. Πρώτη παρουσίαση. *Αρχαιολογικό Έργο Θεσσαλίας και Στερεάς Ελλάδας* 1 (2006) (=Πρακτικά επιστημονικής συνάντησης). A. Mazarakis-Ainian (ed.). Volos 2003, 193-206; Karagiorgou, Demetrias and Thebes, 197ff; Karagiorgou, Urbanism and Economy, 65ff; P. Marzolff, Das Frühchristliche Demetrias. *ACIAC* 10/2 (1980) 293-309; P. Marzolff, Demetrias und seine Halbinsel, in: Demetrias III, P. Marzolff – W. Böser (eds.). Bonn 1980, 5-44; P. Marzolff, Grabungen im Bereich der Damokratia-Basilika, in: Demetrias V, P. Marzolff - S. C. Bakhuizen, S. C. - F. Gschnitzer - Ch. Habicht (eds.). Bonn 1987, 63-267; archaeological excavations also testify Arvanitopoulos' report, revealing the remains of the city wall along the northern coastline, which was rebuilt or repaired in front of the harbour during the 4th century AD, probably encouraged by the continuous barbarian invasions into Thessaly: AD 35 (1980), B'1, 271-272; 43 (1988), B'1, 241.

boulders, as probably belonging to either a quay, jetty or mole (ILL II.II.8, VOL II), Stählin believed that the whole bay must have been enclosed by breakwaters and 2.17 m-wide moles over a distance of around 700 m. Therefore, according to Stählin, the single ashlar had to belong to the supposed western mole.[485] Although the aforementioned photographic material supports such an assumption (ILL II.II.17, VOL II), no archaeological remains of breakwaters, have subsequently been identified. Possessing an ideal natural shelter, however, the northern harbour would not have required any protective architectural element. Therefore, in contrast to Stählin, I believe that the northern harbour was open and never possessed breakwaters, except in case for supporting mole superstructures to provide additional space for increasing merchant activities. As such, based on the account of Apostolides, the surviving ashlar may have belonged either to a jetty leading from the city wall into the bay or to a quay leading along the coastline in front of the northern city wall.[486] The single ashlar, however, does not allow the reconstruction or alignment of either a quay structure or of the late antique coastline, which Apostolides assumes had a different shape that changed with time. Stählin argues that any possible quay elements were probably removed. Nonetheless, during a field season in 2012 elements possibly belonging to quay structures were identified (ILL II.II.18, VOL II). Consequently, I agree with Apostolides' interpretation, that it is more plausible to associate the ashlar with the construction of the harbour's quay. But if indeed the northern harbour possessed breakwaters and moles, they must have been of decent size in order to enclose an estimated length of 700 m and a width of approximately 250 m, forming a harbour basin with a calculated area of 13.20 ha.

[485] Apostolides, Pagasai, 12, 17; Stählin et alii, Pagasai und Demetrias, 94-95.

[486] Although the remains do not allow the reconstruction of its alignment, Apostolides assumes that the ancient coastline had a different shape and changed with time. Accordingly, Stählin argues that the quay elements probably were removed; Apostolides, Pagasai, 12; Stählin et alii, Pagasai und Demetrias, 94-95.

Although Stählin's assumed structures must then be deeply buried by sand and alluvial sediments coming from the forward prograding rivers,[487] based on aerial photographs the sedimentation line allows a fictive reconstruction of the harbour's border line, suggesting an eastern mole of around 430m and a western mole of around 300 m slightly displaced to the north (ILL II.II.19, VOL II).

During Late Antiquity Byzantine Demetrias spread beyond the city walls towards the northern coastline again. Resettling Mycenaean Iolkos at "Palia" and the surrounding area of classical Goritsa (today east Volos),[488] the northern bay presumably came into use for further harbour infrastructures again (ILL II.II.20-22, VOL II). In contrast to the opinion of scholars such as Karagiorgou,[489] the author believes that the southern coastline remained the main harbour and commercial area of Byzantine Demetrias if not also the cultural and administrative centre until the middle of the 11th century AD.[490] The northern

[487] Both due to the change of the water level and the forward pushing rivers Xerias and Krausidonas, the area of the northern harbour got shallower and slowly silted up. Consequently, the area needs to be surveyed by using geophysical prospection. Apostolides, Pagasai, 88; Stählin et alii, Pagasai und Demetrias, 7, 94; for the change of the water level see: Blackman, Sea Level.

[488] For early Christian and Byzantine remains along the northern coastline of the gulf of Volos see: N. I. Giannopoulos, Το φρούριον τοῦ Βόλου. *EEBS* 8 (1931) 110-133; Kalantzi-Smpiraki, Peristylo; Karagiorgou, Demetrias and Thebes, 203ff; Ntina, Demetrias.

[489] Karagiorgou, Urbanism and Economy, 67ff.

[490] Middle Byzantine historians such as Kaminiates and Kekaumenos inform us about relevant historic events and topographical characteristics about Demetrias, referring to its location on the promontory. Kaminiates' account of the conquest of Demetrias by Saracen pirates in AD 896 reports the entrance of the pirate ships to the harbour and the city walls, pretending trading intentions. Although the hill of Iolkos got strongly fortified with a castle shortly after AD 485 or AD 500, it probably just accommodated the ecclesiastical centre which functioned as staple market with its independent infrastructures. Additionally, in the 11th century Kekaumenos states that Demetrias was a "...πόλις ἐστί Ἑλλάδος παρά θάλασσαν, από τε τῆς θαλάσσης καί τῶν κύκλωθεν βαλτῶν ἐξησφαλισμένη", indicating that the city of Demetrias was situated on the promontory surrounded by the sea and the swamps of Bourboulithra and Alykes. Further, the same author reports that after the conquest of the city by the Bulgars in AD 1040 their general Lytoboes Diabolites rebuilt the castle of Demetrias at Iolkos, which indicates that the city itself was still situated

bay gains importance as a harbour area probably only towards the end of the 11th century AD with the establishment of a Venetian merchant-colony along the coast.[491] In AD 1154 the Arab geographer and cartographer Muhammad Al-Idrisi describes Demetrias as "a small town but well organized",[492] which might be a hint for the shift of the nucleus of the city to the small fortified area of Iolkos and the northern harbour with its *scalae*. Finally, in the 14th century AD the fortification at Iolkos appears in the sources with the new toponym "Golos".[493] Due to the continuous siltation of the southern bay, Golos and its harbour along the northern coastline replaced Demetrias, becoming the new leading port-city while Demetrias disappeared from the sources.[494]

THE SHIPYARD "TARSANAS" (ILL II.II.23, VOL II)

The shipyard of Demetrias is located in the southern bay of the gulf of Volos. It was constructed at the area of "Pefkakia", which occupies the eastern side of the northern coastline of the promontory (ILL II.II.24, VOL II). Today it is the most favourable and

along the southern bay of the gulf of Volos: Caminiates, De expugnatione Thessalonicae, 14.6 (506-507); Kekaumenos, Strategikon, II.31, 33; Karagiorgou, Demetrias and Thebes, 210-211; Karagiorgou, Urbanism and Economy, 72; for the conquest of Demetrias in AD 896 see: Papathanasiou, Demetriada, 105ff.; Papathanasiou, Saracen pirates, 85ff.

[491] According to the economic agreements between Byzantium and Venice, providing trading advantages to the Italian city-state, Demetrias was mentioned as one of the cities possessing western merchant-colonies: G. L. F. Tafel – G. M. Thomas (ed.), Urkunden zur älteren Handels- und Staatengeschichte der Republik Venedig mit besonderer Beziehung auf Byzanz und die Levante, I-III, (*Fontes Rerum Austriacarum* 12-14). Vienna 1856-67, I, 53, 118, 184, 266, 487, 493 (Nr. 23, 51, 70, 85, 121); III, 195, 200, 205, 278 (Nr. 370); Koder-Hild, Hellas und Thessalia, 145.

[492] Géographie d´Edrisi traduite et accompagnée de notes, II, A. Jaubert (ed.) (*Recueil de Voyages et Mémoires* 6). Paris 1836-1840, 296; Papathanasiou, Demetriada, 149, 155.

[493] Unfortunately since Iolkos (later Golos) is located beneath the present city of Volos and its modern harbour no remains of harbour structures can be verified along the northern coastline. For Golos see: Avramea, Thessalia, 108; G. N. Chatzidakes, Γόλος – Βόλος. *EEBS* 8 (1931), 231ff.; Giannopoulos, Volos, 110-133; Koder-Hild, Hellas und Thessalia, 144, 165-166; Stählin et alii, Pagasai und Demetrias, 234, 239f.

[494] Arvanitopoulos, Demetriados – Pagason, 14; Stählin et alii, Pagasai und Demetrias, 7f.

sheltered zone of the Pagasetic gulf for shipbuilding facilities,[495] a feature that can be dated back as early as the foundation of the classical port-city of Pagasai. The shipyard, known as "Tarsanas", was used for the construction of ships until the beginning of the 20th century and is still functioning as a dockyard for small sailing and fishing boats. Although the largest area at Pefkakia is today covered by modern structures, both Apostolides and Arvanitopoulos were able to recognize archaeological remains of the ancient shipyard and consequently to localise the Tarsanas.[496] Apostolides does not provide any report concerning the preserved remains. Nevertheless, he suggests the existence not just of slipways and a shipyard but also of possible shipsheds.[497] In contrast, interpreting the same archaeological remains, Arvanitopoulos provides not just photographic material but also more detailed information, reporting that walls of limestone formed arms leading from the coast into the water.[498] Correctly allocating the partly visible wall remains to the shipyard, Arvanitopoulos comes to the conclusion that the walls enclosed the shipyard by meeting together and forming a narrow mouth at the end (ILL II.II.25, VOL II).[499] He does not, however, collect precise data and only in the 1980's did Marzolff finally record one of the supposed walls with a total preserved length of 17 m and a width of around 3 m (ILL II.II.26, VOL II).[500]

[495] The area just west of Pefkakia even today possesses deep and sheltered water; Arvanitopoulos, Demetriados – Pagason, 71, 109; ibid, 94.

[496] Apostolides, Pagasai, 12; Arvanitopoulos, Demetriados – Pagason, Fig. 4, 7, 91-93, 95.

[497] Although Apostolides did not specifically deal with archaeological remains of the shipyard, he recognized the role and importance of the "Tarsanas" Apostolides, Pagasai, 12-17.

[498] Most of the described wall remains, however, are situated underwater and therefore hardly visible or recognizable due to dense *Posidonia* and other plants already at the time of Apostolides, Arvanitopoulos and Stählin; Arvanitopoulos, Demetriados – Pagason, 107; Stählin et alii, Pagasai und Demetrias, 94.

[499] Arvanitopoulos, Demetriados – Pagason, 107.

[500] Marzolff, Demetrias III, Maps (Demetrias, Forschungsstand 1976).

During the 2012 field season I investigated the area again and was able to identify these wall remains, which probably belong to the eastern wall still leading around 5 m into the sea (ILL II.II.26, VOL II). Furthermore, based on the account and photographic material of Arvanitopoulos together with recent aerial and satellite pictures, which allow the analysis of the area's present geography, the present author suggests that both walls formed a quarter circle. While the 3 m wide eastern wall possibly extended originally around 25 m towards northwest and then turned towards southwest for another 10m or so, the western wall with a presumed width of 1.5-2 m possibly extended only around 25 m towards north and northeast into the sea. As a result, besides the missing evidence for other shipyard facilities, the archaeological traces of the surrounding walls together with the photographic material at least allow to reconstruct the extent of the Tarsanas with a calculated total area of 1.7 ha including an approximately 0.7 ha basin. Finally, if the area of the Tarsanas indeed possessed facilities such as shipsheds, it should be interpreted as military harbour installation or smaller naval infrastructure.[501]

THE SOUTHERN HARBOUR "ALYKES" (ILL II.II.29, VOL II)

The southern harbour of Demetrias is situated south of the promontory, just outside the gulf of Volos. The area of the harbour, nowadays known as "Alykes", is located beneath the area of "Kalyvia" and faces east towards the Pagasetic gulf (ILL II.II.27-29, VOL II), leading from the bay south of the lighthouse to the river Aligarorema. Both, Arvanitopoulos and Apostolides refer to the existence of two harbours along the eastern coast of Demetrias, however, neither provides any information concerning the location and characteristics of the supposed southern one of the two harbours.[502] According to

[501] For military harbour installations and its facilities see chapter 1.3.2. "Military harbour installations".

[502] Only Marzolff provides a schematic location of the southern harbour located just south of the estuary of the river Aligarorema: Marzolff, Demetrias III, Maps (Demetrias, Forschungsstand 1976).

Arvanitopoulos the northern harbour at Alykes was still recognizable at the beginning of the 20th century, despite its use as salt pan (from which its modern toponym "Alykes" derives from) during the medieval period until its destruction in 1881.[503] In contrast, Stählin recognizes only one harbour at Alykes, which forms a protected bay with a maximum length of around 700 m and a maximum width of around 300 m, giving a harbour area of around 17 ha (ILL II.II.28, VOL II).[504] Apart from confining the extent of the harbour area and the geographical characteristics of its basin (ILL II.II.30-32, VOL II), no author has provided any detailed archaeological or architectural information about the harbour and its structures and facilities.[505]

Although huge amounts of sand were dug out of the area of the southern harbour, for the construction of the modern harbour of Volos in 1881, Arvanitopoulos believed that he detected the possible archaeological remains of the harbour. Two high sandbanks resting on a natural geological platform or rock bank about 1 m beneath the present water level enclose the basin, which was connected to the Pagasetic gulf just by a narrow artificial channel (ILL II.II.35, VOL II). In between the high sandbanks the artificially constructed connection channel was framed by retaining walls. The walls have a length of 7 m and run together to an outer width of 4.5 m and an inner width of around 1.8 m (ILL II.II.34, VOL II).[506] According to Stählin, however, no relevant archaeological data concerning the southern harbour is preserved due to the formation of a modern inlet for the salt pans and the aforementioned change of the landscape in the late 19th century. As such, while

[503] Apostolides, Pagasai, 12; Arvanitopoulos, Demetriados – Pagason, 88.

[504] Stählin et alii, Pagasai und Demetrias, 95.

[505] Although similar to the northern coastline of the gulf of Volos nowadays unfortunately the whole area is entirely built up and the beach line is used as public bath, luckily the building activities follow exactly the lines of the harbour area.

[506] Stählin et alii, Pagasai und Demetrias, 170, fn. 4.

Arvanitopoulos suggests that Demetrius I Poliorcetes constructed a suitable artificial channel for the entrance and exit to the basin in the 3rd century BC,[507] Stählin argues that no ancient remains can be identified and associated with any ancient harbour architecture. Following archaeological investigations in 1976, Marzolff agreed with Arvanitopoulos' hypothesis (ILL II.II.38, VOL II).[508] Based on Mazolff's results and recent satellite photographs the site was investigated during the 2012 field season. As a result of the documentation of the still clearly visible geological platform or rock bank (ILL II.II.37, VOL II), Arvanitopoulos' interpretation can be supported. Consequently, it is not only convincing that the formation of the sand bank belongs to the original coastline and therefore forms the border line of the ancient harbour basin, but also that it still indicates its entrance. It is felt, however, that more realistic dimensions are of 13 m for the length and 6-7 m for the width of the harbor entrance.

The harbour at Alykes used to be the main harbour area of Pagasai.[509] According to Strabo the harbour continued to function as important imperial station for Demetrias and was used by many Macedonian kings between 294 BC and 168 BC. At the time he was writing (between the end of the 1st century BC and the beginning of the 1st century AD), however, it was exclusively used as naval station.[510] In the 1st century BC Livy (Titus Livius) informs us about the existence and use of an enclosed harbour (a so-called "ostium portus") at Demetrias. Well protected by the city walls and especially by its towers 25 and 43 surrounding and controlling the area of Alykes, Arvanitopoulos consequently interprets Livy's account to be equitable with the southern harbour of Demetrias.[511] But

[507] Arvanitopoulos, Demetriados – Pagason, 78, 88; ibid, 95, 170, fn. 4.

[508] Marzolff, Demetrias III, Maps.

[509] Arvanitopoulos, Demetriados – Pagason, 88.

[510] Strabo, Geographica, 374; ibid, 81, 87-88; Stählin et alii, Pagasai und Demetrias, 95.

[511] Titus Livius, Ab Urbe Condita, Lib. 35. 39. 4; Arvanitopoulos, Demetriados – Pagason, 88, fn. 4.

Stählin correctly questions this interpretation. Although the development of the enclosed harbour or *limen kleistos*/*ostium portus* became a typical and dominant model of harbour architecture at the time when the harbour at Alykes reached its peak as the main harbour of Pagasai and *epineion* for the Thessalian inland,[512] it did not possess the characteristic features for a definition of an enclosed harbour. If this were so then the harbour basin would have been surrounded by the defensive circle, with an extension of the city walls along breakwaters or other enclosing arms of the harbour.[513] Since the area of Alykes was only partially surrounded by the city walls and its towers, the harbour itself was not enclosed and, therefore, was still situated outside the city's fortification. Therefore, according to Stählin the southern harbour of Demetrias did not fulfil the requirement for a *limen kleistos*. In fact, this would rather apply to the enclosed area of the Tarsanas. Accordingly, Stählin assumes that the described "ostium portus" of Demetrias should be situated at the gulf of Volos, probably occupying a distinct sector of the northern commercial harbour and dividing it into two parts: a military and a commercial harbour. Based on Stählin's observation I suggest that the "ostium portus" should be associated with the Tarsanas, which would in turn support its interpretation as military harbour area (see the shipyard "Tarsanas").

Stählin further convincingly argues that the southern harbour of Demetrias shows similarities with the inner harbour of Lechaeum at Corinth, which was also not enclosed.[514] Due to the geographical characteristics of Alykes (ILL II.II.33, VOL II), which is similar to Lechaeum, it is believed that Alykes might have been constructed with

[512] Gerkan, Griechische Städteanlagen, 114.

[513] Stählin et alii, Pagasai und Demetrias, 95.

[514] Arvanitopoulos, Demetriados – Pagason, 88; for the harbour of Lechaeum and its architecture see: Georgiades, Ports; Johannea, Léchaion; Shaw, Lechaeum; Stiros et alii, Lechaion; Theodoulou, Λέχαιο; www.limenoscope.ntua.gr.

a channel system. This theory cannot be supported by contemporary archaeological evidence from the harbour due to the area's destruction in the late 19th century. Early photographs, however, allow such an assumption (ILL II.II.30, 33-35, VOL II), as it is possible to identify small semi-circular basins possibly connected to each other and the harbour entrance by small channels with retaining walls.

Declining urban development from the 2nd century BC and particularly from the Roman Imperial period onwards, together with the continuous siltation of the basin, leads scholars like Stählin to believe that the southern harbour could no longer have been in use in later centuries. Marzolff, however, recorded a massive wall section in 1976, leading from the present beach line to the geological platform (ILL II.II.38, VOL II). Since Marzolff does not provide any further information, the wall was re-investigated during the 2012 field season. Although, theoretically the wall is massive enough to be interpreted as a possible section of a harbour fortification (as discussed regarding the location of Demetrias' enclosed harbour), both its location at the centre of the bay and its architectural characteristics dismiss such an interpretation. In fact, it can be interpreted as a single central jetty protruding around 30 m from the shallow waters of the harbour basin into the open coastline of the bay. Indeed, the wall shows surprisingly high similarities with the quay and mole structures of the Byzantine harbours of Anthedon (ILL II.II.39, VOL II) and Larymna at the Euboean gulf, as well as the outer harbour infrastructures at Byzantine Thessalian Thebes (see chapter 2.3.2. "The Port of Thessalian Thebes").[515] The wall consists of two 1 m wide stone walls running parallel 1.4 m apart from each other.

[515] For the harbour structures of Anthedon see: J. C. Rolfe, Discoveries at Anthedon in 1889. *AJA* 6/1-2 (1890) 96-107; H. Schläger - D. J. Blackman – J. Schläger, Der Hafen von Anthedon mit Beiträgen zur Topographie und Geschichte der Stadt. *AA* 1 (1968) 52-64. (Sonderdruck); Schäfer, Larymna, Abb. 7-8, 10, 13-14, 17; www.limenoscope.ntua.gr.

Similarly to Anthedon, where the quay and the moles are built with a system of 3.40 m wide longitudinal- and lateral walls of limestone ashlar blocks, forming chambers filled with a conglomerate of rubble stones, mortar and coarse ceramic, the space in between the two walls at Alykes is filled with rubble stones and mortar as well. Although I could not recognize any evidence for lateral walls connecting, from an architectural point of view it can be assumed that the wall would have had small interior chambers, which would have been necessary for strengthening the structure. As such, both Alykes and Thessalian Thebes seem to show at least an identical basic architecture for its installations.

Consequently, in contrast to Stählin I believe that the area of Alykes not only continued to function as the southern harbour of Hellenistic and Roman Demetrias, but that it also suggests a continuation of harbour activities for some time into the Byzantine period, although with fundamental alterations and probably slightly smaller dimensions. The question is, at what time were the alterations made? It has been suggested that, like the harbour of Skiathos, the harbours of Anthedon and Larymna could have been constructed as part of Justinian's building programme in the 6th century AD. In contrast to Skiathos, however, the changes at Alykes do not reflect a transitional period from Roman building traditions to a different method for its harbour architecture. Despite a likewise fast and inexpensive construction technique like that applied at Skiathos, Anthedon, Larymna, Thebes and Demetrias' southern harbour, a well-established and highly sophisticated form of architecture was used. Consequently, this suggests that it is datable to the Middle Byzantine period. The alteration and construction of Demetrias' southern harbour and Anthedon or Larymna, respectively, may therefore rather be related to the consequences of the Arab conquest of Egypt and the reconfirmation of Byzantine authority over the Greek peninsula in the 7th century AD, causing the growing importance of central Greece

and in particular that of Thessaly as a major producer and supplier of agricultural products.[516]

Finally, the role of the southern harbour as a so-called "Scala" did not last long. The shift of commercial activities within the gulf of Volos from the southern to the northern coastline affected the role of Demetrias' southern harbour. At the latest by the 11th century AD Alykes lost its importance as a harbour area due to the creation of new *scalae* and the construction of new harbour infrastructures by western merchant-colonies along the northern coastline of the gulf of Volos. Additionally, the declining urban activities from the end of the 9th century AD onwards resulted in the slow but constant siltation of the harbour area. This was probably transformed into salt pans by the Late Byzantine period. However, despite the toponym "Alykes", which indicates the existence of a salt industry in that area, neither material remains nor literary sources provide any further information concerning the development of the southern harbour in the Late Byzantine period. Therefore, it can be assumed that like today, by that time the area was used as staple market for private or ecclesiastical commercial activities (ILL II.II.40, VOL II).

In conclusion, Demetrias continued to function as an essential cultural and economic hub, as well as a social meeting point throughout the Byzantine period. As one of Byzantium's most important port cities and the main gateway for communication, not just for the Pagasetic gulf but of the entire Aegean Sea, it connected the industrial and agricultural

[516] Karagiorgou, Urbanism and Economy, 31, 168ff; in that respect, Anthedon and Larymna have to be re-investigated and will be subject of investigation by the author in the future. Situated opposite of the Euboean port-city of Chalkis, which constituted the major commercial hub and naval base in central Greece during the Byzantine period, the role of the two harbours would not have made much sense for the protection of the trading routes and shipping lanes in the Euboean gulf during the troublesome time period of the 6th century AD. Their increasing role rather started with the importance of Phthiotis' rich hinterland for the export of agricultural and industrial products from the 7th century AD onwards.

hinterland of central Greece with Constantinople, the Black Sea and the west. Although Demetrias possessed and used several distinct harbour areas, it is likely that these constituted different *scalae*, each being involved in specific commercial activities, like the case for the harbours of Constantinople or Thessaloniki.[517]

[517] For information on the harbours of Constantinople and Thessaloniki see "Conclusions".

2.3.2. The Port of Thessalian Thebes (ILL II.II.41, VOL II)[518]

The Byzantine port city of Thessalian Thebes was founded probably around the 1st century AD as a result of the area's re-occupation during the Roman Imperial period. It is situated beneath what is nowadays the modern municipality of Nea Anchialos. Located approximately 17 km southwest of Demetrias, the site was not chosen randomly for the foundation of a new port-city in the northern part of the Pagasetic gulf. In fact, Thessalian Thebes succeeded the port-city of Pyrassos, which occupied the site functioning as *epineion* of the Hellenistic inland city of so-called Phthiotic Thebes.[519] Both, Phthiotic Thebes and Pyrassos were destroyed by the Macedonian king Philip V in 217 BC, who favoured the city of Demetrias and freed it from any competitors in its vicinity.[520] Only with the period of the *Pax Romana*, which started a time of economic and social prosperity and consequently growing urban as well as commercial activities, did the port-city of Pyrassos recover and gain in importance as the gateway to the Thessalian hinterland.

Due to heightened coastal activities during Late Antiquity, Pyrassos underwent a phase of resettlement from around the 1st to the 4th century AD replacing Phthiotic Thebes as the new urban centre. According to Stählin a new settlement was founded as Roman Demetrion.[521] Later, however, free of any pagan tradition and under the influence of

[518] *AD* 25B (1970) 287; 47B1 (1992) 225; *AE* (1915) 76, fig. 2-6, 79ff.; (1916) 61; (1929) 1-158; *PAE* (1928) 53; (1962) 38, pl. 17b; (1963) 50, pl. 36b; (1965) 17, fig. 4; (1966) 18; (1971) 30, pl. 37a; (1973) 33; (1980) 38; (1982) 102, pl. 71a; (1987) 112ff., pl. 87; *BCH* 44 (1920) 396.

[519] G. A. Soteriou, Αι χριστιανικαί Θήβαι της Θεσσαλίας και αι παλαιοχριστιανικαί βασιλικαί της Ελλάδος. *AE* (1929) 2.

[520] P. I. Lazarides, Φθιώτιδες Θῆβαι. Ιστορία, ανασκαφές, μνημεῖα. *AE* 126 (1987) 312-315; it has to be mentioned that researchers often get confused by the toponym of Thebes and therefore relate Hellenistic Phthiotic Thebes with the later Byzantine port-city of Thessalian Thebes.

[521] Stählin, Thessalien, 113.

Christianity, Thebes or Roman Demetrion gained in importance as cultural hub and ecclesiastical centre, which finally resulted in the development of Byzantine Thessalian Thebes.[522] Accordingly, being connected to the same agricultural and industrial wealthy hinterland as Demetrias, it reached a similar level of maritime activities, which in turn had a major impact on the architecture and infrastructure of its port. The city's era of prosperity did not last long. After a time of considerable wealth and growth throughout the 4th and the 5th century AD, the episcopal port-city suffered from the troublesome events of the 6th and early 7th century AD. Earthquakes, plagues and fire, as well as the Gothic, Hunnic and Avaro-Slavic invasions and raids, caused not just an economic regression but also an urban decline and cultural stagnation, resulting in the complete loss of its former splendour.[523] Despite Thebes' gradual recovery after the second half of the 7th century AD, the city entered a time of transformation during the Middle Byzantine period, facing fundamental urban changes particularly due to the permanent Slavic settlement.[524]

Although the entire site is located beneath modern Nea Anchialos, excavations have been able to unearth large parts of the ancient city revealing both Late Roman and Byzantine Thebes. Apart from numerous public buildings for welfare and education, secular and domestic buildings, ecclesiastical buildings, as well as amenities and other urban

[522] Avramea, Thessalia, 150-156; Karagiorgou, Demetrias and Thebes, 184-185; Karagiorgou, Urbanism and Economy, 53-54; Koder-Hild, Hellas und Thessalia, 271-272; Soteriou, Thebai, 4; for Thessalian Thebes see further: Koulouras, Pagasitikou, 281-292; for the etymological complexity of the ancient city name see: Soteriou, Thebai, 5.

[523] Karagiorgou, Urbanism and Economy, 22-28.

[524] Avramea, Thessalia, 155.

infrastructures,[525] a number of buildings relating to the city's port infrastructure were also uncovered (ILL II.II.42, VOL II).[526] This included two categories of buildings: structures belonging to the so-called *Emporion*, surrounding or connected to the harbour area, and the harbour structures and facilities themselves. Thebes' emporion consisted of commercial orientated facilities and monumental buildings directly associated with the harbour, such as the large complex of the forum area and the later marketplace with storerooms and pottery workshops. The most commercially active area of the emporion, however, was the city's pulsing main street leading from southwest to northeast, which also passed by the harbour. The colonnaded street was flanked by shops and other multi-storeyed houses.[527] The excavations indicate building phases dating to the latest shortly after the 6th century AD.[528]

Concerning the harbour installations and facilities, a number of structures are well preserved despite the fact that the harbour is still in use. Surprisingly, the harbour of Thebes has never been the subject of research and therefore its various features still lack detailed studies. Apart from a short report on the harbour's physical layout by Soteriou in 1929, the archaeological information is limited to a brief mention of the existence of breakwaters (ILL II.II.43, VOL II) and the discovery of a boundary stone (ILL II.II.44, VOL II) in the course of dredging works in the harbour basin.[529] In contrast to Demetrias,

[525] For detailed information on these structures see: A. S. Arvanitopoulos, Ανασκαφαί εν Θεσσαλίαι. *PAE* (1907) 161-163; Karagiorgou, Demetrias and Thebes, 185-197; Karagiorgou, Urbanism and Economy, 53-63; Soteriou, Thebai, 11ff.

[526] For the definition of "Port" see chapter 1.2.1. "Port".

[527] For further information on the Marketplace and the street see: Karagiorgou, Demetrias and Thebes, 192-193; Karagiorgou, Urbanism and Economy, 60-61.

[528] Aspasia Ntina, Νεώτερες έρευνες στην Παλαιοχριστιανική Πόλη των Φθιωτίδων Θηβών, in: La Thessalie. Quinze annees de recherches archeologiques 1975-1990. Bilans et Perspectives II, R. Misdrahi-Kapon (ed.). Athens 1994, 363, 365.

[529] Karagiorgou, Urbanism and Economy, 54; Soteriou, Thebai, 12.

Thebes possessed only one central harbour, around which the city spread. Orientated towards the southeast, the harbour used the areas' geographical conditions, providing a sheltered basin with a calculated area of 1.74 ha (ILL II.II.45, VOL II). With a width of between 100 m and 136 m and a length of between 108 m and 132 m the size of the harbour can be perfectly compared with that of Anthedon, which possesses almost the same dimensions (ILL II.II.46, VOL II).[530] Furthermore, the structures from Thebes also use an identical architecture and form of harbour infrastructure.[531] Similar to Anthedon, according to Soteriou, the harbour of Thebes was enclosed by two breakwaters protruding from the quay line – one protecting the harbour area from the southeast and one supposedly from the southwest. Unfortunately, however, Soteriou omits to report further details.[532] While both breakwaters were still recognizable at the beginning of the 20th century, today only the south-eastern one remains. It forms a bow-shape leading from the northern coastline approximately 163 m towards southwest.

Recent aerial photographs and satellite pictures allow a rough determination of its original width of approximately 20 m.[533] Unfortunately, the aerial photographs do not provide any information concerning the exact location and dimension of the south-western breakwater, since it is built over by modern structures. However, based on the orientation of the modern harbour line, and using the 92 m long eastern breakwater of Anthedon as a model, the present author assumes that the lost south-western breakwater was slightly displaced by about 25 m from the present south-western harbour line, leading parallel

[530] The length and width of around 110 m to 140 m (Theodoulou refers to average measures of 120 m to 130 m) calculate for Anthedon a harbour area of 1.78 ha; www.limenoscope.ntua.gr.

[531] For the technical details and data of the various harbor components of Anthedon see: Schläger-Blackman et alii, Anthedon; www.limenoscope.ntua.gr.

[532] Soteriou, Thebai, 12.

[533] Both, the length of 163 m and the width of 20 m correspond with the northern breakwater at Anthedon, which measures a total length of 164.5 m and an average width of 21 m.

towards the end of the south-eastern breakwater (for the calculation see below). With that location an approximate length of 87 m can be calculated for the south-western breakwater and a maximum of 23 m for the harbour entrance (ILL II.II.45, VOL II). Excavations revealed that, similar to Anthedon, at least the south-eastern breakwater supported sea walls, forming an extension of the circuit walls. This resulted in the harbour being part of the city's fortification.[534] Although the original phase of the sea walls is unknown, according to the excavators and written accounts such as Zosimus and Procopius of Caesarea, the city must have been fully fortified at the latest by the 3rd century AD and repaired under the reign of Justinian.[535]

Concerning the space alignment of the harbour basin itself, similar to Anthedon the harbour of Thebes possessed two quay lines, stretching approximately 107 m along the north-western and 120 m along the north-eastern coastline. In the 1920's Soteriou was able to identify, apart from the sea walls and the breakwaters, a wall section belonging to the north-eastern quay line as well as further structures supposedly belonging to harbour facilities along the north-eastern coastline of the harbour basin.[536] However, by simply reporting that the wall section consisted of a row of large well-worked stone blocks, Soteriou omits more precise information. Hence, the site was visited during the 2012 and 2013 field seasons. To my surprise, both the wall section and the various other structures mentioned by Soteriou are still well preserved, which allowed a closer investigation. Concerning the wall section, based on its location along the north-eastern shoreline of the harbour basin, its northwest-southeast orientation, as well as its architectural

[534] Karagiorgou, Demetrias and Thebes, 185-187; Karagiorgou, Urbanism and Economy, 53-54; Ntina, Thebes 357; Soteriou, Thebai, 12

[535] Zosimus, Historia Nova, I. 43; Procopius Caesariensis, De aedificiis, IV. 3. 5; Avramea, Thessalia, 151; Ntina, Thebes 357.

[536] Soteriou, Thebai, 11-12.

characteristics (discussed below) the present author was able to identify a part of the harbour's north-eastern quay line. The visible section consists of a single row of ashlar blocks measuring a total length of around 9 m and a width of 0.35-0.40 m (ILL II.II.47, VOL II). Some of the blocks show small notches of mostly rectangular shape (ILL II.II.48a, VOL II), which is believed to provide a recast for a mortar or metal bonding in order to achieve a high stability and long lasting resistance. This is further shown on the re-used ashlar blocks of the later outer quay structure (ILL II.II.48b, VOL II). The stone wall seems to form a frontal harbour façade followed by a compact conglomerate of rubble stones and mortar. Although the facade is visible only to a certain extent and hardly recognizable due to modern superstructures (ILL II.II.47, VOL II), neither the wall section nor the conglomerate indicate the existence of chambers. As such, it can be assumed that the harbour architecture most probably did not use a chamber system such as applied at Anthedon or Demetrias' southern harbour. The architecture finds parallels in the Roman Imperial and Byzantine harbour of Ephesos.[537]

The main harbour area at Ephesos was equipped with levees and embankments on both sides functioning additionally as so-called river-quays (ILL II.II.49, VOL II).[538] Similar to Thebes' quay line, these levees and embankments are constructed with a single frontal wall of marble blocks followed by a conglomerate of rubble stones and mortar as well. Despite the high architectural similarities with Ephesos, the ashlar blocks themselves are quite reminiscent of the construction material used for the jetty construction at Lazareta

[537] For the harbours of Ephesos see: Y. Dalanay, Late antique and medieval harbours of Ephesos (forthcoming).

[538] Apart from regulating the water level in order to protect further harbour facilities close by as well as avoiding the siltation of the channel, the levees together with the embankments presumably functioned additionally as quay lines for the mooring of ships waiting to enter the busy harbour basin.

at Skiathos (see CAT 28 & PL XXXI, VOL II).[539] Since the harbour area is covered by modern structures, the original width of the quay cannot be determined anymore. Soteriou reports a distance of 10 m from the seawalls to the shoreline of the harbour basin.[540] Based on Anthedon, where the space of the northern mole likewise reaches the seawalls, the distance can be equated with the original space of the quay area. But while the northern mole at Anthedon measures a width of 21 m, the quay area of the harbour of Ephesos possesses a width of exactly 10 m, suggesting that the 10 m recorded by Soteriou could be sufficient for Thebes.[541] In order to benefit from all sides of the harbour basin, it can be assumed that beyond the quays along the north-eastern and north-western coastline, the breakwaters provided additional harbour space as well. The construction of moles along the breakwater's inner sides created additional mooring space for harbour activities. In contrast to Anthedon and the use and alignment of Thebes' modern harbour infrastructure, however, the present author believes that the mole along the south-eastern breakwater did not extend over the entire length of the breakwater (if it existed at all) but just over a length of maximum 70 m. This is supported by the siltation of the area towards the end of the breakwater mentioned by Soteriou.[542] Accordingly, the geographical conditions suggest further mooring space along the original south-western breakwater, which caused the development of the modern south-western quay (ILL II.II.50, VOL II). As a result, the harbour of Thebes had a mooring capacity hypothetically extending over

[539] For further details concerning the jetty at Lazareta see chapter 2.2.3.1. "The broader harbor area".

[540] Soteriou, Thebai, 12.

[541] Y. Dalanay, Late antique and medieval harbours of Ephesos (forthcoming); H. Zabehlicky, Die Grabungen im Hafen von Ephesos 1987-1989, in: 100 Jahre österreichische Forschungen in Ephesos. Akten des Symposions Wien 1995, H. Friesinger – F. Krinzinger (eds.). Vienna 1999, 481.

[542] Even current aerial photographs and satellite pictures indicate a gradual siltation due to the lack of harbour activities in that area.

a total distance of around 370 m compared to approximately 380 m mooring capacity at Anthedon.

In connection with the mooring capacity, dredging works in the harbour basin revealed a boundary stone originally belonging to harbour's mooring facilities (ILL II.II.44, VOL II). Based on the characteristics of the letters the boundary stone has been dated to the 5th-6th century AD. Unfortunately, the original location of the find is unknown. As such, it remains unclear to which side of the harbour the boundary stone belonged, and whether it was situated along one of the quays or one of the moles. It forms a unique discovery for the study of harbour infrastructures and provides new insight and understanding of Byzantine harbour administration. Based on the brief description by Soteriou the boundary stone has the shape of a small column or pillar and measures a height of 0.74 m and a diameter of 0.14 m.[543] At its upper end the following letters can still be read:

Δ΄
ΚΑΤΑ

According to Soteriou, in the 1920's a further line depicting the letter "ΠΛΟΥΣ" was recognizable, consequently reading the epigraphy as:

Δ΄
ΚΑΤΑ
ΠΛΟΥΣ

Understanding the letters *Δ΄* as the Greek numeral 4 and *ΚΑΤΑΠΛΟΥΣ*[544] as "putting ashore" or "sailing to land", the epigraphy can be interpreted and translated as the "4th mooring space". Therefore, similar to its modern equivalent (ILL II.II.51, VOL II), the

[543] Soteriou, Thebai, 12, fig. 9.

[544] Liddell-Scott, A Greek-English Lexicon, 906.

boundary stone marked a specific mooring area for incoming ships. Despite the discovery of just one boundary stone, based on Thebes' flourishing trading activities and the intensive life pulsing through that part of the port-city, it can be assumed that there must have existed numerous such features. The single boundary stone demonstrates the precise arrangement of the harbour basin for the facilitation of trade and its administration, not just within the harbour area itself but also in the area of the emporion adjacent to the harbour. In this respect, concerning the positioning of incoming boats, it can be assumed that in contrast to the harbour's modern arrangement the first mooring zone must have been the quay areas close to the various harbour facilities and the emporion and only secondarily their mole extensions.[545] Accordingly, marking the 4th mooring space, Soteriou suggests that the boundary stone must have belonged to the north-western quay.[546]

Apart from the remaining quay section, a further preserved structure can be identified, projecting from the quay westwards (ILL II.II.47, VOL II).[547] The structure extends approximately 3 m into the harbour basin before it turns parallel to the quay line, leading beneath the modern superstructure again. Similar to the quay structure, it consists of a

[545] For an efficient harbour administration, the process of loading and unloading of cargo, the transport of goods to the marketplace or the storage of products in warehouses, as well as the supervision and control by the harbour master and the payment of taxes to the responsible customs officer had to be quickly executed: Aidoni et alii, Journeys, 27-30; for the organisation of the supply of goods in Byzantium see: K.-P. Matschke, Rechtliche und administrative Organisation der Warenversorgung im byzantinischen Raum: Die Strukturen des 13. Bis 15. Jahrhunderts, in: Handelsgüter und Verkehrswege: Aspekte der Warenversorgung im östlichen Mittelmeerraum (4. bis 15. Jahrhundert). Akten des internationalen Symposions Wien, 19.-22. Oktober 2005, E. Kislinger – J. Koder – A. Külzer (eds.). Vienna 2010, 205-221.

[546] This remains, however, hypothetical assumption by the author.

[547] Unfortunately, neither Soteriou nor harbour work or archaeological excavation reports provide any indication concerning the visible remains. As such, since no information are available, the interpretation is based on the investigation by the present author during his field survey in 2012 and 2013.

single row of stone blocks forming a frontal harbour façade, followed by a compact conglomerate of rubble stones and mortar. Despite the fact that the structure follows the same architectural method used for the quay, it seems that it forms an independent feature. Interrupting the quay's line of ashlar blocks, it is built using smaller stone blocks, which indicates that both features were not constructed contemporaneously. Since the structure uses the alignment of the quay, the author believes that the structure constitutes a later addition, altering the original quay line.[548] Due to the modern superstructure, leaving only a small section of the original harbour installation open, the purpose and functionality of the structure remains unknown. As such, it is uncertain whether it has to be interpreted as an extension of the quay area in order to increase the harbour space along the coastline for facilities and other harbour activities, or as a jetty in order to increase the mooring space to cope with a heightened maritime traffic.[549] In contrast, based on Stählin's dating of the harbour, Soteriou argues that the harbour may also be identified as the ancient *Neorion* of Pyrassos and therefore the visible structures could be interpreted as military installations.[550] However, although the modern superstructure provides just enough information for hypothetical conclusions, the architectural characteristics of the various features, the archaeological results of the surrounding area of the emporion, as well as the economic history of the port-city, tend to suggest an identification as a commercial harbour. With the foundation of Roman and Byzantine Thessalian Thebes and the accompanying focus and aim on economic activities, the harbour basin had to provide

[548] Regarding the dating of the installations, contrary to the opinion of the present author, Stählin believes that the harbour basin and its remaining visible installations belonged to the ancient harbour of Pyrassos and not to the Roman and Byzantine phases: Stählin, Thessalien, 113;

[549] The present author, however, supports a hypothetical identification as jetty, possibly added during the Early Byzantine period (see below for further explanation).

[550] However, Soteriou does not exclude the possibility that the remains may even reveal the medieval (Byzantine) equivalent: Soteriou, Thebai, 10, 12, fig. 10.

commercially orientated installations and facilities and consequently needed to be reorganized.[551] As a result, two construction phases for the harbour basin of Thebes can be proposed: a first possibly between the 1st and the 3rd century AD as a reconstruction of the preceding ancient harbour, and a second possibly around the 4th to 5th century AD in the form of additions and repairs adapting to the new political, economic and urban circumstances. Finally, the 5th-6th century AD dated bollard stone supports an Early Byzantine date for the second harbour construction phase.

Soteriou reports harbour structures along the exterior side of the south-eastern breakwater, running parallel to the sea wall.[552] However, apart from referring to visible quay remains in the water, he does not provide any further information concerning details of the feature's architecture. Consequently, the area was investigated during the 2012 and 2013 field seasons, which documented all preserved coastal structures. Various preserved wall sections running along the outer side of the breakwater and the coastline north of it were identified, forming a huge rectangular feature. However, without excavations it remains unclear whether the wall sections all belong to the same feature or whether some of them form an extension towards the north. Together with the help of aerial and satellite photographs a total length of approximately 163 m can be determined for the wall sections (ILL II.II.52, VOL II). At its south-western end the feature projects into the sea showing a width of around 21 m. This suggests a platform-like installation, similar to the northern mole of the harbour of Anthedon, which was approximately 155 m long and 21 m wide (see above).[553] As such, the present author supports Soteriou's interpretation of a quay

[551] For information on the characteristics and components of commercial harbours see chapter 1.3.1. "Commercial harbour installations".

[552] Soteriou, Thebai, 12.

[553] Schläger-Blackman et alii, Anthedon, 45.

(including a possible extension for associated facilities towards its northern end), which is additionally confirmed by its architectural characteristics. The visible remains show that an identical construction method was also used for the harbour of Anthedon and the southern harbour of Demetrias, providing a system of longitudinal- and lateral walls. According to the understanding of the present author, the preserved sections of the longitudinal wall form the exterior face of the quay (ILL II.II.53, VOL II). Similar to Alykes at Demetrias, the wall consists of two parallel running stone walls, 1 m apart, filled with rubble stones and mortar in between (ILL II.II.54, VOL II). It is striking that for the construction of the walls themselves different methods were applied. While the wall facing the sea is built with huge ashlar blocks of different stone material, probably taken and reused from the harbour installations around the harbour basin, the wall facing the breakwater and the sea wall is built with irregular shaped stones mixed with a compact mortar binding.[554] After following the present northeast-southwest orientated beach line for about 70 m, the quay turns towards south-southwest extending another 25 m. At that part of the quay 1 m wide lateral walls are visible leading into the water (ILL II.II.55, VOL II). The longitudinal and lateral wall sections show an interleaving arrangement, which indicates the construction of chambers. Although the present author was not able to conduct further investigations of the remains situated underwater, it seems that, similar to Anthedon, the chambers were initially filled with a conglomerate of rubble stones and mortar (ILL II.II.56, VOL II).

At the northern end and connected to the quay construction, or to possible associated facilities extending from the quay northwards, another massive wall section was identified during the field season leading from the present coastline and perpendicular to

[554] According to the author, the mortar binding used for the wall might be hydraulic concrete. This, however, has still to be proved.

the quay into the water. Constructed in the same way as the quay, the jetty at Alykes and the harbour of Anthedon, it consists of two parallel running walls of limestone ashlar blocks filled with a conglomerate of rubble stones and mortar (ILL II.II.57, VOL II). The feature possesses a length of at least 37 m but only a width of 1.70 m. Despite the slightly different dimensions compared to Alykes, the wall section can be interpreted as a jetty, possibly functioning as an addition to the quay in order to increase the mooring space and to protect the area from eastern and south-eastern winds.[555] The area does not benefit from any favourable geographical conditions like the jetty at Alykes, which is sitting on a geological platform. Aerial photographs and satellite pictures, however, reveal an outline for the jetty with a width of around 10 m (ILL II.II.58, VOL II). Although that outline may point to collapsed material of the jetty, the possible existence of a small substructure of the wall is also suggested.[556] Although the jetty is connected to a wall section probably belonging to the above-mentioned 163 m long quay line and to its extension for associated facilities, it cannot be ascertained whether the two installations formed a functionally and operationally consistent harbour complex.

Concerning the dating of the harbour installations along Thebes' coastline, both the jetty and the quay construction reflect the same architectural tradition and, therefore, belong to a single, or at least chronologically close, construction phase. Since the harbour installations adopt the same construction technique that is also used for the alterations of Demetrias' southern harbour and the harbours of Anthedon and Larymna, this would suggest that Thebes' outer harbour shows a building activity after the 7th century AD.

[555] If that is the case, the outer coastal harbour would have reached $^{2}/_{3}$ of the size and capacity of the harbour basin, possessing a length of around 170 m and an estimated mooring space of approximately 225m.

[556] Since the present author was not able to investigate the wall section and any further related structure situated underwater, the suggestion remains hypothetical and needs to be investigated properly.

Despite the different fate of Thebes' urban history, similar to Demetrias, the quay and the jetty again reflect the political, economic and social developments of the Middle Byzantine period. Fundamental urban changes during the 6th and 7th century AD caused a decline of commercial activities, which seems to have resulted in the gradual siltation of the harbour basin. With the economic recovery of Thessaly after the second half of the 7th century AD, came the requirement for a new and easily approachable harbour. However, due to the lack of imperial control, the permanent Slavic settlement in Thebes' agricultural hinterland and the rise of private business as the prevailing economic system during the Middle Byzantine period, it can be assumed that by this time Thebes mainly functioned as staple market for private or ecclesiastical commercial activities. At Thebes, as at other locations, the church probably plays not only a social but also an important economic role, influencing and controlling the commercial landscape. This is further supported by the church or small basilica referred as "Church/Basilica J" partly excavated just 66 m north of the jetty.[557] Located next to the sea at the northeast bend of the city wall it indicates a close connection to the harbour installations (ILL II.II.52 and 59, VOL II). However, it is more likely that although the quay and the jetty probably formed a single architectural unit and a consistent harbour area, both fulfilled different functional purposes. While the quay area along the exterior of the south-eastern breakwater forms a direct connection to the earlier harbour area around the basin and the adjacent emporion for state controlled trade, the jetty located at the edge of the commercial area may well have served as a platform for independent private commercial activities.

[557] Karagiorgou, Urbanism and Economy, 59; Aspasia Ntina, Παλαιοχριστιανικοί οικισμοί Θεσσαλίας, in: Proceedings of the 1st International Congress on the History and Culture of Thessaly, II, 9th – 11th November 2006, Lila P. Gklegkle (ed.). Volos 2008, 422-423.

In conclusion, in contrast to the written sources and mainly archaeological evidence on land, which suggest that Thessalian Thebes completely disappeared by the end of the Early Byzantine period,[558] the study of its harbour installations provides a different picture. Even though alterations of the harbour area confirm the general point of view that by the Middle Byzantine period Thebes had lost its role as a port-city,[559] the harbour installations reveal that the city remained commercially active and even underwent a gradual economic recovery after the second half of the 7th century AD. This supported by the account of the *Vita et Miracula Sancti Demetrii*, which indicates trade relations between the Byzantines and the Velegezetes Slavs settled mainly around Thebes.[560] Serving more and more private business, however, Thebes finally slowly descended to a staple market before it disappeared from economic history by the end of the Middle Byzantine period. Probably influenced by western traders, new coastal centres such as Almyros and Pteleos in the central and southern Pagasetic gulf emerge and take over Thebes' commercial dominance from around the 9th century onwards.

[558] Avramea, Thessaly, 155-156; Karagiorgou, Demetrias and Thebes, 214.

[559] Koder-Hild, Hellas und Thessalia, 271; Reinders-Prummel, Halos, 20.

[560] Karagiorgou, Urbanism and Economy, 28-29: §254: "σταλῆναι εἰς τὰ τῶν Θηβῶν καὶ Δημητριάδος μέρη πρὸς τοὺς τοῦ ἔθνους τῶν Βελεγηζητῶν, ὀφείλοντας ἐξ' αὐτῶν ξηροὺς καρποὺς ἐξωνήσασθαι".

2.3.3. The Port of Almyros (ILL II.II.60, VOL II)[561]

Almyros has a rich and varied settlement history due to strong geographical alterations and economic as well as political circumstances. In a similar way to the gulf of Volos, the settlement activity changes frequently, extending over the entire *Krokion* plain north of Mount Othrys.[562] Etymologically Almyros goes back to the Classical city of Halos. Concerning that first major settlement, however, not much is known and researchers are struggling to determine its exact location. Stählin identified Classical Halos as a hill-site on the north-eastern spur of Mount Othrys, just 4 km southwest of the gulf of Almyros.[563] In contrast, Reinders locates the site of Classical Halos on the western coast of the gulf, occupying the 11 ha large so-called *Magoula Plataniotiki* (ILL II.II.60, VOL II).[564] It is possible that both theories are correct and Halos may have possessed the typical characteristics of a Classical port-city, with both an inland city and a coastal *epineion*. Situated north and south of the river Amphrysos, Halos used the sheltered innermost so-called *Sourpi* bay for its harbour activities. Since the Sourpi bay was perfectly suitable for beaching, it can be assumed that no major harbour infrastructures were necessary.[565] Classical Halos constituted one of the most frequented economic hubs in central Greece until its destruction by the Macedonian king Phillip II in 346 BC.

[561] *AE* (1915) 74ff; *BCH* 15 (1891) 565; 23 (1899) 396.

[562] See map at Giannopoulos: N. I. Giannopoulos, Οἱ δύο μεσαιωνικοί Αλμυροί και νῦν. *Epeteris* 8 (1904).

[563] Stählin, Thessalien, Fig. 22; some massive walls remains are still visible.

[564] Reinders-Prummel, Halos, 8, 19.

[565] Ibid., 19.

In around 302 BC Demetrius I Poliorcetes founded the New Hellenistic city of Halos.[566] Similar to the gulf of Volos, the area faced strong geographical alterations caused by numerous rivers flowing into the western coast of the Pagasetic gulf. Accordingly, the shoreline changed dramatically due to the rivers Sourpiotikos (Salamvrias), Amphrysos, Platanorrema (Matatzi) and Xerias, slowly silting up the gulf of Almyros and continuously shifting Sourpi bay towards the northeast (ILL II.II.61, VOL II).[567] This consequently led Demetrius to change location, moving Hellenistic Halos to the foot of the Classical city around 1.8 km inland of the by then marshy coastline. Thereafter, the city occupied a strategic location, directly controlling the narrow coastal passage connecting Thessaly and Achaia Phthiotis. Beyond that, similar to its predecessor, Hellenistic Halos also continued to function as a port-city with intensive maritime contacts.[568] But now its *epineion* moved slightly to the north, using the coastline between the rivers Platanorrema and Amphrysos, which was also suitable for beaching (ILL II.II.62, VOL II). The city, however, had a short lifespan, disappearing soon after its foundation. According to Reinders, a disastrous earthquake resulted in the abandonment of Halos and settlement activities in the southern part of the Krokion plain in 265 BC.[569] Although Early Byzantine textual sources indicate a gradual resettlement of the area of Halos (probably the coastal area of the *epineion*) in later centuries,[570] it stood in the shadow of the now flourishing and influential port-city of Thessalian Thebes.[571] As such,

[566] P. Marzolff, Antike Städtebau und Architektur in Thessalien, in: La Thessalie. Quinze annees de recherches archeologiques 1975-1990. Bilans et Perspectives II, R. Misdrahi-Kapon (ed.). Athens 1994, 255-276; Marzolff, Demetrias III.

[567] For the shift of the coastline see: Zangger, Environments, 1-15; Reinders-Prummel, Halos, 16-17, Fig. 1.9.

[568] Reinders-Prummel, Halos, 11, 20.

[569] Ibid.

[570] Referred as "ἁλμυρά ἐδάφη": Avramea, Thessaly, 67 fn. 2, 167; Giannopoulos, Almyroi, 65.

[571] Stephanos of Byzantium, Ethnika, 77; Reinders-Prummel, Halos, 20.

only with latter's decline in the Middle Byzantine period (see chapter 2.3.2. "The Port of Thessalian Thebes"), did the area gradually gain in commercial importance.

The Byzantine successor, Almyros, is known by name from the 9th century AD onwards and is first mentioned as a major trans-shipment centre in the 11th century AD.[572] As an important gateway, connecting the wealthy industrial and agricultural hinterland of the Krokion plain, reaching as far inland as Farsala, the city owes the beginning of its commercial importance to the establishment of western merchant-colonies along the densely settled coast of Almyros, exporting and trading mainly with grain and linen cloths.[573] In fact, Almyros was not a single nucleated settlement. Since the 12th century AD Byzantine Almyros is historically documented as so-called "Δύο Αλμυροί" (the *Two Almyroi*), dividing the densely settled coast into two main centres – a northern upper Almyros and a southern lower Almyros.[574] In contrast to its predecessors, and the modern city of Almyros, the archaeological remains of settlement traces indicate that both parts of the city are located at the coast.[575] While southern Almyros takes over the site of Halos

[572] Hierocles, Synekdemos, III. 519; Edrisi, Géographie, II, 291.

[573] 12th century AD travelogues and documents, issuing trade agreements between Byzantium and the western communities for trading advantages, report the presence of Venetians, Genoese, Pisans and even of a big Jewish community: Edrisi, Géographie, II, 115, 291; Tafel-Thomas, Urkunden, I, 125-126; Avramea, Thessaly, 168-169; W. Heyd, Histoire du commerce du Levant au Moyen age, I. Leipzig 1923, 245f; Magdalino, Thessaly, 88; it is, however, suggested that the first establishment of the western merchant colonies goes back to the first mention of Almyros in the 9th century AD. Its central role as one of the main commercial hubs exploiting the central Greek hinterland also during the Ottoman period confirms the economic development of Almyros during the Middle and throughout the Late Byzantine periods: G. Stournaras, «διά νά φορτώση εἰς την σκάλαν τοῦ Ἀρμυροῦ σιτάρι διά λογαριασμόν μου». Οι ναυτιλιακές δραστηριότητες του Αλή πασά στον θεσσαλικό χώρο. (forthcoming).

[574] Tafel-Thomas, Urkunden, I, 266, 279, 487; III, 80, 165, 168, 178, 181, 188, 199, 203-204, 214, 216, 257, 273-274; N. Giannopoulos, ΕΠΙΓΡΑΦΑΙ ΤΗΣ ΕΠΑΡΧΙΑΣ ΑΛΜΥΡΟΥ. *BCH* 14 (1890) 244.

[575] Only in the Ottoman period settlement activities move further inland along the river Xerias, with Byzantine Almyros becoming an *epineion* for the newly founded city of Ermiye (modern Almyros): Stournaras, Ali Pasa.

or rather its *epineion* at *Kefalosin* (north of the river Amphrysos), northern Almyros is situated in the area of *Tsiggeli* (south of the river Xerias). Settlement activities, however, are recorded beyond the two centres, extending over a distance of 8.5km between the estuaries of the rivers Amphrysos in the south and Cholorrema in the north (ILL II.II.60-61, VOL II). These include not only industrially and agriculturally orientated villa sites but also the various western merchant-colonies, situated in the area of so-called *Karagats* (between the rivers Xerias and Platanorrema).[576] Almyros remained one of the most important port-cities in the Aegean and, together with Thessaloniki, one of the principal harbours of the Empire and western merchants until the end of Byzantium and beyond.[577]

Neither textual nor archaeological sources provide any information about the existence or possible location of Almyros' harbour installations and their architecture as well as functional characteristics. As such, only a hypothesis can be presented within the scope of this thesis. However, although Almyros' complex urban history and even more so the question of its harbour facilities and the nature of its harbour activities raises more questions than answers and therefore still struggles researchers, it is suggested that in contrast to Classical and Hellenistic times Byzantine Almyros definitely possessed harbour installations. But where do we have to place the supposed harbour or harbours? Despite the existence of two urban centres, it is likely that Almyros possessed only one main harbour area. However, as a characteristic Middle to Late Byzantine port-city,[578] the city functioned as *Scala*. As such, it can be assumed that multiple facilities stretched

[576] For the topography of the two Almyroi and their physical remains see: Avramea, Thessaly, 173, fn. 4-6; Giannopoulos, Almyroi, 86-92; Koder-Hild, Hellas und Thessalia, 171; Magdalino, Thessaly, 88-89.

[577] For details on the history and cultural as well as demographic development of Byzantine Almyros see: Avramea, Thessaly, 166-173; Giannopoulos, Almyroi, 65-86; Koder-Hild, Hellas und Thessalia, 170-171; Koulouras, Pagasitikou, 232-239; Magdalino, Thessaly, 86-90; for its later history see: Stournaras, Ali Pasa.

[578] For the historic development and characteristics of Byzantine harbours see chapter 3.1. "The history of Thessalian coastal sites".

over the entire 8km long coastal area. Based on the research of Giannopoulos, the main harbour structures were located at southern Almyros in the area of Kefalosin towards the western end of Sourpi bay (ILL II.II.60 and 63, VOL II).[579] Unfortunately the entire area is today occupied by a modern metalworking facility and consequently access is restricted. Nonetheless, it was visited during the field seasons in 2012 and 2013. With the additional help of aerial photographs and satellite pictures, it is possible to suggest that the modern industry uses the same loading zone for the shipment of their commodities, and has simply incorporated and extended the Byzantine installations in order to make them suitable for modern industrial as well as commercial standards (ILL II.II.64, VOL II). These modern structures, however, still indicate the alignment of architectural remains of older features, suggesting that only basic infrastructures were necessary to fulfil the requirements for efficient trading activities.

The geographical characteristics and conditions of its coastline still allow a hypothetical basic reconstruction of the various features. Similar to its contemporary equivalent, it is likely that the Byzantine harbour at southern Almyros consisted of a single quay. Oriented towards the east, it presumably possessed a total length of around 250 m. Surprisingly, it seems that the gradual siltation of Sourpi bay by the river Sourpiotikos (Salamvrias) south of the quay was not such a severe problem. Similar to today, the harbour had to be protected from the northern winds and particularly against the heavy siltation deriving from the rivers Platanorrema and Xerias north of the quay (ILL II.II.65, VOL II). Accordingly, a breakwater of approximately 100 m length projected from the northern end of the quay into the sea. Although during the Middle and Late Byzantine period the harbour handled a high number of maritime trade activities, there is no evidence that the breakwater carried mole structures along its inner side for an increased mooring capacity.

[579] Giannopoulos, Almyroi, Map.

Characteristic for a *scala*, Almyros functioned as a port-of-call, not only using the innermost Sourpi bay but the broader gulf of Almyros as roadstead.[580]

According to Stournaras' study of the coastline, the northern urban centre possessed harbour installations in the area of Tsiggeli as well, which later functioned as *epineion* for the inland city of Ottoman Almyros (Ermiye).[581] In fact, simple harbour sites probably existed on both sides of that area. Aerial photographs and satellite pictures allow the assumption of the existence of harbour remains at the estuaries of both the river Platanorrema and the river Xerias. As such, these belonged to the category of so-called river-sea-harbours (ILL I.4, VOL II; for further information see chapter 1.2.2. "Harbour"), functioning as shipment zones for goods transported on the rivers from the hinterland to the coast.[582] The importance of the rivers is confirmed by the existence of forts along the coastline, protecting the river entrances and their harbour facilities.[583] Although detailed coastal and underwater investigations are necessary in order to document and analyse the various harbour installations at the estuary of the river Platanorrema, basic harbour features are discernible. These include a clearly visible northern breakwater and the possible existence of a small quay structure. The breakwater is situated north of the estuary at a distance of around 50 m from the small modern harbour of Glistra, which nowadays is situated south of the estuary (ILL II.II.66, VOL II). The 85 m long breakwater has a nearly east-west orientation forming a hook towards the south after 60 m. It forms an adequate sheltered basin for the trans-shipment from river to open-

[580] For the function of roadsteads as part of harbor areas see chapter 1.2.3. "Anchorage and Roadstead".

[581] Stournaras, Ali Pasa.

[582] The portolan charts of the Piri Reis mention the existence of maritime gates at Almyros, which according to the present author may refer to the river-sea-harbours entering the Thessalian hinterland: Piri Reis, Kitab-i-bahriye, E. Z. Ökte (ed.). Istanbul 1988, 281.

[583] N. I. Giannopoulos, Η μεσαιωνική Φθιωτίς και τα εν αυτῇ μνημεῖα. *DIEE* 8 (1923) 75-83; Koder-Hild, Hellas und Thessalia, 171.

sea vessels with a calculated area of approximately 0.26 ha (ILL II.II.66, VOL II). The exact location of the quay cannot be determined due to the strong siltation of the basin. Consequently, both its location and dimensions remains hypothetical. Nevertheless, it is likely that if a quay existed, it was probably not located at the beginning of the breakwater with a north-south orientation, but rather constituted a river quay located along the sheltered southern riverside of the Platanorrema (ILL II.II.66, VOL II). With an estimated length of minimum 20 m and maximum 30 m, it forms the northern edge of the aforementioned modern harbour area.[584]

Concerning harbour installations at the river Xerias, neither aerial photographs nor satellite pictures provide any indication of coastal structures. These were also not visible during the field seasons in 2012 and 2013. In fact, the foundation of Ottoman Ermiye along the river further inland and its protection by a pentagonal fort at the riverside (ILL II.II.60, VOL II) show that the river Xerias was not only accessible for small riverboats transporting the merchandise to the coast for trans-shipment, but even navigable by bigger open-sea merchant ships. As such, the harbour area has to be located further up the river probably at the site of the later foundation of Ottoman Almyros. Even though this hypothesis is speculative and needs further investigations, as the biggest and most important river of the Krokion hinterland, it would explain the strong military protection of its entrance by the coastal fort at Tsiggeli.[585]

Reinders survey campaigns in the Krokion plain discovered numerous agricultural and industrial rural and coastal sites dating from the Roman Imperial to Late Byzantine

[584] Although satellite pictures indicate the possible existence of features of Byzantine date at the modern harbour as well, the present author was not able to detect any archaeological remains.

[585] See map at at Giannopoulos: Giannopoulos, Almyroi; Giannopoulos, Fthiotis, 75-83; Reinders-Prummel, Halos, 175-178.

periods.[586] Consequently, a large number of other small Scalae for private and ecclesiastical commercial maritime activities presumably existed towards the river Cholorrema.[587] This is also suggested by textual sources referring to agricultural estates and other possessions belonging to monasteries and *Metochia*.[588]

In conclusion, Almyros developed into one of the biggest nodes for communication and trade between the hinterlands and forelands of Greece and beyond during the Middle and Late Byzantine period, temporarily replacing Demetrias and Thessalian Thebes. Until the 14th century AD, when the port-city finally lost its significance in favour of Golos (see Demetrias), portolans even equate the Pagasetic gulf with the gulf of Almyros.[589] Due to its strategic and advantageous central location on the shipping lane and trading route between Constantinople and the west, together with Pteleos it functioned as a hub connecting the Pagasetic gulf and northern Greece with the big commercial centres and *scalae* along the Malian and Euboean gulf such as Zetunion (modern Lamia) and Atalante.[590] Furthermore, due to the settlement of various western colonies, Almyros

[586] Reinders-Prummel, Halos, 20, 35.

[587] Two harbour areas which form Cothon-like sites and may go back to older structures are at Aghios Ioannis north of the river Xerias and at Korfalaki south of the river Cholorrema; the church possessed huge properties, which like at Demetrias and Thessalian Thebes probably played an important social and economic part: for further information on ecclesiastical properties see: Koder-Hild, Hellas und Thessalia, 171; the preserved epigraphy of Aghios Ioannis tou Theologou at Tsiggeli published by Giannopoulos (Giannopoulos, Epigraphai, 244) approves ecclesiastical properties also along the coastline.

[588] F. Miklosich – J. Müller, Acta et Diplomata graeca medii aevi sacra et profana, IV. Vienna 1890, 346-347, 351, 387-388; Magdalino, Thessaly, 89-90; Giannopoulos, Epigraphai, 244; Koder-Hild, Hellas und Thessalia, 171; However, no information is provided concerning the location of any ecclesiastical estates. Therefore, detailed survey investigation is needed for defining the nature and degree of agricultural exploitation.

[589] Italian portolans often refer to "Golfo/Colfo de Darmiro/Larmiro/Armiro: K. Kretschmer, Die italienischen Portolane des Mittelalters. Ein Beitrag zur Geschichte der Kartographie und Nautik. Berlin 1909, 323, 513.

[590] Stournaras, Ali Pasa.

acted as an important cultural and social meeting point, also handling private, ecclesiastical and travel-oriented shipping (see ILL I.4, VOL II).

2.3.4. The Harbour of Pteleos (ILL II.II67, VOL II)

The third major commercial hub of the coast of Thessaly is the area around the gulf of Pteleos, which relied exclusively on maritime activities and consequently functioned as significant *scala*. Similar to Almyros, Pteleos owes its historical prominence to the establishment of western merchant-colonies, which is accompanied by the commercial awakening of the surrounding hinterland during the Middle Byzantine period. Although written sources pay attention to the area for the first time towards the end of the 12th century AD,[591] the known settlement history in the gulf goes back at least to Roman times. Due to its geographical location at the entrance to the Pagasetic gulf (ILL II.II.67, VOL II), Pteleos acted as an important naval base as early as the Macedonian wars. Also during the Byzantine period the gulf of Pteleos constituted together with Oreos in northern Euboea, a strategic outpost controlling both the shipping lanes and trading routes from and towards Constantinople and Thessaloniki as well as the access to the Pagasetic gulf.

The Roman and early Byzantine urban settlement was probably located at modern Achilleion, which is situated at the innermost (south-western) end of the gulf (ILL II.II.67, VOL II). Despite its relatively unknown urban history according to literary sources,

[591] In AD 1192 the scholar and metropolitan of Athens, Michael Choniates, praised the high quality wine of Pteleos (οἶνος Πτελεατικός), which was exported to Constantinople: Michael Choniates, II, 83; Pteleos remains a famous and well documented wine-growing area up to the Ottoman conquest in the 15th century AD: C. N. Sathas, Documents inédits relatifs à l'histoire de la Grèce au Moyen age, I, 32; II, 131, 264; III, 95f., 129f., 223, 234f., 344f., 430f., 451f., 463.

archaeological remains such as floor mosaics and column capitals attest the existence of a thriving coastal settlement (ILL II.II.68, VOL II).[592] Similar to Almyros, by the Middle Byzantine period Pteleos was primarily Venetian, although also other western merchants settled around the gulf, trading agricultural goods such as the famous wine and salt cultivated and produced in the hinterland.[593] Moving to the northern coast away from the urban settlement at Achilleion, portolans inform us about the foundation of a medieval fortified settlement on a hill 3 km south of the modern inland city of Pteleos,[594] forming a cape between the coastal villages of Pigadi (east) and Loutro (west).[595] Most of the visible remains such as its 10 m high rectangular donjon show western architectural traditions, belonging to construction phases of the 14th and 15th century AD. The site is currently under excavation by P. Statsouris and his team,[596] who have not only revealed the settlement grid but also uncovered earlier construction phases (ILL II.II.69, VOL II). Despite several changes of ownership in between, in the 14th century AD medieval Pteleos even partly takes over Almyros' position as the major *scala* of the Pagasetic gulf due to the gradual incorporation of Thessaly into the Ottoman Empire. As one of the few, and consequently most important, fortresses of southern Thessaly, Pteleos remained mainly a Venetian stronghold until its conquest by the Ottomans in AD 1470.[597]

[592] Stephanos of Byzantium, Ethnika, 537; Giannopoulos, Ειδήσεις. *EEBS* 8 (1931) 415.

[593] For an analysis of agricultural and industrial activities in the district of Pteleos, so-called *Nikopolis*, and its commercial exploitation see: Koulouras, Pagasitikou, 274-276; Magdalino, Thessaly, 91.

[594] The author assumes that the foundation of the inland city of Pteleos goes back to Classical times.

[595] Kretschmer, Portolane, 513, 637.

[596] The author expresses his gratitude to Pavlos Fylaktos, member of the excavation team, for information concerning the excavation activities and results.

[597] Reinders-Prummel, Halos, 23; for further historical information and details concerning Pteleos' demographic development see: Koder-Hild, Hellas und Thessalia, 241; Koulouras, Pagasitikou, 273-280; Magdalino, Thessaly, 90-92; for the history of Thessaly during the Late Byzantine period see: Ch. G.

The area was visited as part of the 2012 and 2013 field seasons and revealed the harbour sites of this large *scala*, which belonged to different historical periods. The earliest tangible remains of harbour structures is that of Roman and Early Byzantine Pteleos at Achilleion, which still forms a part of the modern harbour area. The early harbour site extends from the modern infrastructures to the east, occupying the western coast of a projecting cape. Although protected by the cape, the harbour was additionally enclosed by two breakwaters (ILL II.II.70, VOL II). These form a harbour basin with a calculated area of 0.55 ha, with a 32 m-wide entrance (ILL II.II.70, VOL II). While the southern of the two breakwaters has a north-south orientation extending around 42 m, the northern possesses a total length of around 66 m and forms a bow extending from the western coastline of the cape towards the west, eventually turning towards south-west. Similar to the western breakwater at the old (southern) harbour of Skiathos (see "The old (southern) harbour" in chapter 2.2.3.1. "The broader harbour area") and that of Koutsoupia (see below), the breakwaters show a core section built of a mixture of quarry rubbish and small stones and an external part consisting mainly of huge raw rock boulders. Despite considerable surface widths of between 6.30 m and 11 m, no architectural features of moles along their inner sides can be determined. On the contrary, today reaching partly 0.50 m below and partly exactly up to the present surface of the water, the breakwaters seem to have been constructed just for the purpose to break over and create currents within the harbour basin in order to act against siltation. As such, in contrast to their current use, they point to no further mooring space or anchorage area within the harbour itself. Concerning mooring facilities for loading and unloading or embarking and disembarking activities the harbour was provided with three quay lines along its north-eastern, the

Dablias, The history of Thessaly in the 13th century AD. Thessaloniki 2002; Koder-Hild, Hellas und Thessalia, 68-79; Magdalino, Thessaly.

south-eastern and the south-western sides. Unfortunately, the older quay structures are only partly visible and vaguely discernible due to modern superstructures, which hinders a reconstruction of the original quay area. Nevertheless, approximate lengths can be suggested: 55 m for the north-eastern; 67 m for the south-eastern; and 37 m for the south-western quaylines. This would provide a total hypothetical mooring capacity of 159 m (ILL II.II.70, VOL II). Similar to the eastern harbour bay at Skiathos (see chapters 2.2.3.1. "The broader harbour area" and 2.2.5. "Concluding interpretations of the island's Archaeology and History"), the area east of the cape was possibly used for an anchorage as well. Indeed, aerial photographs and satellite pictures indicate the possible existence of another huge breakwater with an estimated length of 145 m and maximum width of 50 m, projecting from the south-eastern coastline of the gulf at a distance of around 250 m to the cape. No further associated coastal structures could be detected along the coastline east of the cape. Although the massive breakwater needs verification by detailed underwater archaeological survey, it would have provided a large, approximately 4.75 ha, open sheltered roadstead (ILL II.II.71, VOL II). Due to minor siltation problems at the southern area of the harbour basin, the harbour at Achilleion remains active today. With the movement to the medieval fortified settlement on the northern coast, however, the main harbour activities have shifted to both sides of the hill.

During the 2012 and 2013 field seasons on the coastline of Loutro and Pigadi, various structures pointing to a long history of harbour activities along the entire northern coastline of the gulf were observed. At the coast of the south-western foot of the hill another small rectangular tower, the so-called *Αλατόπυργος* ("Alatopyrgos" – "Salttower") is preserved (ILL II.II.72, VOL II).[598] The tower measures a height of 4.70

[598] Giannopoulos, Fthiotis, 26-29.

m and widths between 7 and 7.50 m. While Koder identifies it as a watchtower, based on its dimensions and the onomastic context of Pteleos' commercial activities, Koulouras suggests that the tower served as warehouse or so-called *Horreum* for the storage of salt.[599] During the investigation of the coast surrounding the medieval fortified site of Pteleos, a number of further features were detected along the entire coastline west of the tower towards Loutro, extending over a distance of around 700 m. These include not only massive wall sections running parallel to the beachline but also another rectangular building, which despite its smaller dimension shows similarities to the Alatopyrgos (ILL II.II.73, VOL II). Structural remains leading into the water were also recognized (ILL II.II.74, VOL II). Although only the contours are visible due to siltation, it is likely that they were jetties. Although the wall structures and towers may belong to the settlement fortification and constitute a lower defensive circle, as suggested by Koder, it is likely that at least in times of political stability, if not permanently, the towers were used for commercial purposes.[600] Whether a fortification or a commercial site, the area formed an ideal sheltered roadstead, with the entire area functioning as a trans-shipment centre, using simple harbour installations. The coastal facilities and installations reached to the village of Loutro further west. Unfortunately, no physical remains of older structures at

[599] Koder-Hild, Hellas und Thessalia, 241; J. Koder, Negroponte. Untersuchungen zur Topographie und Siedlungsgeschichte der Insel Euboia während der Zeit der Venezianerherrschaft (*VTIB* 1), Vienna 1973, 52, 126-127; Koulouras, Pagasitikou, 279; for warehouses see chapter 1.3.1.6. "Warehouse, Granary and other facilities".

[600] Written accounts inform that the gulf of Pteleos also function as a base of operation for organized regional piracy activities, reporting constant attacks on western merchant ships: Ioannis Cantacuzeni eximperatoris Historiarum, J. Schopen (ed.) (*Corpus Scriptorum Historiae Byzantinae*), II. Bonn 1831, 385; Tafel-Thomas, Urkunden, III. 167, 214, 216, 235; Koulouras, Pagasitikou, 274-275; consequently, the harbour installations of the western merchant-colonies and commercial areas along the coast must have needed protection, which would explain a simultaneous function of the above-mentioned coastal structures as fortification and commercial Scala, similarly to Demetrias, Thessaloniki and Constantinople forming a fortified harbour area and anchorage.

Loutro could be detected during the field seasons. Nevertheless, the toponym *Loutro* indicates the possible former existence of a *villa maritima* (maybe a villa with private baths) or another private coastal site, pointing to coastal activities as early as the Roman or Early Byzantine periods. Equipped with individual landing stages,[601] it can be assumed that also in later centuries the area of Loutro possessed not only Imperial or publicly controlled facilities, but also served ecclesiastical business and private entrepreneurs, forming a huge multifunctional *scala*.

The south-western foot of the hill and Loutro constituted not the only harbour area of medieval Pteleos. The bay east of the hill, today occupied by the coastal village of Pigadi, formed another favourable anchorage (ILL II.II.75, VOL II). Pigadi must have formed an *epineion* for inland Pteleos already as early as the Classical period.[602] During the field season it was realized that in contrast to Loutro and its wider roadstead, Pigadi also possessed proper harbour installations, comprising at least a quayline and a jetty. Unfortunately however, since Pigadi still forms the main harbour of Pteleos, the bay is almost entirely built up by modern harbour installations and infrastructures. Nevertheless, the original phase of the features could still be identified (ILL II.II.76, VOL II). Similar to the old (southern) harbour at Skiathos, these seem to be preserved as the basework for the current harbour superstructures. Without a detailed architectural and material analysis, an exact dating of the old structures is difficult. However, constructed with large blocks of broken rubble stones consisting of a mixture of quarry stones and mortar, in terms of their composition, architecture and arrangement, they show similarities to the investigated

[601] For the function and characteristics of landing stages see chapter 1.2.4. "Landing Stage".

[602] Similar to Almyros, the present author believes that back then probably beaching was practised and therefore no major harbour infrastructures were needed yet.

harbour elements at the old (southern) harbour at Skiathos.[603] If that is indeed the case, with the exception of Achilleion, the northern coastline of the gulf of Pteleos sees intensive harbour and coastal activities during the Early and Middle Byzantine periods.

Based on the sources, it is suggested that similar to Demetrias, Thessalian Thebes and particularly Skiathos, Pteleos faced an urban and commercial decline some time after the second half of the 7th century AD and the latest by the end of the 8th or beginning of the 9th century AD, affecting the harbour and other coastal infrastructures at Pigadi. The foundation of western merchant-colonies and medieval Pteleos resulted in the commercial re-awakening of the area and the increase of coastal and particularly harbour activities east of the settlement, which also expanded west of the hill to Loutro. Pigadi and cape *Gynaikokastro* east of it, however, were not limited to Imperial controlled activities. Written sources report a property of the Hospitallers at Pteleos (referred as "domus de Phitalea"), while other private and particularly ecclesiastical facilities extended over the entire coastline, using not only the wider roadstead east of Pigadi but also the bays at Karabotsaki and Aghia Marina for their commercial business.[604] Similar to Almyros, textual sources refer to widespread possessions of monasteries and Metochia around and north of the gulf of Pteleos.[605]

[603] Likewise, the surface of the original structures is situated around 0.50 m beneath the present water level, reaching almost up to the surface. For a more detailed analysis of the architecture and other characteristics see the quay description of the old (southern) harbour at Skiathos in chapter 2.2.3.1. "The broader harbour area".

[604] Ecclesiastical properties and coastal activities are recorded as reaching up to cape Prioni, situated around 4km east-northeast of inland Pteleos: Miklosich–Müller, Acta et Diplomata, I, 474-475; Avramea, Thessalia, 109; Giannopoulos, Phthiotis, 26-29; Koder-Hild, Hellas und Thessalia, 162, 241; Magdalino, Thessaly, 91.

[605] Magdalino, Thessaly, 91-92.

In conclusion, although maritime traffic and the commercial exploitation of the gulf of Pteleos reached its peak during the Late Byzantine period, the archaeological remains show intensive coastal activities as early as the Roman and Early Byzantine periods. Consequently, similar to Demetrias, Thessalian Thebes and Skiathos, the different harbour installations around the gulf reflect the various stages of harbour traditions, including both major Imperial controlled facilities and individual private or ecclesiastical features such as landing stages.

2.4. Secondary harbour sites and Staple markets of Thessaly

Like the survey project for the island of Skiathos, the 2012 field season revealed that the Pagasetic gulf was richer and more densly settled than was previously thought.[606] As already roughly indicated for the gulfs of Volos, Almyros and Pteleos, besides major port-cities Thessaly possessed numerous smaller secondary harbour sites and primarily private and ecclesiastical coastal installations.[607] As such, similar to the coastal infrastructures shown for Skiathos these provide a comprehensive hierarchy of central Greek harbour installations (ILL I.9, VOL II), which can be used as a model for the economic system and social life of Byzantium from the 4th to the 15th century AD.

In contrast to the port-cities and major harbour sites of the Pagasetic gulf, local coastal structures have not only enjoyed marginal attention by archaeological investigations, but have also been rarely incorporated into historiographical and literary-based studies. Consequently, the following analysis are the results of the 2012 field season and are based on the author's interpretations. For an ease of understanding, the sites are geographically sub-divided between the western (mainland) coast of the Pagasetic gulf and the Pelion peninsula.

[606] Drakoulis, Settlements Network, 375-390.

[607] It is impossible to deal with and discuss all of the coastal sites within the scope of this thesis. Nevertheless the author tries to provide an extensive picture for the observation of Byzantine harbours and the general pattern of their development throughout the centuries, as well as a better understanding of the interaction between production sites and maritime activities.

2.4.1. The western coast of the Pagasetic gulf

Two areas have been identified on the western coast of the Pagasetic gulf: the secondary harbour of Amaliapolis and the staple market of Nies.

2.4.1.1. Amaliapolis (ILL II.III.1, VOL II)

Amaliapolis is located at the innermost south-western end of *Mitzelas* bay east of the so-called *Korakonisi* promontory, which limits the gulf of Almyros to the east (ILL II.III.2, VOL II). Due to the topography of the coast, Amaliapoli provided not only a favourable sheltered anchorage for passing ships but as a secondary harbour it constituted simultaneously a foreland and hinterland for the primary harbour of the Pagasetic gulf. Unfortunately, no settlement history is known from written sources concerning noteworthy coastal activities. Moreover, the area has not been subject of any archaeological studies. Nevertheless, the site was included in the 2012 field season, which investigated the entire coastline of the bay. A number of coastal structures were identified.

Similar to Pigadi at Pteleos or the southern (modern) harbour at Skiathos, Amaliapolis' modern harbour installations show older substructures supporting parts of the quay and the jetty. Unfortunately, only the jetty is still completely preserved, whereas the quay is entirely built over, with only a few elements to indicate the existence of former coastal facilities of unknown function and purpose (ILL II.III.3, VOL II). It is suggested that the jetty formed the main or central harbour feature. In relation to its width of around 5 m, the jetty possesses an exceptional length, measuring approximately 42 m. Without a detailed underwater archaeological survey an interpretation of its architecture and composition remains hypothetical, although it appears to be similar to the jetty at Lazareta

on Skiathos (see THE AREA OF "LAZARETA" in chapter 2.2.3.1. "The broader harbour area"). The remains of the jetty are formed of a compact, solid and homogenous mortar mixed with rubble stones and possibly even ceramic inclusions, possibly to form a type of hydraulic concrete (ILL II.III.4, VOL II). Its position around 0.50 m beneath the present water level supports the comparison to the jetty at Lazareta. This could suggest that the area of Amaliapoli shows agricultural and industrial activities as early as the Roman Imperial to Early Byzantine periods. This is supported by traces of further coastal structures approximately 250-300 m northwest of the jetty. These include not only features belonging to further harbour installations (ILL II.III.5, VOL II), but also at this stage unidentifiable structures (ILL II.III.6, VOL II).[608] Additionally, stratigraphic layers of coastal sites are visible along the north-western end of the bay (ILL II.III.7, VOL II), possibly the remains of Roman Imperial or Early Byzantine private infrastructures, such as a *villa maritima*.

In conclusion, the coastal structures at Amaliapoli reflect intensive activities probably during the Early and Middle Byzantine periods. Accordingly, it functioned as an interstation for ships sailing towards Thessalian Thebes and further north to Demetrias.[609] Together with the staple market of Nies it continued to function as frequent maritime station and secondary harbour until the Late Byzantine period. This is confirmed by the

[608] Located in between the modern quay and the sheltered anchorage further west, the structures may constitute additional jetties of private coastal sites. In the eyes of the author, an interpretation as industrial facilities such as fish ponds etc. seems unlikely but sill possible.

[609] The underwater archaeological investigations of the Hellenic Institute of Marine Archaeology (I.EN.A.E.) along the coast of Amaliapolis and Nies in 2003 revealed among other artefacts amphorae types LR 1, LR 2, LR 2/13 and LR 4/5. These correspond not only with the ceramic finds at Skiathos but also with finds from Thessalian Thebes: Demetra Papanikola-Bakirtzi (ed.), Everyday life in Byzantium. Athens 2002, 302-303; I. Spondylis – Stella Demestika, Αναγνωριστική Έρευνα I.EN.A.E. Δυτικών Ακτών Νότιου Παγασητικού, Έτους 2003. *ΕΝΑΛΙΑ* 8 (2004) 21-22.

recent detection of a number of wreck finds in close vicinity, dating between the 6th-7th and the 12th-13th century AD (see the staple market of Nies).[610] Consequently, although Amaliapoli is situated just 3.3 km east of Almyros, the nature of the Pagasetic gulf with its steep coastline made it an important independent sailing point until modern times.

2.4.1.2. Nies (ILL II.III.8, VOL II)

Nies is located within another favourable deeply cut bay around 5 km southeast of Amaliapolis. With a northwest-southeast orientation it forms a 340 ha anchorage, functioning as an *epineion* for the inland settlement of Sourpi until modern times. Similar to Amaliapolis, Nies is neither mentioned in the written sources nor has been the subject of any systematic archaeological studies. Nevertheless, coastal structures dating to the Roman Imperial and Byzantine periods were identified during the 2012 field season. While the current settlement of Nies is located on the western coast, the archaeological sites are situated along the innermost south-eastern end of the bay (ILL II.III.9, VOL II).

Along the beachfront at the western end of the bay, the investigation revealed the remains of a large building complex. Similar to the coastal villa sites of Vasilias and Lazareta at Skiathos (see THE AREA OF "LAZARETA" in Chapter 2.2.3.1. "The broader harbour area" and THE SITE OF VASILIAS in Chapter 2.2.4. "Evidence of other relevant archaeological sites"), the stratigraphic layers of the frontal façade are visible. This also shows preserved wall sections running almost parallel to the beach and several cross-sections of transverse walls leading inland and the interior of the complex (ILL II.III.10,

[610] The underwater archaeological survey along the western Pagasetic gulf revealed among other ceramic finds various amphora types of type LR and Günsenin: I. Spondylis, Αναγνωριστική Έρευνα I.EN.A.E. Δυτικών Ακτών Νότιου Παγασητικού, Έτους 2000. *ΕΝΑΛΙΑ* 6 (2002) 24-31.

VOL II). A small area was uncovered, probably during the execution of rescue or test trenches (ILL II.III.11, VOL II).[611] Above the wall remains, the stratigraphy additionally shows a disturbed layer of brick tiles, pointing to a destruction presumably caused by the collapse of the complex (ILL II.III.10, VOL II). Similar to Vasilias and Lazareta, the thick ceramic layer includes fragments of fine ware. Consequently, based on the architectural characteristics of the remains and the compositional similarities between the various features and the villa sites on Skiathos, it is possible to suggest that the site was a *villa maritima*, probably dating between the 3rd and the 5th century AD.

A small promontory, which was occupied by the monastery of Aghia Trias,[612] and was used as an oil press and production site until recently (ILL II.III.12, VOL II), extends from the coastline towards the eastern end of the bay (ILL II.III.13, VOL II). Due to the change of the sea level since Antiquity, today only around 0.36 ha of its original total area of 1.30 ha is still above water. With a current depth of 0.5 m to maximum 1 m, it was possible to investigate the entire promontory. While the northern area seems to have been used for production facilities such as fish ponds (ILL II.III.14, VOL II), possible harbour installations could be identified exclusively on the eastern side of the promontory. Three projecting features, running parallel from the promontory towards the northeast were also observed. With lengths of around 30 m (No. 1), 20 m (No. 2) and 15 m (No. 3) these can be interpreted either as simple jetties (ILL II.III.15, VOL II), which depending on the traffic demanding hinterland formed landing stages for the transportation of people or goods, or small breakwaters protecting possible wharfs along the eastern shore of the promontory. Although the first two show compositional differences, a chronological as

[611] Unfortunately no archaeological report was available to the author.

[612] However, its toponym "Metochi" still indicates the existence of a monastic unit subordinated to a bigger independent monastery.

well as typological classification is impossible. It is likely that the structures belong to different periods and perhaps the site was equipped only with one structure at a time. The first north-westernmost shows a core section built of a mixture of quarry rubbish and small stones and an external part consisting originally mainly of bigger stone boulders, suggesting a breakwater (ILL II.III.16, VOL II). Since no remains of a superstructure could be found, it presumably functioned exclusively as protection for coastal mooring facilities against northern winds. Constructed according to Roman traditions, both a Roman Imperial or Early Byzantine date would be possible, however, serving a monastic unit a date towards the 6th century AD can be assumed. The other two structures were probably added in later centuries due to gradual siltation of the area. Apart from the fact that no alignment of border stones could be detected, the latter show high similarities to the jetty at Mylos in the harbour bay of Skiathos (see THE AREA OF "MYLOS" AND "ST. GEORGE" in chapter 2.2.3.1. "The broader harbour area"). As such, an interpretation as Middle or Late Byzantine jetties seems likely.

Beyond the harbour installations of *Metochi*, it can be assumed that, as today, particularly the eastern part of the bay provided numerous further simple coastal structures, such as wooden piers (ILL II.III.17, VOL II). These may have not only served as landing stages for the seasonal agricultural exploitation of Nies' immediate hinterland, but also as a roadstead for inland Sourpi and the nearby *villa maritima* as well as for other monastic units and surrounding sites.[613]

In conclusion, combining the existence of private and ecclesiastical coastal facilities, the bay of Nies functioned as an important staple market, providing the Thessalian port-cities

[613] In the surrounding area further Byzantine churches and monasteries have been documented, communicating with the bay of Nies: Giannopoulos, Fthiotis, 36-38; Koder-Hild, Hellas und Thessalia, 277.

of Demetrias, Thebes and Almyros as well as other primary and secondary harbours such as Pteleos and Amaliapolis with agricultural products. The above-mentioned possible association with the 6th-7th and the 12th-13th century AD wreck finds detected at *Tilegrafos* bay east of Nies confirms its crucial role in the maritime commercial network of the Pagasetic gulf and the hierarchical function of coastal infrastructures for the Byzantine economy.[614]

2.4.2. The Pelion peninsula (ILL II.III.18, VOL II)

The Magnesian or Pelion peninsula limits the Pagasetic gulf in the east. With a total length of around 100 km and an average width of 10 km, it reaches from the plain of Agia down to the islands of Skiathos and Euboea before it forms a hook by turning west towards the gulf of Pteleos. Entirely occupied and following the course of Mount Pelion, the peninsula possesses a mostly steep and inhospitable coastline, both within the Pagasetic gulf and even more along its outer eastern side. The Pelion peninsula was intensively occupied during the Byzantine period, more so even than in Antiquity, and also constituted the most densely settled area of Thessaly.[615] Geologically similar to Aghio Oros and Mount Athos, it particularly attracted ecclesiastical foundations. As such, monasticism was a major stimulant for the establishment of settlement as well as agricultural and industrial networks.[616] Being deeply involved in commercial business, the numerous profitable

[614] Spondylis, Pagasitikou 2000; Spondylis-Demestika, Pagasitikou 2003.

[615] Magdalino, Thessaly, 98; for the settlement network of Thessaly and in particular the Pelion peninsula see: Avramea, Thessalia, 56-59, 103-104; Drakoulis, Settlements Network, 375-390; D. Drakoulis, ΠΟΛΕΙΣ, ΚΩΜΕΣ ΚΑΙ ΧΩΡΙΑ ΤΗΣ ΕΠΑΡΧΙΑΣ ΕΛΛΑΔΟΣ ΣΤΗΝ ΠΡΩΙΜΗ ΒΥΖΑΝΤΙΝΗ ΠΕΡΙΟΔΟ (4ος - 6ος ΑΙΩΝΑΣ). *Byzantiaka* 29 (2009) 39-102; Ntina, Oikismoi, 415.

[616] Due to the constant monastic subsidiaries the Pelion peninsula was also known as *Kellia* (the mountain of the monastic cells): Koder-Hild, Hellas und Thessalia, 186, 233-234; Magdalino, Thessaly, 98; for the

Metochia and monastic endowments resulted in a spiritual and cultural boost during the Early Byzantine period and an economic peak during the Middle and Late Byzantine periods.[617] The geographical, social and commercial importance of the Pelion peninsula is also reflected by the series of forts along its entire coastline.[618]

In respect of harbour installations, however, the Pelion peninsula is still a *terra incognita*. Due to the physical, and to a certain extent geographical conditions of its coastline,[619] Pelion did not possess any major port, nor was it equipped with primary harbour sites. Functioning as an agricultural and industrial hinterland for the Pagasetic and central Greek foreland, it provided mainly secondary harbours and staple markets, which are located almost exclusively within the Pagasetic gulf. A discussion of all coastal structures is beyond the scope of the present thesis, consequently, only the most relevant sites for maritime connectivity during the entire Byzantine period will be discussed. Ancient literary sources such as the written accounts of Scylax, Pliny, Strabo and Pomponius Mela refer to a number of noteworthy settlements along the inner and outer coast of Pelion during the Classical and Roman periods.[620] Apart from the exception of Lephokastro, the Byzantine settlement and coastal activities more or less form continuations of their

distribution of ecclesiastical infrastructures and settlement network see maps of Koder-Hild, Hellas und Thessalia and Koulouras, Pagasitikou; Dablias, 36-45, 163-187.

[617] For details on the economic viability and commercial activities of ecclesiastical installations on the Pelion peninsula see: Magdalino, Thessaly, 98-105.

[618] Koulouras, Pagasitikou, Map; Magdalino, Thessaly, 98.

[619] For the characteristics and role of physical and geographical conditions on the development of coastal structures see chapter 1.2. "Function, purpose and hierarchy of coastal installations".

[620] The following coastal settlements are mentioned: Neleia, Methone, Korope, Korakai, Spalathra, Olizon, Isai, Meliboia, Rizous, Myrae and Sepias: Plinius Secundus, Naturalis Historia, IV. 9; Pomponius Mela, De Chorographia, II. 3 (580); G. Shipley, Pseudo-Skylax's periplous: the circumnavigation of the inhabited world. Text, Translation and Commentary. Exeter 2011, § 65; Strabo, Geographica, IX. 5; for more information see: A. J. B. Wace, The Topography of Pelion and Magnesia. *JHS* 26 (1906) 143-168.

predecessors. As such, the relevant coastal and coastal-related sites for the Byzantine period include Lechonia or Liconia, Kala Nera/Milies, Afissos (Korakopyrgos/Palaiopyrgos), Lephokastro, Olizon and the wider area of Aghia. Consequently, the following areas are of interest within the scope and framework of this thesis, which represent various categories-, types- and functionally different harbour infrastructures (ILL I.4, VOL II):[621] Platanidia, Kala Nera, Afissos, Lephokastro, Chorto and Milina, Aghios Georgios Sagora, Aghios Demetrios,[622] as well as Velika and Koutsoupia north of Pelion.

[621] The following brief discussion is partly based on the results of the present author's field survey in 2012.

[622] Although Aghios Demetrios played a central role for the communication network of Thessaly as being the only approachable anchorage at the northern outer coast of the Pelion peninsula, it will not be subject of discussion within this thesis due to lack of material and consequently missing informative value for the analysis of the function and hierarchy of Byzantine harbour structures; for Aghios Demetrios see: Avramea, Thessalia, 104; Koder-Hild, Hellas und Thessalia, 146.

2.4.2.1. Platanidia (ILL II.III.19, VOL II)[623]

The site of Platanidia is located around 10 km southeast of present Volos. Coastal activities in that area go back as early as Classical times, when it constituted the *epineion* of the ancient inland settlement of Neleia.[624] During the Byzantine period, Platanidia continues to form, together with the area of Agria (5 km northwest inbetween Platanidia and Volos), the harbour sites of late antique and medieval Lechonia, also known as *Liconia*.[625] Despite its relatively close vicinity to the port-city of Demetrias, Lechonia was one of the biggest and most important urban centres along the Pelion peninsula throughout the entire history of Byzantium.[626] As the relocated successor settlement of ancient Methone, during the Early and Middle Byzantine period the nucleus of Lechonia's urban activities was concentrated along the coast of Platanidia. This is confirmed by the strong presence of the church. During construction works of the coastal road at the western end of Platanidia phases of two basilicas dating to the 4th and 5th century AD were detected and excavated in the 1960's and 1980's (ILL II.III.20, VOL II).[627] During the Late Byzantine period the settlement and ecclesiastical activities shifted inland, retreating to the safe hillside.[628] Despite the consequent separation into Kato Lechonia orientated towards Agria and Ano Lechonia orientated towards Platanidia, Platanidia kept its role as the main harbour site of the area.

[623] *AD* 22/3 (1967) 317.

[624] For Neleia see: *PAE* (1911) 211-212; Wace, Pelion, 153-154.

[625] Avramea, Thessalia, 107; Koder-Hild, Hellas und Thessalia, 201-202.

[626] For more detailed information on the history of Lechonia see: *PAE* (1911) 211-216; Avramea, Thessalia, 107-108; Koulouras, Pagasitikou, 264-268.

[627] Originally located next to the sea, parts of their facilities are currently situated underwater; Koulouras, Pagasitikou, 265; Ntina, Oikismoi, 427; Ntina, Thebes, 368-369.

[628] The 250 m high hill of Palaiokastro shows beyond remains of another three-ailed basilica also traces of fortification; Koder-Hild, Hellas und Thessalia, 202; Magdalino, Thessaly, 92.

The 2012 field season investigated the entire coastal area. Although Platanidia has continuously functioned as harbour area since Antiquity, due to its role as a secondary harbour and its southern exposure, no major harbour complex or main installations could be detected. Only a single quayline with a length of at least 130 m could be verified (ILL II.III.21, VOL II). Like most harbour sites in central Greece such as Thebes, Almyros, Pteleos, Amaliapolis or the old (southern) harbour of Skiathos, the original feature is overbuilt by modern superstructures. Nevertheless, the frontal façade was still visible allowing an impression of the architecture and the composition of the quay to be deduced. It had a compact, solid and homogenous concrete base (ILL II.III.22, VOL II). The composition of the quay, or rather its concrete base, shows high similarities to the jetties at Amaliapolis and the site of Lazareta at Skiathos.[629] Some of the stone blocks that originally sat on top of the jetty can still be seen lying scattered in front of it (ILL II.III.23, VOL II). A 4th-5th century AD date is suggested, which further would be in conformity with the two basilicas and Lechonia's Early Byzantine urban activities at Platanidia. Apart from that single installation, the area does not appear to have any remains of further permanent features, which leads to the assumption that the open bay was simply used as roadstead, featuring temporary landing stages extending over the entire coastline. Beyond the fact that most of the landing stages might have served private business, the ecclesiastical installations possessed their own independent facilities. West of the basilicas, various wall structures and coastal features leading into the water and extending over an area of approximately 70 m were observed (ILL II.III.24, VOL II). Apart from residential, agricultural areas and workshops, these structures also included simple jetties, forming landing stages for coastal maritime activities. However, based on the close

[629] However, since the feature is heavily encrusted an interpretation as hydraulic concrete remains hypothetical without a detailed investigation and petrographic analysis.

vicinity and orientation of the basilicas towards the central jetty, it is suggested that they probably still used the Imperial harbour structures in their early phase. As such, although a dating of the ecclesiastical harbour facilities is impossible, these may belong to a later construction phase, dating not before the 6th century AD.

In conclusion, Lechonia and its surrounding area functioned as a direct hinterland for the port-city of Demetrias through using Platanidia as secondary harbour and staple market. The material remains again show the strong presence and influence of both private enterpreneurs and the church on maritime interconnectivity and commercial business. The existence of a single quay together with religious establishments such as the basilicas in close vicinity further suggests a hierarchical allocation as travel-orientated type of coastal structures (see ILL I.4, VOL II). Private dominated small scale regional trade, however, may also have been executed.

2.4.2.2. Kala Nera (ILL II.III.25, VOL II)

Kala Nera is located at the turning point of the inner coast of Pelion towards south, around 6 km east of Platanidia. Physical remains attest settlement activities in the area since the archaic period.[630] The area of Kala Nera can probably be associated also with the location of ancient Korope or Korakai.[631] During the Byzantine period, the area shows a continuation of settlement activities, both inland around the site of Mileas or Meleais (modern *Milies*) and along the coast with Kala Nera as *epineion*. While Milies constituted a junction of the inland road network connecting Aghios Demetrios on the eastern coast

[630] Wace, Pelion, 153.

[631] For Korope or Korakai see: *PAE* (1911) 224-225; Wace, Pelion, 152-153.

with Liconia on western coast of the peninsula, Kala Nera formed a station of the maritime as well as coastal road network connecting northern with southern Pelion.[632] Neither Byzantine nor western literary sources refer to any noteworthy harbour installations and ecclesiastical or private agricultural facilities, respectively, at Kala Nera despite its function as the *scala* of inland Milies.[633]

The bay of Kala Nera was visited during the field season, but apart from features of unknown function and date, which are mostly overbuilt by modern harbour superstructures (ILL II.III.26, VOL II), no harbour installations could be detected. Characteristic for a *scala*, the bay could have functioned as a port-of-call throughout ancient and medieval times. It can be assumed that Kala Nera possessed (if at all) temporary wooden piers forming simple mooring facilities for loading and unloading or embarking and disembarking activities.

2.4.2.3. Afyssos (ILL II.III.27, VOL II)[634]

Afyssos is located at the junction connecting Pelion's western inner coast with Aghios Demetrios at the narrowest crossing point of the peninsula. It was probably Byzantine *Korakaipyrgos* or *Palaiopyrgos*, situated around 6 km southeast of Kala Nera. The existence of a Byzantine fortification together with that of Lephokastro, Aghios Demetrios and *Genitsarokastron* at Lai (on the road in between), confirms the importance

[632] For the maritime- and road network around the Pagasetic gulf see: Avramea, Thessalia, 103-117; Koder-Hild, Hellas und Thessalia, Map; Koulouras, Pagasitikou, 18-28.

[633] Wace, Pelion, 153; even Avramea just mentions the existence of the church of Aghios Nikolaos at Mileas of Pelion: Avramea, Thessalia, 164-165 fn. 7; further information see: *PAE* (1911) 226-227.

[634] *PAE* (1911) 224.

of this access point protecting the crucial connection of the two coasts.[635] Afyssos functioned not only as a strategic station of the Thessalian maritime and road network, it also constituted the Pagasetic harbour area of the inland settlements and the numerous ecclesiastical installations of Neochorion and Lai and probably also served the settlement of Lephokastro close by.[636]

Remains of harbour structures were documented during the field season in 2012. During Classical times ships seem to have both, moored at harbour structures (ILL II.III.28, VOL II) and practizised beaching on a small shore at the northern end of the bay, which formed an ideal sheltered harbour area with a southwest exposure. But despite the bay's continuous use as anchorage until the present day, the late antique and medieval harbour area shifted around 350 m towards south, which today forms a coastal promenade (ILL II.III.29, VOL II). The investigation revealed that the Byzantine installation consisted of a quayline and a single central jetty. The quay is constructed with huge blocks of stone rubble consisting of a mixture of quarry stones and mortar, showing high compositional and architectural similarities to the quays of Pigadi (Pteleos) and the old (southern) harbour at Skiathos (ILL II.III.30, VOL II).[637] Consequently, a chronological association with the construction of the fortification of Korakaipyrgos and the defence network on the Pelion peninsula as part of Justinian's building activities during the 6th century AD is suggested. The jetty forms a direct extension of the the road from Aghios Demetrios.

[635] For Korakaipyrgos and the fortification network along this connection see: Avramea, Thessalia, 107; Koder-Hild, Hellas und Thessalia, 191; Koulouras, Pagasitikou, Map.

[636] Koder-Hild, Hellas und Thessalia, 197; Koulouras, Pagasitikou, Map.

[637] For a more detailed analysis of the architecture and other characteristics see the quay description of the old (southern) harbour at Skiathos in chapter 2.2.3.1. "The broader harbour area".

Protruding from the coastline westwards into the sea it shows a total length of around 20 m and a width of approximately 5 m.

In conclusion, similar to the harbour of Skiathos, Afyssos constituted a multifunctional secondary harbour. Beyond its role as a link between Pelion's hinterland and the regional and supra-regional maritime trading routes and shipping lanes providing Lephokastro and the Thessalian port-cities with commodities, it formed a strategicly important gateway for communication and connection between the Pagasetic gulf and the Aegean Sea.

2.4.2.4. Lephokastro (ILL II.III.31, VOL II)[638]

Together with Lechonia and Olizon, Lephokastro or Lyphokastro constituted another major Byzantine urban centre on the Pelion peninsula (ILL II.III.32, VOL II). With a distance of just 2.5 km southeast of Afyssos, it was directly connected to the road network between the east and the west coast as well. The importance of the fortified settlement derives mainly from its role as a harbour area for the fertile hinterland at Miriovriti, north of inland Argalasti. Furthermore, the remains of numerous churches such as that of Panagia, Aghia Euphemia, Aghios Panteleimon, Aghios Nikolaos and Aghioi Apostoloi have been recorded, pointing to an ecclesiastical stronghold. Similar to Thebes, Lephokastro functioned as a cultural hub and social meeting point for the surrounding area.[639] It is located on a northeast-southwest orientated rocky promontory, forming an open harbour bay on its southern side. Apart from a small jetty of unknown date (ILL II.III.33, VOL II), no features could be detected belonging to a former harbour

[638] *PAE* (1911) 223-224.

[639] For details on settlement activities of Lephokastro see: Avramea, Thessalia, 106-107; Koder-Hild, Hellas und Thessalia, 201; Wace, Pelion, 152.

installation. This suggests that beyond the use of the sandy bay as an open roadstead, Lephokastro probably used the nearby harbour of Afyssos. Material remains, such as columns of *verde antico*, attest a close link to the Thessalian regional and supra-regional trading network, connecting the site with centres like Demetrias, Thessaloniki, Constantinople or Philippoi.[640]

2.4.2.5. Chorto and Milina (ILL II.III.34, VOL II)[641]

Chorto and Milina, which are only 2 km apart from each other, form a large harbour bay, constituting not only the southern *epineion* and later *scala* of inland Argalasti and the Metochion of Aghios Nikolaos but also the *scala* of inland Lavka further south.[642] Although both sites show the strong influence of ecclesiastical activities throughout the entire Byzantine period,[643] emphasis is given here particularly to the site of Chorto.

The site of Chorto is situated around 7.4 km southeast of Lephokastro. Associated with the preceding settlement of ancient Spalathra, coastal activities at Chorto go back as early as Classical times.[644] Mainly due to the rich agricultural hinterland with its numerous ecclesiastical installations, Chorto remains prosperous into the Byzantine period.

[640] Wace, Pelion, 152; for *verde antico* see: Karagiorgou, Urbanism and Economy, 183-195; documented as cargo on the 6th century shipwreck of Marzamemi, the Thessalian stone is known to be shipped as far as Sicily: Parker, Ancient Shipwrecks, 267.

[641] *AD* 22/3 (1967) 308; *EEBS* 10 (1933) 531; *PAE* (1911) 216-217, 219-222.

[642] Avramea, Thessalia, 106; Wace, Pelion, 149.

[643] Numerous remains of Early to Late Byzantine churches and basilicas have been recorded, both inland and along the coast surrounding the two sites: Avramea, Thessalia, 106; Koder-Hild, Hellas und Thessalia, 140, 218; A. Philippson – H. Lehmann, Der Nordosten der griechischen Halbinsel, I (*Die griechischen Landschaften* 1). Frankfurt 1950, 160.

[644] For Spalathra see: Wace, Pelion, 149-151.

Concerning its harbour installations, the settlement is concentrated around the estuary of a river, which still crosses the present homonymous coastal village (ILL II.III.35, VOL II). Consequently, like Almyros and the site of Troulos on Skiathos, it belongs to the rare category of river-sea-harbours. Since the river is navigable even today, it can be assumed that (see chapter 2.2.4. "Evidence of other relevant Archaeological Sites" and 2.2.5. "Concluding Interpretations of the Island's Archaeology and History") in Byzantine times agricultural products were transported from the inland sites to the coast by small boats, which in turn trans-shipped the commodities onto merchant vessels. Unfortunately, since the river is still used as a mooring area and is entirely built up with modern harbour superstructures (ILL II.III.36, VOL II), no remains of former installations could be identified during the 2012 field season.

In conclusion, together with Milina and numerous other landing stages and roadsteads around the huge sheltered bay of Valtoudi and the island of Alata further south (ILL II.III.37, VOL II),[645] Chorto belonged to the dense network of staple markets of southern Pelion. These not only acted as communication platforms between the widely stretched chain of ecclesiastical installations and various surrounding settlements such as Olizon, Kottai or Trikerion,[646] but also served as collection points for the exploitation of their agricultural units.

[645] The bay of Valtoudi served as Scala for the Classical to Early Byzantine inland settlement of Olizon (Palaiokastro). For Olizon see: Avramea, Thessalia, 105-106; Koder-Hild, Hellas und Thessalia, 227; Wace, Pelion, 148-149; for Alata see: *PAE* (1911) 218; Avramea, Thessalia, 106; Koder-Hild, Hellas und Thessalia, 169-170.

[646] Avramea, Thessalia, 105-106; Koder-Hild, Hellas und Thessalia, 194, 227, 278-279; for the widespread churches, basilicas, monasteries, Metochia and other ecclesiastical properties see: Koulouras, Pagasitikou, Map; Magdalino, Thessaly, 98-105.

2.4.2.6. Aghios Georgios Sagora (ILL II.III.38, VOL II)

The first harbour site to be mentioned sailing along Pelion's rocky and inhospitable outer coast coming from the south is Aghios Georgios, today colloquially known as *Katigiorgi*. Located exactly opposite Skiathos, it still constitutes one of only two approachable and safe anchorages on the entire southern coast of the peninsula before reaching Aghios Demetrios. Equivalent with the toponym of the ancient settlement and homonymous cape *Sepias* or Roman *Myrae*,[647] its history is attested by written sources as early as the 5th century BC. Flanking the passage of Skiathos to the west, Aghios Georgios played a prominent role during the Persian war.[648] Due to its unique and strategic position, it continued, together with the bay of Theotokos further north, to function as a crucial anchorage and coastal settlement throughout the entire history of Byzantium. This is confirmed not only by the wall remains of the fortification of so-called *Palaiokastro*, which was communicating with the Kastro at Skiathos for the military control and protection of the trading route and shipping lane passing the channel, but also by the remains of a basilica dating to the 6th century AD, which might even be the eponym of Aghios Georgios.[649] Accordingly, the site is regularly mentioned as an approachable harbour in Portolans and Portolan charts as well as other written accounts.[650] Surprisingly, however, despite its importance, neither Aghios Georgios itself nor Theotokos close by

[647] Wace, Pelion, 147.

[648] Herodot, Historiae, H. Stein (ed.), II. Berlin 1884, VII. 113, 188, 191; for Classical Sepias see: Wace, Pelion, 145-148.

[649] *PAE* (1911) 219; Avramea, Thessalia, 104-105; Koder-Hild, Hellas und Thessalia, 164; for the byname "Sagora" or "Zagora" given in order to differentiate it from the synonymous church in the gulf of Pteleos see: Koder-Hild, Hellas und Thessalia, 162, 164, 282-283.

[650] A. Delatte, Les Portulans Grecs (*Bibliothèque de la Faculté de Philosophie et Lettres de l'Université de Liège* CVII). Lüttich 1947, 226, 296; Kretschmer, Portolane, 417, 513f.; Tafel-Thomas, Urkunden, III. 219-220.

show any harbour features. Consisting of a small sheltered cove with a sandy beach, it is likely that it functioned exclusively as an anchorage. The question, whether access to land was provided by landing stages or whether beaching was practisized cannot be answered. If any kind of harbour structure existed, it is likely that they were similar to Kechria at Skiathos (see chapter 2.2.3.4. The site of "Tarsanas" at Kechrias Bay and 2.2.5. "Concluding Interpretations of the Island's Archaeology and History"), which consisted of wooden piers and possibly a wharf along the sheltered northern rocky shore (ILL II.III.39, VOL II). Beyond its vital role as an anchorage for ships sailing along the Pelion peninsula, similar to Kechria, Aghios Georgios also functioned as a temporary staple market. Directly connected with inland Lavkos via Pelion's road network and with Skiathos and the other islands of the Northern Sporades via shipping lanes, it formed both a foreland and hinterland of the Thessalian economic network. Being connected with the secondary harbour and staple markets of Skiathos, Aghios Georgios supplied the harbours and port-cities within and beyond central Greece with agricultural products.[651]

2.4.2.7. Velika and Koutsoupia (ILL II.III.40, VOL II)[652]

The site of Velika, also known as Byzantine *Verliki*, is situtated at the northern end of the 10 km long north-south orientated favourable sandy bay of Aghiokampos. Velika not only constituted the first hospitable coastal area passing the Pelion peninsula towards the north,

[651] This is indicated by an epigraphy found in vicinity explaining the use of an olive oil press and a Venetian document from AD 1276, implying trading connections between Aghios Georgios Sagora and Chalkis on Euboea by referring "Item Georgio de Crete, derobato die III intranet Marcio MCCLXXVI, dum **venire cum una sua barca de Sagora**,...cum foret ad pontam Delitalde, **veniendo Nigropontem**, per Grecos de Loreo...": *PAE* (1911) 219; Tafel-Thomas, Urkunden, III. 219; Koulouras, Pagasitikou, 21-22; Magdalino, Thessaly, 104.

[652] *AD* 25 (1970) B. 292; 26 (1971) B. 307.

but also the main coastal access point to the wider fertile inland area of Aghia.[653] The history of coastal activities in that area goes back as early as the Classical period. As the successor of the important ancient coastal settlement Melivoia (ILL II.III.41, VOL II), which has recently been located at modern Polidendri,[654] the nucleus of coastal activities shifted from the various potential harbour sites south of Aghiokampos (ILL II.III.42, VOL II) to Velika north of the river of Aghiokampos towards cape *Dermatas* (ILL II.III.40 and 43, VOL II).[655] The importance of controlling this coast, and in particular that of Velika, is shown by the chain of coastal fortifications such as the 6th-7th century AD dated Byzantine castles of Velika and Kokkino Nero (ILL II.III.44, VOL II).[656] Additionally, the role of Velika as an important and rich coastal station and harbour area of northern Thessaly throughout the entire Byzantine period is attested by Portulans and other written accounts particularly of the Late Byzantine period.[657]

The area was visited during the field season in 2012 and together with the director of the 7th Greek Ephorate for Byzantine Antiquities Dr Stavroula Sdrolia, the entire northern

[653] For Aghia and its surrounding settlement and ecclesiastic-agricultural activities see: Avramea, Thessalia, 82; Koder-Hild, Hellas und Thessalia, 169.

[654] For the history and geographical location of the ancient city of Melivoia and its harbour site see: A. Tsiafalias, ΤΟ ΜΥΣΤΗΡΙΟ ΤΗΣ ΑΡΧΑΙΑΣ ΜΕΛΙΒΟΙΑΣ and B. G. Intzesiloglou, ΜΕΛΙΒΟΙΑ. Η αρχαία πόλη στη θέση "Κάστρο" στο Κάτω Πολυδένδρι Σκήτης, της επαρχίας Αγιάς, στο Νομό Λάρισας, in: Αναζητώντας την αρχαία Μελίβοια, A. D. Zoukas (ed.). Melivoia 2010, 9-63; Wace, Pelion, 147.

[655] For information on the settlement history of Velika and its surrounding area see: Avramea, Thessalia, 82; Koder-Hild, Hellas und Thessalia, 134; Stavroula Sdrolia, ΕΥΡΗΜΑΤΑ ΠΑΛΑΙΟΧΡΙΣΤΙΑΝΙΚΗΣ ΠΕΡΙΟΔΟΥ ΣΤΗ ΒΕΛΙΚΑ. Συμβολή στην έρευνα για την Μελίβοια των πρώτων βυζαντινών χρόνων, in: Αναζητώντας την αρχαία Μελίβοια, A. D. Zoukas (ed.). Melivoia 2010, 65-86.

[656] http://www.dimosagias.gr/paralies/item/55-kastro-belikas.html; http://www.dimosagias.gr/fusi-peribalon/item/84-kastro-kokkinou-nerou.html.

[657] Delatte, Portulans, 226; Kretschmer, Portolane, 323, 514, 637; Tafel-Thomas, Urkunden, III. 218 (Nr. 370).

Thessalian coastline from Aghiokampos up to Kokkino Nero was investigated.[658] No indications of harbour structures along the entire bay of Aghiokampos could be found. Nevertheless, the bay of Aghiokampos was probably used as a roadstead. As a port-of-call, the area represents a typical Scala despite the fact that not even simple harbour infrastructures seem to have been utilised along the coast. It is suggested, however, that the river, together with a number of other rivers flowing into the bay further north, was not just accessible for small riverboats transporting agricultural products to the coast, but also to bigger open-sea ships. Similar to the river Xerias at Almyros, Chorto and Troulos at Skiathos, these rivers were probably seasonally navigable by bigger merchant vessels. Consequently, if any facilities existed, the harbour area must be located further up the river.[659] Considering the 6th-7th century AD dated castle of Velika and Early to Middle Byzantine settlement traces such as that of Skiti at the river Aghiokampos further inland, the possible construction of a river-harbour may go back at least to the Early Byzantine period.[660]

Beyond Velika the coastline north of cape Dermatas to the castle of Kokkino Nero and the site of Stomio shows plenty of Early Byzantine material remains identical to those documented at the old (southern) harbour at Skiathos (ILL II.III.45, VOL II). This is further reflected by intensive coastal activities in this area. During the 2012 field season,

[658] Here, the present author wants to express his gratitude to the director of the 7th Greek Ephorate for Byzantine Antiquities, Dr. Sdrolia, for her time and effort to guide the author personally to the sites and to conduct field survey along the entire northern Thessalian coast.

[659] A verification of that hypothesis is impossible within the scope of the current thesis. For that detailed archaeological investigations and a geophysical prospection have to be conducted, which may be realized in a further future cooporation with the 7th Greek Ephorate for Byzantine Antiquities.

[660] A dating to the Roman Imperial period, however, should not be excluded. The destruction of Meliboia shortly after 168 BC and the shift of coastal activities further north probably during the period of the Pax Romana forms a hypothetical terminus post quem for the construction of the river-harbour and the commercial exploitation of Velika and its hinterland.

ancient structures were detected and identified at the harbour site of Koutsoupia, around 5.7 km northwest of the bay of Aghiokampos (ILL II.III.46, VOL II). The small harbour with a northern exposure is located approximately 1 km east of the modern homonymous village and the eastern slope of mount Kissabos (Byzantine Ossa). Similar to its present use, it most probably served as shipyard area, so-called *Tarsanas*, for the Classical to Early Byzantine coastal settlement of Rizus.[661] A function as military base, so-called *Ναύσταθμος*, could equally be possible.

The field season revealed the existence of both the northern and western breakwaters, which are still entirely preserved beneath the modern equivalent structures. The bigger northern breakwater has a total length of approximately 80 m, with a width of up to 40 m. The western breakwater is smaller with a length of approximately 30 m and a width of 15 m. Forming arms leading from the coast into the water, the breakwaters met together at the north-western end enclosing a harbour basin of 0.49 ha with a 20 m wide entrance (ILL II.III.47, VOL II). Despite different overall proportions, the northern breakwater shows identical characteristics with the western breakwater at the old (southern) harbour at Skiathos and the northern breakwater at the harbour of Achilleion.[662] The northern breakwater at Koutsoupia shows a gentle inclination towards the north, lending the construction a high stability against the strong and constantly affecting northern winds by absorbing the force of the waves of the open sea. The original feature is currently situated just between 0.10 m and 0.50 m below the present water level.[663] Like the breakwater at Skiathos, it probably did not protrude greatly from the sea even at the time of its

[661] Koder-Hild, Hellas und Thessalia, 252; Wace, Pelion, 147.

[662] For the architecture of the western breakwater of the old (southern) harbour at Skiathos and a comparison to Koutsoupia see chapter 2.2.3.1. "The broader harbour area".

[663] Blackman, Sea Level, 115-139.

construction. Consequently, in contrast to the modern superstructure, the exterior part of the breakwater still indicates that waves were allowed to break over it in order to create currents within the harbour basin for the prevention of siltation (ILL II.III.48, VOL II). As such, similar to the western breakwater of the old (southern) harbour at Skiathos, it is a form of a "Mound Breakwater".[664] Furthermore, it can be assumed that it did not support mole structures along its internal side, which indicates that no supplementary mooring facilities were needed. Concerning its composition, the internal part or core section is built of a mixture of quarry rubbish and small stones, while the external part consists mainly of large boulders (ILL II.III.49, VOL II). As such, although the possible date of the feature allows a time interval from the Roman Imperial to the Early Byzantine periods, a synchronous date with Skiathos, namely to the end of the 6th century AD is suggested. This is because of its close relationship with the intensive fortification activities in the surrounding coastal area during the 6th-7th century AD, where it can be assumed that like Skiathos the harbour of Koutsoupia is associated with the extensive building programme in central Greece under emperor Justinian I.

In terms of further potential harbour installations, no features could be verified at the present stage without underwater archaeological investigations (ILL II.III.50, VOL II). Even if mooring facilities existed, however, these would not have taken the entire coastline of the harbour. Instead it is likely that similar to today, both ends of the coast provided space for slipways and other necessary facilities for the repair of ships (ILL II.III.51, VOL II). Whether Koutsoupia possessed shipsheds for the protection and maintenance of war- and patrol ships is still unclear and needs more detailed studies. Not only the absence of mole structures but also the assumed limited space for quay areas

[664] For "Mound Breakwater" see chapter 1.3.1.1. "Breakwater and Mole".

excludes a function as merchant harbour and supports the interpretation as a shipyard or even military base.

In conclusion, as the only shipyard in the region Koutsoupia constituted a catchment area for repairs and presumably even construction works for the entire northern Thessalian coast. Due to its central location between the bay of Aghiokampos and the *Pineios* River, in later centuries Koutsoupia served as shipyard for the settlement of Rizus and the harbour sites of Kokkino Nero (ILL II.III.40, 42, 52, VOL II)[665] and Stomio further north.[666]

[665] Despite the author's visit of the site, no close investigation of the coast could be conducted. However, it can be assumed that similar to Velika, Kokkino Nero possessed small river-sea-harbour installations at the estuary of the homonymous river, transhipping products from the inland plains.

[666] Due to lack of time, the author was not able to investigate the site of Stomio.

CONCLUSIONS

Before drawing any conclusions on the history of Byzantine coastal infrastructures and the development of harbour features in Thessaly, it has to be stressed that the archaeological studies of the various coastal sites under examination are uneven; both between the primary port-cities as well as the secondary harbours and smaller staple markets. Although no attention has ever been paid to harbour facilities, sites such as Demetrias and Thebes have been the subject of intensive historiographical research and systematic excavations since the beginning of the 20th century. A similar case form the available data from portolans, portolan charts and other textual sources.[667] Therefore, a more comprehensive picture is given, which provides the context for certain harbour infrastructures and to provide a chronological framework for their dating. In the areas of Almyros or Pteleos especially archaeological investigation is still in its infancy. Small coastal structures and their associated agricultural areas are even completely in the shadow of research. The survey project on Skiathos highlightens particularly the importance of the contribution of small areas for the study of coastal sites and their development through time.

But do the results from Skiathos reflect an individual and independent development of a certain area; in this case influenced by its insular character with distinct geographical and

[667] Except for Demetrias and Almyros, particularly portolans and portolan charts do not give any information concerning Thessalian harbour infrastructures. They mostly provide only distances and directions between the various stations. For the trading routes and shipping lanes of Thessaly based on portolans and charts see Ginalis, Northern Sporades, 279-294.

physical conditions?[668] Or do they show generally valid tendencies for the entire region or even beyond?

The investigation of architectural features and archaeological material of Thessaly's mainland coastal sites in fact revealed similar results. Consequently, together with data assembled from previous archaeological studies and historical as well as written sources, the following conclusions can be made:

[668] For the definition of geographical and physical conditions see chapter 1.2. "Function, purpose and hierarchy of coastal installations".

3.1. The history of Thessalian coastal sites

Despite the uneven state of research between the different sites investigated within the region of Thessaly, they nevertheless provide a clear picture of harbour changes, which are consistent with the historically determined periods of the Byzantine Empire.

THE 4th AND 5th CENTURY AD

The earliest chronologically relevant structures were recorded at Demetrias, Thessalian Thebes, Skiathos, Achilleion, Amaliapolis, Nies and Platanidia, all dating to the 3rd – 5th century AD (ILL CONCLUSIONS.1, VOL II). These early structures show that the first centuries of the Byzantine Empire are still defined by a clear-cut Roman social system. Private commercial and to a certain extent travel activities are still expressed by the existence of Villa estates. The various documented *villae maritimae* along the Thessalian coast, such as at Lazareta and Vasilias on Skiathos, Nies or Amaliapolis suggest a continuation of villa traditions in the east well into the Byzantine period and possibly up to the 5th century AD.[669] At the same time the classical forms of society became increasingly confronted by and intermixed with the new establishment of the church as an institution. The appearance of ecclesiastical foundations indicate an introduction of different levels of communication and interaction, not only within the big cultural centres of Demetrias and Thessalian Thebes but also shown at small sites such as Platanidia.[670] In contrast to the villa sites with their independent harbour installations, however, the ecclesiastical facilities are still orientated towards the use of public Imperial harbour infrastructures.

[669] The toponym of the area of "Loutro" at the gulf of Pteleos indicates the possible existence of another coastal villa site.

[670] Kingsley, Barbarian Seas, 1.

THE 6th CENTURY AD

Not before the 6th century AD a period of transition started due to geopolitical and social changes. At a time of growing political instability in the Balkan regions, it became apparent that only the control over the access to the sea would secure economic and military power. As such, the building programme under the reign of Justinian I not only put emphasis on the establishment of a network of fortifications, but also on the costruction of harbour sites which constituted strategically important stations (ILL CONCLUSIONS.2, VOL II). Accordingly, while Demetrias and Thessalian Thebes remained the major maritime commercial hubs of central Greece despite facing an urban decline, in the gulf of Pteleos the nucleus shifted from Achilleion on the innermost southern coast to Pigadi on the northern coast in order to control the entrance to the Pagasetic gulf. At the northern edge of Thessaly, the site of Koutsoupia shows a close connection to the fortification system as well. Constituting either a shipyard or a military base, it fulfilled the requirements of patrolling warships for the surveillance of the shipping lanes along the inhospitable coast of the Pelion peninsula. Harbour constructions as part of Justinian's building programme can further be observed at Afyssos and Skiathos, which served as significant junctions for land and maritime trading routes and shipping lanes across the Pelion peninsula as well as to Constantinople, the wider Aegean Sea and beyond.

At the same time, the social changes also influenced the nature of private coastal activities. By the 6th century AD at the latest, the church has entirely replaced the tradition of the Roman villa.[671] Particularly the sites of Troulos on Skiathos and Nies but also

[671] This is supported by the site of Diaporit in Epirus, which indicates that the foundation of a basilica at the beginning of the 6th century AD caused the abandonment of the private estate; as a result the

Platanidia and the bay of Chorto and Milina indicate, that with the disappearance of *villae maritimae* ecclesiastical installations such as monasteries and their *metochia* take over the role as independent private trading centres dominating the commercial landscape.[672] The church not only started constituting a decisive factor for the influence and impact on maritime trade, the rock inscription in the old (southern) harbour of Skiathos together with a high number of other archaeological material of religious context, shows that apart from monasteries with their own harbour features, the church also takes on the role as initiator for the construction of public harbour installations. As a result, with weakened Imperial authority, the execution of harbour constructions as well as that of maritime trade gradually shifted from the empire as an entrepreneur itself towards the institution of the church.

THE 7th AND 8th CENTURY AD

After suffering from the troublesome events of the 6th and early 7th century AD, the Byzantine authority attempted to regain control over Thessaly. The effort for a gradual recovery is caused by the loss of Egypt to the Arabs and the need for recuperation of Byzantine authority over the Greek peninsula as both producer and supplier of agricultural products.[673] Public harbour construction activities are limited to the port-cities of Demetrias and Thessalian Thebes as the vital commercial centres (ILL

ecclesiastical installation taking over the commercial and social role of the villa maritima: Bowden, Epirus Vetus, 201.

[672] Kingsley, Barbarian Seas, 5-6; for ecclesiastical activities, executing commercial and inter-connective operations with their independent staple markets and harbour installations etc. see monastic documents such as those of Patmos and Lavra monasteries: Actes de Lavra, I-IV; Vranousi, Patmos, I-II. Athens 1980.

[673] For the growing importance of central Greece and in particular that of Thessaly see: Karagiorgou, Urbanism and Economy, 31, 168ff; parallels can be seen at the harbours of Anthedon and Larymna for Phthiotis.

CONCLUSIONS.3, VOL II). This attests the already unequal relationship between Imperial and private (including ecclesiastical) activities.[674] The movement particularly towards independent ecclesiastical harbour installations as the main economic stimulus which started in the 6th century AD, was complete in the 7th century AD at the latest. This is not only supported by the establishment of independent ecclesiastical harbour installations at Thessaloniki, referred as "εκκλησιαστική σκάλα",[675] but also by the *Vita et Miracula Sancti Demetrii*, describing the private initiative of the citizens of Thessaloniki for commercial contacts to the Velegezetes Slavs, which were trading through the harbour of Thebes.[676]

THE 9th TO THE 15th CENTURY AD

For the period of the late 8th to the 10th century AD the survey project on Skiathos confirms the existing picture of a gap in the material culture in Greece. Contrary to the absence of archaeological finds, however, written sources inform us not only of pirate activities and the raid of Demetrias by the Saracens, which indicates a flourishing trade, but also about the growing importance of Almyros and Pteleos as new trans-shipment centres of the Pagasetic gulf (ILL CONCLUSIONS.4, VOL II). While Demetrias remained active as a major port-city, Thessalian Thebes disappeared from the scene of economic history in favour of the new coastal centres.

In addition to the already existing Thessalian commercial landscape of the Middle- and Late Byzantine periods, which is dominated by private businessmen and particularly by

[674] R. S. Lopez, The Role of Trade in the economic readjustment of Byzantium in the 7th cent. *DOP* 13 (1959) 69-85.

[675] Lemerle, Miracles, II, 186: "....οἱ μὲν (οι Σλάβοι) εἰς τὸν πρὸς δύσιν τῆς **ἐκκλησιαστικῆς σκάλας** πύργον, ἔνθα καὶ παραπύλιον ὑπάρχει..."; Leivadioti, Thessaloniki, 56ff.

[676] Karagiorgou, Urbanism and Economy, 28-29.

the church,[677] western merchant-colonies start to emerge. Their growing level of commercial activities even increases the privatization of trade.[678] The merchant-colonies act as independent trading centres with their own harbour installations. This results in the shift of harbour activities away from major Imperial ports to small individual *scalae*. The best example forms the commercial map of Constantinople, where the alterations in trading patterns resulted in a greater concentration of commerce on the Golden Horn as a roadstead with its numerous independent *scalae*.[679] Similarly, at Demetrias these *scalae* cause a relocation of harbour activities from the coastlines of the promontory to the northern coast of the gulf of Volos as well, forming a distinct zone within Demetrias' greater urban area. The urban area of Almyros even extended around 8km due to the various communities spreading along the coastline. Instead, at Pteleos the Venetian community formed an independent fortified settlement, using a separate roadstead at Loutro for its *scala*.

Finally, the survey project on Skiathos revealed similar developments also for secondary harbour sites. While Skiathos' broader harbour area was used as an open roadstead with

[677] This is also demonstrated by written sources such as the report of the pilgrim Saewulf or that of Patriarch Leontios about a monk being synchronously sea trader, dating to the 12th century AD: Peregrinationes tres. Saewulf, John of Würzburg, Theodoricus, R. B. C. Huygens (ed.), (*CCCM* 139). Turnholt 1994, 60-61, 76-77; Th. Goudelis – D. Tsougarakis, The life of Leontios, Patriarch of Jerusalem. Text, translation and commentary, (*The Medieval Mediterranean* 2). Leiden 1993, 98–100; Kingsley, Barbarian Seas, 5-6; Kislinger, Verkehrsrouten, 170.

[678] This is attested for example by trade agreements between the Byzantine court and Venice: Tafel-Thomas, Urkunden, III. 161, 199, 269 (Nr. 370); Miklosich-Müller, Acta et Diplomata, III, 338; Koder-Hild, Hellas und Thessalia, 257-258; accordingly, already the 10th century AD dated Book of the Eparch indicates that the Imperial authority is limited to the role of a controlling power behind the scene: J. Koder, Das Eparchenbuch Leons des Weisen. Einführung, Edition, Übersetzung und Indices (*CFHB* 33). Vienna 1991.

[679] Ercan, Yenikapi, 12-14; P. Magdalino, Constantinople médiévale. Études sur l'évolution des structures urbaines (*Travaux et mémoires du Centre de recherche d'histoire et civilisation de Byzance. Monographies* 9). Paris 1996, 78-90; Mundell-Mango, Commercial Map, 205.

individual landing stages, other sites around the island such as Kechria, Troulos and Aghia Paraskevi formed independent staple markets. The site of Kechria even indicates only a seasonal agricultural exploitation.

3.2. The harbour architecture from the Roman Imperial to the Late Byzantine periods

Alongside the general historical development of coastal sites, the Thessalian harbour infrastructures under investigation show an architectural development as well. Irrespective of the nature of the coastal site, the harbour architecture provides clear chronological stages, which can be associated with the above-discussed general historical picture. Although comparative examples like Constantinople, Thessaloniki, Ephesos, Anthedon or Larymna are still too few for generalizing conclusions, the following analysis attempts a first step towards an introduction to Byzantine harbour studies.

THE 4th AND 5th CENTURY AD

The survey project and the field seasons revealed that, similar to the Byzantine social system, during the first centuries the harbour architecture is still clearly marked by Roman traditions. Features stretching along the coastline such as the quay lines at the harbours of Demetrias and Thessalian Thebes form frontal façades of big elaborated stone blocks with notches for a mortar or metal bonding in order to achieve a high stability and long lasting resistance. This is followed by a compact conglomerate of rubble stones and mortar. The same system of the levees and embankments can be observed at the Early Byzantine harbours of Ephesos and the Theodosian harbour at Constantinople.[680]

Installations protruding into the water such as jetties are built of hydraulic concrete, consisting of a compact, symmetrical uniform and linear shaped composition of mortar, mixed with rubble stones and ceramics. As described by the Roman architect and engineer Vitruvius Pollio and later by the Byzantine scholar and historian Procopius of Caesarea,

[680] Ercan, Yenikapi, 113, Fig. III. 78; 119ff, Fig. III. 9; 166, Fig. III. 54; for notches of metal bonding see Fig. III. 44-45.

these were constructed by using sunken wooden formworks.[681] While so far this sophisticated but efficient and fast architectural method was found only at major imperial ports such as the Theodosian harbour at Constantinople and the Herodian harbour of Sebastos at Caesarea Maritima, the sites of Lazareta at Skiathos, Amaliapolis and Platanidia show for the first time that hydraulic concrete structures were also applied at secondary harbours and staple markets, including *villae maritimae*.

Finally, in contrast to Roman Imperial harbours like Caesarea Maritima or Portus, during the Early Byzantine period the port-cities of Demetrias and Thebes were fortified. Similar to the Theodosian harbour at Constantinople and Thessaloniki,[682] this included also harbour fortifications which consisted either of inner harbour walls such as at Demetrias or outer harbour walls enclosing the basin such as at Thessalian Thebes.

THE 6th CENTURY AD

During the 6th century AD and associated with Justinian's extensive building programme, a transition period of harbour architecture can be observed. This is reflected by the quay and jetty constructions at the southern harbour of Skiathos, Pigadi and Afyssos, which possess a continuing Roman tradition but a different adaption for harbour architecture. Even though, they show a similar construction technique with earlier hydraulic concrete features, in terms of their composition, architecture and arrangement the method of use is totally different. The construction of architectural features along the coastline did not require the use of a uniform hydraulic concrete structure by the sinking of a wooden formwork. For a more efficient, faster and lower-priced mass production, the formworks

[681] Vitruvius Pollio, De Architectura, V. 12. 3; Procopius Caesariensis, De aedificiis, I. 11. 18-20.

[682] Ercan, Yenikapi, 110ff.; Leivadioti, Thessaloniki, 19ff.

were instead used for the production of individual stone blocks on land. These were simply filled with waste material such as raw quarry stones.

Roman harbour traditions can still be seen at the constructions of breakwaters however. The breakwaters of type "Mound Breakwater" at Skiathos' old (southern) harbour, Achilleion and Koutsoupia as well as that of the *Metochi* at Nies show a core section built of a mixture of quarry rubbish and small stones and an external part consisting mainly of large raw rock boulders. Similarly to Caesarea Maritima,[683] they did not protrude from the sea in order to allow waves to break over for the creation of currents within the harbour basin for preventing siltation.

Concerning the fortification of harbours, while the existing inner and outer sea walls of Demetrias and Thessalian Thebes were repaired, newly constructed sites such as the southern harbour at Skiathos do not show any signs of fortification. Sites such as Afyssos, however, show that they were well protected by the systematic coastal fortification network established as part of Justinian's building programme.

THE 7th AND 8th CENTURY AD

While the harbour features of the 6th century AD represent a transitional period, adapting Roman traditions to new geopolitical and social circumstances, the Middle Byzantine period shows a totally different architecture. Using a likewise fast and cheap production method like that applied at the earlier harbours of Skiathos, Pigadi and Afyssos, the outer harbour of Thessalian Thebes as well Alykes at Demetrias show the execution of an already well-established highly sophisticated architecture. Their quay and jetty structures consist of longitudinal and lateral walls, forming a chamber system. The parallel running stone walls, 1 m apart, are filled with rubble stones and mortar in between, separated in

[683] Raban, Caesarea Maritima, 64.

sections. The only comparative examples to the port-cities of Demetrias and Thessalian Thebes so far are the central Greek harbour sites of Anthedon and Larymna, as well as the Thracian port-city of Aenus,[684] which again are the results of imperial politics and activities during the Middle Byzantine period.

THE 9th TO THE 15th CENTURY AD

The increasing importance of *scalae* in the form of small individual landing stages, makes the observation and identification of harbour facilities difficult. In contrast to written accounts and the recent discoveries at Yenikapi, for the period of the late 8th to the 10th century AD neither the survey project on Skiathos nor the field seasons revealed any harbour infrastructures. Landing stages at that time were typically constructed of wood and formed wharfs and piers, similar to those brought to light in the Theodosian harbour at Constantinople or as shown in iconographic depictions.[685] The identification of such features would consequently need systematic excavations at the harbours of the Thessalian port-cities such as Demetrias or Thebes.

Only for the 11th-13th century AD was the survey project on Skiathos able to register the physical remains of harbour activities again and identify harbour installations with certainty. This can be seen with the eastern breakwater of the old (southern) harbour, dated to the beginning of the 13th century AD. Although it shows the same technique of construction as the western breakwater, consisting of an internal and an external part, it demonstrates a more solid and thicker but rougher concrete composition which is heavily

[684] Here the author wants to express his gratitude to the excavator Dr Thomas Schmidts for sharing his results during a personal meeting at the Museum for Ancient Navigation of the Römisch-Germanisches Zentralmuseum Mainz.

[685] Such as the depiction of the departure of Gregory of Nazianzus from Constantinople: Cod. Taphou 14, f. 265r.; Aidoni et alii, Journeys, 21, Fig. 5; for the wooden remains of piers at the Theodosian harbour of Constantinople see Ercan, Yenikapi, 116, Fig. III. 8; 162, Fig. III. 42.

encrusted with the core's rubble filling. Furthermore, the breakwater is set around 1 m lower than its western counterpart and therefore represents a "Composite Breakwater". Finally, the jetty constructions at the harbour bay of Skiathos and the *Metochi* at Nies are suggested as forming landing stages dating to the Late Byzantine period as well. Since only rough alignments of border stones could be verified due to siltation, however, no further information concerning their architecture or date can be provided at this stage.

3.3. Port network and the hierarchy of coastal installations

Both the survey project on Skiathos and the field seasons revealed that Thessaly possessed a rich and complex coastal system. According to the hierarchical model set up in chapter 1.2. "Function, purpose and hierarchy of coastal installations", the Thessalian coastal sites can be differentiated by category, type and function (see ILL I.4, VOL II). Although possibly all three categories of harbours existed, only sea and river-sea-harbours could be identified. While Dunn shows the existence and importance of river-harbours for the northern Greek coastline, where for example a number of Byzantine sites have been located along the Strymon Delta,[686] river-harbours seem not to have played a significant role in Thessaly due to the geographical and physical conditions of the area.[687] While sea harbours formed the dominant category throughout the entire Byzantine period, the sites of Kechria, Troulos and Aghia Paraskevi on Skiathos or that of Chorto show that the use of river-sea-harbours was not uncommon; at least for staple markets.

In contrast to the category, the typology and function of harbour sites vary through time, dependent upon geopolitical changes. This is clearly visible for example at military and travel-orientated installations. While the site of Koutsoupia or the shipyard at the northern harbour of Demetrias show that during the Early Byzantine period military harbours or bases and military-orientated harbour sections existed, in later centuries no specific area or installation can be associated with military purposes anymore. On the contrary, the site of Platanidia indicates that during the early centuries travel activities were executed

[686] A. Dunn, Byzantine and Ottoman Maritime Traffic in the Estuary of the Strymon: Between Environment, State, and Market, in: Medieval and Post-Medieval Greece. The Corfu Papers, J. Bintliff – Hanna Stöger (eds.), (*BAR Int. Series* 2023). Oxford 2009, 15-31.

[687] This is shown for example by the city of Almyros, which despite moving inland during the Ottoman period, still kept the Byzantine harbour sites along the coast.

mainly via the central public harbour infrastructures. Only in later centuries did distinct travel-orientated facilities seem to develop, which are operated by the church.[688]

Although the differentiation between coastal infrastructures provides already a rough picture of Thessaly's coastal system, the decisive factor for determining an acurate hierarchical model and illustration of the interrelationship between harbour sites is commercial activities. Thessaly's major trading centres Demetrias, Thessalian Thebes, Almyros and Pteleos indicate a further differentiation of harbour types with the same commercial function. Depending on the specific hinterland, each port traded in certain products: besides exporting many other types of merchandise, grain was shipped mainly from Thessalian Thebes and later Almyros, olive oil from Almyros, wool and salt from Pteleos, wine from Pteleos and Thessalian Thebes and white marble as well as the stone "verde antico" from Demetrias.[689] The best comparative example for a similar functional differentiation between various ports is Constantinople. Based on the adjacent markets or its surrounding warehouses and other harbour facilities, each of the Constantinopolitan harbours was used for trading in specific types of merchandise (ILL CONCLUSIONS.11, VOL II). For example during the Early Byzantine period the grain supply for the capital was operated mainly through the Theodosian harbour, whereas the oil, meat and fish trade was operated via the Prosphorion harbour until the wholesale food market moved to the Julian harbour. In the Late Byzantine period the target of commodities further depended on the commercial pattern influenced by the various merchant quarters.[690]

An additional differentiation of harbour sites of the same type based on size data, as suggested by Schörle for the Roman Tyrrhenian coast, is not possible for the Byzantine

[688] The function of private coastal sites with their infrastructures form an independent case.

[689] For the production and distribution of Thessaly's agricultural and industrial products see Karagiorgou, Urbanism and Economy, 168ff.

[690] Ercan, Yenikapi, 17, 127ff.; Mundell-Mango, Commercial Map, Fig. 4.

East. Although the proposed rough size data of up to 30 ha is true also for Early Byzantine harbour sites, these do not allow any conclusion concerning port hierarchies. While in the case of Thessaly for example Demetrias' northern harbour enclosed an area of 13.20 ha and its southern harbour even 17 ha, Thessalian Thebes possessed a harbour basin of just 1.74 ha and the enclosed harbour of Achilleion shows only an area of 0.55 ha (Tab. 2).

Site	**Harbour***	**Time period**	**Area**
Demetrias			
	Northern harbour	Hellenistic-11th c. AD	13.20 ha
	Southern harbour	Classical-8th c. AD	17 ha
	Shipyard	Classical-9th c. AD?	1.7 ha
Thessalian Thebes		Roman-6th c. AD	1.74 ha
Almyros			
	Scala Platanorrema	11th c. AD-	0.26 ha
Pteleos			
	Achilleion	Roman-6th c. AD	0.55 ha (4.75 ha)
Koutsoupia		6th/7th c. AD	0.49 ha
Skiathos			
	Southern harbour	6th/7th c. AD	0.64 ha / 1.77 ha
	Scala Kechria	Late Byz.?	0.05 ha

Tab. 2 Harbour size data

* For open roadsteads, harbour bays and *scalae* (except for Platanorrema and Kechria) no area measurement could be calculated

A comparison of size data rather suggests a chronological differentiation of commercial activities between the Early and Late Byzantine periods. While particularly Demetrias shows that Early Byzantine central harbours tend to occupy a larger area, the staple markets Platanorrema and Kechria indicate a general size for later individual *scalae* of less than 1 ha.

Particularly in context of maritime trade and its close connection to the hinterland, the Thessalian coastal infrastructures show that the harbour was not an independent and separate structure acting as an isolated phenomenon. As already stated in chapter 1.2. "Function, purpose and hierarchy of coastal installations", it rather functioned as economic hub, cultural and social meeting point as well as the main gate for communication and connection. The harbour characteristics (including its size), and consequently the degree and pattern of communication and economy, depend on a series of aspects, such as its geographical and physical conditions as well as the nature of its surrounding hinterland and foreland, which obviously vary between local, district, regional and supra-regional activities. Accordingly, the investigated harbour sites follow the same pattern drawn by Drakoulis for the Thessalian settlement network.[691] The resulting port network confirms a regional subdivision of Thessaly's coast, distinguishing further between districts and local areas (ILL CONCLUSIONS.5, VOL II). The coastal-related areas II, III and X are divided both geographically and topographically in the following three districts:

1. (II) The eastern coastline along the Magnesian or Pelion peninsula, which incorporates the local areas 2 and 19.
2. (III) The western coast of the Pagasetic gulf, which incorporates the local areas 3 and 4.
3. (X) The archipelago of the Northern Sporades, which incorporates the local areas 21-23.

Particularly during the Early and Middle Byzantine periods, apart from the islands each district possessed just one primary harbour; the port-city of Demetrias for district 2 and the port-cities of Thessalian Thebes and later Almyros for district 3. For the Late Byzantine period the economic and communication system reflects a much more complex

[691] Drakoulis, Settlements Network, 14, 20-34; Map 1.

picture. Independent western merchantile activities constitute an additional influencing factor, causing for example a second trans-shipment centre for district 3 at the gulf of Pteleos. However, their responsibilities towards the associated hinterland is even more strictly defined (compare ILL CONCLUSIONS.5 and 10, VOL II). The specific agricultural and industrial hinterland of each primary port-city and its districtal network is subdivided by local areas. While Demetrias forms the commercial hub for area 2, area 3 constitutes the hinterland of Thessalian Thebes and Almyros and area 4 for the gulf of Pteleos. Accordingly, all secondary harbours and staple markets were orientated towards a specific port-city or commercial hub.

Although private installations such as *villae maritimae* or monasteries and their *metochia* may have acted also independently between the different coastal sites disregarding any hierarchical pattern within the area or district,[692] the close investigation of Skiathos nevertheless revealed a symbiotic hierarchical relationship between local production centres, the secondary harbours of districts and the regional and supra-regional primary harbours and ports. In that respect, the surrounding staple markets of Kechria, Troulos, Aghia Paraskevi, Vasilias and Lazareta supplied exclusively the secondary harbour of Skiathos, which in turn supplied the primary harbours in the Pagasetic gulf with agricultural and industrial products. The harbour of Skiathos would also have been used as a profitable port of call by merchants dealing with supra-regional trade (ILL CONCLUSIONS.6, VOL II).

The same phenomenon can also be seen for the Pagasetic gulf. Based on the district and areal subdivision, within the Pagasetic gulf the supply network shows a clear separation

[692] Increasingly monasteries and their metochia may have executed commercial and inter-connective activities through their landing stages, supplying and communicating independently both with staple markets, secondary harbours and even bigger ports within a closer and wider foreland.

between the western and the eastern coast (ILL CONCLUSIONS.10, VOL II). While the staple markets and secondary harbours of Platanidia, Kala Nera, Afyssos and Lephokastro or Chorto and Milina supplying exclusively Demetrias, Amaliapolis and Nies supplying exclusively Thessalian Thebes and Almyros. The secondary harbours along the supra-regional trading routes and shipping lanes such as Amaliapolis, Afyssos or Velika, would also have been used as ports of call (ILL CONCLUSIONS.7, VOL II).

As a result, the Thessalian inter-regional port network follows Nieto's hypothesis of an organized commercial system of a combination of direct distribution and coastal cabotage redistribution network between production sites and staple markets, secondary harbours and primary ports. Consequently, although particularly ecclesiastical activities changed the pattern of Byzantine sea trade and the model of port hierarchies from the 6th century AD onwards, in contrast to the opinion of some scholars such as Preiser-Kapeller,[693] the traditional concept of random coastal tramping (ILL CONCLUSIONS.8, VOL II) has to be buried at least for the intra-regional network. Only the supra-regional economic and communication system reflects a more complex picture, combining both trading patterns. Accordingly, it is suggested that while merchants may have executed commercial tramping between different regions or parts of the Empire, once entering a specific regional economic system they followed the latter's distinct trading network (ILL CONCLUSIONS.9, VOL II). Finally, the presented data suggests that although the nature of maritime trade changes with time, due to the increasing role of private entrepreneurs and institutions like the church, the system of the port network does not change throughout the entire Byzantine period.

[693] J. Preiser-Kapeller, Mapping maritime networks (Working paper 2013).

3.4. Scope for further research

Although numerous works such as "The Economic History of Byzantium",[694] or in the case of Thessaly Karagiorgou's work "Urbanism and Economy in Late Antique Thessaly" and the recently presented work of Preiser-Kapeller,[695] illuminate various aspects of urban development, commercial installations, maritime network systems and Byzantine trade, one of the most important elements has been totally ignored so far: the role and function of harbour installations.

Consequently, this thesis presents for the first time an introduction to the study of Byzantine ports and other relevant coastal infrastructures in order to fill the gap and offer a full picture of architectural, social and economic developments throughout the Byzantine period. As the study of Byzantine harbour installations still form a *terra incognita*, section I sets up a basis for the correct interpretation of harbour installations and the understanding of their context by defining their various features. With that crucial groundwork, I put the different harbour structures and their associated facilities into a hierarchical pattern, creating a model which can be applied to any future work in harbour studies.

In order to test the hypothetical models with real archaeological data, fieldwork was undertaken in 2012 and 2013 under the patronage of the Greek Archaeological Services.[696] This was at two scales: a detailed local survey of the island of Skiathos and a wider survey of the ports of Thessaly. The archaeological investigations concentrate on

[694] Angeliki E. Laiou, The Economic History of Byzantium. From the Seventh through the Fifteenth Century (*DOS* 39), I-III. Washington, D.C. 2002.

[695] Karagiorgou, Urbanism and Economy; J. Preiser-Kapeller, Mapping.

[696] The author wants to express his gratitude to the directors of the Greek Ephorates for Underwater Antiquities, Dr Simossi, the 13th Greek Ephorate for Prehistoric Antiquities, Dr Intzesiloglou, and the 7th Greek Ephorate for Byzantine Antiquities, Dr Sdrolia.

the important and wealthy province of Thessaly, due to its high potential for archaeological heritage. Not only did Thessaly play an important role in maritime networks since Antiquity, forming a link for trading connections between the Mediterranean and the Black Sea,[697] but also the absence of large scale developments and the missing of scientific research makes the heartland of Greece ideal to be subject of investigation. Subsequently, the archaeological material has been set against the theoretical groundwork of section I as well as the historical background of the province. Additionally, the survey project on the island of Skiathos aims to act as an illuminative example for the archaeological approach of harbour investigations.

Due to the cooperation and the commitment of the directors of the responsible Greek Archaeological Services, a joint research programme, including three different authorities, has been developed which will continue the detailed fieldwork on Skiathos. A long durée study of the island's archaeology, including putting in context land and underwater sites, allows the study of economic and cultural developments within a historiographical framework. The successful execution and the excellent results of the Skiathos project shows the urgent necessity of both continuing the present project but also to adopt the approach and methods at other future programmes.

In future, the project will not only expand the systematic underwater and coastal exploration within the mainland and islands of Thessaly and central Greece, as stated already by Karagiorgou, but also start such systematic joint programmes for the study of harbour sites throughout the entire Aegean Sea and the wider Mediterranean. Finally, one of the biggest potentials for work on the topic of harbours, besides the analysis of the

[697] This is shown particularly by the number of trading goods and material exported and imported from the Black Sea, such as the 5th-7th century AD dated lamps, the LR 2 amphorae, or the 12th-13th century AD dated incised sgraffito ware.

recently excavated Constantinopolitan Theodosian harbour at Yenikapi, can be expected for the wider area of the Black Sea, which is highly understudied and research still faces the problem of diversity and inconsistency. Even though within the scope of this thesis the connection between the Black Sea and central Greece as a linking area for trading activities is shown by the high amount of exported and imported goods, the systematic research of Black Sea harbour sites with their infrastructures promises decisive results for the understanding of port networks between the Mediterranean and the Black Sea.

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