

The Socio-Ecosystem of South-Western Asia Minor in the Roman Period

by

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A thesis submitted for the degree of

Doctor of Philosophy

Hilary 2022

PREFACE

The author of this thesis is just a tip of an iceberg. Obviously, I stand on the shoulders of the scholars who wrote before me, but my debts reach far beyond the circles of academia. Humans are a social species; we are closely interconnected and co-dependent in our everyday life. To produce one piece of scholarship, hundreds of people are needed, and to all those people I am grateful. I hope that the effects are worth their hard work. I am extremely lucky and privileged to have been able to pursue a degree in a foreign country. Finishing this thesis would not have been possible if not for the generous and continuous support of several people and institutions.

I would like to thank my supervisors Professor John Ma and Professor Peter Thonemann for their inexhaustible patience and support through the ups and downs of my academic journey.

I would also like to thank numerous people: Adam Izdebski for everything; Marcus Chin, Beate Dignas, Martin Hallmannsecker, Ine Jacobs, Juliane Kerkhecker, Leah Lazar, Nino Luraghi, Jonathan Prag, Nicholas Purcell and Andrew Wilson for discussions, inspiration and advice during my time in Oxford; Andrew Burnett, Kevin Butcher, Dario Calomino, Chris Howgego, Jérôme Mairat, Marguerite Spoerri-Butcher and George Watson for the chance to listen to their papers on numismatics of ancient Asia Minor, additionally George Watson for reading through and commenting on the chapter on the social network analysis; John Haldon, Neil Roberts and Warren Eastwood for email correspondence on interpreting environmental data; Çetin Şenkul for the possibility to glimpse his ongoing palynological work; Marek Jankowiak, Kasia Kostecka, Mateusz Kostecki, Paweł Nowakowski, Wiktor Ostasz, Lidka Ożarowska, Maciek Paprocki, Aleksander Paradziński, Karolina Sekita, Łukasz Sokołowski, Kuba Sypiański, Marta Szada, Jerzy Szafranowski, Kasia Szafranowska, Kasia Szymańska, Joanna Wegner for our uplifting Polish meet-ups; Kevin Bloomfield, Sambor Czerwiński, Sarah Defant, Ricardo Fernandes, Katerina Kouli, Georgios Liakopoulos, Alessia Masi, Lucrezia Massi, Jordan Palli, Maria Papadaki, Cristiano Vignola for listening to and discussing consecutive chapters of my work. Special thanks to Professor Gregory Hutchinson for his kindness and approachable attitude towards all students.

I would like to thank Piotr Wilkin for guiding me towards the software for performing the Social Network Analysis, Reynaud Lambiotte for the advice on projecting bi-partite social networks, Bolek Telesiński and Agnieszka Dzielendziak for advice on various issues during the years.

I greatly appreciate the financial support from the Crescendum Est Polonia Foundation, Exeter College in Oxford, and the Max Planck Institute for the Science of Human History in Jena that covered various

expenses during my studies, and from the Craven Committee, whose generosity allowed me to travel in the Mediterranean.

I want to express my gratitude to my parents and in-laws for giving us a roof to live under in the times of pandemic crisis, and to Anna Izdebska and Adam Izdebski, Kasia Borkowska, Yorgo Liakopoulos, Maria Tyszkiewicz and my grandparents Sabina Ciołkowska and Roman Ciołkowski for letting me into their homes to write in peace.

My sincerest thanks to the fellow residents of the Summertown House in Oxford for their support and exchange of thoughts on matters both sublime and mundane. You were my village.

I would like to thank the BBuona café on Gloucester Green, Dakota café in Cohen Quad and KafkaKafe in Jelcz-Laskowice for the supply of coffee and delicious food.

Finally, I would like to thank my children and my husband Zbyszek Fiołna for their unconditional love and for always believing in me.

ABSTRACT

The aim of this thesis is to explore the characteristics of the socio-ecosystem of south-western Asia Minor in the Roman period. I propose a new narrative anchored in complex systems approach reconstructing the co-evolution of the human populations and their environment with the main focus on the ancient regions of Pisidia and Pamphylia. This experimental work combines recent developments in a number of scholarly fields. The previous historical narratives on the regions, both ancient and modern, have been deconstructed. The numismatic material serves firstly as a starting point for the synthesis of the history of the region, and then as a material for performing Social Network Analysis of Anatolian 'poleis' and the creation of multiple graphs. The climatic framework of the Roman period has been discussed with the special focus on the proxies relevant to south-western Asia Minor. The past landscapes and their changes have been reconstructed with the use of palynology. My main hypothesis is that in the Roman Imperial period Anatolia operated not only on the basis of independent micro-ecologies, but also on the level of meso-scale entities. These were formed along river systems from their springs in the high mountains through upland and coastal plains to their outlets to the Mediterranean, Aegean and Black Seas. Such regional socio-ecological systems were more connected internally than externally, characterised by hierarchical structures and developed thanks to both cultural and natural drivers. The cultural drivers included the interplay between imperial and local politics and economy, changes in land ownership patterns and land use practices. The main natural drivers were the shape and cycles of the local hydrosphere and climatic variability. The potential and connectivity of the regional and supra-regional socio-ecological systems of Anatolia had been accumulating over a longer period of time, but it was particularly encouraged and accelerated by the conditions created effectively by the Pax Romana, and this proved later to be the basis of the resilience of the Roman Empire in Anatolia. My reconstruction tries to grasp the dynamics of these processes in Pisidia and Pamphylia and add nuance to earlier syntheses on the region.

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ABBREVIATIONS - GENERAL

AD – Anno Domini
AWMC - Ancient World Mapping Centre
BC – before Christ
BOP – Beyşehir Occupation Phase
BP – before present
c. - *circa*
cal. - calibrated
cf. - *conferre*
Ch. – chapter
cm – centimetre/s
CONISS - stratigraphically constrained sum-of-squares hierarchical cluster analysis
ed. – edited by
e.g. – for example
ESRI - Environmental Systems Research Institute
et al. – and others
ff. – and following
fig., figs. – figure, figures
ID - identification number
km – kilometre/s
l., ll. – line, lines
m - metre/s
mm – millimetre/s
NLT – Needle-Leaved Trees
no. - number
NW – north-west, SE – south-east etc
p., pp. – page, pages
PAI – Primary Anthropogenic Indicators
SAI – Secondary Anthropogenic Indicators
SNA – Social Network Analysis
s.v. – sub voce
transl. – translation

ABBREVIATIONS - ANCIENT AUTHORS

Appianus [App.]

BC = Bella Civilia

Mith. = Mithridates Bella

Syr. = Syriaca

Aristoteles [Arist.]

Pol. = Politica

Arrianus [Arr.]

An. = Anabasis

Cicero [Cic.]

Att. = ad Atticum

Ver. = in Verrem

Dio Cassius [D.C.]

Diodorus Siculus [D.S.]

Herodotus. [Hdt.]

Homerus [Hom.]

Il. = Ilias

Josephus Historicus [J.]

BJ = Bellum Judaicum

Livy [Liv.]

Nepos [Nep.]

Dat. = Datames

Plinius [Plin.]

Nat. = Naturalis Historia

Plutarchus [Plu.]

Alex. = Alexander

Pomp. = Pompeius

Them. = Themistocles

Polyaenus Historicus [Polyaen.]

Polybius [Plb.]

Stephanus Byzantius [St. Byz.]

Strabo [Str.]

Xenophon [Xen.]

An. = Anabasis

Mem. = Memorabilia

Hell. = Hellenica

Zosimus Historicus [Zos.]

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“Sometimes environmental history seems too tangential to the main concerns of other historians. What can it tell them about the big issues that have preoccupied historians for generations? What can it say about empire, war, revolution? What can it say about issues that have preoccupied the last generation, such as gender, identity, or slavery? These are fair questions, to which a fair answer would be more and more every day, but not yet enough.”

(McNeill, 2010, p. 357)

“Phenomena, systems, and processes are rarely deterministic, but contain stochastic, probabilistic, or random components. Even if nature were to follow purely deterministic laws, which at a quantum level it does not, our scientific notion of the world would still have to remain probabilistic to a large extent.”

(Thurner, Hamel and Klimek, 2018, p. 30)

1 INTRODUCTION

When we observe a few particles of H₂O on a microscopic scale, we can predict their trajectories with considerable certainty. However, when we observe a massive number of H₂O particles, we have no means to predict how a given particle is going to behave. When we start raising the temperature of the system, we are not able to tell which particles are going to turn into a gaseous state first or when they are going to do this. Still, when we look at the same set of H₂O particles on the macroscopic scale, let's say in the form of water filling a pot on a stove, we can calculate with much more certainty how much time it will take for water to start boiling and evaporate.

As ancient historians we can look at ancient people through the textual and material traces they left and try to track down the trajectories of their lives. Through the words of ancient historians, we may learn the names and deeds of Roman leaders. Through inscriptions we may learn about local

entrepreneurs boasting of their benefactions. Through clay oil lamps we may say something about the light inside ancient houses. But it is impossible to grasp the lives of all the people living in an ancient city. The number of stone benches in the city theatre may give us a general idea of how many people could sit there, but we have no clue how many people actually lived in that city at any given time. Nonetheless, as we can describe the process of evaporation without knowing the exact trajectories of water particles, we may attempt to reconstruct the patterns of life of ancient societies based on the material we have at hand.

The aim of my research is to investigate the socio-ecological system of southwestern Asia Minor, more particularly the ancient regions of Pamphylia and Pisidia with the focus on the Roman Imperial period. Existing research in environmental history concerning Roman Anatolia largely consists of either detailed multidisciplinary local studies (the Sagalassos Project, the Kyaneai Survey) or vast syntheses on the pan-Mediterranean level (McNeill, 1992; Horden and Purcell, 2000; Grove and Rackham, 2001; Thommen and Hill, 2012; Hughes, 2014). Existing historical studies of Pisidia and Pamphylia in the Roman imperial period do not take environmental issues into consideration (Levick, 1967; Brandt, 1992; Mitchell, 1993b; Arena, 2005; Talloen, 2015; Bru, 2017; Watson, 2020), although such work has been done for the Late Antique / Early Byzantine Period (Izdebski, 2013). The time is ripe for such an environmentally oriented study. Current research in the climatology and palynology of Asia Minor (Bereket Basin pollen record: Kaniewski *et al.*, 2007; Kocain Cave speleothem: Göktürk, 2011; general overview: Luterbacher *et al.*, 2012) offers necessary data on the natural environment, while the fast-developing complex systems science brings in tools and models to study and understand human societies (Kadushin, 2012; Thurner, Hamel and Klimek, 2018). Advances in software development for the Social Network Analysis and geospatial data help us to handle the vast body of numismatic material from Asia Minor, to explore it and reconstruct connectivity networks in their geographical context (GEPHI Graph Visualization and Manipulation software, QGIS Geographic Information System software). By combining the evidence on the natural and human parts of the socio-ecological system

(Schoon and van der Leeuw, 2015) I will try to demonstrate the different ways in which the Roman Empire shaped the human pressure on the environment, or in other words how it affected the local landscapes and livelihoods of people living in Pisidia and Pamphylia – and vice-versa: how the local environment constrained the functioning of the Roman Empire and its parts.

My main hypothesis is that in the Roman Imperial period Anatolia operated not only on the basis of independent micro-ecologies, but also on the level of meso-scale entities. These were formed along river systems from their springs in the high mountains through upland and coastal plains to their outlets to the Mediterranean, Aegean and Black Seas. Such regional socio-ecological systems were more connected internally than externally, characterised by hierarchical structures and developed thanks to both cultural and natural drivers. The cultural constraints included the interplay between imperial and local politics, changes in land ownership patterns and land use practices. The main natural constraints were the shape and cycles of the local hydrosphere and climatic variability. The potential and connectivity of the regional and supra-regional socio-ecological systems of Anatolia had been accumulating over a longer period of time, but it was particularly encouraged and accelerated by the conditions created effectively by the *Pax Romana*, and this proved later to be the basis of the resilience of the Roman Empire in Anatolia. My reconstruction tries to grasp the dynamics of these processes in Pisidia and Pamphylia and add nuance to earlier syntheses on the region.

To present my argument I use concepts from ecology, complexity science and network theory, such as the socio-ecological system, panarchy and social network (explained later in this chapter). Such an investigation fits well within the field of environmental history, that tends to combine various disciplines. The reconstruction of the human part of the ecosystem requires a critical review of historical sources and scholarship (Ch. 2). To develop my own arguments, I utilise numismatic material, treating it from the point of view of traditional numismatics (Ch. 3) and with the use of Social Network Analysis (Ch. 4). To reconstruct the non-human part of the ecosystem I utilise the results of climatology

(Ch. 5) and palynology (Ch. 6). The final reconstruction of the social-ecosystem of the Pamphylia-Pisidia region is proposed in Ch. 7.

1.1 WHAT IS ENVIRONMENTAL HISTORY?

On the most general level, environmental history is the study of the distribution and abundance of populations of living organisms in relation to their environment. It encompasses not only the biological level of populations but also social and cultural patterns, e.g. the non-material flows of information. It is thus ecology within the specific context of human history. Environmental history originates from similar sources as ecological history, but instead of an ecosystem it puts more attention on the human perspective, as in the words of Verena Winiwarter: “The object of environmental history is the social and economic dimension of human communities with respect to interactions in a habitat. (...) The ‘environment’ in environmental history is thus all phenomena which influence the life situation of a human community. It takes into account all human actions which have any effect – even indirect – on the resource base and the natural spatial surroundings” (Winiwarter, 1994, p. 155, transl. Lukas Thommen). Instead of treating people as an exogenous stressor on ecosystems, it focuses on the mutual relations between humans and their environment. The difference between the two is eloquently expressed by Gonzales de Molina and Victor Toledo: “Historical ecologists are more oriented towards studying the large fluctuations of the physical and biological cycles, particularly those of climate, and their repercussions on human societies and their capacity for reaction (resilience). Their view of the past is rather *naturalistic*, from the perspective of its functional rules contemplating society as separate from nature and reacting differentially in response to environmental pressures. Instead, Environmental History obeys the growing concern of the community and historians for the environment, having a more *social* view. As a part of History, the human past remains the focus, but regarding material interactions, it remains engaged in studying the

various past and extant societies as human ecosystems, or as subsystems of the more inclusive system of nature.” (de Molina and Toledo, 2014, p. 15; original highlight).

The concerns of environmental history are in fact fundamental to understanding the course of history in general. Environmental history recognises long-term trends, investigates the causal role of the environment in historical events (or vice versa) and as such has often been present in historiographical discourse. However, the self-conscious environmental approach is the product of modern 20th-century historiography, and can be traced on the one hand to the *Annales* school in Europe and to green movements in the United States on the other (McNeill, 2003, 2010; Isenberg, 2014; Hughes, 2016).

The turning point in the introduction of environment into the historical discourse was the publication of the massive volume one of *La Méditerranée et le monde méditerranéen à l'époque de Philippe II* by the French *Annales* historian Fernand Braudel, where he presented a profound analysis of how the geography of the Mediterranean Sea determined the way people functioned (French original: Braudel, 1949; English translation: Braudel and Reynolds, 1972). His model was criticised for systemic rigidity and environmental determinism, but the sole notion of environment as a factor shaping historical events, even if conceptualised as *l'histoire immobile*, opened a wide field for further discussions. Emanuel Le Roy Ladurie's constructive critique of Braudel led to the publication of his influential *Histoire du climat depuis l'an mil* (French original: Le Roy Ladurie, 1967; English translation: Le Roy Ladurie and Bray, 1972), where the importance of the temporal variability of environment and the human impact on it were acknowledged. His additional contribution, inspired by the ideas of Malthus, was to define the demographic phases of boom-bust cycles in the Mediterranean history and to link them with the environmental, especially climatic, factors (Le Roy Ladurie, Goy and Burke, 1982).

Discussions of environmental historians have often been entangled with environmental movements and policymaking as the rise and popularity of environmental history originates from the concern over our impact on Earth. The dominant declensionist narratives have become the hallmark of the field,

finding a wide reception among a non-specialist audience (but see: McNeill, 2003, pp. 35–36). Several works drift towards various forms of determinism or highlight the negative impact of human actions on nature, neglecting, however, the reciprocal relations between them (White, 1967; Merchant, 1982; Hughes, 1993). In the search for clarity, some works downplayed the role of social systems in shaping the course of historical events, exaggerating the influence of climate. Terms such as the ‘Medieval Warm Period’ or the ‘Little Ice Age’ were coined and used as an explanatory tool without proper justification (see discussion in: Manning, 2013). A dispute between North American and European scholars emerged regarding the concept of a ‘natural environment’. Americans saw ‘nature’ more as a place without any human intervention (‘wilderness’), while European ideas allowed the co-existence of humans and other living organisms (‘natural landscape’, ‘Landschaft’). The diverging visions of ‘natural environment’ had implications in the form of differing judgments not only on modern environmental policies, but also on the role of pre-industrial societies in shaping past environments, as well as blocking the study of combined human and natural systems challenged only by the deconstruction of the very concept of ‘wilderness’ (Cronon, 1996).

However, the understanding of ecosystems, nature and environment and their characteristics has changed since the 1980’s when environmental history was in its formative phase. For example, the previous simplistic notion of the collapse of a human system being a consequence of the mismanagement of the natural environment, embodied in the popular works of Jared Diamond (Diamond, 1997, 2006), has met with a profound critique (the series of articles of Karl Butzer: Butzer, 2005, 2012; collective volume: McAnany and Yoffee, 2010; Butzer and Endfield, 2012). The idea of a static ecosystem maintaining equilibrium has been rejected, and new, dynamic models inspired by interdisciplinary encounters have emerged (social metabolism: Fischer-Kowalski and Haberl, 1993; panarchy: Holling, 2001; resilience: Folke, 2006). The complex systems approach, merging the cultural and natural spheres, has entered the field of environmental history in recent years, promoting transdisciplinarity and multi-causal narratives (Schoon and van der Leeuw, 2015).

The relative richness and variety of evidence together with the temporal depth allowed for the sophisticated study of classical Greek and Roman civilizations from the perspective of environmental history early on. A regular stream of classicists contributing to environmental history can be seen from the 1980's (e.g.: Meiggs, 1982; Osborne, 1987; Fedeli, 1990; Weeber, 1990; Panessa, 1991; Sallares, 1991; Hughes, 1993; Vögler, 1997). However, the often-raised problem of environmental history – the nation-state focus – means something different for the history of classical antiquity. The focus has been put mainly on the centres of Greek and Roman culture, neglecting the amazing variety of peoples living in the same time and space, making them just a substrate for the processes of Hellenization or Romanization. The areas dominated by non-classical peoples or located outside the borders of the Roman Empire were long seen as barbarous and thus not deserving scholarly attention, unless they were located on the territory of a modern nation-state. As a result, there is still an unevenness in the accumulated material that makes generalisations difficult. Luckily, such notions are in retreat, and more is being done to fill the gaps in the picture of the Graeco-Roman world.

Another problematic aspect at the junction of ancient history and environmental history is that of 'the Mediterranean'. For historians it has been natural to see the Mediterranean as some sort of unity. In the words of Theodor Mommsen: "Rings um das mannigfaltig gegliederte Binnenmeer, das tief einschneidend in die Erdfeste den größten Busen des Ozeans bildet und, bald durch Inseln oder vorspringende Landfesten verengt, bald wieder sich in beträchtlicher Breite ausdehnend, die drei Teile der Alten Welt scheidet und verbindet, siedelten in alten Zeiten Völkerstämme sich an, welche, ethnographisch und sprachgeschichtlich betrachtet, verschiedenen Rassen angehörig, historisch ein Ganzes ausmachen" (Mommsen, 1881, p. 1). However, the definition of what constitutes 'the Mediterranean' is far from clear, and it seems to originate from cultural constructs rather than quantifiable geographic characteristics or functional units (Harris, 2005; Horden and Kinoshita, 2014). Lucia Nixon even remarks: "It could be said that the Mediterranean as an entity has existed only in two periods, the Roman Empire and the age of tourism" (Nixon, 2002). It is true that the

Mediterranean is often equated with the Roman Empire or with Graeco-Roman culture, but such understandings ignore spatial incongruities between 'Mediterranean' and 'Roman' or 'Graeco-Roman' and neglect the deep regional geographic, ecological, climatic, cultural and ethnic variances. On the other hand, if 'the Mediterranean' is taken in its narrower sense – that is the extent of the Mediterranean climate defined by hot, dry summers and mild, wet winters or by the reach of the wild olive (Allen, 2001) – then several regions that constituted the integral part of the Roman world, such as the majority of Anatolia, Egypt, Britain or Germania are lost from sight. Even within the strict sense of the reach of the Mediterranean climate it is dangerous to generalise, as different climate forces shape the climate in the eastern and western parts of the Mediterranean basin, often resulting in opposing trends (Lionello *et al.*, 2012, pp. 301–346). Likewise, 'the Mediterranean' understood as the water body of the Mediterranean Sea interconnected with trade or cultural links is mostly a recent concept, that may easily blur diverging local or regional trajectories (Horden, 2014, p. 1).

It is vital to keep in mind these caveats when looking at the series of synthesising works published at the beginning of the 21st century that focus either on the Mediterranean or various incarnations of Graeco-Roman culture. The most influential work among historians (but not so much among other scholars) is probably Peregrine Horden's and Nicholas Purcell's *The Corrupting Sea* (Horden and Purcell, 2000). Their main line of argument is that the Mediterranean world 'works as a gigantic set of microecologies, with no significant intermediate level between the very small and the very large' (Horden & Purcell, 2000, p. 518) and that the characteristic trait of the 'Mediterranean' is its extreme fragmentation and variability. They renewed modern interest in the history of the 'Mediterranean', provoking responses and numerous discussions on topics both general and detailed (Horden and Purcell, 2020). However, they were criticised on equally numerous points: for under-theorizing their methodology (Nixon, 2002); for neglecting the role of socio-cultural systems and constructs; for the terminology generalised to a point of uselessness, as in the case of their definitions of 'redistribution' or 'connectivity' (Algazi, 2005); for focusing exclusively and uncritically on the textual evidence (Knapp,

2001); and for ignoring material from the vast stretches of the Eastern Mediterranean (Shaw, 2001, p. 420, no.7; p. 424, no.24). Their abandonment of the concept of a 'city' seems to produce more problems than it resolves, and it exemplifies their blindness to the phenomena connected with effects of scale such as emergence (Shaw, 2001, pp. 426–7, nos.41, 437, 444; Algazi, 2005, pp. 232–3). Horden and Purcell's combination of relational, bottom-up, non-equilibrium approaches towards the history of the Mediterranean might have been a novelty in the field of ancient or medieval history, but it would be wrong to claim that the fragmentation, unpredictability and interdependence were traits which made the Mediterranean exceptional, as it seems that they are immanent characteristics of any socio-ecological system (Shaw, 2001, p. 427; cf. Algazi, 2005, p. 234). *The Corrupting Sea* is not precisely a book in environmental history, "but rather ecologically sensitive social and economic history" and "a study of the degree and nature of unity in the Mediterranean" (McNeill, 2001, p. 645).

A systematic treatment of ancient literary sources from the perspective of environmental history is offered by Lukas Thommen (Thommen, 2009; Thommen and Hill, 2012) who carefully introduces modern ecological terminology into the study of ancient history and compares it with ancient intellectual ideas about nature. He skilfully avoids being trapped in declensionist or deterministic narratives by accentuating differences between Greek and Roman relations with the environment and exposing biases present in the primary sources.

Pan's Travail by Donald Hughes was an interesting proposition when it was published in 1993 (Hughes, 1993). The coherent use of both historical and archaeological evidence still makes it a good reference book. Unfortunately, he missed the opportunity to acknowledge twenty years of developments in ecology and environmental history and repeated his earlier declensionist argument in the second edition of his book (Hughes, 2014).

Other works concerning environmental history in the Mediterranean focus on detailed topics such as mountain landscapes (McNeill, 1992), desertification (Grove and Rackham, 2001), rivers and wetlands

(Thonemann, 2011; Campbell, 2012; Blouin, 2014; Hermon and Watelet-Cherton, 2014) or climate and disease (Harper, 2017). From these works, the last one has recently sparked wider interest even outside academia. Kyle Harper's *The Fate of Rome: Climate, Disease, and the End of an Empire* makes a strong and evocative case for environmental influence on historical events in different temporal scales. It is mainly devoted to the effect of pandemic diseases, but also claims a wide impact of climatic changes on the overall condition of the Roman Empire. However, it has been rightly pointed out that these links require more precise argumentation. Harper operates with generalisations, whereas when looked at in closer detail it is extremely hard to define a favourable climate for an empire extending from the British Isles to Egypt and from the Iberian peninsula to Mesopotamia; one should not assume that warming equals better conditions for agriculture overall, nor that the general trends find the same reflection in local trajectories everywhere (Haldon *et al.*, 2018a, 2018c, 2018b; Bresson, 2020).

Still, *The Fate of Rome* remains an excellent example of the incorporation of scientific data into a historical narrative and as such it is a great success. Other useful insights into recent developments in the cooperation between history and various sciences is presented in the collective volumes: *The Science of Roman History* (Scheidel, 2019) and *The Ancient Mediterranean Environment Between Science and History* (Harris, 2013).

1.2 BASIC CONCEPTS

Environmental history gives us an exceptional perspective on ancient Anatolia in its entirety. Human societies are inevitably bound to their environment; they constitute an integral part of a wider socio-ecological system (also called a social-ecosystem). From this point of view, human activities such as agriculture, commerce, and warfare can be conceptualised as energy flows between different components of the ecosystem. The ecosystem follows the laws of conservation of mass and energy; that is, they cannot be taken from nothing and cannot simply disappear. The energy is kept within the

system or must be exchanged with the outside environment. Our role is to reconstruct these flows of energy and seek for the patterns governing them.

The World Systems and Core-Periphery models focus on human systems and do not allow for the satisfactory description of systems with fluid, adaptable structures and fuzzy boundaries (Bintliff, 2014, pp. 211–2). The relational model of microecologies (Horden and Purcell, 2000) fails to recognise the scalability of phenomena and does not help in understanding the temporal changes within systems. Methods and approaches deriving from ecology, palaeoecology and the science of complex systems provide an answer to appeals raising the necessity of a holistic approach, and deliver tools to address the deficiencies of earlier models (Schoon and van der Leeuw, 2015; Bresson, 2020, p. 244).

1.2.1 Complex adaptive systems

„Complexity science, also called complex systems science, studies how a large collection of components - locally interacting with each other at the small scales - can spontaneously self-organize to exhibit non-trivial global structures and behaviors at larger scales, often without external intervention, central authorities or leaders” (De Domenico *et al.*, 2019). Complexity science originated from the sciences dealing with complex systems such as biology, chemistry, physics, and mathematics, and has been applied successfully in social and economic studies like ecology, urbanism, sociology and management. It describes systems that are capable of non-linear development and adaptation.

The complex system is a phenomenon that occurs when a given system starts to reveal characteristics that cannot be predicted from the individual traits of its components, the classical examples being e.g. a living cell emerging out of chemical components or a society consisting of human individuals. One of the strong advantages of the complexity approach is the multi-layered, multi-dimensional perspective on the phenomena. It helps to conceptualise links between different levels of detail or to discuss the place of a single element within a wider framework. However, the full potential of the complex system approach reveals itself when the focus is shifted from individual actors onto the

multiplicity of interactions between them and their environment. If looked upon from this perspective, complex systems reveal striking structural similarities.

The data used for the reconstruction usually grasp only approximate states in a given point of time, and it should be remembered that ecosystems are dynamic systems that constantly coevolve with their environment. “With the exception of a few physical phenomena, virtually all processes that take place on this planet, including the entire biosphere and the anthroposphere, are driven non-equilibrium processes. Systems in equilibrium are the exception in nature and exist practically only in laboratories or for systems at relatively short timescales” (Thurner, Hamel and Klimek, 2018, p. 86). One of my aims is to describe the driving processes behind the changing picture of southwestern Roman Asia Minor and to assess the resilience, connectedness and potential of the overall system.

1.2.2 Panarchy

The terms resilience, connectedness and potential used above come from the model of ‘panarchy’, that allows us to describe and categorise socio-ecological systems and to predict the challenges they may face (Holling, 2001; Gunderson and Holling, 2002). The general idea is that an ecosystem consists of adaptive cycles evolving on different spatial and temporal scales. Several cycles on a lower scale form a higher-level cycle that itself may take part in forming another higher-level cycle, e.g. weather phenomena on the scale of one hour build up the weather on the scale of a day, days combined form yearly trends and yearly trends define the climate of a place. The “potential” of a system means how much energy or resources can be accumulated within that system. The overall ability of an ecosystem to survive through disturbances is called its resilience (Gunderson, 2000; Folke, 2006). The difference between resilience and resistance is that resistance is the ability of the system to maintain its former state despite disturbances, while resilience is defined as an adaptive process. The consequence of high resilience of a system is its long-term survival for the price of change. Low resilience may result in the collapse and disintegration of a system.

In the context of panarchy, connectedness is a measure of how interdependent the components of the system are. It may refer to top-down connectedness between lower and higher-level processes or to horizontal connectedness between cycles or elements on the same level. High connectedness of a system may first help in the accumulation of potential and the creation of higher-level cycles, but at the same time it makes the system less resilient. In a tightly connected system, there is little room for change and thus it becomes more prone to collapse after disturbance.

The panarchy model conceptualises the system's dynamics as its adaptive cycles. The adaptive cycle starts from a state of low potential and low connectedness, but high resilience (exploitation or r phase), and moves gradually to the state of high potential, high connectedness, but low resilience (conservation or K phase). In the K phase, the high connectedness results easily in domino effects, so the whole panarchy is susceptible to a cascading failure. The collapse of one of its components may lead to a rapid collapse of the whole system through the state of low connectedness and low resilience but high potential (release or Ω phase). After the release, the panarchy consists of separated components that experiment locally and dynamically rearrange the potential (reorganization or α phase). When the remaining potential is spent on innovations, the system goes back to r phase, where the rearranged cycles slowly accumulate new potential and increase the connectedness. The assessment of a system's connectedness, resilience and potential serves to point towards which phase it is currently in, and consequently predicts what challenges and opportunities it may face. Both the theoretical implications of the panarchy model and its applications in the study of past systems have been widely discussed and developed (e.g. Allcock, 2017).

The model of panarchy proposes an overarching narrative that collects together the human, animate and inanimate components. Separately, they are the objects of study of history, network theory, palynology or climatology and their specialised methods, but here they may be gathered under a single framework.

1.2.3 Network approach

Another concept helping us to understand complex adaptive systems is that of a network. It has the charm of a simple, intuitive mental tool. While the panarchy framework is concerned with hierarchical processes and their evolution, network theory focuses instead on relations. In the context of complexity science, it has become a versatile conceptual, analytical and visualisation model for describing a set of prescribed components linked with relations of one or more types. It originated from interdisciplinary encounters, including graph theory studied by mathematicians and physicists on the one hand (Granovetter, 1973; Watts and Strogatz, 1998; Watts, 1999, 2002, 2003), and social networks studied by sociologists on the other (Simmel, 1908; Durkheim and Halls, 1984; Wasserman and Faust, 1994). Social networks are of particular interest here, as I intend to utilise network theory to propose a reconstruction of relations between human communities. A set of individuals or political entities conceptualised as a network of components interacting on several levels constitutes an interesting answer to the critique of world-systems theory propagated by Immanuel Wallerstein, while retaining its unification of spheres of knowledge (society, economy, politics). It allows more fluidity, heterogeneity, and hybridisation, and avoids pre-ascribed hierarchisation.

1.2.4 Social Network Analysis

From the vast field of network theory, I have chosen to adopt Social Network Analysis. It is a fast-developing quantitative method that allows us to utilise numerous data in order to model and explore the characteristics of dynamic social systems. Properly applied, it may help to detect the interconnectivity of cities freed from either administrative or geographical clichés. Network theory and network analysis are principally used for the investigation, modelling and development of existing systems, mainly social systems both animal and human, but it can be useful for the study of past systems as well. Its focus on relations instead of the qualities of participating elements helps us to identify the structural characteristic of a given system: communities, information flows, hubs and bridges (Kadushin, 2012).

The quantitative methods which nowadays constitute complexity science are already well established among archaeologists, e.g. for exploring past spatial or social networks, and are utilised for tasks such as population fluctuations, dynamic landscape reconstruction or dispersal modelling (Cherry, 1977; Doran *et al.*, 1994; Kohler, Gummerman and Reynolds, 2005; Graham, 2006; Giligny *et al.*, 2015; Campana *et al.*, 2016; Kohler and Gummerman, 2020). There has been much self-conscious discussion on the opportunities and limitations of social network analysis or a network approach more broadly in archaeology, as represented in the collective volumes *Network Analysis in Archaeology* (Knappett, 2013) and *Maritime Network in the Ancient Mediterranean World* (Leidwanger and Knappett, 2018) as well as in thought-provoking articles and reviews by Tom Brughmans (Brughmans, 2010, 2013a, 2013c).

There have been attempts in the field of classics as well. One of the early examples was the collection of papers *Greek and Roman Networks in the Mediterranean* (Malkin, Constantakopoulou and Panagopoulou, 2009). The collection has shown a wide range of understandings and trial applications of the network theory, as well as some confusion as to how to use it and what it actually adds into the field (cf.: Ceccarelli, 2021). Irad Malkin, drawing from these attempts, tried to address the problem of applicability of the network theory in his monograph *A Small Greek World* (Malkin, 2011). Inspired by the works of network physicians such as Albert-László Barabási and Duncan Watts (Watts, 1999, 2003; Barabási, 2003; Newman, Barabási and Watts, 2006) he incorporates the network theory vocabulary into the discourse on the Greek colonisation and the formation of Greek culture in the Archaic period. He tries to navigate the reader through the concepts of emergence, self-organisation, a small-world network and a back-ripple effect, and presents case studies from the Greek world exemplifying these phenomena. However, his work is of a purely narrative character, and he lacks the actual analytical tools and database to prove his claims. He uses network theory terminology to demonstrate points that could have been demonstrated without it, such as the processes of identity formation, and he

misses the chances that network theory apparently opens in the discussion on Greek colonisation (Brughmans, 2013b).

Similarly, William Mack in *Proxeny and Polis* (Mack, 2015) conceptualises the role of ‘proxenoi’ as bridges between ‘poleis’ of the Hellenistic Aegean within the theoretical framework presented by Charles Kadushin in *Understanding Social Networks* (Kadushin, 2012), but he immediately refuses to utilise the quantitative tools of complexity science. Mack precisely points out the problems arising when trying to apply the Social Network Analysis for the study of epigraphical lists and catalogues of ‘proxenoi’ (such as incomplete and skewed data, unidirectional character of the relation, different types of actors). He is right in saying that the SNA is not a proper tool for answering the detailed questions he is interested in, but still this does not dismiss the potential of the method in further study of ‘proxenia’ in the wider context of inter-polis relations.

An example of the application of quantitative methods in historical research can be found in Anna Collar’s *Religious Networks in the Roman Empire* (Collar, 2013). In her case study on the spread of the cult of Zeus Dolichenios, deriving much from archaeology, she utilises the Proximal Point Analysis of epigraphical material for the reconstruction of the social network of Roman officers and for the distribution of the cult. Then she discusses how the dynamics of the cult spread can be interpreted as an information cascade along the network links.

However, the most exceptional example of what can be achieved with the network approach is ORBIS — the Stanford Geospatial Network Model of the Roman World (Meeks, 2015; Scheidel, 2015). It is an interactive scholarly work using several computational tools including calculation of least cost paths, cost surfaces, and distance cartograms in order to model communication networks of the Roman Empire. Its uniqueness is based on the comprehensiveness of the covered area and the possibility of ascribing different weights to paths between locations that indicate the estimated price or time costs for these paths (depending on route, time of the year and means of transport) combined with the

interactive interface. These characteristics make ORBIS an immensely useful and versatile tool for any classicist reconceptualising our understanding of ancient communication networks.

In my work I present an attempt in applying Social Network Analysis to the handling of numismatic evidence that reflects the human part of the ecosystem. As material for the analysis I chose the Greek imperial bronze coin issues of Asia Minor, as they are numerous, were issued in numerous places, and are easy to identify. The focus of my work lies in the Pamphylia-Pisidia region, so the collected and analysed data cover this area most comprehensively. Still, it is necessary to include, at least partially, other regions of the eastern Mediterranean in order to properly situate Pamphylia and Pisidia within wider networks and add nuance to regional relations.

The same corpus of coins can be looked at from different perspectives, thereby producing many types of data series that reflect past links inside the social system. Although the actors responsible for these links can be ascribed to different categories (private individual, official, mint, workshop, tribe, town), I treat them tentatively as emanations of a unit, called here a 'city', to enhance the clarity of networks. Thus, the final network is built from just two types of building blocks: cities, represented as points, and their mutual relations, represented as lines joining them.

My aim is to reconstruct the network of polities in southwestern Asia Minor, to detect the clusters of particularly interconnected ones ("small worlds"), investigate their regional and supra-regional relations independently from administrative or (perceived) geographical boundaries, and determine what factors led to such a distribution and discuss its temporal dynamics. The resulting city-network will be assessed in regard to its connectedness, potential and resilience in the context of the local environmental conditions.

It is necessary to point out the overlapping terms. In network theory there are two terms with specific meaning. The first one is *connectedness* and it refers to the overall shape of a network. A network is called *connected* if all of its nodes can be reached from any other node in the network. If there are

parts of a network that have no links between each other they are called *separate components*. *Connectivity* in the network theory is defined as the number of links per node in the network and thus it reflects the properties of individual nodes. This is different from *connectedness* in the relation to a panarchy, which describes the general notion of the level of dependency between the units that constitute the adaptive cycles. The average *connectivity* of nodes in a network may be used to assess the *connectedness* of a panarchy.

However, both the *connectedness* and *connectivity* levels do not inform us about the mesoscopic qualities of the network. Peregrine Horden and Nicholas Purcell seem to openly reject the analysis of the Mediterranean on the medium scale. Irad Malkin in turn claims the existence of *small world* properties in the ancient Mediterranean, which is a mesoscopic characteristic of a network. The small world effect means that there are parts of a network that are more connected with their neighbouring nodes than with the rest of the network (*communities*) and simultaneously a small number of nodes connects these communities with each other (*bridges*). The small world effect is characteristic of networks with high clustering but low average path within the network. The detection of communities within a given network and the calculation of the average path can be done with the use of graph analysis software (Chapter 4). However, the interpretation of how these communities evolved is another matter. Again, to explain how the detected communities evolved in the past we need to put them in the context of their environment (Thurner, Hamel and Klimek, 2018, p. 177). Among several fields studying past environments, climatology and palynology are the most accessible for a historian, and are discussed below.

1.2.5 Climatology

Climate is one of the inanimate components of the socio-ecosystem. In recent decades it has been recognized as an important factor affecting the course of human history and it has been shown that the historical archives may be a helpful, even if not that straightforward, source for the study of climate. The climate-oriented branch of environmental history is continuously productive and

increasingly sophisticated (Farmer, Ingram and Wigley, 1981; Pfister, 1988; Lamb, 1995; Dobrovolný *et al.*, 2010; McCormick *et al.*, 2012). Climate is not only the background of historical events, but also an independent player whose influence is complex, subtle and manifold. Its whims may stretch a society's resilience to the maximum, or open unexpected opportunities. The basic reference work for discussing the palaeoclimatic trends in Anatolia is the collective volume *The Climate of the Mediterranean Region* (Lionello *et al.*, 2012), and their importance for the course of Roman history is still debated (Manning, 2013; Bini *et al.*, 2020).

The choice and interpretation of presented climatic proxies require a few words of comment. It is important to distinguish between mechanisms that affect the Earth's climate on different time and spatial scales, in order to avoid misleading overgeneralisations. The most basic and the most important process is defined by the amount of energy that arrives from the Sun. This is the ultimate source of energy on Earth. The solar activity triggers several other phenomena that form a complex system of connections and feedbacks resulting in an ever-changing situation. Moreover, the Sun directly affects the hydrosphere and biosphere, which are the primary concern for the human race.

Another major trigger of climatic conditions are volcanic eruptions. They are independent from solar activity but are still capable of influencing the global climate. The volcanic aerosols that reach the atmosphere prevent the sunlight from reaching the Earth's surface and result in cooling episodes. Although a single eruption may affect weather only on a limited timescale, counted in weeks or months, clusters of eruptions may provoke long-lasting consequences and even push the global climatic systems into a new phase.

The evidence on solar radiation and volcanic activity is obtained from the analysis of Greenland ice cores corroborated with tree rings around the globe and presents climatic forcing on a global or hemisphere scale. However, this macroscopic picture must be supplemented with more localised data, especially for regions under the influence of several climatic forcings and varied relief. More local

proxies for the Western Taurus (Ch. 5) come from the Kocain Cave speleothem, that reflects winter temperatures and the snow cover in winter-spring months; isotopic analysis of the calcite from the Gölhisar Gölü and water levels from the Burdur Gölü reflecting precipitation changes; and the pollen cores from the valleys of Ağlasun, Gravgaz and Bereket, suggesting the level of moisture in local areas.

1.2.6 Palynology

The animate components of past landscapes can be reconstructed thanks to palynology. Palynology is a branch of natural sciences that originated from research on peat bogs in Northern Europe as early as the beginning of the 20th century. It is the study of pollen grains and other microscopic particles, organic and inorganic, collected mainly from land deposits. It was first utilized narrowly as a stratification tool, but with technological development, accumulation of data and sophistication of analytical methods it became a powerful tool for ecological research (Fyfe, Woodbridge and Roberts, 2018). As an auxiliary discipline in archaeology and history, it has been narrowed to the study of pollen deposited in human contexts.

The lake or bog deposits are studied through the extraction of sediment or peat cores. As the sediments or peats accumulate in aquatic conditions, they can form a comprehensive, often uninterrupted picture of local conditions through dozens of ages. Several layers of error and inaccuracies make it impossible to reconstruct the local vegetation directly from the pollen count. The pollen core does not reflect the exact composition of species or their reach in a given layer. It records each spatial component differently. Still, pollen cores can be an extremely useful tool. The mass production of pollen in several taxa ensures that the changes in their mutual relations are not dependant on accidental preservation, but rather reflect a real change in the past environment. The growing literature on palynology offers sophisticated ways of interpreting data (Vermoere, 2004; Kaniewski *et al.*, 2007; Bakker, Paulissen, *et al.*, 2012). The analysis of selected taxa and their groups allows us to reconstruct the changes in the human pressure on the landscape (Ch. 6).

1.3 LIMITATIONS

Analysing past socio-ecological systems is an ambitious project. It requires familiarity and understanding of methods and approaches originating from different scholarly fields. The attempt to combine them poses the risk of mistakes originating from insufficient expertise. The rising inaccuracies in measurements and gaps in data make any reconstruction open to errors on different levels. The broad temporal strokes may create a static impression and reducing complex relations into a set of nodes and edges may seem to oversimplify them. This thesis remains a highly experimental work in combining our knowledge on the cultural and natural parts of the social-ecosystems into a single narrative. Still, I hope to deliver a convincing picture explaining how Anatolia functioned in the Roman period, and which could be later developed into a more general framework used for comparative studies.

2 MOUNTAINS AND PLAINS

2.1 THE VIEW FROM ABOVE

When flying from Ankara south-west to Antalya we can admire vast steppic areas. White in winter, fresh green in spring, different shades of dun in other seasons. Steppic but by no means flat. Except for the Plain of Konya, which is as flat as a table, most of Central Anatolia has diverse relief resembling choux pastry. It is easy to hide and even easier to get lost. Creeks and ponds pop out unexpectedly from between hills intermittently with roads and villages. There are almost no trees, but every inch of space suitable for agriculture is intersected into neat rectangular fields. Just like steppic areas of Ukraine, Kazakhstan or Midwest US these lands are a breadbasket for innumerable people (Photos 1-7).

The entrance into a different world is guarded by the contour of Sultan Dağları (Fig.2.1). The mountain range stands out from the surrounding plains and valleys with its dark green of pine forest. Several passes cut through it regularly, each crowned with a modern Turkish town radiating into steppe. From there, the Western Taurus Mountains unfold into several ranges like leaves of a fan from its head. Sultan Dağları continues further south-east as Erenler Dağı and south-west as Karakuş Dağları, forming together the apex of a triangle. Further south, in the east lie Geyik Dağları and Dedegöl Dağları (whose ice cover does indeed look like the beards of great-grandfathers, Photos 8-9), then in the middle Kuyucak Dağları and in the west Katrancık Dağları, whose extensions southwards are Akdağlar, Bey Dağları and Yanartaş Dağları. And just like the leaves of a fan, the relief goes up with ranges and down with valleys, sometimes flat yaylas and sometimes steep river gorges. Higher peaks shine with white snow and grey limestone, while the lower slopes are covered with timid mountain vegetation that gradually turns into sparsely growing dwarf pines or black pines closer to the valley bottoms. Wide modern asphalt highways run from valley to valley, mercilessly cutting through mountains if

necessary. Every piece of flat land in the valleys has been turned into arable fields or, if the abundance of water allows, apple and apricot orchards or rose gardens.

This is also the Turkish Lake District, whose beauty puts to shame even the famous Lombardian lakes. Eber Gölü and Akşehir Gölü (*Philomela lacus*) lie just north of Sultan Dağı and their fresh waters serve well both birds and people. South-east from Karakuş Dağları is located Eğirdir Gölü (*Limnai lacus*) - a true crown jewel – whose colour varies depending on the weather and season from flashy turquoise through deep hypnotising blue to cold steel (Photos 10-14). It fills up two intramountain basins squeezed between Dedegöl, Barla and Davraz Dağları (Photos 14-17). But its benefits go much further than aesthetic sensations. It is one of the most important water sources in the area and its lacustrine fauna bring considerable income to the inhabitants of the region. Its waters flow down the canal into the charming dark coloured Kovada Gölü, surrounded by wild areas enclosed in a protected national park. On the eastern side of Dedegöl Dağları lies the extensive freshwater Beyşehir Gölü (*Koralis lacus*) whose waters flow south-east into Suğla Gölü (*Trogitis lacus*) and disappear further south through underground sink holes (Photo 18). On the western side of Katrancık Dağları lies the very interesting Burdur Gölü (*Ascanius lacus*). High salinity and alkalinity make its waters unsuitable to drink but also resistant to freezing. The smaller Acıgöl (*Sanaos lacus*), Akgöl and Yarıklı Gölü located nearby are characterised by even higher levels of minerals, that give them distinctive light shades of green-blueish colour and leave milky white residues around their shores. Yet another alkaline lake in the vicinity – Salda Gölü, located in an old crater – is one of the deepest lakes in Turkey.

Several rivers start their lives in the Lake District: furthest to the east, the Manavgat Çayı (*Melas*) collects water from Geyik Dağları and through karstic outlets is fed even from lakes Beyşehir and Suğla; then Köprüçay (*Eurymedon*) has its sources in Dedegöl Dağ (Photos 20-22), while Aksu Çayı (*Kestros*) originates in Davraz Dağ and is fed with waters from lakes Eğirdir and Kovada. Finally, in the west, Düden Su (*Katarrhaktes*) carries its waters capriciously – partly underground, partly over ground – until it reaches the coast near Antalya and falls down the cliffs into the Mediterranean Sea in a

spectacular series of waterfalls (Photos 23-24). All of these rivers begin among high mountains, but then they cross the fertile, green Plain of Antalya, meandering like blue thread through green cloth. The fabric of the plain is regularly stitched with white domes of greenhouses that protect precious tomatoes, bananas and oranges. The Plain of Antalya and the Gulf of Antalya lie in the centre of our fan, hugged by the widely spread ribs of the Taurus Mountains. The airport of Antalya is located in the western part of the plain, and this is where our imagined flight would find its end dazzled by the sapphire blue of the Mediterranean Sea (Photo 26-28).

However, the bird's-eye view was not available for ancient people in the same way as it is for us. Their view of Pamphylia and Pisidia would be different from ours. If they were to arrive by ship at the coastal town of Side (Photos 29-35) in Roman times, they would not see the greenhouses. Still, they could admire the extensive cultivated plains abundant with water and populous cities. Many streams would dry up during summer (Photo 25), but the most significant ones, the Kestros and Eurymedon, were navigable considerably upstream and fresh water was additionally brought down to towns with impressive aqueducts. The Roman road ran parallel to the coast, providing a convenient east-west path. One could see the towns of Aspendos (Photos 36-41), Sillyon, Magydos and Perge (Photos 42-47) with their 'acropoleis' sticking out of the plain. Attaleia would be less visible from the east, as the port was located on the cliff, hidden behind the slightly elevated plateau (Photos 48-51). It was much more visible from the proud city of Termessos (Photos 52-58), the famous friend of the Romans, perched at the height of over 1,000m on Mount Solymos (Güllük Dağı). The city's theatre was located exactly so as to present the spectators with the view of the port of Attaleia down below (Photo 59).

The trip from the Plain of Pamphylia westwards past Termessos up to Isinda across the range that Strabo calls Milya was already a considerable undertaking. But once up on the flat highlands, the trip was not very hard. The height brings pleasant coolness to hot Mediterranean summers. The road past Isinda would lead further west towards the fertile Kibyrtis (Photos 62-67), Kabalia (Photos 68-73), Mount Kadmos and the Maiandros Valley. The Milyas would allow a convenient route along the south-

north axis (Photos 60-61). Perhaps the friendly, unfortified small towns of Verbe, Sibidounda or Pogla would welcome a tired pilgrim with a cup of fresh water and a bowl of olives. Maybe we would hear some news from the town of Ariassos, hidden from our eyes by the mountains in the east (Photo 74).

At the end of the valley, the road would split into two branches, just like today: one leading around the hills, along lake Askanios towards Phrygia Paroreios, the other one going right into the heart of Pisidia towards *colonia* Kremna and Sagalassos, the friend and ally of the Romans. The crossing would be guarded by the Roman colony of Komama. If we choose the road to Phrygia, we would step on the busy Via Sebaste leading north through Apollonia-Mordiaion (Photos 82-83) to the Roman colony of Antiochia (Photos 84-88) and back south towards lake Koralis and further east to Iconium (Photo 89-91). The road would be rather well-maintained and busy with people travelling from far East, through the central plateau to the opulent towns of the Aegean Coast. If we chose the right branch of the road towards Pisidia proper, we could visit the Roman colony of Kremna founded in the place of an old Pisidian city (Photo 75-77). The town was located on an impregnable hill with a splendid view over the valley of the Kestros. Down the river to the south lay the territory of Pednelissos, east across the valley was Adada, and to the north were the fertile valleys belonging to proud Sagalassos (Photos 78-81). Today, this is a land of deep dark forests, steep mountains and river gorges, but still it was rich enough in the past for a few towns and several villages to emerge among them. The travel to Adada (Photos 92-96) and up north through the mountains towards Timbriada would be troublesome and perhaps even impossible in winter, but it would be rewarded with the possibility to visit the oracle in the sanctuary of Meter Theon at the springs of Eurymedon (Photos 97-100).

Again, from Timbriada we could go west to the valley of the capricious Tioulos (Photo 19) and then north to visit the town of Prostanna (Photos 101-102). Possibly we would see not one lake Limnai but two, depending on the time of our travel, divided by a road leading south-west from Antiochia to *colonia* Parlais (Photos 102-105) and to the old Hellenistic settlement of Seleukeia. The land around Seleukeia was able to feed other towns as well, such as Konana or Baris (Photos 106-107). And just

south from it, on the other side of Akdağ, lay the town of Sagalassos reigning over the valley at her feet. However, if we wanted to go further east from Timbriada, we would need to cross a narrow pass through lofty Dedegöl Dağ and we would arrive at Tityassos, lying on the western shores of lake Koralis. The sea breeze would be at that point only a faint memory. More possibly we would breathe in either the summer dust, or winter frost would bite our noses. Going south through the imperial estates located around the lake would lead us to Mistheia and close to the territory of Amblada, famous for its exquisite wine, on the borders with Isauria (Photo 108). The Taurus Mountains would tower over our heads in the east and south. If we were bold enough, we could try and cross them back towards the Mediterranean Sea. This world of cities and tribes is now the most obscure to us. We have suspicions about where Etenna was lying, but what about Kotenna or Erymna? Where were the seats of Hytenneis, Catenneis, Homonadeis and Sedaseis? Luckily, there was one proud Pisidian city that had ambitions equal to Termessos and Sagalassos and whose identity is clear to us: Selge – the notorious rebel town, famous for the martial qualities of her people (Photos 109-114). As time passed, the Romans tamed even those peoples and towns, laid down roads and built bridges between the steep slopes to shorten the passage inland from the sea coast. From the high mountains of Pisidia, we would descend back to the Pamphylian Plain, breathing in the hot, humid vapour instead of sharp mountainous air.

This is the stage set up for our investigations, but it is by no means a static picture. Both the landscapes and the ways in which people perceived it were changing over time. Forests are cut and regrow, lakes dry up and fill in their basins again, springs show up and hide. Sheep and goats follow their shepherd, deer hide in forests, fish linger in dark waters and birds fly in the sunlit sky. Even plants, seemingly immovable, travel and change their distribution patterns. Even germs invisible to the naked eye hop from one host to another conquering new territories. Every part of the system evolves in close connection with others. Roads and settlements grow and wither, resonating with words of multiple dialects and languages, witnessing changing festivals and rituals, assizes and tax collections. Borders

are defined and redefined, negotiated or pushed by force, rules are settled and broken, reproduced or forgotten. Everything that lives tries to survive with the use of all possible means. Peasants get up early to till their land, merchants travel to sell their goods, soldiers march to claim their outposts, slaves run for their lives.

No wonder people have always been creating narratives to grasp this kaleidoscopic richness. Natural processes are too complex to be comprehensible for the human mind in their entirety, but we are still seeking patterns and we try to infer general laws governing them. As we seek for meaning we have no choice but to simplify and generalise our observations and this is true as much in regard to ancient historians as it is for the modern ones. The trick is to be aware of, attentive to and explicit about the limits of our own capabilities.

2.2 EMPIRE IN THE BACKGROUND

The history of Pisidia and Pamphylia in the first millennium AD is unavoidably woven into the history of the Roman Empire. From the final pacification of Pisidia under Augustus until the Seljuk raids in 11th century AD they were an integral part of the Empire. However, the crucial observation is that their history is not only woven into imperial history, but also written from the perspective of an empire, and even more than one. The majority of our literary sources speak from the position of privileged Greeks and Romans. We hear very little about Pisidians and Pamphylians through their own voices. The Sidetan language probably died out already in the Hellenistic period (Orozco, 2020). The Pisidian language survived for longer (at least until the 3rd century AD), but it never acquired the status of an official, literary language. Our knowledge of it is based on onomastics and a handful of funerary inscriptions written in the Greek script, often hardly distinguishable from the Greek ones (Brixhe, 2016). We hear about academics based in Pamphylia in antiquity, but their works did not survive. Thus, it is important to keep in mind that the stories we hear are second-hand at best and filtered through the lens of Graeco-Roman elite education. The modern historical discourse developed in

Western capital cities equally requires close scrutiny so as to distinguish between imperialistic, colonial and orientalisng tropes and what lies behind them (Said, 1978, 1993). The role of the Roman Empire in shaping our understanding of the region is not straightforward, and has been changing together with our understanding of the Empire itself.

Recent works suggest that the secret of the longevity of the Roman Empire lay in its ability to attract regional and local elites and convince them to participate in the imperial project as if it was their own (Woolf, 2001; Goldstone and Haldon, 2009). The Roman hegemony was based on ceding the responsibility to collect taxes and to keep order onto provincials in exchange for the right to join the exclusive club of Roman citizens and considerable autonomy on the local level. This was done in a highly flexible and ad hoc manner leaving much room for negotiation, variation and evolution. The Empire had never had an all-encompassing goal of controlling and Romanizing its subjects and never had enough tools to put it into action. Roman officials intervened only when absolutely necessary and even the most strategic resources were never fully monopolised by the state or an emperor. The state was content with the promises of loyalty from the local elites and Rome's overwhelming coercive power was more of a peace guarantee than a threat for them. The wellbeing of the commoners, on the other hand, was important only as a way of keeping peace in the provinces (Bang, 2007; Burbank and Cooper, 2010, pp. 23–59). Pisidia and Pamphylia remained within the Roman empire for centuries longer than Italia, Gallia or Iberia; the uprising of the Isaurian Lydius in Pisidia described by Zosimus (Zos. 1.69-70) was strangled by the governor of Lycia-Pamphylia Terentius Marcianus, who could have been of local origin (Mennen, 2011, pp. 140–1). Thus, the course of history itself demonstrated the effectiveness of the Roman integrative strategy, especially in the case of the Eastern Empire: Pisidians and Pamphylians of power deemed themselves as parts of the imperial order.

This is not to say that the Roman conquests had consequences only on the ideological level. The increasing unity and integrity of state structures or the rising level of prosperity and quality of life were most probably a real thing in the Early Empire (see the series of Oxford Studies in/on the Roman

Economy). However, the apparent economic growth or universal administration is not the same as the concept of Rome's cultural superiority. The Roman civilising mission was postulated already in antiquity, but it was picked up and developed by European colonial powers more in order to justify their 'civilizing' efforts rather than to explain the historical events of the past. Such tropes are ubiquitous in works on Asia Minor, e.g. on Antiochia in Pisidia: "But the Roman empire transcended nationality: it carried out in the east the work of civilisation which the Hellenic race did no more than begin, and that part of its history is the most varied and not the least important which deals with the diffusion of western culture over lands little affected, or wholly unaffected, by Hellenism. The foundation of Roman colonies was one of the means employed by the early empire to help on that work" (Anderson, 1913, p. 267). The 19th and early 20th-century narratives describing the process of unification of the Roman Empire allowed little room for local or regional agency and variance, and often transplanted the knowledge of the western part of the Empire onto eastern provinces, leaving awkward paradoxes unanswered, such as the unequal spread of Latin or the evident uniqueness of Egypt.

The sense of overarching common identity was certainly necessary in gluing all the parts together or defining and protecting official priorities, but the actual job of increasing the potential and connectivity of the system was done bottom-up rather than top-down. As recent research shows, the integrating processes in the sphere of economy, law or religion depended on locals, who more or less voluntarily participated in and contributed to the evolution of the common project (Mitchell and Katsari, 2005; but see also: Thonemann, 2013a). Rome set the general direction, but it was up to locals what response they choose and how they motivated it. How provincials understood their place within this wider framework has also become the subject of systematic scholarly interest and the problem of local identities has now firmly entered the field of ancient history (Thonemann, 2013b; Bekker-Nielsen, 2014; Bru, 2017). Thanks to this cultural turn it is easier to understand the rules governing the interactions between an empire and its subjects and to detect the recurring colonial and imperial

narratives. Such awareness is necessary in order to avoid hasty conclusions when reconstructing the socio-ecological system of Pisidia and Pamphylia.

2.3 THE ANCIENT ACCOUNTS OF THE REGION

Matters of everyday survival were rarely the focus of historians (until relatively recently) unless they found them strikingly different, strange or shocking. The narratives on the cultural habits of given peoples can be thus more telling about their authors than about the actual subjects of description. They often fall into predictable stereotypical constructs that reproduced and reinforced the helleno- or romanocentric worldview and served as ideological legitimization of political actions and attitudes towards 'others': nomads, villagers, locals, barbarians.

The legendary origins of the peoples living in Pisidia and Pamphylia passed down by the earliest Greek writers preserve some names known in later periods, but it is not easy to make sense from such fragmentary evidence. The first account of the inhabitants of Pisidia or Pamphylia may be tentatively identified in the passage of Homer's *Iliad* mentioning the Solymoi, the opponents of Bellerophon and his son Peisander during their stay in Lycia (Hom. *Il.* 6.184-9, 6.203-4). Already in antiquity, the identification of Homer's Solymoi was a topic for debate. Herodotus says that these Solymoi were the original inhabitants of Lycia and were later called Milyoi (Hdt 1.173). However, four centuries later Strabo identifies Homer's Solymoi as Kabalians and Termessians, in a polemic with Apollodorus who had supposedly rejected Homer's account completely (Str. 13.4.16). These voices testify to the process of constructing local identities with the use of Greek cultural references. They inform us more on how Pisidians and Pamphylians negotiated their place in relation to their more famous neighbours (Greeks, Lycians) in the Roman period than on the historical events of the Early Iron Age (Horsley, 2000). The archaeological evidence suggests that Pamphylian and Pisidian cities displayed traits characteristic of Greek civic culture from at least the 3rd century BC (Mitchell, 1992; Vanhaverbeke and Waelkens, 2005), but this seems to be not Greek enough for their descendants in the 1st-3rd century AD (leaving

aside the complicated discussion on what being Greek actually meant). As Roman emperors actively promoted the Graeco-Roman culture as the ideal type, Pisidians and Pamphylians were actively looking to anchor their origins in Greek culture (general: Sartre, 1994, pp. 202–210; on Tymbrida: Takmer and Gökalp, 2005; on Selge: Arroyo Quirce, 2016).

Pisidians and Pamphylians seem to remain in obscurity during the Persian period, staying in the background as the focus of Greek historians lay mostly on the Persian state elites. In Xenophon's writings, Pisidians are presented as rebellious members of the Persian empire, but there is little detail on the campaigns against them (Xen. *An.* 1.1.11; 1.2.1; 1.2.4; 1.9.14; 2.5.13; 3.1.9; 3.2.23; *Mem.* 3.5.26; *Hell.* 3.1.13). Likewise, the narrative preserved in Diodorus Siculus concerning this period describes them as a continuous threat to Persians, while the Pamphylians are mentioned only briefly (D.S. 11.2.1; 11.2.7; 11.61.1-7; 14.19.6; 15.90.1-4). It is fairly imaginable that the Pisidians had earned their fame as troublesome and independent peoples not without a reason. However, their role within the Persian empire is not straightforward. Xenophon mentions that Pisidians delivered ships for the Persian army while hoards of Persian sigloi found near Isparta (IGCH 1249) and Burdur (CH 8.26) suggest that they could have been paid for their military services as soldiers fighting for Persians. The Persian Empire was haunted by constant uprisings in different provinces and Pisidians were just one among many peoples trying to regain their independence.

Diodorus' text concerning the Hellenistic period preserves more specific knowledge, and this is symptomatic of Hellenistic historiography, as Greeks and Macedonians penetrated Asia Minor more thoroughly. His *Bibliotheca Historica* contains several descriptions of army manoeuvres, with special attention paid to the conflict with Alketas, and presents knowledge of the internal affairs of Pisidian cities (the stasis in Termessos, a story of a tyrant Molcestes in Boubon: D.S. 18.44-47; 18.50.1; 33.5a). In the 2nd century, Polybius reveals a detailed knowledge of the conflict between Pednelissos and Selge (Plb. 5.72.1ff). Strabo's excellent discussions of the ethnography, geography and biology of Pisidia have no match in the whole of ancient literature (Str. 1.2.10; 1.2.28; 2.5.32; 11.1.4; 12.3.27; 12.4.10;

12.6.3-7.3; 13.1.59; 13.4.16-17; 14.3.8; 14.5.1; 14.5.23-24). On the other hand, Nepos in the *Life of Datames* fails to anchor events in Pisidia in any closer geographical detail (Nep. *Dat.* 4-6). Also Livy's and Polybius' descriptions of M'.Vulso's campaign are problematic (although see: Grainger, 1995). Most place-names are hopelessly corrupted (some of them were possibly mistaken already in the original works) and the detailed course of events is far from clear (Liv. 35.13, 14, 37.40, 54; 38.13-15. Plb. 21.33-35). The names of Pisidian and Pamphylian cities and individuals became known, but much of their history did not enter the writings of classical authors and thus did not survive. Classical texts do not inform us about the history of Pisidian colonisation in Milyas and Kibyratis, on the acquisitions of Sagalassos inferred from the archaeological surveys or on the land disputes between Apollonia and Timbriada known from inscriptions. We are not sure what the extent was of power of the Hellenistic monarchs or what the process of colonization looked like.

In historical narratives, specific events and names are usually covered by stereotyping of tribes and peoples. The most distinctive feature of the Pisidians, often mentioned in ancient historiography, was their military expertise. The Pisidians in general 'were of outstanding prowess' (D.S. 18.45.5). Livy says that the Sagalassians 'are by far the best soldiers in that part of the world. Their military superiority, the fruitfulness of their soil, their large population, and the situation of their exceptionally strong city make them a brave people' (Liv. 38.15). Arrian agrees that 'the men of this city were deemed most so' (Arr. *An.* 1.28.1). Certainly, it should be noted that the Sagalassians were among the first and most eager allies of the Romans in the region, so it is rather understandable that they deserved the most favourable description. The Selgeans had 'a bold and dare-devil spirit in war' according to Polybius (Plb. 5.73.8) and were 'warlike' according to Arrian (Arr. *An.* 1.28.1). According to our sources Pisidians were often a challenge (or salvation) for several Persian, Hellenic and Roman commanders (Persians: D.S. 11.61.1-7; 14.19.6; 15.90.1-4; Plu. *Them.* 30; Cyrus: Xen. *An.* 1.1.11; 1.2.1; 1.2.4; 1.9.14; 2.5.13; 3.1.9; 3.2.23; *Mem.* 3.5.26; *Hell.* 3.1.13; Datames: Nep. *Dat.* 4-6; Autophradates: Polyæn. 7.27.1 ; Alexander the Great: Arr. *An.* 1.24.2 ; 1.27.2; 1.28.1; Plut. *Alex.* 18; Alketas: D.S. 18.44-47, 18.50.1;

Antigonous: Polyæn. 4.6.7; Antiochia: App. *Syr.* 2.9, 3.12; 6.32; Cneius Manlius Vulso: Liv. 35.13, 14, 37.40, 54; 38.13-15; D.C. 19.20.8; Pompey: App. *BC.* 2.8.49, 2.10.71; Eumachus: App. *Mith.* 11.75). They were praised as good soldiers, e.g. by Cicero: "The auxiliaries are certainly good, Galatians, Pisidians, Lycians – for they are the flower of my force" (Cic. *Att.* 6.5.3; other attestations: J. *BJ* 1.88; D.S. 18.61.4).

The late 2nd and 1st-century BC Pamphylians, especially Sidetans, were often seen as pirates or their allies. Pamphylians are said to cooperate with Cilicians and to open their ports as markets for enslaved people and looted goods (cf. Str. 14.3.2; App. *Mith.* 92; D.C. 36.20-23; Plu. *Pomp.* 24). The question remains as to what extent this narrative was constructed as a by-product of pro-Roman propaganda that emerged amongst the struggles to control the Eastern Mediterranean basin (de Souza, 1996). There is no doubt that the Romans themselves profited from the slave trade and their policy towards the pirates in the Eastern Mediterranean was not particularly consistent (Tröster, 2009). Still, we do not find this stereotype in relation to the Pamphylians in the imperial period. Neither is there anything pointing towards their exceptional martial prowess, as in the case of the Pisidians, although inscriptions and papyri in fact mention Pamphylian soldiers more often than Pisidian ones (Brandt, 1992, pp. 88–9; 165). Pamphylians were better known as merchants (Polyæn. 4.6.16), sailors (App. *Mith.* 56) and people of arts (Brandt, 1992, pp. 77; 143–150). It seems that the easier access to maritime routes and widespread acquisition of the Greek language allowed them to become known to other peoples on an everyday basis. Pamphylia belonged at various periods to the Seleucid and Ptolemaic empires, and as such it became an integral part of the Greek world even if there are few historical texts devoted to it.

It seems that the persistency of the tropes on Pisidians may be connected with the theories presented by Strabo. He distinguished two main types of peoples: the dwellers of mountains and the dwellers of plains. Martial prowess, independence and aggression are ascribed to peoples living in the mountains while laziness, civilisation and peacefulness are the characteristics of peoples living on the plains. First

Greeks, then Macedonians and finally Romans were supposed to combine the best traits from both types and thus they were worthy to lead other peoples (Str. 2.5.26). Strabo implies that being subjugated by Rome serves to the benefit of the subjected, because it helps to civilise the mountainous people and work on the character of the peoples from plains. Interestingly, Strabo himself does not strictly follow his own model. He praises the abundance of the country of the Pisidians and their opulent cities (Str. 12.7).

Strabo's views were certainly firmly anchored in the general views expressed by classical authors. Aristotle in his *Politics* writes in a similar tone: “οἱ μὲν οὖν ἀργότατοι νομάδες εἰσὶν (ἢ γὰρ ἀπὸ τῶν ἡμέρων τροφή ζῶων ἄνευ πόνου γίνεται σχολάζουσιν: ἀναγκαίου δ' ὄντος μεταβάλλειν τοῖς κτήνεσι διὰ τὰς νομάς καὶ αὐτοὶ ἀναγκάζονται συνακολουθεῖν, ὥσπερ γεωργίαν ζῶσαν γεωργοῦντες) : οἱ δ' ἀπὸ θήρας ζῶσι, καὶ θήρας ἕτεροι ἐτέρας, οἷον οἱ μὲν ἀπὸ ληστείας, οἱ δ' ἀφ' ἀλείας, ὅσοι λίμνας καὶ ἔλη καὶ ποταμούς ἢ θάλατταν τοιαύτην προσοικοῦσιν, οἱ δ' ἀπ' ὀρνίθων ἢ θηρίων ἀγρίων: τὸ δὲ πλεῖστον γένος τῶν ἀνθρώπων ἀπὸ τῆς γῆς ζῇ καὶ τῶν ἡμέρων καρπῶν. οἱ μὲν οὖν βίοι τοσοῦτοι σχεδόν εἰσιν, ὅσοι γε αὐτόφυτον ἔχουσι τὴν ἐργασίαν καὶ μὴ δι' ἀλλαγῆς καὶ καπηλείας πορίζονται τὴν τροφήν” (Arist. *Pol.* 1.1256a)¹. In a similarly deterministic manner Hippocrates in his treaty *On Airs, Waters and Places* links human living conditions, first of all the climatic ones, with their individual character. The only exception to the rule is made in regard to the mode of government where self-government is deemed better for a character development than living under royal rule. Both

¹ “The laziest are shepherds, who lead an idle life, and get their subsistence without trouble from tame animals; their flock having to wander from place to place in search of pasture, they are compelled to follow them, cultivating a sort of living farm. Others support themselves by hunting, which is of different kind. Some, for example, are brigands, others, who dwell near lakes or marshes or rivers or a sea in which there are fish, are fishermen, and others live by the pursuit of birds or wild beasts. The greater number obtain a living from the cultivated fruits of the soil. Such are the modes of subsistence which prevail among those whose industry springs up of itself, and whose food is not acquired by exchange and retail trade.” (transl. S. Everson 1996, p.20-21)

supposedly inferior cases – the mildness of climate and being ruled by kings – were ascribed to Asiatic peoples.

From this brief collection we can see that we should be extremely cautious while generalising on the basis of ancient literary sources. The occasional glimpses into the internal affairs of Pisidians and Pamphylians remind us that they had a rich military and political history of their own, although its transmission is problematic, incomplete and often skewed by elitist helleno- and romanocentrism. Nonetheless, their simple (or even simplistic) explanatory power appealed to generations of modern historians. The general equation between nomads, pastoralists, highlanders and being uncivilised was picked up by modern historians and used to create their own narratives to serve different hegemonies (on the ubiquitous disregard for pastoralist societies: Pomeranz, 2009, p. 9). It is important to be aware of these tropes in order to avoid repeating biased interpretations.

2.4 THE VERY LONG 19TH CENTURY

Long after the demise of the Roman Empire it still functioned as a role model for multiple states aspiring to become empires. The Roman criteria of what it means to be civilised and how to promote this among subjugated peoples was studied, emulated and remodelled with much persistence (Burbank and Cooper, 2010, p. 4). Generations of historians of different nationalities educated in the classical paradigm repeated the claims about Rome's superiority and higher level of civilization. But the more the surface is scratched, the more doubts arise as to what extent the Graeco-Roman perspective is skewed by cultural or class biases and political agendas and how it was instrumental in creating modern imperialistic narratives.

The way the ancient texts were transmitted and reinterpreted through the ages reinforced some of the narratives while leaving others to sink into oblivion and creating new ones. Curiously, several modern accounts of the ancient Western Taurus seem to stress the dichotomy between mountainous Pisidia and coastal Pamphylia much more, and altogether ascribe them a much lower level of

development and cultural sophistication than the ancient authors. One may wonder how much this derives from Western Europeans projecting 19th-century orientalisng visions of the late Ottoman Empire onto the reality of the Roman period. A host of travellers and geographers visited Ottoman Turkey and wrote down accounts of the country dominated by nomadic pastoralists, leaving the impression of low development, periphery, seclusion, remoteness, harsh conditions, mystery, and timelessness (Beaufort, 1817; Leake, 1824; Arundell, 1834; Fellows, 1839, 1841; Ritter, 1858). Paradoxically, the conviction of the low level of civilization in the region remained strikingly persistent even after the increasing penetration into Anatolia brought into light a growing number of identified sites and Greek and Latin inscriptions testifying to vibrant civic, religious and cultural life (Smith, 1852; Le Bas and Waddington, 1870; Collignon and Duchesne, 1877; Duchesne, 1877, 1879; Collignon, 1878; Ramsay, 1883a, 1883b, 1883c, 1885, 1888, 1890, 1930; Benndorf and Niemann, 1884; Paris and Radet, 1886b, 1886a; Sterrett, 1888b, 1888a; Petersen and von Luschan, 1889; Lanckoroński, 1890; Bérard, 1891, 1892; Heberdey and Kalinka, 1897; Cronin, 1902; Rott *et al.*, 1908; Paribeni and Romanelli, 1914).

The early epigraphic, numismatic and archaeological works are an invaluable source of evidence. However, it should be remembered that they pose interpretative challenges on their own, as their authors were not free from the imperialistic perspective that set the tone for historiographic discourse for decades to come. The primary topics of interest were dictated by philhellenism and biblical geography; if need be, the contemporary Ottoman Empire was the object of studies, usually entwined with the discourse on the clash of East and West and the rivalries between the colonial powers. The local peoples of ancient Anatolia were perceived merely as the substrate for subsequent Hellenization, Romanization and Christianization. Several travellers and epigraphists were prone to look for historical sites close to contemporary significant centres. On the one hand, it is understandable that they were bound to existing communication routes, on the other it suggests a considerable level of presentism in their investigations. The vast areas of the Western Taurus, especially those corresponding to Eastern

Pisidia, remained underexplored and it was taken for granted that they could not sustain urban life. Even in the face of material remains of a city, some found it hard to comprehend this phenomenon. John Sterrett, on his visit to a place that was later identified as Adada, wrote: "Kara Baulo is really a mystery, for it is impossible that even a village could have subsisted in these mountains without help from outside. The mountains are not only uncultivated, but are not capable of being cultivated. And yet in Kara Baulo we stand in the presence of an ancient town of great wealth" (Sterrett, 1888b). Similar convictions determined the objectives of scholarly funds. As a result, the identification of the city of Selge, that was deemed the finest city of Pisidia by Strabo, remained problematic for years because several travellers were looking for her in the wrong parts of Taurus (Arundell, 1834, p. 334; Fellows, 1839, p. 170; Ritter, 1858, pp. 505–7); the more inland cities of Timbriada and Amblada were not identified with certainty before the 1930's (Ramsay, 1930, pp. 246–7; Swoboda, Keil and Knoll, 1935, pp. 32–9), and some toponyms such as Tarbassos remain unlocated until today (but see: Waelkens and Poblome, 1997, pp. 70–72).

Interesting and eloquently articulated tropes can be found in the prose of William Ramsay – the giant of Anatolian history. He viewed the Anatolian landscape through the lens of geographical determinism: "If geography be regarded as the study of the influence which the physical features and situation of a country exert on the people who live in it, then in no country can geography be studied better than in Asia Minor. The physical features of the country are strongly marked; its situation is peculiar and unique; its history can be observed over a long series of centuries, and amid its infinite variety there is always a strongly marked unity, with certain clear principles of evolution, standing in obvious relation to the geographical surroundings" (Ramsay, 1908, p. 105). Surely, he was right in saying that there are few better places to study the relations between geographical surroundings and the course of human history. However, in his understanding the history of Anatolia was a history of constant battle between East and West: "In my 'Historical Geography' the contrast between the Aegean coastlands and the rest of the great peninsula is described, the former being, as it were, a part

of Greece, full of the light and the variety and the joyous brightness of the Greek lands; the rest, including the whole plateau, being, alike in geographical character and in spirit, part Asia, impressive in its immobility, monotony, and subdued tone. But one feels inclined to draw a further distinction, and to describe the west coast as Greek, the plateau within Taurus as the Debatable Land, and the country beyond Taurus as Eastern and Asiatic" (Ramsay, 1902, p. 261). Anatolia was not able to sustain an original civilization, "but has generally been subject to one of the great empires of the east or the west"²; the inland plains bereave a man from "vigour and initiative", "the sense of individuality and personal power grows weak and shrinks away" and "the old Asiatic paganism had proved too strong alike for the Greek trade and education and for the Christian teaching" in the face of the timeless cult of the Great Mother, and the Taurus Mountains are basically impenetrable both in terms of travel and spread of ideas; nomads are uncivilised, although "the traveller at the present day finds them [Kurds and Turkmen] generally quite peaceful and quiet" (Ramsay, 1908). Pisidia and Pamphylia lie in the Asiatic part of Anatolia, hence their backwardness and primitivism: "Nothing can be expected from the ruins to adorn a museum, for it is improbable that any fine works of art ever came to Adada, and certain that every accessible fragment of marble has been carried away long ago" (Ramsay and Hogarth, 1890, p. 136). Ramsay's authority guided generations of later modern historians. "The country is little known, except to enthusiasts. Who has seen anything like the whole of Pisidia except Sterrett? Or cares to see it?" (Ramsay, 1930, p. 240).

Famous historians of Rome, such as Theodor Mommsen or Mikhail Rostovtzeff, devoted rather little space to Asia Minor in their works on the Roman Empire (Mommsen, 1885; Rostovtzeff, 1926). David Magie and Robert Broughton had much more material to discuss Roman economy and administration,

² It seems that Ramsay was not aware of the discoveries of the Hittite Empire made under the leadership of a German archaeologist Ernst Winckler in Boğazkale-Ḫattuša and Kültepe-Kaniš in 1906; the Hittite cuneiforms were only deciphered by Bedřich Hrozný in 1925, but the Hittite identity of the tablets was suspected long before

and their huge compilations were long the basic reference works used for the history of Pisidia and Pamphylia, although they presented a limited picture of the region (Broughton, 1938; Magie, 1950). Even fairly recently Christian Marek in his hefty volume on the history of Asia Minor describes the regrettable state of art in regard to the Mediterranean coast of Anatolia. He mentions Pisidia and Pamphylia only a few times (Marek, 2016) despite the accumulating evidence collected thanks to generations of epigraphists (Heberdey, 1923, 1929, 1941; Robert, 1928; Swoboda, Keil and Knoll, 1935; Bean, 1959, 1960; Hall, 1968; Milner, 1998b) and numismatists (Aulock, 1977, 1979).

It is a fact that among the historical works of the second half of the 20th century only few were devoted to Pisidia or Pamphylia. The works by Jameson and Greenhalgh remained unpublished doctoral theses. They were of a rather descriptive character and neglected the pre-Hellenistic history of the regions (Jameson, 1965; Greenhalgh, 1987). The book by Barbara Levick on the Roman colonies in southwestern Asia Minor is an exception, but it is now seriously outdated (Levick, 1967). Levick shares Ramsay's opinion on the major prevalence of east-west communication at the expense of the north-south axis and the low level of civilization in the region, especially in Pisidia: "There can be little doubt that, down to the intervention of Augustus, the social organization of this area was a fairly homogenous one of warlike tribes ruled by petty chieftains, with a sprinkling of superficially Hellenised cities" (Levick, 1967, p. 17); "It may be doubted whether the Taurus as a whole had ever been thoroughly civilized or even conquered" (Levick, 1967, p. 173). By contrast, Pamphylia was recognized as a fairly urbanised region: "The coastal plain of Pamphylia was always more easily held, and the inhabitants claimed to be descended from Greek settlers. It was from this direction that civilizing influences spread towards the mountains and caused some of the barbarian Pisidians to organize themselves into primitive city states" (Levick, 1967, p. 16). Nonetheless, Levick, in her choice to talk about the Roman colonies from the perspective of the Roman civilizing mission, can be placed deep inside the imperialistic discourse, that denies Pisidians any cultural sophistication and equals them with mountainous, warlike and unruly shepherds.

As far as the imperialistic narrative omnipresent in Levick's book was still mainstream in her times, the book by John Grainger on ancient Pamphylia (Grainger, 2009) is a peculiar example of how persistent and influential it is in Classics even today despite the lively development of postcolonial discourse. The book has rightly met with a profound critique (Adak, 2010; Brandt, 2010). Using an event-oriented narrative, Grainger claims that Pamphylia was an isolated region both on land and on the sea, and the primary drive of growth for the Pamphylian cities was the constant external threat. Grainger underestimates the importance of maritime networks, does not recognise the existence of road networks and seriously belittles the local input into the development of imperial culture. *The Cities of Pamphylia* would not be worth mentioning if not for its usage as a reference work among a number of scholars not directly interested in the history of Pisidia and Pamphylia.

2.5 STONES, SHERDS AND LETTERS

The spread of post-modernism has brought a lot of fresh air even into Classics. New approaches started to populate the historical discourse on Pamphylia and Pisidia from the 1990's. Hartwin Brandt combines available historical, epigraphical, archaeological and numismatic evidence to reconstruct the society and economy of Pisidia and Pamphylia (Brandt, 1992). While doing this he finally acknowledges the pre-Greek history of these regions and stresses the continuity and sophistication of their culture. He offers a critique of earlier works that juxtaposed the supposedly barbarous, warlike and infertile Pisidia with well-developed, highly urbanised Pamphylia. Instead he describes the similarities, cooperation and complementarity of the two regions.

Around the same time another book discussing material from Asia Minor was published: Stephen Mitchell's *Anatolia*, focusing on inner Asia Minor, based on historical and archaeological material (Mitchell, 1993b). Some sections are devoted to Pisidia and Pamphylia, especially ch.II.6 on the pacification of the Taurus Mountains and sections of ch.II.7 on the Roman colonies, but evidence from Pisidia and Pamphylia is scattered throughout the whole book. Even though Pisidia and Pamphylia do

not receive systematic treatment, Mitchell offers a new perspective by putting them in the context of inner Anatolia and the Galatian migrations instead of the traditional imperial point of view. His additional contribution is the shift in focus from urban centres to rural areas as a key for understanding ancient peoples: "The core of any general investigation of Asia Minor must be a study of the countryside" (Mitchell, 1993b, p. 9). His book is an attempt to demonstrate this approach, particularly when discussing the impact of Roman rule.

These works by Brandt and Mitchell exemplify the rising interest in Anatolia beyond the Aegean Coast as well as the growing awareness of how important a role it played in the history of the Roman Empire. This final turn in the study of Pisidia and Pamphylia was brought in thanks to the combined efforts of archaeologists and epigraphists. Alois Machatschek and Mario Schwarz conducted an architectural survey of Selge (Machatschek and Schwarz, 1981) while Johannes Nollé and Friedel Schindler an epigraphic one (Nollé and Schindler, 1991). Nollé worked also in Side (Nollé, 1993b, 2001) continuing the work of Arif Mansel (Bosch, 1951; Bean, 1956; Mansel, 1963), while excavations in Perge were conducted by Haluk Abbasoğlu and Wolfram Martini (Martini, 2010). Claude Brixhe was the main person working on the epichoric languages of south-western Anatolia and local varieties of Greek (Brixhe, 1976, 2013, 2016; Brixhe and Hodot, 1988; Brixhe and Özsait, 2001). The Pisidia Survey Project started with Antiochia in Pisidia under the lead of Mitchell and then covered several cities including Sagalassos, Kremna, Ariassos, Pednelissos and several smaller sites (Mitchell and Waelkens, 1987, 1988, 1998; Mitchell, 1991, 1994, 1995; Schulz, 1992; Aydal *et al.*, 1995; Horsley and Mitchell, 2000; Vandeput and Köse, 2002, 2001). The influx of archaeological reports and articles on history, epigraphy, linguistics and numismatics combined with the decline of scholarly paradigms based on classical education completely changed the way that south-western Asia Minor is perceived.

2.6 LANDSCAPES AND IDENTITIES

The late 20th century and early 21st brought in completely new trends to the study of ancient Anatolia. The first trend develops towards environmental history, the other focuses on the topics of culture, religion, language and identity in the study of past societies.

The topic of environment can hardly be avoided in any work describing the Western Taurus. Brandt carefully avoids environmental determinism; however, his view of natural environment is rather static (Brandt, 1992). Mitchell cites Meiggs' work on forests in antiquity and discusses changes in the landscapes, although just like Brandt, he states that change was negligible (Mitchell, 1993b, p. 7). John McNeill introduces the Taurus Mountains as a case study in his wider work on the human impact on high-altitude marginal lands in the Mediterranean basin (McNeill, 1992). It offers a quite accurate summary of the climate of the Taurus Mountains in the context of the whole Mediterranean basin and a short discussion of the history of the regions of his choice reaching from antiquity to modern times. However, his historical reconstructions lack a critical approach towards literary sources, while his use of scientific evidence (geomorphological, palynological) is rather modest (see: Butzer, 1996).

The cultural trend is exemplified by a number of monographs and articles refining our knowledge on sub-regional and local variances of Pisidia and Pamphylia. The most comprehensive one is the book by Gaetano Arena that presents the synthesis of the structural and functional dynamics of both regions adding the social and cultural axis to Brandt's work focused on economy (Arena, 2005). Arena proposes four sub-regions in Pisidia and Pamphylia based on archaeological, epigraphic and literary evidence: the Pamphylian coast, Central and Western Pisidia, Eastern Pisidia, Northern Pisidia. His conclusions are clearly expressed, though alas, he does not resist the temptation to describe Pisidian pastoralists with such labels as "pirateria e brigantaggio" and to link the mountainous character of the country with the Pisidian "banditismo" (Arena, 2005, p. 3). Peter Talloen focuses his work on the religion of Pisidia. He has perfectly described the chronological ambiguities of the name 'Pisidia' and

observes the prominence of local water gods (Talloen, 2015). An active group of French and Turkish scholars have produced several articles discussing sites, local epigraphic habits and epichoric languages (Brixhe and Özsait, 2001; Labarre, Özsait and Özsait, 2005, 2007, 2010; Özsait, Özsait and Labarre, 2009, 2007; Brixhe and Cankardeş-Şenol, 2012; Labarre *et al.*, 2012; Bru and Labarre, 2013; Özsait and Brixhe, 2013; Bru, 2020). A synthesis of these works is presented by Hadrien Bru in his study on the socio-cultural conditions and identities of Phrygia Paroreios (including Northern Pisidia) and Eastern Pisidia, including a discussion of the Phrygian, Macedonian, Greek and Roman influences on the region (Bru, 2017). Bru mentions the results of environmental research, although he does not discuss them in depth. He cites palynological evidence from Asia Minor (Eastwood, Roberts and Lamb, 1998), but selectively focuses on the Beyşehir Occupation Phase in the 1st millennium BC and does not acknowledge changing climatic conditions (Bru, 2017, p. 11). Furthermore, inspired by the work of geographer Xavier de Planhol (Planhol, 1958, pp. 115–8), he anachronistically envisages Phrygia Paroreios as the meeting place for nomad and semi-nomad pastoralists also in the Roman period (Bru, 2017, p. 16). Such an equation with Ottoman times requires careful discussion of historical, archaeological and palynological evidence and without this it is unjustified. Planhol himself compares the situation in Roman Pamphylia and Pisidia rather to mid-20th century AD and opposes environmental determinism (Planhol, 1958, pp. 80, 437). Finally, George Watson in his book devoted to the coin production of Pamphylian cities in the Roman period (Watson, 2020) is able to draw conclusions leading far beyond the simple system of organization of coin minting as he proposes cultural and organizational divisions within the region distinguishing Western and Eastern Pamphylia. By far the most productive project in the region, giving space to both approaches, is the Sagalassos Survey conducted from the late 1980's until today (Waelkens, Mitchell and Owens, 1990; Waelkens, Harmankaya and Viaene, 1991; Waelkens, 1993; Waelkens and Poblome, 1993, 1995, 1997; Waelkens and Loots, 2000; Degryse and Waelkens, 2008). It is an amazing interdisciplinary project experimenting with new methods, techniques and approaches, trying to grasp all the aspects of ancient lives.

Specialists from different fields of science have participated in the project and such cooperation resulted in publications on bioarchaeology, tectonics, palynology, and many others (De Cupere, 2001; Similox-Tohon *et al.*, 2002; Sintubin *et al.*, 2002, 2003; Arndt *et al.*, 2003; Degryse, Muchez, Loots, *et al.*, 2003; Degryse, Muchez, Six, *et al.*, 2003; Degryse, Poblome, *et al.*, 2003; Degryse and Waelkens, 2008; Bakker, Kaniewski, *et al.*, 2012; Bakker, Paulissen, *et al.*, 2012; Jacobs, 2012; Van Loo *et al.*, 2017; Frémondeau *et al.*, 2017). The Sagalassos team pioneers an environmental approach on the local scale, and has demonstrated a number of important points including the high levels of population and dense settlement in the territory of Sagalassos, sophisticated technology and agricultural practices, the presence of olive cultivation in the Pisidian highlands (Vanhaverbeke and Waelkens, 2003; Vermoere, 2004; Richard, 2012). Paradoxically, the project brings in new biases. The astonishing richness of evidence from Sagalassos dwarfs all other settlements in Pisidia or Pamphylia. It requires a lot of caution to keep a balanced judgment and not to overemphasize the role of Sagalassos in the regional context.

2.7 CONCLUSIONS

This brief overview of the historiography of the region serves to point out a number of cautionary notes. The classical education that constituted the dominant paradigm in Europe in the period when the scholarly disciplines were forming left a substantial footprint on the study of ancient peoples and environments. The words of ancient historians were taken at their face value despite their obvious helleno- and romanocentrism. The Pisidians in particular were deemed as barbarian, unruly and troublesome following the stereotypical literary descriptions. The works of classical Greek and Roman writers such as Strabo were the source of the concept of the fight between East and West, where the East is the passive, receiving, less civilised one.

Modern historians, deeply affected by the imperialistic and colonial ideas of the 19th century, often mistook the contemporary Ottoman realities with the ancient ones. The southern shores of Asia Minor

were seen as areas of no importance and low urbanisation, dominated by primitive nomadic pastoralists. Such views not only ignored the literary, epigraphic and archaeological material suggesting high urbanisation, widespread sedentary life and sophisticated agricultural practices in antiquity, but also testified to the denigration and contempt of local customs, religion, knowledge and ways of life. The vision of the meek and primitive Orient waiting to be civilised by the enlightened Westerners was constructed amidst the fight of the colonial empires and amplified by the notions of the Roman civilising mission among Asiatic barbarians. Environmental determinism served as an ideological framework justifying colonialism.

The picture of Asia Minor in general, and of Pisidia and Pamphylia in particular, is completely different today than it was even 30 years ago. This has been thanks to the hard work of dozens of scholars working in different academic fields, laboriously collecting, analysing and synthesising evidence. And yet, some mental constructs are hard to eradicate. It is still ubiquitous to think about the environment in terms of a motionless background subject to human actions. Meanwhile, it has been governed by its own rules and played an independent role in human history. The nomadic and pastoral life still tends to be described in terms of civilisational level rather than being seen as a sophisticated adaptation to environment and a productive part of a wider socio-economic system. Finally, the mountain dwellers are far too often described as bandits and brigands, only because they did not subject easily to greater power.

A fish does not see the water it swims in. It is extremely hard to go beyond the mental constructs and prejudices of the culture one was raised in. The author of this work is not free herself from subconscious preconceptions. However, all effort has been made to challenge them and broaden the narratives present in the scholarly discourse.

3 THE HISTORY OF PISIDIA AND PAMPHYLIA SEEN THROUGH THEIR COINAGE

3.1 COINS ARE THE SIGN OF MOVEMENT

As was discussed in the previous chapter, the history of Pisidia and Pamphylia told through literary sources is full of blank spots. The deficiencies of our knowledge are being persistently filled in with the use of sources brought into light by archaeologists and epigraphists: architectural remains, pottery, inscriptions, coins. Coinage has a special place amongst them. A combination of several factors such as mass production, small size, durability, relative ease of identification and early interest of collectors in ancient coinage resulted in a relatively comprehensive recovery. Coinage is a clear proof of people's actions: minting, paying, buying, travelling. If looked at in bulk, coins may help in tracing the complex connections between regions, peoples and communities at different levels of detail and their diachronic dynamics. In the case of regions outside the main focus of ancient historiography, the numismatic evidence helps to fill in the gaps in our knowledge and offer opportunity to develop our own historical narrative.

Just thirty years ago it was thought that coinage represented mostly the mercantile face of ancient societies: "Es lassen sich aus der geographischen Verbreitung der Münzen Rückschlüsse auf die wirtschaftliche Bedeutung eines Ortes, die Intensität des Handels, den materiellen Wohlstand ziehen" (Franke, 1989, p. 3), and this approach is efficiently applied in the study of Brandt on Pisidia and Pamphylia (Brandt, 1992). Today our knowledge about ancient monetary systems (still highly incomplete) allows us to draw a much more nuanced picture. It is true that the use of coinage was widespread in the Roman Empire reaching even the lowest social classes (Temin 2001), but a wide scope of economic activities took place without the involvement of actual money (Harris, 2006) or did not operate on the basis of market economy (Bang 2007). Today much more emphasis is put on the

role of the military needs of states and rulers in shaping monetary output in antiquity, especially in regard to precious metal coinage minted in the Classical and Hellenistic periods.

3.1.1 Money is for strangers

It is worth making a remark concerning the peculiarity of coin usage in antiquity: money was made for strangers (Depeyrot, 2019, p. 15). A pre-industrial economy based on agriculture did not need money to function. The use of metal mediators, even when they were known, was not necessary to exchange goods and services in a society where all people lived in the same area, knew each other personally and were tied with well-defined mutual obligations. Such exchanges could have been extended in time and manipulated according to societal rules allowing for the emergence of sophisticated structures on the level of the state and even the empire (such as the Inca Empire). The exchange of goods and services could have been performed as barter, through taxes in kind or via a clientelic system. Of course, once in place, money facilitated interactions with those who were not included in local systems, such as soldiers, pilgrims or spectators, and merchants, and they encouraged more distanced interactions with no further obligations (in contrast to, for instance, the Greek system of *xenia*). Thanks to the fact that coinage was used by these particular groups of people, we may try to reconstruct some interesting aspects of ancient connectivity.

Soldiers are itinerant strangers par excellence, who come, interact and go, and who need an intermediary tool to satisfy their needs without imposing obligations upon themselves. Providing for the needs of their armies was the main concern of ancient rulers. It is believed that most of the Hellenistic silver issues were struck in order to pay soldiers (Callataÿ, 2012). The army was also the primary item of state expenditure for the Roman Empire (Duncan-Jones, 1994, pp. 33–46; on the difficulties of financing the army see e.g.: Mattern, 1999, pp. 126–142). It was armies and their suppliers that transported money for the longest distances in relatively short but intense outbursts. Our richest sources of information, coin hoards, were in most cases a direct consequence of military turmoil, and they are usually absent in times of peace.

Pilgrims and spectators were also itinerant people. They visited sanctuaries, oracles, and festivals for religious purposes or for entertainment (usually both at the same time). They were half-outsiders, often gathering in large numbers for a short period of time, so the use of money facilitated their stay without overloading the local social system. There are attested instances of coins issued specifically for the use of festival participants (Psoma, 2008). These types of coins would normally stay relatively close to the issuing place, with some further travels on a regional scale. Their find-spots would mirror the places of peoples' origins and thus the area in which a given festival or a sanctuary was popular.

Another group, and the most obvious one, are traders. However, the usage of money in ancient trade is not clear and straightforward, complicated by the existence in some periods of closed monetary systems (Thonemann, 2016). For the Roman period, we have evidence for sophisticated minting techniques (Butcher *et al.*, 2014) and large-scale money transactions (Erdkamp, Verboven and Zuiderhoek, 2020), but still there is doubt as to how understand the patterns of ancient monetary economies (see e.g.: Bang, 2007; Harris, 2011; Temin, 2012). Small-scale local trade did well without money, and regional economies could flourish as a system of such small-scale barter transactions within or beside the local reciprocal system. In the Roman Empire we are certainly dealing with a universal currency, but we still do not fully understand how coinage was used in everyday life and how different denominations interacted with each other (on the Roman denominations see e.g.: Johnston, 2007). The sum needed to acquire grain for the city of Rome, or a prestigious residence required, in principle, several carts full of coins. Where were they stored? How were they transported? Were they in fact stored and transported at all? A significant proportion of taxes must have been paid in cash. How did the taxpayers get possession of coins, how were they collected, and by whom? How these problems were solved in practice remains a topic for debate.

Of course, people did use money locally and for local purposes. We should just keep in mind that they did not use it like we do. Issuing money in antiquity would be more of a political tool or an ideological statement than an economic necessity. Still, coinage is an invaluable source of information in its own

right. Every single coin testifies to human actions needed to produce, transport and deposit it. Coinage in bulk is therefore a tool to identify long-term patterns of interaction. Actions of individuals led to the emergence of collective entities such as, but not limited to, towns; and the aggregated activities of towns could lead to the emergence of higher-level socio-economical constructs that did not need to correspond with Roman administrative units or ethno-linguistic regions. Patterns of coin circulation will be different, depending on whether the vector was a soldier, a pilgrim or a trader. The aim of this chapter is to briefly describe the history of Pisidian and Pamphylian internal and external interactions through the lens of the coinages connected to them, and to discuss the processes shaping the nature of these patterns.

3.2 SHIFTS IN PATTERNS

3.2.1 Pre-Roman coinage

The pre-Roman coinage material for Pisidia and Pamphylia is still understudied, although the situation is dynamic. The corpus of known coinage is growing, but no comprehensive synthesis has been produced to date. Nonetheless, it is useful to be aware of the general patterns of coin production and circulation in pre-Roman times. The minting activity of cities and the shifts in the reach of certain types of coins reflect wider political and economic changes.

Contrary to the Greek towns of the Aegean coast (Kroll, 2012), we know of no coinage minted by the Pamphylian or Pisidian communities in the Lydian period, even after the conquests of Kroisos (for the extent of Kroisos' conquests: Hdt. 1.28; Wiseman, 1956, pp. 37, 88). The monetary tradition in Pamphylia and Pisidia starts in the early 5th century BC under Persian rule (Afram, 2012). The oldest known coins in the area are silver issues of the 5th century BC from Aspendos, Side and Selge, struck on the Persian standard, and coins from the Aeolian colony of Olbia on the Aeginetic standard (Fig. 3.2.1; *Aspendos*: BMC 1897; SNG Finland II; SNG Sweden 1.2; SNG Ashmolean 5; *Side*: BMC 1897; SNG Finland II; SNG Ashmolean 5; *Selge*: BMC 1897; SNG Finland II; *Olbia*: BMC 1897, but the attribution is

old and questionable). From the same century comes a hoard of Persian sigloi found around Burdur that are thought to have travelled there from Sardis (CH 8.26). The use of silver Pamphylian coins on the Persian standard was mostly limited to western Asia Minor (exceptions exist, but they consist of just two hoards containing single specimens from Selge and Side found in Egypt among much more numerous Greek coins: Demanhur hoard - IGCH 1637, Asyut hoard - IGCH 1644 = CH 2.17). Meanwhile, Lycian, Phaselite and Cypriot coins are found in many hoards around the Mediterranean (IGCH 1180, 1182, 1185, 1482, 1638, 1639, 1640, 1645, CH 8.10, 8.57, CH 8.587 = CH 9.356, 10.206, 10.437).

Significant developments emerge in the 4th century. Etenna and Sillyon started minting their coins (Etenna: vA Pisidien II; Sillyon: SNG Ashmolean 5: 1478-1481) and the output of the Aspendian mint seems to dwarf all other mints in the area (cf. hoards containing coins from Aspendos: IGCH 1244, 1245, 1246, 1257, 1262, 1267, 1268, 1427, CH 1.26 = CH 5.19 = Kraay 1979, CH 8.107, 9.403, 9.410, 9.417). Most of the hoards with Pamphylian and Pisidian coins are found locally or in regions to the east (Fig. 3.2.2): Pisidia and Pamphylia (IGCH 1254, CH 1.30, 9.408, 9.415), southern Asia Minor (IGCH 1261), Cilicia (IGCH 1255, 1259, 1263 = CH 8.99, CH 6.11, CH 8.91 = CH 9.390), Cyprus (IGCH 1278), but some of them also as far as Mesopotamia (IGCH 1747), Media (IGCH 1790), Bactria (IGCH 1820) or Gandhara (IGCH 1830). Several hoards are generally confined in their composition to Pisidian-Pamphylian, Cilician and Cypriot coins (IGCH 1244, 1246, 1265, CH 8.99 = IGCH 1263, CH 9.415). Interestingly, no hoards found within Pisidia or Pamphylia contain Athenian coins (unlike the hoards found outside southern Asia Minor). Such an East-oriented picture seems to conform with Pisidia and Pamphylia's affiliation with the Persian Empire.

The conquests of Alexander the Great changed the political and economic landscape of the Eastern Mediterranean considerably. The most noticeable change in Pamphylia during his lifetime is the introduction of a new system based on the Attic standard. Possibly supervised by Antigonos Monophthalmos (upon the death of Alexander, Antigonos was in charge of Pisidia and Pamphylia and both regions remained mostly under his control until his death in 301 BC at the battle of Ipsos, cf:

Arena, 2005, p. 70), Side started issuing Alexanders – coins types depicting Alexander, both in gold and silver. These were reissued several times and remained in circulation even until the end of the 3rd century BC, especially at the outskirts of the Hellenistic world. By the end of the 4th century BC Sidetan coins travelled to Greece (IGCH 80, 81, 82, 83, 84, 95, 410, 414, 801), Phrygia (IGCH 1395), Cappadocia (IGCH 1246), Cyprus (IGCH 1468, 1470), the Levant (IGCH 1510, 1513, 1515, 1516, CH 8.172), Mesopotamia (IGCH 1756, CH 10.251), Susiana (IGCH 1792u) and Egypt (IGCH 1664, 1665, 1667, 1668, 1669, 1670, CH 2.55, CH 2.56 = CH 7.49 = CH 10.446) (Fig. 3.2.3). Together with Alexander types from other mints, they probably circulated as pay for Hellenistic soldiers and mercenaries either coming back from the East or serving the Diadochi. In the 3rd century BC, Sidetan Alexanders dispersed even further (Fig. 3.2.4), testifying to the reliability of the type: Ukraine (IGCH 866, Anadol), Bulgaria (CH 10.60, Sumensko?; CH 9.145, Dragoevo), Balkan (CH 9.196, IGCH 458), Serbia (IGCH 444), Thessalonica (IGCH 445, Pontoleibade-Kilkis), Macedonia (IGCH 448, Prilepec, Macedonia; CH 9.189, Tricala, Thessaly), Armenia (IGCH 1735, Diyarbekir, anc. Amida) and Pakistan (CH 10.275, Quetta).

However, Side together with other cities in the region (Aspendos, Selge, Etenna and Phaselis) also continued minting on the Persian standard, even if on a much smaller scale than in the case of the royal Alexander issues (Side: SNG Pfälzer 4; Aspendos: BMC 1897; Selge: BMC 1897; SNG Pfälzer 4; Etenna: CH 8.243; Phaselis: IGCH 1430; BMC 1897); The phenomenon of continuous issues based on the Persian standard is also known from Aegean poleis in the first half of the 3rd century BC, see: Ashton, 2012, p. 175). Unfortunately, they are only roughly dated, and it is impossible to say if they were issued continuously or occasionally during the Hellenistic period. In comparison to Alexanders, their distribution was locally restricted, and perhaps better reflects the local habits and circulation of money (Pamphylia: CH 8.243; Pisidia: IGCH 1408, 1409, CH 10.284, 10.285, 10.287; Southern Asia Minor: IGCH 1429).

After the death of Antigonos Monophthalmos in 301 BC Pamphylia's affiliation was more fluid, and Pisidia belonged nominally to Lysimachos until his death in 281 BC. Afterwards, Pamphylia and the

southern cities of Pisidia fell under the Ptolemies, while the rest of Pisidia came under Seleucid rule (Arena, 2005, p. 71). This arrangement carried on during most of the 3rd century BC, although there is little material on the specific events (Le Rider, 1986, pp. 43–4; Kosmetatou, 1997a, pp. 18–20). The archaeological survey in the chora of Sagalassos dates the extension of the city's territory to the Hellenistic period (Vanhaverbeke and Waelkens, 2003, p. 217). Termessos oversaw the expansion of her influence to the west in the form of colonies in Kabalia and Kibyrtis in the first half of the 3rd century BC (Coulton *et al.*, 2012). There is a suggestion of Galatian raids as far south as Lycia – and, interestingly, with Pisidian involvement, but it should be treated with caution as the source text is rather late (St. Byz. 21.13–23).

In the last quarter of the 3rd century BC the Seleucids gained control over Pamphylia, Milyas and the rest of Pisidia (Mitchell, 1993b, p. 22; Vanhaverbeke and Waelkens, 2005, p. 49). The period of Seleucid dominance in the region was possibly mirrored in the renewal of posthumous Alexander issues in Phaselis, Perge, Aspendos, Sillyon, and possibly Sagalassos, as well as the beginning of the 'civic' coinage of Side; many of these issues are dated with civic eras that lasted from c.223 BC to c.184 BC (McIntyre, 2007; Meadows, 2009; van Heesch and Stroobants, 2015; McIntyre discusses the dating of the main series of Aspendos and Perge; I follow him in the interpretation of the 'M' series as a mark of magistrate, not the town of Magydos). This was also the first time Termessos started issuing her own coins (McIntyre, 2006, 2007). The issuing and circulation patterns of the coinages of Perge, Aspendos and Side correlate with the military campaigns of the Seleucids, and the more modest issues from Sillyon and Termessos can also be linked to them (Meadows, 2009, pp. 72–3). The hoards containing Pamphylian issues were found in Propontis (IGCH 888 = CH 7.93), Mysia (IGCH 1302, 1303), Lydia (IGCH 1318), Phrygia (CH 10.293, IGCH 1405, 1406, 1410, 1413, 1547), Central (IGCH 1411, 1412) and Southern (CH 5.43 = CH 6.34 = CH 10.294, IGCH 1426) Asia Minor, Commagene (IGCH 1542), Armenia (IGCH 1735), Syria (CH 1.77, CH 2.81 = CH 10.289, CH 9.501, IGCH 1535, 1536, 1537, 1538, 1539, 1541, 1773), Lebanon (CH 10.295), Mesopotamia (IGCH 1769, 1772) as far east as Sogdiana

(IGCH 1822) or Pakistan (CH 10.275) and as far west as Spain (CH 8.411). The geographical scope of these hoards broadly mirrors the sphere of influence of the Seleucid empire, however it has been proposed that the Syrian hoards containing Attic tetradrachms should be linked to the 2nd cent BC military interventions funded by the Attalids (Psoma, 2013).

After the Roman-Antiochian war and the treaty of Apameia in 188 BC parts of Pisidia and Pamphylia nominally became a part of the Attalid kingdom. The Attalid presence in the area could have been sustained with the cistophoric coinage known from Kibyra, Oinoanda (Ashton, 2013, pp. 253–5), possibly Kormasa (Thonemann, 2008) and the Attic-weight issues of Side, Isinda and Termessos (Meadows 2013, pp. 186–188; Weiß, 1992, p. 149). On the other hand, the monetary system of Selge seems not to conform with the Pergamene one (Kosmetatou, 1997a, p. 31). Pamphylian silver Alexanders travelled to Pergamon probably as a war indemnity, where they were redistributed around the Attalid dominion with countermarks bearing the name of the target recipient (Thonemann, no date; Meadows, 2013, pp. 171–3). Interestingly, Sidetan bronzes seem to travel in the opposite direction around the same time, namely to the Levant, possibly as pay for the Seleucid soldiers (Johananoff, 2007). The coinage from the Lycian League, Phaselis and Olympos conforms more with the Rhodian plinthophoric standard marking her sphere of influence around the middle of the second century BC (Ashton, 2013, pp. 259–262). Roman power and influence in the region were sealed with the campaigns of M'.Vulso. M'.Vulso was also the first Roman to collect tribute from Pisidian or Pamphylian poleis and secure their allegiance towards Rome (Grainger, 1995).

The new political order in western and south-western Asia Minor imposed by Rome, a distant yet powerful arbitrator, was built around the enlarged Attalid kingdom, Rhodes, and a host of free cities. The establishment of free cities had possibly catalysed a series of social and cultural changes that found their voice in the foundation of local *panegyreis* (festive markets) and the introduction of epichoric coin iconography connected to those festivals (Meadows 2018; Psoma 2013). The example

of such coinage are the Attic silver tetradrachms bearing the legend of Artemis Pergaia minted possibly in Perge for festivals in the middle 2nd cent BC (Colin 1996).

3.2.2 The onset of the Roman Empire

As Goldstone and Haldon suggest, micro-structural social organisations and networks always precede state organisation and give it its tone (Goldstone and Haldon, 2009, p. 22). Rome took over the Pergamene state relatively quickly, not only because of their administrative and military skills or their reputation, but also thanks to their constant and increasing grass-root penetration of western and south-western Asia Minor. Romans and their allies were present in the region long before the actual annexation. The creation of the province of Asia amplified this process and extended it further east. It is also known that Pisidians and Pamphylians travelled westwards as slaves, mercenaries, artists, craftsmen or merchants within the Roman sphere of influence (Bru, 2020). Rome had a profound effect on the minting practices because poleis and rulers of Asia Minor tried to accommodate Roman standards and expectations. Some of these communities, such as the poleis of Termessos and Sagalassos, officially became free cities and allies of Rome enjoying equal status for their citizens; some of them, such as the Homonadeis, remained unconquered, but most of the inhabitants of Asia Minor fell under various forms of Roman control including being sold into slavery. The level of colonial exploitation in provinces could outrage even the Romans themselves (Cf. Cic. *Ver.* 2.1.41-102). Similarly, despite the unexpected death of Amyntas, Augustus took over his kingdom with considerable ease. The Romans were already firmly in control of the situation.

3.2.2.1 *Provincia Asia, provincia Cilicia*

The creation of the province of Asia in 129 BC brought direct Roman rule to Asia Minor, although Roman influences had long been on the rise (Mitchell, 1993b, p. 29; Bru, 2017, pp. 21–23). Pamphylia and parts of Pisidia previously belonging to the Attalid kingdom were also ascribed to the province of Asia (Mitchell, 2008). The ports of Pamphylia fell later under the province of Cilicia upon its creation

in 102 BC as an accommodation to naval campaigns in the Eastern Mediterranean (Mitchell, 2008, pp. 189–192; Tröster, 2009).

Perge, Aspendos and Side seem to have reissued Alexander coinage of the previous century, but now on a weight standard fitting the Roman monetary system. These issues are marked with years of new civic eras, and they seem to date to the period between the battle of Pharsalos in 48/7 BC and the accession of Amyntas in 36 BC (Meadows, 2014, no date, pp. 34–6). The practice of imitating well-established local issues is characteristic of Roman colonial policy in newly incorporated regions.

Pisidian Termessos was one of the few entirely and openly pro-Roman poleis in the region that we know of. The granting of the status of a free city to Termessos in 71 BC was possibly the starting point of her civic era, as marked on the subsequent issues from that city (Arena, 2005, p. 247). Much less is known about the rest of Pisidia. The 1st century BC is the time when several Pisidian poleis started to mint their own coinage, usually in bronze (Fig. 3.2.5): Adada, Amblada, Andeda, Ariassos, Komama, Konana, Kremna, Malos, Parlais, Pednelissos, Prostanna, Sagalassos, Seleukeia, but also in silver: Sagalassos, Kremna with Keraitai and Komama (Weiß, 1992, p. 149). One may hypothesise that the bronze issues were an answer to the rising pressures on behalf of Roman *publicani* (Talloen, 2015, p. 34), but it is impossible to say anything for certain without a precise dating.

3.2.2.2 *The kingdom of Amyntas*

The second half of the first century BC led to another reorganisation of Roman power in Asia Minor. In 39 BC Antonius decided to pass the responsibility for the Royal Road to Amyntas, a client king. Amyntas' domain stretched from Pontus to the Pamphylian coast, but possibly excluding the coast itself (Syme, 1934). Amyntas minted silver coins connected with a number of cities such as Perge, Aspendos, Sagalassos (van Heesch and Stroobants, 2015), Komama, Kremna and Keraitai (Meadows, no date, pp. 37–8), as well as imitations of Sidetan coins (Meadows, 2006). The system of client-kings was efficient enough for Octavian to accept it after the battle of Actium. Eventually though, Amyntas

was killed during his campaign against the Homonadeis in eastern Pisidia and his kingdom was turned into the province of Galatia (Mitchell, 1993b, p. 72).

3.2.2.3 *Provincia Galatia, provincia Lycia et Pamphylia*

In 25 BC, after the death of Amyntas, it was decided to create the imperial province of Galatia and designate a legate to manage it. It seems that Rome did not plan in advance to take the kingdom into possession, as Amyntas was at the peak of his power. His death was rather unexpected, but the Romans had a lot of experience in such opportunism and took over power immediately. The safety of the East-West route was of prime importance (for a discussion of the exact date of Amyntas' death and its immediate consequences see: Mitchell, 1993b, pp. 61–63). The construction of the Via Sebaste surrounding the region and foundation of a series of colonies (Antiochia in Pisidia, Kremna, Komama, Olbasa, Parlais, Lystra) and veteran settlements preceded the final pacification of Pisidia, which was conducted in the years 12–6 BC by P. Sulpicius Quirinius. Lands belonging to defeated communities, such as the Orondeis around the Lake Beyşehir, were turned into *ager publicus* and the people themselves were turned into slaves (Bru, 2017, pp. 26–27). Tiberius and Claudius added further colonies (Pappa-Tiberiopolis, Claudiocaesarea-Mistheia, Claudioseleucia-Seleukeia Sidera), sealing the final conquest (Arena, 2005, p. 79). The road system and colonies efficiently secured Roman control over the resources and communication routes in southern Asia Minor (cf. Fig. 3.2.6).

It seems that once the situation in Pisidia itself had been definitively pacified and local poleis and communities accepted (more or less freely) the new sovereign, it was no longer necessary to keep an army inside the region. 'As long as her [the Roman] army continued to be victorious and those successes became well known, challenges to Rome's power were discouraged...' (Hanson, 1997, p. 69). Legions V and VII were withdrawn from Galatia in 6 AD (for Galatia: Mitchell, 1976a; cf. the situation in Britain: Hanson, 1997, pp. 72–75; fig. 4.1 and 4.2). The Via Sebaste, the colonies of Roman veterans and the loyalty of the most important local cities was enough to keep general order until the unrests of the 3rd century AD emerged (Mitchell, 1993b, pp. 70–79). The military focus of the Romans

shifted further east towards struggles with the Parthians. From the time of Vespasian, the Roman army was stationed on the *limes* on the upper Euphrates (Hanson, 1997, p. 68). Only smaller units were stationed in area (Bennett, 2007).

As time had shown, the borders of provincia Galatia changed depending on circumstances (Mitchell, 1993b, p. 63, 1993a, pp. 151–164). The evidence for Pisidia and Pamphylia's affiliation to the province Lycia-Pamphylia comes from inscriptions from the cities of Sagalassos and Komama, dated to 138-141 AD and 144-147 AD respectively. Mitchell argues that the change could have happened as early as the incorporation of Lycia under Claudius, making it a new province in 43 AD (Mitchell, 1993a, pp. 154–157). New evidence shows, however, that the creation of the double province Lycia-Pamphylia must have happened during the reign of Vespasian, c.70-72 AD (Adak and Wilson, 2012; Şahin, 2013). Regardless of these changes over time, the provincial boundaries were meant to serve imperial purposes in the first place, and they often went across local ethnic or functional divisions. Our problems with marking their exact course may testify to their permeable and fuzzy character, especially in the areas deemed unsuitable for agricultural usage.

3.2.3 The bronze provincial issues and the Roman Imperial period

The start of the imperial period brings important changes to the numismatic material. Minting in silver and gold was basically centralised and restricted to the imperial capital of Rome (with just a few exceptions), but a high number of cities in Asia Minor still issued bronze coinage that can be easily assigned to specific cities and reigning emperors. The exact mechanisms behind the organisation of coin production are not fully understood, but in the case of Asia Minor it was certainly more connected to non-military activities than ever. War did not reach the region until the 3rd century AD, conflicts between the cities were mediated by the Roman authorities and internal strife was largely suppressed, while pirates and bandits were curbed. The relative non-occurrence of hoards reflects this time of peace. There are no recorded hoards containing Pisidian or Pamphylian coinage until the 3rd century AD (except for one coin from Magydos in a hoard dated to 150-160 AD from the sanctuary of Zeus

Olympios at Dion, CH 10.196). Several communities started minting coinage for the first time in history, and sometimes coinage is the only evidence we have for their existence. Without knowing the local context, though, it is often hard to determine the exact message and actors behind these specific issues.

The bronze provincial issues can inform us on long-term changes from Augustus to Tacitus in Pisidia and Pamphylia in various ways. The mere enumeration of minting cities in the early imperial period testifies to a dense settlement grid and a vibrant provincial life (Fig.3.2.7) that can be corroborated with literary and archaeological evidence (Hanson, 2011; Willet, 2019). The coinage discussed in the following sections covers Pamphylia and Pisidia in their broadest geographical sense, in order to highlight the sub-regional patterns. The description includes not only Pamphylia, but in the west also Lycian Olympus and Phaselis, which were perceived as belonging to Pamphylia in previous periods, and in the east settlements as far as Syedra. Outside Pisidia proper, I also look at cities of Isauria: Pappa Tiberia and Amblada; of Phrygia Paroreios: Apollonia and Antiochia; of Kibyrtis, Kabalia (Oinoanda, Balbura, Boubon); and of Milyas (Lycian Milyas: Choma and Podalia, Pisidian Milyas: Isinda, Sibidunda, Verbe, Andeda, Pogla, Komama, Olbasa).

3.2.3.1 The Julio-Claudian period

The period of the Julio-Claudian dynasty is a time of experiments (Figs. 3.2.8 and 3.2.9). The coinage seems to have been intended to facilitate the final incorporation of the region and only close Roman allies were allowed to produce it. At the same time these were poleis guarding strategically important routes: Ariassos and Sagalassos overlooked the route from the coast to inner Anatolia, Termessos and Kibyra the route to the Maiandros Valley. Their relations with Rome date well back to the times of the Attalid kingdom or perhaps even the campaign of Manlius Vulso. The Roman colony of Antiochia in Pisidia and veteran settlement at Apollonia were located on the major east-west highway. It is worth noting that Antiochia was the only Roman colony that minted civic coinage. This points to her double role as the main seat of Roman troops in the region and as the local religious centre.

Interesting peculiarities are characteristic of the reign of Augustus (Fig. 3.2.8). Several towns and communities are known (or suspected) to be combined such as Komama with Kretopolis, Kremna with Keraia, Termessos with Typallion (Asarlık Tepesi) and Neapolis, Adada with Kapıkaya, Ariassos with Sia (Talloon, 2015, p. 36). Among Pisidian cities, Ariassos minted coins together with Termessos and Sagalassos. Little is known about the history of Ariassos (Robinson, 2002; Arena, 2005, pp. 184–5), and two Augustan issues may suggest that it was equally closely related with the Roman state as the other two cities. The impression is strengthened by the fact that the civic era of Ariassos attested in the 3rd century AD had its starting point at the beginning of the period of Attalid rule, around 189-8 BC (Leschhorn, 1993, p. 390) and the architectural features found in the city resemble Pergamene constructions (Mitchell, 1991, p. 160). As was previously mentioned (Section 3.2.2.1; Fig. 3.2.5), Ariassos also minted ‘autonomous’ coinage dated broadly to the 1st century BC. With her location guarding the main passage north from Pamphylia it must have been of a particular importance for the Romans (cf. Robinson, 2002, pp. 102–3).

The situation in Pamphylia is equally interesting: we know of issues from Aspendos, Attaleia and Sillyon, but not from Perge or Side, which is surprising because in later periods their coinage was the most abundant in the region (cf. Chart 1 and Chart 2). This brings us back to the question of the extent of the kingdom of Amyntas. If Side was outside his kingdom, as has been suggested (Meadows, 2006), it would not have been incorporated automatically into the province of Galatia in 25 BC, and this could explain the lack of imperial issues under Augustus. It is plausible that Perge, being a cult centre of Artemis Pergaia, would have enjoyed similar autonomy. That would conform with Cassius Dio, who says that Antonius granted only parts of Pamphylia to Amyntas (D.C. 49.32). It is hard to say when Side and Perge could have been incorporated into the province of Galatia, although their autonomy could not have lasted long. Already under Tiberius they started issuing coins with imperial portraits, possibly as a token of their loyalty.

The numismatic material provides some interesting evidence on the history of Kabalia (the towns of Balboursa, Boubon and Oinoanda) and Kibyrtis. It has been suggested that the eras noted on the bronze imperial coinage from Kibyrtis and Boubon under Augustus and Tiberius are connected with Murena overthrowing the local tyrant Moagetes and dissolving the Kibyrtic Tetropolis in 82/1 BC (Vitale, 2012). Kibyrtis was then incorporated into the province of Asia, but the fate of the Kabalian towns is less certain. Strabo says that Balboursa and Boubon joined the Lycian League (Str. 13.4.7), but Oinoanda is not mentioned. The inscription preserving the treaty between Rome and the Lycian League from 46 BC sets the boundary of the League south of Oinoanda, thus most probably also without the rest of Kabalia (Mitchell, 2005). That would suggest that Kabalia remained separate from the Lycian League, at least from 46 AD. Furthermore, the coinage of the Lycian League bears a distinctive set of features (square incuse, a kithara on the obverse, mint signs, dotted circle around the edges) that is lacking from most of the bronze issues of the Kabalian towns. Hyla Troxell explains the lack of Balbouran and Boubonian issues within the Lycian system with their subordinate position. The coinage that does bear similar motives (the head of Artemis, a quiver, a stag) is supposed to merely imitate the Lycian coinage (cf. Troxell, 1982, pp. 109, 238).

However, the Kabalian bronzes issued under Augustus, Tiberius and Caligula may suggest their adherence to a different administrative unit, at least at the start of the imperial era (RPC 3353-3361). The territories of Kibyrtis and Kabalia were long neglected by modern scholars, but once discovered, they were deemed more fertile than e.g. neighbouring Milyas (Kokkinia, 2008, p. 4). It is imaginable that Kabalia avoided incorporation into the Lycian League and it is probable that it would have opposed such incorporation. Eventually though, the creation of the province of Lycia in 43 AD, in the aftermath of mysterious unrests under Claudius, was followed by the disappearance of civic issues from both regions, as the new province switched to the Roman system completely. After that date there is little doubt of Kabalia's adherence to the province of Lycia (Milner, 1998a).

3.2.3.2 *The Flavian period*

On his accession, Vespasian undertook wide administrative changes in Asia Minor in preparation for military campaigns in the East. He established the double provinces of Lycia-Pamphylia and Galatia-Cappadocia, as well as the new province of Cilicia (Eck, 2012). The rearrangement in the provincial boundaries could have served to facilitate the logistics of his campaigns in the East (similarly to the creation of the province of Cilicia at the end of the 2nd century BC).

This is probably reflected in issuing patterns under the Flavians. The ports of Pamphylia (Aspendos, Attaleia, Magydos, Perge, Side, Sillyon), as well as poleis in Phrygia Paroreios (Apollonia and Antiochia) and Kibyra continued to issue coins, but the rest remained silent. The chain of towns along the main maritime and land routes would provide the backdrop needed for the effective management of armies on the Euphrates. Antiochia in Pisidia and Apollonia, especially under Vespasian, saw a rise in the number of issues. Bronze coinage could have been minted there to facilitate the transport and provisioning of armies going east. An additional factor favouring these cities could have been the patronage of elite families close to imperial circles such as the Caristanii of Antiochia in Pisidia (Eck, 2012, pp. 32–3). Pisidia, now belonging mostly to the province Lycia-Pamphylia, remained inactive in regard to minting coins (Fig. 3.2.10, Chart 3).

3.2.3.3 *The explosion of local issues under Nerva-Antonines*

Significant changes in the landscape of provincial coinage come in the period between Nerva and the Antonine dynasty. Already under Nerva, Sagalassos issued five issues after a pause under the Flavians. Under Trajan, Adada and Pednelissos in Pisidia, as well as Korakesion and Laertes in Pamphylia, started minting coinage (Fig. 3.2.11, Chart 4), and finally under Hadrian the number of issuing cities in Pisidia rose to ten (Fig. 3.2.12), and under Antoninus Pius to fifteen (Fig. 3.2.13), including the unfortified communities of Milyas. Smaller cities of eastern Pamphylia also started to produce coinage under Trajan. The rising number of known mints is characteristic not only of Pisidia and Pamphylia, but goes in line with wider tendencies observed in other regions of Asia Minor (Yarrow, 2012).

The relatively low number of known issues from the Julio-Claudian or Flavian periods cannot be attributed solely to the practice of reminting older coins during the monetary reforms under the Antonines. The difference in the number of issuing cities between the Flavian dynasty and the Antonines is significant and cannot be a coincidence. The second century emperors oversaw the final integration of Pisidia into the Roman Empire and deeper cultural changes. Hadrian in particular was vividly interested in the redefinition of the provinces of Asia Minor, and took more direct engagement in provincial affairs.

Hadrian encouraged the inhabitants of the eastern provinces to build and express their identity within the Hellenised world with the use of tools provided by the empire itself: the institution of a polis, local leagues, imperial cult and religious festivals (Nollé, 2012; Lozano, 2017). Following his encouragement, many towns claimed Greek ancestry, and Kibyra became a member of the Panhellenion (Sartre, 1994, pp. 202–210; Romeo, 2002; Doukellis, 2007).³ The imperial visits of Trajan, Hadrian and Lucius Verus to Pamphylia and Pisidia could be commemorated on local coinage (cf. Fig. 3.2.14), even if emperors themselves were just passing near a particular city without actually entering it (Arena, 2005, pp. 80–81). The monumental architecture of Perge or Side, perhaps built to impress emperors, also bears marks of the same cultural process of constructing local identities within an imperial framework (Tüner Önen, 2013).

However, this is not yet the whole story, as Hadrian's philhellenic policies were largely abandoned by his successors. The observed patterns in the bronze provincial coinage must have originated from

³ The membership of Timbriada in the Panhellenion is more problematic. The inscription from the sanctuary in Zindan Mağarası mentioning the panhellenes Samos and Abas is usually ignored or left without a further comment in the discussions on the Panhellenion. However, Hadrien Bru proposed that the title 'panhellenes' should be understood as the victors in the Athenian Panhellenic agones and thus they should not be connected to the Hadrianic Panhellenion (Bru, 2017, p. 138)

multiple factors. As can be noticed, the Pisidian cities minting under Nerva, Trajan and Hadrian were usually those with a prominent history (e.g. those mentioned in Artemidorus' list of Pisidian poleis) and with sumptuous civic architecture often dating back to the Hellenistic period: Adada, Kremna, Pednelissos, Sagalassos, Selge, Timbriada, Tityassos (Arena, 2005, s.v.). Since the reign of Antoninus Pius, though, communities of a different character had started issuing coinage (Fig. 3.2.13). Andeda, Isinda, Kolbasa, Konana, Olbasa, Palaiopolis, Pogla, Sibidunda – these are all small communities in Milyas, often without any fortifications or civic buildings (Arena, 2005, s.v.). The abundance of local issues in Milyas could be connected to the extensive help of Antoninus Pius after a catastrophic earthquake. His intervention is attested in Milyas by an inscription from Kodroula where he is called a 'saviour' (*sōter*) (Mitchell, 1994, pp. 144–145). Imperial intervention after natural disasters was deemed a part of an emperor's duties. Another possible explanation can be connected to the settlement developments that are similar to those recognised during the Sagalassos Survey - a shift in settlement patterns from guarded mountainous strongholds to unfortified villages and small towns in the highland valleys (Vanhaverbeke and Waelkens, 2003). But while the settlements in the chora of Sagalassos remained within her territory, the communities of Milyas developed as separate poleis. Interestingly, the tendency of abandoning the hill-top settlements in favour of location on flat lands has also been observed on the other side of the Empire: e.g. in the Iberian Peninsula (Rodríguez Gutiérrez, 2019). At the same time, there are no evident signs of crisis supposedly brought by the Antonine plague (Harper, 2017, pp. 115–118).

Interestingly, Pisidian identity also found its voice within the Hellenised world in various hybridised forms, e.g. the inclusion of local deities such as Men, Solymos, local river gods or mythical motives in the repertoire of coin legends (Kosmetatou, 1997b; Heuchert, 2005, p. 49; Nollé, 2015; Bru, 2017, p. 108). Another example comes from the grave stelae inscribed in the Pisidian language but with the use of the Greek alphabet in Eastern Pisidia. They could have been founded by local middle-class citizens profiting from wider prosperity (Brixhe, 2016). The otherwise unknown Moulasseis, living in

the area between the poleis of Selge, Adada and Timbriada, call themselves a *demos* in their inscriptions (Özsait *et al.*, 2012, p. 184, no.1) and are thought to have engaged in textile production (Özsait *et al.*, 2012, pp. 183–9; Labarre *et al.*, 2013; Flohr and Wilson, 2017b). Their production was surely based on the sheep-rearing popular in many places in Pisidia, and as the depictions of shepherds on reliefs and coin legends testify, this could have been a source of local pride and substantial income (Nollé, 1992, p. 72; Labarre *et al.*, 2015, p. 98; cf. Photos 115-116). The products of such dispersed inconspicuous communities could have been transported down the valley of Eurymedon to Selge and to the Pamphylian coast (cf. Flohr, 2016) or upstream to Timbriada and the cities around Lake Eğirdir. Paradoxically, such manifestations of local self-expression mark tightening state control over the region, its gradual homogenisation and rising connectivity that required the re-evaluation of local identities and the emphasis on differences instead of growing similarities.

Surely, the developments among the middle- and small-size urban centres and communities are striking, but still in the period from Nerva to the Antonines the most active poleis remained Perge (70 issues), Side (60 issues), and Antiochia in Pisidia (65 issues) – cities cosily nested within the imperial system, giving a convenient stopping point while travelling east-west, while also acting as regional religious, economic and cultural centres (Chart 4). The polis of Syedra, lying on the boundary with Cilicia, also produced a considerable number of issues (57). A number of their issues can be connected to imperial visits and possibly substantial commercial activity. The coastal cities, in particular, could have functioned as entrepôts linking the region with Rome and the wider Mediterranean (de Ligt and Bintliff, 2019, p. 24). Attaleia, despite housing Roman colonists, seems to have had only a secondary importance in the region (Nollé, 1993a, p. 310), while Aspendos dropped down to the rank of second-category towns such as Sillyon and Magydos (cf. Nollé, 1990, p. 259). Within Pisidia, Sagalassos with her 33 issues seems to be the most prominent city in the region. However, Selge and Kremna, with 28 and 27 issues respectively, are not far behind. This pattern remained stable under the whole dynasty, even if the philhellenic trends of Hadrian were largely abandoned by his successors. It is also

interesting to see that the inland cities of the region located in mountainous areas were not that drastically depopulated like their counterparts in central Sicily or the Iberian Peninsula (de Ligt, 2019; Rodríguez Gutiérrez, 2019). Therefore, the economic foundations of inland areas must have been significant. The opulent cities of Asia Minor, enjoying times of unprecedented peace (cf. Çevik and Bulut, 2007), constituted a solid part of the empire providing people with both staple and luxurious goods.

3.2.3.4 *The Severans*

In general, the tendencies observed under the Antonines continue and amplify under the Severans, with the symbolic high point of the *constitutio Antoniniana* (Bru, 2017, p. 295). The landscape of the issuing cities remains fairly similar (Fig. 3.2.15). The whole of Asia Minor, including Pisidia and Pamphylia, engaged in festivals celebrating both local pride and local identity as well as the joy of being a part of the empire (Mitchell, 1979; in general on Asia Minor: Klose, 2005; Nollé, 2012). Pythian games, the greatest festivals in the region, were organised in Side and Perge (Brandt, 1992, p. 146), but lower rank agones are attested for almost every other Pamphylian polis (Watson, 2020, pp. 169–70). The agones were also popular in inland Pisidia, although at a slightly later period (Weiß, 1992, p. 154). Some of the issues from Termessos (largely undatable) and Ariassos have been connected to the festival of the hero Solymos, established possibly in the 2nd century AD (Kosmetatou, 1997b). However, their foundation, as in the case of the Kesbelia hosted in Selge, can possibly be traced as far back as the Hellenistic period (Talloen, 2015, p. 139). The coinage and inscriptions testify to the popularity of agones in Eastern Pisidia (Bru, 2017, pp. 111, 126, 131). Another type of coin legend from Selge, Adada, Andeda, Pogla and Lysinia issued under the Severans commemorates the Epinikia – festivals celebrating military victories in connection with the imperial cult (Talloen, 2015, pp. 170–1).

Ann Johnston sees the Severan coinage mostly as a tool of self-expression and commemoration of local events, with little military and even less economic use (Johnston, 2012; similar opinion: Nollé, 2012, p. 19). However, even if the bronze coinage was of diminishing importance within the economic

system, its very existence testifies to the energetic lives of local communities. The Pisidian or Milyadic cities minted coinage on a smaller scale and less often than the Pamphylian or Asiatic ports, but they did so continuously and consciously. Perhaps a notion of “quite insignificant towns” (Johnston, 2012, p. 454) is just a function of our biased sources and is worth reassessing. After all, big regional hubs could not have built their importance without their local backstage.

The continuation of issues of some otherwise inconspicuous cities of Eastern Pisidia – Etenna, Timbriada and Tityassos – is worth noting. Although less known from the literary sources, and hence purportedly peripheral, they had been issuing coinage persistently since Hadrian. As a matter of fact, Etenna under Elagabalus and Severus Alexander minted the highest number of issues among Pisidian cities – 16 and 41 respectively, which is more than those of Sagalassos (10 and 15), Selge (6 and 26), or Antiochia in Pisidia (12 and 20), in the same period (Charts 5 and 6). It has been suggested by Nollé that the coinage of Etenna also covered the needs of the neighbouring settlements of Kotenna and Erymna (Nollé, 1992, pp. 68–69), but this does not explain the change in proportions between the Antonine and Severan dynasties. The location of the city on the narrow pass towards inner Anatolia on the junction of routes from Aspendos and Side may point towards Etenna’s role as a transit town from the coast to Antiochia in Pisidia (route Side-Mistheia-Antiochia – ca.245 km; route from Perge along the Via Sebaste – over 300 km) or other Roman colonies in inner Anatolia and the imperial domains in the *tractus Orondicus*. It is conceivable that with time and the increased security of mountainous routes, this had become a significant alternative route for those travelling from the southern coast to the interior, or vice versa (Nollé, 1992, pp. 70–1). A similar route from the Plain of Antalya towards Lake Beyşehir functioned in the Selçuk period (Planhol, 1958, pp. 89, Fig.10).

Tityassos and Timbriada, in turn, guarded the passage across the Dedegöl Massif between Lakes Beyşehir and Eğirdir. The sanctuary of Meter Theon Veginos in the cave of Zindan Mağarası, well-known in the area, was located on the territory of Timbriada (Kaya and Mitchell, 1985; Dedeoğlu, 2005, p. 99; Takmer and Gökalp, 2005). Possibly there was also a temple of Meter in Tityassos (Weiß,

1992, p. 155). The territory of Timbriada covered the upper valley of Eurymedon, while Tityassos extended along the western shores of Lake Beyşehir, not far from the imperial estates attested on the Killanian Plain. The minting activity of Timbriada and Tityassos testifies to their stable economic foundations.

Interestingly, the reign of Macrinus lasted less than two years, but the coinage with his portraits suggests he was quickly recognised in the East. The monetary output of his reign is relatively high, especially in Syria (Scott, 2008, pp. 85–103). His coinage was produced in a few key cities: Perge, Side, Aspendos, Attaleia in Pamphylia (SNG Pfälzer 5), Olbasa and Sagalassos in Pisidia (vA Olbasa 1971; BMC 1897). The composition of the minting cities, enclosed in the short chronological snapshot of 217–218 AD, may suggest their nodal role in spreading information and imperial policies, as well as their importance in military organisation during the Parthian war. Macrinus' accession as the first non-senatorial emperor, even if followed by the restitution of the Severan dynasty, can be viewed as a foreshadowing of soldier emperors later in the century.

3.2.3.5 *The crisis of the 3rd cent. AD*

The accession of Maximinus Thrax initiates the series of emperors whose position was particularly tied to their relations with their armies. Military skills and accomplishments, as well as popularity among the soldiers, became more important than other considerations such as senatorial status (de Blois, 2014). Events between 235 and 280 AD affected the minting patterns more vehemently than had been the case during the two previous centuries. Gothic raids reached the coasts of Anatolia as far as Pamphylia, the Persian threat was lurking from the East, and Asia Minor was often a theatre for civil wars (Arena, 2005, pp. 85–88). Cities were no longer able to provide safety – the civic *paraphylakes* were replaced with troops of soldiers. The collection of taxes largely fell into the hands of the army too, creating a massive pressure on the local population (Stroobants, 2020, p. 465). Pisidia and Pamphylia served both as a place of refuge for Roman emperors, and as the stage for some last issues of bronze provincials.

The situation on the eastern and northern frontiers required the constant presence of the emperor, resulting in the need for either dynamic relocation of the central authority or its decentralisation. The imperial itineraries had a great attractive power that elevated regional centres into imperial quasi-capitals. The frontier bases became the foci of military, political and economic power (Watson, 1999, p. 14). Simultaneously, emperors experimented with collegial power. The failure in securing all the vulnerable spots quickly enough (which was the case more often than not) resulted in a plethora of usurpers who tried to patch the shortcomings of the central power on their own.

The major reshuffles in the socio-political system of the empire went in hand with changes in the economy (Watson, 1999, p. 19). The constant need to fund armies resulted, among other things, in an unprecedented quantity of coins produced and the continuing debasement of centrally produced gold and silver coinage. The imperial trimetallic system went into complete disarray and it took decades for a new system to emerge after the reforming efforts of Aurelian and Diocletian (Estiot, 2012). The patterns of production of provincial coinage should be seen against this eventful background.

As can be seen on Chart 7, the number of issues minted by a single city per regnal year increased considerably from the reign of Elagabalus onwards, and peaked under Decius (based on the material available in RPC). At the same time, the older issues of higher quality were being withdrawn from circulation. Three hoards testify to the unprecedented coin debasement: people started hoarding bronze coinage, because it had higher value than the exceedingly debased antoniniani (Akyay, 1966; Foss, 1979; Watson, 2014). However, the hoards from this particular region may be indicative not so much of warfare but rather of the acute monetary crisis after 270 AD (Ruffing, 2008, pp. 824–5). The joint composition of the hoards marks the main directions towards which the region of Pamphylia-Pisidia was oriented in times preceding the crisis. The mints recorded in the hoards were located along the Pamphylian coast, the Aegean coast of Asia Minor and Hellespont, north towards Phrygia and west towards the Maiandros Valley, with a few in Macedonia and Syria (Fig.4.3.3-5).

The dynamic military and political situation resulted in highly changeable patterns of coin production. The most characteristic feature is that the number of known coins from particular Pisidian and Pamphylian cities largely fluctuates between different emperors (Charts 9-13). It has been suggested that in this period the production of small bronze change was targeted at satisfying the needs of troops. The bronze coinage could have been distributed through soldiers in camps or during numerous agonistic festivals organised to keep them entertained. The coinage could have also served to advertise claims to imperial power and sustain the image of a powerful ruler (Cluett, 2002, pp. 387–388). Still, the cumulative number of issues produced in the Pisidian and Pamphylian cities from Maximinus to Trebonianus Gallus concentrates in Perge, Side and Antiochia in Pisidia, highlighting their role as the most significant cities in the region.

Maximinus was mostly active on the northern frontiers of the Empire and in Italy. In his declarations he was breaking with his predecessor Severus Alexander, but in real terms his reign was marked rather by continuity with the Severan traditions (Huttner, 2014, p. 164). Coin production under Maximinus seems to focus on the coastal cities (Chart 9): Perge (35), Aspendos (29), Side (20), Syedra (15); the drop in the proportion of issues from Etenna and Selge is conspicuous as well as the lack of known issues from Antiochia in Pisidia that could be indicative of a local crisis, possibly connected to the regional supply chains. Nonetheless, the minting cities are quite widespread geographically (Fig.3.2.16). A number of coin legends may echo the distant military activities of Maximinus such as the depictions of Nike on the coinage of Perge and Kremna (Perge e.g. RPC VI, 6171; Kremna VI 5933), a military trophy from Side (RPC VI 6446, 6451, 6452) or Maximus driving a quadriga on the coinage from the colony of Kremna (RPC VI 5929). At the same time, Olbasa chose to depict the personification of Homonoia (RPC VI 5962) as a sign of peace and order (on the variety of meanings hiding behind the personification of Homonoia in the Augustan period see: Sheppard, 1984). The Pamphylian poleis represented their productive capacities in the form of a galley in Side (RPC VI 6438, 6443), the scene depicting Athena receiving a miniature quinquireme from Zeus in Sillyon (RPC VI, 6315), or the issues

of Perge (RPC VI 6170) and Aspendos (RPC VI 6323) depicting Hephaistos working on armament. The Hephaistos types become more popular later on, appearing on the Pamphylian coinage from Olympos to Syedra (Nollé, 1995). The presence of Hephaistos on the provincial coinage may suggest the rising importance of metallurgic products in the economic and political life of issuing cities despite the low esteem ascribed to people working in crafts.

The rivals of Maximinus, Gordian I, Gordian II, Pupienus and Balbinus, did not leave a legacy in the form of provincial bronzes in Pisidia and Pamphylia. This confirms that their influence was geographically limited and did not reach Asia Minor. However, Gordian III is universally recognised as the emperor. The most active mint in the region in his times is that of Antiochia in Pisidia with as many as 69 issues (Chart 10). They can be linked to imperial travel to the East in preparation for the campaign against the Persians, as Gordian's route is generally marked with coin types representing adventus ceremonies or war ships (Huttner, 2014, p. 186). The peak of festival activities is also ascribed to the reign of Gordian III, who established a number of games under the name of Gordianeia (Nollé, 2012, p. 12). Interestingly, it has been suggested that Side and Perge coordinated their monetary output beginning from the reign of Gordian III in the wake of granting the status of *Isopytheia* to their civic festivals (Klose, 2005, p. 131; Watson, 2019, pp. 108–109).

The minting pattern under Philip I shows the dominance of the port cities of Perge and Side (Chart 11). Their activity may be connected to the conclusion of the Persian campaign, the return of the new emperor to Rome via maritime routes and the grant of privileges to the visited cities. Perge issued an unusual series of coins with personified hope - *Elpis* (RPC VIII ID 27211), otherwise popular rather in Tarsos or Egyptian Alexandria, possibly symbolising trust towards the new emperor. Multiple issues commemorate the right of *asylia* of the temple of Artemis Pergaia (e.g. RPC VIII ID 26705, 21052) while depictions of agonistic crowns are popular in Side (e.g. RPC VIII ID 21151, 21152, 21153) pointing towards local games with the titles of *hieros* and *isopythios* (RPC VIII ID 27431, 21158). Additionally, Side advertises again her maritime power with the use of depictions of a galley (RPC VIII ID 21147) or

a prow (RPC VIII ID 26686, 27491) with military standards, or a trophy (RPC VIII ID 21155). Further inland, Antiochia in Pisidia seems to advertise peace with the Sassanians with their *Pax* (RPC VIII ID 3345) and *Providentia* (RPC VIII ID 3234) issues, echoing the *pax* issues from imperial mints in Syrian Antiochia and Rome (Huttner, 2014, p. 191).

Other examples of military types are less specific, and may be connected not only to the Persian campaign, but also to the massive concentration of legions on the northern border against the Carpi (Huttner, 2014, pp. 190–1). Sagalassos issued a series with the legend $\text{CAΓAΛACCEΩN ΠPΩTHC ΠICIΔΩN, ΦIΛHC KAI CYMMAXOY PΩMAIΩN}$ (RPC VIII ID 20875). Together with the higher numbers of the types depicting Lakedaimon (RPC VIII ID 20880, 20886, 29259, 29260), this may suggest a considerable participation of Sagalassos in the military campaigns of the Romans, recognised in her title of the First of Pisidia. In turn, issues from Amblada celebrating homonoia with Lakedaimon (RPC VIII ID 20801-3) are indicative of constructing local identities with mythological heritage.

Despite tensions on the frontiers under Philip I, the provinces of Asia Minor, including *provincia* Lycia et Pamphylia, seem to enjoy peace and prosperity. The number of minting cities remains high (36). The general trend of stressing a prestigious heritage is copiously represented, e.g.: Apollonia representing her Thracian and Lycian roots (RPC VIII ID 20815) and homonoia with Ilion (RPC VIII ID 20816), and Cremna commemorating the deified Augustus, the founder of the Roman colony (RPC VIII ID 20908). Depictions of local river gods (Anthios in Antiochia in Pisidia, Hippophoras in Apollonia, Tioulos in Prostanna), deities (Men, Hekate triformis and Aphroditai Kastnietides in Aspendos) and myths (the foundation myth of Etenna) are ubiquitous.

However, under Decius, the political situation in the Roman Empire deteriorated, as conflicts ignited on multiple borders of the empire at the same time. Different military and political leaders tried to control the situation ad hoc, but with no long-term success (Watson, 1999, pp. 23–38). The Empire was divided and the situation started affecting the inner provinces much more seriously (Goltz and

Hartmann, 2008; Hartmann, 2008; Luther, 2008). Starting from Decius, the number of issuing cities gradually decreases, especially in Milyas, northern and eastern Pisidia. This may be explained as a consequence of the massive production of drastically debased silver coinage. The antoniniani were of such low value and were so ubiquitous that the provincial bronzes lost their economic rationale (Watson, 1999, pp. 126–7).

Still, Decius and Trebonianus Gallus left a massive amount of coins considering the duration of their reigns. The highest number of issues come from Antiochia in Pisidia, Perge and Baris (Charts 12, 13). The number of identified issues from Side may seem surprisingly low, but it might be connected to her joint monetary policy with Perge (vide supra; Watson, 2019, pp. 108–9). Baris is another interesting case, as her monetary output rises considerably in comparison to earlier emperors. Possibly Baris took over the responsibility for minting coinage for the neighbouring cities of Seleukeia and Konana.

Coinage under Valerian and Gallienus was issued in massive quantities, but of very poor quality. Most of the known coins were issued in Side and Perge in connection to the festivals of Olympieia and Augusteia aimed at restoring the faith in the good fortune of the empire (Arena, 2005, p. 358; Nollé, 2012, p. 13). They both issued several types advertising homonoia with other cities. In the case of Perge these are prestigious connections with Ephesos and Delphi; Side shares these connections and adds Egyptian Alexandria as well as the other regional centres of Myra, Attaleia, Aspendos and Sagalassos. In this way Side and Perge situated themselves within the wider homonoia network in Asia Minor (see: Ch. 4.6 below).

However, the celebrations did not help in averting the empire-wide dangers. Under Claudius Gothicus Pamphylia was invaded by the Goths, who even succeeded in taking the city of Side. Consequently, the number of issuing cities dropped down to five, all located in Pisidia (Antiochia, Seleukeia Sidera, Prostanna, Sagalassos, Selge). The issues from Sagalassos possibly celebrate the successful attempt by Claudius to drive the Goths out of Asia Minor (Cluett, 2002, p. 389).

Under Aurelian most of the coinage seems to be produced in Kremna, with smaller quantities in the southern cities of Perge, Side, Sillyon and Selge (Cluett, 2002, p. 386). They were perfect places for army concentrations and naval bases and participated in the collection and transport of the *annona* (Arena, 2005, pp. 86–87). The stronghold of Kremna could have been one of the bases of Aurelian in 270/1 AD before his campaign against Zenobia. However, after the resolution of the Palmyrene campaign, a local uprising broke out. The rebels took control of Kremna and considerable Roman forces were needed to take the fortress back (Mitchell, 1995; Davies, 2000). Interestingly, both the leader of the uprising and the general commanding the intervention most probably were of local origin. Thus, the uprising can be seen as a class backlash after years of arduous economic and military endeavours whose costs were surely to be paid by the local populace in the first place.

Finally, under Tacitus, only Perge issued coinage, and these were the last provincial bronzes. These last issues in their ideological message are neatly in line with an inscription from Perge boasting of her history and privileges gained from emperors in appreciation for her loyalty (SEG 34.1306). It is not known if Tacitus himself visited Perge, but the fact that he is known from fighting Gothic raids all over Asia Minor except Pisidia and Pamphylia makes Perge a quite plausible headquarters. Perge seems to have seized the moment after her local rival, Side, was recovering from the Gothic siege.

In the face of the crisis of the whole empire, usurpations, disintegration, raids and uprisings, Pisidia and Pamphylia may seem the last safe spot on the map. Consecutive emperors relied on the region, appreciating its perfect strategic position, rich resources and loyal cities. Pamphylia and Pisidia achieved this not so much thanks to their peripheral position in the Taurus Mountains (Levick, 1967, p. 163; Howgego, 1985, p. 71), but rather the opposite, as a result of their connectivity both on sea and land. The Pamphylian ports were crucial in controlling the eastern basin of the Mediterranean Sea, while Pisidia was connected with the rest of Anatolia by a network of Roman roads leading in all

directions. Years of peace enabled the region to develop multiple connections and accumulate wealth, while it largely evaded destruction in the years of warfare and chaos (Ruffing, 2008, pp. 835–6).

The history of coinage in the region does not end with the moment of mint closures, since they must have continued to circulate until much later, especially in the face of the extreme debasement of silver and gold coinage. The monetary chaos of the middle 3rd century AD required profound reform which was executed no sooner than under Diocletian.

3.3 CONCLUSIONS

The traditional numismatic approach, focussing on types and minting patterns over time, lets us draw some conclusions about the internal dynamics of the region of Pamphylia and Pisidia on different temporal scales. Moreover, we can observe interesting shifts in the adherence of Pamphylia and Pisidia within the wider Mediterranean landscape. In the Persian period they seem oriented towards the East and well-integrated with Cilicia and Cyprus. The Hellenistic period brought never-ending wars, but also a time of greater mobility and innovations; it reoriented the lines of focus towards the west. Finally, the Roman period saw the universal conquest of the Mediterranean basin and the unprecedented integration of Pisidia and Pamphylia into the wider framework.

It is worth recalling the basic forces underlying the nature and functioning of monetary systems. The circulation of money is determined by several factors. The first one is the role of the state. It is the ruler who decides on the introduction of a monetary system, its standard, official reach and interchangeability, and it is mostly the size and location of the centres of power that shapes the flow of money. Money often tends to travel towards the capital city, possibly in the form of, or along with, taxes. During the Persian period, Pamphylian money travelled almost exclusively east; under Attalid rule it travelled west to Pergamon. The maximum reach of Pamphylian coinage shifted west considerably after Alexander's conquest.

A separate major factor shaping the minting patterns were the ambitions of local elites. We know extremely little about the internal affairs of Pisidian and Pamphylian cities, but from the scraps we have, we can presume that the local and regional politics were equally, if not more, important forces behind the issuing patterns. The bronze coinage was used primarily by the local populace, thus the size of issues and messages on coin legends were targeted at them in the first-place advertising elite agendas of a given time. Explanations associated with the imperial-level events are better attested and easier to identify, so the existing scholarship may leave the impression that they were the only ones that matter, but the sad truth is that the world of provincial politics is largely obscure to us and we should allow ample space for this unknown sphere.

The next one is geography. Money follows people, and people tend to follow easier and quicker routes. The organic flow of money usually did not reach far. It is facilitated by sea coasts and rivers, but restrained on land, stopped by mountain ridges. Under the Achaemenid Empire the money from the southern coast circulated within a limited range along maritime routes. Under the Roman Empire, money followed the Western coast and the track of mountain valleys. In both cases coins did not tend to travel inland towards the north-east.

The fourth major factor is warfare. During the Hellenistic period we can see money travelling as far as the Black Sea, Egypt, Bactria and Susiana. Hereby it followed Hellenistic kings in their campaigns in the east or in their efforts to pay off northern tribes from attacking them. The hoard material mostly reflects this particular type of circulation. Times of peace are characterised by an almost complete absence of hoards.

The relation between the Pamphylian coast and Egypt requires separate reflection as it represents another factor – people's preferences. Despite relative closeness, Pamphylia and Egypt do not seem to be closely connected. According to ORBIS: The Stanford Geospatial Network Model of the Roman World, the sea trip across the Mediterranean Sea from Side to Alexandria could have taken about four

days – about the same time as travel from Side to Rhodes or Antiochia in Syria by sea or to Phaselis by land – but this direct journey seems to have been seldom taken. Travelling along the coast was much more preferred, making the travel to Alexandria take at least eleven days. Thus, it turns out that by excluding open sea routes, Alexandria is assigned to a zone lying further from Side than e.g. Ascalon on the Levantine coast. The disconnection between the two regions is particularly visible during the period of Ptolemaic rule in Pisidia. The province was probably ruled by Macedonians and Greeks, and the cultural influences from Egypt are basically non-existent.

These reflections might seem trivial, but by summarising and repeating them we may realise the applicability of numismatic evidence for environmental history. Coins reflect various human activities often without the actors realising or intending it. Moreover, the relative comprehensiveness of the preservation of ancient coinage makes this type of data much more reliable than e.g. pottery (prone to excavation bias) or literature (culturally biased, unevenly transmitted) as a tool for modelling anthropogenic pressure on the environment. It helps to shed light on those aspects of the history that are otherwise invisible. I will therefore now move on to social network analysis in order to reconstruct in further detail not only the historical trajectories of individual cities, but also their mutual relations and their place within the wider network of the Roman Empire.

4 COMPLEXITY APPROACH IN ANALYSING THE NUMISMATIC MATERIAL

4.1 METHOD

4.1.1 Introduction

In his *Ancient History from Coins*, Christopher Howgego asked the basic question: What can coins tell us about the ancient world? (Howgego, 1995). Traditional numismatic approaches, despite their limitations, can tell us a lot about coins and people who used them. A single coin may become a crucial piece of evidence in a historical narrative. However, quantitative analysis and interpretation of the numismatic material may yield equally interesting results of a complementary value for historians. The body of over 100,000 coins from Asia Minor collected in numismatic cabinets around the world begs for such an overall treatment. It may seem a titanic challenge, but with the help of the latest developments in complexity science, computational and visualisation software, database creation and management it becomes imaginable, applicable and desirable (Malkin, 2011).

With the use of numismatic evidence, the complexities of past societies can be presented as a series of mathematically calculated graphs, that is visual objects consisting of interconnected nodes and edges that symbolise individual communities and relations between them. This novel way of visualising ancient societies allows for deeper understanding of their character and systemic properties. It provides a way to infer generalisations without overlooking detail and to define higher-level structures without sharp and rigid delineations. The visual inspection of graphs is an alternative way of building up the knowledge and understanding of phenomena, and it may be superior to verbal narratives in describing complex systems in an intelligible way.

The first step is statistics. Its current use in numismatics focuses on detailed topics: methods of estimation of the number of dies, the number of coins struck from one die, wastage rates, or the patterns in coin hoards. It entered the mainstream of the field long time ago, but despite significant

developments, has not yet offered formal methods for the analysis of complex networks hiding behind coins (Esty, 2003). Naturally, some attempts to represent graphically the simple networks of die-sharing or countermarking have been made, but these have so far lacked the sophistication of Social Network Analysis (Kraay, 1956; Kraft, 1972; Howgego, 1985). This chapter aims to introduce Social Network Analysis derived from complexity science into the study of Roman bronze provincial coinage in Asia Minor. This attempt is in line with the latest developments in the field that combine numismatics with a network approach (Fabian, 2017; Watson, 2021b).

The complex system is a phenomenon that occurs when a given system starts to reveal characteristics that cannot be predicted from the individual traits of its components, the classical examples being the biological system emerging out of chemical components or a social system consisting of human individuals. One of the strong advantages of the complexity approach is the multi-layered, multi-dimensional perspective on the relevant phenomena offering multi-causal explanations. It helps to conceptualise links between different levels of detail or to discuss the place of a single element within a wider framework (Ch. 1.2.1). However, the full potential of the complex system approach reveals itself when the focus is shifted from individual actors onto the multiplicity of interactions between them and their environment.

4.1.2 Social Network Analysis

Social Network Analysis originated from interdisciplinary encounters between graph theory studied by mathematicians and physicists, on the one hand, and social networks studied by sociologists, on the other (Ch. 1.2.3-4). This fast-developing method allows us to utilise numerous data of different characters in order to reconstruct and explore the characteristics of dynamic social systems in the light of network theory. Properly applied, it may help us to detect the interconnectivity of cities freed from either administrative or geographical clichés. Network analysis is used principally for the analysis, modelling and development of existing systems, mainly social systems both animal and human, but it can be useful for the study of past systems as well. Its focus on relations instead of the qualities of

participating elements helps us to identify structural characteristics of a given system such as communities, bridging points between otherwise separated parts or information flows between them (Kadushin, 2012).

Here I present an attempt at applying Social Network Analysis to the handling of numismatic evidence. Such an approach fits well with long-term reflections on the ecology of the Pamphylia-Pisidia region. Socio-ecosystems in their very nature are complex adaptive systems. Numismatics is able to deliver material that reflects the human part of the socio-ecosystem.

As material for the analysis I chose the Roman bronze provincial issues of Asia Minor, as they are numerous, were issued in numerous places, and are easy to identify. The focus of my work lies in the Pamphylia-Pisidia region, so the collected and analysed data cover this area most comprehensively. Still, it is necessary to include, at least partially, other regions of the eastern Mediterranean in order to properly situate Pamphylia and Pisidia within wider networks and add nuance to regional relations.

The Roman period, especially the second and third centuries AD, has left us the most varied and abundant coinage and thus allows the most comprehensive analysis. Depending on the available material, it is possible to render networks on the scale of the reign of one emperor, a dynasty, a century or the whole Roman period. Obviously, the risk of errors rises with narrowing the time range, but defining narrower time-slices is useful to observe changes over time.

The same corpus of coins can be looked at from different perspectives, thereby producing many types of data series that reflect past links within the social system. Although the actors responsible for these links can be ascribed to different categories (private individuals, officials, mints, workshops, peoples, towns), I treat them tentatively as emanations of a unit called here a 'city' to enhance the clarity of networks. This decision is dictated by the fact that the bronze provincial coinage is usually marked with names of individual towns and was a tool in promoting their civic identity. Thus, the final network

is built from just two types of building blocks: cities, represented as points, and their mutual relations, represented as lines joining them.

My aim is to reconstruct the network of polities in southwestern Asia Minor, detect the clusters and communities of particularly interconnected ones (“small worlds”), investigate their regional and supra-regional relations independently from administrative or (perceived) geographical boundaries, propose what factors led to such a distribution and discuss its temporal dynamics. The reconstruction should help to elicit cities’ hierarchy and interdependence. The strong feature of Social Network Analysis is the fact that it does not assume a priori any hierarchies. Potential divisions, groupings and layers emerge from the innate characteristics of the relations between nodes.

4.1.3 Databases

In my database I have collected five types of relations that are the products of past interactions between two or more ‘cities’. These datasets go under the categories of find spots, hoards, countermarking, die-sharing and homonoia. The first category represents the relation between the minting place of a coin and its find spot (‘mint-find spot’). In times of unprecedented peace, they should mark the movement of non-military persons much better than, for example, the material from Hellenistic hoards. Most of the Roman period finds represent bronze coins minted locally and used in everyday life as small change. There are basically no known hoard finds up until the second half of the third century AD, and that fact speaks for the political and economic stability of the period. Any movements of the Roman military forces in the western part of Anatolia were better controlled and predictable than in the Hellenistic period. The database includes the findspots of Pisidian and Pamphylian coins wherever possible, and ‘foreign’ finds inside the region that record the movement of people in and out of the region.⁴

⁴For the bibliography of the database material see: Appendix 1.

The second category comprises of hoards of two types. The first group contains hoards with Pamphylian or Pisidian coins; the other group consists of hoards supposedly found within the region of Pamphylia-Pisidia. Only rarely are the exact provenances known to us, so the relation is defined as the relation between the mint that issued a specimen found in a hoard to a hoard: 'hoard signature-mint'. The Roman period has yielded only four entries, three of which are dated to the third century AD. As a result, they do not show a wide picture, but rather a couple of narrow snapshots. Nonetheless, they do present some interesting features and add nuance to our overall image of the network.

The third category consists of a list of countermarked coins from Asia Minor, and the relation is defined as the relation between a coin from a given mint and the mark it bears: 'countermark-mint'. In most cases the coins treated with the same countermark must have been present in the same place at the same time. Thus, they testify to circulation patterns, even though they might have been sometimes consciously sorted according to pre-set criteria. The earlier countermarks were applied almost exclusively on coins from the same mint, while later ones can be found on coinage from several places. Most of the countermarking occurrences are dated from the time of the 3rd century crisis and bear witness to rapid changes in the currency system.

The fourth category covers the phenomenon of die-sharing: 'die/style-mint'. It has been observed that some coins share an identical or a very similar obverse, despite originating from two or more different mints. Different explanations have been proposed for the origins of die-sharing and its relation to the system of coin production (Kraft, 1972; Johnston, 1974, 1982, 1995; Butcher, 1988; Spoerri Butcher, 2006a; Flament, 2007; Watson, 2020, 2021a). Most plausibly, the phenomenon is of heterogenic origin and the right answer depends on a specific place and period. The proposed explanations include the existence of itinerant mint-workshops or artisans, operation of a central mint or the haste caused by military struggle. However, it is not my aim to explore the die-sharing phenomenon here, as this topic goes beyond the scope of this study. Its meaning should not be overstated as it constitutes only

a small fraction of all known coin types. Still, die-sharing in itself testifies to interactions between two places and, as such, it forms material for the reconstruction of the wider social network.

The last category collects the instances of homonoia type coins: 'issuing city-allied city'. The homonoia types bear the names of two or more associated cities and the word OMONOIA, but their meaning and significance is far from homogenous (Burnett, Amandry and Ripollès, 1992, p. 48; Kampmann, 1996; Franke and Nollé, 1997; Burnett, Amandry and Carradice, 1999, pp. 33–34; Spoerri Butcher, 2006b, p. 39). Possibly they commemorated treaties resolving disputes and various agreements regulating mutual relations between communities. Some of the relations seem to be more of a symbolic rather than practical value, especially when they mention cities that are distant geographically and with rather little economic significance in the Roman period, such as Sparta. Still, they help to draw the directions of overlapping interests between different cities, their ideological orientation and geographical horizons.

Any of these elements taken alone represent fractioned and circumstantial evidence. However, if taken together they may help in mapping city networks in the Roman period in a satisfactory manner. The numismatic material reveals a variety of relations between cities performed on different levels and by different actors. The general picture emerging from the totality of these interactions should help in drawing the reconstruction of the past interconnectedness of Pamphylia and Pisidia and its changes over time. As all the categories must equally be reduced to schematic lines and dots, the heterogeneity of the database should be kept in mind. Similarly, it should be noted that the datasets may register one specimen multiple times, as one coin may constitute evidence for more than just one category of relation between cities.

4.1.4 Software

In my work I have used GEPHI Graph Visualization and Manipulation software (Mathieu, Heymann and Mathieu, 2009, version: 0.9.2 201709241107) for the social network analysis. Based on the input data,

GEPHI calculates the network properties and creates a graph according to the chosen visualisation algorithm. The graphs consist of nodes (points) that are connected with edges (lines) of a certain weight. In my work a node represents a 'city'. An edge is defined as an interaction between two 'cities', e.g. countermarking. The weight of an edge is defined primarily by the number of coins or types that attest a particular relation. However, certain modifications had to be applied to achieve balance between various categories.⁵ The hoards, countermarking and die-sharing databases produce unusually dense networks, because they connect all the cities which share the same feature with each other. This may lead to an artificial elevation of connectivity level for cities whose coins entered the group as an outlier.⁶ To achieve a more balanced picture additional weight has been ascribed to the find spot category (multiplication by a factor of 3) and the homonoia category (multiplication by the factor of 3, 5 or 10 in small, medium and large networks respectively). The resulting weights are further transformed while using algorithms.

From the vast array of available visualisation algorithms, I have used those that allow sensible visual examination of the graphs. Most of them are the force-based algorithms such as Force Atlas, Force Atlas 2, Yifan Hu (Hu, 2006; Jacomy *et al.*, 2014) where linked nodes attract each other and non-linked nodes are pushed apart. The algorithm renders these forces until the whole network achieves equilibrium. Other algorithms arrange nodes according to chosen characteristics such as Circular layout and Double Circular layout that spatialize the nodes around a circle in a predefined order (Groeninger, 2012). For plotting the resulting graphs on maps I have used the QGIS Geographic Information System (QGIS Development Team, 2009) and the mapping resources from the Ancient World Mapping Center (AWMC) and the Environmental Systems Research Institute (ESRI).

⁵ For the full list of graphs with parameters used for the calculation and visualisation, see Appendix 2.

⁶ The problem of projecting bi-partite networks is discussed in Appendix 1.

GEPHI contains several statistical tools that allow us to explore the characteristics of individual nodes or edges, whole networks or their parts. The important statistical metrics utilised here are degree, betweenness centrality, and modularity. 'Degree' is a total number of links going both in and out of a node. In a directed network the relations between nodes are asymmetrical: the links going into a node (in-degree) and from a node (out-degree) are calculated separately, whereas in an undirected one nodes share reciprocal relation and thus there is no such differentiation. Degree can be later used to organise nodes or calculate other indicators. 'Betweenness centrality' is a way of detecting the amount of influence a node has over the flow of information in a graph or, in other words, how often a node appears on shortest paths between nodes in the network (Brandes, 2001). It is often used to find nodes that serve as a bridge (connecting two or more clusters of nodes within one graph) or a hub (connecting nodes within one cluster). It is a good metric for the detection of local centres or supra-regional entrepôts. 'Modularity' is a tool used to identify communities of nodes, that is the nodes that are more connected with each other than with the rest of the network (Blondel *et al.*, 2008). Parts of a network that have no links with each other are called separate components.

4.2 THE FIND SPOTS NETWORK

The evidence for the provenance of coins is still fragmentary because of the low number of high-quality excavation projects in Anatolia, particularly in this region (Chapters 2.4-2.6). The necessity to go through several scattered publications additionally hinders the capacity to collect the material in a regular and exhaustive manner. Therefore, the picture based solely on the provenance data is rather crudely sketched and limited to coins coming from or found in Pisidia and Pamphylia. On the Graph 4.2.1 the size of a node represents the number of coins coming from a given city (in-degree measure) including self-loops; thus, the picture here largely exhibits excavation bias. It can be seen that the network is predictably dominated by two cities: Side and Sagalassos. We can make some general remarks, though, especially if betweenness centrality is used for rendering the size of nodes instead

of the in-degree measure (Graph 4.2.2). It turns out that Perge (another thoroughly excavated city) has much power over the flow in the network and belongs to the same community as Sagalassos. These three main cities are interconnected with each other, but they do not share much of their networks. Likewise, some Pamphylian (Attaleia) and Pisidian (Antiochia) cities occupy central places within the network, even though there is no direct evidence from these sites in the database. Connections with the capital city of Rome and with Antiochia ad Orontem are emblematic of general connections with the outside world.

When plotted on the map, some geographical patterns emerge (Fig. 4.2.3, 4.2.4). Side is characterised by the highest number of connections and her connections are the most widespread (Fig. 4.2.5). It seems to be particularly connected with Eastern and Central Pamphylia and with south-eastern Pisidia (Etenna, Selge). On the higher level we can observe some connections with Cyprus (Kourion), Cilicia (Tarsos), Ionia (Magnesia ad Maeandrum) and Bithynia (Kyzikos, Germe). Probably these coins were carried via marine routes. The inland connections include northern Pisidia (Sagalassos, Prostanna), Phrygia Paroreios (Antiochia in Pisidia), Phrygia (Peltai, Traianopolis), Lydia (Tripolis) and Galatia (Ankyra). Perge (Fig. 4.2.6) features local connections with Termessos and supra-regional with Patara and Ephesos, that possibly mirror the marine route from the southern to western coast of Asia Minor. On the other hand, some Pergean coins have been found in the east, namely in Antiochia ad Orontem and Gerasa. Interestingly, there are no Pamphylian coins found in Perge yet. The city links of Sagalassos (Fig. 4.2.7) seem to be confined to the regions of Phrygia, Pisidia and Pamphylia along the north-south axis. The only exceptions are Rome and Kyzikos.

The connections taken together (Fig. 4.2.3, Fig. 4.2.4) testify to the movement from Pamphylia and Pisidia north to Phrygia and west to Lydia and Ionia via the Maiandros Valley. Alternative inland routes via Kabalia and the Kibyrtis are possibly marked with the links Kibyra-Priene and Sardeis-Termessos Minor-Termessos Maior.

Although fragmentary, a clear picture of the geographical horizon of the Pisidia-Pamphylia region emerges. It can be seen that the Pamphylian cities were connected with the wider Mediterranean via marine routes. On the other hand, Pisidia, particularly northern Pisidian cities, served as a gateway region to north and west. We should now turn to other categories of evidence to fill in the gaps.

4.3 THE HOARDS NETWORK

A very important category of evidence for coin circulation comes from coin hoards. They usually mirror the circulation patterns from a short time before their burial. It is true that they might have been hoarded during a wider span of time or been pre-selected according to unknown rules, but still they testify to the spatio-temporal coincidence of coins.

In the case of Pisidia and Pamphylia in the Roman period we have only four hoards to discuss (Graph 4.3.1). The first one comes from Dion in Macedonia (CH 10.196) and it is a temple deposit dated to 150-160 AD containing just one coin from Magydos among massive amounts of other coinage, mainly of local Macedonian origin (the hoard is marked green on the graph). Three remaining hoards (Mossop, Hecht and Pamphylia hoards: find spots unknown, marked pink on the graph) come from the years 270-275 AD and mark the monetary crisis of the reign of Tacitus. Thus, they preserve the situation from the third quarter of the third century AD. These two groups of hoards are more than a century apart from each other, but they are not completely disconnected (Graph 4.3.2). Coins from Magydos appear in all of the hoards, coins from Amphipolis in Thrace and Tralleis appear both in the deposit from Dion and in the Pamphylia hoard, and additionally the Pamphylia hoard contains a coin from Pella in Macedonia (Fig. 4.3.3).

When we consider only the hoards from the 3rd century AD, we can see that their geographical scopes overlap (Fig. 4.3.4, Fig. 4.3.5). All three hoards contain a significant proportion of Pamphylian coins. The Mossop hoard has the smallest geographical range as it is confined to the western Pamphylian towns of Perge, Aspendos, Magydos, Attaleia, Sillyon and the Pisidian city of Selge. The Hecht and

Mossop hoards cover the Pamphylian coast from Kyaneai to Antiochia ad Cragum; many Pisidian cities, with a particularly high proportion of coins from Kremna, Sagalassos and Antiochia in Pisidia (south-north route); and coins from Termessos Maior, Isinda and Kibyra (east-west route). Both hoards also contain coinage from Phrygia, the Maiandros Valley and the Aegean Coast. The Hecht hoard additionally contains coinage from Cilicia and Syria, while the Pamphylia hoard contains specimens from as far away as Alexandria and Kaisareia Paroreiros in the south, Samosata in the east and Pella in the west.

The patterns revealed by the hoards are in line with those drawn from the find spots record. They seem to follow the marine routes from Thrace along the western and southern coasts of Asia Minor and then the eastern Mediterranean as far as Alexandria in the south. The inland connections involve mainly Phrygia, the Maiandros Valley and Kibyratis. It is interesting to see Perge and Magydos in more central places within the network; the presence of Kremna seems to be better accentuated, while the role of Side and Sagalassos is reduced.

Much of this picture may result from the circumstantial character of the archaeological record. In order to reconstruct a more comprehensive picture we should turn to datasets with a wider geographical scope.

4.4 THE DIE-SHARING NETWORK

4.4.1 General overview

The phenomenon of die-sharing was not spread evenly in the ancient Mediterranean. Because of the popularity of bronze provincial issues in Asia Minor, it is also the area with the highest number of identified die-links, although, as has been observed, the sole fact of minting bronze provincial coinage does not guarantee any die-links to occur. It is thus natural to assume that die-links must have been a (by-)product of the organisation of the minting process, even if no definitive model of the procedures

of die production and usage has been proposed yet. However, it is highly likely that the transfer of dies or the spread of engraving styles is a derivative of wider social conditions. It has been suggested that the actual re-use of dies and stylistic similarities should be studied separately in order to reconstruct the *modus operandi* of provincial mints, but unfortunately few such studies exist to date and they do not cover the whole of Asia Minor (Watson, 2021a, 2021b). The original book by Konrad Kraft is still the basic reference on the subject and it is unavoidable to treat these phenomena jointly (Kraft, 1972). Thus, the Social Network Analysis presented here may not offer a decisive solution to a question of die-sharing, but still it may help in sketching the social background from which it originated.

The involvement of cities of Asia Minor in die-sharing varied: Ephesos, Thyateira and Metropolis are associated with a considerably large number of die-links (64, 49 and 42 respectively), but the majority of cities are characterised by fewer than 5 links (168 out of 274 cities; the average number of links is 6.2). Material from central Anatolia and from outside of Asia Minor is scanty, but this is largely a reflection of the spread of mints issuing bronze provincial coinage. Only relatively few cities issued coins regularly and there are regions such as Cyprus, Lycia or Caria that abandoned the habit of minting bronze provincial coinage at some point. Some of the features of the network may originate from the incidental numismatic material or from modern research bias. Still, some patterns are striking and are backed with enough material to not be easily dismissed.

The die-sharing network in Asia Minor presents a complex yet noticeably clustered pattern (Graphs 4.4.1, 4.4.2).⁷ Thirty-six communities at the modularity resolution of 0.4 have been defined with

⁷ The graphs in this section depict the bi-partite type of network, that is networks with two different kinds of nodes, here: 'cities' (bigger nodes with labels) and 'die-links' (smaller nodes, without labels). Such networks allow more precise calculations and higher clarity of visualisation in the form of a graph. On the other hand, projected networks ensure more legibility on maps as 'die-links' are not anchored to any specific locations. Thus, maps represent 'city' nodes with colouring defined by their respective bi-partite networks while edges are presented as in a projected network.

multiple connections between each other. The centre of the network is occupied by clusters corresponding with cities located (Fig.4.4.4, Fig.4.4.5) on the upper Maiandros and Lykos Valleys (green), along the Kogamos Valley (aquamarine) as far as the middle Hermos (purple). They are characterised with connections leading in all directions. Three distinctive communities with powerful hubs have been defined around Pergamon (blue), Smyrna (cerulean), and the triad of Ephesos-Metropolis-Magnesia (orange). Interestingly, they seem to gather cities located in the lower parts of the river systems of Kaikos, Hermos, Maiandros-Kaystros and around their respective river mouths. More independent clusters are formed by the groups of cities corresponding with the regions of (1) Eastern Pamphylia (magenta, steel) and Western Pamphylia with Pisidia (bronze), (2) Phrygia Epiktetos (turquoise), Bithynia and Paphlagonia (dark green), Pontus (turmeric), and (3) Troas, Mysia and Mytilene (rose, mahogany). Interestingly, the rose and turquoise communities are quite distanced from each other on the graph despite the geographic proximity of cities that constitute them. The centre of the graph is linked with its peripheries through bridging communities with the main cities of Thyateira (grey), Hypaipa (silk) and Apameia (brown) whose locations correspond with the Lykos, upper Kaystros and upper Maiandros Valleys. The community consisting of cities located in Lycia (seashell) is only loosely connected with the rest of the network.

Finally, two smaller communities have been defined that characterise with low number of die-links connecting cities. The first one can be identified with the region of Caria (violet). The cities from the other one (olive) might seem a puzzle as they are scattered from Cilicia Pedias (Augusta, Adane, Mallos, Aigaiai), around Pisidia (Amblada, Philomelion, Apollonia Mordiaion) as far as the Maiandros Valley (Antiochia ad Maeandrum, Anineta, Mastaura, Euhippe). It is possible that the olive community marks the east-west route from the Maiandros Valley through the central plateau north of the Taurus Mountains to Cilicia and the eastern limes, or perhaps marks the circuit route of Roman officials.

Beside the main component of the graph there are fifteen separate components that have no connection with the rest of the network. The most apparent examples are cities from outside Asia

Minor located in Greece, Thrace, coastal Moesia, Syria and Palaestina. However, some separate components appear despite the geographic proximity of the mints they represent. They correspond with the pair of the Roman colonies of Antiochia in Pisidia – Ikonion (pink), that lie close to well-connected areas, and with the regions of Cilicia Pedias and Cilicia Tracheia (flamingo, terracotta, dusty red). The disconnection from the rest of the network may reflect a different institutional framework of coin production.

The die-sharing network may be analysed on different levels of detail. To see the more general picture the resolution of 6.0 was applied (Graph 4.4.3). On this graph the communities are clearly separated from each other. When plotted on a map (Fig.4.4.6) the cities from the main part of the graph (cerulean) are characterised with multiple connections and occupy most of western Asia Minor. Contrastingly, the southern coast of Asia Minor is divided into more separate communities corresponding to the regions of Lycia (pink), Pamphylia and Pisidia (orange), Cilicia Tracheia (steel) and Cilicia Pedias (olive). These communities consist of several cities gathered around fewer die-links. The classification of the vast areas of Phrygia, Bithynia, Paphlagonia and Pontus within one cluster remains the same with any applied resolution level above 1 (brown) and it remains separate from Mysia-Troas (green).

The areas occupied by the clustered cities do not exactly coincide with the boundaries of Roman provinces, so we should seek other explanations (Watson, 2020, p. 162). They do not follow Roman roads or form along sea-coasts in a straightforward manner either. It rather seems that the communities formed in connection with river systems emptying into different water bodies. The general communities defined at the modularity resolution of 6.0 can be explained in this way with quite noticeable precision (graph 4.4.3): the orange community corresponds with the river systems of the Melas, Eurymedon and Kestros, emptying into the Pamphylian Sea; the pink community is located along the Lycian coast with its short rivers of Arykandos, Myros and Xanthos emptying into the Lycian Sea; the cerulean community extends from the springs of Maiandros and Hermos and their tributaries

in inner Anatolia flowing towards the Aegean Sea (with the eastward extension towards areas lying on watersheds and around drainless lakes in Phrygia Paroreios and northern Pisidia); the green community is located along the coast of Troas and then covers the area of inland Mysia along rivers Mekestos and Rhyndakos whose waters flow into the Propontis; the boundary of the brown community seems to lie along the watershed that divides the catchment areas of the Black Sea and other water bodies, and the cities that constitute this cluster are located within the river systems of Sangarius-Tembris, (with the extension of Kaisareia Germanike, Prusa, Nikaia and Nikomedia that seem to gravitate towards the Sangarius system), Halys, Iris-Lykos-Skylax and other shorter rivers emptying into the Black Sea.

The relation between the die-sharing system and river systems is quite suggestive. Travel and transport, especially the bulk transport, was definitively easier along the river valleys. Several Roman roads were built along them, further improving communications. Still, it is striking that several cities seem to have had more connections down the river valleys than with their close neighbours with whom they were connected with a road. The inland regions offered several products such as wool, textiles, animals, marble, grain, wine, and olives while luxury products travelled the opposite way and possibly we should count dies among them.

4.4.2 Changes in time

To further explore this system, it is worth looking at the temporal dynamics of the die-sharing network. The amount of material allows us to perform the analysis for the periods of the Antonine dynasty (96-192 AD), the Severan dynasty (193-235 AD) and the period of Barrack Emperors (235-275 AD). The number of occurrences of die-sharing in these periods and changes in their geographical scope speaks for itself even before actual performing of Social Network Analysis. In the Antonine period only 44 cities participated in die-sharing that we know of, while in the Severan period there were as many as 202 and under the Barrack Emperors 175 participating cities. The average number of die-links

associated with a given city was only 1.5 in the Antonine period, but as high as 3.97 in the Severan period and 4.76 under the Barrack Emperors, despite the fact that they cover a shorter time span.

The network in the Antonine period is rather disconnected (Graph 4.4.7) and covers only limited areas in western Asia Minor when plotted on a map (Fig.4.4.8). It consists of 16 separate components. The largest component (cerulean) seems to gravitate around Pergamon, Thyateira and the cities around the Strait of Mytilene. A smaller, orange community seems to complement it. Another larger separate component (pink) is located along the Hellespontos and Propontis. The rest of the network is highly compartmentalized, although several participating cities seem to group along the Maiandros Valley from its upper stream to the Gulf of Ephesos.

The radical change in the shape of the network comes with the Severan period. The network consists of 14 components among which the main one (Graph 4.4.10) is highly interconnected. When plotted on a map (Fig. 4.4.11) it shows interesting features. First, we can see that the geographical scope of the phenomenon extended both in and outside Asia Minor. The new regions in Anatolia include Bithynia and Pontus (cerulean), Mysia (jade), Caria (magenta), Pisidia and Pamphylia (orange), Cilicia Tracheia (olive, purple) and Cilicia Pedias (dark green) and those from the outside cover Moesia, Thrace, Greece, Syria and Palaestina.

The connections in western Asia Minor are quite complex. The pink 'community' with hubs in Thyateira and Sardeis stands out. It seems that the regional unit from the previous period had divided. Pergamon with just 5 die-links seems to focus on the sea connections, while Thyateira and Sardeis have a strong local position (34 and 20 die-links respectively). A very interesting 'community' has been identified along the NW-SE axis (green), that is from the Gulf of Smyrna, through the lower Hermos, Kogamos and Lykos valleys with the extension towards Kibyrtis and Milyas. It may be connected to the circuit route chosen by Roman officials while travelling east. The leading cities there seem to be Smyrna and Philadelpheia – notable poleis (Marek, 2016, pp. 260–2). They also played an additional

role of bridges between different communities. Another cluster (bronze) follows the Maiandros and Kaystros Valleys. The brown cluster corresponds with the region of Phrygia. The area around Mount Kadmos collects several different communities, revealing a crossroads important for the whole of south-western Asia Minor. A distinctive purple community is already detected in this period, leading from the Maiandros Valley (Antiochia ad Maeandrum), around Pisidia through Phrygia Paroreios (Peltai, Philomelion, Hadrianopolis) to Cilicia (Lamos), marking the east-west route from the Aegean to the eastern limes.

The areas of Pisidia and Pamphylia have been ascribed to a single large 'community', with interesting exceptions. Sagalassos belongs to the cerulean community, whose cities are generally located in northern Asia Minor, while Amblada belongs to the pink community, with no direct connections to the rest of Pisidia. The pair Korakesion-Kasai forms a separate component (aquamarine), but it seems that they complement the orange community (the die-links inside Pamphylia may be slightly overrepresented thanks to the recent study on die-sharing: Watson, 2020). Cities lying in the valley between the Barla Dağ and Davraz Dağ seem to be particularly integrated with each other (Seleukeia Sidera, Baris, Konana, Prostanna), similarly the cities of central and eastern Pamphylia (Sillyon, Aspendos, Side, Syedra and notably Etenna). The whole cluster is connected with the western part of the network through Milyas and Kibyrtis following the green community.

The network from the tumultuous period of 235-275 AD (Graph 4.4.13) is characterised by as many as 20 separate components, and the main component seems to be loosely connected with other clusters. The geographical scope of the network shrank back a little (Fig.4.4.14, 4.4.15). There are die-link communities that seem to form along the coastal routes from the Black Sea to the Aegean (brown, olive, turquoise). From the previous period we may again observe the communities organised around Sardis and Thyateira (jade), Pergamon (blue), Ephesos-Metropolis-Magnesia (cerulean) or along the river systems of Rhyndakos and Mekestos (purple). The cluster from Cilicia leading north of Taurus to the Maiandros Valley (violet) is still detectable and more cities are connected to it: Adane, Aigaiai,

Augusta, Mallos in Cilicia, Apollonia Mordiaion, Philomelion in Phrygia Paroreios with a branch to Amblada and Antiochia ad Maeandrum, Anineta and Mastaura in the Maiandros Valley with a branch towards Dioshieron.

The NW-SE axis has changed, though. The bronze cluster is defined around Smyrna and lower Hermos, while Philadelphieia with much of the area around Mount Kadmos has now been linked together with large parts of Phrygia. Another novelty is the magenta cluster corresponding with the region of Lycia. Its presence within the network is connected with the fact that the Lycian cities issued provincial coinage for a short time under Gordian III. This should be a reminder that not all of the relevant past connections can be detected through the analysis of the Roman imperial coinage, and some parts of the real-life network remain invisible due to the character of our material.

Two communities have been identified in Pisidia and Pamphylia. The orange one covers Eastern Pamphylia. Cities there seem to maintain stable relations resulting in multiple die-links between two or more cities, such as Syedra-Laerte, Karallia-Kolybrassos, Etenna-Side-Lyrbe. The pink community corresponds to Central and Western Pamphylia and Pisidia. Except for Perge and Sillyon, several cities are linked with just a few die-links, suggesting less tight relations than in the case of Eastern Pamphylia. Still, they seem to be geographically limited.

4.4.3 The social system behind the die-sharing phenomenon - conclusions

The three phases of die-sharing practice differ between each other significantly in terms of the intensity of the phenomenon and the level of intra- and supra-regional integrity, but less in terms of the shape of the identified communities. The clusters reconstructed for the Antonine period continued into the Severan and Barrack Emperors period. The main hubs such as Ephesos, Thyateira, Philadelphieia, Smyrna or Apameia remained stable through time, as well as some communication routes such as the way from the Maiandros Valley north of Taurus towards Cilicia or the NW-SE route through the Kogamos Valley towards the Lykos Valley. The area around Mount Kadmos is often

characterised by the presence of several clusters, revealing an important crossroads. What is particularly interesting is that there seems to be more integration along the river valleys rather than along the seacoasts. Most of the connections are formed locally and the communities exhibit a chain-like structure, but some of the die-links connect coastal cities with cities far in the interior (e.g. Germe, Synaos and Phrygian Ankyra, Amorion and Nikaia, Augusta in Cilicia and Philomelion). This supports the earlier suggestion that some of the dies could have been transported for long distances along important highways together with some other products or in connection with embassies travelling to meet Roman officials and their entourage. The fact that the 'communities' at the most general level correspond with the catchment areas of different water bodies suggests that die-sharing originated from interactions driven not only by Roman administrative or judicial arrangements, but also by the rising interdependence of cities located at different altitudes that was facilitated by the relief and riverine transport. Dies could possibly have travelled upstream along river valleys as part of the high-quality return cargo after delivering some bulk products such as grain, olives or wool and textiles to the coastal locations.

4.5 THE COUNTERMARKING NETWORK

The countermarking network in Greece and Asia Minor shows a more integrated pattern than the die-sharing network (Graphs 4.5.1, 4.5.2). Most of the material comes from Asia Minor, but there is also a separate component corresponding with the cities located in the Peloponnese. Other separate components occur within city-pairs. Except for the Peloponnesian component, hardly anything appears in Greece or Crete (Figs.4.5.3) and the only two links with Asia Minor include Athens and Kerkyra, suggesting mobility westwards. The base material for the study of countermarking did not cover the ancient Near East, but still some connections have been detected, namely with Alexandria and Philadelphiea in Arabia. The general picture suggests that the south-western parts of Asia Minor were highly interconnected with each other, but less with other regions of the Mediterranean.

Different modularity resolutions can reveal the hierarchy of the interconnections of different parts of the graph. On the most general level (modularity 1.4, Fig.4.5.3, 4.5.4) we can see two main clusters in Asia Minor: the bigger one in the south-western part (cerulean) and the smaller one concentrating around Bithynia and Propontis (orange). A separate component is defined by the cities lying on the island of Lesbos. The next resolution level (modularity 0.8, Fig.4.5.5) reveals a split between the western (orange) and southern (blue) regions, the cities around Mount Kadmos being ascribed to the southern region. It can be inferred that Aphrodisias and Tabai (south of Mount Kadmos) had a bridging role on the way towards Kibyrtis, while Hierapolis and Laodikeia (north of Mount Kadmos) had closer links with Eumeneia and Apameia. Tripolis, on the other hand, has been ascribed to the western group as a bridge towards the Kogamos Valley. Notably, Perge has been identified within the western cluster, as having more links with that area than locally.

The cities of Caria and Phrygia located around Mount Kadmos and their associates emerge as a separate cluster (orange) at the modularity resolution of 0.4: Aphrodisias, Tabai, Laodikeia, Trapezopolis, Kolossai, Sebastopolis, Herakleia, Harpasa, Antiochia, Mastaura, Tripolis, Philadelphieia, Blaundos, Bria, Kotiaion, Amyzon, Kibyra (Graph 4.5.2, Fig. 4.5.6). Hierapolis and Attouda are not among them, but instead are ascribed to the cluster of southern cities (bronze) including among others Isinda, Sillyon and Side. A second cluster in Pamphylia (green) includes Apameia, Kremna, Perge, Aspendos, and several coastal cities from Patara to Tarsos.

The split in the Pamphylian region opens up a question of its internal relations. Possibly it hints towards the connection between Pamphylian coastal cities with their Pisidian 'partners' located to the north. When plotted on a map (Fig.4.5.6) they seem to be grouped into intermittent pairs: Perge-Kremna, Sillyon-Pednelissos, Aspendos-Selge, Side-Etenna. Another observation that can be made based on the bronze and green communities is the general direction towards which each of them is oriented. Side has particularly strong connections with Isinda and Hierapolis, suggesting that it was the final port for people travelling inland from the western to southern coast and the other way

around. Most of the cities belonging to the same community are located along the north-south communication channel through the Milyas, namely Baris, Olbasa, Panemoteichos and Ariassos. At the same time Perge has been grouped within the green community with such centres as Kremna, Prostanna and Apameia pointing towards the north-south route (not only the Via Sebaste, but also possibly along Kestros towards Eğirdir Lake), and with the main city of Lycia, namely Patara, a pattern which suggests closer marine connections.

To better reconstruct the role of Pamphylian ports we should locate them and their immediate neighbours within a wider network. We can see that Side (Fig.4.5.7) and Sillyon (Fig.4.5.8) share many connections, while Aspendos (Fig.4.5.9) lacks those concentrated around Milyas and western Pisidia, suggesting a more local position. By contrast, Perge (Fig.4.5.10) presents more numerous connections leading west (e.g. Miletos, Priene, Samos, Ephesos, Magnesia, and the Lycian cities of Aperlai and Patara), again suggesting the importance of marine routes. This might suggest that Perge was the main port for people travelling east-west by sea.

In general, it can be said that the presented networks do reflect regional boundaries, but they are much less geographically constrained than the patterns of die-sharing. The countermarked coins in most cases arrived in the countermarking city as a result of the organic flow of money instead of an institutionalised process. As the examples of the ports of Pamphylia or the cities on the crossroads around Mount Kadmos show, the countermarking patterns can be associated with the main routes of communication. They also testify to people's considerable level of mobility both on land and water in south-western Asia Minor. It can be hypothesised that the high number of connections from inland may reveal the administrative and judicial role of Side, while the marine connections of Perge show her strength as an entrepot.

The last problem to tackle is that of change over time. Coins bearing the same countermark had most probably been at the same time in the same place. Therefore, with some caution they can be treated

as fossils preserving circulation patterns from just before the act of countermarking, similarly to the hoards. The material up to the reign of Commodus (up to 192 AD), beside the fact that it is not abundant, represents almost exclusively coins countermarked by the same city that minted them. Consequently, it does not help in the reconstruction of the final network. By contrast, the countermarking phenomenon was widespread in the 3rd century, especially during the crisis years 235-270 AD. Thus, the picture drawn here reflects mostly the situation from around the middle of the 3rd century.

4.6 THE HOMONOIA COINS NETWORK

The number of homonoia coin types is not very high, but it still allows us to draw a comprehensive network (Graph 4.6.1). Three main communities (cerulean, orange and bronze) have been identified at the modularity resolution of 1.0, with Ephesos and Smyrna dominating much of the network (Graph 4.6.4). These communities cover most of south-western Asia Minor with quite dense connections (Fig.4.6.2). One of the offshoots of the cerulean community reaches Pamphylia with her main cities Perge and Side. The second loosely connected community corresponds with the cities located in Caria (pink) and the third one gathers cities from Phokaia on the Aegean Sea through the area of Propontis as far as the Black Sea. Several separate components mark some quite local relations, such as Chios-Erythrai, Kyme-Myrina-Aigai, Attouda-Trapezopolis, Brouzos-Okoklia, Baris-Seleukeia Sidera, Philomelion-Hadrianopolis in Phrygia, Antiochia ad Pisidiam-Ikonion. We can only speculate if these very localised links commemorate the resolution of disputes, or just confirm cooperation and harmonious relations.

The repetition of alliances between the same pairs of cities, such as Antiochia-Aphrodisias, Byzantion-Nikaia, Perge-Side, Halikarnassos-Kos and within the group of Ephesos, Pergamon, Smyrna, Tralleis, Hierapolis, Laodikeia, Apameia, points towards their practical meaning and a continuous overlap of interests through time. Contrastingly, it seems to be symbolic alliances which connect for example

Miletus with its colony Amisos, or Nysa with its legendary metropolis Sparta. Likewise, three Pisidian cities (Sagalassos, Amblada, Selge) record their *homonoia* with Sparta. Sagalassos and Selge are known for their alleged Spartan ancestry, so the same motivation may be suggested also for Amblada. Both Side and Perge commemorate their alliance with Delphi, which seems to be connected to Delphic Pythia and the title of *Isopytheia* granted to local agones (Klose, 2005, p. 129).

Another interesting case are alliances with Egyptian Alexandria. Three cities, Ephesos, Samos and Side, have connections with it, and it may be hypothesised that they commemorate imperial permission to buy Egyptian grain. Ephesos is known to have been granted such permission under Hadrian and under an unknown emperor (under Hadrian: IEphesos II, no.274 = Syll.3 839 = Smallwood, no.494; under unknown emperor: IEphesos II, no.211). Possibly the *homonoia* coin issued by Ephesos under Marcus Aurelius commemorates this particular event. The *homonoia* coins of Gordian III and Valerian are of a much later date, but it is plausible that they reflect a similar agreement with Alexandria.

The *homonoia* coins have quite a long history. The first known instances are as early as the reign of Augustus and commemorate *homonoia* between Sardeis and Pergamon; the next one was issued by Laodikeia under Nero to mark an alliance with Smyrna. Several *homonoia* issues come from the reign of Domitian. These early connections from the 1st century AD form a simple graph (Graph 4.6.5), and they seem to represent the most notable cities of the province of Asia (Fournier, 2010, pp. 41–98; Marek, 2016, p. 260). When plotted on a map they form a triangle (Fig.4.6.6.) that reemerges and defines the structure of Western Asia Minor also in later periods.

The situation under the Antonines slowly evolves (Graph 4.6.7). Again, the main structure seems to be concentrated along the Maiandros Valley and the Aegean coast with Ephesos as the main hub (Fig.4.6.8, 4.6.9). The participating cities were usually also the main urban centres, but there are some exceptions. We can observe local alliances between Kyme-Myrina-Aigai at the mouth of the Hermos

(bronze), and in Caria: the network of alliances around Aphrodisias under Commodus (pink) and the alliance Trapezopolis-Attouda under Antoninus Pius (brown).

A conspicuous pattern is represented by Hierapolis and Mytilene under the reign of Marcus Aurelius. Both cities were not assize centres but were directly linked with them: Mytilene with Pergamon and Adramyttion, Hierapolis with Ephesos, Synnada and Kibyra. We may only hypothesize on the implications of this observation. Judging from the relative location of these cities, that is at almost equal distances from their commemorated allies but not bordering with them, the matters might have concerned the details of judicial responsibilities or participation in the costs of a governor's arrival.

The connections outside Asia Minor include Sparta, Athens and Egyptian Alexandria. As was mentioned above, the alliance between Ephesos and Alexandria under Marcus Aurelius might be connected with the right to buy Egyptian grain in times of hardship. As for Sparta and Athens, the meaning might have been symbolic, as Athens was styled as the centre of Greek culture and Sparta as the specialists in military upbringing. On the other hand, it has been suggested that they could also be the local assize centres for the province of Achaia (Fournier, 2010, p. 90). That would raise the possibility that homonoia issues were particularly connected with the circuits of Roman officials. Possibly, they did not commemorate a routine, yearly circuit, but rather some special occasion connected to it such as the visit of an emperor himself, the grant of privileges or an unusual arrangement of the circuit.

The Severan period brings the simplification of the main component of the network (Graph 4.6.10), but on the other hand the phenomenon of issuing homonoia coins is extended geographically. For example, homonoia issues link places as far east as Amisos and Kaisareia in Cappadocia (Fig.4.6.11, 4.6.12). The main component of the network still sits comfortably within the triangle defined by the Ionian Coast in the West, the Maiandros Highway in the South (dominated by the cerulean community) and the road from Laodikeia ad Lycum through Philadelpheia and Thyateira as far as

Pergamon (dominated by the orange community). Some local alliances are recorded for the pairs Kos-Halikarnassos, Bageis-Sala, Philomelion-Hadrianopolis, Akmoneia-Aizanoi, Ankyra-Gangra. The Pamphylian cities show up for the first time in the form of a coin from Apollonia Mordiaion commemorating her homonoia with Perge – surely one of the two most notable poleis in the region.

The network for the period of Barrack Emperors shows significant changes. The cities located within the triangle Pergamon-Ephesos-Hierapolis are still quite active and share multiple connections, but it seems that Ephesos lost her place in favour of Smyrna (Graph 4.6.13). Several cities further east in Phrygia, Pisidia and Pamphylia joined the network (Fig.4.6.14, 4.6.15). There are particularly stable connections between Perge and Side, as well as Sagalassos and Side. Apollonia Mordiaion again issues coins commemorating her alliance with Perge. This sudden introduction of the habit into Pisidia and Pamphylia seems to be the result of the military and political situation of the third century crisis, when marking a transitional phase. It has been argued that the link between Side and Perge marks their agreement on their joint minting policy in the region (Watson, 2019, pp. 108–110). On the other hand, the connections of the Pisidian cities of Sagalassos and Selge with Sparta seem to be of more symbolic value.

When we look at the province of Lycia-Pamphylia as we did at the province of Asia, we may again identify two types of connections. One type is between the regional centres of higher rank such as Perge, Side, and Sagalassos. Possibly we may add here also Patara, which is known as the main city of Lycia, and Apollonia Mordiaion. The other type links cities within local circles, here exemplified with the links Side-Attaleia and Side-Aspendos. Side in particular plays the role of a local hub within the homonoia network.

The die-sharing and countermarking networks were dense with connections that correspond to geographic or cultural regions and communication routes. The die-sharing network seems to have originated from administrative structures, while the countermarking network possibly reflects the

organic circulation of money and thus the flow of people and commodities. The homonoia network could have originated as the result of Roman administrative functions and divisions or granting special privileges, but with time it started to represent the landscape of higher-level connections, mark long-distance interests, and also perceived prestigious or historical connections which are not always equal with economic or functional ones. These were imagined ancestries and shared legends and they could be used in order to gain prestige, build up common identities and eventually to resolve disputes. The connections seem to link cities of similar status: the local centres with neighbouring local centres, the more significant ones with cities of comparable supra-regional meaning. Although heterogenous, the homonoia network helps us to understand ancient city hierarchies and mental maps.

4.7 AGGREGATED NETWORKS

4.7.1 1st-3rd cent AD

After discussing different datasets separately, it is time to analyse the aggregated networks. Different categories reflect the past social system of Asia Minor in complementary ways, as they originate from different phenomena driven and performed by different actors. In their totality they may help to fill in the gaps left by each of the categories alone, revealing wider patterns governing diachronic changes in Roman Asia Minor. The aggregated networks are calculated with the use of data from the die-sharing, countermarking and homonoia categories, as these cover the area and period most comprehensively.⁸ With such a rich and widely defined set of relations it is possible to reconstruct the place of Pisidia and Pamphylia in their relations with other regions.

It can be seen that the aggregated city network in Asia Minor is quite dense, yet independent clusters are still discernible (Graphs 4.7.1, 4.7.4). The geographical scope (Fig.4.7.2) reaches from provincia

⁸ In order to standardize the data, the die-sharing and countermarking networks had to be projected, see: Appendix 1.

Dacia, Viminacium and Korkyra to Egyptian Alexandria to Bostra and Samosata. Only a few links connect Asia Minor with Greece, and they link symbolic and cultural centres such as Sparta, Athens and Delphi rather than the administrative centre and local hub of Korinthos. Even fewer links (if any) connect Asia Minor with other regions. Such a scarcity of connections probably reflects the gaps in our evidence in the first place. Bronze provincial coinage – the source material for this analysis – was much less popular outside Asia Minor (which in itself testifies to the existence of some common paradigm of thinking). Regions such as Cyprus decided to switch to the Roman currency system very early on, while others such as Caria and Lycia minted provincial bronzes only occasionally. The mints striking other types of coinage are much harder to identify and were less numerous. Thus, the empty places on the map do not automatically indicate a lack of connections. Nonetheless, the recorded links result from real-life interactions and may guide us through the internal complexities of Roman Asia Minor.

It can be noticed that the centre of the graph (Graph 4.7.4) is occupied by nodes corresponding with the cities of western Asia Minor (cerulean) having numerous connections with communities defined by the cities from Caria (bronze), Mysia (green), Phrygia Epiktetos, Bithynia, Paphlagonia (pink), and Pontus (purple). Pamphylian and Pisidian cities (orange and jade) are particularly close to each other. The graph positions them close to the central cluster, and they seem to play a bridging role towards Lycia (brown), Cilicia Tracheia (grey) and Bithynia (pink). On the other end of the connectivity spectrum, cities of Greece (violet), Cilicia Pedias (olive), Syria (turquoise) and Moesia Inferior (blue) form separate components.

Some of the remarks made in the earlier sections can be repeated and highlighted when looking at a map with the communities defined with the modularity resolution of 1.0 (Figs.4.7.2, 4.7.3). As in the case of the die-sharing network, the communities seem to go in line with river systems, but the aggregated network brings a few new insights to our understanding. The cerulean community covering western Asia Minor in its central part leans towards the Aegean Sea, but this time many

Carian cities have been defined as an independent community (bronze). The cities of higher Betweenness Centrality score, such as Aphrodisias (0.040), Attouda (0.055), Trapezopolis (0.009), Alabanda (0.012), as well as smaller cities directly connected to them (Bargasa, Harpasa, Neapolis, Herakleia, Apollonia, Sebastopolis...) have been assigned to the cerulean community. They are closer to the Maiandros Valley also in geographic terms. Contrastingly, those located more to the south, on the rivers independent from the Maiandros system, form a visibly detached cluster without a leading hub. They also have lower Betweenness Centrality scores: Stratonikeia in Caria – 0.008, Knidos – 0.006, Mylasa – 0.005, Halikarnassos – 0.002, Kos – 0.002.

The green community gravitates towards the Northern Aegean Sea and Propontis. The sharp division between the green and pink communities is preserved. The pink community along the Sangarius, Tembris and Paphlagonian rivers leans towards the Black Sea, as does the purple community on Lykastos, Iris, Skylax and Lykos (former kingdom of Pontus). The central plateau represents a less clear situation. Gangra, located at the junction of the Xanthos and Halmyros, both tributaries of the Halys, is ascribed to the purple community, and Ankyra lies within the Sangarius system and belongs to the pink community. However, Tavion and Kaisareia, located within the Halys system emptying into the Black Sea, have been ascribed to the pink and cerulean communities respectively instead of the purple one. It is possible that this assignment of Tavion and Kaisareia reflects the fact that they were located far inland, on the outskirts of the social system concentrated on western Asia Minor, or they belonged to it on different grounds. Tavion, as a Galatian city in the province of Galatia, was more interior-oriented and thus did not produce links with cities down the Halys river, while Kaisareia was the main city of the province of Cappadocia (also a former kingdom), an important regional and supra-regional centre on the crossroads, and one of the few mints issuing silver coinage in the eastern part of the Roman Empire. Galatia and Cappadocia were regions different from those around them. They covered vast stretches of land, were less urbanised and usually did not mint provincial coinage. Therefore, their assignment into one community or another is less reliable.

The southern coast is more fragmented than others, especially the area of Cilicia Pedias and Cilicia Tracheia, despite the fact that the communities defined there often do have connections with cities along the Mediterranean coast. This may be due to a different organisation of coin minting than in the rest of Asia Minor – a fact which is meaningful in itself (Butcher, 1988). Pamphylia is divided into an eastern part (jade) and a western part that is joined with Pisidia (orange). The jade cluster reaches from Iotape to Aspendos and includes the south Pisidian city of Etenna, but not her neighbour Selge. The orange cluster gathers the rest of Pamphylia as far as Olympos and Phaselis, with the addition of the Lycian city of Arykanda, then the whole of Pisidia including the Milyas, but excluding Kibyratis and Phrygia Paroreios. Baris, having direct links with Apameia, has been ascribed to the cerulean community. It is worth mentioning here that Sagalassos, despite being ascribed to the northern community on the basis of the previous material, remains within the Pisidian cluster (orange) after aggregation. Most of the Lycian cities belong to the brown community, except the already-mentioned Arykanda, Olympos and Phaselis.

The pair of Roman colonies in Antiochia ad Pisidiam and Ikonion seem to be completely disconnected from the rest of the network despite their supposed role as guardians over the regions of Pisidia, Lycaonia and important communication routes. It would be expected that their connections would reach far in many directions, but it seems that the administrative uniqueness of these Roman colonies prevents us from exploring their connectivity through provincial bronze coinage. This separation concerns not only Pisidian or Phrygian cities in the area, but also other Roman colonies nearby. By contrast, the east-west highway is marked with the cities assigned to the magenta cluster: they are located along the route leading from Cilicia (with the main bridging city - Augusta) through southern Phrygia (Hadrianopolis, Philomelion, Apollonia Mordiaion) to the Maiandros Valley (Antiochia, Anineta, Mastaura). Amblada has also been assigned to the magenta cluster, emphasising her connections with the Phrygian cities at the expense of the Pisidian ones.

4.7.2 Changes in time

Finally, it is worth discussing some diachronic differences. The material has been divided into four phases whose chronological frames are defined by imperial dynasties. The phases differ in the amount and character of material included, demonstrating changes in minting practices in Asia Minor. The division is arbitrary and the main reason for such a criterion was convenience. The material assigned to the reign of just one emperor is usually too scanty to grasp wider long-term patterns and the division into equal time intervals ignores the irregularity of reforms introduced by individual emperors. Thus, I chose to analyse the material on the scale of dynasties.

The first phase

The first phase covers the period from the reign of Augustus until the reign of Domitian (31 BC – 96 AD), that is the Julio-Claudian and Flavian dynasties, a ‘long’ first century AD. The only available material for this phase comes from the homonoia dataset and has already been discussed above (Ch. 4.6, Graph 4.6.5, Fig.4.6.6.). However, it is worth highlighting here that the phenomenon of homonoia issues appears earlier than the others. The homonoia network possibly reveals the skeleton of the administrative and economic network at the onset of the Early Imperial period – those were the towns regularly visited by governors for court hearings, they were hosting agones, religious festivals and markets on a regional scale. These cities did not possess pre-assigned administrative or judicial prerogatives or responsibilities themselves, but the predictable presence of a Roman governor with his entourage or a flock of spectators or traders would render them as functional centres of their districts. The original arrangement could have determined many of the later developments such as securing concessions and privileges, further strengthening their position in a feedback loop (Mitchell, 1993a, pp. 203, 242; Fournier, 2010, pp. 41–98; Kantor, 2013, p. 148).

The second phase

The second phase, defined as the reign of the Antonines (96-193 AD), extends the geographical scope of the network and introduces the die-sharing material into the analysis (Graph 4.7.5, Figs.4.7.6,

4.7.7)⁹: there are homonoia links recorded with Athens and Sparta in Greece and with Alexandria in Egypt; two pairs of cities sharing their dies locally were identified in Thrace and Palaestina. However, the core of the network is built around the homonoia connections and focuses on a few large cities: Ephesos, Smyrna, Pergamon, Laodikeia ad Lycum, Hierapolis. Thus, it reproduces the triangular pattern from the previous period (cf. Fig. 4.6.6 and Fig. 4.6.9). Notably, the die-links recorded for the Antonine period do not overlap with the homonoia relations, with the only exception being the pair Ephesos-Magnesia ad Maeandrum, and in fact complement them (Graph 4.7.5: the pink edges represent the homonoia relations, the green edges represent die-links). It may hint towards the notion that the large urban centres were also the focal points which shaped the monetary policies of their neighbours.

When looking at the map it can be observed that the communities defined at the modularity resolution of 1.0 correspond with geographical units. Three very significant cities on the Aegean coast, Pergamon, Smyrna and Ephesos, are the central hubs of their respective communities: cerulean, pink and orange. The cerulean community extends around the Strait of Lesbos and in the Lykos Valley, but also has a strong offshoot towards Laodikeia ad Lycum and her connections (Herakleia Salbake and Eumeneia). The jade community with its hub at Thyateira complements the cerulean community. Thyateira and Pergamon share no homonoia connection, but it is rather evident that they shared their spheres of influence. The pink community is organised around the coastal city of Smyrna. She has few but notable connections with inland cities: Philadelpheia and Laodikeia ad Lycum, marking the circuit route from Smyrna to Apameia and Synnada. All other connections are coastal cities, suggesting that the Smyranean sphere of influence was directed rather towards the sea. The most striking community is formed around the Ephesian connections. They seem to follow three directions: south towards Miletos, Kos and even Alexandria in Egypt; east along the Maiandros Valley to Hierapolis and from

⁹ The countermarking dataset was not included here, as in this period it was represented almost exclusively by self-loops, thus revealing no significant connections between cities.

there north to Synnada and south to Kibyra; north-east along the Royal Road to Sardis and her environs. There are also communities formed by less significant cities of more localised scope: the bronze community in northern Caria, the pair of Attouda-Trapezopolis (seashell) on Mount Kadmos, the magenta community around the Gulf of Ephesos, and the green community around the Elaitic Gulf. The bronze community is defined by a series of homonoia issues commemorating the alliance of a number of Carian cities with Aphrodisias in Caria. Contrastingly, the green and magenta communities are built up mostly from the die-sharing links. It seems that the cities of Caria were still negotiating their mutual relations with each other and within the administrative network, while the cities of the Elaitic Gulf and the Gulf of Ephesos are connected rather by die-links, suggesting already existing integration in the production of money, possibly independent from their respective hubs: Pergamon and Ephesos, but conspicuously close to them.

The third phase

Only from the Severan period onwards does the material under study appear in other regions of Asia Minor, and the number of active actors rises considerably. This in itself is meaningful as it hints towards the adoption and emulation of some of the solutions from the province of Asia. Up until then the southern coast evolved differently. Under the Julio-Claudians and Flavians hardly any Pisidian city minted provincial coinage. The Pamphylian cities remained active in minting, but there is no numismatic evidence comparable with that from the province of Asia. Even after the eruption of local issues from Hadrian onwards, there are no identified die-links or homonoia coins suggesting different institutional solutions, but they became numerous from the Severan period onwards.

The countermarking dataset appears in this period for the first time, but still in such low numbers that it does not affect the network much. Most of the countermarks appear on coins from cities far away from the countermarking city, suggesting some sort of validating function of countermarks.

In the Severan period the central city and the main hub of the network is Ephesos, with a Degree score of 33 and Betweenness Centrality of 0.20 (Graph 4.7.8). It is the largest hub within the cluster that

corresponds with the cities of the central part of western Asia (Fig.4.7.9, 4.7.10). Four communities have been identified at the modularity resolution of 0.4 and their geographic configuration repeats many of the tendencies from the Antonine period. The most stable part of the system is the community with Ephesos as its hub (orange). In the Severan period it extends around the Ephesos Bay, along the northern part of the Maiandros Valley as far as Hierapolis, along the Kaystros Valley and north towards Sardeis and her environs. Kolophon and Metropolis previously formed a separate component with Samos, but now they are tightly connected with Ephesos.

The other stable community is the one starting in Smyrna, leading along the Kogamos Valley through Philadelphieia to Laodikeia ad Lycum and north-west from the Lykos Valley towards Apameia and Synnada and south-west towards Kibyra and the Milyas (Palaipolis, Isinda). It seems that in the Antonine period Hierapolis governed most of the flow towards the east, while in the Severan period it was rather Laodikeia that operated these connections.

The cities of Caria have been assigned into two communities whose lines of division correspond to those from the Antonine period (cf. Fig.4.7.7.). Antiochia ad Maeandrum, Aphrodisias, Neapolis, Bargasa have been assigned to the violet community, interestingly together with Samos, Themisonion, Peltai, Philomelion and Hadrianopolis in Phrygia. The rest of Caria with the island of Kos and cities located on Mount Kadmos – Trapezopolis and Attouda – were ascribed to the green community. Trapezopolis and Attouda formed a separate component in the previous period, but under the Severans they play a bridging role towards Caria. In general, the region around Mount Kadmos is dotted with cities ascribed to different communities stretching in different directions, thus marking an important crossroads.

The entangled communities from the area of Pergamon and Thyateira have been now assigned into one community (brown). It seems though that the Pegamene influence over the network shrank considerably, especially in the coastal areas. Pergamon's Degree score is just 11 (Thyateira - 15,

Adramyttion – 20, Smyrna – 21, Philadelpheia – 22), while the Betweenness Centrality is 0.036 (Thyateira – 0.25, Adramyttion – 0.072, Smyrna – 0.043, Philadelpheia – 0.060). The die-links of Pergamon are much less numerous than those of Thyateira, Adramyttion or Smyrna, and the homonoia relations cannot match those of Ephesos or Smyrna. On the other hand, the instances of countermarking between Mytilene, Methymna and Pergamon show the constant circulation of money between the mainland and Lesbos, although it may suggest some sort of institutional separation. It seems that the cities on both sides of the Mytilene Strait got closer to each other at the expense of Pergamon.

The cities of Mysia form a dense cluster that geographically extends from Adramyttion and Methymna in the south to Kyzikos in the north, Apollonia ad Rhyndacum and Hadrianoi in the east. The community encompasses not only coastal cities, but also the inland ones.

Other regions appear on our map for the first time. Phrygia Epiktetos has been ascribed to a community (gold) separate from but closely linked to Bithynia (blue). Interestingly, the gold community is linked with cities located further to the south and east: Apameia, Sagalassos, Ankyra and Tavion. This could suggest more intense traffic from the area of Propontis inland and across Anatolia connected with the campaign on the Danube and the Euphrates. The Severan network extends even as far as Pontus, defined as an individual community based mostly on the die-sharing material (grey). The first links are recorded in Cilicia Tracheia, Cilicia Pedias, Syria and Moesia; the relation between Gaza and Raphia remain stable, while the network in Greece becomes denser with Korinthos as its main hub.

The cities of Pamphylia and Pisidia enter the picture with an already sophisticated structure, with Perge as the main hub and Sagalassos and Olbasa as bridges leading north and west respectively (Degree score: Perge – 20, Side – 11, Sagalassos – 19, Olbasa 14; Betweenness Centrality: Perge – 0.048, Side – 0.006, Sagalassos – 0.063, Olbasa – 0.066). Perge is the only city in the area to be

commemorated on a homonoia issue at the time. The issuer was Apollonia Mordiaion, a city in Phrygia Paroreios, located on the Via Sebaste in its northern part. It seems that coastal Pamphylia had significant connections with its Pisidian hinterland and there is still no division between eastern and western Pamphylia. Pisidia, despite the division into two communities, seems to be well integrated internally. An interesting case can be observed on the western fringes of the Milyas, where Olbasa is connected both to the east and west, while the cities of Isinda and Palaipolis have connections rather towards the west. This shows the fluidity of regional boundaries in the Severan period.

The network reconstructed with the use of the material from the Severan period has a complex and comprehensive structure. The identified communities to some extent correspond with the boundaries of provinces (e.g. the pink and grey communities). The cerulean and violet communities seem to follow the route from the Aegean coast towards inland Anatolia, while the bronze community may reflect the movement of armies from the north-west to the south-east limes. Except for the initial triangle of the province of Asia, we can detect numerous new regions and communities interconnected with each other in multiple ways. The visible evolution of the network reflects the rising integration, unification and complexity of the networks of Asia Minor. The reconstructed network must have been based on already existing social, economic and administrative ties, their repetitiveness and predictability. The network based on the material from for the crisis period of 235-276 AD shows significant changes in this respect.

The fourth phase

The period of the third century AD crisis was the time when numerous emperors were elevated to power with the help of their armies; they spent most of their days on military campaigns and thus are sometimes called the Barrack Emperors. The period of the Barrack Emperors (235-276 AD) brings in significant changes in the picture of the social network in Asia Minor. First of all, the huge influx of countermarking allows us to calculate a network that reflects the organic flow of money, and thus the movement of people, better than in previous periods when the connections were defined more by

the administrative and inter-city relations. The rise in countermarking is connected with a monetary crisis that eventually resulted in the introduction of a completely new currency system. Consequently, the Roman provincial bronzes were abandoned, never to return.

The cities in the period of the Barrack Emperors form a tightly packed network with just a few offshoots and separate components (Graph 4.7.11). The main cluster is divided at the modularity resolution of 1.0 into four largely interconnected communities that correspond to the regions of Bithynia (green), Asia (cerulean), Pisidia-Pamphylia (orange) and a bridging community that geographically extends from the middle Maiandros Valley through Phrygia and Lycaonia as far as Cilicia (pink). The geographic scope of the network presents a similar picture to that from the Severan period, but with some notable changes (Fig.4.7.12). There are still separate components in Syria and Moesia, while links between Asia Minor and Greece are maintained. Alexandria has several connections with Asia Minor. However, the die-sharing phenomenon disappeared from Greece and Palestine. There are no connections detected in Thrace. Finally, the landscape of participating cities in Asia Minor was largely confined to coastal cities in the case of Pontus, Paphlagonia, Bithynia and Mysia.

The third century crisis was a turbulent time in the history of the Roman Empire. The Empire was divided between different internal and external players. The identified communities often correspond with cities located along coastal or inland routes (green, magenta, pink), which may originate from the need to transport armies, their pay and supplies from one part of the Empire to the other. They may also be interpreted as the signs of interruption of the previous trade and supply networks affecting locations far inland in a domino effect. The most densely connected community is the one corresponding with Pisidia and Pamphylia (orange). This is possibly thanks to the fact that the cities of the region were the last ones to issue bronze provincial coinage and they provided a convenient base for Roman emperors. On the one hand, they were protected enough to deter rivals to power, while on the other they were a perfect base for a counterattack thanks to their location and connectivity.

The picture that originates from the period of the Barrack Emperors is different from previous periods, as it was a time of disturbance and realignment. However, it also demonstrates that Pisidia and Pamphylia had become an integral part of the Roman Empire, without which it would have not survived. The patterns of countermarking testify not only to the monetary crisis, but also to considerable mobility of people using that coinage, and strong integration between the province of Asia and the province of Lycia et Pamphylia. Without a strong economy and a considerable level of integration with a wider Empire the Pisidian and Pamphylian communities would not have been able to provide reliable shelter for emperors in times of the crisis of central power.

4.7.3 The aggregated networks - conclusions

Obviously, the question remains as to what extent these networks reflect actual interconnectedness, and not just the spread of certain minting habits or the scope of modern academic interests. Such an objection is justified in the case of any one of the datasets treated separately in a traditional way. Nevertheless, the whole aggregated network reflects more than just a numismatic phenomenon, as the characteristics of a network are not a simple sum of its components. It is notable that despite the fragmentary evidence, the networks calculated above present quite a comprehensive picture of Roman Asia Minor. Most of the cities known from other sources have been mapped, and geo-cultural regions and communication routes are detectable. Each database is sensitive to different sets of human actions and reflects different processes. As such, they testify to the existence and spread of a certain functional and cultural system common to much of ancient Anatolia, no matter the underlying local substrate. Thus, the discussed networks are a robust benchmark for human presence: the more information flow on the graph, the more relations between people and institutions, the more human activity and pressure on the environment.

4.8 CONCLUSIONS

The numismatic material has yielded much interesting information on the city network in Roman Asia Minor. Despite limitations and inherent biases, the aggregated networks present a fairly comprehensive and consistent picture portraying the interactions of peer polities (Ma, 2003). It seems that the general long-term patterns reconstructed here confirm and develop some of the observations and conclusions achieved with the use of spatial analysis and archaeological evidence (Hanson, 2011; Willet, 2019) and additionally they allow us to reconstruct changes over time. The aggregated networks mirror not only the landscape of cities minting bronze provincial coinage but also elucidate their mutual relations and past connectivity, helping to propose mechanisms governing the emergence of these relations.

The reconstructed picture suggests that the river systems of western and southern Anatolia were the most active areas of the whole network, with the cities around Mount Kadmos lying on the crossroads. The cities of Asia preserve their central positions within networks despite the changing datasets and periods, while the cities of Pamphylia rise in their influence over time. It appears that the main bridges and hubs were the cities located on the outskirts of their respective communities, usually seaports (Pergamon, Smyrna, Metropolis, Ephesos, Perge, Side), but also cities lying at the end of river systems (Apameia, Sagalassos) or busy cross-roads (Tripolis, Hierapolis, Aphrodisias, Laodikeia). The low number of distant links (e.g. with Alexandria, Greece, Palaestina) makes us believe that more profound long-distance contacts were not common. In the light of the currently collected evidence, Roman Asia Minor seems to be a world in itself, only slightly connected with other eastern regions and largely disconnected from the western regions, with the exception of the capital city of the Roman Empire.

Contacts were obviously restrained by the presence of mountain chains. The whole Pisidia-Pamphylia region is strongly defined by the Isparta Angle of the Taurus Mountains. The Maiandros Valley is

defined by the ranges of Messogis to the north and the mountains of Caria to the south. But it seems that the mountains are not enough to isolate a region completely, as quite busy routes follow rivers from their estuaries up to their springs, and then leave flat land behind, cross narrow mountain passages and reach the inner highlands of Anatolia. The city of Ephesos, lying on the Kaystros River, is usually ascribed to the same cluster as cities lying on the Maiandros. Therefore, I would rather suggest that the main geographical constraint for the network is the climatic factor that shapes local ecosystems and thus limits the ability of human populations to sustain polis life of the Mediterranean type. The areas with precipitation levels allowing only steppe vegetation (Galatia, Cappadocia, Lycaonia) were placed on the peripheries of the network.

The Roman administration also played a role in shaping the connections in Asia Minor. The identified hubs overlap with assize centres and cities holding neocorates, while communities identified on the most detailed level may correspond with the assize districts and judicial circuits made by Roman officials. The administrative status does not explain all of the features of the reconstructed networks, but they could have been an important element of building up feedback loops.

Interestingly, it seems that city links were stronger along the land routes than the marine ones. The west-east and west-south land routes are detectable on different levels of the network analysis, while there is no homogenous community around the coast of the Anatolian peninsula. Such an observation calls into question the presumed importance of the marine routes, or at least their scale and character. In the long term, the most general patterns are best explained by the communities emerging along river systems. Possibly, cities located along one river system became functional cooperatives thanks to the gradual building up of the system of interconnections based on the rising specialisation of labour and land use combined with a considerable ease of travel (cf. Planhol, 1958, pp. 432–5). A dense network could have grown bottom-up following positive feedback loops leading to the integration of communities with various resources at their disposal, as rivers cross different landscapes with varying micro-climates at different altitudes, as a result of spontaneous optimisation

of the local environment. This may also reflect the routes in which the resources were mobilised from the dispersed hinterlands, transported to coastal entrepôts and later to more distant areas of the empire. The ports would play the role of bridges linking their respective hinterlands with the wider world. The shape of these networks goes far beyond the cultural ideal of self-sufficiency.

Noticeably, this process can perhaps be traced while comparing changes over time. The earliest material from the Flavian period comes solely from the province of Asia, presenting a starting point for later developments. This basic setup defined by the triangle from Adramyttion to Ephesos to Hierapolis reappears in the Antonine and Severan periods, but with evolving offshoots and rising connectedness. Only the period of the Barrack Emperors shows a significant shift in focus towards the southern coast. One may argue that the picture is distorted by the military campaigns of the third century AD and that the phases reflect the realities of peace and war more than the diachronic developments. This may be true to some extent, but it is worth noting that an army would be more likely to march along a route that is safe and prepared to accommodate the needs of soldiers wherever possible. This task was better performed by the regions that already had a stable economy, good transport infrastructure and an integrated, predictable ruling class (on the rising loyalty of elites and urban dwellers testified by the imperial cult see: Talloen, 2015, pp. 155–79, 343–4). Either way, the maps showing city networks can be read as maps of the distribution of imperial Roman identity and Roman way of life. The social system of Roman Asia Minor looks much less like a precise mechanism, but it rather resembles an opportunistic, flexible, adaptable colony of ants or a dynamic and densely packed neural network.

5 THE RECONSTRUCTION OF THE LOCAL CLIMATE

The last two chapters were devoted to the reconstruction of the social part of the socio-ecosystem. The next two chapters focus instead on its environmental part. In recent decades the climate has been recognized as an important factor affecting the course of human history. It is not only the background of historical events, but also an independent player. Once the variability of the palaeoclimate was discovered, it was tempting to link the historical patterns of rise and fall with the rhythms of solar irradiance.

However, the influence of climate is complex, subtle and manifold. Our cognitive abilities limit our perception, understanding and, as a result, our capability to respond and adapt to events that extend over different scales from local to global and from seconds to millennia. Because humans react differently to daily, seasonal, yearly, interannual, decadal or generational changes, it is very hard to grasp the nature of climatic pressures in its entirety. Warming and cooling, increase and decrease in precipitation or frequency of extreme events can mean something different depending on the condition of a human system in a given time and place (Degroot *et al.*, 2021). Furthermore, it was largely impossible to study the influence of climate before the era of instrumental records, and despite fast advances there remain many uncertainties regarding climatic mechanisms. Tracking and modelling of climate require huge amounts of data and computing powers. Thus, it is important for a historian to understand both the opportunities and limits that the study of climate brings into our understanding of historical processes (Manning, 2013).

5.1 GLOBAL PROXIES

There are several mechanisms that affect the Earth's climate on different time and spatial scales (Neukom, Barboza, *et al.*, 2019). The most basic and the most important one is the amount of energy that arrives from the Sun. The solar activity triggers several other phenomena that form a complex

system of connections and feedbacks resulting in the ever-changing situation. Moreover, the Sun directly affects the hydrosphere and biosphere, which are the primary concern for humans up to the present day.

Another major trigger of climatic conditions is volcano eruptions. They are independent from solar activity, but they are still capable of influencing the global climate. The volcanic aerosols that reach the atmosphere prevent the sunlight from reaching the Earth's surface and this results in cooling episodes. Although a single eruption may affect weather only on a limited timescale counted in weeks or months, clusters of eruptions may provoke long-lasting consequences and even push the global climatic systems out of equilibrium.

The climate of the Late Holocene was relatively stable (with a slight tendency to cooling), but what is more, the evidence for both solar and volcanic activity suggests an interesting climatic framework for the Roman imperial period. The total solar irradiance reconstructed from C^{14} and Be^{10} isotopes mark a period of robust solar activity from the fourth century BC to seventh century AD (Steinhilber, Beer and Fröhlich, 2009). In turn, the level of volcanic activity in the period between the fourth century BC and sixth century AD was rather low, with exceptional low-level activity in c.100 BC – AD 100, with only one major eruption of 44 BC (Sigl *et al.*, 2015). That period is labelled as the 'Roman Warm Period' or the 'Roman Climate Optimum' (Lamb, 1995; McCormick *et al.*, 2012) roughly defined from c.200 BC to c.AD 150, characterised by warmth, even greater stability and abundant precipitation.

However, the spatial consistency of global temperatures, as well as the term 'Roman Climate Optimum', have recently been contested, as research urges us not to overlook important regional divergences from the general framework (Neukom, Steiger, *et al.*, 2019; Bini *et al.*, 2020). The evidence for solar radiation and volcanic activity is obtained from the analysis of Greenland ice cores corroborated with tree rings around the globe, and presents climatic forces on a global or hemisphere scale. To see the more detailed, local picture we need to look at different sources of information.

5.2 LOCAL PROXIES

The reconstruction of local climates is a challenging task (Labuhn *et al.*, 2016). In the case of today's Asia Minor we deal with an area that is under the influence of several large climatic systems: the Northern Atlantic Oscillation from the west and the North Sea-Caspian pattern from the north in winter, and the Indian monsoon from the south-east in summer (Göktürk, 2011, p. 2). The latitudinally extending mountain chains (the Taurus and the Pontic mountains) additionally complicate the climatic patterns. The presence of the main local climatic pattern, 'Cyprus cyclones', originates from the combination of the considerable land mass of Cyprus, the high Taurus mountains to the north and prevalent westerly winds induced by the differences between the Azores high in the Atlantic and the Persian low (Lionello *et al.*, 2012). Most probably Anatolia in the Roman period was under the influence of climate forcings the same as today, but their power, frequency and mutual relations might have been slightly different. It is also worth pointing out that the temperature reconstructions are much more spatially consistent than the precipitation patterns. This is an important realisation, as in the case of the Mediterranean basin it is usually precipitation that determines favourable conditions for agriculture (Büntgen *et al.*, 2010).

Pisidia and Pamphylia lie between the climatic zones that are today described as Mediterranean and Mediterranean Transition climates. This means hot, dry summers and warm, wet winters on the coast, lower temperatures in the mountains with snowfall in the winter, and more continental influence in the highland plains. Luckily, for the Western Taurus, we have some significant evidence on local climate characteristics: the Kocain Cave speleothem that reflects winter temperatures and consequently the snow cover in winter-spring months, as well as isotopic analysis of the calcite from the Gölhisar Gölü, reflecting precipitation changes, and the pollen cores from the valleys of Ağlasun, Gravgaz and Bereket, suggesting the level of moisture in local areas.

5.2.1 Kocain Cave

The Kocain Cave is located just north from Antalya (ancient Attaleia), under the mountain slope at the edge of the valley. It has been shown that the Kocain Cave speleothem (Fig. 5.1) is an archive sensitive to winter-spring temperature and to the intensity of the snow cover expressed as the amount of C^{13} isotope in relation to other isotopes. The higher the $\delta^{13}C$ value (a measure of the ratio of stable isotopes $C^{13}:C^{12}$), the higher temperature and less abundant snow cover. The speleothem record suggests that after around eight centuries of cold and harsh winters there was a relatively sharp increase in winter temperatures from c.175 BC onwards until ca.150 AD. The whole Roman period from c.100BC to 400 AD was characterised by warm (though colder than today) temperatures in comparison to the previous millennium. The average resolution of the speleothem data is quite accurate (4.3 years), so we can say with considerable certainty that the temperatures were especially stable in the period 100BC-200AD. The lower than today temperatures must have resulted in more abundant snow cover than we know now. On the one hand, lying snow complicates winter communication and shortens the vegetation season in the highland areas. On the other, it is a perfect retention reservoir for the dry summer season in the lowlands, so its influence on the local populations varied. Unfortunately, the Kocain Cave record does not allow us to reconstruct the absolute levels of temperatures or precipitation (Göktürk, 2011).

5.2.2 Gölhisar Gölü

The second record applicable to our region is the Gölhisar Gölü pollen core. The Gölhisar Gölü is located in the ancient region of Kibyrtis, in the flat basin in the northern part of the Lycian Taurus. It is a small and shallow lake with high sensitivity to evaporation. Although it is located north of the Taurus chain, its water sources are fed from the aquifers in the nearby mountains that collect rainfall from the Mediterranean Sea. Thus the lake levels reflect the precipitation available in Pisidia and Pamphylia. The analysis of the isotopes of the lacustrine calcite suggests that the Roman and Byzantine

periods were slightly more humid than the preceding and following periods. Unfortunately, more precise dating is not possible (Eastwood *et al.*, 2007).

5.2.3 Pollen records

Plant communities are a very sensitive proxy for climatic changes, so the pollen record from lakes and bogs have been used as a base for large-climate reconstructions (Mauri *et al.*, 2015). However, their use in generalised reconstructions is problematic, as they usually reflect very localised conditions. Several pollen cores extracted within the Sagalassos Project come from the area of Western Taurus, and as such they are an additional source of information.

Ağlasun and Gravgaz valleys

The lake cores from the Ağlasun and Gravgaz valleys inform us on the conditions prevalent in northern Pisidia. Although they focus on the palynological analysis of the closely adjacent areas, some preliminary conclusions in regard to general moisture can be inferred from them. The arch of the Western Taurus is the most northern point in which the climate correlates with the Pamphylian coast of the Mediterranean Sea today. It has been suggested that the broadly defined Hellenistic-Roman-early Byzantine period was more humid, perhaps thanks to more intense precipitation (Vermoere, 2004, pp. 163–4).

Bereket basin

The lake core from the nearby Bereket basin gives much more detail, as it is characterised by an exceptional resolution of down to 2 years (14 years on average). The Bereket basin is located in northern Pisidia, much higher than the Ağlasun and Gravgaz valleys, a little more west from them, but it is still under the influence of the Mediterranean Sea. The observed change patterns in an open-marsh ecosystem succession and sedimentation dynamics cannot be explained solely on the basis of human influence. It is suggested that they reflect changes in local water levels originating from wetter and drier climatic episodes (Fig.5.2). The Hellenistic period is generally described as humid with intermittent wetter and drier phases (wetter phases dated at cal.c. 250-195 BC, cal.c. 160-110 BC).

The Roman period in turn is characterised by a gradual decrease in precipitation and increase in temperature with the longest drier episode at cal.c. 130-350 AD. Another wet phase is suggested at cal.c. 450-650AD after a hiatus in the record (Kaniewski *et al.*, 2007, pp. 2211–3).

The evidence from Bereket helps us realise one more important feature. Even though the Hellenistic period is usually described as colder and dryer on average, the episodes of warmer and wetter conditions lasted as long as around two human generations (c.50-65 years). From the climatic perspective this is a quick and short-term change, but this is enough time for a society to adapt to change and perceive it as a timeless norm. The Hellenistic period was also characterised by a higher amplitude of changes. Such information is lost in records with lower resolution that register more generalised patterns.

5.2.4 Dead Sea

Interestingly, in the case of precipitation, we can supplement our knowledge with the data from outside Asia Minor. The rainfall patterns can also be deduced from the Dead Sea levels, as the coastal Levant precipitation records, thanks to the Cyprus cyclones, are correlated with the southern shores of Asia Minor and upper Euphrates. The record (Fig.5.3) shows a steady rise in the level of the Dead Sea from the 3rd century BC, with a peak in the second half of the 1st century BC. The next lowest stand is noted for the middle of 4th century AD with a possible sharp peak just afterwards. Thus, the Dead Sea levels suggest wetter conditions in the Eastern Mediterranean during the Roman period (Enzel *et al.*, 2003).

5.2.5 Lake Amik

Another record that testifies favourable climatic conditions in the Roman period is the evidence from the Amik Lake in Syria. The analysis of the detrital fraction of its lacustrine sediments suggests a lack of torrential rains in the Eastern Mediterranean and thus more steady rainfall within a year, no matter the overall level of precipitation. The predictability and low amplitude of phenomena are considered

as a positive occurrence for agricultural societies, as they allow better plant growth and accumulation of resources that would otherwise have been used during worse years. Torrential rains in modern times are known to cause severe erosion within just a few hours. The lack of such rains in the Roman period would have reduced the risk of catastrophic events for agriculture (El Ouahabi, Hubert-Ferrari and Fagel, 2017).

5.3 IMPLICATIONS FOR PISIDIA AND PAMPHYLIA

The 'Roman Climate Optimum' in Pisidia and Pamphylia was benign, albeit not primarily thanks to its high temperatures, which in fact were lower in the Eastern Mediterranean than today or during the Minoan Period. The main advantage in comparison with the preceding centuries was the sharp relative warming and centuries-long stabilisation afterwards. The coping mechanisms of the local people inherited from previous generations as cultural norms were not tested against rapid climatic changes until the fifth-seventh century AD. Higher winter temperatures and the consequently smaller reach of winter cover made access to and communication within Pisidia easier during longer periods within each year, while still keeping the mitigating influence of melting snow on the water regimes in the region. Milder winters and rising temperatures enabled many crops to be cultivated in higher and more northern locations. And most of all, the precipitation was more abundant and more evenly distributed throughout the year, enabling both wild and cultivated vegetation to flourish.

Another aspect is the influence of temperatures and precipitation on the local hydrosphere. Rivers were the source of water for irrigation, urban and domestic use, especially important in the areas lying within the rain shadow of Taurus. Larger rivers such as the Kestros and Eurymedon were used for communication and transport in their lower courses or for logging. Higher and more evenly distributed precipitation would protect rivers from drying up in summer months and secure their usefulness around the year. Changing water levels in lakes are equally important. The rising salinity of a drying

lake may render its waters unsuitable for drinking and agricultural use. On the other hand, exceptionally high waters claim more land, and may affect communications routes.

5.4 WIDER CONTEXT

We saw in the previous chapters that there were more and less turbulent periods in the history of the region. The third century crisis can be described as one of the more challenging times for the inhabitants of Anatolia. It is tempting to link these turbulent times, directly or indirectly, with the cessation of the 'Roman Climatic Optimum'. Massive changes in the societal, economic and political systems seem to be aggravated by deteriorating environmental conditions. Similarly, the Hellenistic period was full of disruptive political events: the Macedonian conquest, struggles between the Hellenistic monarchs, the arrival of the Galatians, the conflicts between Pisidian cities, the westward expansion of the Pisidians. Also, the Romans entered Pisidia in 189 BC for the first time, just before the warming period started. Can we say that the turmoil of the Early Hellenistic period was a consequence of a colder and more unpredictable climate? It may be true that the higher variability and unpredictability of climate could have constituted another destabilising factor. However, the 'climatic optimum' started c.150 BC, but the historical events in the region do not seem to slow down until the end of the Roman conquest under Augustus.

It is worth noting that the change seems to come earlier to the Western Mediterranean. Here, the warming trend might have started as early as the middle of the first millennium BCE, as the evidence from the Alp glaciers show (Harper and McCormick, 2019, p. 84). The inhabitants of the western Mediterranean basin could have enjoyed the favourable change much earlier than their eastern neighbours, which might have helped in the rise of the Roman and Punic states. On the other hand, there is a strong consensus on the view that the eastern part of the Mediterranean in the Hellenistic period was better developed, with a denser settlement grid, bigger cities, more sophisticated technology and richer states.

Such paradoxes show that climate change is not enough to push human history in a pre-defined direction. It may open opportunities or pose limitations on human activities, it may put a well-established entity under much stress, but it is not decisive for the course of events. We should not treat climate in a deterministic way, especially in an environment such as the Mediterranean basin and its surrounding mountains where every river valley or coastal plain has its own microclimate and every mountain slope its own pattern of exposition to sun, rain and wind. As Thonemann shows in his book on the Maiandros Valley, the same land can be used in multiple ways depending on local needs, technology and cultural habits (Thonemann, 2011) and conversely, as has been pointed out for the Late Antique period, similar climatic trends may bring different results depending on the resilience of local people (Izdebski *et al.*, 2016).

Traditional text-based history is not the best tool to follow human reactions to climatic events (except perhaps those extreme events). The classical sources are focused on elite perspectives that rarely touch matters of everyday survival and risk strategies, following often conventional literary tropes (Thommen and Hill, 2012). The subtle interplay between the climate fluctuations and human responses is better inferred from analysis of the past plant cover. Plants rely on the climatic conditions and people rely on plants as their food, raw materials and fodder for their animals. At the same time people consciously or unconsciously may influence local vegetation and change its character completely in a relatively short time (e.g. melioration, forest clearance). The next chapter is devoted to the reconstruction of the local landscapes based on palynology and it explores the role of both anthropogenic and climatic factors in the dynamics of changes.

6 PALYNOLOGICAL EVIDENCE FROM SOUTHWESTERN ASIA MINOR

6.1 WHAT IS PALYNOLOGY

Pollen evidence is an invaluable source of information about the past environments. Pollen accumulated in lakes or bogs forms a long-term, broad, comprehensive archive of local landscape registering a continuum of vegetation changes induced both by human and non-human factors. It became the object of study of the discipline of palynology, that originated from the research on peat bogs in Northern Europe as early as the beginning of the 20th century as a branch of the natural sciences (for the detailed history of palynology see: Birks and Berglund, 2018), and in recent decades its potential has been developed for the use of historical research.

The palynological evidence was first utilized narrowly as a stratification tool, but with technological development and sophistication of analytical methods it became a powerful tool for ecological research. It has also been utilised as an auxiliary tool in a variety of fields including e.g.: archaeology, paleoclimatology, phytogeography, conservation biology, landscape management, ecosystem modelling etc. As an auxiliary discipline in archaeology and history it is narrowed to the study of deposited pollen and palynomorphs in the human contexts, that is e.g. the archaeological sites or in deposits that might be related to human activities (lakes, bogs). It constitutes a line of inquiry independent from the historical or archaeological record, thus offering material useful not only for testing historical hypotheses, but also for developing completely new narratives describing relations between humans and their environment in the past.

6.1.1 Pollen ecology and preservation

Pollen records can inform us about the living conditions of ancient people in a unique way. What is more, some pollen cores from Turkey offer a better temporal resolution than archaeological or epigraphical records from the same area. However, before presenting the pollen evidence, it is useful

to comment on the specifics of pollen ecology, preservation and treatment. Just like any other scientific method, palynology is prone to research bias and requires careful interpretation. The composition of a pollen spectrum is influenced by a series of variables that complicate the attempts to reconstruct the past vegetation directly from the count of pollen grains, and has different characteristics for every ecological zone and often for every individual coring location. When using the palynological evidence for historical studies it is worth being aware of its limitations.

The first set of variables concern the ecology of pollination. Wind-pollinated plants (pine or many grasses) produce much more pollen that is more easily dispersed than insect- (plants with showy flowers) or auto-pollinated plants (wheat). As a result, the high percentage of pine pollen in a sample may result from the transportation of pollen over large distances and thus reflect vegetation on a higher regional level. On the other hand, just one pollen grain of wheat can be interpreted as a good proof of the cultivation of cereals in the vicinity of the coring place. The dispersal of pollen depends on the local weather conditions, prevalent wind strength and directions, and land relief. A sudden rise in the amount of pollen may not necessarily indicate the rise in the reach of a given plant, but can be the result of conditions that allow the pollen to be transported for greater distances, e.g. more arid conditions during the flowering season (Faegri *et al.*, 1989, pp. 31–41).

Another set of variables concerns the features of a deposition place, that is to say, the water body that collects pollen. The location and size of a lake or a marsh, the chemical features of water and soil, and their changes over time influence the ratio of intercepted and preserved pollen grains. The accumulation rate affects the resolution of the chronology, while abrupt events may completely distort it (Faegri *et al.*, 1989, pp. 42–6).

The sampling method also influences the final results: the choice of coring places, the frequency of sampling, and methods of sample preparation. Counting the number of pollen grains is a demanding task. The grains can be cracked, broken or creased, or the characteristic features damaged, so it is

rarely possible to identify a fossilized pollen grain down to a species level. The identification at the family level is much more common. Notwithstanding this, pollen grains are the most durable plant relics and can be found in mass quantities unlike other plant remains (Faegri *et al.*, 1989, pp. 53–82).

Several layers of error and inaccuracies make it impossible to reconstruct the local vegetation directly from the pollen count (Faegri *et al.*, 1989, pp. 114–136). The pollen core does not reflect the exact composition of species or their reach in a given layer. It records each spatial component differently. Still, the mass production of pollen in several taxa ensures that the changes in their mutual relations are not dependant on accidental preservation but reflect a real change in the past environment such as climatic fluctuations, human interference or changes in plant distribution due to biotic factors.

6.1.2 Available research

For Asia Minor several pollen cores have been extracted and analysed (Fig.6.1). They are an invaluable source of information even if they are not as numerous as cores from Northern and Western Europe; many of them have few, if any, radiocarbon dates, and thus there are still numerous gaps in the picture of vegetation changes in the region (most notably, there are no cores extracted from the Plain of Antalya or the Aeagean Coast). Nonetheless, they provide access to information not available through other disciplines.

The first cores in Turkey were collected by Beug for Northern Turkey and published in 1967 (Beug, 1967). Later, two important expeditions were conducted by van Zeist, Bottema, Woldring and Stapert in 1970 and 1977. The results, except the lake Akgöl in Central Turkey, covered mostly the Southwestern part of the country and included: Ova Gölü, Köyceğiz Gölü, Avlan Gölü, Bataklığı, Hoyran Gölü, Gölhisar Gölü, Söğüt Gölü, Beyşehir Gölü, Pınarbaşı Gölü, Kara Gölü near Elmalı (van Zeist, Woldring and Stapert, 1975; Bottema and Woldring, 1984). Another project by van Zeist and Woldring resulted in the publication of data from Van Gölü in 1978 (van Zeist and Woldring, 1978). In the 1980s Inceoğlu and Pehlivan extracted a core from Tuz Gölü, and Sullivan from Gölçük Gölü (Inceoğlu and

Pelhivan, 1987; Sullivan, 1989). The 1990s brought Eastwood's project on the Gölhisar Gölü and a new set of cores from Northern Turkey (Akgöl Adatepe, Küçük Akgöl, Melen Gölü, Yeniçağa Gölü, Tatlı Gölü, Lâdik Gölü, Kaz Gölü, Demiryurt Gölü, Büyük Gölü, Seyfe Gölü, Tuzla Gölü) by Bottema, Waldring and Aytuğ (Eastwood, 1997; Eastwood *et al.*, 1999). In the new millennium, new researchers entered the field. In 2001 Roberts *et al.* published cores from Eski Acıgöl (Roberts *et al.*, 2001), in 2004 Vermoere presented several pollen cores from Southwestern Turkey (Gravgaz, Çanaklı, Ağlasun: Vermoere, 2004) and Kaniewski *et al.* published results from the Bereket basin (Kaniewski *et al.*, 2007). 2016 brought the publication of the pollen core from Iznik Gölü that focuses on the last glacial, but it includes data as late as Byzantine times (Miebach *et al.*, 2016).

The quality of gathered material differs considerably. Most of the older core chronologies were based on just one or two uncalibrated radiocarbon dates. The resulting dating errors exceed sometimes 100 years, making reliable historical analysis hard or even impossible. Some of the cores do not have radiocarbon chronology at all. Several cores must be excluded from the analysis for this reason: Beyşehir II, Gölhisar I, Avlan, Elmalı. The newer projects benefit from technological development, and offer deeper and wider insight into the context of pollen cores. These new developments allowed for the recalculation of the age-depth models from the old cores according to the C¹⁴ calibration curve and allow us to draw new pollen diagrams that are more suitable for the current study of the Roman Imperial period. The detailed presentation of the pollen cores, their exact location and used methodology can be seen in Appendix 3.

6.1.3 Data interpretation

It is not necessary to study all the data from a pollen core. The starting point for the interpretation is not a raw count of pollen grains, but its percentage values calculated in the relation to the pollen sum in a given sample. To discuss anthropogenic processes, we should follow changes in percentages of specific taxa and plant assemblages that are indicative of human-induced change. Notably, it is presumed that the pollen cores preserve the continuum of processes and the lack of a certain taxon

can be interpreted as meaningful, especially in regards to plants producing mass amounts of pollen (Faegri *et al.*, 1989, pp. 83–85).

Specific ways of categorising material may differ between the cited studies, but the ecological principles lying behind the chosen methods and indicators are the same for the whole area of Western Taurus, and thus a number of key taxa are followed fairly consistently. To further improve the consistency between the sites I have recalculated pollen diagrams from Beyşehir, Horan, Söğüt and Pınarbaşı following the principles described below. In order to focus on land vegetation, spores, arboreal and non-arboreal pollen were used to calculate the pollen sum, excluding water plants and unidentified grains. The choice of indicators is based on previous research in Southwestern Turkey, as they are the most relevant ones to the local conditions (the main seminal works: Bottema and Woldring, 1990; Vermoere, 2004; Bakker, Paulissen, *et al.*, 2012; Izdebski, 2013).

The categories I have chosen to trace the human impact in the Hellenistic and Roman periods are as follows.

Arboreal taxa

1. The **Needle-Leaved Forest** is a characteristic climax formation of the Western Taurus. The taxa include *Pinus* (pine), *Abies* (fir), *Picea* (spruce), *Cedrus* (cedar), *Juniperus* (juniper) with the pine pollen usually dominating the whole pollen spectrum. A decrease in coniferous plants pollen can be interpreted as human-induced forest clearance, and an increase as a decline in human impact. The primary coniferous forests are usually characterised by a mixture of species, while the secondary coniferous forest is largely dominated by pine. It is worth emphasising that the pine pollen can be transported over long distances, so its presence on the diagram need not indicate the local presence of pine forest and it is necessary to look at local relief to determine the possible source of pollen.
2. **Other Trees and Shrubs** include all the broad-leaved taxa (excluding the potentially cultivated ones). The most notable taxa here are deciduous *Quercus cerris* (Turkey oak) and evergreen

Quercus coccifera (kermes oak) which are usually successful succession trees which precede the return of coniferous forest. Thus, they may indicate the fairly recent retreat of cultivation. On the other hand, their stable presence in line with other deciduous trees and shrubs implies human management, e.g. tree cutting, forest pasturage, rotation in the cultivated land plots.

3. The last arboreal category is **Potentially Cultivated Trees and Shrubs**: the family *Rosaceae* (among others apple, pear, cherry, prune, almond), *Olea* (olive), *Fraxinus ornus* (manna ash), *Castanea sativa* (sweet chestnut), *Juglans regia* (walnut), *Vitis* (vine), *Corylus* (hazel), *Eleagnus angustifolia* (oleaster), *Punica granatum* (pomegranate), *Ficus carica* (figs), *Morus alba/nigra* (mulberry), genus *Pistacia* (pistachio, terebinth, mastic). In the Mediterranean they may occur in the wild as well as in orchards, so it is not easy to discern the level of human intervention in this case. On the other hand, except for the olive, they do not produce high amounts of pollen, so the sole presence of these taxa in a sample is meaningful. A considerable rise in the amount of their pollen is usually interpreted as reflecting a rise in arboriculture in the local area.

Non-arboreal taxa

4. Family *Poaceae* (*Gramineae*), family *Henopodiaceae* (*Amaranthaceae*), family *Cyperaceae*, genus *Artemisia* have been chosen as **Steppic Indicators**. They include a wide variety of grasses, rushes, sedges, herbs etc. They are characteristic of open field vegetation. The rise in their presence can be interpreted as the indicator of natural aridification or human activities: extensive pasturing and forest clearance.
5. The agricultural activities can be testified by **Primary Anthropogenic Indicators (PAI)**: *Poaceae* - *Cerealia* type (wheat, rye, barley), family *Brassica* (mustard family, they include many garden vegetables e.g. mustard, cabbage, rapeseed), *Apiaceae* (*Umbelliferae* – carrot family, they include many garden vegetables e.g. celery, anise parsley, coriander, fennel, cumin), *Linum* (flax), *Humulus/Cannabis sativa* (hemp). As with the cultivated trees, some of the species from these families appear in the wild, so they should not be interpreted alone. They disperse their

pollen only on a very small scale, so any occurrence is meaningful and a considerable rise in the amount of pollen can be interpreted as reflecting intensive agricultural practices in the immediate area, especially in the case of *Cerealia*.

6. The analysis of the **Secondary Anthropogenic Indicators (SAI)** helps in the interpretation of the Primary Anthropogenic Indicators. The Secondary Anthropogenic Indicators include ruderal (those colonising lands previously disturbed by human activities) and adventive (unintentionally transported and sustained by human activities) species as well as those of meadows and pastures. It has been demonstrated that they accompany the agricultural areas as weeds and margin plants: *Sanguisorba minor* (burnet), *Rumex acetosa* (common sorrel), *Plantago lanceolata* (ribwort plantain), *Vicia* (vetches), *Polygonum aviculare* (common knotgrass), *Urtica* (nettles).

6.2 THE ROLE OF THE ROMAN EMPIRE IN SHAPING LOCAL AND REGIONAL LANDSCAPES

The impact of human activities on the local landscape was not studied in detail in the early palynological works and conversely historical research did not take the results of palynology into account. Only later were the patterns connected with human presence investigated more profoundly (Sullivan, 1989, pp. 191–5; Eastwood, Roberts and Lamb, 1998; Vermoere, 2004; Kaniewski *et al.*, 2007). The main focus of palynologists has been laid either on the first emergence of human activity or on the most intense phase of anthropogenic changes known as the Beyşehir Occupation Phase (van Zeist, Woldring and Stapert, 1975; Bottema and Woldring, 1984; Sullivan, 1989; Eastwood *et al.*, 1999; Vermoere, 2004, p. 108ff; Mercuri, 2014). My aim is to focus even more specifically on the influence of the Roman Empire on the vegetation of south-western Turkey and its possible historical background. As we have seen in earlier chapters, the Romans came into already highly populated regions of Pisidia, Kabalia, Milyas, Pamphylia and Lykia and gradually incorporated them into the wider framework of the pan-Mediterranean imperium with various political and economic consequences for

their subjects (Ch. 3, Ch. 4). This conquest interestingly coincides with the period of more stable climatic conditions, which should help in the interpretation of the palynological data (Ch. 5).

The term Beyşehir Occupation Phase (BOP) requires a short explanation as it is one of the most important problems observed in south-western Asia Minor. Its presence can be observed in cores from Beyşehir, Ağlasun, Gravgaz, Çanaklı, Bereket, Pınarbaşı, Söğüt, Elmalı, Gölhisar and is characterised by an unambiguous and sophisticated human presence: forest clearance, crop cultivation, pasturing, arboriculture. It was usually preceded by the presence of mixed forest (pine, oak, juniper, cedar) and followed by the regrowth of secondary pine forest. The duration of the BOP differs greatly between various places. Its beginning is dated between second millennium BC to 1st cent BC while its end from 1st cent AD to 10th cent AD (Roberts, 2018). What is more, in the cores from Bataklı, Avlan, Köyceğiz, Ova and Hoyran Gölü the presence of BOP is uncertain. These two observations suggest the uneven spread of cultural practices leading to the BOP-type vegetation signature. It is worth looking into the inner dynamics of individual cores to identify patterns potentially connected with political and socio-economic changes (Eastwood, Roberts and Lamb, 1998; Vermoere, 2004, pp. 108–11, 156–64, tab. 3.6, 4.6, 4.7, figs. 3.16-18, 4.13-21; Kaniewski *et al.*, 2007, p. 2213ff). Indeed, meaningful changes, whose dating corresponds with the onset of the Roman period (the second half of the 1st century BC and the first half of the 1st century AD), can be observed in a number of locations.

6.2.1 Pattern 1: Intensification

The first pattern includes the rise in and climax of arboriculture and a sharp decline in needle-leaved tree-pollen – possibly the result of forest cutting, in the cores from Gravgaz, Çanaklı and to some extent Bereket (Vermoere, 2004, pp. 115–69; Kaniewski *et al.*, 2007, pp. 2213–5). The valleys of Gravgaz, Çanaklı and Bereket lie in the territory of the polis of Sagalassos – an ally of Rome. It seems that Rome left the large territory of Sagalassos untouched during its interventions. The polis could have profited from the proximity of the *Via Sebaste* and newly founded Roman colonies as well as access to wider networks of the Roman world. At the same time, the regional distribution of

Sagalassos Red Slip Ware and a building boom in the town of Sagalassos can testify to local economic developments and the domination of the polis in northern Pisidia (Vandeput and Waelkens, 1997; Poblome, 1999). All these changes go in line with the forest clearance and the climax of arboriculture (mainly olive, but also vine, walnut and manna ash) from the 1st century BC. The high percentages of olive pollen would suggest substantial investments in long-term cash crops, perhaps made by the Sagalassian elites in estates further from the main town. Cereals could have been cultivated on the valley bottoms and olives on the surrounding slopes. The produce could have been sold both in the immediate area thanks to increasing population, as well as outside the territory of the polis thanks to external connections developing in all directions (Ch. 3, Ch. 4).

Contrastingly, cores from the Ağlasun valley, the centre of the territory of Sagalassos, do not show the same features. Cores 9, 12 and 13 do not allow us to distinguish any additional subphase around the change of eras. Only core 6 shows the disappearance of some cultivated trees (olive, hazelnut) and taxa characteristic to wet grassland, but it is possible that the observed abrupt change in the core is the result of a hiatus. These cores do bear the BOP characteristics and show evidence for crop cultivation, but the cultivated tree percentages are not as pronounced as in other locations in the territory of Sagalassos. On the other hand, the persistent presence of oak pollen on the diagrams is interpreted as the preservation of oak woodlands for pig herding. Such a stability in pollen cores suggests also a relative stability in the structure of the local agricultural system and land owning (Vermoere, 2004, p. figs. 3.9-10, 3.18-19).

The difference in the duration and character of the BOP in the territory of Sagalassos can be partly explained by the character of Ağlasun cores (poorer in pollen material, some of them possibly disturbed), but the historical explanation is also possible. The Ağlasun valley has always been a centre of intensive human activities, as the onset of the BO Phase (c.1,000—905 BC) would suggest. Excavations on the hill above the valley revealed an urban site at Düzen Tepe that is dated to the Classical and Hellenistic periods (Vanhaverbeke *et al.*, 2010). The BO Phase in the Gravgaz and Çanaklı

valleys starts later (c.400-260 BC) than in the Ağlasun Valley. Possibly they were independent political entities before their incorporation into the polis of Sagalassos, and possibly changes in land ownership following the incorporation initiated changes in the agricultural practices. The archaeological record shows that in Hellenistic times the whole territory of Sagalassos was covered with constructions of military functions, possibly to guard her new acquisitions (Vanhaverbeke and Waelkens, 2003, pp. 217–239). The Bereket core shows BOP features from ca.280 BC. Notably, the excellent resolution of the core shows significant fluctuations. The BOP in the Hellenistic period is marked by the moderate and intermittent presence of olive pollen, while the Roman period is characterised by the highest percentages of primary and secondary indicators, including olive. The Bereket basin is located above 1,400m and can be described as marginal land susceptible to subtle climatic changes and overuse. The persistence and intensity of the BOP type vegetation shows how intense the human pressure on land was in the Roman period.

The continuous intensification and durability of arboriculture in Çanaklı, Gravgaz and Bereket can be explained by the confirmation of Sagalassian possessions in the face of its rivals under the aegis of Rome. The increased internal and external safety, and the possibility of settling the conflicts among neighbouring poleis with Roman arbitration coupled with the rising and stable demand on behalf of the Roman army and urban population were certainly factors that could encourage local elites towards long-term investments in cash-crops such as olive orchards or durable staples such as cereals.

6.2.2 Pattern 2: Temporary shift

A sudden fluctuation in the Hoyran core can be observed (Fig.6.13). The change features a sudden drop in pine pollen and a rise in cereals in c. 439-87 BC to c.161 BC-226 AD (time ranges denote the spread of radiocarbon dating error; for the recalibration procedures see: Appendix 3) and it can be interpreted in the context of wider political events in the region. The coring site is located just next to the road that goes around Pisidia from Pamphylia to Phrygia Paroreios. Apollonia and Antiochia in Pisidia, the most significant towns, were both refounded at some point by Hellenistic kings. They

surely needed large amounts of wood for construction and fuel for heating, furnaces and kilns. Another Hellenistic foundation in the vicinity can be found just south from Barla Dağ: Seleucia Sidera. Based on the name's meaning (σίδηρος – iron) it is tempting to think that its inhabitants were in charge of extracting and processing iron from the nearby mountains, which requires lots of charcoal for furnaces. The Taurus Mountains were a good source of timber and it is imaginable that high quality material was acquired from the locations around Eğirdir Gölü (e.g. from Barla or Anamas Dağ) once sources closer to the sea shores were depleted (Akkemik et al. 2012; Veal 2017, p. 330).

Still, the importance of the area of Eğirdir Gölü and Barla Dağ was confirmed after 25 BC by the location of Roman *coloni* in Apollonia, the refoundation of Antiochia in Pisidia as a Roman colony and the creation of a new one in Parlais. The colony of Parlais was located on the eastern slopes of the mountain near modern Barla, and controlled the hilly area between the mountain and the lake's eastern shore (Labarre, Özsait and Özsait, 2005). It has been proposed that its main purpose was to supervise the local villages and to spread Roman ways of life (Levick, 1967, pp. 53–5; De Giorgi, 2011). However, in the context of the above considerations something more could have lain behind the decision to locate it at this particular spot. Parlais was in a perfect position to control transport over the lake. The products transported could have been timber and possibly iron, and they could have been heading either towards newly founded Antiochia and inner Anatolia, and the marine coast to the south. The Hoyran core shows that the needle-leaved forests came back to the regional landscape after the integration of Pisidia into the Roman Empire. Perhaps the reasons were the depletion of iron ore or high-quality timber, the decrease in demand or the competition from Sagalassos, that lies to the south on the other side of the Ağlasun Dağ. In this light, the decline of the colony itself, described by Levick, can be understood in terms of changing economic patterns rather than cultural stagnation.

But this is not the end of possible Roman influence. The Roman colonists could indeed spread their lifestyle in the area, as the presence of the oak pollen is more pronounced and stable in the later part of zone III a (c.0-900 AD). The long-term preservation of oak woodlands around the lake Hoyran may

be indicative of pig rearing for meat production. Simultaneously, the arboriculture and crop cultivation are most evident for this period. The pollen of cultivated trees and grains do not travel far, so the agricultural activities must have been located in the immediate area of the core. The agricultural produce could have been easily collected from there and transported by the Via Sebaste to satisfy the needs of Antiochia in Pisidia and Roman tax collectors. The steppic indicators are consistently high, suggesting an important pasturing component in the local agricultural system.

6.2.3 Pattern 3: Abandonment

A quite different picture emerges from the Söğüt core (Fig.6.14). The traces of agricultural activities here are visible as early as c. 960 BC and the BOP can be recognised on the pollen diagram as late as c.1,200 AD. The climax of the BOP phase lies in zone Ic between c. 675 BC and c. 100 BC, which may reflect the establishment of the settlement of Tyriaion and its later incorporation into the polis of Balboursa. However, the following phase (c.100 BC- 1,200 AD) brings some profound changes. The closing of the landscape is rather evident on the diagram (a radical rise in needle-leaved tree pollen, decrease in the steppic indicators). Some of the cultivated trees and shrubs disappear from the record (olive, manna ash, chestnut, vine) and the anthropogenic indicators decrease.

It seems that the Hellenistic period that brought the hegemony of the newly established polis of Balboursa into Söğüt basin brought also an intensification of land use. Perhaps the elites of the polis (whether they were of local origin, i.e. Tyriaion, or from among the Pisidian colonists) were highly interested in the development of their estates, and not necessarily for the town of Balboursa. Paradoxically, it is closer from the valley of Söğüt to the bigger towns of Kibyra or Isinda than it is to the town of Balboursa. The route from Kibyra to Isinda could have led through the territory of Tyriaion (this was probably the route taken by Cn. Manlius Vulso in 189 BC). During the Hellenistic period Balboursa formed a tetrapolis with other settlements in Kabalia, among which was its metropolis, Kibyra. These two facts lead to the idea that the produce of the Söğüt valley might have been transported in considerable quantities also outside the polis of Balboursa. The Roman intervention that

led to the split of the tetrapolis around 82/1 BC and the later incorporation of Kabalia into the province of Lycia could have resulted in the reorientation of local interests or stagnation of this local trade (Chapter 3.2.3.1.).

Another explanation may be connected with the environmental changes in the basin. The excessive irrigation works could have resulted in the salinization of the valley floor thus making it unsuitable for agriculture. The failure to secure the productive land could have pushed the local elites to move their interests into more prominent places such as Attaleia, as it is suggested by Coulton in his analysis of the epigraphical material from Balbura. Furthermore, the modest and unfinished investments in the town are more a proof of the ambition of rather exceptional individuals and not of a stable, energetic higher class (Coulton *et al.*, 2012, pp. 125–142). Consequently, the lack of social incentives for intensive use of land could have led to the permanent abandonment and reforestation of the vast stretches of nearby land.

6.2.4 Pattern 4: Continuity

In some corners of southwest Asia Minor the incorporation into the Roman Empire did not bring much change. The evidence from Gölhisar Gölü, which lies within the territory of Kibyra, testifies to continuous stability and prosperity in the local area (the most notable change in zone GH-4 was the introduction of sweet chestnut c. 500 BC). The local agricultural habits in the valley seem to remain undisturbed until c.500 AD despite Pisidian colonisation and Roman conquest during this time. That would suggest continuity also in landowning patterns secured by a skilfully negotiated position in the face of Roman conquest.

The data from Pınarbaşı, a small basin close to lake Burdur, do show some features of the BOP in the Hellenistic and early Roman period, but the incorporation into the Roman Empire seems to change little in this place (Fig.6.15). The definite end of the BOP probably took place gradually somewhere between c. 286 BC-106 AD and c.386-656 AD, but the low resolution of the record makes reliable

historical conclusions impossible to anchor. The most notable features are the consistent high level of steppic indicators, suggesting extensive pasturing resulting in the persistence of the open landscape despite climatic fluctuations.

On the other side of the Isparta Angle, on the edge of Lycaonia, the core from Beyşehir again suggests continuity for the Roman period (Fig.6.12). The climax of the BOP falls here for the first millennium BC and the Roman period sees mostly stagnation in the arboriculture and crop cultivation in the vicinity of the coring site. A vital post-Luwian agriculture probably gave way to pasturing (high steppic indicators) at the end of the Persian period (c. 400 BC). However, it is worth noting that the fluctuations in the ratio between the arboreal and steppic pollen may be more indicative of the fluctuations in the water level of the Beyşehir Lake than of anthropogenic pressure.

6.3 DISCUSSION

6.3.1 The question of the climate

The climatic background of the described changes deserves a short comment. The palynological record does show an increase in human impact in the Roman period in some places (Gravgaz, Çanaklı, Bereket, Hoyran), but it points also towards a continuation of trends (Ağlasun, Gölhisar, Pınarbaşı, Beyşehir) or even stagnation (Söğüt) in others. It indicates that the start and persistence of the BO Phase c. 1,450 BC was linked with the more humid period, but the later evidence based on the lake cores and vegetation analysis was contradictory (Vermoere, 2004, p. 111). The independent climatic record from the Kocain Cave shows that the first millennium BC was possibly cooler and drier than the preceding and following periods (Ch. 5), and still many communities in southwestern Asia Minor thrived. It is the emergence of the Roman Empire that changed the political landscape of the Mediterranean basin completely. Its long-term influence on the landscape varied considerably from place to place, but it often has more explanatory power than the influence of the 'Roman Climate Optimum'.

6.3.2 Presence of the olive in the highland plains

Anthropogenic influence can be studied not only through the whole assemblages of vegetation, but also through the mirror of a single taxon. For example, an interesting discussion has emerged around the presence of the olive – the most famous Mediterranean crop and defining feature of the agonistic culture and euergetic habit of the Hellenistic and Roman urban centres of the polis type.

The cultivation of olives in the highland plains of Southwestern Turkey has been long doubted as was the polyadic character of its settlements (Sullivan, 1989; Bottema and Woldring, 1990; Bottema, Woldring and Aytuğ, 1993). The upper limit of modern olive cultivation has been assumed only up to the altitude of 1,000m (Neef, 1990; Rackham and Moody, 1994), whereas the pollen diagrams from Söğüt, Bereket, Pınarbaşı, Gölhisar and Gölçük lakes (the first two at the elevation of over 1,400m, the rest slightly above 1,000m) in fact show the presence of the olive pollen. The argument can be partly resolved by the fact that in the territory of Sagalassos modern olive stands were found up to the altitude of 1,186m (Vermoere, 2004, pp. 239–76). The stone weights found during the Balboursa and Sagalassos surveys up to the height of 1460m (Waelkens and Poblome, 1997; Waelkens *et al.*, 1999; Coulton *et al.*, 2012) can be thus interpreted as parts of not only vine, but also olive presses. Even if the climatic conditions (Ch. 5) were less favourable in the times corresponding with the Hellenistic and earlier periods it is still plausible that the olive could have been cultivated at elevations around 1,000m. However, the strongest evidence comes from the Bereket cores, where various degrees of olive presence cannot be explained solely on the base of regional pollen transport. The usual extra-local olive pollen level does not exceed 1% of the pollen sum, whereas in the Bereket cores the observable maximum reaches 7,4%. The modern pollen spectra in places of non-extensive olive cultivation note similar percentages, e.g. 5% in Bakırlı (Kaniewski *et al.*, 2007, pp. 2214–5). The high-resolution record from Bereket suggests that the presence of the olive pollen is not a coincidence. The pollen diagram shows periods where olive is absent from the record, although it was certainly cultivated in the nearby valleys (Kaniewski *et al.*, 2007, pp. 2214–7). If the olive pollen was brought to

the valley by wind, it would have left a continuous record. Thus, the evidence from Bereket is another example of how cultural preferences affected the choices of local farmers, resulting in the expansion of olive cultivation even in marginal lands.

Usually in the discussions on the role of climate in shaping the upper limit of the olive only average climatic properties were considered. Meanwhile, there are several other factors that may affect the presence of this tree in the highland plains. For example, the complicated relief of Western Taurus allows the formation of microclimatic zones. The very important feature here is the intensity and direction of winds. The olive is susceptible to cold winds, so locations exposed to northern or eastern winter winds should be avoided. On the other hand, the farmers could have taken advantage of the presence of warm foenial winds while choosing the place for planting. Younger, more vulnerable trees could have been planted in pots and stored under rooves during winters before transferring them into soil.

Another set of factors are cultural preferences. As Vermoere observes, modern Turkish farmers in the highlands are usually not interested in this kind of investment and they do not give much attention to tending olive groves. This is even more applicable to the nineteenth and early twentieth century nomads who were described by European travellers. By contrast, the olive was one of the main crops for ancient Mediterranean cultures, and thus we may expect greater care to have been introduced for tending olive trees. The strategies that protect trees and shrubs from the adverse frosty conditions include mulching, covering or wrapping (fleece is an especially good material for this) for winter, carefully locating them in places safe from cold winds and waterlogging, planting more fragile trees in the middle of an orchard, or even putting bonfires around groves in the event of a particularly harsh frost. Olive trees are capable of regrowing from the same trunk even after the frost has damaged them. As the writing of Pliny the Elder (Plin. *Nat.* books XII-XVII on arboriculture) shows, arboriculture in the Roman Empire and earlier was quite sophisticated.

The small-scale ancient farmers were not as interested in market profits as modern farmers are. For them the main goal was to diversify their produce in order to maximize the survival chances after paying taxes. They did not expect trees to maximize their yields, but to give any yield acceptable in the relation to the time spent on work in the reality of pre-mechanised farming. Diversification also allows one to evenly spread the labour requirements throughout the year, as different kinds of crops require different work inputs in different seasons. For instance, it is true that olives bear a greater amount of fruit if pruning and raking is performed, but these are not necessary and the amount of work spent on tending olives can be flexible depending on the conditions of a given year. Such an approach increases the chances that plants were cultivated in the areas outside their optimal boundaries and explains the low, but persistent, presence of olive pollen in the discussed cores.

The peasant economy model proposed by Bang is capable of explaining how the aggregated actions of small-scale farmers resulted in a large intensification of olive cultivation (Bang, 2007). At the same time the high percentages of olive pollen in the cores from Gravgaz and Çanaklı are indicative of large-scale orchards that may be interpreted as elite investments in cash-crops. Both elite land owners and common small-scale farmers could have benefited from the high demand for olive oil in the local, regional and imperial market.

6.3.3 The question of transhumant pastoralism

The role of animal husbandry within the socio-ecosystem of south-western Asia Minor is an equally interesting topic. Because of the poor reputation of pastoralists, especially those practicing a nomadic lifestyle, the topic of animal herding was treated with contempt in historical narratives as a rule (Ch. 2). However, a major inspiration for contemporary historians of the region was the book by geographer Xavier de Planhol on the historical geography of south-central Anatolia, in which he described large scale migrations between the Plain of Pamphylia and inner Anatolia performed yearly by sheep and goat herders (Planhol, 1958). Several authors have followed him in equating the Ottoman realities with the Roman ones (Bru, 2017, p. 16; Willet, 2019, pp. 505–6). However, such an

equation requires closer scrutiny. The southern coast of Anatolia was much less populated and much less urbanised than the Aegean coast in the Ottoman period from the 16th century onwards. The agricultural use of land was not intense, as the irrigation canals were basically non-existent and several locations resembled malarial swamps rather than promising land for grain cultivation or gardens (Faroghi, 1990, pp. 147–9). By contrast, the Roman period situation resembles rather the one which began to emerge in the mid-20th century AD, with Pamphylian poleis having been equal partners to their peers on the Aegean coast (Planhol, 1958, p. 395ff). The rising population level, strict boundaries between poleis, and intensive agricultural use of land testified in the literary sources would have largely restricted large scale transhumance in Pamphylia during the Roman period.

Similarly, it is misleading to use the Turkish agricultural censuses for the assessment of the agricultural potential of Roman Anatolia (Willet, 2019, pp. 500–2). Modern farmers are tied to completely different market networks; they have different incentives and expectations, as well as different farming methods and cultivars at their disposal. The productivity of land is largely a derivative of cultural preferences (Thonemann, 2011, pp. 295–338) and it requires more discussion to compare different socio-economic systems.

The palynological evidence gives some important clues as to how to construct an alternative narrative concerning Pisidian and Pamphylian pastoralism. Indeed, on the outer side of the Taurus Mountains, we have a clear steppic signal that may point towards large-scale pasturing activities (cores from Beyşehir, Pınarbaşı). However, despite the fact that we have no pollen cores from the Pamphylian Plain, the evidence from other sites in Pisidia points rather towards sophisticated and intensifying agricultural patterns, e.g.: rises in cereals, olive and other trees (cores from Ağlasun, Gravgaz, Çanaklı, Bereket, Hoyran, Gölhisar). At the same time archaeology and numismatics provide evidence for the rising urbanisation of the region. This is not to say that steppic indicators are absent. Quite the contrary, the combination of pastoralism with the cultivation of cereals, vine, olive and others is a defining characteristic of the BOP. Animal herding was an integral part of life (De Cupere, 2001) and

source of pride, as the Pisidian tombstones testify. Animal rearing in the most densely inhabited parts of Pisidia and Pamphylia could be envisaged more as a type of local pasturing attested on the Methana Peninsula (H. A. Forbes, 2007), that is to say, using the fallow land as meadows and pastures in a crop-rotation cycle, or using the mountain tops unsuitable for agriculture. The intermittent pastures and field plots were seen in Terziler Köyü that is the territory of ancient Timbriada (cf. Photo 100).

6.4 CONCLUSIONS

The pollen record provides a unique opportunity for a historian. It provides long-term evidence on the past landscapes independent from other sources. At the same time, palynology is free from the cultural biases inherent in our literary sources.

The pollen cores from and around Pisidia allow us to reconstruct a complex heterogenic system in the Early Roman period. The identified patterns testify to intensification and continuity, but also to stagnation and overuse of land. The territories belonging to the long-term allies of Rome – Kibyra and Sagalassos – could have enjoyed stability. Their centres preserved land use patterns from earlier periods, focused on the balanced cultivation of cereals, trees and pasturing, while the newly-acquired territories of Sagalassos could have been largely devoted to cash-crop investments in olives. On the outer rim of the Isparta Angle, husbandry seems to be a dominant form of land use. Animal husbandry, namely sheep rearing, constituted the resource base for the famous textile production of Asia Minor.

The onset of the Roman period often seems to be the turning point introducing change. The peace offered by the empire opened unprecedented opportunities for local communities. The rising intensification, specialisation and complementarity of land use once again testify to the increasing inter-connectivity of the Roman world. It is Roman roads that facilitate transport, Roman favouritism towards polis-type organisation, and the Roman army that drives up demand for agricultural (cereals, olive oil, wine) and industrial (textiles from wool) products.

7 THE SOCIO-ECOSYSTEM OF PISIDIA AND PAMPHYLIA

7.1 THE SCALES OF COMPLEXITY

In his essay “The Scholarly Mainstream and Reality” Immanuel Wallerstein describes the most popular intellectual concepts of the twentieth century (Wallerstein, 2004). There, he reveals his inspiration from Braudel’s *longue durée* and Prebisch’s take on the idea of the core-periphery model, that were the basis of his own world-system theory (Braudel, 1949; Wallerstein, 1974). Those three concepts, mentioned already in the Introduction (*longue durée*, the core-periphery model and the world-system model), are still influential among scholars studying antiquity (e.g.: Bintliff, 2014). However, Wallerstein in the same essay has identified new emerging paradigms, one of which is the science of complexity that obliterates the differences between supposedly competing and antithetical scholarly fields: the sciences and humanities. Indeed, newly developed methods and models originating from the science of complexity allow us to extract new information from old evidence and shed fresh light on old questions, broadening our understanding of the past. Almost two decades later, the complexity turn is a fact in the scholarly world, even though it still requires experimenting and refinement of both theory and practice (for the opportunities and challenges of the consilience approach see: Schoon and van der Leeuw 2015; Izdebski *et al.* 2016; Sessa 2019).

The last four chapters were devoted to the discussion and analysis of different types of evidence from the Pisidia-Pamphylia region in Asia Minor: numismatic, climatic, palynological. Now it is time to combine these separate lines of inquiry and propose interpretations as to how various elements of the socio-ecosystem interacted with each other. The concept of Panarchy with its interlocking Adaptive Cycles (see Chapter 1.2.2) offers a robust mental tool to combine different lines of data, investigate and understand their mutual relations and propose a narrative explaining observed patterns and trajectories (Holling, 2001; Gunderson and Holling, 2002; Folke, 2006; Butzer, 2012).

Scholars studying past systems have already experimented with the application of this model. Samantha Allcock uses the Adaptive Cycles framework to explain the settlement patterns in the last ten thousand years in Cappadocia as revealed by archaeological site survey supplemented with palaeoecological material (Allcock, 2017). She defined four adaptive cycles on millennial scales: the Neolithic, Bronze Age, Iron Age-Classical, and Medieval-Modern periods, separated by periods of rupture, and concluded that environmental factors played an important but not decisive role in the collapse of a given system. Andreas Zimmermann, in his work on the Central European archaeological cultures, explores the scalability of the adaptive cycles on the centennial scale: "Concepts of kinship, heritage and residence rules are elements of a value system for large regions connected by self-organized mating and kinship networks. In contrast, basic concerns of household or settlement alter with increased social density. In situations like this decision processes of local groups gain more importance. Decisions within a single cooperating group may be fast, especially if directly influenced by opinion leaders in hierarchical decision structures. The emergence of contradictions between slowly changing value systems at a large scale and fast decisions at the local scale is one possible reason more for cultural disintegration" (Zimmermann, 2012, p. 257). He also argues that the collapse of a cycle or even a whole system can be viewed in positive terms as a process of creative destruction.

The collected material allows for sketching such Adaptive Cycles for the evolution of the Roman imperial system. The period between late 1st century BC and 3rd century AD defines the time of our interest. For most of it the Roman Empire was capable of securing external and internal peace and of offering an integrative ideology adaptable enough to attract the key social strata, thus providing a long-term dynamic equilibrium (cf.: Ch. 2.2). Local elites (but not only elites), while seeking to (re)create their coercive power (Bang, 2007), were given strong incentives for seeking economic profits and social prestige. Only such a large-scale collaboration of locals could provide the buffering capacities to the empire in the face of major disturbances such as epidemics, crop failure, civil wars,

uprisings, or monetary crisis (Goldstone and Haldon, 2009, pp. 11–5; cf. McAnany and Gallareta Negron, 2010, pp. 223–32).

However, the imperial scale of the Roman state required an equally imperial-scale diversity of solutions matching local conditions. It is noteworthy that this was not a top-down project designed by a single architect, but rather a stream of unpredictable, changeable, chaotic, ad-hoc decisions in the hands of multiple negotiating actors (Goldstone and Haldon, 2009, pp. 25–6). They can be understood as fast developing adaptive cycles on a small scale spontaneously self-organising into higher level, slower adaptive cycles. "The formation of a state, and the civilizational system it may represent, is never a single event but rather a longer-term evolutionary process in which social habits and institutions and state organizations respond to changing conditions" (Goldstone and Haldon, 2009, p. 7) and it affects different segments of society differently (Cote and Nightingale, 2012).

The cumulative effect of these self-organised pursuits must have left a visible impact on the environment down to the local level. The shifts in the agricultural practices, deforestation and afforestation are indicative of cultural and social transformations as much as they reflect climatic changes. The relation between human communities and their immediate surroundings originated from the combination of several factors including technological means, social structure, ownership patterns and wider economic drivers (see: Ch. 6.3).

The level of integration within the Roman Empire, the co-evolution of the regional and imperial systems, the resilience of regional systems and their relation to the overall resilience of the empire can be discussed through the Panarchy theory. It is also another way of presenting how a regional inquiry can inform us both about the universal traits of the Roman Empire as well as the local peculiarities of its constituting parts. Long ago Barbara Levick, faced with the achievements of Brandt's book on Pisidia and Pamphylia, asked: "What is the wider use of regional enquiry? Was there an economy of the Empire?" (Levick, 1995). Almost twenty years later this direction was fruitfully

pursued: Alan Bowman and Andrew Wilson in their Introduction to “The Roman Agricultural Economy” discuss problems ingrained in the study of the Roman Empire in the context of the relation between ‘the whole’ and ‘the part’. Despite limitations, they find it more than valid to study the Roman Empire through the lens of its regions. In this way they wish to avoid the overflow of details brought in by the micro-ecological approach on the one hand, and the broad strokes obscuring local differences characteristic of the world-system model on the other (Bowman and Wilson, 2013, pp. 8–9). Likewise, Luuk de Ligt and John Bintliff argue for the usefulness of regional study in the context of urban systems of the Roman Empire as a way to understand the variety of impacts that the conquest had on local populations (de Ligt and Bintliff, 2019). Furthermore, the regional level of investigation operates on a more secure level of palaeoenvironmental generalisations than is possible for Mediterranean-wide studies. The area of Pisidia and Pamphylia lies within a variable, but still clearly distinct ecological zone of the Western Taurus Mountains that displays a set of distinctive geomorphological and hydrological features associated with karstic landscapes and altitudinal zonation characteristic for mountainous regions (Ch. 2.1; Ch. 6; Hütteroth, 1982, pp. 54–61, 84–6). At the same time the area remains under the influence of a specific set of climatic forcings (Ch. 5; Ulbrich *et al.*, 2012).

7.2 THE SCALES OF RESILIENCE: THE ADAPTIVE CYCLES

The Roman Empire is the background against which the regional situation should be interpreted. No region operated in isolation and events taking place in geographically distant areas could have had their repercussions in small villages in the Taurus Mountains. Peter Bang (Bang, 2007) offers a theoretical framework to conceptualise the Roman economy that goes beyond the old debate between primitivists (e.g. Finley 1973) and modernists (e.g. Rostovtzeff 1926). With the use of a handful of labels (peasant economy, tributary empire, portfolio economy, protection costs) he delivers tools that bring us closer to understanding the Roman economy. The series of conference proceedings

and monographs within the Oxford Roman Economy series populate this framework with quantitative and qualitative data giving it its flesh. They tend to agree on the unprecedented economic development in the period between 2nd century BC – 2nd century AD, with a crisis period in the 3rd century AD and partial recovery in 4th century, followed by a gradual and uneven dissolution of the Roman empire, quicker in the West, slower in the East. Their bottom-up approach identified peaks in building activities, production of olive oil, wine, garum, textiles, metal extraction, and stone extraction, all around the 2nd century AD. The literature testifying to the economic peak between the Flavian and Severan dynasties is copious and growing also outside the Oxonian project (e.g.: pottery: Peacock and Williams, 1986, p. 57; pottery in Sagalassos: Poblome, 2016, p. 369). These developments describe the most general level of the Panarchy – the imperial one. In itself, it consists of lower level cycles encompassing various regions, social groups or spheres of human activity entwined with each other.

The socio-ecosystem of Pisidia and Pamphylia set against the imperial-level developments in the period 1st century BC – 3rd century AD shows features that can be seen as a set of such Adaptive Cycles operating in different spatio-temporal scales, and often with diverging trajectories. The Roman Empire under the Late Republic was characterised by the politics of aggression and exploitation of conquered lands. In the Hellenistic period, hilltop settlements prevail in several regions: Spain, Sicily, Pisidia (Vanhaverbeke and Waelkens, 2003; de Ligt, 2019; Rodríguez Gutiérrez, 2019). Those settlements often constituted the focal points of independent city states that competed with each other. Inter- and intra-city conflicts were ubiquitous and the disputes over frontiers often resulted in a military clash (Arena, 2005, pp. 70–2). This is the time when the cities and elites of Asia Minor started looking for patronage among important Romans (Eilers, 2002). Destruction and resettlement, as well as the colonisation and refoundation of cities, were tools of setting up and maintaining state power (De Giorgi, 2011). Every city minted their own coinage, although increasingly compatible with the Roman system (Chapter 3.2.2). The agricultural regime was based on a combination of arboriculture (olive, vine), agriculture (grain), and pasturing (the Beyşehir Occupation Phase), although the high-resolution

pollen cores show alternating phases of more intense human impact and abandonment in the course of 3rd-1st century BC (Appendix 3: Bereket). As the climate in the Eastern Mediterranean had already been stabilising, these phases could be rather ascribed to anthropogenic factors (Ch. 5). The social and political spheres in the 1st century BC were thus largely disturbed on the regional level (phase Ω) and this goes in line with the notion of a transitional phase across the whole Roman Empire.

The reign of Augustus is the moment of realignments and investments – phase α (Chapter 3.2.3.1). He sees to the conclusion of civil wars, steers the wave of confiscations and donations, foundations and refoundations of old cities and new colonies, and engaged in large-scale construction of roads. His policies set up a framework for years to come in several spheres. His successors further experimented with the monarchical rule, but the basic ideological foundations survived until the 3rd/4th centuries AD, constituting the system of government that is now known as the Principate.

After this point the security of the inner parts of the empire rises. The hilltop settlements disappear or diminish and new settlements emerge in open lands and on the valley bottoms (Vanhaverbeke and Waelkens, 2003). Peace makes space for cooperation between communities, and rivalry finds its outlets in symbolic forms such as the race for titles and privileges or agones. Local elites largely cooperate with the conquerors, with the imperial cult as an ideological glue. The Roman colonists keep their Latin identity, but not for long (Levick, 1967). Roman coinage becomes the official means of payment, but the cities of Asia Minor maintained the privilege and habit of issuing local bronze coinage (Ch. 3.2). The connectivity of the Roman Empire in the social and political spheres rises (phase r), and as a result a higher-level adaptive cycle emerges making multiple regions more inter-dependent than before. Consequently, the slowly changing land-use patterns entwined in the imperial-wide networks change too, leaving a distinctive impact on the environment. The intensification of agricultural production can be detected in the form of mass cultivation of olives, and opening the landscape for the cereals, garden crops and use of sheep pasturing (Ch. 6.2.1-2).

Within the second century the local elites are to a large extent merged with the Roman settlers. There are equestrian and senatorial families originating from Pisidia and Pamphylia (Arena, 2005, pp. 321–35). The Greek language prevails in a number of Roman colonies in Pisidia and Roman citizenship eventually becomes universal among free inhabitants of the region, but at the same time local epichoric languages find their voice (Brixhe, 2016) and local motifs appear on coin legends (Ch. 3.2.3.3–4). Cities in the region are self-organised into a tight network, being a part of a wider system of Asia Minor and having connections with the outer world exemplified by the imperial centres of Rome, Alexandria or Antiochia on the Orontes (Ch. 4). The intensification is visible in the pollen record and the system is resilient enough to survive such disturbances as the Antonine plague (Harper, 2017, pp. 115–6). On the other hand, the increasing role of the army stays at odds with the ideological ideal promoted by the senatorial elites.

The mid-third century brings in rapid changes. The political structures are ruptured, the unity of imperial elites is cracked along many lines, safety is seriously lowered due to both external and internal threats. Several settlements hide behind hastily built walls (Vanhaverbeke and Waelkens, 2003). The local urban elites lose their role in the imperial system as intermediaries between common people and the imperial order. The cities gradually cease to mint the provincial bronze coinage (Ch. 3.2.3.5). The monetary system collapsed; the new one that emerged in 4th century AD was based on gold, and the production was concentrated in just a few mints, controlled centrally. Around the 3rd century AD, the cultivation of olives starts declining in several places; however, the general agricultural productivity is maintained (Ch. 6). The second half of the third century is a period of major disturbance, fragmentation of the state structures (phase Ω), but eventually of realignment (phase α). The broad reconfiguration of social, political and economic spheres opened the way to the emergence of the new ideological system manifesting itself in the religious sphere as the rise of Christianity and in the sphere of state structures as the Dominate.

In the above description we could see the adaptive cycles operating on different spatio-temporal scales. The first century BC and the second half of the third century AD were times of realignments, mainly in the political, social and economic spheres. The major patterns of export of surpluses were changing according to the political situation. However, the overarching agricultural regime of the Beyşehir Occupation Phase based on the cultivation of cereals combined with arboriculture and pasturing remained in force, despite modifications (e.g. the importance of olive, or changes in the ratio between animal species). After the first transitional period the intensification of human impact was the most prominent (cash crops); after the second period, the gradual decrease in olive production can be explained as the consequence of changes in cultural preferences coupled with economic stagnation. Likewise, the ideal of the self-governing city as the main administrative unit was older than the Roman Empire, but the difficulties of the third century AD started the process of its demise. On the other hand, the integration of the local and imperial elites which had begun with the Roman conquest developed further, resulting eventually in the emergence of the pan-imperial elite stratum of the Byzantine era. At the same time, the status of the commoners was homogenising, and the Roman identity became the prevailing one.

7.3 DIFFERENT ACTORS, DIFFERENT PERSPECTIVES

7.3.1 State perspective

The state institutions, both the formal ones such as administration, courts, army, imperial cult, and the informal ones such as imperial ideology, family ties, chains of personal loyalty, are the basic tools in maintaining the resilience of the imperial system. It is a common feature of pre-modern empires to elicit surplus wealth and maintain control over the crucial resources through these institutions to support its functioning (Goldstone and Haldon, 2009, p. 8). However, no empire or state in pre-modern history achieved a monopolistic position in the economy (Shaw, 2001, p. 434). The Roman Empire took a particular interest in grain, but despite its key importance, it was never a full state

monopoly and Roman administrators often relied on private entrepreneurs in its collection and transport (Hirschfeld, 1905; Casson, 1980). Supplying the city of Rome with grain, pork and olive oil was based on the subtle interplay between the state and markets (Lo Cascio, 2006). Still, the needs of the state, thanks to its scale, had a huge role in creating demand and directions of flow that went far beyond market mechanisms (Bang, 2007, p. 26), as has been demonstrated in the case of the stone trade by Ben Russell (Russell, 2013).

Based on the collected evidence, it can be suggested that this is equally true for Pisidia and Pamphylia. The production of grain, olive oil, sheep wool, timber, and luxury goods such as high-quality textiles and industrial products such as ships or armament were surely of particular interest for the Roman state. Imperial estates were located in several places in and around the region and could have provided the Emperor with both staple and luxury goods that could have been used in Rome or redistributed among armies. And indeed, strong links between the inland producers and coastal entrepôts are identifiable thanks to Social Network Analysis. The imperial interests were secured (among others) through the foundation of Roman colonies and the maintenance of transport infrastructure. Additionally, the problem of transport in the mountainous areas could have been mitigated with the possibility of paying tax in the form of transport services (Mitchell, 1976b).

7.3.2 Elite perspective

The Roman legal and tax system protected land owners and promoted the long-term intensification in agricultural production, e.g. in the form of investments in oil presses, olive orchards and vineyards. It especially favoured the large proprietors (Kehoe, 2015) who formed the land-based aristocracy from which the state officials were recruited. Such an alignment of the elite stratum with the state administrators secured the privileged position of that class at the expense of the intermediary mercantile class (Bang, 2007, p. 27).

The evidence from Pisidia and Pamphylia suggests that they could have invested in olive and wine production together with sheep rearing as the base for textile production. Strabo says that the hills around Selge were covered with olive groves. Also, the palynological evidence testifies to the constant presence of vine pollen and a significant increase in the olive pollen percentage in several places in the Roman Period. The percentage of olive pollen, at the level of 15% of the pollen sum, is a huge number that can only be explained by large-scale cash crop cultivation. The unexpectedly high proportion of olives in the landscape would rather be the effect of landownership patterns centralised on the main urban centre allowing for intentional investment in olive oil production for the purpose of trade (Chapter 6.2.1, 6.3.2).

Apart from the local Pisidian aristocrats, there is ample evidence for elite families from Pamphylian cities having land possessions in Pisidia or inner Anatolia (Mitchell, 1993b, pp. 142–164; Arena, 2005, pp. 297–300; Willet, 2019, pp. 505–6). It would have been in the economic interest of these elites to collect and transport the produce of their estates and sell it, for which they had a wide scope of options: to the managers of imperial estates, or the state administrators collecting supplies for the armies or the city of Rome, or to the civic institutions supplying local gymnasia or to sell them further away with the use of ships. The recorded ties of Pamphylian cities with places as far as Egyptian Alexandria, Syria, Thrace and Rome may point towards the directions of this trade. Elites could have organised their own transport, or they could just take the advantage of the infrastructure built for the needs of the Roman state (including the important costs of providing safety).

However, the Roman elites were not so much interested in increasing their income in a capitalist way as they were in recreating their privileged social and political position within their immediate communities – thus, their participation in euergetism. In fact, the incentive to satisfy social expectations could have been a stronger drive to pursue agricultural intensification than purely economic considerations (Bang, 2007).

7.3.3 Urban perspective

In the case of the Roman Empire a useful unit for discussions is that of a self-governing city (cf. Flohr and Wilson, 2017a), or most often in the case of Asia Minor – polis (cf. Hanson, 2011; Willet, 2019), understood as the administrative and functional unity of *asty* (a town) and *chora* (hinterland), similar to (but not identical with) the units used in Chapter 4 or to the concept of a microecology (Horden and Purcell, 2000). The urban communities are surely deeply affected by both state institutions and elite behaviour, but their perspective is different. Their internal connections certainly deserve analysis on their own as poleis themselves are complex adaptive systems (Scheding, 2019, pp. 350–3). The production, extraction, processing, and manufacturing would take place in the wider landscape, and the town would provide the nodal point and institutional framework for concentration, negotiation and exchange of information and resources (Arena, 2005, p. 311; Morley, 2011; Flohr, 2016, p. 37). Interestingly, the resources under the control of civic institutions could have been quite substantial in comparison to the sums offered by aristocrats (Zuiderhoek, 2005), which may explain their relative independence and far-reaching ambitions. The network approach offers ways to conceptualise these dynamic relations between micro (polis) and macro (imperial) perspectives, by providing intermediate units. The concept of emergence gives us an idea on how small components form higher-level self-organised yet unplanned entities.

Obviously, the concept of the self-governing city by no means exhausts the variety of social organisations attested around Asia Minor. However, the Romans themselves promoted cities as a tool for managing the empire, and towns were the stage enabling interaction between different human actors. The importance of the peer-polity interactions has been long recognised (Ma, 2003). From the practical point of view, the material available for the study of cities (in the social and administrative sense) or towns (in the sense of the materiality of larger settlements) is relatively copious and readily available. Going into detail on a smaller scale would be extremely difficult, and often impossible, with

the kind of evidence we have now. For these reasons it is viable to discuss the nature of Roman cities and urban systems in order to enrich our understanding of the Roman Imperial period in general.

Asia Minor or its parts are rarely taken into consideration on a regional level, even if it is becoming evident that it was one of the most populous and economically developed areas of the Roman Empire (Hanson, 2011; Elton and Reger, 2007). Although serious interest in the antiquities of Asia Minor goes back to the nineteenth century and beyond, the area is still much understudied in comparison to the north-western provinces of the Roman Empire. In the words of John Hanson: "Lacking a more recent archaeological study of the region, our understanding is based on travellers' accounts from the early nineteenth century to as late as the 1980s, a handful of 'biographies' of individual cities, a few surveys of small areas, and a number of largely out-of-date historical accounts, loosely integrating archaeological material. Our picture of the urban system of Asia as a whole has also tended to be drawn to a large extent from primary sources (...) and the extrapolation of trends perceived in the wider Roman empire." (Hanson, 2011, p. 231). Social Network Analysis based on numismatic material combined with the palynological and climatic evidence allows for the reconstruction of the regional socio-ecosystem, providing an independent line of argument in the discussion on the Roman Empire, its cities and the impact it had on people and environment. It can be a cure to our largely anecdotal evidence (Levick, 2004).

The results of Social Network Analysis have demonstrated the functional ties of Pisidia and Pamphylia, despite some cultural and linguistic differences between them (Chapter 4). The onset of the Roman Empire changed the direction of the main vectors, thus modifying the shape of pre-Roman networks (similar thoughts have been expressed in relation to the textile trade in Asia Minor: Flohr, 2016, p. 39). Changing social, economic and cultural conditions are reflected in the changing shape of the whole network, as the connectivity of a given city evolves. A particular configuration of relations between cities allows us to reconstruct the character of urban centres, their groups and, to some extent, their changes over time. The evident disparities in the position of cities within the network highlight the

notion that there is no single model that would describe the character of Roman cities in a satisfactory manner (Flohr and Wilson, 2017a, p. 1).

As Shaw remarked on the history of Cilicia: "in the constantly changing relationships between mountain and plain, there is no permanent condemnation of specific communities to isolation and others to integration" (Shaw, 2001, p. 426). The cultural expectations and incentives, together with the structural limitations of the human systems, leave a cumulative impact not only on specific spots, but also on wider areas and regions.

7.3.3.1 The southern gates

In the light of social network analysis (Ch. 4), there is no doubt that Pamphylia was the bridge (a very broad one) for communication between inland and the outer world. It is mirrored in the fact that the Pamphylian cities were the first to start minting coins, their issues were more numerous and almost continuous.

Within the history of the region different towns played the leading role in this coastal plain. First it was Aspendos that seems to play the leading role in the Persian period, and then Side in the Hellenistic period. In the Early Roman period Perge competed with Side on multiple fronts, but seemingly they also cooperated regarding their common interests. Eventually, Side seems to have dropped out from the contest for a period of time after the Gothic raids, when the more inland location of other poleis sheltered them from the danger.

Notably the urban centres of Perge, Aspendos and Side were located at the intersection of the main East-West regional road and the largest rivers of Western Taurus: Kestros, Eurymedon, and Melas, that were navigable considerably upstream. The less prominent cities of Sillyon, Magydos and Attaleia shared only some of these features, which may explain their smaller size and less prominent role. Sillyon was located on a hill close to a river (like Perge and Aspendos), although a smaller and shorter one, whose sources flow from the hills immediately north of the plain. It maintained closer links with

the nearby city of Pednelissos but had fewer connections further inland. Magydos was not particularly linked to any of the inland cities and her territory was squeezed between her larger neighbours. Attaleia, in turn, despite considerable privileges given to her as a Hellenistic colony and later a settlement of Roman veterans (such as the land acquisitions at the expense of earlier Greek settlements) did not develop into a primary regional centre. Possibly after losing her special position as a centre of Pergamene power, Attaleia lost the developmental impetus. However, there is a possibility that her relations with Termessos remained undetected (Termessian coinage does not bear the portraits of emperors, leaving it largely outside the SNA).

In general though, all Pamphylian cities had access to the resources brought down from the mountains and from afar by the sea and could have had the character of an entrepreneurial city (cf. Bintliff, 2014, pp. 209–10). Several spots on the Pamphylian plain had favourable environmental characteristics and it was thanks to cultural and political processes that one urban centre or another raised in its influence over others becoming a local hub.

7.3.3.2 The northern border

In the north, Pisidia bordered with Phrygia Paroreios, belonging to the province of Galatia. The main cities in that area in the Roman period were Apollonia and Antiochia in Pisidia. Substantial realignments in the first century BC gave them a solid land base for sustenance (Bru, 2017, pp. 80–88, 144–163). As a Roman colony, Antiochia institutionally stood out from the surrounding poleis. Furthermore, Social Network Analysis has shown that Apollonia and Antiochia were rather connected to the east-west route from the province of Asia to the eastern frontier, but they lack strong connections with cities towards Lycia and Pamphylia (Ch. 4). Unlike the colonies of Kremna, Parlais, Komama or Olbasa, Antiochia more persistently cultivated her exceptional character and maintained a unique status (Levick, 1967, pp. 130–161). Possibly, in the initial conception of Augustus, Apollonia and Antiochia were meant to play the role of bridging nodes towards Pisidia; however this function seems to be enforced from above, unlike the more bottom-up links with the southern cities of

Pamphylia. Later, Antiochia did not receive much attention from emperors. The creation of the province of Lycia et Pamphylia as separate from the province of Galatia possibly only acknowledged and reinforced the situation on the ground.

Interestingly, the city of Apameia, belonging to the province of Asia, seems to have had more influence in northern Pisidia. Her links reach through Baris¹⁰ to the *poleis* located in the Plain of Isparta and to Sagalassos (Figs. 4.7.3, 4.7.10, 4.7.13). Possibly Apameia was a preferred stopping point when travelling along the north-south axis (which can be explained by the shape of the Karakuş Dağları) from Phrygia to Pamphylia.

7.3.3.3 *Western and Eastern Pamphylia*

A number of cities lying around the Gulf of Pamphylia were sometimes assigned as belonging to Pamphylia too. In the West these were Olympos and Phaselis, and in the East Karallia, Kolybrassos, Kasai, Korakesion, Laerte, Syedra and Iotape. They were lacking extensive hinterlands on the scale of Side or Perge and they generally did not develop into significant centres. In the Persian period, Phaselis could have played the role of a border city, as it was a significant Greek colony; however, Phaselis lost her advantage in later periods. On the other side of the Pamphylian Gulf, Syedra rose in importance as a stopping point on the marine routes. Her minting patterns are unique and possibly reflect imperial visits to the city. In general, Eastern Pamphylian communities seem to be dominated by Side. A number of settlements could have been little more than the seat of the members of elites.

7.3.3.4 *Pisidia*

The eastern and western boundaries of Pisidia are less pronounced than its northern and southern fringes in cultural terms, although the ranges of the Isparta Angle are quite well-pronounced (see: Fig.

¹⁰ Baris is incorrectly located on the maps at modern Isparta. More recently it has been identified with the site in the village of Kılıç (Foss *et al.*, 2019), that notably lies closer to the ancient site of Apameia.

2.1.). These were areas with mixed population and changing adherences. The lands around the Lakes Burdur and Beyşehir have delivered evidence of substantial imperial estates (the villages of Takina and Tymbrianassos in the West, *tractus Orondicus* and *tractus Cillanicus* in the East), rather than self-governing cities (Mitchell, 1993b, pp. 90–1, 157; Arena, 2005, s.v. Bru, 2017, pp. 164–182). In the face of the lack of civic coinage the SNA could not detect their functional relations. However, it may be suggested that the produce of these estates could have been transported comfortably along the Via Sebaste or through Kremna to Perge, and in the East through Etenna to Side (compare to the Selçuk trade routes Planhol, 1958, p. 89, fig.10; reconstructed Roman roads French, 2014, p. maps 5.1.1-2).

The core Pisidian cities share a number of traits even if they often fought vehemently with each other: Termessos, Ariassos, Sagalassos, Pednelissos, Adada, Timbriada, Selge. The ethnic identity of the Pisidians found its outlet in multiple ways, including the worship of distinctive deities (Talloen, 2015), writing inscriptions in the Pisidian language (Brixhe, 2016), displaying local motives such as the Pisidian shield in architecture (Mitchell and Waelkens, 1987, pp. 40–2; Mitchell, Owens and Waelkens, 1989, p. 65), depictions of shepherds on funerary reliefs (Brixhe and Gibson, 1982; Labarre *et al.*, 2015, p. 98) or advertising local mythology and festivals on coin legends (Ch. 3.2.3.3-4). It is notable that the life of the communities in Pisidia was often concentrated around the strongholds and well-established urban centres (Ch. 3.2.3.3). We have little evidence of agricultural practices for the poleis outside Sagalassos, but as the modern example from Selge (Photo 110) or the Methana peninsula (H. Forbes, 2007) show, it is perfectly possible to sustain sophisticated agriculture based on the combination of terraced fields and pasturing. These same fortified settlements provided refuge during the unstable times of the 3rd century AD. The exploitation of their lands was enabled by the merging of local and Roman elites, indicative of colonial exploitation (Bru, 2017, p. 297).

The communities in Milyas appear in the numismatic record from the Antonines onwards (Ch. 3.2.3.3) and seem to flourish when the *pax Romana* allowed cultivation of flat valley floors from unfortified settlements. The people who settled there could have come from the nearby stronghold such as

Ariassos, but the rise could have also been the effect of population growth. The communities of Milyas (Isinda, Sibidunda, Ouerbe, Andeda, Pogla, Kodroula, Kolbasa) were located close to the Via Sebaste among a number of Roman colonies (Komama, Olbasa) profiting from the stable political and economic conditions. The development of such small but densely packed self-governing urban centres could be indicative of the popular acceptance of the Roman hegemony (Goldstone and Haldon, 2009, p. 11), in contrast to e.g. the communities in Phrygia (Thonemann, 2013a).

7.3.3.5 *Roman colonies*

The Roman colonies founded by the emperors from the Julio-Claudian dynasty in the Western Taurus Mountains, that is Antiochia, Kremna, Parlais, Komama, Olbasa, Lystra, Pappa, had both a distinctive administrative status and a unique ethnic and social profile. The inhabitants of the colonies were descendants of Italian veterans from the Roman armies and had a privileged position in relation to local populations (Roman citizenship). However, it seems that their economic position was not altogether that strong. Latin is poorly represented in comparison to Roman colonies elsewhere (Levick, 1967, p. 167) and in most cases the colonies share a similar position within wider networks as their local neighbours (Ch. 4, see particularly: Komama, Olbasa, Parlais).

7.3.4 *Diachronic patterns*

The growth of Perge and Side can be coupled with the parallel growth of the inland cities they had closer relations with – Kremna with Sagalassos and Etenna respectively, while the stagnation of Aspendos goes in line with the decreased importance of such Pisidian cities as Selge and Timbriada. These changes result from the deep rearrangements brought in by the Romans. The communities which cooperated with the conquerors, such as Termessos, Ariassos, and Sagalassos, were granted privileges (Mattingly, 1997, p. 10), e.g. territorial acquisitions, while the ones resisting the conquest were deprived of parts of their possessions (as in Timbriada) or completely dissolved (as in the cases of the Homonadeis and Orondeis).

An additional spur to growth was the opportunity to settle permanently on the flat valley floors. In the pre-Roman periods this was difficult due to the need to build costly defensive systems. The hill-top settlements had natural advantages in this regard. But once the external and internal peace was secured, the settlements in the valleys were much encouraged. The self-governing communities in Milyas and settlements in the valleys such as the Çanaklı or Çeltikçi Valley dependant from Sagalassos could flourish without having city walls until as late as the second half of the third century AD. The development of these small towns further amplified the position of those regional centres that had direct connections with them, that is Perge and Sagalassos. The cities located in the areas with steep river valleys had no such advantage and thus their development was slower.

The case of the pair of Side and Etenna is particularly interesting. Etenna did not possess an extensive flat territory, but still her importance under the Severans is not to be overlooked. The routes leading through her territory linked the Pamphylian coast with inland Anatolia. More precisely, they linked Side to the Roman colonies of Mistheia, Pappa and eventually to Antiochia in Pisidia and to extensive imperial estates around *tractus Orondicus*. The Roman colonies and communities of imperial laborers (whatever their status: slave, freed or free) did not leave evidence of relations in the form of civic coinage, although it can be presumed that they were particularly tied to the interests of the Roman state and to consecutive emperors.

7.3.5 Verticality

The importance of links between the inland and coastal cities across the Taurus Mountains brings in the question of their 'ecological complementarity'. It is tempting to describe the observed connections with labels such as the 'vertical system' and explain it with the notion of 'ecological convergence'. In fact, such terms were coined decades ago in the context of the Inca Empire in South America. John Murra proposed the model of a 'vertical archipelago' in order to describe the conscious aim of the Andean societies to secure resources in different ecological zones located across the altitudes in the Andes Mountains without the need to engage in trade or exchange (Murra, 1972, 1975, 1985). He

advocated for the idea that the core societies living in the Andean altiplano who engaged in dry farming of frost sensitive crops (maize, beans, vegetable, quinoa, root crops) founded colonies on both sides of the Andes to get access to the wider variety of resources: marine animals, the products of irrigation farming on the coastal plains (gourd, cotton, squash), the highland frost-resistant crops (legumes, potatoes) or animals (alpacas and llamas), and tropical crops (coca, peppers, fruits) from Amazonia (cf. D'Altroy, 2015).

The model proposed by Murra has been discussed and modified by a number of scholars (Masuda, Morris and Shimada, 1985; Van Buren, 1996). There are a number of apparent similarities between the Andean system and the one sketched here for Asia Minor: the cultural ideal of self-efficiency within a given polity, search for the differentiation and complementarity of plant and animal resources located among diversified landscapes including coastal, highland and mountainous ones. Those similarities in an obvious way testify against the exceptionalism of either of the regions, but at the same time reveal common structural features characteristic to imperial systems of considerable resilience. The diversification of resources and intensification of production, driven by the needs of state and elites, gradually led to the specialisation and division of labour, which in turn raised the productivity of the whole system and enabled further diversification, specialisation and intensification in a feedback loop.

Furthermore, the comparison can direct our attention towards phenomena usually neglected in the study of the Roman empire, such as the labour-tax or the importance of seasonal work. Jeroen Poblome proposes that some farmers paid their dues in the form of tile-making in Sagalassos outside the farming season (Poblome, 2016, p. 386). This resembles the Inca taxing system of *mit'a* where some members of the communities were delegated to perform temporary tasks such as construction or weaving (D'Altroy, 2014, pp. 395–401). In the absence of money among Andean societies, the labour tax was the basic form of mobilising surplus resources. The laborious textile production could have been intensified in this way (cf. Photos 116a-116e). During the snowy months in the Taurus

Mountains people surely devoted themselves to wool processing and weaving and it is imaginable that it could have been done also for tax purposes.

Although the basic idea of the 'vertical archipelago' has been deconstructed, it is still an inspiring concept. As Mary van Buren has demonstrated, the Lupaqa colonies survived through the Spanish conquest and apparently flourished as separate enclaves (Van Buren, 1996). Thanks to their relations with the central territory of the Lupaqa, they maintained a privileged position among their immediate neighbours. It shows that the social and political considerations may play an equally important role in shaping inter-city networks as economic or ecological considerations. Another feature demonstrated by van Buren is the fact that the complementary systems exist as long as the cultural ideal serving as the justification for the chosen set of practices. Without higher-level state structures the long-distance contacts are prone to dissolution.

7.4 THE MISSING PERSPECTIVE

The previous sections described the socio-ecological system of Pisidia and Pamphylia as a set of dynamic Adaptive Cycles operating at different spatio-temporal scales and consisting of different types of actors with sometimes converging and sometimes diverging incentives and interests. The discussed actors were the state, the elite stratum and *poleis* of the region. The question remains: what about the common people?

Unfortunately, just as it is impossible to provide an exhaustive description of the behaviour of H₂O particles in a pot of boiling water, it is impossible to describe the lives of individuals from the lower classes in the Roman Period in a satisfactory manner. Still, it is worth pointing out that the picture painted above is more the result of the actions and decisions of those innumerable yet unnamed people as it is of prominent politicians, generals and philosophers whose names we know. It should be remembered that the material remains we can see until now are the result of their actions; the wealth of the emperor and land proprietors came from their work and both the substance and the

sustenance of the armies relied on them. Most often they were not in a position to defend themselves in the face of state or elite power, but still it was their choice on how to adapt to it: to cooperate, to resist or to flee.

The fact that the Beyşehir Occupation Phase observed in the pollen cores continues through the periods of crisis of state and ideological systems suggests that, despite the dissolution and realignment of higher-level imperial institutions, the lower-level Adaptive Cycles based on small local human communities were able to maintain and transmit a complex set of agricultural practices and cultural habits testifying to their resilience. However, who paid the price for maintaining this resilient system is a different question (Izdebski, Mordechai and White, 2018).

APPENDIX 1

Remarks on the compilation of coin databases

During working on my thesis, I have compiled six databases recording various features of the numismatic material. These data constituted the material discussed in chapters 3 and 4.

COIN DATABASE

The base of coins from Pamphylia and Pisidia is based mostly on the resources from the Roman Provincial Coinage project. As the RPC does not cover all the periods, it is supplemented with printed corpora. These data have been used for the discussion and creation of charts in Chapter 3.

Literature:

- Ashton (Ashton, 1996)
- BMC 19 (Hill, 1897)
- BMC 20 (Wroth and Poole, 1892)
- BMC 21 (Head, 1897)
- SNG Ashmolean 5 (Ashton and Ireland, 2013)
- SNG Brasil 1 (Magalhaes, 2011)
- SNG Finland II (Suomen, 1999)
- SNG Pfälzer 4 (Nollé 1993c)
- SNG Pfälzer 5 (Nollé 1999)
- SNG Sweden 1.2 (Schwabacher, Post and Boehringer, 1995)
- SNG Turkey 1.1 (Konuk, 2002)
- SNG Turkey 2.1 (Tekin and Altinoluk, 2007)
- SNG Turkey 3.1 (Tekin and Altinoluk, 2009)

- SNG Turkey 5.1 (Tekin, Tanrikulu and Sağur, 2011)
- SNG Turkey 6.1, part 1 (Köker, 2012)
- vA Kolbasa (Aulock, 1969)
- vA Komama (Aulock, 1970)
- vA Olbasa (Aulock, 1971, 1973b)
- vA Parlais (Aulock, 1973a)
- vA Pisidien I (Aulock, 1977)
- vA Pisidien II (Aulock, 1979)
- Krzyżanowska (Krzyżanowska, 1970)

FIND SPOTS DATABASE

The coin database derived from the catalogues of numismatic collections has actually yielded little information on the find spots of coins. It has thus been necessary to reach for the archaeological reports in order to obtain more. The database has 461 entries, though after rejecting unknown or uncertain mints, only 420 were included in the social network analysis in Chapter 4.

Literature:

Group A

Coin finds from Pisidia or Pamphylia

- Atlan, S. (1976) 1947-1967 yılları Side kazıları sırasında elde edilen sikkeler. Ankara. (Atlan, 1976)
- Mitchell, S. (1995) Cremna in Pisidia: an ancient city in peace and in war. London. (Mitchell, 1995)

- Scheers, S. (1993) 'Catalogue of the coins found during the years 1990 and 1991', in Waelkens, M. (ed.) *Sagalassos I. First general report on the survey (1986–1989) and excavations (1990–1991)*. Leuven, pp. 187–205. (Scheers, 1993)
- Scheers, S. (1997) 'Coins Found during 1994 and 1995', in Waelkens, M. and Poblome, J. (eds) *Sagalassos IV. Report on the survey and excavation campaigns of 1994 and 1995*. Leuven, pp. 315–350. (Scheers, 1997)
- Scheers, S. (2000) 'Coins found during 1996 and 1997', in Waelkens, M. and Loots, L. (eds) *Sagalassos V. Report on the survey and excavation campaigns of 1996 and 1997*. Leuven, pp. 531–2. (Scheers, 2000)
- Tekin, O. (1991) 'A Preliminary Report on Coins found at Perge', *Anatolia antiqua*. pp. 217–220. (Tekin, 1991)

Group B

Sites with identified coins from Pamphylia or Pisidia

- Bellinger, A. R. (1938) *Coins from Jerash, 1928-1934* by Alfred R. Bellinger. New York (State): American Numismatic Society, 1938. (Bellinger, 1938)
- Butcher, K. (2004) *Coinage in Roman Syria: Northern Syria, 64 BC-AD 253*. London: Royal Numismatic Society ; vno. 34). (Butcher, 2004)
- Buttrey, T. V (1981) *Greek, Roman, and Islamic coins from Sardis*. Cambridge, Mass: Harvard University Press ; 7). (Buttrey, 1981)
- Cox, D. H. (1959) 'Coins from the Excavations at Curium, 1932-1953', *Numismatic notes and monographs* (New York). The American Numismatic Society, (145). (Cox, 1959)

- Evans, J. D. (2018) Coins from the excavations at Sardis: their archaeological and economic contexts: coins from the 1973 to 2013 excavations. Cambridge, Massachusetts ; 13). (Evans, 2018)
- Kroll, J. H. and Walker, A. S. (1993) 'The Greek Coins', The Athenian Agora 26. (Kroll and Walker, 1993)
- Marcellesi, M.-C. and Çizmeli Öğün, Z. (2011) 'Réseaux d'échanges régionaux en Asie Mineure occidentale: l'apport des monnaies de fouilles', in Faucher, T., Marcellesi, M.-C., and Picard, O. (eds) Nomisma. La circulation monétaire dans le monde grec antique. Actes du colloque international, Athènes 14-17 avril 2010, pp. 297–342. (Marcellesi and Çizmeli Öğün, 2011)
- Özdoğru, Ş. (2002) Patara sikke basımları ve Patara kazıları'ndan (1989-2001) ele geçen sikkeler. Akdeniz Üniversitesi. (Özdoğru, 2002)
- Regling, K. and Dressel, H. (1927) Die Münzen von Priene. Berlin: (Archäologische Forschungen. Priene ; Bd. 3]). (Regling and Dressel, 1927)
- Travaglini, A. and Camilleri, V. G. (2010) Hierapolis di Frigia, le monete: campagne di seavo 1957-2004. İstanbul: Ege Yayınları (Hierapolis di Frigia ; 4). (Travaglini and Camilleri, 2010)
- Waage, D. B. (1952) Antioch-on-the-Orontes. IV. Part two: Greek, Roman, Byzantine and Crusaders' coins. Princeton : London : The Hague: (Publ. of the Committee for the excavation of Antiochia and its vicinity ; IV, 2). (Waage, 1952)

Group C

Other consulted reports - sites with no identified coins from Pisidia or Pamphylia

- Bellinger, A. R. and Bellinger, C. B. (1930) *Catalogue of the coins found at Corinth, 1925*. New Haven: Yale University Press. (Bellinger and Bellinger, 1930)

- Feugère, M. and Py, M. (2011) *Dictionnaire des monnaies découvertes en Gaule méditerranéenne : (530-27 av. notre ère)*. Montagnac : Paris: Éditions Monique Mergoïl ; Bibliothèque nationale de France. (Feugère and Py, 2011)
- Knapp, R. C., Mac Isaac, J. D. and Miller, S. G. (2005) *Excavations at Nemea III: The Coins*. Berkeley: University of California Press. (Knapp, Mac Isaac and Miller, 2005)
- Lauwers, C. (2013) 'Les monnaies des fouilles belges d'Apamée sur l'Oronte, Syrie (2005-2010)', *Belgisch Tijdschrift voor numismatiek en zegelkunde= Revue belge de numismatique et de sigillographie*, 153, pp. 151–186. (Lauwers, 2013)
- Macdonald, D. J. (1974) 'Aphrodisias and Currency in the East, A. D. 259-305', *American Journal of Archaeology*. Archaeological Institute of America, 78(3), pp. 279–286. (Macdonald, 1974)
- Musheghian, K. A., Mousheghian, A. and Depeyrot, G. (2000) *History and coin finds in Armenia : antiquity*. Wetteren, Belgique: Moneta (Collection Moneta ; 17). (Musheghian, Mousheghian and Depeyrot, 2000)
- Noeske, H.-C. (2006) *Münzfunde aus Ägypten. II, Griechisch-römischen Münzfunde aus dem Fayum*. Mainz am Rhein: Von Zabern (Studien zu Fundmünzen der Antike ; Bd. 22). (Noeske, 2006)
- *Online Coins of the Roman Empire (OCRE)* (entry 01.10.2019). Available at: <http://numismatics.org/ocre/>; locations checked: Priene, Bergama, Milet Harabeleri, Magnesia on the Meander, Germany, Britania, Italy, Bulgaria, Romania, France, Spain, Dumuztepe, Edfu, Athens, Colonia Veneta, Cologne, Pella (Jordan), Pompeii, Rome (*Online Coins of the Roman Empire (OCRE)*, no date)
- Tekin, O. (2007) 'Coins', in *Nagidos. Results of an Excavation in an Ancient City in Rough Cilicia*, pp. 435–438. (Tekin, 2007)

- Voegtli, H. (1993) *Die Fundmünzen aus der Stadtgrabung von Pergamon*. Berlin: Walter de Gruyter (Pergamenische Forschungen ; Bd.8). (Voegtli, 1993)

HOARDS DATABASE

The hoards database compiles mainly two sources: *An Inventory of Greek Coin Hoards* (IGCH) and the *Coin Hoards* (CH) series. These two were supplemented with articles discussing particular hoards or publishing new ones. The database assigns the catalogue number to the group of issuing cities/tribes/rulers. It contains two types of nodes: ‘signature’ and ‘city’, and the edges are defined as directed from one type to another, but never across. Such a network is called a bipartite network and it is impossible to correctly incorporate it with other data in one graph, because they denote different categories. In order to utilise this data in the final network I had to project the bipartite network into a normal one using MultiModeNetworks TransformationPlugin. The resulting network connects every two ‘cities’ that shared the same ‘signature’. Both the unprotected and projected networks are discussed in Chapter 4.

Literature:

- Akyay, Y. (1966) ‘Coins of the City of Perge in the “Hecht Hoard”’, *İstanbul Arkeoloji Müzeleri yıllığı* (Annual of the Archaeological Museums of Istanbul), 13–14, pp. 246–286. (Akyay, 1966)
- Arslan, M. et al. (1999) *Greek coin hoards in Turkey: the Antalya Archaeological Museum and the C.S. Okray collection: with additional material from the Burdur, Fethiye and Sinop Museums*. 1st ed. Ankara: Udaş. (Arslan *et al.*, 1999)
- Ashton, R. (2005) ‘The coinage of Oinoanda’, *Numismatic Chronicle*, 165, pp. 65–84. (Ashton, 2005)
- Kagan, J. (1994) ‘An Archaic Greek coin hoard from the Eastern Mediterranean and early Cypriot Coinage’, *The Numismatic Chronicle*, 154, pp. 17–52. (Kagan, 1994)

- Meadows, A. and Houghton, A. (2010) 'The Gaziantep Hoard 1994 (CH 9.527; 10.308)', *Coin Hoards*, 10, pp. 173–223. (Meadows and Houghton, 2010)
- Olçay, N. and Mørkholm, O. (1971) 'The Coin Hoard from Podalia', *Numismatic chronicle*. London: The Royal Numismatic Society, 11, pp. 1–29. (Olçay and Mørkholm, 1971)
- Spier, J., Arslan, M. and Dervişağaoğlu, A. (2002) 'The Demirler, Lycia (c. 1972) Hoard (CH 1.6, 8.30, 9.351)', *Coin Hoards*, 9, pp. 87–93. (Spier, Arslan and Dervişağaoğlu, 2002)
- Thompson, M. et al. (1973) *An inventory of Greek coin hoards*. New York: Published for the International Numismatic Commission by the American Numismatic Society. (Thompson *et al.*, 1973)
- Vermeule (1999) 'The Athenian Treasury Hoard', *The Celator*, 12(12), pp. 26–30. (Vermeule, 1999)
- Watson, G. C. (2014) 'A Hoard of Roman Provincial Bronzes from Pamphylia', *Numismatic chronicle*. The Royal Numismatic Society, 174, pp. 307–316. (Watson, 2014)
- Coin Hoards I, II, III, V, VI, VII, VIII, IX, X

OTHER DATABASES

Data for the further three databases were based on existing studies of the phenomena of countermarking, die-sharing and homonoia. These publications cover the whole of Asia Minor, thus they allow us to create a wider picture. Obviously, they do not present the whole extent of the phenomena, as some of them are quite old, but still they are the basic reference books on the subject and they are a good starting point for making meaningful comparisons.

COUNTERMARKS DATABASE

The countermarks database records the place of countermarking or the catalogue number of a countermark. It consists of 743 entries.

Literature:

- Howgego, C. (1985) Greek Imperial countermarks : studies in the provincial coinage of the Roman Empire. London: Royal Numismatic Society (Special publication (Royal Numismatic Society (Great Britain)) ; 17). (Howgego, 1985)

DIE-SHARING DATABASE

The die-sharing database records dies or styles that were shared among two or more cities. I decided to incorporate the styles as well as identical dies in order to increase the number of entries (the final number: 1395). This database, similarly to the hoards database, produces a bipartite network (two categories of nodes: 'style/die' and 'city'), so it had to be projected using MultiModeNetworks TransformationPlugin to obtain direct city-to-city relations. The resulting network densely connects the cities that share a die or a style among each other.

Literature:

- Kraft, K. (1972) Das System der kaiserzeitlichen Münzprägung in Kleinasien : Materialien und Entwürfe. Berlin: Gebr. Mann (Istanbuler Forschungen ; Bd. 29). (Kraft, 1972)
- Watson, G. C. (2021) 'Kraft in the 21st Century. A New Listing of Shared Dies in the Roman Provincial Coinage', *American Journal of Numismatics*, 32, pp. 219–272. (Watson, 2021a)

HOMONOIA COINS DATABASE

The homonoia coins database is the least numerous one, with just 246 entries

Literature:

- Franke, P. R. and Nollé, M. K. (1997) *Die Homonoia-Münzen Kleinasiens und der thrakischen Randgebiete*. Saarbrücken (Saarbrücker Studien zur Archäologie und Alten Geschichte 10). (Franke and Nollé, 1997)

APPENDIX 2

List of graphs and their attributes in Chapter 4

Number	Data set	Type	Network class	node colour	node size	edge colour	edge weight
Section 4.2							
4.2.1	Find Spots	Circular layout graph	Directed	modularity class (resolution 1.2)	In degree (number of coins found in a place)	mixed from node	number of coins
4.2.2	Find Spots	Force Atlas graph	Directed	modularity class (resolution 1.2)	In degree (number of coins found in a place)	mixed from node	number of coins
4.2.3	Find Spots	Map layout graph	Directed	modularity class (resolution 1.2)	In degree (number of coins found in a place)	grey	number of coins
4.2.4	Find Spots	Map layout graph (zoom)	Directed	modularity class (resolution 1.2)	In degree (number of coins found in a place)	n/a	n/a
4.2.5	Find Spots	Map layout graph (zoom)	Directed	modularity class (resolution 1.2)	In degree (number of coins found in a place)	red - links with Side, grey	number of coins
4.2.6	Find Spots	Map layout graph (zoom)	Directed	modularity class (resolution 1.2)	In degree (number of coins found in a place)	blue - links with Perge, grey	number of coins
4.2.7	Find Spots	Map layout graph (zoom)	Directed	modularity class (resolution 1.2)	In degree (number of coins found in a place)	orange - links with Sagalassos, grey	number of coins
Section 4.3							
4.3.1	Hoards	Double circular layout graph	Bi-partite	modularity class (resolution 1.0)	Out degree (number of coins in a hoard)	mixed from node	number of coins
4.3.2	Hoards	Yifan Hu graph	Bi-partite	hoard affiliation	Weighted in degree (share of a mint in a hoard)	mixed from node	number of coins
4.3.3	Hoards	Map layout graph (all hoards)	Bi-partite	hoard affiliation	Weighted in degree (share of a mint in a hoard)	grey	number of coins
4.3.4	Hoards	Map layout graph (3rd cent AD hoards)	Bi-partite	hoard affiliation	Weighted in degree (share of a mint in a hoard)	grey	number of coins
4.3.5	Hoards	Map layout graph zoom (3rd cent AD hoards)	Bi-partite	hoard affiliation	Weighted in degree (share of a mint in a hoard)	n/a	n/a
Section 4.4							
4.4.1	Die-sharing	Circular layout graph	Bi-partite	modularity class (resolution 0.4)	In degree (number of a mint's die-links)	mixed from node	1

4.4.2	Die-sharing	Force Atlas 2 graph	Bi-partite	modularity class (resolution 0.4)	In degree (number of a mint's die-links)	mixed from node	1
4.4.3	Die-sharing	Force Atlas 2 graph	Bi-partite	modularity class (resolution 6.0)	In degree (number of a mint's die-links)	mixed from node	1
4.4.4	Die-sharing	Map layout graph	Bi-partite	modularity class (resolution 0.4)	In degree (number of a mint's die-links)	grey	1
4.4.5	Die-sharing	Map layout graph (zoom)	Bi-partite	modularity class (resolution 0.4)	In degree (number of a mint's die-links)	n/a	n/a
4.4.6	Die-sharing	Map layout graph	Bi-partite	modularity class (resolution 6.0)	In degree (number of a mint's die-links)	n/a	n/a
4.4.7	Die-sharing	Force Atlas 2 graph (Antonine)	Bi-partite	modularity class (resolution 5.0)	In degree (number of a mint's die-links)	mixed from node	1
4.4.8	Die-sharing	Map layout graph (Antonine)	Bi-partite	modularity class (resolution 5.0)	In degree (number of a mint's die-links)	grey	1
4.4.9	Die-sharing	Map layout graph (zoom, Antonine)	Bi-partite	modularity class (resolution 5.0)	In degree (number of a mint's die-links)	n/a	1
4.4.10	Die-sharing	Force Atlas 2 graph (Severan)	Bi-partite	modularity class (resolution 2.0)	In degree (number of a mint's die-links)	mixed from node	1
4.4.11	Die-sharing	Map layout graph (Severan)	Bi-partite	modularity class (resolution 2.0)	In degree (number of a mint's die-links)	grey	1
4.4.12	Die-sharing	Map layout graph (zoom, Severan)	Bi-partite	modularity class (resolution 2.0)	In degree (number of a mint's die-links)	n/a	n/a
4.4.13	Die-sharing	Force Atlas 2 graph (Barrack Emperors)	Bi-partite	modularity class (resolution 1.0)	In degree (number of a mint's die-links)	mixed from node	1
4.4.14	Die-sharing	Map layout graph (Barrack Emperors)	Bi-partite	modularity class (resolution 1.0)	In degree (number of a mint's die-links)	grey	1
4.4.15	Die-sharing	Map layout graph (zoom, Barrack Emperors)	Bi-partite	modularity class (resolution 1.0)	In degree (number of a mint's die-links)	n/a	n/a
Section 4.5							
4.5.1	Countermarks	Circular layout graph	Mixed	modularity class (resolution 0.4)	Betweenness centrality	mixed from node	Aggregated
4.5.2	Countermarks	Force Atlas graph	Mixed	modularity class (resolution 0.4)	Betweenness centrality	mixed from node	Aggregated
4.5.3	Countermarks	Map layout graph	Mixed	modularity class (resolution 1.4)	Betweenness centrality	mixed from node	Aggregated
4.5.4	Countermarks	Map layout graph (zoom)	Mixed	modularity class (resolution 1.4)	Betweenness centrality	n/a	n/a
4.5.5	Countermarks	Map layout graph (zoom)	Mixed	modularity class (resolution 0.8)	Betweenness centrality	n/a	n/a
4.5.6	Countermarks	Map layout graph (zoom)	Mixed	modularity class (resolution 0.4)	Betweenness centrality	n/a	n/a

4.5.7	Countermarks	Force Atlas graph (focus on Side)	Mixed	red - connected with Side	Betweenness centrality	mixed from node	Aggregated
4.5.8	Countermarks	Force Atlas graph (focus on Sillyon)	Mixed	pink - connected with Sillyon	Betweenness centrality	mixed from node	Aggregated
4.5.9	Countermarks	Force Atlas graph (focus on Aspendos)	Mixed	yellow - connected with Aspendos	Betweenness centrality	mixed from node	Aggregated
4.5.10	Countermarks	Force Atlas graph (focus on Perge)	Mixed	blue - connected with Perge	Betweenness centrality	mixed from node	Aggregated
Section 4.6							
4.6.1	Homonoia	Circular layout graph	Directed	modularity class (resolution 1.0)	Betweenness centrality	mixed from node	sum of the number of types
4.6.2	Homonoia	Map layout graph	Directed	modularity class (resolution 1.0)	Betweenness centrality	grey	sum of the number of types
4.6.3	Homonoia	Map layout graph (zoom)	Directed	modularity class (resolution 1.0)	Betweenness centrality	n/a	n/a
4.6.4	Homonoia	Force Atlas 2	Directed	modularity class (resolution 1.0)	Betweenness centrality	mixed from node	sum of the number of types
4.6.5	Homonoia	Force Atlas 2 (Iulo-Claudian and Flavian)	Directed	modularity class (resolution 1.0)	Betweenness centrality	mixed from node	sum of the number of types
4.6.6	Homonoia	Map layout graph (zoom, Iulo-Claudian and Flavian)	Directed	modularity class (resolution 1.0)	Betweenness centrality	n/a	n/a
4.6.7	Homonoia	Force Atlas 2 (Antonine)	Directed	modularity class (resolution 1.0)	Betweenness centrality	mixed from node	sum of the number of types
4.6.8	Homonoia	Map layout graph (Antonine)	Directed	modularity class (resolution 1.0)	Betweenness centrality	grey	sum of the number of types
4.6.9	Homonoia	Map layout graph (zoom, Antonine)	Directed	modularity class (resolution 1.0)	Betweenness centrality	n/a	n/a
4.6.10	Homonoia	Force Atlas 2 (Severan)	Directed	modularity class (resolution 1.0)	Betweenness centrality	mixed from node	sum of the number of types
4.6.11	Homonoia	Map layout graph (Severan)	Directed	modularity class (resolution 1.0)	Betweenness centrality	grey	sum of the number of types
4.6.12	Homonoia	Map layout graph (zoom, Severan)	Directed	modularity class (resolution 1.0)	Betweenness centrality	n/a	n/a
4.6.13	Homonoia	Force Atlas 2 (Barrack Emperors)	Directed	modularity class (resolution 1.0)	Betweenness centrality	mixed from node	sum of the number of types
4.6.14	Homonoia	Map layout graph (Barrack Emperors)	Directed	modularity class (resolution 1.0)	Betweenness centrality	grey	sum of the number of types
4.6.15	Homonoia	Map layout graph (zoom, Barrack Emperors)	Directed	modularity class (resolution 1.0)	Betweenness centrality	n/a	n/a
Section 4.7							

4.7.1	Homonoia+Countermarks+Die-sharing	Circular layout graph	Mixed	modularity class (resolution 1.0)	Betweenness centrality	mixed from node	Aggregated weight
4.7.2	Homonoia+Countermarks+Die-sharing	Map layout graph	Mixed	modularity class (resolution 1.0)	Betweenness centrality	grey	Aggregated weight
4.7.3	Homonoia+Countermarks+Die-sharing	Map layout graph (zoom)	Mixed	modularity class (resolution 1.0)	Betweenness centrality	n/a	n/a
4.7.4	Homonoia+Countermarks+Die-sharing	Force Atlas 2 graph	Mixed	modularity class (resolution 1.0)	Betweenness centrality	mixed from node	Aggregated weight
4.7.5	Homonoia+Countermarks+Die-sharing	Force Atlas 2 graph (Antonine)	Mixed	modularity class (resolution 1.5)	Betweenness centrality	mixed from node	Aggregated weight
4.7.6	Homonoia+Countermarks+Die-sharing	Map layout graph (Antonine)	Mixed	modularity class (resolution 1.5)	Betweenness centrality	grey	Aggregated weight
4.7.7	Homonoia+Countermarks+Die-sharing	Map layout graph (zoom, Antonine)	Mixed	modularity class (resolution 1.5)	Betweenness centrality	n/a	n/a
4.7.8	Homonoia+Countermarks+Die-sharing	Force Atlas 2 graph (Severan)	Mixed	modularity class (resolution 0.4)	Betweenness centrality	mixed from node	Aggregated weight
4.7.9	Homonoia+Countermarks+Die-sharing	Map layout graph (Severan)	Mixed	modularity class (resolution 0.4)	Betweenness centrality	grey	Aggregated weight
4.7.10	Homonoia+Countermarks+Die-sharing	Map layout graph (zoom, Severan)	Mixed	modularity class (resolution 0.4)	Betweenness centrality	n/a	n/a
4.7.11	Homonoia+Countermarks+Die-sharing	Force Atlas 2 graph (Barrack Emperors)	Mixed	modularity class (resolution 1.0)	Betweenness centrality	mixed from node	Aggregated weight
4.7.12	Homonoia+Countermarks+Die-sharing	Map layout graph (Barrack Emperors)	Mixed	modularity class (resolution 1.0)	Betweenness centrality	grey	Aggregated weight
4.7.13	Homonoia+Countermarks+Die-sharing	Map layout graph (zoom, Barrack Emperors)	Mixed	modularity class (resolution 1.0)	Betweenness centrality	n/a	n/a

APPENDIX 3

Detailed description of the pollen cores

ORIGINAL CORE STUDIES

The Sagalassos Survey

Several good quality palynological studies have been conducted under the Sagalassos Survey. They were gathered in 2004 by Vermoere. The Sagalassian cores share several common features that I will present jointly before discussing individual cores. Five sites have been cored in the territory of Sagalassos among which the temporary lake of Çanaklı, the marsh of Gravgaz, and the valley of Ağlasun Çay will be discussed (Vermoere, 2004).

Despite the high elevation that would predestine the territory of Sagalassos to an Oro-Mediterranean climate, it lies in fact on the border between Eu- and Oro-Mediterranean climates within the Isparta Angle (the valley bottoms lie at an altitude of 800-1200m, the upland hills and plateaus at 1,200-1,400m, mountain peaks reach over 1,800m). This means humid and considerably mild winters and hot, dry summers. Around 50% of precipitation falls during winter in the form of snow. Snow cover in the mountains forms water reservoirs for less water-abundant spring months. The potential natural vegetation for this area is defined as needle-leaved forest with additions of broad-leaved trees and shrubs (*Pinus*, *Cedrus*, *Juniperus*, deciduous *Quercus*) (Vermoere, 2004, p. 9).

The Sagalassos Survey has identified several settlements with a hierarchical structure in the Hellenistic and Roman periods. They testify to intense and continuous human pressure in the area, especially in the fertile valleys of Ağlasun, Çanaklı, Kuzköy, Çeltikçi and Bağsaray. All of the coring sites lie in the areas that were densely populated (Vanhaverbeke and Waelkens, 2003).

The analysis of the cores was performed by Vermoere. ^{14}C dates were obtained and calibrated with the program OXCAL (version 3.5). The age depth models were calculated with the linear interpolation method. The software used to analyse pollen data and create diagrams were TILIA (v.2.0.b.4), TILIAGRAPH (v2.0.b.4) and TGVIEW (v1.1.1.1.). Pollen assemblage zones were calculated using stratigraphically constrained sum-of-squares hierarchical cluster analysis (CONISS).

Ağlasun Valley

The valley of Ağlasun is located south from Isparta and east from Burdur, and its main modern settlements are Ağlasun and Başköy (the average elevation is c.1,150m). The valley is particularly moist and fertile, and it formed the heart of the polis of Sagalassos in the Hellenistic and Roman periods with the town of Sagalassos overlooking it from the nearby mountain slopes (Fig.6.2). Several cores were extracted c.1,5km from Ağlasun and 2km from Başköy, close to Ağlasun Çayı that flows on the valley bottom, four of which (cores 6, 9, 12, 13) will be discussed in detail (c.37,64°N, 30,52°E; elevation c.1,100m; Fig.6.3). Six ^{14}C dates were gathered from core 12, five from core 6, two from cores 9 and 13. Unfortunately, most of the dates come from the older parts of the cores, making late Holocene dating less certain. Wetland plants and pteridophyta were excluded from the pollen sums (Vermoere, 2004, pp. 46–51).

The core 9 was extracted at a distance of 20m from the river and is dated for c.4,340-0 years BP. The zone that safely covers the Hellenistic and Roman periods is A9-2a (cal. from c.810-795 BC to c.1,415-1,435 AD). It is characterised by the strong presence of Russian olive (*Eleagnus angustifolia*, which grows well on poor soils while bearing edible fruits) and well-represented secondary anthropogenic indicators (*Plantago lanceolata*, *Polygonum aviculare* type, *Polygonum cognatum* type). Other cultivated trees and shrubs (olive, walnut, vine) are not as well represented as before. The percentage of cedar decreases in this period, while oak appears only in small quantities (Vermoere, 2004, pp. 81–4, figs 3.7, table 3.4).

The core 12 was extracted just 5m from the river and is dated for c.7,640-0 years BP. The assemblage zone A12-2a that includes the Hellenistic and Roman periods is long (cal. from c.4,445-4,340 BC to c.690-775 AD) and it introduces many changes in comparison to the previous zone. The percentage of oak pollen decreases drastically, *Pistacia* disappears, while *Pinus* considerably increases on the diagram. Cultivated trees include walnut and Russian olive. The pollen of secondary anthropogenic indicators rapidly increases as well as Cerealia type (Vermoere, 2004, pp. 84–5, figs 3.8, table 3.4).

The core 6 was extracted 100m from the river and is dated at c.8,760-0 years BP. There are two assemblage zones that correspond to the Hellenistic and Roman periods: A6-2b (from cal. c.2,480-2,350 BC to c.90 BC-5 AD) and A6-2c (from cal. c.90 BC-5 AD to present). It was noted that durable grains (like fern spores) can be overrepresented due to differences in preservation. The characteristic feature of these zones is the disappearance of oak woodlands. *Quercus cerris* and *Quercus coccifera* are still recorded in small percentages in the zone A6-2b, but they completely disappear from the younger zone. Pine pollen is constantly present and increases gradually from c.500 AD. Cultivated trees appear in the zone A6-2b in considerable quantities, mainly olive but also walnut, platanus, hazelnut, sweet chestnut, pistachio, vine, but most of them disappear from the record in the zone A6-2c. Cerealia, that were present also in the previous zones, preserve their position, while the secondary anthropogenic indicators rise on the diagram (*Artemisia herba-alba* type, mainly *Plantago lanceolata*, but also in smaller quantities – *Rumex acetosa*, *Sanguisorba minor*). The rise in steppic indicators (*Artemisia* type, *Poaceae*) advocate for an open-land landscape with pastures. The zone A6-2c differs from the previous one in that the percentage of *Artemisia* type and *Poaceae* decrease, while *Centaruea solstitialis* and *Polygonum* type increase. Plants characteristic of wet grassland (*Filipendula*, *Cirsium* type, *Dipsacus*) disappear from the record (Vermoere, 2004, pp. 86–8, figs. 3.9, 3.14, table 3.4).

The core 13 was extracted further from Ağlasun Çay – c.220m and it mirrors the hill vegetation. It covers the period from c.7,840-6,560 to 0 years BP. The assemblage zone of our interest is zone A13-

2a that is dated from cal. c. 3,695-3,650 BC to c. 690-780 AD. This zone was unfortunately poor in preserved pollen grains. Its main features are the recovery of broad-leaved woodlands with dominant oak (other species being *Alnus* and *Betula*). Pine forests increase gradually in this zone. The values for cultivated trees are too low to indicate cultivation in the close vicinity of the coring site, but other anthropogenic indicators are present: *Vicia*, *Plantago lanceolata*, *Polygonum aviculare* type, *Polygonum cognatum* type. Other taxa point towards open-field landscape (*Lactuceae*, *Centarea solstitialis*) and wet grassland (*Cirsium* type, *Dipsacus*, *Filipendula*).

Gravgaz

The marsh of Gravgaz is located in the valley of Gravgaz surrounded by hills, close to the village of Kayaaltı, c.15km southwest from ancient site of Sagalassos (elevation 1,215m; Fig. 6.4). It covers an area of c.800x350m and is sourced by several freshwater sources with a karstic outlet at the western end of the basin. The area around the marsh was probably densely populated in antiquity and several settlements were found there including a town site at Kepez Kalesi that could have been independent from Sagalassos in the Hellenistic period. Three cores were extracted from the marsh of Gravgaz: G96, G98 and G99, but only core G99 has been studied in full detail, while the analysis of core G96 was less detailed and core G98 was studied only in the middle part. Wetland pollen types, unidentified pollen grain and pteridophyte spores were excluded from the pollen sum. Seven radiocarbon dates were obtained from cores G96 and G99. For core G98 only biostratigraphical dating has been done.

Gravgaz cores G99 and G96 and Çanaklı core (discussed in detail below) have been divided into pollen assemblage zones within one consistent framework. In core G96 the zone G-2 corresponds with the Hellenistic and Roman periods (from cal. c.405-390 BC to c.650-670 AD). Its main characteristic is a strong presence of cultivated trees (olive, walnut, manna ash) together with peak values for cereals. The presence of coniferous forest (mainly pine, but also cedar, fir, juniper) is strongly marked in line with the oak woodlands. An interesting feature is the decrease in steppic indicators (*Artemisia*, *Chenopodiaceae*).

Gravgaz core G99 was studied in greater detail and thus the zone G-2 has been divided into smaller units: G-2a (from cal. c.400-260 BC to c. 90 BC - 5 AD) and G-2b (from cal. c.90 BC - 5 AD to c.560-620 AD). Similarly to core G96 the main feature of these assemblage zones is a rapid increase in the pollen of cultivated trees and shrubs, notably including a strong presence of olive and walnut, and lesser of sweet chestnut, manna ash and vine. Pine forests are not that well pronounced, though oak woodlands remain an important part of the landscape. The primary (*Cerealia* type) and secondary anthropogenic indicators are well represented (*Centaurea solstitialis*, *Sanguisorba minor*, *Plantago lanceolata*, *Polygonum aviculare* type, *Polygonum cognatum* type) and *Artemisia* values are high. The zone G-2b has been distinguished as a climax phase in olive cultivation and the presence of secondary anthropogenic indicators. The following zone G-3 is marked by an abrupt increase in pine pollen and the disappearance of most anthropogenic indicators.

Gravgaz core G98 has been dated only biostratigraphically based on the comparison with core G99. The assemblage zone G-2 has been dated from cal. c. 400-260 BC to c.560-620 AD. The main features of the pollen diagram remain the same as in cores G96 and G99, with high percentage values of olive and walnut pollen, and a strong presence of secondary anthropogenic and steppic indicators (with *Artemisia* pollen increasing even more at the end of this zone). *Quercus cerris* pollen is present but decreases toward the end of the phase.

Çanaklı

The lake in the valley of Çanaklı is located c.10km to the south of Sagalassos (elevation 1,015m; Fig.6.5). It changes its size within a year and sometimes dries up completely during summer. The basin that is affected by the water fluctuations measures c.5,500x800m. It is fed mainly by rainwater and has several karstic outlets. One core has been extracted from the lake and it has not been studied in full detail. No radiocarbon dates were obtained; instead biostratigraphical dating based on the data from Gravgaz core G99 was done based on the proximity between two places (10km).

The assemblage zone C-2 has been dated tentatively from cal. c.400-260BC to c.560-620 AD. The subzone C-2a represents the onset of the cultivation phase with an increasing olive presence, a considerably low but stable percentage of walnut and evidence of the presence of manna ash and sweet chestnut (but not vine). *Cerealia* are not well represented, as well as other secondary anthropogenic indicators (*Polygonum cognatum* type, *Plantago lanceolata*) except *Polygonum aviculare* and *Centaurea solstitialis*. *Artemisia* pollen is present, but not in high values. An interesting feature of this zone is the high percentage of cedar pollen and considerable presence of oak pollen.

The subzone C-2b notes a peak in olive cultivation, the presence of walnut, manna ash, vine and sweet chestnut. Secondary anthropogenic indicators are not well represented, but the steppic indicator of *Artemisia* pollen is high. The percentages of cedar and oak pollen have decreased.

Bereket

The Bereket basin is an intramountain valley located south from Burdur (37°32'42.65''N; 30°17'42.23''E; Fig. 6.6), between the mountain ranges of Kokayanık Tepe (1,830m) and Beşparmak Dağları (2,280m). Its size is just 6.3km², and only 13% of it constitutes a flat valley bottom (height c.1,410-1,430m). The valley is drained by Aykırdağ Deresi and Bügdüz Çay towards Burdur Gölü. The climate characteristic to the Bereket basin can be described as Oro-Mediterranean (long, snowy winters, short dry summers). A marsh used to exist at the mouth of the valley, but it was drained in the 1960s for agricultural use. In Hellenistic and Roman times, it was part of the territory of Sagalassos. Two cores BKT-1 and BKT-2 have been extracted and thanks to their high correlation analysed jointly (Kaniewski *et al.*, 2007). Seven radiocarbon dates were obtained for BKT-1 and four for BKT-2 using accelerator mass spectrometry. One of them has been interpreted as too old and thus excluded. The resulting chronology represents a mean temporal resolution of cal.c. 14 years, with the most precise one of cal.c.2 years dated for 40-130 AD. Together with the fact that the Bereket basin is a marginal landscape sensitive both to anthropogenic and non-anthropogenic signals it makes the reconstructed picture an invaluable source of information for the region.

Kaniewski et al. decided to exclude *Pinus* pollen from the main pollen sums because of its overrepresentation in the landscape heavily influenced by fires. Only *Pinus* percentages have been calculated in relation to the sum of the main pollen sum and *Pinus* pollen. Additionally, all aquatic plants, fern spores and indeterminates pollen and spores were excluded. Aquatic plants were analysed separately. The Local Zones have been obtained using an optical division with relative frequency of individual species (Kaniewski et al., 2007, p. 2206).

The final pollen diagrams are dated from 1520 BC to modern times, but hiatuses have been detected, so the discussed material includes the periods from 360 BC to 350 AD and from 450 to 650 AD. These correspond roughly to the periods from Late Achaemenid to Early Byzantine. The oldest local zone Ber-3g is dated at 360-280 BC, and is characterised by the opening of the landscape and massive local and regional fires (probably of anthropogenic origin). With the local zone Ber-3f (cal.c.280 BC) the Beyşehir Occupation Phase starts that lasts until Ber-2a (cal.c.350-450 AD). Its constituent components are arboriculture (*Olea europaea*, *Pistacia atlantica*, *Castanea sativa*, *Fraxinus ornus*, *Juglans regia*, *Corylus*, *Vitis*), agriculture (Poaceae *Cerealia*-type, weeds), and opening of the landscape (gradual decrease of *Pinus*). It is observed that the onset of the BO Phase is not stable. Local Zones Ber-3e (?), Ber-3c (c.190-160 BC) and Ber-3a (c.70-40 BC) suggest abandonment phases of c.30 years each. These phases are marked by the disappearance of cultivated tree species and regrowth of pine forest with oak undergrowth. An interesting feature is the presence of alluvial forest (*Alnus*, *Fraxinus*, *Populus*, *Salix*, *Ulmus*) often disturbed after fire episodes.

From cal.c. 40 BC starts a continuous arboricultural phase marked with the signature Ber-2i to Ber-2a. The first part of it (c.40 BC – 130 AD) shows the highest concentrations of olive and vine pollen. The second part presents a gradual decrease in arboriculture, a lack of charred charcoals and a rise in deciduous forest. The last Local Zone Ber-1d (c.450-650 AD) shows marks of catastrophic fires, the disappearance of cultivated species and an abrupt increase in forest and steppe vegetation. The

characteristic of the core record point to the gradual drying of the lake and a marked human presence in the form of pastoralism.

Göhlisar Gölü

Göhlisar Gölü is a small (c.4km²), shallow (c.2,5m) freshwater lake located in the highland plain of Lycian Taurus, close to the route from Çavdır to Göhlisar (37°8'N, 29°36'E; elevation 930m; Fig.6.7). The lake's catchment area is c.88km², half of which comprises areas above 1,000m. Its current climate is characterised as Oro-Mediterranean with an average annual precipitation of 600mm, wetter winters and dry summers. The ruins lying on the lake shores have been identified as the ancient site of Sinda. In the Roman period the lake was located within the territory of ancient Kibyra. As many as six cores were extracted from three locations on the lake's shores. The first attempt from 1984 by Bottema is incomplete and was not dated with radiocarbon dating unfortunately (Bottema and Woldring, 1984, pp. 136–7). From the remaining cores extracted by Eastwood in 1992 three were analysed in greater detail: GHA, GHB from one location and GHC from another. All are very well dated based on eleven radiocarbon ages (Eastwood *et al.*, 1999).

In their analysis Eastwood *et al.* choose to include the pollen of aquatic plants and the spores of algae and fungi in the total pollen sum. The local pollen assemblage zones were delimited using constrained incremental sum-of-squares cluster analysis (CONISS) with the exclusion of taxa below the 3% abundance threshold.

The joint analysis for the GHA and GHB cores shows five main assemblage zones of which zone GH-4 corresponds with the period of our interest: c. cal. 1240 BC - 700 AD. It is characterized by the presence of the primary (Cereals) and secondary (*Artemisia*, *Plantago lanceolata*-type, *Sanguisorba minor*-type) anthropogenic indicators and of cultivated trees (*Olea*, *Juglans*, *Pistacia*, *Castanea*). The fluctuation of coenobia of aquatic algae may be explained with the eutrophication of the lake's waters due to

agricultural activities. Two subzones *a* and *b* can be differentiated on the basis of the emergence of *Juglans* pollen c. 2,500 BP, that may indicate the introduction of walnut cultivation.

The core GHC shows a good correlation in the sequence of assemblage zones. Nonetheless, it slightly differs in detail from the zone GH-4, e.g. a much lower percentage of pine pollen (40%, whereas the GHA/GHB cores show fluctuating values c.60-75%) and the presence of *Olea*, *Fraxinus ornus* and *Pistacia*. The end of the GH-4 phase is marked by a more gradual increase in pine pollen than in the other cores. It is worth noting that the coring place of GHC is in close proximity to the site of Sinda, so the more pronounced human impact is not surprising.

RECALCULATED CORES

In my work I used data from the European Pollen Database where available and reworked it to achieve consistency in data presentation as far as possible. For the calibration of C¹⁴ dates and creating the age-depth models I used Clam – the latest version 2.2 (Blaauw, 2010), with the terrestrial calibration curve for the northern hemisphere: IntCal13.14C (Reimer *et al.*, 2013). With just one or two radiocarbon dates, only linear interpolation and cubic spline have been chosen for the age-depth models based on the best goodness-of-fit results. The half-Gaussian uncertainty distribution assigned to core tops generally results in modelled surface ages being biased toward older ages. As linear interpolations directly connect the assigned ages, half-Gaussian uncertainty distributions were not considered in these cases (Giesecke *et al.*, 2014, p. 80). Calculations were conducted at 95% confidence ranges.

For the creation of pollen diagrams, I used Tilia (Grimm, 1990 - version 2.0.60.). The pollen sums were calculated with the exclusion of aquatic or unknown taxa. Pollen assemblage zones were calculated using stratigraphically constrained sum-of-squares hierarchical cluster analysis – CONISS (Grimm, 1987).

Hoyran Gölü

Hoyran Gölü is the northern part of Eğirdir Gölü (38°30'N, 30°52' E; elevation c.917m; Fig. 6.9), divided from the southern part of the lake only with a short narrowing. The whole lake is one of the largest freshwater reservoirs in Turkey and measures 482km² (50km long, 3 to 5km wide, average depth 14m). It is located inside two intramountain basins between Barla Dağ, Davraz Dağ and Anamas Dağ. The core has been extracted from the northern shore of the lake Hoyran (38°16'30"N, 30°52'30"E), close to the road from Uluborlu to Yalvaç, south of the village Aşağıkasıkara. A similar route from Apollonia to Antiochia in Pisidia passed this spot in antiquity (Via Sebaste). Hoyran Gölü lies north of Isparta and thus outside the reach of the Eu-Mediterranean climate. It can be described as warm temperate, with cold winters and hot summers. The average yearly precipitation is not high (c.560mm), but more evenly spread throughout the year than in the coastal area.

The pollen core has been extracted and analysed by Zeist, Woldring and Stapert (van Zeist, Woldring and Stapert, 1975, pp. 121–4). Their pollen data are available through the European Pollen Database. Only one radiocarbon date was obtained from the core (2,470 +/- 50 BP, depth 1.65-1.80m), the calibration and an age-depth model was created by Giesecke et al. (Giesecke *et al.*, 2014, p. 80). I have created the pollen diagram and determined assemblage zones with the use of CONISS (Fig 6.13).

The pollen diagram can be clearly divided into three main vegetation zones, of which zone III (dated for cal. c. 3,200-200 BP) is of our main interest. It is mostly characterised by the high amount of arboreal pollen (pine 26.7% and cedar 10.9% on average), but with equally high additions of steppic indicators (30% on average). Possibly the high value of needle-leaved taxa reflects vegetation of the nearby mountain slopes, while the steppic taxa reflect the valley bottoms to the east and west. Within the steppic indicators, the lower percentage of *Amaranthaceae* or *Poaceae* pollen in relation to *Cyperaceae* pollen and *Dryopteris*-type spore in the zone III a (from cal. c.3,200 to c.1,100 years BP) may indicate more humid conditions around the coring site in comparison to previous and consecutive periods. Both primary and secondary anthropogenic indicators are rather low, and their presence is

irregularly stretched along the whole pollen diagram as early as cal. c. 6,000 BP. On the other hand, we have a cluster of potentially cultivated trees (hazelnut, Russian olive, vine, manna ash, walnut) from cal. c. 2,500 to 1,100 years BP, but also in very low values (together 0.3% on average). It may indicate that the northern shore of lake Hoyran was not cultivated. It is more likely that it was used as a pasturing area.

There is one very interesting deviation from the general characteristic of zone III a. Around the depth 130-150 cm, the needle-leaved forest percentage is sharply lower than usual (from 49.9% at 160cm to 31.8% at 150cm and 16.3% at 140cm, it goes back to 50.4% at 110cm), while *Cyperaceae* pollen achieves its climax (57.3% at 140 cm, while the average for zone III a is 19.8%). The abrupt decrease in needle-leaved tree pollen is also observable if the *Cyperaceae* pollen is excluded from the analysis, assuming that the unusually high number of its pollen grains is a result of accidental deposition (the decrease in NLT is then from 60.4% at 160cm to the average 35.8% at 130-150cm). This may be explained by forest clearance in the period from c. 439-87 BC to c.161 BC-226 AD. The following pollen samples show a gradual increase in the needle-leaved trees pollen and simultaneously a higher level of broad-leaved trees and shrubs, that can be explained as the process of forest recovery. The *Cerealia*-type pollen also achieves its local climax c.161 BC-226 AD (2.3%). It is tempting to explain such a sequence as human-induced forest clearance and the subsequent intensification of agricultural activities.

Söğüt Gölü

Söğüt Gölü, now almost completely dried up, was located in an intramountain basin in the eastern Lycian Taurus (elevation c.1,393m; Fig. 6.10). It is surrounded by hills and mountains with the highest peak to the south – Kizilcadağ (c.2,500m). The ancient settlement of Tyriaion was located in the basin, being a part of the territory of the polis of Balboursa in the Hellenistic and Roman periods. Söğüt Gölü lies in the area of Oro-Mediterranean climate with considerable amounts of rain (700-800mm).

The pollen core was extracted and analysed in the laboratory by Zeist, Woldring and Stapert (van Zeist, Woldring and Stapert, 1975, pp. 124–31). Their pollen data are available through the European Pollen Database. The core was extracted from the marshy lake that still existed there in 1967 (37°03'N, 29°53'E). Three radiocarbon dates were obtained at two levels (organic fraction: 2,885 +/- 35 BP at depth 2.05-2.20 m; organic fraction 9,180 +/- 95 BP at depth 3.25-3.45m; calcareous fraction: 10,150 +/- 130 BP at depth 3.25-3.45m), but the age depth model was created with the use of only the younger date and surface value; linear interpolation was implemented with the goodness-of-fit of 1.55. The chronology based on the younger radiocarbon date covers all the periods of our interest. The whole Söğüt Gölü core covers more than 10,000 years BP and is much less detailed in its older parts. In order to maintain clarity, the diagram shows data only from cal.c.3,500-0 years BP.

The diagram (Fig. 6.14) shows two distinctive zones. Zone I (cal.c. from 3,500 to 2,000 years BP) is characterised by a higher percentage of steppic indicators (53% on average, while in zone II they reach 10.5%). Within the arboreal pollen, needle-leaved trees achieve lower values than in other diagrams in the region (20% on average). Broad-leaved (mainly oak) trees are an important and stable component in the forests (8.6% on average). Within this zone we may find clear traces of human agricultural activities. Around cal.2,800 years BP we may observe the onset of arboriculture (olive, manna ash above 2%, the presence of chestnut, hazelnut, vine, walnut) in the vicinity of the lake together with a considerable rise in primary and secondary anthropogenic indicators (from 1.1% to 2.9% and from 0.1% to 0.4% respectively). The zone Ib (cal. from c.2,800 to 2,550 years BP) represents an episode of partial reforestation of the area. Both needle- and broad-leaved trees rise on the pollen diagram, but they fall once again at the end of this subzone (juniper disappears almost completely from this moment). Simultaneously, *Poaceae* drop drastically, while *Cyperaceae* do not, which may suggest that the marshy area around the coring site did not change, but the grasslands on the lake shores were replaced with other types of vegetation (e.g. oak woodland). The consecutive rise in

steppic and anthropogenic indicators suggests a return of intense human influence in subzone Ic (from cal.c 2,550 to c.2,000 years BP). *Cerealia* type achieves its climax in this zone (6.0%).

The next zone II (from cal.c.2,000 to 0 years BP) is characterised by the rise in needle-leaved tree pollen (as much as 70% on average), especially pine, at the expense of open land vegetation. The broad-leaved trees maintain their percentage for a moment, but later are completely dominated by the arboreal pollen. All the anthropogenic indicators lose their intensity in the transition from zone Ic to IIa (cultivated trees' values fall from 2.7% to 0.4%, PAI from 5.0% to 2.0%, SAI from 3.2% to 1.3%). Olive, manna ash and vine disappear from the record. Some cultivation remains in the area, but probably on a smaller scale up until cal.c.700 years BP.

Beyşehir Gölü

Beyşehir Gölü is a large (45km x 20km, c.650km²), but not very deep (up to 10m) freshwater lake located on the eastern edge of the Isparta Angle (c. 37°47'N 31°33'E, elevation 1,120m; Fig.6.8). To the west it is adjacent to the Anamas and Sultan Mountains whose streams feed the lake. The water level changes considerably from season to season and from year to year. Marshy terrain is located to the southwest of the lake and the pollen core has been extracted from there, 2km from Yesildağ (37°32'N 31°30'E). The climatological data have been taken from the Beyşehir meteorological station (c.25km from the coring site) and can be characterised as the Oro-Mediterranean type with dry, warm summers and wetter, mild winters; the average yearly precipitation is c.500mm (van Zeist, Woldring and Stapert, 1975, pp. 114–21).

Beyşehir I pollen core was extracted in 1970 and analysed in the laboratory by Zeist, Woldring and Stapert (van Zeist, Woldring and Stapert, 1975, pp. 68–9). Their pollen data are available through the European Pollen Database. The two radiocarbon dates were obtained. I calibrated them and created a new age depth model (linear interpolation was chosen based on the goodness-of-fit of 1.56). The pollen diagram was created, and assemblage zones determined with the use of CONISS (Fig. 6.12).

Beyşehir II pollen core was extracted in 1977 by van Zeist, Woldring and Bottema, but its only radiocarbon date was calculated for 15,390 +/- 370 BP. An age depth model based on such an old date with large standard deviation makes it unreliable for our purposes. It was estimated that the top of the core reaches just 2,000 years BP so that it does not cover the period of our interest as a whole, and thus it will not be discussed here (Bottema and Woldring, 1984, pp. 123–31).

The zone that corresponds with the Hellenistic and Roman periods in the Beyşehir I pollen core is marked as II b (cal. from c. 2,600 to c. 1,100 years BP). It continues the characteristics observed in the previous zone II a (cal. c. 4,000 to c. 2,600 years BP), that is the low percentage of pine pollen, but high presence of steppic indicators (*Poaceae*, *Cyperaceae*, *Artemisia*). The presence of cultivated taxa in zone II b is not high, but well-marked (from trees and shrubs: *Corylus* 0.1-0.3%, *Vitis* 0.1-0.2%, *Olea* 0.1-0.4%, from the primary anthropogenic indicators: *Poacea-Cereal* type 0.1%-1.8%, *Apiaceae* 0.3-1.6%, *Brassicaceae* 0.1-0.4%, from the secondary anthropogenic indicators: *Polygonum aviculare* 0.5%-2.2%, *Plantago lanceolata* 0.1-2.1%).

The onset of II b zone is marked by the climax of *Poacea* and *Cyperaceae* pollen percentages (10% and 41%). Together with the high values of *Dryopteris*-type spores this can be explained as resulting from the existence of open field marsh in the area of the coring site. Beginning from the subzone II b2 (cal. c. 2,400 to c. 1,700 years BP) the value of pine pollen increases, while the pollen of broad-leaved trees and steppic indicators decreases. The pollen of vine and olives disappear from the record around the 1st century BC. Another slight decrease in the pine pollen followed by increase in steppic indicators is noted in the zone II b3 (cal. from c.1,700 to 1,100 AD), but the values of anthropogenic indicators continue to fall (for the cultivated trees 0.4% to 0.1%, for PAI 1.28% to 1.0%, for SAI 3.14% to 1.0%).

Pınarbaşı Gölü

The now drained lake of Pınarbaşı is located in a basin in the northern part of Lycian Taurus, south-west of Burdur Gölü (37°28' N, 30°3' E, elevation 980m; Fig.6.11). The basin is drained by Eren Çay,

that flows into Burdur Gölü. The modern climate in the basin can be described, on the basis of data from Burdur meteorological station, as Oro-Mediterranean with snowy but mild winters and rather dry summers, and the average estimated precipitation for the area is 400-500mm per year. The basin is small and secluded, so the pollen diagram probably reflects mostly local vegetation.

The Pınarbaşı core was extracted in 1970. The marsh had already been drained at that time and the first 40cm of the core was disturbed. Two hiatuses were identified, and two radiocarbon dates extracted (6,550 $\pm$ 600 BP at the depth 290-300cm, 1,370 $\pm$ 70 BP at the depth of 90-100cm). Giesecke et al. created the age-depth model with a reliable age range of 19,390 to 600 calibrated years BP. Only the uppermost layers of the core positioned above the hiatuses are of our interest, so the diagram shows data for cal.c. 6,400 to c.600 years BP. The pollen data are available through the European Pollen Database. The pollen diagram was created, and assemblage zones determined with the use of CONISS (Fig. 6.15).

The diagram can be divided into two main zones. Zone I is characterised by the dominance of needle-leaved pollen (on average 59% in zone I and 24% in zone IIa), while in zone II the majority of the pollen sum consists of steppic indicators (on average 10% in zone I and 57% in zone IIa). The change took place around cal. c. 3,400 years BP. The decrease in pine and cedar pollen together with the appearance of oak woodlands and cultivated tree species may be connected with deforestation and the introduction of agriculture in the area. Primary and secondary indicators do not achieve high levels but are present. Consecutive subtle changes took place cal.c. 1,800 BP when the arboriculture and agriculture seem to decrease (cultivated trees' values fall from 1.1% to 0.3%, PAI from 1.7% to 0.2% and SAI from 0.2 to 0.1%). The last subzone IIb (from cal.c. 1,800 to 600 years BP) seems unstable, with diminished agricultural activities and consecutive phases of reforestation and steppisation.

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