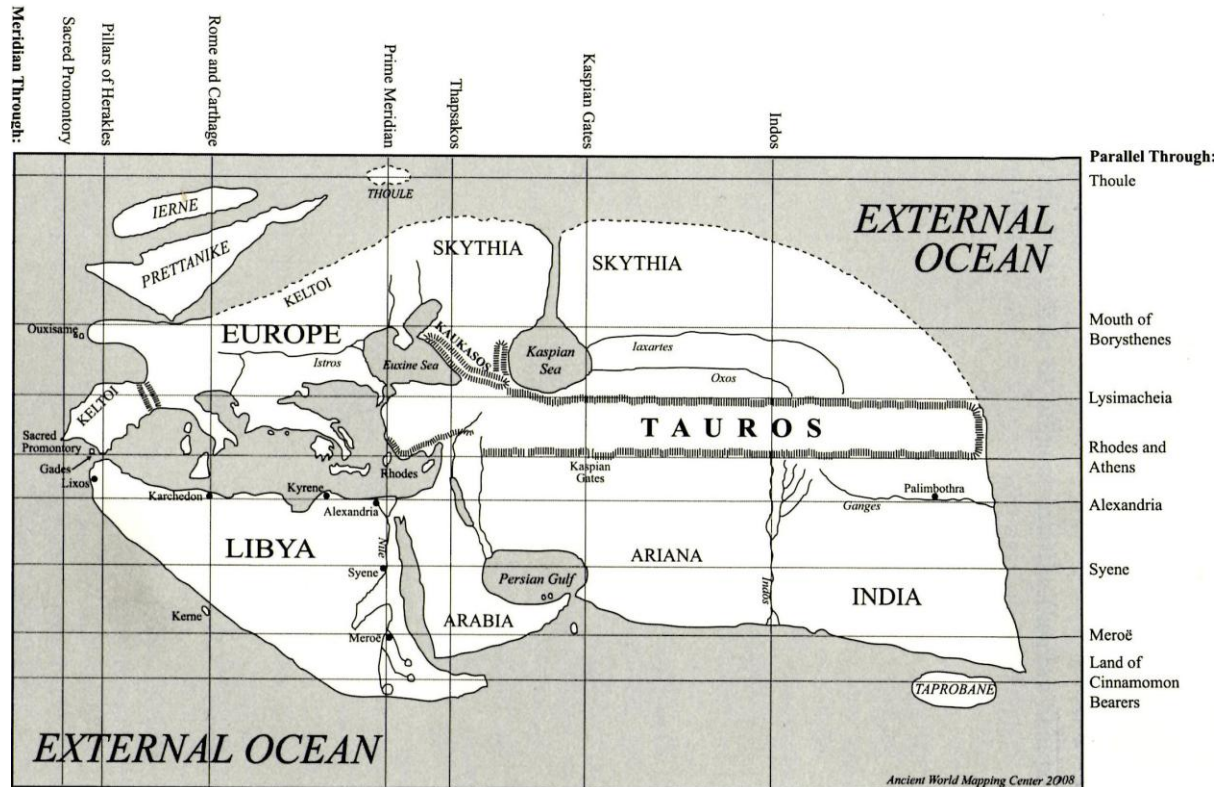


RECONSTRUCTING ERATOSTHENES' MAP OF THE WORLD: A STUDY IN SOURCE ANALYSIS



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ABSTRACT

This thesis aims to reconstruct a map of the world drawn by Eratosthenes of Cyrene (ca. 285 – 205 BC), a Greek polymath of the third century BC. It was during his time as chief librarian at the Library of Alexandria in Egypt that Eratosthenes wrote a three-volume geographical treatise with an accompanying world map. The map is lost and the treatise is extant only in fragments preserved by later authors, primarily Strabo.

The fragments illustrate that Eratosthenes' map was a product of its sources, influenced greatly by various published reports of early Hellenistic exploration. The expeditions of Alexander the Great, Pytheas of Massalia, Megasthenes, Patrocles and Timosthenes of Rhodes, to name only a few, introduced an abundance of new geographic, ethnographic and scientific knowledge to the Greek world. The frontiers of the known and inhabited world were empirically investigated, from India in the east to the Iberian Peninsula in the west, and from Ethiopia in the south to Scandinavia in the north.

Eratosthenes extensively utilised the reports of early Hellenistic exploration to inform his mapping of topographic features, geographic regions and cartographic systems. Figuring out the ways in which Eratosthenes took information from these reports and transposed it onto his map of the world will be this thesis' main concern. A thorough analysis of Eratosthenes' map in the context of its source material will also elucidate a great deal about the development of Greek cartography in the Hellenistic Age.

ABBREVIATIONS

Note that many of the abbreviations used in this thesis are consistent with the system found in the *Oxford Classical Dictionary*, 3rd edn. revised (2003). There are, however, several exceptions, each of which is marked by an asterisk.

General Abbreviations

* <i>Brill's New Jacoby</i>	<i>BNJ</i>
*Liddell, Scott and Jones, (<i>Greek-English Lexicon</i>)	<i>LSJ</i>

Ancient Authors and Works

Author	Abbreviation	Work
Aelian	<i>Ael. NA.</i>	<i>On Animals</i>
Aeschylus	<i>Aesch. PV.</i>	<i>Prometheus Bound</i>
	<i>Aesch. Pers.</i>	<i>Persians</i>
Aetius	<i>Aet. Plac.</i>	<i>Placita</i>
*Agathemerus	<i>Agath.</i>	<i>Sketch of Geography</i>
Ammianus Marcellius	<i>Amm. Marc.</i>	<i>Res Gestae Libri XXXI</i>
Apollonius of Rhodes	<i>Ap. Rhod. Argon</i>	<i>Argonautica</i>
Aristophanes	<i>Ar. Nub.</i>	<i>The Clouds</i>
Aristotle	<i>Arist. Mete.</i>	<i>Meteorology</i>
	<i>Arist. Pol.</i>	<i>Politics</i>
Arrian	<i>Arr. Anab.</i>	<i>Anabasis of Alexander</i>
	<i>Arr. Ind.</i>	<i>Indica</i>
Athenaeus	<i>Ath.</i>	<i>Learned Banqueters</i>
Avienus	<i>Av.</i>	<i>Ora Maritima</i>

Cicero	Cic. <i>Att.</i>	<i>Letters to Atticus</i>
Claudius Ptolemy	Ptol. <i>Geog.</i>	<i>Geography</i>
*Cleomedes	Cleom.	<i>On the Circular Motions of the Celestial Bodies</i>
*Diodorus Siculus	Diod.	<i>Library of History</i>
Diogenes Laertius	Diog. Laert.	<i>The Lives of Eminent Philosophers</i>
*Eratosthenes	Erat., fr.	<i>Geography (Fragments)</i>
Euclid	Euc.	<i>Elements</i>
Geminus	Gem.	<i>Introduction to the Phenomena</i>
Herodotus	Hdt.	<i>Histories</i>
Hesiod	Hes. <i>Op.</i>	<i>Works and Day</i>
	Hes. <i>Theog.</i>	<i>Theogony</i>
*Hipparchus	Hipp.	<i>Commentary on the 'Phenomena' of Aratus and Eudoxus</i>
Hippocrates	Hippoc. <i>Aer.</i>	<i>Airs, Waters, Places</i>
Homer	Hom. <i>Il.</i>	<i>Iliad</i>
	Hom. <i>Od.</i>	<i>Odyssey</i>
	<i>Hymn. Hom. Ap.</i>	<i>Homeric Hymn to Apollo</i>
Julius Caesar	Caes. <i>B Gall.</i>	<i>Gallic War</i>
Justin	Just.	<i>Epitome of the Philippic History of Pompeius Trogus</i>

*Marcianus	Marc. <i>Epit. Peripl. Men.</i>	<i>Epitome of Menippus of Pergamum's Periplus of the Inner Sea</i>
Martianus Capella	Mart. Cap.	<i>On the Marriage of Philology and Mercury</i>
Photius	Phot. <i>Bibl.</i>	<i>Bibliotheca</i>
Pindar	Pind. <i>Pyth.</i>	<i>Pythian Odes</i>
Plato	Pl. <i>Criti</i>	<i>Critias</i>
	Pl. <i>Ph.</i>	<i>Phaedo</i>
	Pl. <i>Ti.</i>	<i>Timaeus</i>
Pliny the Elder	Plin. <i>HN.</i>	<i>Natural History</i>
Plutarch	Plut. <i>Alc.</i>	<i>Life of Alcibiades</i>
	Plut. <i>Alex.</i>	<i>Life of Alexander</i>
	Plut. <i>Nic.</i>	<i>Life of Nicias</i>
Polybius	Polyb.	<i>The Histories</i>
Quintus Curtius Rufus	Curt.	<i>History of Alexander</i>
Seneca the Younger	Sen. <i>Q Nat.</i>	<i>Natural Questions</i>
*Strabo	Strabo	<i>Geography</i>
Thucydides	Thuc.	<i>History of the Peloponnesian War</i>
Xenophon	Xen. <i>An.</i>	<i>Anabasis</i>
	Xen. <i>Cyr.</i>	<i>Cyropaedia</i>

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INTRODUCTION

Eratosthenes (ca. 285 – 205 BC) was born in Cyrene, a Greek colony located in modern-day Libya, during the early Hellenistic period.¹ During his youth in Cyrene, he studied under Lysanias and possibly also Callimachus. Later, he moved to Athens, where he became a pupil of Zeno of Citium (ca. 333 – 261 BC), the founder of the Stoic school of philosophy (Strabo 1.2.2). Eratosthenes was a polymath. He wrote prolifically on a wide range of subjects, enhancing Greek knowledge of mathematics, philosophy, chronology, poetry, history and geography. He is usually credited with coining the term ‘geography’ (γεωγραφικά) and founding the science of geography as we now know it.² In ca. 245 BC, Ptolemy III Euergetes (r. 246 – 222 BC), King of Egypt, summoned Eratosthenes from Athens and appointed him head of the Library at Alexandria, a post which he presumably held until his death.³ Eratosthenes’ major intellectual achievements include inventing the armillary sphere; formulating a simple algorithm for finding prime numbers; scientifically calculating the circumference of the earth; and

¹ The Hellenistic Age usually refers to the era following the conquests of Alexander the Great (III of Macedon), during which Greek culture diffused widely throughout the known world. The term ‘Hellenistic’ was coined in 1836 by the German scholar Droysen, and derives from the verb ἐλληνίζειν (‘to make Greek’). Conventionally, the Hellenistic Age begins with the death of Alexander the Great in 323 BC and ends with either the Roman conquest of mainland Greece in 146 BC, or the subjugation of Ptolemaic Egypt in 30 BC. Some scholars, however, have argued for the inclusion of Alexander’s reign in the chronology, believing that his conquests initiated the cultural dynamism, fusion and cosmopolitanism that characterised the era. For the purposes of this thesis, 331 BC, the year of the Battle of Gaugamela, has been chosen as the start date for the Hellenistic Age, as it was after this battle that Alexander subjugated the Achaemenid Persian Empire, and thus began the cultural transformation of the known world. 30 BC has been chosen as the end date because the Roman subjugation of Ptolemaic Egypt marked the final disintegration of all the former Hellenistic kingdoms and the end of the Hellenising process. On the Hellenistic Age and the issues of chronology, see Droysen 1836: 1; Karttunen 1997: 1-2; Burn 2004: 13-16; Bosworth 2009: 1-27.

² Dicks 1960: 18-31, esp. 30-1 deals with the origins of the term γεωγραφικά, within a brief but informative history of Greek geography up until the era of Hipparchus in the second century BC.

³ For a thorough history of the Library of Alexandria under Ptolemaic administration, see Fraser 1972, vol. 1: 320-35.

creating a map of the world. This map was included in and described throughout Eratosthenes' lost geographical treatise, the *Geography*, the main purpose of which was cartographic: διορθῶσαι τὸν ἀρχαῖον γεωγραφικὸν πίνακα ('to amend the old geographical map') (Strabo 2.1.2, Erat., fr. 47).⁴

This thesis will produce a critical examination of Eratosthenes' map of the world, as presented in the fragments of his *Geography*. More specifically, this thesis will evaluate how primary accounts of early Hellenistic exploration subsequently informed the main features of Eratosthenes' map. An analysis will be undertaken of the multifarious ways in which Eratosthenes incorporated topographic, scientific and cartographic information from these accounts into his *Geography*, and how he then used the information to construct a cartographic image of the world. The extent to which Eratosthenes' map departed from earlier Greek world maps and contributed to the development of Greek cartography will be discussed throughout.

References from the fragments of Eratosthenes' *Geography* indicate that his map of the world was influenced by the accounts of several different early Hellenistic explorations. The two most important explorations to be mentioned are Alexander the Great's Asian campaigns and Pytheas of Massalia's (Marseille) journey in the regions of northern Europe. Also to be investigated are Megasthenes' and Deimachus' expeditions to India and Patrocles' voyage in the Caspian Sea, all three of which were dispatched under the Seleucid Empire in Asia. Furthermore, there will be some

⁴ All translations are my own. The fragment numbers of Eratosthenes' *Geography* follow the system used in Roller's *Eratosthenes' Geography: Fragments collected and translated, with commentary and additional material* (2010). On Eratosthenes' life, work and achievements, see the Suda s.v. Ἐρατοσθένης (2898). For further discussion, see Bunbury 1879, vol. 1: 615-16; Fraser 1970: 175-207; Fraser 1972, vol. 1: 308, 322; vol. 2: 463, 489-90; Roller 2010: 1-15. Geus 2002: 263 emphasises that cartography was Eratosthenes' primary interest in the *Geography* ('Eratosthenes primäres Interesse in dieser Schrift galt der Kartographie').

discussion of Timosthenes of Rhodes' voyage around the Mediterranean Sea and Philo's travels in Ethiopia, both commissioned under the Ptolemaic dynasty in Egypt.⁵

Historians of ancient cartography are frequently constrained by the sheer paucity of surviving primary source material. The only extant ancient Greek world maps are those drawn by Claudius Ptolemy (ca. AD 90 – 168), which are found in Renaissance manuscript copies of his treatise on cartography.⁶ Our knowledge of Greek cartography in the Hellenistic Age, however, is obscured commensurately by the absence of surviving world maps and fully-extant geographical texts from the period.⁷ Additionally, all primary accounts of early Hellenistic exploration are lost. Therefore, this autopsy of Eratosthenes' map of the world is almost entirely reliant on the information, testimonia and citations preserved by later authors. Aujac, Harley and Woodward have highlighted succinctly the difficulty involved in ascertaining definite links between early Hellenistic exploration and Greek world maps:

‘As exemplified by the journeys of Alexander and Pytheas, the combination of theoretical knowledge with direct observation and the fruits of extensive travel gradually provided new data for the compilation of world maps.

While we can assume a priori that such a linkage was crucial to the

⁵ After Alexander the Great's death in 323 BC, rivals for the Macedonian throne engaged in a series of wars with one another, resulting eventually in the partition of the empire into several successor kingdoms. Ptolemy I Soter established the Ptolemaic dynasty (305 – 30 BC) in Egypt, while Seleucus I Nicator established the Seleucid Empire (312 – 63 BC) in Asia, which at its height extended from Syria to India. For recent literature on the Successors (Diadochi) of Alexander the Great, see Kincaid (1985) *Successors of Alexander the Great: Ptolemy I, Pyrrhus of Epirus, Hiero of Syracuse, Antiochus III*; Bosworth (2002) *The Legacy of Alexander: Politics, Warfare, and Propaganda under the Successors*; Bennett and Roberts (2008) *The Wars of Alexander's Successors, 323 – 281 BC*; Wheatley and Hannah (2009) *Alexander & his Successors : Essays from the Antipodes: a Companion to Crossroads of History: the Age of Alexander; Alexanders's Empire: Formulation to Decay*.

⁶ Berggren and Jones (2000) *Ptolemy's Geography: An Annotated Translation of the Theoretical Chapters* affords a comprehensive treatment of Ptolemy's treatise and maps.

⁷ For analysis of the various problems pertaining to the source tradition for ancient Greek maps, see Aujac, Harley and Woodward 1987a: 130; Dilke 1987: 105-6.

development of Hellenistic cartography, there is no evidence, as in so many other aspects of its history, that allows us to reconstruct the technical processes and physical qualities of the maps themselves.’⁸

A corollary of the fragmentary source tradition is that no comprehensive study of Eratosthenes’ map of the world in the context of early Hellenistic exploration has been ventured. Eratosthenes’ *Geography* as a whole has, in fact, received limited scholarly attention. Berger’s *Die geographischen Fragmente des Eratosthenes: neu gesammelt, geordnet und besprochen* was the first work produced on Eratosthenes’ geographical fragments and has remained fundamental since its first publication in 1880. Furthermore, the first and thus far only English translation and commentary on the geographical fragments did not appear until early 2010, with Roller’s *Eratosthenes’ Geography: Fragments collected and translated, with commentary and additional material*. There are a few other scholarly works of note, which deal with different aspects of Eratosthenes’ geographical thinking.⁹ However, throughout these works only a very superficial understanding of the source material for Eratosthenes’ map can be gained.

Three widely accepted axioms dominate the scholarship on Eratosthenes and Greek cartography in the Hellenistic Age. Firstly, that the explorations of Alexander the Great, Pytheas, the Seleucids and the Ptolemies substantially expanded Greek geographical horizons. Secondly, that this expansion stimulated a tremendous growth in empirical geographic knowledge. Thirdly, that this knowledge enabled later mapmakers,

⁸ Aujac, Harley and Woodward 1987b: 151-2.

⁹ For some of the most relevant scholarship, see Bunbury (1879) *A History of Ancient Geography among the Greeks and Romans from the Earliest Ages till the Fall of the Roman Empire*; Fraser (1972) *Ptolemaic Alexandria*; Dilke (1985) *Greek and Roman Maps*; Aujac, Harley and Woodward (1987b) ‘The Growth of an Empirical Cartography in Hellenistic Greece’; Geus (2002) *Eratosthenes von Kyrene: Studien zur hellenistischen Kultur- und Wissenschaftsgeschichte*; Geus (2004) ‘Measuring the Earth and the *Oikoumene*: zones, meridians, *sphragides* and some other geographical terms used by Eratosthenes of Cyrene.’

like Eratosthenes, to create new and revised maps of the world.¹⁰ Thus, it is implied strongly that there were various links between the data recorded by early Hellenistic explorers and the cartographic details of Greek world maps thereafter. Nonetheless, there is a need for in-depth scrutiny of how reports of exploration tangibly influenced Eratosthenes' mapping of specific topographic features and cartographic systems.

The methodology behind this examination will be straightforward. By way of introduction, the first chapter will discuss the subject matter and function of maps in the Greek context; give a concise overview of Greek cartography down to Eratosthenes; and dissect the source tradition for his map. Chapter two will be dedicated to thorough source criticism. The relevant fragments of Eratosthenes' *Geography* will be cross-referenced with the fragments of early Hellenistic explorers' reports, in order to identify specific instances in which Eratosthenes used these primary accounts to inform his map. The chapters following this will form the core of the study. In each chapter, important aspects of Eratosthenes' map will be investigated in relation to the primary accounts of early Hellenistic exploration. Chapter three will briefly consider how Eratosthenes represented the world's shape and size, before thoroughly analysing his depiction of a line of zero latitude, the main parallel of the map. The genesis of the main parallel as a cartographic system will be of special interest. Chapter four will discuss how

¹⁰ Bunbury 1879, vol. 1: 407-8, 615; Cary and Warmington 1929: 148-9; Warmington 1934: xli; Heidel 1937: 122-3; Thomson 1948: 124; van Paassen 1957: 263-5; Dicks 1960: 26-31; Tozer 1964: 123-4, 166; Dilke 1985: 29-35; Aujac, Harley and Woodward 1987b: 148-60; Roller 2010: 16-33. Warmington, discussing the geographic works of Eratosthenes and Hipparchus, emphasises their reliance on information derived from accounts of exploration: 'To the knowledge obtained by explorers, including Alexander and men under his successors, they applied astronomical and mathematical discoveries which substituted for the older speculations of philosophers on the nature of the earth as a body in space (without necessarily abandoning all the old doctrines) some real knowledge in regard not only to the sphericity, but also to the circumference of the earth. The main object of these mathematical geographers was to plot a map of the earth in which place and distance were drawn to scale by the mathematical reference to latitude and longitude, though they were compelled also to use unmathematical material drawn from all the other types of geographic literature indicated above' (*travellers' reports, surveyors' reports, handbooks for travellers and general works on geography*).

Eratosthenes divided up his map of the world, focussing on the cartographic systems of continents, ἄκραι ('promontories') and σφραγίδες ('sealstones'). Chapter five will briefly outline Eratosthenes' perspective on the geographic concept of Ὠκεανός ('Ocean'), before exploring how he mapped the Caspian Sea. Whether he conceived of the Caspian as a landlocked sea or a gulf of the Ocean will be the crux of the chapter. Finally, chapter six will explain the prodigious influence which Pytheas of Massalia's voyage had on Eratosthenes' map of the world. Although each chapter will survey one or two isolated issues, it is hoped that the thesis, when viewed as whole, presents the reader with a synoptic picture of Eratosthenes' map in the context of early Hellenistic exploration.

1. CONTEXTUALISING ERATOSTHENES' MAP

This chapter will contextualise and introduce Eratosthenes' map to the reader. In order to gain an informed perspective on this map, it is important that we first explore the role of maps in ancient Greek society. Furthermore, we must look back prior to Eratosthenes' time and survey the development of mapmaking as a science. Some understanding of this process will explicate Eratosthenes' contribution to ancient Greek cartography. The last part of the chapter will delve into the source tradition for Eratosthenes' *Geography*, summarising the very fragmentary transmission of the text and the map.

1.1. THE SUBJECT MATTER AND FUNCTION OF GREEK MAPS

What is a map? In the formative work, *The History of Cartography*, editors Harley and Woodward state that maps are 'the primary medium for transmitting ideas and knowledge about space.'¹ With similar emphasis on the communicative power of maps, Turnbull asserts that maps show identifiable landscapes and 'provide ways of ordering and knowing our physical environment – the territory.'² Since prehistoric times, maps have functioned as tools of communication, transforming spatial data into perceptible graphic representations.³ Maps are either practical or theoretical in nature. Maps of a practical nature may display highly detailed images which can be used to navigate one's way across a terrain from location to location, like a road map for instance. On the other hand, maps of a theoretical nature are usually broader in conception, showing the general outline and appearance of large environs. Intrinsicly, maps are always relevant to both the mapmaker and the viewer. The mapmaker decides

¹ Harley and Woodward 1987: xv.

² Turnbull 1993: 50.

³ Delano-Smith 1987: 45-9 argues that scholars commonly view prehistoric maps as primitive methods of wayfinding, while ignoring the abstract and symbolic value of maps to prehistoric people.

how the space is rendered, while the viewer decides how it is interpreted. With each new mapmaker comes a new rendering and with each new viewer comes a new interpretation. Therefore, maps are intersubjective, experienced personally and uniquely by different people.⁴ Maps are also records of cultural history. They illuminate a great deal about the various cultural norms, attitudes and ideologies influencing mapmakers and their audiences.⁵ Maps of the world, via the depiction of terrestrial space as a unified whole, are underpinned by a consciousness of global interconnectivity and often reflect cultural and political paradigms.

In ancient Greece, maps of the world depicted the part of the earth which was known to the Greeks, referred to as the οἰκουμένη (*oikoumene*). According to our sources, the first map of the οἰκουμένη was drawn sometime in the mid-sixth century BC by the Ionian philosopher Anaximander (ca. 611 – 546 BC).⁶ In Miletus, located in western Asia Minor, Anaximander and his followers concerned themselves with examining the natural world, its origins and material structure as part of the *cosmos*.⁷ This tradition of natural philosophy encouraged cartographic speculation about the entire earth, but especially the part of the earth which could be observed and comprehended rationally – the οἰκουμένη.

⁴ Turnbull 1993: 15 explains the notion of intersubjectivity in relation to cartography. On the biases and limitations inherent in ancient mapmaking, see esp. Hodgkiss 1981: 11-14; Black 1997: 9-11; Edson 1999: vii-x; Wilford 2002: 15.

⁵ For recent literature on cultural history, see Burke (2008) *What is Cultural History*, 2nd edn.

⁶ For ancient references to Anaximander's map, see Strabo 1.1.11; Agath. 1.1; Diog. Laert. 2.1. I disagree with Roller's assertion that the word οἰκουμένη 'seems to have originated in the fourth century BC to characterize the civilized (i.e. Greek) world as opposed to those not civilized (i.e. the Makedonians)': see Roller 2010: 145. There are numerous earlier examples, especially from Herodotus' *Histories*, of the Ionic form οἰκεομένη being used to define inhabited land and the known/inhabited world: see Hdt. 2.32.5, 3.106.1, 3.114.1. Cf. Xen. *An.* 1.2.20; Xen. *Cyr.* 3.3.2.

⁷ On the Ionian philosophers' theories about the *cosmos* and the natural world, see Kahn 1960: 222; Kirk, Raven and Schofield 1983: 133-42; Jacob 1996: 191-8; Hahn 2001: 177-218.

Throughout antiquity, the οἰκουμένη was the principal subject of the Greek cartographic tradition. The first explicit association of the οἰκουμένη with mapmaking is found in Aristotle's *Meteorology*, where it is defined as a finite and measurable spatial entity located within the spherical earth (Arist. *Mete.* 362 b12-30). Similarly, in the early first century AD, the Greek geographer Strabo (ca. 64 BC – AD 23) argued that it was the geographer's purpose σχῆμα καὶ μέγεθος εἰπεῖν ὡς ἀπλούστατα ἐγχειρεῖν τὸ πῖπτον εἰς τὸν γεωγραφικὸν πίνακα συμπαραδηλοῦντα καὶ τὸ ποῖόν τι καὶ πόστον μέρος τῆς ὅλης γῆς ἐστι ('to try to convey the shape and extent of that section of the earth which falls within the geographical map, showing what the nature of that section is and what portion it is of the entire earth') (Strabo 2.5.13). The 'section of the earth' referred to in this passage is identified elsewhere by Strabo as the οἰκουμένη. In fact, when describing Eratosthenes' world map, he refers to it explicitly as τὸν τῆς οἰκουμένης πίνακα ('map of the οἰκουμένη') (Strabo 2.1.1, Erat., fr. 47).⁸ Eratosthenes, it seems, demonstrated a keen interest in the spatial relationship between the οἰκουμένη and the whole earth, which he explored through his world map and scientific measurement of the earth's circumference.

It is necessary now to examine how Greek mapmakers came to a determination about and then subsequently mapped the topographic features and spatial details of the οἰκουμένη. As a finite and measurable spatial entity, the οἰκουμένη comprised all the space on the earth's surface which the Greeks claimed to be 'known'. That is, all the space for which Greek mapmakers had a pertaining corpus of reliable geographic information that they could utilise to conceive accurate cognitive blueprints for maps. Thus, the perceived topographic features and spatial details of the οἰκουμένη depended

⁸ Scholars have debated about whether Eratosthenes included a map of the world within the text of his *Geography*, or merely collated the geographic data out of which one could be constructed: see Roller 2010: xi. The ancient sources are largely ambiguous on this question, but this extract from Strabo certainly uses terminology (πίνακα) consistent with the description of an actual map. On the meaning of πίναξ, see *LSJ* (1940) s.v. πίναξ: 1405.

on the quantity and quality of the geographic data to which Greek mapmakers had access. Greek mapmakers relied upon a mixture of sources, including their own firsthand observations, eye-witness geographical reports, travellers' tales and an abundance of derivative information often diffused along trade routes and obtained via intermediaries. Consequently, the οἰκουμένη was characterised by an understanding of the world's interconnectedness, with extensive networks of communication enabling the transmission of geographic information to the Greeks from distant regions and places. The οἰκουμένη was the known world, but even more specifically it was the world which the Greeks knew to be inhabited, synonymous with the known extent of human habitation, interaction and knowledge transmission.⁹

It is clear that maps functioned as an important means of communication in ancient Greece. Maps of the οἰκουμένη, in particular, transmitted a diverse range of ideas about space, places and peoples. Greek mapmakers were required to sift through a huge corpus of geographic information, selecting only a modicum of data, the most germane, to be interpreted and arranged into a coherent graphic form. Despite continual advancements in Greek geographic knowledge and the theoretical apparatus for mapping, it has been shown that the fundamental purpose of all Greek world maps was

⁹ For further insight into οἰκουμένη as a geographic concept, see *LSJ* (1940) s.v. οἰκουμένη: 1205. Romm 1992: 37-41 argues that οἰκουμένη implies a region made coherent by the intercommunication of its inhabitants. Fowden 1993: 13-14 states that 'By such expressions as *orbis terrarium* and *oikoumene*, educated Greeks and Romans basically meant the *Kulturländer*, the useful parts of the world, which they defined with rather self-conscious broad-mindedness as what lay between, in the West, the Atlantic Ocean where Heracles had set the bounds of the earth; in the East, the remotest Indians who had been visited by Heracles together with Dionysus; in the North, the Scythians; and in the south, the Blemmyes and Ethiopians.' Munn 2006: 188-9 suggests that in the Ionian tradition οἰκουμένη denoted all the lands of the earth under the regime of settled agriculture. Similar to Romm, Schmitt 2007: 73 stresses that the οἰκουμένη was 'not just a geographic entity, but first of all a social realm established by its inhabitants' ability, at least in principle, to form relationships with one another.' Cosgrove 2008: 105-6 postulates that the οἰκουμένη was the civilised world, defined by the existence of culture and cultivation, found especially in the central, Mediterranean region. In my opinion, during Eratosthenes' era, the increased

to show the basic spatial structure of the known and inhabited world. This οἰκουμένη could fluctuate in perceived shape, size and form, but at all times it remained relevant and important to the Greek audience. This was because what Greek mapmakers considered to be known and inhabited inherently reflected notions about the Greek sense of place in the world.

Jacob states that ‘A map may display a view but it also provides the viewer with a point of view, a place in space.’¹⁰ Greek maps revealed the world from the Greek point of view. For the Greek audience, the position of Greece relative to the location and orientation of other places, peoples and landmarks would have embodied questions of Greek identity and cultural self-perception.¹¹ In this sense, world maps provided a graphic format for mapmakers to express how the Greeks viewed themselves in relation to the global spatial environment.

There is sufficient evidence to suggest that in antiquity, especially during the Hellenistic Age, maps circulated widely within the Greek world.¹² There were several different materials and media available for the depiction and display of maps. Maps were drawn on papyri and parchment, painted on wooden panels, engraved on portable bronze tablets, imprinted on model globes and embossed on coins.¹³ Historians of cartography have raised important questions about the extent to which maps were

cross-cultural interaction between the Greeks and foreign peoples would have brought the idea of global interconnectivity to the fore, as a defining feature of the οἰκουμένη.

¹⁰ Jacob 1996: 193.

¹¹ Romm 1992: 46-7 examines how many early Greek maps of the world were ingrained with notions of ethnocentrism. He states that ‘Ethnocentrism, in the most literal sense of the word, denotes a construct of space which sees the center of the world as the best or most advanced location, and therefore demotes distant peoples to the status of unworthy savages...In such negative schemes, we note, it is the peoples of the *eschatiai*, in this case the Nomad Scythians, who become most prominent as ethical *paradeigmata* for the Greeks, since they are assumed to differ most widely from the rest of humankind.’ Cf. Geus 2003: 233-4. This concept of centre versus periphery is demonstrated most overtly by the historian Ephorus’ conception of the οἰκουμένη; see fig. 1.4.

¹² Dilke 1985: 30-1.

¹³ Dilke 1985: 21, 30-1; Aujac, Harley and Woodward 1987b: 157-8.

disseminated throughout Greek society. The art of mapmaking was esoteric undoubtedly, requiring expert knowledge and technical drawing skills. The process of viewing and interpreting world maps, however, was a little more straightforward, open to the educated and astute observer. Several literary sources from the Classical period (ca. 500 – 323 BC) suggest that the average Athenian citizen was familiar with world maps, but may have had difficulty comprehending some of the spatial details and cartographic systems employed.¹⁴

Aujac, Harley and Woodward argue that during the Hellenistic Age cartographic systems and maps of all kinds were becoming even more accessible, through the various media, to citizens in major towns and cities.¹⁵ Maps featured readily in education, used as didactic tools for geographical instruction in schools and academies. There is even evidence to suggest that ‘the cartographic image was being popularized,’ with maps displayed in public spaces for general viewing.¹⁶ Confirmation of this is found in the will of Theophrastus (ca. 371 – 287 BC), a student of Aristotle and a contemporary of the mapmaker Dicaearchus (fl. 326 – 296 BC).¹⁷ In his will Theophrastus requested that πίνακες (‘panels’) depicting γῆς περίοδοι (‘maps of the world’), be displayed in the lower stoa adjacent to the Museum of the Lyceum in Athens (Diog. Laert. 5.51). It is probable that in the great Hellenistic cities, like Athens and Alexandria, with their

¹⁴ Thuc. 6.1.1, in the context of the Athenian expedition to Sicily in 415 BC, implies that most Athenians were ignorant of the island’s vast size and its number of inhabitants. Furthermore, it is stated that a voyage around Sicily took eight days in merchant vessels and that the island is separated from the Italian mainland by 20,000 stadia. Ar. *Nub.* 206-15 provides a comical take on the average Athenian’s knowledge of world maps. The student points out to Strepsiades the location of Athens, Attica, Sparta and the island of Euboea off the Attic coast. Plut. *Alc.* 17.2-3 notes that in preparation for the Sicilian Expedition people in Athens were mapping out the shape of Sicily and the relative positions of Libya and Carthage.

¹⁵ Aujac, Harley and Woodward 1987b: 157.

¹⁶ Aujac, Harley and Woodward 1987b: 157-8.

¹⁷ Aujac, Harley and Woodward 1987b: 158. Dicaearchus of Messana wrote a geographical treatise entitled *Circuit of the Earth*. According to Cicero, who probably had firsthand access to Dicaearchus’ work, this treatise contained maps: see Cic. *Att.* 6.2.3.

libraries, intellectual institutions and large public buildings, maps would have regularly overlapped the intellectual and plebeian spheres.

In imperial Rome also, maps pervaded the civic arena, displayed publically as symbols of empire and imperial administration. One such example is the world map of M. Vipsanius Agrippa (ca. 64/63 – 12 BC), placed on the wall of the Porticus Vipsania near the Via Flaminia.¹⁸ This map clearly served symbolic and propagandistic purposes. It demonstrated to the Roman populace the vast extent of Roman imperial dominion under the Emperor Augustus, showing in detail the spatial relationship between Rome, the provinces of the empire and the rest of the world.

An example of the symbolic and propagandistic use of maps in the Greek world comes from an Ionian coin type possibly minted in the 330s by Memnon of Rhodes (380 – 333 BC), the commander of the Greek mercenaries who were serving in Asia Minor under the Persian King Darius III. On the reverse of a series of Rhodian-weight tetradrachms, Johnston has identified a miniature map, showing the physical relief of the hinterland of Ephesus in western Asia Minor (see fig. 1.1). On the obverse side there is a representation of the Persian King holding a bow and spear.¹⁹ Based out of Ephesus, Memnon probably minted these coins to pay his troops, and may have chosen this topographical image to signify the domain which he controlled on behalf of the Persian King. Although itself too small to have had any real practical application, the Ionian coin map foreshadowed the Roman use of maps, especially regional maps, in the practical realms of land surveying, town planning, navigation and administration.²⁰ This map, therefore, to some extent challenges the view, long held by historians of

¹⁸ Pliny the Elder provides the most detailed ancient references to Agrippa's map: see Plin. *HN*. 3.17, 3.86, 4.81, 4.91, 4.98, 4.105, 5.102, 6.136-7. Dilke 1985: 41-2 argues that Agrippa's map was constructed to further Roman imperial expansion. Also, see Nicolet 1991: 95-122.

¹⁹ Johnston 1967: 86. For further discussion of this Ionian coin type, see Dilke 1985: 146-7; Aujac, Harley and Woodward 1987b: 158; Virga 2007: 16.

²⁰ On the various practical applications of Roman maps, see Dilke 1985: 87-129.

cartography, that the Greeks had no interest in practical and detailed regional mapping.²¹ It now seems plausible that during the Hellenistic Age maps of all kinds and in assorted media gradually gained in popularity, becoming increasingly accessible, recognisable and familiar to a relatively wide spectrum of Greek society.



Fig. 1.1: The reverse side of an Ionian coin type, which shows the physical relief of the Ephesian hinterland.

1.2. A BRIEF OVERVIEW OF GREEK CARTOGRAPHY DOWN TO ERATOSTHENES

The perceived spatial structure of the *οικουμένη* was always subject to revision. Increases in Greek geographic knowledge, primarily occurring through trade, travel and exploration, initiated important changes and advances in Greek mapmaking. In their earliest and simplest form, Greek maps of the world typically depicted a circular *οικουμένη* sitting atop the surface of a flat earth-disc. The *οικουμένη* was bisected symmetrically into two continents, Europe and Asia, and organised around the

²¹ For discussion of the dichotomy between theoretical and practical cartography in ancient Greece, see Aujac, Harley and Woodward 1987a: 130; Purves 2010: 118-19.

Mediterranean Sea and Greece in the centre (Agath. 1.1).²² Beyond the Mediterranean coastline, the Ionian mapmakers, like Anaximander and Hecataeus, depicted a vast peripheral expanse framed by a circumambient Ocean, with the spatial relationships of places and peoples throughout the οἰκουμένη perceived in relation to the central axis. Only very vague outlines were afforded of the Asian and European interiors (see fig. 1.2).²³

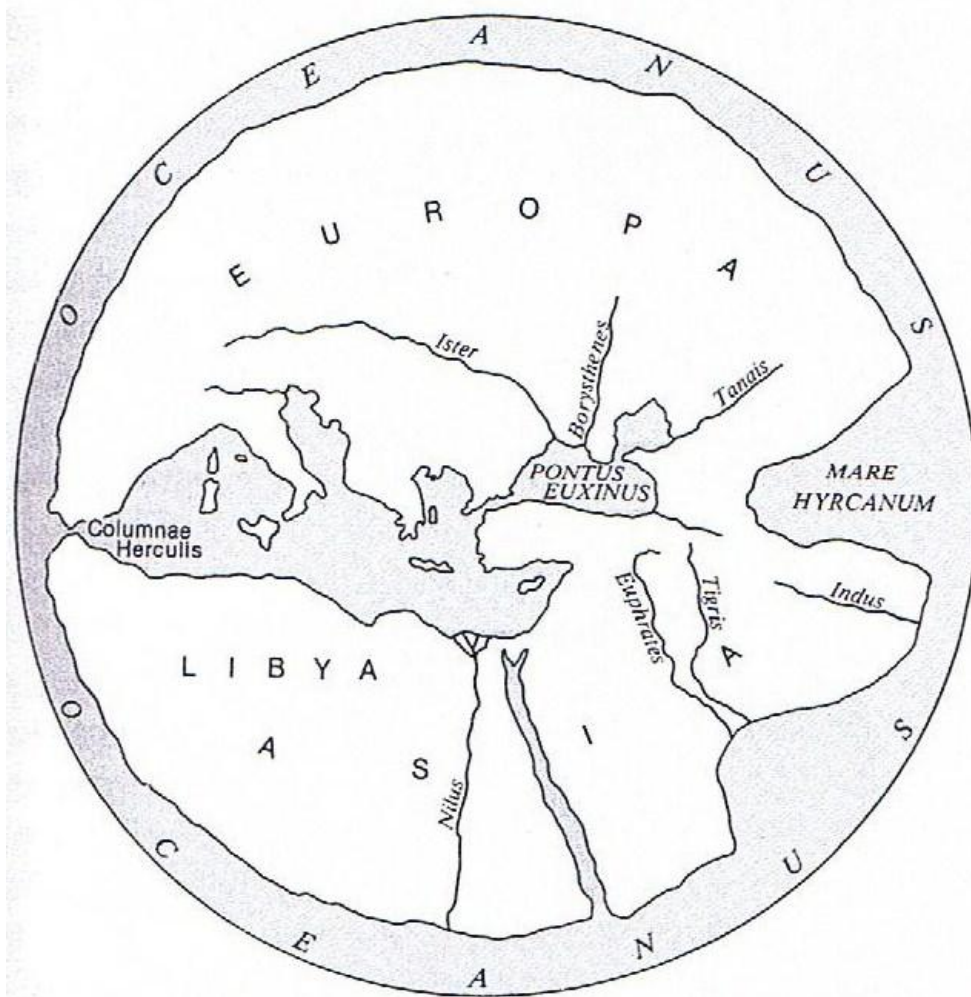


Fig. 1.2: A reconstruction of Hecataeus' view of the world (ca. 500 BC).

²² Early Ionian maps seem to have subsumed Libya (Africa) into the continent of Asia: see esp. Berger 1880: 164-5; Lewis and Wigen 1997: 21; Munn 2006: 179-80; Virga 2007: 16; Purves 2010: 111; Roller 2010: 3.

²³ Hdt. 4.36.2 and Hdt. 5.49.5-8 provide evidence for the basic structure of early Greek maps. In the first extract, Herodotus critiques earlier mapmakers for depicting Europe and Asia as equal in size, with the Ocean flowing all around the οἰκουμένη. The second passage refers to Aristagoras' map, probably based on the Ionian cartographic tradition of Anaximander and Hecataeus, which depicted the various regions of Asia from Anatolia to Susa.

In the fifth and fourth centuries BC, hostilities with the Achaemenid Persian Empire roused Greek geographical curiosity, especially with regard to the outlying regions of Asia. Greek mapmakers, over time, acquired many new pieces of information, which they used to map more precisely the spatial structure of the οἰκουμένη. The historian Herodotus (ca. 484 – 425 BC), for instance, described a conceptual map which demonstrated a superior knowledge of distant territories, such as Persia, India, Egypt and Scythia, and challenged traditional theories about the known world's spatial extent. Herodotus rejected the circumambient Ocean model, instead suggesting that vast tracts of unknown, uninhabitable land extended far to the north and east of both Scythia and India (Hdt. 4.36.2, 4.45.1) (see fig. 1.3).²⁴

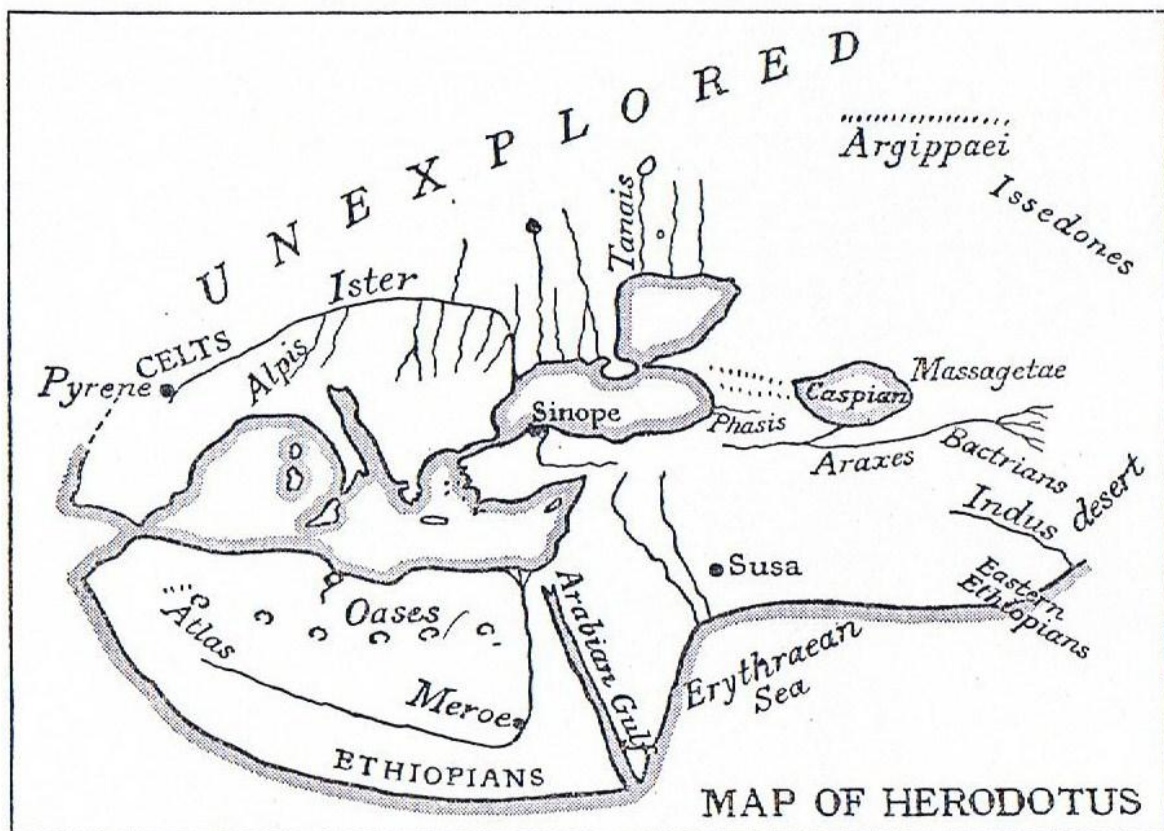


Fig. 1.3: The world according to Herodotus.

²⁴ Hdt. 4.36-45 provides the clearest and most detailed description of Herodotus' conception of world geography. This section reads very much like Herodotus is describing an actual map. He discusses the general outline and structure of the οἰκουμένη, particularly its division into continents. He also describes in great detail the substructure of Asia, listing the relative locations of nations and territories, as if plotting them on a map.

In the mid-fourth century BC, immediately prior to the expeditions of Alexander the Great and Pytheas of Massalia, the historian Ephorus (ca. 400 – 330 BC) constructed a world map based on ethnographic divisions. He depicted Greece in the centre of the map, surrounded by the Scythians in the north, the Indians in the East, the Ethiopians in the south and the Celts in the west (Strabo 1.2.28) (see fig. 1.4).²⁵ Contemporary with Ephorus, Aristotle created a more scientific map of the οἰκουμένη. In his *Meteorology*, he postulated

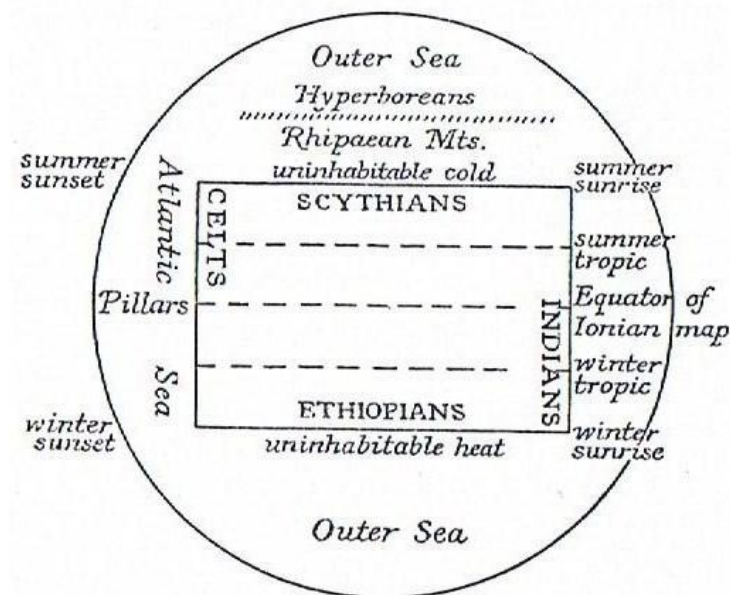


Fig. 1.4: Ephorus' ethnographic conception of the οἰκουμένη.

that the earth was a sphere, becoming one of the first to prove this empirically and then apply it to cartography. Aristotle divided up the earth sphere into two hemispheres and five climatic zones: two frigid, two temperate, and one torrid (Arist. *Mete.* 362 a31-b9, 362 b27-8). He then placed the οἰκουμένη entirely within the temperate zone of the northern hemisphere, asserting that it was an oblong in shape, with the length (west to

²⁵ On Ephorus' map, see Heidel 1937: 16-20; Thomson 1948: 97-8; Aujac, Harley and Woodward 1987a: 142-3; Gardiner-Garden 1987: 2; Geus 2003: 234; Roller 2010: 6. Heidel suggests that the ethnographic frame of Ephorus' map should be traced back at least as far as Hecataeus. Hecataeus was familiar with the Ethiopians, Scythians and Indians. There is, however, little evidence to suggest that he knew of the Celts.

east) exceeding the breadth (north to south) by a ratio of 5 to 3 (Arist. *Mete.* 362 b12-25).²⁶

During the Hellenistic Age, Greek maps of the οἰκουμένη underwent continued reassessment. In the early Hellenistic period, Greek explorers travelled far beyond the conventional limits of the known world, collating multifarious geographic information about places never before seen or even heard of by the Greeks.²⁷ In the space of approximately one century, these explorations, largely transmitted via accounts of first-hand observation, helped transform Greek mapping theory and practice. Greek mapmakers thereafter had a firm empirical basis by which to map the topographic features and spatial details of the regions traversed, and in the process redefine the perceived spatial extent and overall cartographic structure of the οἰκουμένη.²⁸ Dicks suggests that, in particular, the primary accounts of Alexander the Great's campaigns in Asia dramatically increased the empirical geographic information to which the likes of Eratosthenes had access. Indeed, he states that Eratosthenes' *Geography* 'represents the final synthesis of Greek knowledge of the inhabited world resulting from the opening up of the East by Alexander's conquests, before the advent of the Romans and the subsequent Graeco-Roman era.'²⁹

Greek cartography in the Hellenistic Age benefited from a diverse range of influences. Early Hellenistic exploration was fundamental, but due consideration must also be given to the influence of Greek science, especially in the disciplines of

²⁶ The notion of an oblong οἰκουμένη was first formulated by the philosopher Democritus (ca. 460 – 370 BC): see Aujac, Harley and Woodward 1987a: 137. Geus 2003: 232-6 comments perceptively on the differences between Ephorus' and Aristotle's conceptions of the οἰκουμένη.

²⁷ There were, of course, many notable Greek travellers and explorers prior to the Hellenistic Age, including the likes of Aristeas of Proconnesus, Euthymenes of Massalia, Scylax of Caryanda, Hecataeus, Herodotus, Ctesias and Xenophon. Cary and Warmington (1929) *The Ancient Explorers*, despite its age, still supplies the most comprehensive modern treatment of ancient exploration.

²⁸ Aujac, Harley and Woodward 1987b: 148.

²⁹ Dicks 1960: 30-1.

mathematics and astronomy. During the Hellenistic Age, Greek science rapidly advanced in thriving intellectual centres, such as Alexandria, Athens and Rhodes.³⁰ Furthermore, cross-cultural contact at these centres facilitated the spread and absorption of scientific wisdom from other civilisations, substantially increasing the Greeks' knowledge pool.

Crucially, it was during the late Classical and early Hellenistic periods, in Greek intellectual circles at least, that the notion of a spherical earth became widely accepted as scientifically proven fact, replacing the conventional flat earth-disc model.³¹ Proof of the earth's sphericity had resounding implications for the development of Greek cartography. Ultimately, it allowed mapmakers to introduce a whole host of cartographic advancements, ushering in the era of scientific cartography. Mapmakers were now able to scientifically calculate the earth's circumference; determine the known world's shape and size relative to the earth; divide the earth into terrestrial zones; create systems of parallels and meridians; and eventually form a grid of coordinates for the calculation of latitude and longitude.

Thus, in the Hellenistic Age a synergy emerged between Greek exploration and science, combining to create an increasingly sophisticated approach to geography and cartography. Dicaearchus of Messana, a pupil of Aristotle, was one of the first mapmakers to utilise this synergy. In his geographical treatise, Dicaearchus drew a map of the world, which depicted an oblong οἰκουμένη bisected by a διάφραγμα (*diagphragma*), a line of zero latitude stretching from the Pillars of Heracles (Strait of Gibraltar) in the west to the Himalayan mountain system (Emodus/Imaus) in the east

³⁰ For insight into the development of science in relation to Greek cartography, see Dicks 1960: 23-6; Dilke 1985: 31; Aujac, Harley and Woodward 1987b: 148-9; Aujac, Harley and Woodward 1987c: 161.

³¹ Philosophical speculation about the existence of a spherical earth may date back as far as the sixth century BC; however, it was not until the late fourth and early third centuries BC that the earth's sphericity was proven by astronomical observations. On the Greek conception of the spherical earth and

(Agath. 1.2, 1.5) (see fig. 1.5). Eratosthenes partially adopted Dicaearchus' line of zero latitude for his own map of the world, and made various other contributions to scientific cartography. Dicks argues 'that it is to Eratosthenes we owe the first and, on the whole, successful attempt to draw a map of the world based on scientific data instead of vague speculations.'³²

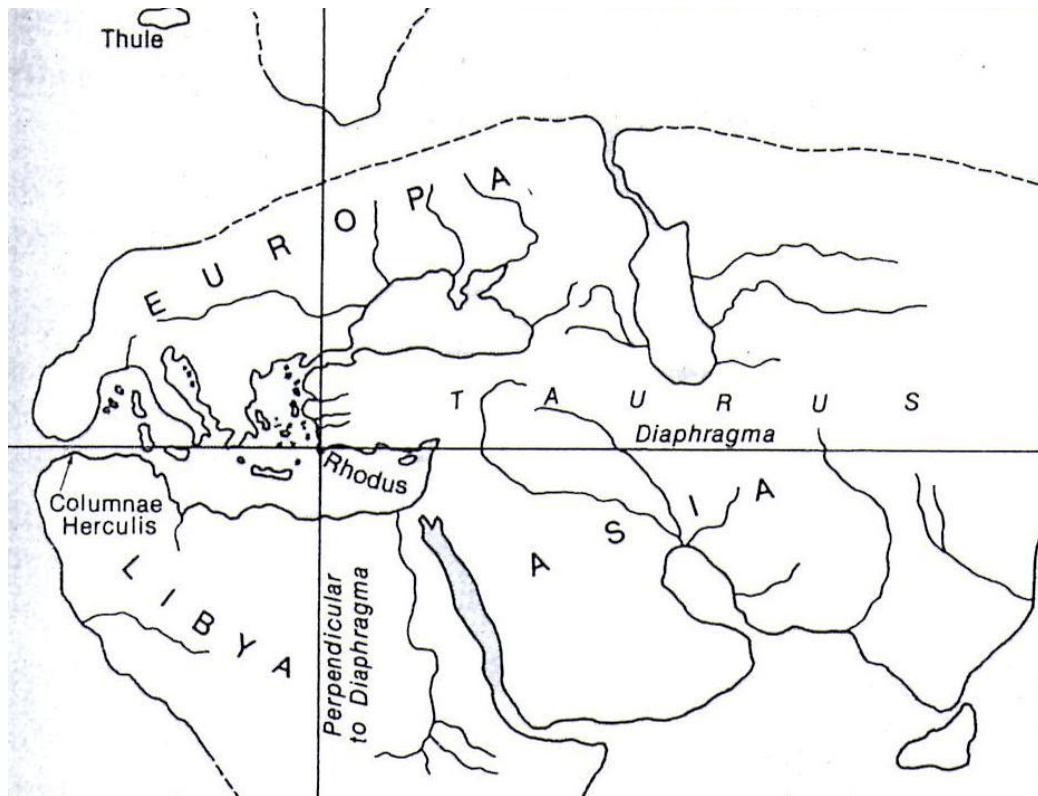


Fig. 1.5: Dicaearchus' map and διάφραγμα (ca. 295 BC).

A synopsis of Eratosthenes' map of the world, as presented in the fragments of his *Geography*, is now apposite (see fig. 1.6). Of course, critical analysis of the main features will be reserved for later in the study. First, it should be noted that Eratosthenes conceived of the earth as a sphere (Strabo 1.3.3, Erat., fr. 15). Sitting atop the earth's spherical surface, he perceived an oblong, *χλαμυδοειδές* ('chlamys-shaped') οἰκουμένη surrounded by a continuous Outer Ocean (Strabo 2.5.5-6, 2.5.9, 2.5.14, Erat., fr. 30, 34).

its implications for mapmaking, see Heidel 1937: 63-102; Thomson 1948: 110-22; Dicks 1960: 23-4; Tozer 1964: 166-8; Neugebauer 1975: 332-3; Keyser 2001: 362; Cunliffe 2002: 35; G. Parker 2008: 52.

³² Dicks 1960: 31.

Eratosthenes depicted the breadth of the οίκουμένη as extending from the parallel through the mysterious land of Thule in the north to the parallel through the Cinnamon-producing country (Somaliland) and Taprobane (Sri Lanka) in the south (Strabo 1.4.2, Erat., fr. 35). The length he portrayed as stretching from the Cabaeum promontory (Pointe du Raz), erroneously perceived to be located just beyond the Pillars of Heracles in the west, to the farthest side of India in the east (Strabo 1.4.5, Erat., fr. 37).

Inside the map's frame, Eratosthenes sketched an irregular system of parallels of latitude and meridians of longitude, which he employed in order to chart accurately the geographic position of places relative to one another. This system was based on a combination of distance estimates between places, dead reckoning and some recorded observations of the length of the longest day at certain localities. The distance estimates were undoubtedly derived from the reports of explorers, travelling by both land and sea.³³ Eratosthenes probably did not possess the mathematical capabilities and knowledge of trigonometry required to transform the astronomical observations into coordinates of latitude and longitude.³⁴

Eratosthenes' main parallel bisected the οίκουμένη into north and south. Parallel to the equator and corresponding to approximately 36° N, it stretched horizontally from the Pillars of Heracles through Athens and Rhodes, along the so-called Taurus mountain chain to the Himalayan mountain system and the eastern capes of India (Strabo 2.1.1, Erat., fr. 47). Farther to the north, a parallel passed through Lysimachia, located near the north-western extremity of the Thracian Chersonese (Strabo 2.5.40-41, Erat., fr. 60). Beyond this lay the parallel through the mouth of the river Borysthenes (Strabo 2.5.8,

³³ Roller 2010: 24.

³⁴ The astronomer and geographer Hipparchus is thought to have been the first to apply trigonometry to calculations of latitude and longitude: see Dicks 1960: 168-9, 192-3; Roller 2010: 169. Roller states that 'Using the lengths of the longest day was an easy way to calculate latitude, and Eratosthenes seems to have collected data (mostly by report rather than personal effort) from as many places on his grid as

Erat., fr. 34). 11,500 stadia to the north of the Borysthenes mouth was the parallel through Thule (Strabo 1.4.2, Erat., fr. 35).³⁵ South of the main parallel through Rhodes and Athens, Eratosthenes placed a parallel through Maurusia, Cyrene, Alexandria in Egypt and northern India (Strabo 2.5.38, Erat., fr. 60).³⁶ The next parallel passed through Syene (Aswan) on the summer tropic, 5,000 stadia south of the parallel through Alexandria and with a longest day of 13.5 equinoctial hours (Strabo 2.2.2, 2.5.35-36, Erat., fr. 58, 57, 59). 5,000 stadia south of Syene lay a parallel which ran through Meroë (in modern-day Sudan) and the southern promontories of India (Strabo 2.1.20, 2.5.36, Erat., fr. 68, 59). A further 3000 stadia to the south, the most southerly parallel went through what Eratosthenes believed to be the southernmost parts of Libya (Africa), the Cinnamon-producing country and the island of Taprobane (Strabo 2.5.35, Erat., fr. 57).³⁷

Eratosthenes' main meridian stretched from the parallel through the Cinnamon-producing country in the south to the parallel through Thule in the north, passing through Meroë, Syene, Alexandria, Rhodes, the Hellespont and the mouth of the river Borysthenes (Strabo 1.4.1-2, 2.5.7-9, Erat., fr. 25, 35, 34).³⁸ East of the prime

possible. Turning these into actual latitude figures was probably something he could not do: this depended on the astronomical skill of Hipparchos.'

³⁵ The stadion was the standard unit of measurement for terrestrial distance in Greek geography. One Roman mile was equivalent approximately to eight stadia. According to Herodotus, one stadion was equal to 600 Greek feet (or 185 metres). However, there were several regional and temporal variations on the exact distance: see Dicks 1960: 42-6; Engels 1985: 298-311; Potheary 1995: 49-67; Berggren and Jones 2000: 14.

³⁶ Roller 2010: 171 states that this is the earliest extant citation of 'Maurusia', referring to a vast region of northwest Africa.

³⁷ It is difficult to determine from the sources the exact nature of Eratosthenes' parallels, as Strabo's references to these parallels are infiltrated by the criticisms and emendations of Eratosthenes' successor Hipparchus: see Roller 2010: 153, 170-2. Some of the calculations of the length of the longest day probably derive from Hipparchus.

³⁸ It should be noted that this prime meridian deviated considerably from a strict north-to-south course. Eratosthenes was aware that nearly all his parallels and meridians were not entirely straight (Strabo 2.1.41, Erat., fr. 131): see Roller 2010: 24. The idea of meridian lines may have been first conceived of

meridian, another meridian passed through Thapsacus on the river Euphrates (Strabo 2.1.28-29, Erat., fr. 80, 63). 10,000 stadia to the east of this meridian was another running through the Caspian Gates, located somewhere in the central Alborz Mountains (Strabo 2.1.24, 2.1.34, Erat., fr. 83, 64). Farther east, a meridian followed the course of the river Indus, which Eratosthenes perceived as flowing due south (Strabo 2.1.34, Erat., fr. 64). Approximately 13,000 stadia west of the prime meridian, Eratosthenes located a meridian passing through both Rome and Carthage (Strabo 2.1.40, Erat., fr. 65). He may have perceived another running through the Pillars of Heracles, or perhaps even the Sacred Promontory (Cape St. Vincent) (Strabo 2.1.40, 2.5.14, Erat., fr. 65, 53).

In conjunction with his system of parallels and meridians, Eratosthenes subdivided the world on a regional basis, believing that such a method of partition was more practical than the conventional continental scheme (Strabo 1.4.7, Erat., fr. 33). He dissected southern Asia into four geometric σφραγίδες ('sealstones'). Each of these sealstones was bounded by the Taurus mountain chain in the north and the Erythraean Sea in the south. The first comprised India east of the Indus; the second, Ariana between the Indus and Caspian Gates; the third, the land between the Caspian Gates and the Euphrates; and the fourth, the region between the Euphrates and the western boundary of Egypt (Strabo 2.1.22, 2.1.23, 2.1.32, Erat., fr. 66, 83, 92). Eratosthenes recorded estimates of distance for the dimensions of these σφραγίδες. He also subdivided the Mediterranean coastline north of the main parallel into three promontories (ἄκραι). The first comprised Iberia and all the land down to the Straits of Gibraltar; the second incorporated Italy and the whole area jutting down to the Straits of Messana; and the third encompassed all the land between the Adriatic Gulf and the Euxine (Black Sea), including the Peloponnese (Strabo 2.1.40, 2.4.8, Erat., fr. 134, 135).

rudimentarily by Herodotus. In the first book of his *Histories*, he describes the city of Pteria as situated on a line directly south of Sinope: see Hdt. 1.76.1.

Additionally, Eratosthenes depicted many notable topographic features on his map. These included numerous rivers and mountain ranges; the islands of Britain, Thule, Taprobane and Cerne; the Persian Gulf; and the Hyrcanian/Caspian Sea (Strabo 2.4.2, 1.4.2, 16.3.2, 11.6.1, Erat., fr. 14, 35, 94, 110).

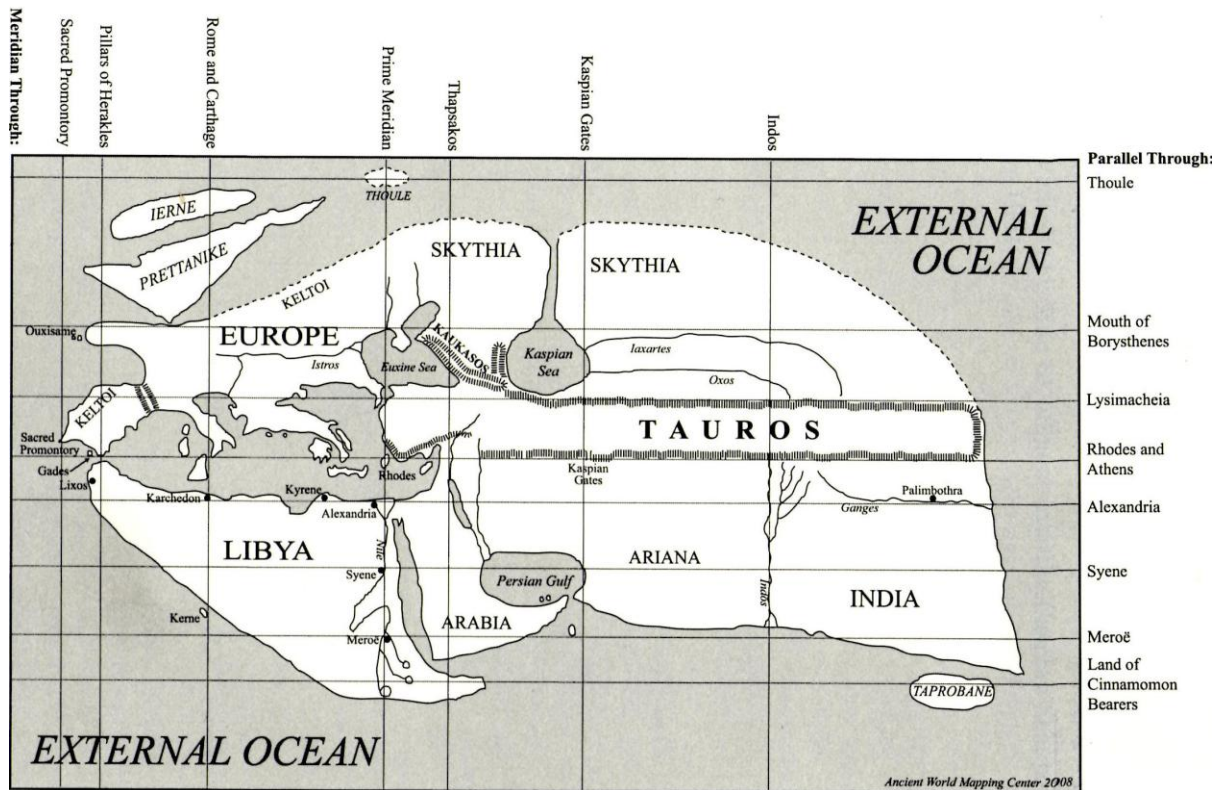


Fig. 1.6: A conjectural rendering of Eratosthenes' map of the world.

1.3. THE SOURCE TRADITION FOR ERATOSTHENES' MAP

Some of the problems associated with the source tradition for Eratosthenes' map were alluded to in the introduction. Presently, it is useful to reiterate that we have no extant Greek maps of the world at our disposal. Furthermore, the textual evidence for Eratosthenes' map is, to say the least, highly fragmentary. Nearly all the primary material pertaining to early Hellenistic explorations and Greek cartography thereafter is derived from the citations of later authors. Thus, analysis of the source tradition for Eratosthenes' map is required before we can reach informed conclusions about the

various ways in which Eratosthenes integrated geographic information from explorers' reports into his *Geography* and map of the world.

Eratosthenes' *Geography* comprised three books. The first book discussed the history of Greek geography; the second examined the spatial relationship between the earth and the οἰκουμένη; and the third outlined the map of the world and investigated the topography of individual regions.³⁹ There are 155 fragments of this work surviving, preserved mainly in Strabo's *Geography*. Some other important citations can be found in Arrian's *Anabasis of Alexander* and *Indica* and Pliny the Elder's *Natural History*. Many of the fragments in Strabo's text are ultimately derived from the lost geographical work of Hipparchus (fl. 162 – 126 BC) and the *Histories* of Polybius (ca. 200 – 118 BC). Hipparchus, a renowned astronomer and geographer, wrote a work entitled *Against the Geography of Eratosthenes*, which, as the name suggests, critiqued many aspects of Eratosthenes' treatise and map.⁴⁰ Polybius, a Greek historian, wrote a universal history which detailed Rome's rise to global prominence during the period from 264 to 146 BC. In the fragmentary thirty-fourth book of his *Histories*, Polybius gave a descriptive account of world geography, in which he frequently cited Eratosthenes and criticised his map of the world.⁴¹

Detailed attention should now be given to the context, perspective and biases of Strabo's *Geography*, as the main source of our knowledge on Eratosthenes' map of the world. Strabo was born to a wealthy Greek family in the town of Amasia. Amasia was situated in northern Anatolia only a short distance from the Black Sea, within the

³⁹ On the contents of each book in Eratosthenes' *Geography*, see van Paassen 1957: 34-9; Tozer 1964: 182; Walbank 1981: 207; Geus 2002: 263-71; Nutton 2007: 17; Roller 2010: 22-4. Geus 2002: 263 notes that Strabo regarded the third book of Eratosthenes' *Geography* as a description of a map of the world: 'Die ersten beiden Bücher sollten auf das dritte Buch hinführen, das Strabon (II, 1, 1, C. 67) als Beschreibung einer „Karte der Oikumene“ (πίναξ τῆς οἰκουμένης) ansieht': see Strabo 2.1.1, Erat., fr. 47.

⁴⁰ Dicks 1960: 37-42.

⁴¹ For commentary on the thirty-fourth book of Polybius' *Histories*, see Walbank 1979: 569-638.

Roman province of *Bithynia et Pontus*. Strabo received a formal education in Nysa (in Caria) and Rome, where he probably became a follower of the Stoic school of philosophy. He also spent several years (ca. 25 – 20 BC) studying at Alexandria in Egypt. Throughout his life he travelled extensively, accumulating a vast body of knowledge and geographic data.⁴²

Strabo wrote the *Geography* in the early first century AD. He probably began drafting it during the reign of Augustus (27 BC – AD 14), before completing the final revised version in Rome under Tiberius (AD 14 – 37). All seventeen books of the *Geography* are extant. In the *Geography*, Strabo compiled an encyclopaedic range of information about the known world, citing and critiquing thoroughly the geographical works and maps of his predecessors. He also made many references to the geographic data amassed from early Hellenistic explorations. Consequently, it is from Strabo that we derive a large proportion of our information about the development of Greek cartography in the Hellenistic Age.⁴³

Strabo classified his *Geography* as a work of descriptive geography, that is, geography primarily concerned with describing the appearance of physical landscapes, places and peoples for practical use by statesmen, generals and administrators (Strabo 1.1.16-19). Scholars argue that Strabo interpreted descriptive geography as a useful adjunct to universal history, which attempted to find historical unity in events occurring across the whole geographic span of the οἰκουμένη.⁴⁴ During the Hellenistic Age, the likes of Polybius and Diodorus Siculus (fl. first century BC) wrote voluminous universal histories. Moreover, Strabo himself wrote a universal history, now lost,

⁴² Dueck 2010: 236-51 provides a good biographical overview of Strabo and his approach to geography.

⁴³ Strabo, in the first two books of the *Geography*, reviews the origins and development of Greek geography from Homer to his own time. It is from these two books, therefore, that we derive the basis of our knowledge about the likes of Dicaearchus, Eratosthenes and Hipparchus.

⁴⁴ Dicks 1960: 29. On the development of universal history during the Hellenistic Age, see Sacks 1981: 96-112; Mortley 1996: 1-7; Clarke 1999: 114-28.

entitled *Historical Sketches*, which documented the history of the known world beginning chronologically with the Roman conquest of Greece in 146 BC.⁴⁵ As a matter of fact, the writing of universal history acquired close associations with the Roman imperialism and expansion which occurred during the Hellenistic Age. For Greek historians, the arrival and subsequent dominance of Rome on the international stage gave new meaning to the course of world history, creating a synthesis of historical events and revealing the interrelationship of the whole οἰκουμένη.⁴⁶

In Strabo's *Geography*, the reader encounters several proclivities which may have influenced his opinion of Eratosthenes' map. First, it is apparent that Strabo's vision of the Roman Empire coloured his description of world geography. Dueck states that 'Throughout the *Geography*, in the course of the systematic description of the *oikoumene*, he emphasizes the Roman presence in widespread parts of the world.'⁴⁷ Strabo highlights the immense size of the Roman Empire and suggests that its boundaries defined those of the known world and vice versa (Strabo 7.2.4, 17.3.24).⁴⁸ He also discusses how the Romans obtained a great amount of new geographic knowledge about a vast array of distant places and peoples (Strabo 1.2.1). Furthermore, he asserts that Roman and Parthian conquests provided a great deal of new and accurate geographic data that antiquated the information afforded by Alexander the Great's campaigns in Asia (Strabo 11.6.4). Therefore, Eratosthenes' map of the world was reliant on sources which were in Strabo's time deemed to be obsolete. As a result,

⁴⁵ Strabo was first and foremost a historian. The *Historical Sketches* contained forty-seven books and was written prior to the *Geography*: see Strabo 1.1.22-3, 2.1.9.

⁴⁶ During the Hellenistic Age, Rome's political dominion expanded rapidly. The Punic Wars with Carthage (264 – 146 BC) embodied Rome's conquering spirit. The final destruction of Carthage occurred in 146 BC, coinciding with the Roman conquest of Greece and giving Rome control over much of the Mediterranean region. On the role of Rome in Greek universal histories, see Sacks 1981: 96-112; Clarke 1999: 210-28; Feeney 2007: 59-67.

⁴⁷ Dueck 2000: 111.

⁴⁸ Nicolet 1991: 47; Dueck 2000: 109-11.

Strabo probably did not include in his *Geography* much of the supposedly antiquated geographic information recorded by Eratosthenes.

While placing great emphasis on Rome's expansion of the οἰκουμένη, Strabo's understanding of world geography was also in many ways intrinsically Greek. He wrote in Greek, predominantly employed Greek sources and intended the *Geography* for a Greek audience. Moreover, it is clear that Strabo had a great appreciation for the geographic concepts developed in early Greek geography, especially by Homer and the Ionian mapmakers (Strabo 1.1.2, 1.1.7, 1.1.11).⁴⁹ As a corollary, Strabo's approach to geography represented a dichotomy in thought, with the theoretical worldviews of early Greek geographers reinterpreted in light of Rome's expansion of the geographical horizon. Strabo, therefore, had a very distinct mental image of the world.

By blending aspects of early Greek geographical thought with new ideas about empire and space, Strabo gained a unique perspective on Eratosthenes' map and the influences of early Hellenistic exploration. In the *Geography*, Strabo's criticism of his predecessors is, by his own admission, directed primarily against Eratosthenes (Strabo 1.2.1). Strabo was very critical of Eratosthenes' perspective on Homeric geography. Eratosthenes, it seems, believed that the geographic locations mentioned in relation to Odysseus' wanderings in the *Odyssey* were fictional. Strabo, on the other hand, rebuking Eratosthenes, argues that many of these locations corresponded to real sites in the Mediterranean (Strabo 1.2.7, 1.2.12-15). Eratosthenes' sceptical opinion of Homer's geography, thus, contradicted Strabo's geographical worldview.

⁴⁹ On Strabo and the Greek geographical tradition, see esp. Dueck 2000: 31-45. With regard to Strabo, Dueck states that 'his scholarly orientation, based on his personal education, is deeply rooted in traditional Greek culture' (p. 39). Furthermore, she argues that 'Strabo bases his concept of the *oikoumene* and his geographical survey on ancient ideas and on very early foundations such as voyages of exploration' (p. 45). Nonetheless, it is recognised by Dueck that contemporary geographic knowledge, as well as political and cultural changes also had a considerable influence on Strabo (p. 45).

Strabo's skill as a geographer was confined predominantly to the descriptive tradition. Although he recognised the value of mathematical calculation and astronomical observation to geography, this scientific side of the discipline was, for the most part, beyond his area of expertise (Strabo 1.1.12-14).⁵⁰ Consequently, his presentation of the scientific and mathematical aspects of Greek cartography in the Hellenistic Age is often quite limited in scope and sometimes misleading. For instance, Strabo provides virtually no explanation of what Eratosthenes meant by describing the οἰκουμένη as χλαμυδοειδές ('chlamys-shaped'). Also, he gives some quite confusing information about the earth's terrestrial zones and Eratosthenes' connection with the concept of κλίματα (Strabo 2.1.35, 2.5.5-6, 2.5.14).⁵¹ Eratosthenes, and to an even greater extent Hipparchus, recognised that accurate scientific data were needed to calculate and map precisely the geographic location of places relative to one another.⁵² Hipparchus, however, was often extremely critical of Eratosthenes, attempting to prove that many of Eratosthenes' distance estimates between places were contradicted by geometric reasoning and accurate astronomical observations; thus, undermining his system of parallels and meridians (Strabo 1.1.12, 2.1.20, 2.1.34). In the context of Hipparchus' criticisms, Strabo became a staunch supporter of Eratosthenes. On many occasions, he does not fully comprehend the mathematical calculations applied by Hipparchus, defending Eratosthenes even when he may have had a case to answer.

Strabo also comments on the sources chosen by Eratosthenes to inform his map of the world. On the one hand, he denounces Eratosthenes for accepting geographic details contained in Pytheas of Massalia's *On the Ocean* (Strabo 2.4.1-2). Pytheas'

⁵⁰ Dueck 2000: 53; Roseman 2005: 27.

⁵¹ Dicks 1960: 156-7 asserts that there is no real evidence connecting Eratosthenes with the theory of κλίματα. These κλίματα were narrow belts of latitude, approximately 400 stadia wide, in which the observable celestial phenomena did not deviate considerably. This theory probably originated with Hipparchus.

⁵² Dicks 1960: 31.

travels in northern and western Europe supplied Eratosthenes with information about remote places previously unheard of by the Greeks. Strabo, basing his distrust of Pytheas on an earlier polemic by Polybius, thought that there was no substantial external evidence to support the geographic and scientific data provided by Pytheas, labelling him a ψευδίστατος ('outright liar') (Strabo 1.4.3, 2.5.8). On the other hand, when discussing Eratosthenes' sources for the geography of Asia, Strabo states that the eye-witness geographical descriptions used by Eratosthenes are credible and reliable (Strabo 2.1.9). For example, he praises Eratosthenes for usually preferring Patrocles' information on India over Megasthenes' and Deimachus' less reliable reports (Strabo 2.1.4-9).

This chapter has attempted to place Eratosthenes' map of the world in its original context. It has shown that Eratosthenes created his map during a period of great intellectual ferment, especially in the disciplines of science, geography and cartography. With the οἰκουμένη as its subject, Eratosthenes' map depicted a known and inhabited world that looked vastly different from all earlier Greek world maps. It benefited from both a wealth of new empirical geographic data and new sophisticated mapping techniques. Our knowledge of Eratosthenes' map is facilitated mainly through Strabo, whose citations of Eratosthenes' *Geography* are invaluable but not devoid of problems. The following chapter will introduce the primary source material which informed Eratosthenes' cartography.

2. THE SOURCE MATERIAL FOR ERATOSTHENES' MAP

Eratosthenes wrote the *Geography* and constructed his map of the world during his time in Alexandria as the chief librarian.¹ The Library of Alexandria stored hundreds of thousands of scrolls sourced from all over the known world. Thus, Eratosthenes had access to a massive amount and diverse range of source material. Strabo emphasises this point, commending Eratosthenes for consulting a variety of eye-witness reports, while researching for geographic information at the library (Strabo 2.1.5). In the fragments of Eratosthenes' *Geography*, there are explicit citations of numerous primary accounts of early Hellenistic exploration. Accounts cited include the τῆς ἀναγραφῆς τῶν σταθμῶν (*Record of Stages*) and the τοῖς Ἀσιατικοῖς σταθμοῖς (*Asiatic Stages*), compiled by Alexander the Great's bematists ('step-measurers'); Nearchus' and Onesicritus' histories of Alexander; Androstenes of Thasos' *Sailing Along the Indian Coast*; Pytheas of Massalia's *On the Ocean*; Megasthenes' *Indica*; Deimachus' *Indica*; Patrocles' geographical report; Philo's *Aithiopica*; and Timosthenes of Rhodes' *On Harbours*.² Undoubtedly, Eratosthenes drew information from various other early Hellenistic sources not cited explicitly, including Aristobulus' history of Alexander.³ In fact, it was quite commonplace for Greek authors to paraphrase or copy parts of another's work without citing them by name. More often than not, references to other

¹ Fraser 1972, vol. 2: 772 argues that Eratosthenes wrote his *Geography* in Alexandria between 240 and 210 BC. Alexandria is central to Eratosthenes' cartographic worldview and is where the necessary sources were easily available.

² For Eratosthenes' citation of the *Record of Stages*, see esp. Strabo 2.1.7-8, 15.1.11, Erat., fr. 73, 69; on the *Asiatic Stages*, see Strabo 15.2.8, Erat., fr. 78; on Nearchus and Onesicritus, see Strabo 2.1.20; Plin. *HN*. 2.183-5, Erat., fr. 68, 41; on Androstenes of Thasos, see Strabo 16.3.2, Erat., fr. 94; on Pytheas, see Strabo 1.4.2-5, 2.4.2, Erat., fr. 37, 14; on Megasthenes and Deimachus, see Strabo 2.1.9, Erat., fr. 22; on Patrocles, see Strabo 2.1.4-5, Erat., fr. 50; on Timosthenes, see Strabo 2.1.40, Erat., fr. 134; on Philo, see Strabo 2.1.20, Erat., fr. 40, 68.

³ For instances where the geographic information attributed to Eratosthenes and Aristobulus is closely related, see Strabo 11.7.3, 16.1.12; Arr. *Anab.* 3.28.5-6.

authorities were made only when the author disagreed with them or when there were several conflicting opinions on an issue.⁴ Eratosthenes appears to have been no different in this respect.

Nonetheless, Eratosthenes' citations by name are invaluable for modern scholars looking to trace the origins of his cartographic worldview. It is clear from the fragments of Eratosthenes' *Geography* that these accounts of early Hellenistic exploration became fundamental to his map of the world. In order to analyse this premise critically, this chapter will introduce each of the aforementioned sources and establish what kinds of data Eratosthenes acquired from them. First, however, it is necessary to provide a very brief overview of Greek exploration in the Archaic and Classical periods. A great deal of the geographic information obtained during these periods was antiquated by early Hellenistic explorations. Nevertheless, the regions traversed, distances covered and data collated by earlier Greek explorers can provide a useful yardstick for measuring the extent to which early Hellenistic explorations subsequently improved and expanded Greek geographic knowledge.

2.1. EARLY GREEK EXPLORERS

Besides the legendary wanderings of Heracles and Dionysus, the first Greek explorer of note is Aristeas of Proconnesus. Active sometime in the seventh century BC, Aristeas travelled in the region of Scythia north of the Black Sea. Herodotus tells us that Aristeas journeyed as far as the land of a tribe named the Issedones, located somewhere to the northeast of Scythia (Hdt. 4.13.1). Also, from the Issedones, Aristeas learnt that living farther to the north were one-eyed Arimaspians, griffins guarding gold deposits and the utopian Hyperboreans. All this, he documented in a poem entitled the

⁴ Bosworth 1988b: 4; Karttunen 1997: 9. Roller 2010: 20 states that 'There is no reason to believe that Eratosthenes named all his sources.' Roller mentions several fragments of Eratosthenes' *Geography* in which the information is clearly derived from an earlier source, but is left unattributed.

Arimaspeia, which probably did not survive past the Classical period.⁵ Although the *Arimaspeia* certainly trod the path between geography and fantasy, it was the first and for a long time only work which supplied detailed information on the northern regions of Europe. That it had a definite influence on Greek geography cannot be denied, as Herodotus accepted and transmitted much of Aristeas' information, especially with regard to the Issedones.⁶

In the early sixth century BC, a Greek explorer named Euthymenes from the Phocaean Greek colony of Massalia sailed out through the Pillars of Heracles and explored part of Africa's western coast. His published report is not extant, but a later citation by Seneca the Younger shows that he travelled at least as far as Senegal and identified a river flowing into the ocean in this region as the source of the Nile in Egypt (Sen. *Q Nat.* 6.2.22).⁷ At this point in time, Massalia was a flourishing trading colony, importing goods and resources, especially tin, from throughout the western Mediterranean. There is evidence from the *Massaliot Periplus*, quoted extensively by the Roman poet Avienus, of trading activity between Massalia, the Phoenician colony of Gadeira (Cadiz), Tartessus in western Iberia, Brittany and even southern Britain.⁸ As a result of the Massaliots' interest in and familiarity with parts of West Africa and

⁵ Bolton 1962: 38.

⁶ See Hdt 4.13 – 4.32 for his account of the Issedones and northern Europe, which was based at least in some part on Aristeas' poem. Note that at Hdt. 4.36.1 Herodotus contradicts Aristeas by arguing against the existence of the Hyperboreans. For the most definitive modern work on Aristeas, see Bolton (1962) *Aristeas of Proconnesus*.

⁷ On Euthymenes, see esp. Cary and Warmington 1929: 46.

⁸ Some good general introductions to ancient trade and interaction in the Atlantic are provided by Cunliffe (1988) *Greeks, Romans and Barbarians: Spheres of Interaction* and Cunliffe (2001) *Facing the Ocean: The Atlantic and its Peoples, 8000 BC – AD 1500*. It is worth noting that at this time Massaliot traders were competing with the Phoenician colony of Gadeira for control over the supply routes for tin sourced from Brittany and Britain as well as amber sourced from the Baltic region: see Hyde 1947: 45-7, 119-20; Cunliffe 1988: 12-13; Cunliffe 2001: 4-5.

northwest Europe there emerged a sketchy, but improved picture of the world's perceived western edges.⁹

In the late sixth century BC, a certain Scylax of Caryanda (in Caria) was instructed by the Persian King Darius I to lead an expedition in search of the mouth of the river Indus. The expedition fleet sailed down the Indus to the Erythraean Sea (Indian Ocean) and then went west along the coast of Asia past Arabia and into the Arabian Gulf (Red Sea) (Hdt. 4.44.1-3).¹⁰ The report of Scylax's voyage introduced the Greek world to India and the southern regions of Asia. The historian and geographer Hecataeus of Miletus (fl. 500 BC) had knowledge of Scylax and used his report for geographic data on India especially. Hecataeus himself wrote a geographical work entitled *Journey Round the World*, which was divided into two books, one on Europe and the other on Asia (including Libya/Africa) and probably incorporated a map of the world (Strabo 1.1.11). This work described the geography and ethnography of the places encountered in a clockwise voyage around the coast of the Mediterranean and also supplied some information on parts of the European and Asian interiors. It seems

⁹ Of interest too is the report of the joint Egyptian-Phoenician expedition sent in ca. 600 BC to circumnavigate the continent of Libya from east to west. Greek knowledge of this voyage came from Herodotus, who, for the most part, believed the account: see Hdt. 4.42.2-4. Mention should also be made of the two Carthaginian explorers Hanno and Himilco. In the late sixth century BC, Hanno explored the west coast of Africa perhaps as far as Cameroon, while Himilco sailed through the north Atlantic as far as Brittany. A brief account of Hanno's report was inscribed in a temple upon the navigator's return to Carthage and has survived in a Greek translation: see Blomqvist (1979) *The Date and Origin of the Greek Version of Hanno's Periplus with an Edition of the Text and a Translation*. On Hanno, see Bunbury 1879, vol. 1: 318-35; Cary and Warmington 1929: 47-52; Hyde 1947: 141-50; Tozer 1964: 104-9. On Himilco, see Cary and Warmington 1929: 31-3; Hyde 1947: 121-4; Tozer 1964: 109-12.

¹⁰ On Scylax's voyage, see Cary and Warmington 1929: 61-2; Hyde 1947: 174-8; Tozer 1964: 101-2. Cary and Warmington argue that nearly all of the Greeks' knowledge of Arabia, Iran and India came from Persian sources until Alexander the Great's conquests.

likely that Hecataeus based his work on his own travels around the Mediterranean and then supplemented it with the reports of others like Scylax.¹¹

Greek geographic knowledge was increased significantly by the historian Herodotus. Herodotus' *Histories*, written in the mid-fifth century BC, explored the perpetual enmity between Greece and Persia, while also investigating the geography and ethnography of the οἰκουμένη. Herodotus compiled detailed information on a vast array of different regions, notably Egypt, Scythia, Ethiopia, Persia and India. It is generally believed that Herodotus travelled extensively around the world, deriving a great deal of his geographic information from both first-hand observation and local reports. Regions outside of mainland Greece and Ionia which he visited include Egypt, the Black Sea region, Italy and possibly even Babylonia, close to the heart of the Persian Empire.¹²

Greek insight into the lands of the Persian Empire gained further ground with the travels of the physician and historian Ctesias of Cnidus. At the turn of the fifth century BC, Ctesias served as the physician to the Persian King Artaxerxes II (r. 404 – 359 BC). He presumably travelled with the king and was present at the battle of Cunaxa (on the Euphrates north of Babylon) in 401 BC. Ctesias published two books: the *Persica*, which related the history of Assyria and Persia, and the *Indica*, which gave an account of India as seen by the Persians. These books survive in epitomes by Photius (c. 810 – 893 AD) and a few fragments are found elsewhere. Many modern critics have viewed Ctesias' works as highly exaggerated, with a penchant for the marvellous and the ridiculous, containing descriptions of dog-faced people, giant worms and men with monstrously large feet. However, Bigwood has argued convincingly that many ancient authorities on Ctesias, particularly Aelian and Photius, significantly overemphasised the

¹¹ On Hecataeus' book and map, see Bunbury 1879, vol. 1: 134-55; Pearson 1939: 31, 61-2; Hyde 1947: 112-15; Dilke 1985: 23-4, 56-7; Roller 2010: 3.

¹² For discussion of Herodotus' travels and geographical thinking, see esp. Bunbury 1879, vol. 1: 156-317; van Paassen 1957: 117-211; Casson 1974: 95-111; Zingross 1998: 5-55; Thomas 2000: 75-101; Harrison 2007: 44-65; Romm 2010: 215-20.

fantastical elements of his work.¹³ Thus, the extant citations may reflect their tastes and interests more so than the true nature of Ctesias' writing. His works certainly added another layer to the ever-growing Greek interest in the world beyond their shores.

A quick mention will suffice for Xenophon, the Greek mercenary soldier and historian. Contemporary with Ctesias, Xenophon was on the opposing side at the Battle of Cunaxa, part of a 10,000 strong Greek mercenary detachment fighting for the Persian prince Cyrus the Younger against Artaxerxes II. After Cyrus' defeat, Xenophon and the Ten Thousand ventured on a perilous return journey to Greece. They trekked across thousands of miles of unknown territory, following the Tigris north into Kurdistan and the Armenian Highlands, before eventually finding their way to the south coast of the Black Sea, which they followed all the way to the Bosphorus. Xenophon described this arduous march in his *Anabasis*, which introduced the remote, rugged regions of Armenia and eastern Asia Minor to the Greek world.¹⁴

It is clear that Greek explorations in the Archaic and Classical periods greatly broadened Greek geographical horizons. Nonetheless, despite their vast scope, these explorations paled in comparison to what followed in the early Hellenistic period. Early Hellenistic explorers travelled to the outer limits of, if not beyond, what the Greeks believed to be the ends of the earth. The amount and diversity of the geographic information compiled as a result proved to be groundbreaking for Greek geography and cartography. Let us begin our examination of these explorations with an overview of the campaigns of Alexander the Great and a discussion of the primary accounts which Eratosthenes used to inform his map of the world.

¹³ Bigwood 1989: 302-16. On Ctesias' life and career, see Bunbury 1879, vol. 1: 336-64; Llewellyn-Jones and Robson 2010: 11-18.

¹⁴ For insight into the Ten Thousand's journey and its contribution to Greek geographic knowledge, see Bunbury 1879, vol. 1: 342-78; Cary and Warmington 1929: 138-40; Tozer 1964: 112-18; Roy 2007: 66-77.

2.2. ALEXANDER THE GREAT'S CAMPAIGNS

In 334 BC, Alexander the Great led a 40,000 strong Macedonian army across the Hellespont and into Asia (Arr. *Anab.* 1.11.3-5).¹⁵ After victory in the battle of the Granicus, the army proceeded along the west and south coasts of Asia Minor, before looping inland to Gordium in Phrygia (Arr. *Anab.* 1.29.4-5). From Gordium, the army travelled southeast to Tarsus, and then, after the battle of Issus, followed the Mediterranean coastline down through Syria, Phoenicia and Palestine (Arr. *Anab.* 2.4.6, 2.15.6-7). Entering Egypt, Alexander founded the city of Alexandria on the Mediterranean coast, before journeying inland to the desert oasis of Siwah (Arr. *Anab.* 3.1.5 – 3.2.2, 3.3.1 – 3.4.5).

Returning from Egypt in early 331 BC, the army went back along the Phoenician coast before heading northeast to Thapsacus on the Euphrates River (Arr. *Anab.* 3.7.1). From Thapsacus, the army crossed the Tigris River and won a decisive battle against the Persian army at Gaugamela, near Arbela in October of 331 BC (Arr. *Anab.* 3.7.7 – 3.15.7). Alexander then moved south, capturing Babylon, before advancing southeast through Susa, the Persian Gates, Persepolis and Pasargadae (Arr. *Anab.* 3.16.3 – 3.18.10). Having secured the heart of the Persian Empire, Alexander marched the army northwest to Ecbatana in Media (northwest Iran) in pursuit of the Persian King Darius III (r. 336 – 330 BC) (Arr. *Anab.* 3.19.5). From here, Alexander pressed the army eastward along the south coast of the Caspian Sea, past the Caspian Gates, and through the regions of Parthia, Hyrcania and Margiana (northern Iran and southern Turkmenistan) (Arr. *Anab.* 3.20.1 – 3.25.1). Alexander then marched the army southward, in an effort to subdue the provinces of Aria and Drangiana (eastern Iran and Afghanistan) (Arr. *Anab.* 3.25.6-8, 3.28.1-3). After this, he veered northeast into Arachosia (southeast Afghanistan and southwest Pakistan), where he founded

¹⁵ This overview of Alexander's route closely follows the account in Arrian's *Anabasis of Alexander*.

‘Alexandria by the Caucasus’ in the southern foothills of the Paropamisus Mountains (Hindu Kush) (Arr. *Anab.* 3.28.4). He then set out farther north, crossing the Paropamisus Range and conquering the remote regions of Bactria (northern Afghanistan) and Sogdiana (Uzbekistan and Tajikistan) (Arr. *Anab.* 3.28.9 – 3.30.11).

In August of 329 BC, on the southern bank of the river Jaxartes (Syr-Darya) in Sogdiana, Alexander founded Alexandria Eschate (‘Alexandria the Farthest’), establishing it as his most northern base in Asia (Arr. *Anab.* 4.1.3-4). From here, the army undertook a long, arduous campaign in Sogdiana and Bactria, before advancing eastward into central Pakistan and northwest India (Arr. *Anab.* 4.22.3). In 326 BC, after traversing the Punjab region, Alexander’s army mutinied at the river Hyphasis (Beas), refusing to travel farther east (Arr. *Anab.* 5.25.1 – 5.29.2). This mutiny forced Alexander to construct a fleet of ships and sail south down the Hydaspes (Jhelum) and Indus rivers to the Erythraean Sea (Arr. *Anab.* 6.1.1 – 6.19.5). At this point, Alexander instructed his admiral Nearchus to sail west along the southern coast of Asia through the Persian Gulf and up the Euphrates to Babylon (Arr. *Anab.* 6.21.3).¹⁶

The rest of the army travelled by land, marching northwest through the Gedrosian Desert, Carmania (southeast Iran) and Persis (southern Iran), spending time in Persepolis, Susa, Opis and Ecbatana, prior to reaching Babylon (Arr. *Anab.* 6.21.3 – 7.19.1). On his way to Babylon, Alexander ordered Heracleides, son of Argaeus, to sail with a fleet around the Caspian Sea. The objective of this mission was to investigate the Caspian’s northern waters and discover its source (Arr. *Anab.* 7.16.1-4). Once in Babylon, Alexander made extensive preparations to invade Arabia (Arr. *Anab.* 7.19.4-6). He perhaps even had far grander plans to explore and conquer large parts of Africa

¹⁶ Cf. Arr. *Ind.* 20.1 – 43.14.

and Europe; however, his sudden death in June of 323 BC put an end to these ambitions (Arr. *Anab.* 7.28.1).¹⁷

Alexander's campaigns covered immense distances and brought the remote interior regions of Asia firmly into the Greek worldview. Alexander employed historians, astronomers, bematists and other specialists to record a diverse range of data about the peoples, places, terrains and landscapes encountered.¹⁸ Dicks emphasises this point, stating that 'Much was already known to Herodotus about the extent of the Persian empire, but the importance of Alexander's campaigns for geographic knowledge lies in the fact that regions that had hitherto been mere names on a map, such as Sogdiana and Bactria, were now actually traversed by the Greeks.'¹⁹ Eratosthenes seems to have been very conscious of how Alexander's campaigns expanded Greek geographical horizons. Strabo paraphrases Eratosthenes as saying that Alexander ascertained a great deal of new ἐμπειρίας ('empirical data') and ὁ μὲν γὰρ τῆς Ἀσίας πολλήν ἀνεκάλυψεν ἡμῖν καὶ τῶν βορείων τῆς Εὐρώπης ἅπαντα μέχρι τοῦ Ἰστού ('uncovered for us a large part of Asia and the whole of Europe as far north as the Ister') (Strabo 1.2.1).²⁰

¹⁷ On Alexander's last plans (*Hypomnemata*), see Diod. 18.4.4; Curt. 10.1.17-19; Plut. *Alex.* 68.1; Arr. *Anab.* 7.1.2-3. The best modern discussions of the *Hypomnemata* are found in Badian 1968: 183-204; Hornblower 1981: 87-97; Bosworth 1988b: 185-211. On the route of Alexander's march, see fig. 2.1.

¹⁸ None of the primary sources for Alexander's campaigns are extant. We have only fragments of the various primary sources, preserved mainly in five later extant histories. The extant histories are Diodorus Siculus' seventeenth book of the *Library of History*, Quintus Curtius Rufus' *History of Alexander*, Plutarch's *Life of Alexander*, Arrian's *Anabasis of Alexander* and Justin's epitome of the Philippic history of Pompeius Trogus. Also, some fragments pertaining to the geography of Alexander's campaigns can be found in Strabo's *Geography* and Arrian's *Indica*. The earliest of the extant histories is Diodorus' account, which dates to ca. 30 BC, 300 years after the time of Alexander. Curtius wrote in the early first century AD; Plutarch in the late first and early second century AD; Arrian in the mid-second century AD; and Justin sometime in the third or fourth century AD. For good, concise introductions to the both the primary source tradition and the extant sources, see Walbank 1981: 15-21; Bosworth 1988a: 295-300.

¹⁹ Dicks 1960: 27.

²⁰ Cf. Strabo 1.3.3, Erat., fr. 15, where Eratosthenes is quoted as emphasising the great advance in the Greeks' geographic knowledge of the οἰκουμένη made in the period of Alexander and his Successors.

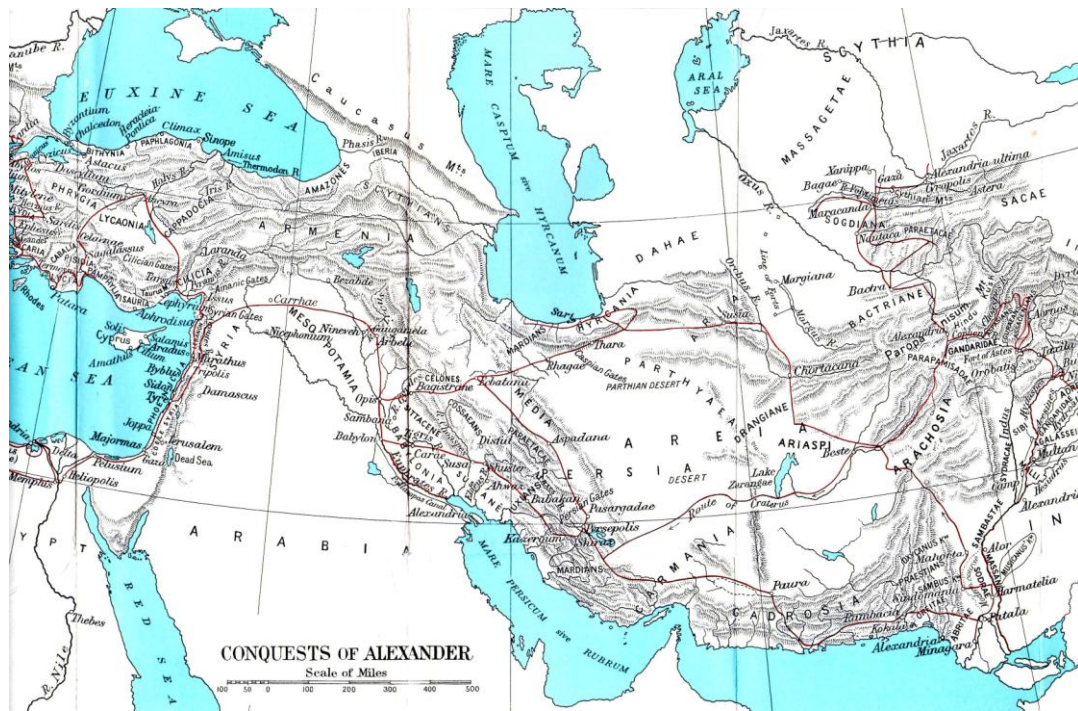


Fig. 2.1: The campaign route of Alexander the Great.

The records compiled by Alexander’s bematists were some of the most important sources of geographic information for Eratosthenes. The bematists surveyed a number of roads throughout Asia, pacing out and measuring the distances between stopping places along Alexander’s route of march.²¹ The sources suggest also that the bematists commented on the topography, natural history and climate of the regions traversed.²² Whether the bematists incorporated maps into their work is not mentioned in the sources, but it is a possibility that will be explored briefly later in the study. Alexander’s royal secretary, Eumenes of Cardia (ca. 362 – 316 BC), may have compiled the records of the bematists into daily reports (*ephemerides*), which survive only in

Prior to invading Asia, Alexander subdued several European tribes, marching as far as the river Ister (Danube): see Arr. *Anab.* 1.1-7.

²¹ On the role of the bematists in Alexander’s army, see Pearson 1955: 440-3; Brunt 1976: 487-8; Bosworth 1980: 368; Bosworth 1988a: 299; Fraser 1996: 78-83; Lewis 2001: 22; Heucke 2007: 593; Williams (2010) *BNJ* s.v Patrokles (712).

²² Plin. *HN.* 7.11-12 quotes a report of the bematists as describing the environmental conditions experienced by an Indian tribe living in the Himalayas. Also, see Engels 1978: 68-9, 85, 157-8; Dilke 1985: 29.

fragments (Arr. *Anab.* 5.24.6, 7.4.6).²³ The bematists' records would have informed many of the lost histories of Alexander the Great. The royal historian Callisthenes of Olynthus (ca. 360 – 327 BC), in particular, would have required access to the *ephemerides* on a frequent basis, in order to compile his officially sanctioned history of Alexander's conquests.

What little is known about the bematists derives primarily from references in Strabo's *Geography* and Pliny the Elder's *Natural History*. We are told the names of three bematists: Baeton, Diognetus and Amyntas (Plin. *HN.* 6.61-2; Ath. 2.67a, 10.442b, 11.500d, 12.529e). Both Strabo and Pliny record sequences of distance measurements between places located along Alexander's route of march, for which it can be inferred reasonably that the records of the bematists were the ultimate source of origin.²⁴ The bematists reconnoitred numerous roads in Asia. They recorded distances from Susa to Carmania; from Thapsacus to the Persian Gulf; from Thapsacus, through Arbela and Ecbatana, to the Caspian Gates; from the Caspian Gates, through Bactria, to the river Jaxartes; and from the Caspian Gates, through Arachosia and India, to the river Hyphasis.²⁵

In one fragment of his *Geography*, Eratosthenes records distance measurements from the Caspian Gates to the river Indus, and from the Caspian Gates to the river Jaxartes (Strabo 11.8.9, Erat., fr. 108). These measurements must have originated with the bematists, as Pliny independently ascribes almost identical descriptions to Baeton, Diognetus and the 'Itineraries of Alexander the Great' (Plin. *HN.* 6.44-5, 6.61-2). Eratosthenes, it seems, used the records of the bematists when calculating the length of

²³ On the royal diaries (*ephemerides*) and Eumenes' role in the army, see Pearson 1955: 429-55; Hammond 1988: 129-50; Blomqvist 1992: 55; Schäfer 2002: 47-51; Mehl 2007: 165.

²⁴ See esp. Strabo 2.1.6-7, 2.1.23-7, 11.8.9, 15.2.8; Plin. *HN.* 6.45, 6.61-2, 7.11-12.

²⁵ Strabo 2.1.23-7, 11.8.9; 15.2.8; Plin. *HN.* 6.44-5, 6.61-2. For discussion of the bematists' distance measurements, see esp. Cary and Warmington 1929: 149; Brunt 1976: 487-509; Engels 1978: 68-9, 157-8; Roller 2010: 182-4.

each side of his geometric σφραγιδες. During a discussion of Ariana's length from the Caspian Gates to the river Indus, Eratosthenes cites distance measurements from a compilation of itineraries entitled τοις Ασιατικοις σταθμοις (*Asiatic Stages*) (Strabo 15.2.8, Erat., fr. 78).²⁶ Moreover, when calculating the length and breadth of his third sealstone, between the Caspian Gates and the river Euphrates, Eratosthenes acknowledges his reliance on various measurements found in itineraries, which are undoubtedly those of the bematists (Strabo 2.1.23-7, Erat., fr. 83, 84).

Eratosthenes also quotes a work entitled της αναγραφης των σταθμων (*Record of Stages*), which provided distance estimates between localities east of the river Hyphasis as far as the mouth of the river Ganges (Strabo 2.1.7, 15.1.11, Erat., fr. 73, 69). It is likely that this *Record of Stages* was the same as another used by Pliny, who cited a Seleucid itinerary when giving several distance estimates east of the Hyphasis (Plin. *HN*. 6.63-4).²⁷ Eratosthenes refers to this itinerary as his chief source for the estimate of India's east-to-west extent. Hence, Eratosthenes used the records of the bematists and the Seleucid itinerary to inform his mapping of the σφραγιδες, presumably also his calculation of distances between parallels and meridians and his estimate of the length and breadth of the οικουμενη.

Eratosthenes also extensively utilised geographic information found in the reports of Nearchus, Onesicritus and Androstenes of Thasos. During the expedition from India to the Persian Gulf, Nearchus served as the admiral of Alexander's fleet and Onesicritus as the chief pilot (Strabo 15.2.4). Androstenes participated in the expedition, and also made a separate coastal voyage around the Persian Gulf (Strabo 16.3.2). All three men published accounts of their experiences shortly after Alexander's

²⁶ Williams (2010) *BNJ* s.v. Patrokles (712) argues convincingly that the *Asiatic Stages* was part of Alexander's Archive and derived from the reports of the bematists.

²⁷ On the difficulties involved in identifying the provenance of the *Record of Stages*, see Williams (2010) *BNJ* s.v. Patrokles (712). Williams suggests that the *Record of Stages* was a Seleucid itinerary different from the similar itinerary used by Patrocles, said to be from Alexander's Archive like the *Asiatic Stages*.

death. Nearchus' and Onesicritus' accounts are cited primarily in Arrian's *Indica* and in Strabo's *Geography*, while Androstenes' report is briefly referred to by Strabo.

Androstenes' report thoroughly described the Persian Gulf. In the fragments of his *Geography*, Eratosthenes, quoting Androstenes as his chief source, provides a very extensive account of the gulf's shape, size and topographic outline (Strabo 16.3.2-4, Erat., fr. 94). Nearchus and Onesicritus both recorded detailed information on a wide range of subjects, including India's geography and natural history; the location of various islands in the Erythraean Sea; and the course of the entire coastline between the Indus River Delta and the east coast of Arabia (Strabo 15.1.12, 15.1.15-16, 15.1.34, 16.3.5-7; Arr. *Ind.* 3.6, 43.9). Nearchus' and Onesicritus' accounts seem to have informed Eratosthenes' mapping of India especially. Eratosthenes, trusting the reports of Nearchus and his followers, believed that the Bears (Ursa Major and Ursa Minor) set over India (Strabo 2.1.20, Erat., fr. 68; Plin. *HN.* 6.98). The Bears were viewed as circumpolar constellations (never set) throughout most of the Northern Hemisphere; therefore, this observation encouraged Eratosthenes to locate India closer to the equator than previously assumed. Additionally, Eratosthenes compared the reports on India with astronomical observations made by Philo in Ethiopia, influencing his representation of the southernmost parallels of his map (Strabo 2.1.20, Erat., fr. 40).

Eratosthenes also consulted Nearchus' and Onesicritus' reports when estimating the size of India. After outlining Eratosthenes' calculations of India's shape, size and dimensions, Strabo contrasts them with several estimates of India's size detailed by earlier writers, including Ctesias, Onesicritus, Nearchus, Megasthenes and Deimachus (Strabo 15.1.12). In the *Indica*, Arrian has an almost identical passage, which gives Eratosthenes' calculations and then criticises the estimates of each of the earlier writers, except Deimachus (Arr. *Ind.* 3.2-8). Arrian appears to have been unfamiliar with Strabo's work, so both passages in all likelihood derive from Eratosthenes'

Geography.²⁸ Thus, Eratosthenes consulted but ultimately dismissed Nearchus' and Onesicritus' opinions on India's size. It is likely; however, that Eratosthenes' knowledge of Taprobane was obtained in part from Onesicritus, who is the first Greek known to have mentioned the island, probably ascertaining his information from local reports (Strabo 15.1.14-15).

For Eratosthenes' purposes, Aristobulus' history would have been one of the most relevant accounts of Alexander's campaigns. Aristobulus, it seems, was an engineer who accompanied the army on Alexander's march through Asia and wrote his history sometime in the early third century BC.²⁹ His history was one of the two main primary sources consulted by Arrian. Aristobulus was fascinated with geography. Arrian, and also Strabo, frequently cite Aristobulus in connection with various descriptions of physical landscapes, flora and fauna. In particular, both authors identify him as the source of much geographical data concerning the regions of Central Asia, Bactria, Sogdiana and India. He was an authority on India's various rivers and monsoons, the rivers Oxus and Jaxartes in Sogdiana and the so-called Taurus mountain chain.³⁰

In the fragments of Eratosthenes' *Geography*, Aristobulus is not cited explicitly. However, both Aristobulus and Eratosthenes made similar comments about all of the aforementioned physical landscapes.³¹ Aristobulus' history almost certainly informed Eratosthenes' perception of the Taurus mountain chain. Both Strabo and Arrian relate

²⁸ This assertion is supported by Bosworth 1995: 227.

²⁹ We know from Arrian that Aristobulus was charged with repairing the tomb of Cyrus in Pasargadae: see Arr. *Anab.* 3.30.5.

³⁰ For Aristobulus' views on India's rivers and monsoons, see Strabo 15.1.17-19, 15.1.45. On the Oxus and Jaxartes rivers, see Arr. *Anab.* 3.30.7; Strabo 11.7.3. On the Taurus mountain chain, see Strabo 15.1.17; Arr. *Anab.* 3.28.5.

³¹ For Eratosthenes on India's rivers and monsoons, see Strabo 15.1.13, 15.1.20, Erat., fr. 74, 75. On the Oxus and Jaxartes rivers, see Strabo 11.7.3, Erat., fr. 109. On the Taurus mountain chain, see Strabo 15.1.11; Arr. *Anab.* 5.3.3, Erat., fr. 69, 23.

how Eratosthenes criticised the ‘Macedonians’ for transferring the Caucasus Mountains from the Pontus region to the Hindu Kush and the Indian portions of the Taurus mountain chain (Strabo 15.1.11; Arr. *Anab.* 5.3.3, Erat., fr. 69, 23). Arrian, in another passage, specifically identifies Aristobulus as one of the writers responsible for this transferral of the Caucasus. Therefore, it is possible that Eratosthenes’ condemnation of the ‘Macedonians’ is directed primarily against Aristobulus (Arr. *Anab.* 3.28.5).

2.3. PYTHEAS OF MASSALIA’S VOYAGE

Pytheas of Massalia is a name unknown to most people today, yet it is a name which reverberated in antiquity. Pytheas, an explorer and scientist, voyaged out into the Atlantic Ocean from his hometown of Massalia, a port city situated in the *Gulfe du Lion* on the Mediterranean Sea’s northern coastline. He sailed throughout the waters north of mainland Europe before returning back to Massalia and the familiar waters of the Mediterranean. The main intentions behind Pytheas’ voyage are open to speculation. A partial explanation is that Pytheas, driven by intellectual curiosity, wanted to seek out the provenance of precious commodities, particularly tin and amber.³² In Massalia, which was an important centre for trade, tales of tin-producing islands (*Cassiterides*) and Baltic amber would have fired the imagination.³³ However, in Pytheas’ time, Carthaginian merchants held a secure monopoly over these resources, blockading the Strait of Gibraltar to prevent foreign ships from exiting into the Atlantic. Hence, there is a possibility that Pytheas was under instructions from Massaliot officials to find a way to bypass the Carthaginian blockade and open up new trade routes to the north for

³² On the motives for Pytheas’ voyage, see Nansen 1911: 45; Hyde 1947: 124-5; Tozer 1964: 154; Hawkes 1977: 7; Roller 2006: 61-5.

³³ Northern Europe’s association with these resources in the Greek imagination predates Pytheas. In the *Histories*, Herodotus admitted having little knowledge of the remote regions of Europe, and was sceptical of stories about the *Cassiterides* and an amber-producing river (Eridanus): see Hdt. 3.115.1.

Massaliot merchants, weakening the Carthaginian stranglehold on the economy of the western Mediterranean.³⁴

Pytheas' exact route of travel is the subject of continued debate. It suffices to give a brief, speculative summary. First, Pytheas exited the Mediterranean. There are two possible ways by which this could have been achieved. On the one hand, he could have followed an overland trade route from the port of Narbo (Narbonne) to the Gironde Estuary, a scenario postulated by Cunliffe.³⁵ On the other hand, he could have sailed west along the Mediterranean coastline through the Pillars of Heracles, somehow evading the Carthaginian blockade.³⁶ Having reached the Atlantic, Pytheas sailed some distance along the Atlantic coastlines of Iberia and Celtica (Strabo 1.4.3-5, 2.4.2). Sailing north from the Armorican peninsula in Brittany, he reached the south coast of Britain. He then went west past the tin-producing region of Cornwall, rounding the island's south-western tip (Land's End) (Plin. *HN*. 4.104). He continued north along the island's west coast to the northern tip of Scotland and the Orkney Islands, possibly visiting the Isle of Man and Ireland en route.³⁷ From the north coast of Scotland, he

³⁴ For the latest take on this theory, see Cunliffe 2002: 50-4. The Carthaginian blockade may have been active from ca. 500 to ca. 250 BC, with intervening periods of brief relaxation in policy. It may be that such an interlude occurred sometime during the latter half of the fourth century BC, when the Carthaginians were preoccupied with war against Syracuse. Pytheas possibly took advantage of this in order to exit the Mediterranean: see esp. Cary and Warmington 1929: 33.

³⁵ Cunliffe suggests that Pytheas could have sailed west from Massalia to the Greek port of Agde, and then on to Narbo. From Narbo he could have traversed the valley of Aude as far as Carcaso and then travelled through the lowland passage between Montagne Noire and the Pyrennes to Tolosa (Toulouse). From here he could have followed the Garonne River to Burdigala (Bordeaux), where he may have taken a local ship northward through the Gironde Estuary and onward to the Armorican Peninsula. Cunliffe argues that the two references in Strabo linking Pytheas to Iberia do not prove that he sailed around the Iberian Peninsula, while the archaeological record suggests that the overland route was well used by Massaliot traders in Pytheas' time: see Cunliffe 2001: 306-8; Cunliffe 2002: 54-8.

³⁶ This scenario is more conventional. Roseman argues that Pytheas bypassed the Carthaginian blockade by using local ships, changing from vessel to vessel at each new port: see Roseman 1994: 149-50.

³⁷ On this leg of the journey, see Cunliffe 2002: 98-9.

journeyed north for six days to the land of Thule, an unknown location in the far north (Strabo 1.4.2).

After returning from Thule, Pytheas sailed down Britain's east coast to Cantium (Kent) (Strabo 1.4.3). At this point, he crossed to Europe and travelled east to the west coast of the amber-producing Jutland peninsula, or perhaps he went even farther east, entering the Baltic Sea (Plin. *HN*. 4.95-6).³⁸ He then turned back and began his return trip to Massalia. It is probable that throughout the expedition Pytheas frequently disembarked onto land at native ports, allowing himself time to observe and trade with the local peoples.³⁹ He also surveyed the geography of the regions visited and, at several locations, used a gnomon to calculate the sun's height at the winter solstice and the length of daylight at the summer solstice (Strabo 2.1.18; Plin. *HN*. 2.186-7; Gem. 6.8-9). These astronomical observations helped him determine how far north he had travelled relative to the location of Massalia, at which he must have made the same observations before departure (Strabo 1.4.4, 2.5.41). An expedition of this nature could have taken several years.

³⁸ On Pytheas and the amber-producing region, see Nansen: 1911: 32; Cunliffe 2002: 136-52.

³⁹ Cunliffe 2002: 98. On Pytheas' route of travel, see fig. 2.2.

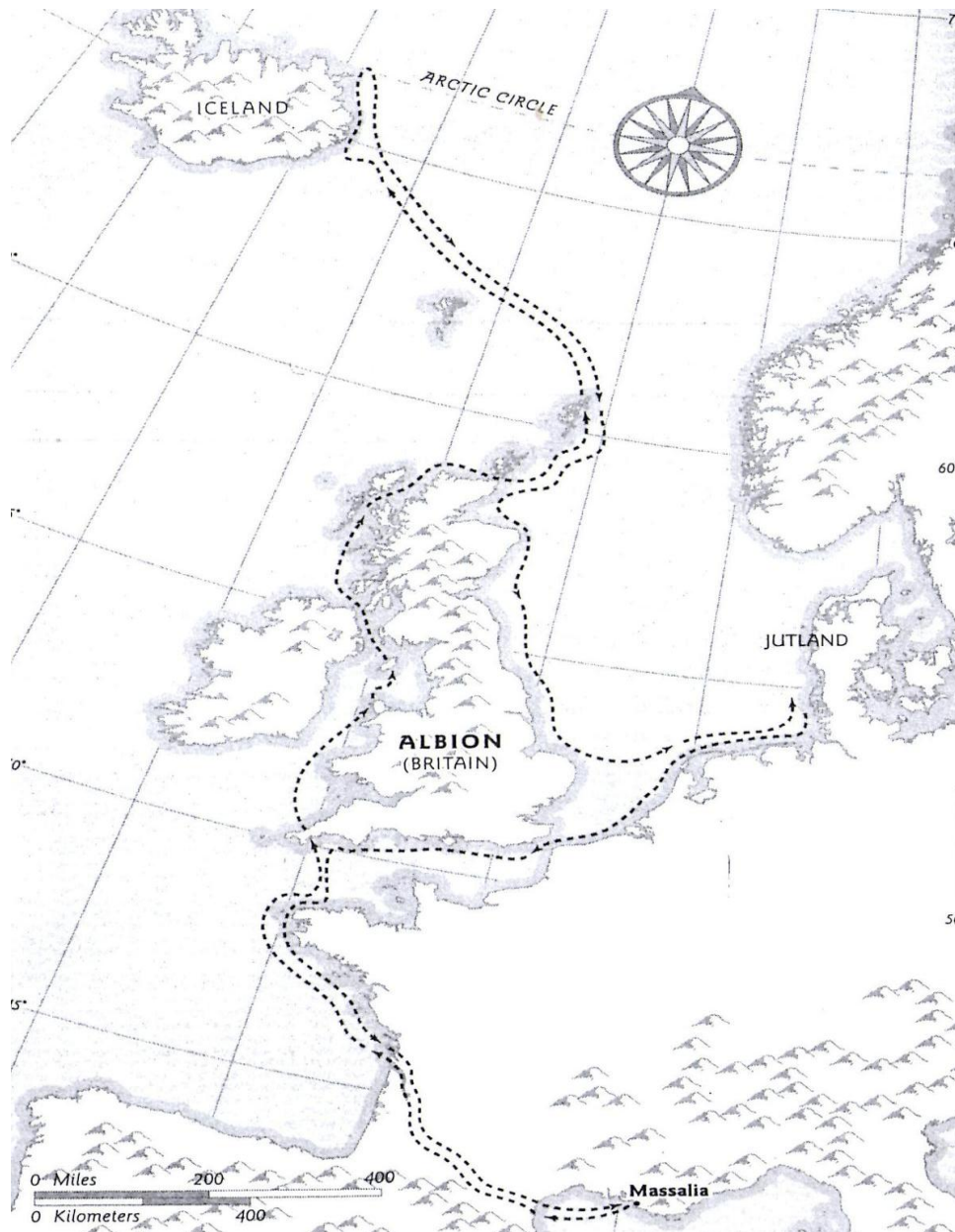


Fig. 2.2: Pytheas' possible route of travel, as hypothesised by Cunliffe.

Pytheas described his travels and observations in a book entitled *On the Ocean*. Most scholars now believe that *On the Ocean* was a scientific work, recording observed geographic, ethnographic, astronomical and hydrographic data, as opposed to a *periplus* ('a sailing-around'), which provided an itinerary of places and peoples encountered during a coastal voyage.⁴⁰ This book was quoted by eighteen ancient writers over the

⁴⁰ Roseman 1994: 1; Cunliffe 2002: 155. Contra Dilke 1985: 135-7, who categorises Pytheas' work as a *periplus*. Pytheas' book may have been influenced by the *Massaliot Periplus*. The *Massaliot Periplus* appears to have documented a journey from Massalia to Brittany: see Cunliffe 2002: 42-5.

following 900 years, before vanishing completely from the literary record.⁴¹ Dicaearchus is the first person known to have cited *On the Ocean* (Strabo 2.4.2). His references to *On the Ocean* probably occurred in the lost *Circuit of the Earth*, which he wrote during the early third century BC while living in mainland Greece. Timaeus of Tauromenium (ca. 356 – 270 BC), a contemporary of Dicaearchus, also read and cited Pytheas' book. It provided some of the geographical backdrop for his lost history of Sicily, Italy and Greece, which he wrote while in exile in Athens.⁴² The dates of these sources imply that *On the Ocean* must have been in circulation prior to 300 BC. Moreover, because no mention of Pytheas can be found in the scientific and geographical corpus of Aristotle, it is usually presumed that Pytheas wrote *On the Ocean* between 320 and 300 BC, with the voyage itself probably occurring sometime in the 320s.⁴³

It is apparent that soon after publication, copies of Pytheas' work disseminated widely throughout the Greek world, perhaps accessed by both Dicaearchus and Timaeus at the Lyceum library in Athens. *On the Ocean* was also extensively used by Eratosthenes, as Strabo cites Eratosthenes several times on Pytheas' voyage. Interestingly, *On the Ocean* had a very mixed reception in antiquity, received well in general by the likes of Timaeus, Eratosthenes, Hipparchus and Pliny the Elder, but utterly rebuked by Polybius and Strabo. In the lost thirty-fourth book of his *Histories*, Polybius launched a scathing polemic against Pytheas. In the fragments preserved by Strabo, Polybius dismissed Pytheas' voyage as having only a kernel of truth, and criticised Eratosthenes, in particular, for believing Pytheas' lies (Strabo 2.4.1-2). Both Roseman and Walbank argue that Polybius' attack on Pytheas' reliability was driven primarily by a desire to elevate the reputation of his own voyage along the Atlantic

⁴¹ Roseman 1994: 17; Cunliffe 2002: 3.

⁴² Brown 1958: 25.

⁴³ On the chronology of Pytheas' voyage and book, see Roseman 1994: iv; Cunliffe 2002: 154-5.

coasts of Africa and Spain, undertaken in 146 BC in the company of the Roman consul Scipio Aemilianus (Polyb. 3.59.7-8).⁴⁴

Polybius' polemic had a resounding impact on the textual transmission of Pytheas' book. It inclined Strabo, who only had second-hand knowledge of *On the Ocean* through the likes of Timaeus, Eratosthenes, Polybius, Hipparchus and Posidonius, to label it as a work of exaggeration and fabrication.⁴⁵ Both Polybius' and Strabo's negative predispositions toward Pytheas meant that they ignored a great deal of the geographic material which Eratosthenes extracted from *On the Ocean*. Nevertheless, the fragments of Eratosthenes' *Geography* show that Eratosthenes derived much geographic and astronomical information from Pytheas, which informed his mapping of northern and western Europe. Pytheas recorded data about the topography of Europe's Atlantic coastline and the location of tribes and nearby islands. Polybius and Strabo derided Eratosthenes for taking a large degree of this information at face value (Strabo 1.4.2-5, 2.4.1-2). Perhaps Pytheas' most significant contribution to Eratosthenes' map resulted from the astronomical observations which he made at several locations. These observations enabled Eratosthenes to plot northern parallels of latitude and identify Thule as the northernmost inhabited land of the οἰκουμένη.

2.4. SELEUCID EXPLORATIONS

Consideration will now be given to some lost accounts of Seleucid exploration, which occurred in the late fourth and early third century BC. Sometime in the last two decades of the fourth century BC, Megasthenes was sent as a Seleucid ambassador to the court of Chandragupta at Palibothra (Pataliputra) on the river Ganges (Strabo

⁴⁴ Walbank 1981: 205; Roseman 1994: 9-10.

⁴⁵ Nansen 1911: 44 and Whitaker 1982: 149 emphasise that Strabo's knowledge of Pytheas was only second-hand.

2.1.9).⁴⁶ Chandragupta was a native Indian king, who controlled much of the territory east of the river Indus.⁴⁷ There is little known about Megasthenes' life, but it seems that he spent considerable time in India and perhaps was the first Greek to travel down the upper half of the Ganges, along the Royal Road from the Indus to Palibothra.⁴⁸ He wrote a report of his travels, which commented on India's geography, ethnography and natural history. After Megasthenes' expedition another Greek named Deimachus visited Palibothra as a Seleucid ambassador to Chandragupta's son Bindusara (Strabo 2.1.9). He too documented his experiences, discussing the geography and ethnography of India and Bactria.⁴⁹ Both Megasthenes' and Deimachus' accounts are preserved only in fragments, primarily by Strabo, but also by Diodorus Siculus, Pliny the Elder and Arrian.

The fragments of Eratosthenes' *Geography* show that he thoroughly examined Megasthenes' and Deimachus' reports. As a matter of fact, Eratosthenes' overall impression of Megasthenes' and Deimachus' accounts was predominantly negative. He criticises both for their unreliability and their frequent contradiction of each other (Strabo 2.1.9, Erat., fr. 22). Eratosthenes disagrees with both men's estimates for the north-to-south extent of India, dismissing them as gross exaggerations (Strabo 2.1.4). Moreover, he is extremely critical of Deimachus' assertion that the Bears do not set in India (Strabo 2.1.19-20, Erat., fr. 67, 68). According to Eratosthenes, Deimachus'

⁴⁶ Conventionally, Megasthenes' embassy is dated to ca. 304 BC, when Chandragupta's power as Mauryan Emperor was at its apex. However, recently Bosworth has presented a strong case for dating Megasthenes' stay in India to ca. 320-18 BC before the creation of the Mauryan Empire. For this line of argument, see Bosworth 1996: 113-27.

⁴⁷ For biographical information on Megasthenes and Chandragupta, see Goyal 2000: 1-4.

⁴⁸ See Roller (2008) *BNJ* s.v. Megasthenes (715). Arrian states that Megasthenes lived with Sibyrtius, the satrap of Arachosia. Sibyrtius may have sent Megasthenes to India, rather than the king Seleucus I Nicator: see Arr. *Anab.* 5.6.2.

⁴⁹ Dicks 1960: 29.

opinions were negated by Nearchus and even Megasthenes, who may, in this case, have derived their information from local reports (Strabo 2.1.20, Erat., fr. 68).⁵⁰

Eratosthenes is, on some occasions, slightly more favourable toward Megasthenes' account of India. Arrian states that Eratosthenes and Megasthenes were in agreement about India being the largest region of Asia (Arr. *Anab.* 5.5.2). Furthermore, Strabo shows that both were also in agreement about the length of India's northern boundary, which was seen as running from the river Indus to the eastern capes along the line of the Taurus mountain chain (Strabo 15.1.11, Erat., fr. 69).⁵¹ Megasthenes also reported on Taprobane and presumably supplied Eratosthenes with some information about the island, complementing that provided by Onesicritus (Plin. *HN.* 6.98). Megasthenes' *Indica*, thus, had a far greater impact on Eratosthenes' map than Deimachus' report.

The geographical report of Patrocles also had considerable influence on Eratosthenes' map of the world. Patrocles was a leading Seleucid general under Seleucus I and his son Antiochus I. He perhaps also became governor of a large region between the Indus and the Caspian Sea (Strabo 2.1.17).⁵² In ca. 285 – 282 BC, Patrocles was sent to explore the Caspian Sea (Plin. *HN.* 6.58). After this expedition, he wrote a geographical treatise which discussed the Caspian and the regions of Bactria and India. This treatise survives in only a few meagre fragments preserved by Strabo and Pliny the Elder.

Eratosthenes, it seems, was reasonably well-disposed toward Patrocles, believing that he was a lot more reliable than Megasthenes and Deimachus (Strabo

⁵⁰ On Eratosthenes' critical approach to Megasthenes and Deimachus, see Brown 1957: 24; Brunt 1983: 451.

⁵¹ Despite their agreement, Eratosthenes claims to be following the Seleucid *Record of Stages* rather than Megasthenes' estimate.

⁵² For biographical information on Patrocles, see Broderson 2007: 621; Williams (2010) *BNJ* s.v. Patrokles (712).

2.1.4-7, Erat., fr. 50, 73). Strabo reports that Eratosthenes derived his estimate of India's north-to-south extent from Patrocles' calculations (Strabo 2.1.2, Erat., fr. 47). Eratosthenes used these calculations to help establish his system of parallels. He argued that the distance between India's southern capes and the Taurus mountain chain was the same as that between Meroë and Athens. These measurements, in conjunction with recorded astronomical observations, informed Eratosthenes' assertions that Athens lay on the same parallel of latitude as the Taurus Mountains, and that Meroë lay on the same parallel of latitude as India's southern capes (Strabo 2.1.2, 2.1.20, Erat., fr. 47, 68). Patrocles also gave an estimate for India's east-to-west extent; however, as mentioned earlier, Eratosthenes based his estimate of India's east-to-west extent on the Seleucid *Record of Stages*, which gave a slightly larger figure than that estimated by Patrocles (Strabo 2.1.7-8, 15.1.11, Erat., fr. 73, 69).

Patrocles' description of the Caspian Sea was fundamental to Eratosthenes' mapping of it and the surrounding regions. The fragments show that Patrocles wrote on the dimensions and nature of the Caspian Sea. He measured the length of the Caspian's western coastline, estimated its north-to-south extent and stated that as a whole it was comparative in size to the Euxine (Strabo 2.1.17, 11.7.1). Crucially, Patrocles reported that the Caspian was a gulf of the Northern Ocean, into which the rivers Oxus and Jaxartes flowed (Strabo 2.1.17, 11.7.3, 11.11.5-6; Plin. *HN*. 6.58). Patrocles' theories contradicted the information provided by Herodotus, Aristotle and Polycleitus of Larissa, who all correctly thought the Caspian to be a landlocked sea. Polycleitus, who may have accompanied Alexander on his campaigns, seems to have put forward an unusual hypothesis, suggesting that the Caspian was connected somehow with Lake Maeotis (Sea of Azov) (Strabo 11.7.4). Eratosthenes' approach to these conflicting ideas and mapping of the Caspian will be discussed at length later.

2.4. PTOLEMAIC EXPLORATIONS

Under the Ptolemaic dynasty, Egypt flourished, with its capital Alexandria becoming a centre of Mediterranean trade and intellectual zeal. Throughout the third century BC, the Ptolemies sponsored dozens of exploratory expeditions. The likes of Philo, Eumedes, Simmias, Dalion and Simonides travelled south to investigate Ethiopia (including modern-day Sudan), the Cinnamon-producing country, the Arabian Gulf and the Arabian Peninsula (Plin. *HN*. 6.183, 6.191-4; Strabo 2.1.20, 16.4.7). The main purpose behind many of these expeditions was to hunt for war elephants, using the ports of Adulis and Ptolemais Theron ('Ptolemais of the Hunts') on the African coast of the Arabian Gulf as bases of operation (Strabo 16.4.7, 17.1.5). Mention should also be made of Dionysius, who was sent as a Ptolemaic ambassador to King Ashoka in India (r. 269 – 232 BC), and Timosthenes of Rhodes, who undertook a voyage around the Mediterranean and possibly into the Atlantic Ocean (Plin. *HN*. 6.58-9).⁵³

Accounts of these explorations presumably circulated throughout Ptolemaic Egypt, especially at the Library of Alexandria. However, in the fragments of his *Geography*, Eratosthenes cites explicitly only Philo's *Aithiopica* and Timosthenes' *On Harbours*. Philo's expedition to Ethiopia has already been mentioned briefly. Almost nothing is known about Philo's life, and the fragments of his travelogue are extremely scanty. It appears that Philo travelled south from Egypt during the reign of Ptolemy I Soter (r. 303 – 281 BC). The purpose of his journey is not specified, but Strabo shows that he recorded important astronomical observations (Strabo 2.1.20).⁵⁴ At Meroë, Philo used a gnomon to determine that the sun was at its zenith forty-five days prior to the summer solstice, giving an indication of its proximity to the summer tropic (Strabo 2.1.20). Strabo states that Eratosthenes agreed with Philo's calculation and compared it

⁵³ Walbank 1981: 200-4 provides a good overview of Ptolemaic exploration in Africa, Arabia and the Red Sea region.

⁵⁴ Ameling 2007: 52 discusses the astronomical observations recorded by Philo.

with the astronomical observations recorded by Nearchus and Megasthenes in India (Strabo 2.1.20, Erat., fr. 68). This allowed Eratosthenes to ascertain the latitudinal positions of Ethiopia and India relative to one another and locate each region in accordance with his system of parallels.

Timosthenes of Rhodes was the admiral of Ptolemy II Philadelphus' fleet (Plin. *HN*. 6.183). His voyage occurred sometime in the 270s and his published account provided a thorough survey of the Mediterranean coastline, recording data on various Mediterranean ports, the contours of the coastline and the distances between different locations.⁵⁵ *On Harbours* was written in ten books and survives in fragments preserved mainly by Strabo and Pliny the Elder. Strabo tells us that Eratosthenes praised Timosthenes' reliability on geographic matters, but frequently disagreed with him on points of detail (Strabo 2.1.40, Erat., fr. 134). Polybius, Hipparchus and Strabo criticised Timosthenes and Eratosthenes for their partition of Europe's Mediterranean coastline into three promontories (ἄκρα) (Strabo 2.1.40, 2.4.8, Erat., fr. 134, 135). Moreover, Strabo states that both Timosthenes and Eratosthenes provided inaccurate information about many regions in Europe, including Iberia, Celtica, Germany, Britain, Italy, the Adriatic Sea and the Euxine (Strabo 2.1.41, Erat., fr. 131). These passages demonstrate that Timosthenes' coastal survey influenced Eratosthenes' mapping of Europe's Mediterranean coastline. Interestingly, Timosthenes is credited also with creating a schematic map of twelve wind directions, with each direction corresponding to a specific nation, based partially on the wind compass described in Aristotle's *Meteorology* (Arist. *Mete.* 363 a21; Agath. 2.7).⁵⁶ Eratosthenes' opinion on this map is

⁵⁵ Gärtner 2007: 706 provides a brief overview of Timosthenes' life and career. Fraser 1972, vol. 1: 522 argues that Timosthenes' work may have provided information on the whole coastal belt from Ethiopia up the east coast of Africa to the western end of the Mediterranean.

⁵⁶ For synopsis and reconstruction of Timosthenes' geography and map, see Bunbury 1879, vol. 1: 587-8; Aujac, Harley and Woodward 1987b: 153. Note that Timosthenes added two winds to the wind compass constructed by Aristotle.

not recorded, but it is possible that he viewed it and integrated some details into his own map of the world.

With the main source material for Eratosthenes' map of the world now introduced, the next few chapters will form the main body of the examination, providing critical analysis of Eratosthenes' map of the world in the context of its source material. This examination will begin with an analysis of the shape and size of Eratosthenes' οἰκουμένη and the depiction of the map's main parallel.

3. THE SIZE, SHAPE AND MAIN PARALLEL OF ERATOSTHENES' MAP

3.1. THE LOCATION, FRAME AND GENERAL SHAPE OF ERATOSTHENES' *OIKOUMENE*

Earlier discussion demonstrated that Eratosthenes' map of the world depicted the *οικουμένη* - the part of the earth which the Greeks knew to be inhabited. Less obvious perhaps is that Eratosthenes intended his map of the *οικουμένη* to be projected onto the three-dimensional surface of the terrestrial earth sphere. In an earlier work entitled *On the Measurement of the Earth*, Eratosthenes had described his method for measuring the earth's circumference, which he calculated as 250,000 stadia, but later amended to 252,000.¹ In both this treatise and the *Geography*, Eratosthenes discussed in detail the earth's spatial structure, theorising that it could be divided into terrestrial zones. The theory of terrestrial zones was certainly not a new invention. It was probably first formulated by Eudoxus of Cnidus in the first half of the fourth century BC, and then gradually developed by the likes of Aristotle, Dicaearchus, Eratosthenes, Polybius

¹ Eratosthenes' method for calculating the earth's circumference is explained comprehensively at Cleom. 1.7.63-103. Eratosthenes started from the assumption that the sun was so distant that its rays could be considered parallel anywhere on earth. Using observations made at Syene in Egypt, he determined that the city was directly under the tropic with the midday sun at its zenith on the summer solstice. Next, he placed Syene on the same meridian of longitude as Alexandria. At Alexandria, he measured the angle between the vertical and the position of the sun at midday on the summer solstice, discovering that it was one fiftieth of a circle. This angle was equal to the angle at the earth's centre subtended by the arc of the meridian on which Syene and Alexandria were located. Eratosthenes then estimated the distance between Alexandria and Syene as 5,000 stadia. The circumference of the earth would be fifty multiplied by 5,000 – 250,000 stadia. It appears that Eratosthenes later amended this figure to 252,000 stadia, a round number divisible by sixty, fitting his sexagesimal division of the circle. On this method, see Bunbury 1879, vol. 1: 620-5; Tozer 1964: 170-2; Fraser 1972, vol. 1: 413-15; Dilke 1985: 32; Aujac, Harley and Woodward 1987b: 155. There may have been various earlier attempts to measure the earth's circumference. Quoted figures include 400,000 and 300,000 stadia: see Fraser 1972, vol. 1: 414.

and Posidonius.² The terrestrial zones of the earth were defined by theoretical circles corresponding to and concentric with the variable circles of the celestial sphere: the equator, summer tropic, winter tropic and polar circles.

Closely following the model of Aristotle, Eratosthenes divided the earth into five terrestrial zones and two hemispheres, the northern and southern. Each terrestrial zone was characterised by a specific climate that affected human habitation. He placed one torrid, equatorial zone somewhere in-between the two tropics, uninhabitable due to the heat; two inhabitable temperate zones between the tropics and the polar circles; and two frigid zones beyond the polar circles, uninhabitable on account of the cold (Strabo 2.5.5, Erat., fr. 30). Both Walbank and Roller argue that by Eratosthenes' time, Ptolemaic expeditions to Meroë and other places south of the summer tropic began to undermine the traditional opinion, which held that the whole region between the tropics was uninhabitable because of heat.³ Similarly, Pytheas' voyage and report of human habitation in the land of Thule, in the vicinity of the northern polar circle, challenged the concept of uninhabitable polar regions.⁴ With knowledge of these explorations in equatorial and polar latitudes, Eratosthenes believed that some human habitation was possible outside of the so-called temperate zones. In fact, as we have seen, Eratosthenes extended the οἰκουμένη far south of the summer tropic. He conceived of a parallel passing through the Cinnamon-producing country and Taprobane, marking the boundary between the οἰκουμένη and the torrid, uninhabitable zone.⁵

² Roller 2010: 144-5 argues that Eudoxus saw the world as sloping toward the poles and used the word κλίμα 'slope' to define each zone. Also, he stresses that in Eratosthenes' day, the concept of zones and terrestrial circles was still vague.

³ For the conventional Greek perception of an uninhabitable zone between the tropics, see Arist. *Mete.* 362 a31 – 362 b9, 362 b27-8.

⁴ Walbank 1979: 571-6; Roller 2010: 159-60.

⁵ Eratosthenes theorised about the possibility of there being a temperate, inhabitable region extending directly under the celestial equator, interrupting the torrid zone. Polybius may have expanded upon this

Strabo tells us that Eratosthenes projected his map of the world onto the northern hemisphere of the spherical earth. Eratosthenes divided the earth into fourths, defined by the equator and a circle running perpendicular to the equator, which passed through the poles. The northern hemisphere naturally contained two of these fourths. Inside each of these Eratosthenes outlined a quadrilateral area (τετράπλευρος). The outline of each quadrilateral area was as follows: the northern side ran along half of the polar circle; the southern side ran along half of the equator; and the eastern and western sides, as segments of the circle passing through the poles, lay directly opposite to one another and were equal in length (Strabo 2.5.5, Erat., fr. 30). Eratosthenes then described the location of the οἰκουμένη within this framework: ἐν θατέρῳ δὴ τῶν τετραπλεύρων τούτων (ὅποτέρῳ δ' οὐδὲν ἂν διαφέρειν δόξειεν) ἰδρῦσθαί φαμεν τὴν καθ' ἡμᾶς οἰκουμένην περικλυστον θαλάττῃ καὶ ἐοικυῖαν νήσῳ ('Now in either one of these quadrilaterals [and it would appear to make no difference in which of the two] we say that our inhabited world is situated, washed all round by the sea and like an island') (Strabo 2.5.5, Erat., fr. 30).⁶

Eratosthenes comprehensively defined the outline and dimensions of the οἰκουμένη within the quadrilateral area. He stated that the maximum length of the quadrilateral along the equator was 126,000 stadia, half of the earth's circumference, while the distance from the equator to the pole was 63,000 stadia, a quarter of the earth's circumference (Strabo 2.5.6, Erat., fr. 30).⁷ A total of 8,800 stadia was given as

notion, arguing that the region at the equator was conducive to human habitation, being high and mountainous and having much precipitation: see Strabo 2.3.2.

⁶ At Strabo 2.5.5-6, Erat., fr. 30 Eratosthenes is not mentioned by name; nonetheless, this whole passage is commonly thought to be a direct quotation from Eratosthenes' *Geography*. Roller 2010: 144 asserts that the straightforward linear style of this passage is indicative of Eratosthenes, while the lack of multiple source citations is inconsistent with Strabo's own method of literary composition.

⁷ The breadth of the uninhabitable frigid zone between the pole and the polar circle is not recorded, but can be calculated by subtracting both the breadth of half the torrid zone and the breadth of the οἰκουμένη from 63,000 stadia.

the breadth of the part of the uninhabitable torrid zone between the equator and the southernmost limits of the οίκουμένη (Strabo 2.5.6, Erat., fr. 30). Stretching from the parallel through Thule in the north to the parallel through the Cinnamon-producing country in the south, Eratosthenes calculated the breadth of the οίκουμένη at either 30,000 or 38,000 stadia (Strabo 1.4.2, 2.5.6, Erat., fr. 35, 30). From the westernmost point of Europe to the eastern capes of India, he calculated the length at either 70,000 or 78,000 stadia (Strabo 1.4.5, 2.5.6, Erat., fr. 37, 35).⁸ These measurements meant that Eratosthenes preserved two standard dictums of Greek geography, that the οίκουμένη was oblong in shape and that it had a length more than double its breadth.⁹

The dimensions which Eratosthenes attributed to the οίκουμένη emphasised its smallness in relation to the quadrilateral and the earth as a whole. In particular, Eratosthenes highlighted the vastness of the Atlantic Ocean compared to the οίκουμένη. He suggested that a voyage from Iberia to India along the same parallel, though possible, was made extremely difficult by the distance of not much less than 200,000 stadia (Strabo 1.4.6, Erat., fr. 33).¹⁰ Also, Eratosthenes hinted that human habitation may not be restricted solely to the οίκουμένη. He posited that the spherical earth could be inhabited all the way round, with inhabited landmasses perhaps located in each of the earth's three other quadrilaterals (Strabo 1.4.1, 2.5.13, Erat., fr. 25, 31).

⁸ Eratosthenes' citation of two different measurements for both the length and breadth of the οίκουμένη is problematic. It may be that the smaller figures represented rough estimations, while the larger figures may have been maximum dimensions derived from distances measured along the main parallel and main meridian.

⁹ It has been mentioned that in the early fourth century BC, Democritus became the first Greek to describe the οίκουμένη as oblong. Also, he ascribed to the οίκουμένη a ratio of 3 to 2, with a length one and a half times its width. Dicaearchus agreed with this ratio. Aristotle favoured a ratio greater than that of 5 to 3, while Eudoxus apparently was the first to suggest that the length was twice the width: see Arist. *Mete.* 362 b21-24; Agath. 1.2.

¹⁰ Aristotle was the first to propose that the Atlantic Ocean separated the eastern and western extremities of the οίκουμένη, preventing it from forming a continuous belt around the globe: see Arist. *Mete.* 362 b18-30.

The theory of habitation beyond the οἰκουμένη was first advanced properly by Plato. In *Phaedo*, Plato has Socrates state that πάμμεγά τι εἶναι αὐτό, καὶ ἡμᾶς οἰκεῖν τοὺς μέχοι Ἡρακλείων στηλῶν ἀπὸ Φάσιδος ἐν μικρῷ τινι μορίῳ, ὥσπερ περὶ τέλμα μύρμηκας ἢ βατράχους περὶ τὴν θάλατταν οἰκοῦντας, καὶ ἄλλους ἄλλοθι πολλοὺς ἐν πολλοῖσι τοιούτοις τόποις οἰκεῖν ('I am convinced that the earth is gargantuan, and that we who inhabit it from the Phasis as far as the Pillars of Heracles dwell in a small part of it, living about the sea just like ants or frogs about a pond, and that many other people live elsewhere in many regions of such kind') (Pl. *Phd.* 109b). Plato also developed this concept of multiple οἰκουμέναι through the story of Atlantis in the dialogues *Timaeus* and *Critias* (Pl. *Ti.* 25a; Pl. *Criti.* 108e, 113c).¹¹ Aristotle followed Plato's line of thought, suggesting that there may be another inhabited landmass in the temperate zone of the southern hemisphere (Arist. *Mete.* 362 a33-35, 362 b31-33). It is not surprising then that Eratosthenes, in the wake of early Hellenistic explorations which extended the οἰκουμένη into regions previously unknown, felt that there may be worlds beyond the one which was known to the Greeks. He suggested that the inhabitants of these other worlds would be completely different in nature from those in the οἰκουμένη (Strabo 2.5.13, Erat., fr. 31). This, however, appears to have been the extent of his thinking on the subject. As a geographer, he had no desire to concern himself overly with the unknown; instead, he highlighted that the known and inhabited world of the οἰκουμένη was the primary focus of his investigations (Strabo 2.5.13, Erat., fr. 31).

Eratosthenes' opinion on the shape of the οἰκουμένη is in need of further analysis. It has been shown that the basic template for the shape of Eratosthenes' οἰκουμένη and the frame of his map was an oblong. The fragments of his *Geography*,

¹¹ Plato's Atlantis was a hypothetical landmass probably located somewhere to the west of the Pillars of Heracles. Romm 1992: 121-4 provides an overview of Plato's description of Atlantis and its place in Greek mythology and geography.

however, demonstrate that he used a vivid clothing metaphor to describe more specifically the shape and contour: λέγεται δὲ καὶ γλαμυδοειδὲς πῶς τὸ σχῆμα· πολλὴ γὰρ συναγωγή τοῦ πλάτους πρὸς τοῖς ἄκροις εὐρίσκεται, καὶ μάλιστα τοῖς ἑσπερίοις, τὰ καθ' ἕκαστα ἐπιόντων ἡμῶν ('The shape [of the inhabited world] is somehow like a *chlamys*; for when we visit every part [of the inhabited world], a substantial narrowing of the breadth toward the extremities is found, and especially at the western extremities') (Strabo 2.5.9, Erat., fr. 34).¹² The *chlamys* was a short mantle or cloak typically worn by soldiers. In terms of shape, the *chlamys* was four-sided. The lower edge was the longest and may have been slightly concave in form. The upper edge was shorter and probably straight. The other two sides intersected the top and bottom so that the breadth of the *chlamys* was at its greatest in the middle and at its least toward the edges.¹³ Hence, by referring to the οἰκουμένη as *chlamys*-shaped, Eratosthenes may have been concerned particularly with highlighting the tapering and convex contour of the landmass at its eastern and western extremities (see fig. 3.1).

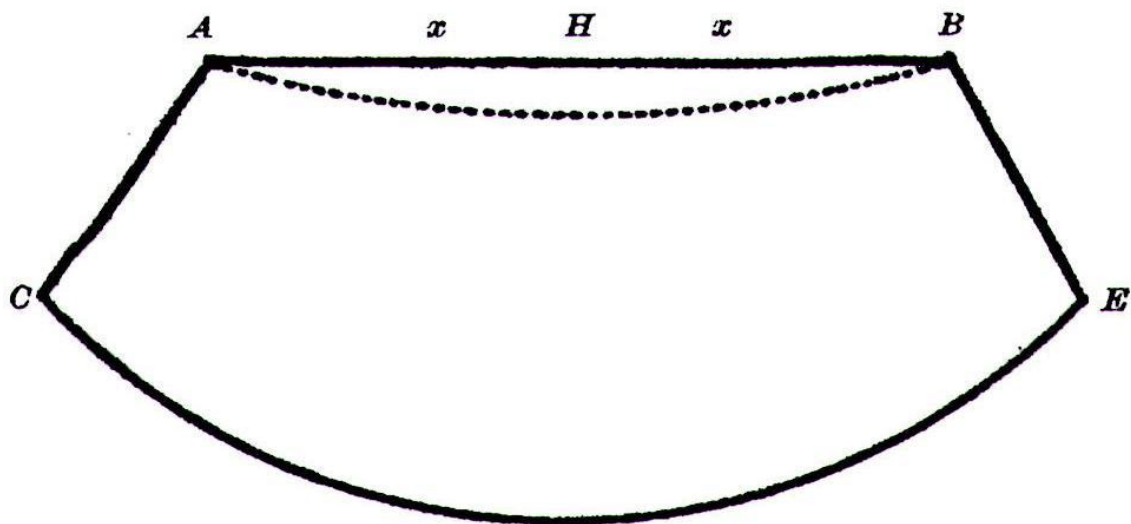


Fig. 3.1: Tarbell's conception of the shape of the *chlamys*.

¹² Cf. Strabo 2.5.6, 2.5.14, Erat., fr. 30, 53. Note that at Plut. *Alex.* 26.5 Alexandria in Egypt is described as being built in the shape of a *chlamys*.

¹³ On the form and shape of the *chlamys*, see Tarbell 1906: 283-9; Evans 2008: 31-2.

Recently, however, Zimmermann has proposed a compelling new interpretation of Eratosthenes' *chlamys*-shaped world. He argues that Eratosthenes may not have applied the *chlamys* metaphor strictly to the form of the οἰκουμένη. Elsewhere in the fragments of the *Geography*, Eratosthenes describes the οἰκουμένη as having a rather irregular shape, not quite consistent with that of a *chlamys*. The οἰκουμένη was indented by gulfs and at the southeast extremity of the landmass India was shaped like a rhomboid, which was asymmetrical with the triangular shape of Libya in the southwest (Strabo 11.6.1, 15.1.10-11, 17.3.1-2; Plin. *HN*. 6.108, Erat., fr. 110, 69, 100, 93). Zimmermann suggests that the designation of 'chlamys-shaped' would have been better suited to the οἰκουμένη as it appeared framed by the quadrilateral.¹⁴

As shown earlier, the quadrilateral had a lower edge running along half of the equator and a shorter upper edge running along half of the polar circle. These lines were intersected by two other curved edges running along the meridian circle. In a two-dimensional projection this quadrilateral would correspond roughly to the presumed shape of a *chlamys*. Zimmermann believes that Eratosthenes took this comparison a step further, intending for the οἰκουμένη, framed by the quadrilateral, to be imagined on the three-dimensional surface of the sphere. He states that the aim of Eratosthenes' comparison was 'to explain to the reader that in reality the *oikoumenē* was not a flat surface but a curved one, located on the northern hemisphere of the globe like a *chlamys* put around the shoulder of its wearer.'¹⁵ This explanation fits well with the composition of the fragments in which the *chlamys* metaphor is mentioned. In each of the relevant fragments, Eratosthenes demonstrates a keen interest in the spatial relationship between the *chlamys*-shaped οἰκουμένη and the three-dimensional terrestrial sphere (Strabo 2.5.5-6, 2.5.7-9, 2.5.13-14, Erat., fr. 30, 34, 31, 53). It is apparent from these passages

¹⁴ Zimmermann 2002: 31-2.

¹⁵ Zimmermann 2002: 32.

that Eratosthenes intended his map of the world to be traced onto the spherical surface of a globe (see fig. 3.2).

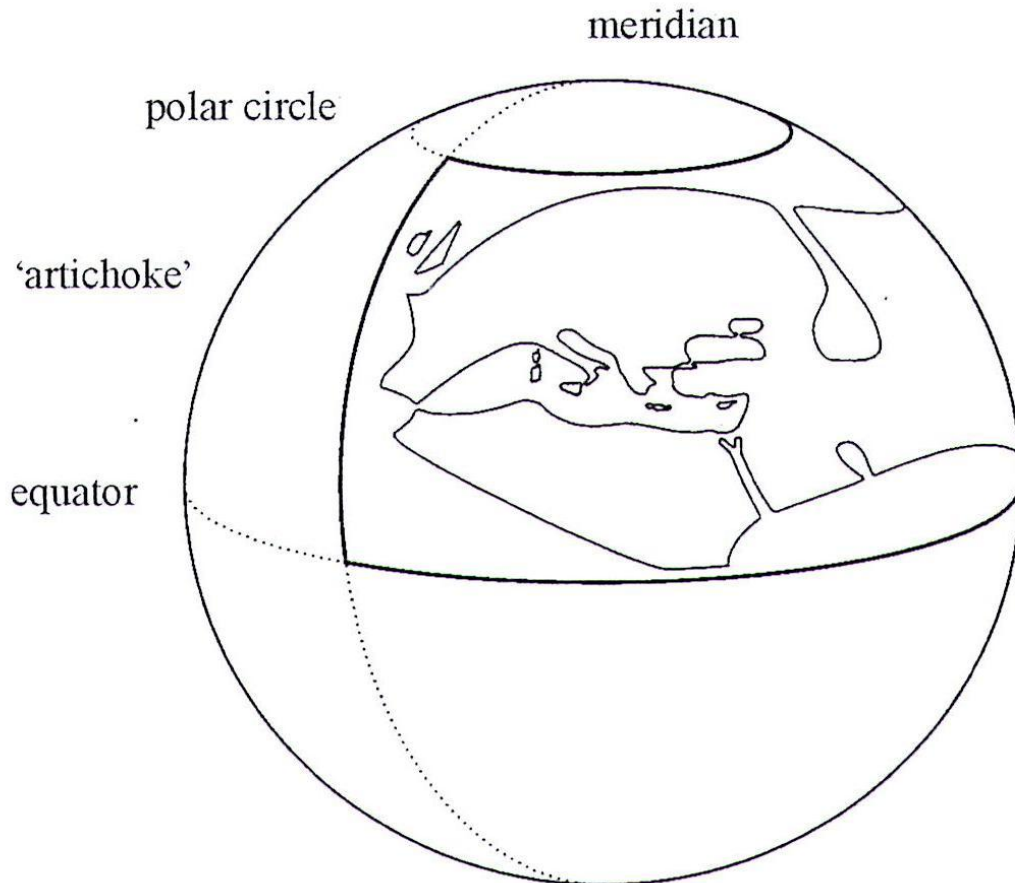


Fig. 3.2: Zimmermann's reconstruction of Eratosthenes' οἰκουμένη framed by the quadrilateral and projected onto the three-dimensional surface of the spherical earth.

3.2. THE MAIN PARALLEL OF ERATOSTHENES' MAP

The most prominent feature of Eratosthenes' map of the world was a line of zero latitude, corresponding to approximately 36° N, which divided the οἰκουμένη into two halves. Eratosthenes' description of this main parallel, as cited by Strabo, is worth quoting in full:

Ἐν δὲ τῷ τρίτῳ τῶν γεωγραφικῶν καθιστάμενος τὸν τῆς οἰκουμένης πίνακα γραμμῇ τινι διαίρει δίχα ἀπὸ δύσεως ἐπ' ἀνατολήν παραλλήλῳ τῇ ἰσημερινῇ γραμμῇ. Πέρατα δ' αὐτῆς τίθησι πρὸς δύσει μὲν τὰς Ἡρακλείους στήλας,

ἐπ' ἀνατολῇ δὲ τὰ ἄκρα καὶ ἔσχατα ὄρη τῶν ἀφοριζόντων ὁρῶν τὴν πρὸς ἄρκτον τῆς Ἰνδικῆς πλευράν. γράφει δὲ τὴν γραμμὴν ἀπὸ Στηλῶν διὰ τε τοῦ Σικελικοῦ πορθμοῦ καὶ τῶν μεσημβρινῶν ἄκρων τῆς τε Πελοποννήσου καὶ Ἀττικῆς, καὶ μέχρι τῆς Ῥοδίας καὶ τοῦ Ἰσσυκοῦ κόλπου. μέχρι μὲν δὴ δεῦρο διὰ τῆς θαλάττης φησὶν εἶναι τὴν λεχθεῖσαν γραμμὴν καὶ τῶν παρακειμένων ἠπείρων (καὶ γὰρ αὐτὴν ὅλην τὴν καθ' ἡμᾶς θάλατταν οὕτως ἐπὶ μῆκος τετάσθαι μέχρι τῆς Κιλικίας), εἶτα ἐπ' εὐθείας πῶς ἐκβάλλεσθαι παρ' ὅλην τὴν ὄρεινὴν τοῦ Ταύρου μέχρι τῆς Ἰνδικῆς; τὸν γὰρ Ταῦρον ἐπ' εὐθείας τῆ ἀπὸ Στηλῶν θαλάττη τεταμένον δίχα τὴν Ἀσίαν διαιρεῖν ὅλην ἐπὶ μῆκος, τὸ μὲν αὐτῆς μέρος βόρειον ποιοῦντα, τὸ δὲ νότιον; ὥσθ' ὁμοίως καὶ αὐτὸν ἐπὶ τοῦ δι' Ἀθηνῶν ἰδρῦσθαι παραλλήλου καὶ τὴν ἀπὸ Στηλῶν μέχρι δεῦρο θάλατταν ('In the third book of his *Geography*, Eratosthenes, setting down his map of the inhabited world, divides it in two with a certain line running from west to east parallel to the equatorial line. At the extremities of this line he places the Pillars of Heracles to the west, and to the east, the capes and the most remote peaks of the mountain chain which forms the northern boundary of India. He draws the line from the Pillars through the Strait of Sicily and also the southern capes of the Peloponnese and Attica, and as far as Rhodes and the Gulf of Issus. Now, as far as here, he states that the said line runs through the sea and the adjacent continents [indeed also our entire sea itself stretches lengthwise along this line as far as Cilicia], then the line is thrown out on an approximately straight course along the whole Taurus mountain chain as far as India. For the Taurus, extending on a straight course with the sea from the Pillars, divides the whole of Asia lengthwise in two, making one part of it northern, and the other southern; so that likewise

the Taurus and the sea that comes from the Pillars as far as it lie on the parallel through Athens’) (Strabo 2.1.1, Erat., fr. 47) (see fig. 3.3).

This main parallel and dividing line of Eratosthenes’ map of the world is crucial to our understanding of Eratosthenes’ cartography. Eratosthenes’ line was based, at least partially, on that of Dicaearchus, who is the first Greek known to have drawn a map with a main parallel.¹⁶ Agathemerus, in his overview of Greek geography, written in the third century AD, describes Dicaearchus’ main parallel in the following manner: Δικαίαρχος δὲ ὀρίζει τὴν γῆν οὐχ ὕδασιν, ἀλλὰ τομῇ εὐθείᾳ εὐκράτῳ ἀπὸ στηλῶν διὰ Σαρδοῦς Σικελίας Πελοποννήσου Ἰωνίας Καρίας Λυκίας Παμφυλίας Κιλικίας καὶ Ταύρου ἐξῆς ἕως Ἰμαίου ὄρους. τῶν τοίνυν τόπων τὸν μὲν Βόρειον, τὸν δὲ νότιον ὀνομάζει (‘Dicaearchus divides the earth not by waters, but by a straight, perfect cut from the Pillars through Sardinia, Sicily, Peloponnese, Ionia, Caria, Lycia, Pamphylia, Cilicia and Taurus successively until the Imaus Mountain Range. Accordingly, in terms of these places, he gives the names North and South’) (Agath. 1.5).

¹⁶ For discussion of Dicaearchus’ and Eratosthenes’ main parallel, see Bunbury 1879, vol. 1: 628; Berger 1880: 174-5; Heidel 1937: 111-13, 126-8; Tarn 1948, vol. 2: 7; van Paassen 1957: 39-40; Dicks 1960: 122-3; Fraser 1972, vol. 1: 532-4; Brunt 1976: 523-4; Goukowsky 1978: 112-13; Hornblower 1981: 62, 80-7; Dilke 1985: 30-5; Aujac, Harley and Woodward 1987b: 152-6; Bosworth 1995: 237-8; Karttunen 1997: 99, 106-8; Aujac 2001: 83; Keyser 2001: 367; Geus 2002: 271; Roller 2010: 162; Romm 2010: 227; Williams (2010) *BNJ* s.v. Patrokles (712).

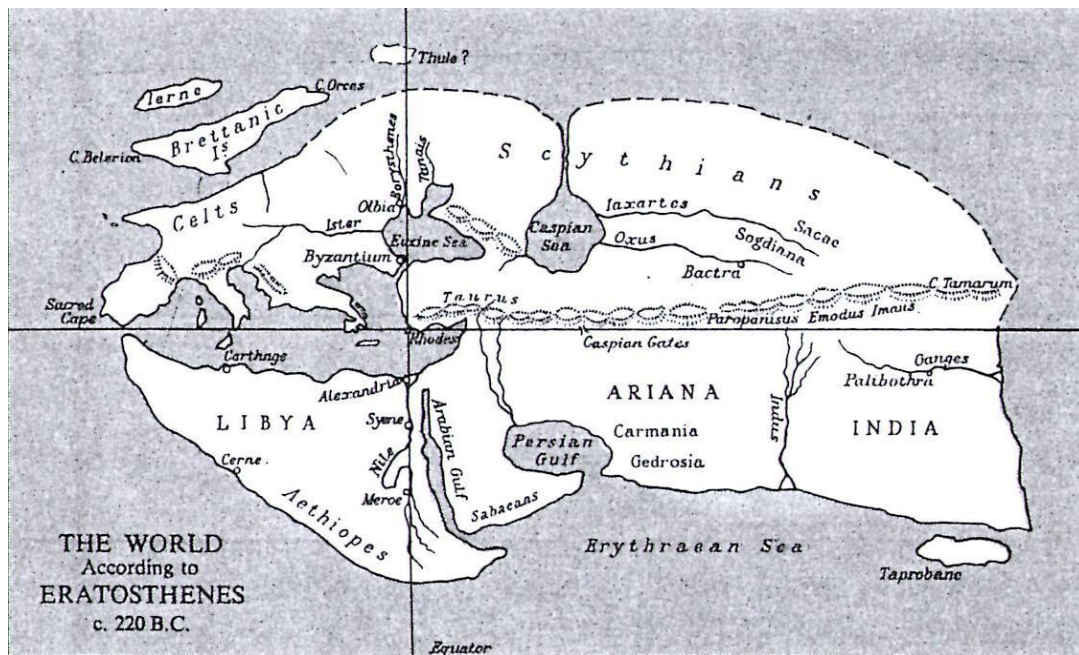


Fig. 3.3: A simplified rendering of Eratosthenes' map, with the main parallel clearly depicted.¹⁷

From the eastern limits of the οἰκουμένη all the way along to the western terminus of the Taurus mountain chain Dicaearchus' and Eratosthenes' lines were practically identical. Technically speaking, the Taurus Mountains were located in southern Anatolia in the region of Cilicia. However, from at least the time of Dicaearchus onward, this range was believed to extend eastward roughly in a straight line to the edge of the map, incorporating the Alborz Mountains, the Hindu Kush (Paropamisus) and the Himalayan mountain system (Emodus/Imaus).¹⁸ Eratosthenes estimated the breadth of the Taurus mountain chain as approximately 3,000 stadia

¹⁷ Note that the deviation of the Taurus mountain chain to the northeast of the main parallel is not consistent with the fragments of Eratosthenes' *Geography*: see esp. Strabo 2.1.2, Erat., fr. 47.

¹⁸ For ancient references to the Taurus mountain chain and the several different ranges which it comprised, see Diod. 18.5.2-3; Strabo 2.1.1; Arr. *Anab.* 3.28.5, 5.5.2-4; Arr. *Ind.* 2.1-4; Agath. 1.5. Dicks 1960: 30 argues that this main parallel of latitude was Dicaearchus' most important contribution to the science of geography and he notes that this parallel was fairly accurate considering that it was sketched before any scientific concept of latitude. Roller 2010: 162 discusses the scientific accuracy of Dicaearchus' and Eratosthenes' main parallels: 'The Tauros Mountains in southern Anatolia were believed to be the western end of a great range that ran all the way to the Imaos north of India (the Tauros, Elburz, Hindu Kush, and Himalayas), a generally accurate theory. The mountains lie between 35° and 37° north latitude as far as the Hindu Kush, but then across northern India they angle in a great arc to the southeast, through 10° of latitude.' Also, see Brunt 1976: 523-4; Bosworth 1995: 236-40.

(Strabo 2.1.2, Erat., fr. 47). In terms of his map, it meant that only the southernmost parts of the chain, including the regions of Cilicia, the Hindu Kush and the Himalayas, lay upon the main parallel. In the east, the Hindu Kush and the Himalayas formed the northern boundary of India (Strabo 2.1.2, Erat., fr. 47). 3,000 stadia to the north, the northernmost parts of the chain straddled the southern regions of Bactria, and extended just south of the Caspian and the Euxine (Strabo 2.1.3, Erat., fr. 47). West of the Taurus, Dicaearchus' and Eratosthenes' lines diverged. Eratosthenes' line ran through the Gulf of Issus and Rhodes, while Dicaearchus' extended along a more northerly course through southern Asia Minor (Strabo 2.1.1, Erat., fr. 47; Agath. 1.5). Both Dicaearchus and Eratosthenes presented their lines of zero latitude as theoretically parallel to the equator. They realised, however, that in reality their lines were not perfectly straight, with nearly all the cited toponyms located on slightly different latitudes, including each of the ranges which comprised the Taurus mountain chain.¹⁹

Dicaearchus' apparent reference to the Imaus Mountain Range, which is usually associated with the Himalayan mountain system, suggests strongly that the primary accounts of Alexander the Great's campaigns influenced his rendering of the διάφραγμα. The earliest mention of 'Imaus' (Ἰμάος) in Greek literature reportedly came from Baeton, one of Alexander's bematists. Pliny the Elder cites Baeton as discussing the thin air experienced by people living at high altitude in the foothills of the Imaus Mountain Range (Plin. *HN*. 7.11-12). Megasthenes also mentioned the Himalayas in the context of a discussion about India's northern boundary. He probably used the toponym 'Emodus', which we believe to have been practically interchangeable with 'Imaus' (Diod. 2.35.1).²⁰ With the likely sources for Dicaearchus' knowledge of the Himalayas

¹⁹ Note that the Straits of Messana and southern Attica lie on a latitude north of Rhodes: see Roller 2010: 161-3. Strabo 2.5.24, Erat., fr. 128 implies that Eratosthenes used a gnomon to calculate the latitudinal position of Rhodes.

²⁰ Ancient evidence usually cited in favour of the interchangeable nature of 'Imaus' and 'Emodus' includes Plin. *HN*. 6.64; Arr. *Ind*. 2.3. Though Megasthenes is not cited explicitly by Diodorus, scholars

established, it is worth investigating the impact which the explorations of Alexander the Great and his successors had on Dicaearchus' and Eratosthenes' practically identical representations of the Taurus mountain chain along the main parallel of their world maps.

First of all, it is important to note that the placement of the Taurus mountain chain along the main parallel represented a fundamental revision of earlier world maps. According to Strabo, Eratosthenes had seen maps which depicted the eastern sections of the mountain chain as deviating from the horizontal, curving considerably to the north (Strabo 2.1.2, Erat., fr. 47). As mentioned earlier, the Paropamisus and Emodus/Imaus parts of the mountain chain were believed to form the northern boundary of India, thus their supposed northerly deviation caused the whole of India to be located farther to the north than Eratosthenes thought that it should (Strabo 2.1.2, Erat., fr. 47). Megasthenes and Deimachus apparently produced distance measurements which were consistent with these old maps, estimating the north-to-south extent of India as 20,000 and 30,000 stadia respectively (Strabo 2.1.4, 15.1.12). Eratosthenes, instead, preferred Patrocles' estimate of 15,000 stadia as the minimum distance from the southern capes to the mountains, as it supported his projected horizontal course and more southerly latitudinal location of the Taurus mountain chain (Strabo 2.1.2, Erat., fr. 47).²¹ Eratosthenes adduced astronomical data to support this theory, arguing that celestial phenomena

believe that there is sufficient evidence to posit Megasthenes as the main source for Diodorus' description of India and the Emodus Mountains at Diod. 2.35-42: see Brown 1957: 16-17; Roller (2008) *BNJ* s.v. Megasthenes (715).

²¹ For good discussion of the confusion regarding India's north-to-south extent, see Berger 1880: 178-83; Williams (2010) *BNJ* s.v. Patrokles (712). Roller 2010: 162 discusses Eratosthenes' corrections to earlier maps, which depicted the Taurus Mountains deviating to the north: 'Eratosthenes was sensitive enough to realize the error, but corrected it only halfway, making the Imaos run east-west rather than to the northeast as on the old plan, or to the southeast as they actually do.' Heidel 1937: 48 suggests that early geographers, including Hecataeus, must have thought that the mountains of India ran in line with the Caucasus Mountains northeast of the Euxine. There is nothing in Strabo 2.1.2, Erat., fr. 47 which lends any support to this theory.

observed by Nearchus and Megasthenes in India and by Philo in Ethiopia proved that the southern capes were on the same parallel of latitude as Meroë. He then postulated that the distance from Meroë to the parallel through Athens and the Taurus mountain chain was approximately 15,000 stadia, the same as Patrocles' estimate for India (Strabo 2.1.2, 2.1.19-20, Erat., fr. 47, 67, 68).²² Although the makers of the earlier maps are not named, it is obvious that they did not place the whole Taurus mountain chain along the line of zero latitude, theoretically parallel to the equator. In fact, the line of zero latitude may not, as of yet, have been conceived.

It is to be argued here that the origins of the main parallel lie with the notion that the Taurus mountain chain, projected along an oversimplified east-to-west course from the Himalayan mountain system to Cilicia, bisected Asia into a northern and southern portion. There is evidence to suggest that this notion of a dividing range was first postulated by members of Alexander the Great's army, before it was adopted by Dicaearchus and Eratosthenes. Both these mapmakers utilised the existing division to draw a line all the way along the Taurus mountain chain to the Pillars of Heracles, so as to create a main parallel for their maps of the world. Tarn, J. Hornblower and Bosworth have each given a degree of support to such a view, suggesting that Alexander's men may have been ultimately responsible for the development of the Taurus dividing line and the διάφραγμα concept.²³ Further in-depth analysis of this theory is pertinent, as it

²² Nearchus and Megasthenes recorded that the Bears set over India. The Bears do indeed set around Cape Comorin, the southernmost tip of India, but to our knowledge neither Nearchus nor Megasthenes travelled this far south. Their information on the Bears must have been derived from hearsay: see Karttunen 1997: 71, 125-8; Roller 2010: 175. In fact, the full southern extension of India was not known to Greek geographers until the first century AD: see Dicks 1960: 125. At Meroë, Philo recorded the relation of the gnomon to the shadow and observed that the sun was in the zenith forty-five days prior to the summer solstice: see Strabo 2.1.19-20.

²³ Tarn 1923: 93-4; Hornblower 1981: 63, 80-7; Bosworth 1995: 238. Contra Keyser 2001: 371-2, referring to Dicaearchus' cartography: 'There is an interesting *lack* of influence of the journeys of Alexander: one might have expected information about the mountains or rivers of that area, or more about

appears that this line of thought has been overlooked by some scholars, and, in fact, much of the evidence is still in need of serious critical analysis.

There is a passage in Strabo's *Geography*, citing Eratosthenes, which describes the Taurus mountain chain and mentions a unique interpretation derived from some of the primary literature of Alexander's campaigns. Eratosthenes stated that τὴν Ἰνδικὴν περιώρικεν ἀπὸ μὲν τῶν ἄρκτων τοῦ Ταύρου τὰ ἔσχατα ἀπὸ τῆς Ἀριανῆς μέχρι τῆς ἐφάσ θαλάττης, ἅπερ οἱ ἐπιχώριοι κατὰ μέρος Παροπάμισον τε καὶ Ἡμωδὸν καὶ Ἴμαον καὶ ἄλλα ὀνομάζουσι, Μακεδόνες δὲ Καύκασον ('India is bounded on the north, from Ariana as far as the eastern sea, by the remotest parts of the Taurus, which the natives call, in reference to different parts, Paropamisus, Emodus, Imaus and other names, but the Macedonians call Caucasus') (Strabo 15.1.11, Erat., fr. 69).²⁴ Traditionally, the Greeks had located the Caucasus Mountains between the Euxine and the Caspian, around the regions of Colchis (modern-day Georgia) and Scythia. Aristotle placed the Caucasus toward the summer sunrise (northeast) and argued that it was the world's largest mountain range both in extent and height (Arist. *Mete.* 350 a28-30).²⁵ Contrast this with his description of the Hindu Kush (referred to as 'Parnassus'), which he situated toward the winter dawn (southeast) and extremely close to the Eastern Ocean (Arist. *Mete.* 350 a18-23). According to Aristotle's geography, the Hindu Kush, whether part of the Taurus mountain chain or not, was clearly separate from the

the extent of the *oikoumene* in that direction than the mere references to the latitude zero passing through the Himalayas (but perhaps that is merely the misfortune of poor preservation).'

²⁴ Cf. Strabo 11.8.1.

²⁵ The exact location of the Caucasus Mountains appears to have created great confusion for the Greeks even prior to Alexander's campaigns: see Aesch. *PV.* 422, 719; Hdt. 1.203-4, 3.97.4; Arist. *Mete.* 350 a28-30. Heidel 1937: 19, n. 33 argues that the early Ionian maps depicted the Caucasus Mountains as beginning at the northeast extremity of the Euxine and running approximately due east to the Caspian. Thomson 1947: 87 notes that Aristotle followed the Ionians' line of thought.

Caucasus Mountains.²⁶ Hence, the Macedonians' transferral of the Caucasus toponym to the southeast appears to have been an original, innovative conception.

Eratosthenes, quoted in similar passages from Strabo and Arrian, provides the most comprehensive and compelling account of the Caucasus toponym's relocation. This relocation may have originated as Macedonian propaganda aiming to glorify Alexander's achievements. To paraphrase Eratosthenes: the Macedonians, having discovered a cave in the region of the Paropamisadae, identified it with the site of Prometheus' imprisonment by Zeus and eventual release at the hands of Heracles. They then relocated the Caucasus Mountains, where this story traditionally occurred, 30,000 stadia southeast to the Paropamisus and the mountains of India. This geographical manipulation was undertaken to venerate Alexander as having crossed the Caucasus, having conquered all Asia and having travelled farther than his predecessors both real and mythical (Strabo 11.5.5; Arr. *Anab.* 5.3.2-4, Erat., fr. 23).²⁷

It is unclear from our sources exactly when the Caucasus toponym was first transferred southeast by the Macedonians. Arrian tells us that Alexander, while in the country of the Paropamisadae near the southern foothills of the Hindu Kush, founded a city which was known as 'Alexandria by the Caucasus' (Arr. *Anab.* 3.28.4, 4.22.4, 5.1.5).²⁸ It is difficult to ascertain whether this was the title given to the city upon its foundation in 329 BC, or if it gained this name at a later date from the primary

²⁶ There is no evidence to support Geus' assertions that Aristotle saw the Hindu Kush as contiguous with the Taurus, and that the whole Iranian plateau region between Armenia and the Hindu Kush was referred to as the 'Caucasus' prior to the campaigns of Alexander: see Geus 2003: 235-8. For further discussion of Aristotle's conception of the Caucasus and Hindu Kush ranges, see Heidel 1937: 42; Gardiner-Garden 1987: 12-13.

²⁷ Alexander was obsessed with bettering the explorations of his predecessors, including the Assyrian Queen Semiramis, Cyrus the Great and the mythological Perseus, Heracles, Dionysus and the Argonauts: see Arr. *Anab.* 3.3.1-2, 6.24.2-4. The identification of the Indian mountains with the story of Prometheus and Heracles clearly fitted this mould.

²⁸ Cf. Diod. 17.83.1; Curt. 7.3.23. The city was located near modern-day Begram in Afghanistan: see Bosworth 1980: 370; Fraser 1996: 66.

historians of Alexander. The latter would be true if Roller is right when he traces the origins of the Macedonian propaganda regarding the Caucasus toponym back as far as Cleitarchus.²⁹ Cleitarchus was not present with Alexander's army, but published a very popular history of the campaigns perhaps as early as 310 BC.³⁰ In the seventeenth book of Diodorus Siculus' *Library of History*, for which Cleitarchus is commonly assumed to have been the main source, the Caucasus toponym and the story of Prometheus are applied specifically to the Hindu Kush, showing consistency with the passage in Strabo paraphrased above (Diod. 17.83.1).³¹

There is clear evidence from Arrian that Aristobulus too specifically identified the Caucasus with the Hindu Kush (Arr. *Anab.* 3.28.5).³² Aristobulus was known in antiquity as *kolax* ('flatterer'), as his portrayal of Alexander was highly apologetic. Therefore, his adoption of the Caucasus toponym's relocation, as an attempt to glorify Alexander, should perhaps come as no surprise. Interestingly, however, there is some indication from Arrian that Aristobulus, and presumably Cleitarchus also, postulated that the Hindu Kush and the mountains of northern India were in actual fact contiguous with the Scythian Caucasus, which in turn they perceived as contiguous with the Armenian section of the Taurus (Curt. 7.3.19; Arr. *Anab.* 3.28.5, 5.5.2-4).³³ By proposing this geography, Aristobulus and Cleitarchus may have been trying to make the relocation of the story about Prometheus and Heracles from the Scythian Caucasus

²⁹ Roller 2010: 139 states that 'Even by Eratosthenes' day, a century later, Alexander's unique vision of topography had become standard, originating from the official version of his travels by Kleitarchos.'

³⁰ For discussion of when Cleitarchus' history was published, see Tarn 1948, vol. 2: 19; Pearson 1960: viii; Hammond 1993: 195-7; Baynham 2003: 10-11.

³¹ Cf. Curt. 7.3.19.

³² Bosworth 1980: 370-1.

³³ For the argument that the Macedonians' relocation of the Caucasus was driven by genuine misunderstanding of the topography rather than by propaganda, see Heidel 1937: 33; Thomson 1948: 126; Bosworth 1995: 213-19, 239-40. Bunbury 1879, vol. 1: 484-5 prefers a combination of misunderstanding and propaganda.

to the Indian mountains appear more reasonable and believable to their readers.³⁴ Nevertheless, Eratosthenes criticised the Macedonians' conception of the Caucasus, believing that they had created an unnecessarily complicated picture of Asian geography and confused the true nature of the Taurus mountain chain, all for the glory of Alexander (Strabo 11.5.5, 11.8.1, 15.1.11; Arr. *Anab.* 5.3.1-4, 5.5.2-4; Arr. *Ind.* 2.1-4, Erat., fr. 69, 23).

The notion that the Indian mountains were contiguous with the Scythian Caucasus was not consistent with Eratosthenes' διάφραγμα extending horizontally along the Taurus mountain chain. The Scythian Caucasus was situated far to the north, beyond even the most northerly parts of Eratosthenes' Taurus. Also, the Scythian Caucasus was traditionally interpreted as part of the boundary line between Europe and Asia, in contrast to the Taurus which was seen by Eratosthenes as dividing Asia in half.³⁵ There is evidence, however, that the Caucasus propaganda had an earlier source, predating Cleitarchus and Aristobulus. In this early source, the name Caucasus only was applied to the Indian mountains, acting as a propagandistic toponym with no suggestion of geographical contiguity between what were in reality two very disparate ranges. In this conception, the Taurus mountain chain ran from the Indian Caucasus (Hindu Kush) to Cilicia in a straight east-to-west line, symmetrically bisecting Asia without the problematic inclusion of the Scythian Caucasus.

Diodorus has preserved a description of the Taurus mountain-chain derived ultimately from the early source: ἀπὸ τοίνυν τοῦ κατὰ Κιλικίαν Ταύρου συνεχὲς ὄρος δι' ὅλης τῆς Ἀσίας διήκει μέχρι τοῦ Καυκάσου καὶ τοῦ πρὸς ἀνατολὰς Ὠκεανοῦ· τοῦτο δὲ πανταδαποῖς ἀναστήμασι λόφων διειλημμένον ἰδίας καθ' ἕκαστον ἔχει προσηγορίας.

³⁴ It seems probable that Patrocles, Megasthenes and Deimachus were each also familiar with the Caucasus toponym and its expanded application to the mountains of India: see Strabo 2.1.2-4, 15.1.11-12. Also, see Brown 1957: 17-18; Bosworth 1995: 239-40.

³⁵ Heidel 1937: 19, n. 33 argues that the Caucasus Mountains formed an integral part of the boundary line between Europe and Asia in the east: see Hdt. 1.203-4, 3.97.4.

τοῦτον δὲ τὸν τρόπον εἰς δύο μέρη διαιρουμένης τῆς Ἀσίας τὸ μὲν πρὸς τὰς ἄρκτους αὐτῆς νένευκεν, τὸ δὲ πρὸς τὴν μεσημβρίαν ('So then from the Cilician Taurus an unbroken mountain chain passes through the whole of Asia as far as the Caucasus and toward the Eastern Ocean; and this chain is divided by crests with heights of all kinds and each part has its individual name. In this fashion, Asia is cut into two parts, one of which is inclined toward the north, and the other toward the south') (Diod. 18.5.2-3). This description of the Taurus mountain chain contains two details of significance for this study. First, the term 'Caucasus' is used here to denote the Hindu Kush, but there is no suggestion of contiguity between this range and the Scythian Caucasus. Second, the Taurus mountain chain, from Cilicia to the Eastern Ocean, is referred to as splitting Asia into north and south, consistent with Dicaearchus' and Eratosthenes' descriptions of the main parallel.³⁶ Hence, this passage may represent the missing link - the original source for the theory of a continuous Taurus mountain chain bisecting Asia, which formed the basis for the main parallel developed by Dicaearchus and Eratosthenes.

Diodorus' description of the Taurus mountain-chain comes at the beginning of a short section on the geography of Asia, describing the mountains, rivers and satrapies which comprised the continent at the time of Alexander the Great's campaigns (Diod. 18.5.2-6). Diodorus' source for this geographical section as a whole, which occurs in no other author, is commonly thought to be Hieronymus of Cardia.³⁷ Tarn was the first to argue this point convincingly; however, he also proposed that Hieronymus derived this geographic information from a political document, the 'Gazetteer of Asia', produced

³⁶ Cf. Strabo 2.1.1, Erat., fr. 47; Arr. *Ind.* 2.1-4; Agath. 1.5.

³⁷ Hieronymus was a Greek general and historian, who, in the mid-third century BC, wrote a history of the Diadochi and their descendants, encompassing the period between Alexander the Great's death in 323 BC and the demise of Pyrrhus of Epirus in 272 BC. On Hieronymus' life and writings, see Hornblower 1981: 5-17. Hieronymus has been positively identified as Diodorus' main source for the eighteenth book of his *Library of History*. On Hieronymus and Diod. 18.5-6, see Tarn 1923: 93-4; Tarn 1948, vol. 2: 309-18; Hornblower 1981: 80-7; Bosworth 1995: 237-8.

sometime during the final years of Alexander's life.³⁸ He gave various proofs for the date and identification of this document, which need not be examined here.³⁹ It suffices to say that both Hornblower and Bosworth have accepted Tarn's argument in general, agreeing that Hieronymus' geography of Asia was based on the primary literature of Alexander's campaigns.⁴⁰

J. Hornblower has modified Tarn's argument slightly, suggesting that the geographical section in Diodorus was crafted by Hieronymus, who in turn obtained most of his knowledge from the primary literature of Alexander's campaigns.⁴¹ She believes that Hieronymus gained access to the materials produced by Alexander's chancellery, using these and his own memories to inform his perception of Asia. In fact, Hieronymus' geography of Asia, especially the concept of the Taurus-Caucasus line bisecting the continent, may have been derived specifically from the reports of Alexander's bematists.⁴² According to J. Hornblower, the whole geographical section

³⁸ Tarn 1923: 93-4; Tarn 1948, vol. 2: 309-18.

³⁹ One of the main proofs, which Tarn believes to date this geographical section to the time of Alexander, is its description of the Caspian/Hyrceanian Sea. According to Tarn, the Caspian is described clearly as a detached body of water, meaning that the passage probably dates earlier than Patrocles' geographical report (ca. 285-282 BC), which described the Caspian as a gulf of the Northern Ocean. We can use this account of the Caspian Sea to date the passage even more specifically. Evidence from the extant historians of Alexander the Great suggests that Alexander originally believed the Caspian to be an inland sea, in keeping with the teachings of his old tutor Aristotle. However, toward the end of his life he seems to have begun questioning this belief, culminating in his decision to send an expedition to the Caspian under Heracleides in 323 BC: see Arr. *Anab.* 7.16.1-2. Therefore, Hieronymus' source probably dates before 323 BC: see Tarn 1948, vol. 2: 309-18

⁴⁰ Hornblower 1981: 80-7; Bosworth 1995: 237-8.

⁴¹ Hornblower 1981: 83-4.

⁴² Hornblower 1981: 63 states that 'The geographical description of Asia at xviii.5-6, with its horizontal division along the line of the Taurus-Caucasus, has sometimes been thought to presuppose the scheme of Eratosthenes; but our ignorance of the state of Greek geography directly before Eratosthenes hardly allows this conclusion. It is entirely possible that the north-south division of Asia is an idea which goes back to Alexander's geographers; and there are in any case references in this passage to the political conditions of Alexander's time which could not have survived a general renovation in the light of Eratosthenes' work.'

reads like a map or a survey of regions that we would expect the bematists to have produced.⁴³ Furthermore, she argues that the geography of Asia, described by the bematists, clearly influenced the development of the main parallel: ‘As for the scheme of the geography, it is possible and even likely that the horizontal division of Asia along the line of the Taurus-Caucasus did not originate with Eratosthenes, but was an idea at least implicit in the studies made by Alexander’s bematists, which were known to Eratosthenes and frequently used by him.’⁴⁴

We lack any definitive evidence to prove that the Taurus-Caucasus line originated with Alexander’s bematists. There are, however, various pieces of information which collectively lend great support to the theory. The first, mentioned earlier, is that Baeton discussed environmental conditions near the Imaus Mountain Range, which became the easternmost part of the line (Plin. *HN*. 7.11-12). Perhaps more substantive are the distance estimates which the bematists made between places along Alexander’s route of march. Strabo and Pliny the Elder each note several measurements of the bematists made between places situated in close proximity to the mountains of Armenia, northern Iran, Afghanistan and northwest India, and within a relatively narrow latitudinal range.

Strabo quotes Eratosthenes regarding the distance between Thapsacus on the Euphrates and the Caspian Gates, a high mountain pass traversed by Alexander’s army

⁴³ Goukowsky 1978: 112 has even suggested that Hieronymus’ geography of Asia may have been based on an actual map created by the bematists (‘*Le pinax décrit reposait probablement sur les travaux des Bématistes d’Alexandre, puisqu’il comportait l’indication des toponymes, des villes et des distances*’).

⁴⁴ Hornblower 1981: 82. It is implicit in Hornblower’s argument that Dicaearchus’ διάφραγμα was also influenced by the bematists. Note that in the description of Dicaearchus’ main parallel at Agath. 1.5 there is no mention of the Caucasus toponym. It could be that the original reports of the bematists only mentioned the Taurus in conjunction with the native names for the mountains farther to the east, and that the Caucasus toponym was later applied to these mountains by Hieronymus, in keeping with the formula of Aristobulus and Cleitarchus. This could account for why Dicaearchus, possibly writing prior to all three historians, referred only to the Taurus, but Eratosthenes, writing later, used both the Taurus and Caucasus toponyms.

and believed to be located somewhere in the central Alborz Mountains, south of the Caspian Sea.⁴⁵ Eratosthenes provided a distance measurement between the two of 10,000 stadia (Strabo 2.1.24). He placed the Caspian Gates on his main parallel, while locating Thapsacus approximately 1,100 stadia south of the parallel and the Armenian and Cilician parts of the Taurus (Strabo 2.1.21, 2.1.39, Erat., fr. 52). The route from Thapsacus to the Caspian Gates was traversed by Alexander's army during his pursuit of Darius III. It is clear from Strabo's citation of Eratosthenes that his distance measurement between these two sites must have derived at least in part from Alexander's bematists: μέχρι μὲν δὴ τοῦ Τίγριδος, ὅπου Ἀλέξανδρος διέβη, σταδίου δισχιλίου καὶ τετρακοσίου γράφει· ἐντεῦθεν δ' ἐπὶ τοὺς ἐξῆς τόπους διὰ Γαυγαμήλων καὶ τοῦ Λύκου καὶ Ἀρβήλων καὶ Ἐκβατάνων, ἧ̃ Δαρεῖος ἐκ τῶν Γαυγαμήλων ἔφυγε μέχρι Κασπίων πυλῶν, τοὺς μυρίου ἐκπληροῖ ('Now [from Thapsacus] as far as the Tigris, where Alexander crossed, he [Eratosthenes] records 2,400 stadia; and from there successively through the places Gaugamela, the Lycus, Arbela and Ecbatana, the way

⁴⁵ The precise location of the Caspian Gates has caused some confusion among scholars. Standish 1970: 24 affords the most in-depth discussion: 'It must be allowed that the early evidence is vague, admitting of more than one interpretation. The Sar-i-Darreh lies some twenty miles westwards of the entrance to the valley of the Hableh Rud, and this intervening space within the district of Khvar was of necessity a crossroads for traffic proceeding between Media and Parthia and thus avoiding the desert to the south, and for traffic proceeding northwards to the Caspian or southwards over the less frequented caravan route to distant desert cities. Through this relatively fertile and watered plain travellers must pass to achieve their further object. Whether the Gates which Arrian had in mind conformed precisely with those of Pliny, or whether there was confusion between the two defiles amongst antique minds as well as those of more recent years, is a matter which cannot here be resolved, nor are the limits of early Rhagae capable of precise definition to accommodate the stadia given. What does seem conclusive, however, is that a point established in the ancient world for measurement of distances should undoubtedly have had a fixed geographical identity, and this would obviously refer to the only effective and consequential crossroads in the dominating position situated near the exit of the Hableh Rud, a point of refreshment as well, if one considers the aridity of the terrain extending in most directions from it.' Cf. Bosworth 1980: 333-4; Roller 2010: 163-4.

by which Darius fled from Gaugamela as far as the Caspian Gates, fills out 10,000 stadia') (Strabo 2.1.24, Erat., fr. 83).⁴⁶

In several passages, Strabo states that Eratosthenes located the Caspian Gates, as part of the Taurus mountain chain, on the main parallel of his map (Strabo 2.1.24, 2.1.33, 11.12.4-5, Erat., fr. 83, 56, 48). The bematists also recorded distance measurements from the Caspian Gates east through several sites as far as the river Hyphasis, probably compiled in the work *Asiatic Stages*. Strabo records estimates taken from Eratosthenes, while Pliny the Elder independently ascribes very similar estimates to Baeton and Diognetus. According to these sources, the bematists calculated the distances through the Caspian Gates, Hecatompylus, Alexandria in Ariana (Herat), Prophthasia (Farah), Alexandria in Arachosia (Kandahar), Ortospana (Kabul), Alexandria by the Caucasus, Peucolatis, Taxila on the Indus, the river Hydaspes and the river Hyphasis (Strabo 11.8.9, Erat., fr. 108; Plin. *HN*. 6.61-2).⁴⁷ This path through northern Iran and Central Asia to India followed main roads, including some of the major trade highways of the famous Silk Road.⁴⁸ As they surveyed this route, the bematists travelled through or at least in close proximity to the southern portions of the Alborz, Hindu Kush and Himalayan mountain ranges.⁴⁹ Thus, it is entirely plausible that the bematists, drawing upon the data from their road surveys, could have conceived of a

⁴⁶ On the bematists' survey of the route from Thapsacus to the place where Alexander crossed the Tigris, see Engels 1978: 68-9.

⁴⁷ Engels 1978: 157 provides an excellent table listing the distance estimates of the bematists between each place, as preserved in both Strabo and Pliny the Elder. The bematists recorded the number of paces which they undertook for each day's march, which the likes of Eratosthenes later converted into stadia: see Brunt 1976: 487; Lewis 2001: 22.

⁴⁸ On the Silk Road and its role in the Hellenistic world, see esp. Brunt 1976: 487-509; Engels 1978: 85; Holt 1989: 11.

⁴⁹ Hecatompylus was located in the Semnan province of northern Iran, which stretches along the Alborz Mountains. Alexandria in Ariana (Herat), Prophthasia (Farah), Alexandria in Arachosia (Kandahar), Ortospana (Kabul), Alexandria by the Caucasus (Begram), Peucolatis and Taxila were all located either in close proximity to or within the Hindu Kush Mountain Range. The rivers Indus, Hydaspes (Jhelum) and Hyphasis (Beas) each flow from the Himalayan mountain system.

continuous mountain belt dividing Asia, all the way from Asia Minor to India. In addition, Pliny the Elder records some information obtained from a Seleucid itinerary, which gave distance measurements from the river Hyphasis as far as the mouth of the river Ganges (Plin. *HN*. 6.63-4).⁵⁰ As Seleucid explorers travelled southeast along this route, they would have observed the Himalayas to the north, perhaps necessitating a further eastern extension of the Taurus-Caucasus line, established by the bematists, to include the Emodus/Imaus Mountain Range.

How the bematists decided that the Taurus-Caucasus line ran theoretically along an east-to-west course is a point of considerable interest. Keyser argues that Dicaearchus determined the course of his main parallel from records of the observations of the pole or the length of the longest day of the year at the various sites mentioned. Furthermore, he suggests that the latitude of the Imaus Mountain Range probably originated with one of the men who accompanied Alexander on his campaigns or perhaps Megasthenes.⁵¹ If indeed the Taurus-Caucasus line was first postulated by the bematists, it is not impossible that they made astronomical observations at various places along the surveyed route. They may have then used these observations to locate the Taurus-Caucasus line within a narrow latitudinal range and postulate a general horizontal course, parallel to the equator. Unfortunately, there is no surviving record of such observations. However, there are several extant references to astronomical observations made in India by Nearchus, Onesicritus, Megasthenes and Deimachus, which were later examined by Eratosthenes to determine India's latitudinal position.⁵²

⁵⁰ Williams (2010) *BNJ* s.v. Patrokles (712) believes that this Seleucid itinerary is probably the same as the *Record of Stages* used by Eratosthenes to measure India's east-to-west extent (Strabo. 2.1.7, 15.1.11, Erat., fr. 73, 69).

⁵¹ Keyser 2001: 367.

⁵² On Nearchus' observations, see Strabo 2.1.20; Arr. *Ind.* 25.4-8. On Onesicritus' observations, see Plin. *HN*. 2.183-5. On Megasthenes' observations, see Diod. 2.35.2, Strabo 2.1.19-20. On Deimachus' observations, see Strabo 2.1.19-20.

That these men all made such observations shows that the Greeks had a keen interest in the latitudinal location of the eastern regions of the οἰκουμένη. Thus, it would not have been out of the ordinary if the bematists had used their own astronomical observations to determine the course and latitudinal position of the Taurus-Caucasus line.

The evidence for the Taurus-Caucasus line originating with the bematists is circumstantial; nonetheless, the theory is both plausible and attractive. That Dicaearchus and Eratosthenes perceived this line as the basis and starting point for the main parallel is also entirely likely. Both men extended the line of zero latitude along the Taurus mountain chain, but had divergent opinions about the course of the line west of the Taurus. This suggests that they obtained their information about the mountain chain from a common source, namely the bematists, while consulting different sources on the regions west of the Taurus. Perhaps the use of different sailors' reports explains why Dicaearchus extended his line through the Peloponnese, Sicily and Sardinia, while Eratosthenes drew his through the Gulf of Issus, Rhodes, Attica and the Strait of Sicily (Strabo 2.1.1, Erat., fr. 47; Agath. 1.5).

If Dicaearchus and Eratosthenes took the Taurus-Caucasus line as the basis of the main parallel, it seems self-explanatory that they would have drawn the main parallel from right to left (east to west), beginning with the Taurus-Caucasus line and ending at the Pillars of Heracles. However, throughout antiquity commentators frequently described the main parallel as running from the Pillars in the west to the mountains of India in the east (Strabo 2.1.1, 2.1.35; Agath. 1.5). Although it has already been shown that Strabo referred to the main parallel in this manner, he also preserved a citation from Eratosthenes, which may demonstrate the original way in which Eratosthenes drew the line of zero latitude, beginning with the Taurus-Caucasus line in the east: τὸ μὲν γὰρ τῆς οἰκουμένης μῆκος διὰ τοῦ Ταύρου γράφει καὶ τῆς ἐπ' εὐθείας μέχρι Σητλῶν θαλάττης κατὰ γραμμὴν τὴν διὰ τοῦ Καυκάσου καὶ Ῥόδου καὶ Ἀθηνῶν

(‘For he [Eratosthenes] draws the length of the inhabited world through the Taurus and the Mediterranean Sea as far as the Pillars on a straight line through the Caucasus, Rhodes and Athens’) (Strabo 2.1.33, Erat., fr. 56). In this passage, Eratosthenes’ main parallel is clearly depicted as beginning with the Taurus-Caucasus line and ending with the Pillars of Heracles. The Taurus-Caucasus line would have been the natural starting point for Dicaearchus’ and Eratosthenes’ main parallel, as it was an established geographic concept, with its course and latitudinal position comprehensively surveyed during Alexander’s campaigns by the bematists.

This chapter has analysed both the general outline and main parallel of Eratosthenes’ map of the world. The next chapter will look at how Eratosthenes divided up the οἰκουμένη on his map of the world. It will examine Eratosthenes’ depiction of continents, the promontories (ἄκρα) of southern Europe and the sealstones (σφραγίδες) of Asia.

4. CONTINENTS, PROMONTORIES AND SEALSTONES: THE BUILDING BLOCKS OF THE OIKOUMENE

The previous chapter described the most important cartographic feature of Eratosthenes' world map, a line of zero latitude which divided the οίκουμένη into north and south. As an extension of this, Eratosthenes devised a unique cartographic system in which terrestrial space was subdivided into geometrically defined regions - σφραγίδες ('sealstones'). Our knowledge of Eratosthenes' σφραγίδες is rather limited. The relevant fragments of the *Geography* mention only four σφραγίδες, all located to the south of the main parallel. It is unclear whether or not Eratosthenes divided up the whole οίκουμένη into sealstones. Our main extant sources, Strabo, Pliny the Elder and Arrian, do not elaborate any further on this issue. It appears that Eratosthenes also applied another cartographic system to his mapping of Europe's Mediterranean coastline, partitioning it into three ἄκρα ('promontories'). Eratosthenes' conception of these regional divisions will be analysed thoroughly throughout this chapter. First, however, it is necessary to consider Eratosthenes' viewpoint on continents, which were the traditional building blocks of the οίκουμένη.

4.1. THE CONCEPT OF CONTINENTS

The earliest Greek maps of the world depicted the οίκουμένη as divided up into continents. The Ionian philosopher Hecataeus believed the οίκουμένη to be bisected by two continents, with Europe in the north and Asia (including Libya) in the south.¹ This

¹ Roller 2010: 3 argues that Hecataeus 'was probably the first to see the world in terms of continents.' As evidence for the bipartite continental system, he cites the division of Hecataeus' *Journey Round the World* into two books, one on the geography of Europe and the other on the geography of Asia. Roller notes that there is a myriad of topographic entries found in the *Ethnica* of Stephanus of Byzantium, a sixth century grammarian, which are defined as 'Hecataeus in his *Europe* and *Asia*'. It is possible that Hecataeus' predecessor Anaximander invented the concept of continents, as Agath. 1.1. describes how

bipartite continental system was challenged by Herodotus: γελῶ δὲ ὀρέων γῆς περιόδους γράψαντας πολλοὺς ἤδη καὶ οὐδένα νονεχόντως ἐξηγησάμενον· οἱ Ὠκεανὸν τε ῥέοντα γράφουσι πέριξ τὴν γῆν ἐοῦσαν κυκλοτερέα ὡς ἀπὸ τόννου, καὶ τὴν Ἀσίην τῇ Εὐρώπῃ ποιούντων ἴσην (‘I laugh seeing many people already having drawn maps of the world and not one of them has conceived of it reasonably; they draw the Ocean flowing around the [inhabited] earth which is circular as if [shaped] by means of a compass, while also they make Asia proportionate with Europe’) (Hdt. 4.36.2). Scholars argue that initially ‘Europe’ and ‘Asia’ were place names used to denote limited areas of land on either side of the Aegean Sea.² The term ‘Asia’ was localised in western Anatolia, with Homer describing a productive Ἀσίῳ λειμῶνι (‘Asian Meadow’) in this region (Hom. *Il.* 2.461). The *Homeric Hymn to Apollo*, written ca. 600 BC, designated ‘Europe’ as a tract of land situated in the vicinity of northern Greece or Thrace (*Hymn. Hom. Ap.* 250, 290).³ The toponyms ‘Europe’ and ‘Asia’ eventually came to incorporate all of the land which the Greeks knew to extend outward from the adjacent shores of the Aegean, culminating in Hecataeus’ bipartite continental system.

It appears that during the fifth century BC, a tripartite continental system began to gain prominence, superseding Hecataeus’ schema.⁴ The term ‘Libya’, which originally denoted a region in North Africa west of Egypt, expanded to include the

Hecataeus used and improved upon Anaximander’s map. Munn 2006: 179-88 suggests that Anaximander understood the term ‘Asia’ in a limited sense, referring to the western coast of Anatolia, with ‘Europe’ located on the opposite side of the Aegean Sea.

² See esp. Stewart 1975: 205-11; Munn 2006: 179-88.

³ W. H. Parker 1960: 278 argues that ‘Europe’ referred to an unspecified area of northern Greece. Lukermann 1961a: 271 puts forward the possibilities of Dodona in northwest Greece, the *Europas* plain in Thessaly or the plain of Emathia in Macedonia. Lewis and Wigen 1997: 22 see Thrace as the most likely location of ‘Europe’. Also, see Munn 2006: 180, n. 2.

⁴ Roller 2010: 3 asserts that Aesch. *Pers.* 718 and Pind. *Pyth.* 9.8 prove that ‘By early in the fifth century BC, the theory of continents was well established.’ Aeschylus uses the word for continent (ἥπειρος) to describe Asia, while Pindar refers to the ‘third’ continent, namely Libya. Note that in the Hippocratic treatise *Airs, Waters, Places* the bipartite continental system is still advanced: see Hippoc. *Aer.* 12-13. For discussion of the meaning of ἥπειρος, see *LSJ* (1940) s.v. ἥπειρος: 776.

whole of the landmass known to the Greeks south of the Mediterranean Sea and west of Arabia.⁵ Thus, Libya became the third continent of the οἰκουμένη, no longer subsumed into Asia. As he did with the bipartite continental system, Herodotus questioned whether the division of the οἰκουμένη into Europe, Asia and Libya was an accurate representation of world geography. In the fourth book of his *Histories*, he criticises the naming of the three continents and the natural features chosen to comprise the continental boundary lines:

οὐδ' ἔχω συμβαλέσθαι ἐπ' ὅτευ μῆ ἐούση γῆ οὐνόματα τριφάσια κέεται
ἐπωνυμίας ἔχοντα γυναικῶν, καὶ οὐρίσματα αὐτῇ Νεῖλος τε ὁ Αἰγύπτιος
ποταμὸς ἐτέθη καὶ Φᾶσις ὁ Κόλχος (οἱ δὲ Τάναιν ποταμὸν τὸν Μαίητην καὶ
πορθμῆια τὰ Κιμμέρια λέγουσι), οὐδὲ τῶν διουρισάντων τὰ οὐνόματα
πυθέσθαι, καὶ ὅθεν ἔθεντο τὰς ἐπωνυμίας ('I am not able to guess the reason
why three names, all names of women, are laid upon the one earth, and why
the boundary lines established for it are the Egyptian river Nile and the
Colchian river Phasis [but some say the Maeotian river Tanais and the
Cimmerian Ferries], nor do I know the names of those who divided the
earth, and from where they derived the names which they placed upon it')
(Hdt. 4.45.2).⁶

⁵ Hom. *Od.* 4.85 describes Libya as a fertile land in Africa, which Menelaus traversed during his return from the Trojan War.

⁶ This extract indicates that the river Nile in Egypt was traditionally believed to separate Libya and Asia. Herodotus infers that there was some debate about the Europe-Asia divide. One school of thought postulated that the river Phasis (Rioni), which flowed into the southeast corner of the Black Sea, was an integral part of the boundary line. It comprised some of the eastern extension of an interconnected waterway, which ran from the Aegean Sea to the Black Sea. The other school of thought preferred the river Tanais (Don) instead of the Phasis. The Tanais flowed south into Lake Maeotis from an unknown source in northern Scythia. For discussion of these alternative continental boundary lines, see Berger 1880: 164-5; W. H. Parker 1960: 278; Aujac, Harley and Woodward 1987a: 136; Lewis and Wigen 1997: 21-7; Zingross 1998: 15-17; Thomas 2000: 75-101; Munn 2006: 179-88; Harrison 2007: 46-51; Romm 2010: 216-19.

This passage demonstrates that Herodotus was cynical of the validity of continents as topographical entities. It is evident that from a scientific perspective he saw the concept of continents as problematic, misrepresenting the οἰκουμένη as divided into distinct, discrete landmasses when in truth it was one contiguous whole (μῆ ἑούση γῆ). Herodotus' criticisms were unique. However, throughout his narrative, for the sake of clarity, he reverted to the conventional doctrine and terminology of the tripartite continental system and even gave his own opinion on specific continental boundary lines.⁷ The theory of continental division maintained currency throughout the fifth and fourth centuries BC, and was canonical by the time of Eratosthenes.⁸ Eratosthenes' approach to the continents, however, was clearly influenced, at least in part, by the scepticism of Herodotus.⁹ Strabo quotes Eratosthenes on the matter:

ἐξῆς δὲ περὶ τῶν ἠπειρῶν εἰπὼν γεγονέναι πολὺν λόγον, καὶ τοὺς μὲν τοῖς ποταμοῖς διαρεῖν αὐτάς, τῷ τε Νεῖλῳ καὶ τῷ Τανάιδι, νήσους ἀποφαίνοντας, τοὺς δὲ τοῖς ἰσθμοῖς, τῷ τε μεταξύ τῆς Κασπίας καὶ τῆς Ποντικῆς θαλάσσης καὶ τῷ μεταξύ τῆς Ἐρυθρᾶς καὶ τοῦ Ἐκρήγματος, τούτους δὲ χερρονήσους αὐτάς λέγειν, οὐχ ὀρᾶν φησι, πῶς ἂν εἰς πράγματα καταστρέφοι ἢ ζήτησις αὕτη ('Next, after saying that there has been much deliberation about the continents, and that some divide them by the rivers, the Nile and the Tanais, describing them as islands, but that some divide them by isthmuses, both the isthmus between the Caspian Sea and the Pontic Sea and the isthmus between the Red Sea and the Ecregma, and that the latter call the continents peninsulas, he [Eratosthenes] says that he does

⁷ After critiquing the theory of continental division, Herodotus states that he will continue to use the conventional names of the continents (τοῖσι γὰρ νομιζόμενοι αὐτῶν χρῆσόμεθα): see Hdt. 4.45.5.

⁸ See esp. Aesch. *Pers.* 718; Aesch. *PV.* 1092; Pind. *Pyth.* 9.8; Hippoc. *Aer.* 12-13; Arist. *Pol.* 1327 b18.

⁹ That Eratosthenes was familiar with Herodotus' *Histories* is highlighted at Strabo 1.3.22, Erat., fr. 20. Here, Eratosthenes discusses Herodotus' statement regarding the existence of Hyperboreans and Hyperboreans (Hdt. 4.36.1).

not see how this inquiry can result in anything of consequence’) (Strabo 1.4.7, Erat., fr. 33).

Eratosthenes’ comments had much in common with Herodotean continental theory. He discussed the tripartite system of continental division, noting that the continents were commonly divided either by rivers, or by isthmuses lying between bodies of water. Then, like Herodotus, he suggested that continental divisions and boundary lines in general were arbitrary, with limited geographic significance.¹⁰ Nonetheless, Eratosthenes appears to have believed that if it was necessary to divide the οἰκουμένη into continents, then it was better for these continents to be separated by rivers, rather than by isthmuses. Strabo cites Eratosthenes as defending those mapmakers who divide the continents by rivers, making light of the idea that rivers, namely the Nile and Tanais, poorly define the continents because they do not flow all the way to the Ocean (Strabo 1.4.8, Erat., fr. 33).¹¹ He did not think it necessary to dwell on whether the Nile and Tanais were the most suitable natural features to form the boundaries between Asia and Libya, and Asia and Europe respectively. This contrasts with Herodotus, who disparaged the decision of Ionian mapmakers to divide Asia and Libya at the Nile and believed that the river Phasis was a more valid boundary line between Europe and Asia than the river Tanais.¹²

¹⁰ Fraser 1972, vol. 1: 530, regarding continental boundaries, states that ‘Eratosthenes denied the usefulness and validity of these divisions which, he maintained, in the absence of delineated boundaries, represented the ever-expanding frontier of geographical knowledge and had no place in an oecumenical conception of the earth, and merely provided fuel for learned disputes.’ Also, see Aujac 2001: 82.

¹¹ With regard to this passage, Roller 2010: 151 suggests that ‘The statement that the continents are not islands (made twice), but merely part of the island of the inhabited world, reflects some unknown early theory.’ I would argue that this theory perhaps derives, at least in part, from Herodotus, who, as mentioned earlier, was uncertain as to why ‘the one earth’ had been given three names and divided into continents. Herodotus did not, however, believe the οἰκουμένη to be surrounded entirely by water.

¹² Hdt. 2.16.1-2 stresses that the Ionians are wrong to divide Asia and Libya by the Nile because the river splits and flows around the Delta, meaning that the Delta lies between Asia and Libya. Thus, the Delta should, in accordance with this scheme, be added as a fourth continent. Since Herodotus argued that Europe was the length of Asia and Libya combined, it can be inferred that he saw the east-to-west running

Eratosthenes' perspective on the river Tanais is an issue of some interest. The notion of the river Tanais as a boundary line between Europe and Asia was complicated by the campaigns of Alexander the Great. The extant sources indicate that Alexander came to believe that the river Tanais (Don) in Scythia had a branch which flowed east into Bactria and Sogdiana, where the natives called it the Jaxartes (Syr-Darya).¹³ Strabo, following Eratosthenes, records how some of Alexander's followers postulated that Lake Maeotis, into which the Scythian Tanais flowed, was connected with the Caspian Sea, into which they erroneously believed the Jaxartes flowed, with its source in the Paropamisus Mountains (Hindu Kush) (Strabo 11.7.4, Erat., fr. 24). This theory supported the notion that the Jaxartes was a tributary of the river Tanais, branching off from it and flowing into the same body of water at a separate locality. Therefore, the boundary line between Europe and Asia was greatly extended to the east, dividing the Scythians and other European peoples in the north from the Bactrians, Sogdians and other peoples of Asia in the south (see fig. 4.1).

Phasis as part of the boundary line between Europe and Asia, so that Europe would stretch along the whole northern section of the οἰκουμένη.

¹³ For references to this Tanais-Jaxartes River, derived ultimately from the primary historians of Alexander the Great, see Diod. 18.5.2-5; Curt. 7.5.36, 7.6.13, 7.7.1-4; Plut. *Alex.* 45.5; Arr. *Anab.* 3.30.6-9, 4.1.1-4. For scholarship on the issue, see Pearson 1960: 163-4; Brunt 1976: 522-5; Bosworth 1980: 378-9; Geus 2003: 238; Williams (2010) *BNJ* s.v. Patrokles (712). The belief that the Tanais had a branch in Bactria and Sogdiana may have originated with Aristotle. In the *Meteorology*, Aristotle states that the Tanais branches off from the Araxes River, by which he probably meant the Jaxartes, and flows into Lake Maeotis. Also, he reports erroneously that the Araxes flows from the Parnassus Mountains (Hindu Kush): see Arist. *Mete.* 350 a24. Herodotus also mentioned an Araxes River situated in the vicinity of the Caspian Sea: see Hdt. 1.202.1-4, 1.205.2, 4.40.1.

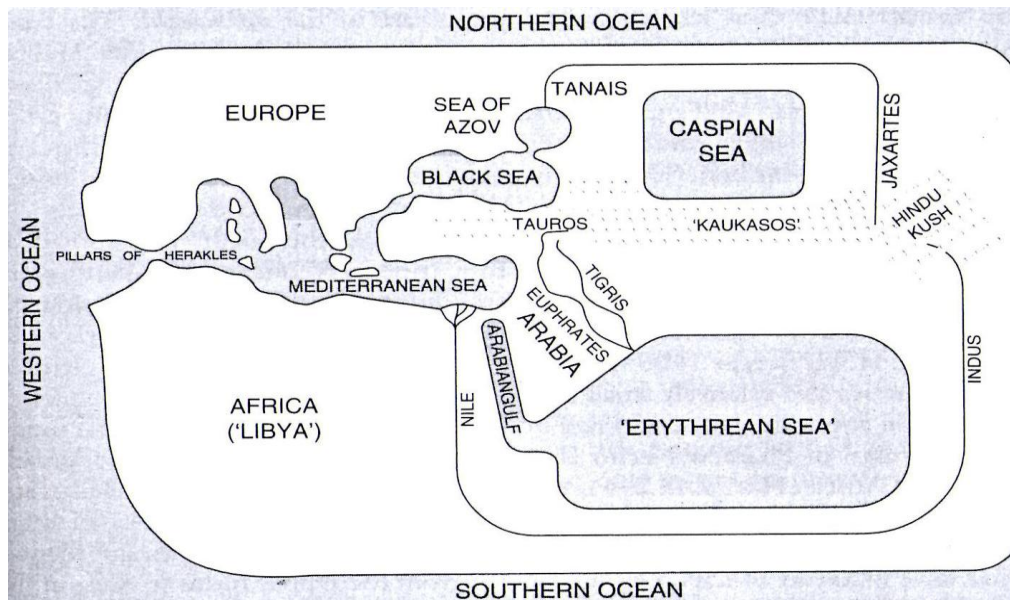


Fig. 4.1: A schematic diagram of the world map at the time of Alexander the Great's campaigns. In this reconstruction the Tanais and Jaxartes are connected but the Jaxartes does not flow into the Caspian Sea.

Strabo cites Polycleitus of Larissa, one of Alexander's followers, as the main proponent of this topography (Strabo 11.7.4, *Erat.*, fr. 24). Furthermore, he describes the evidence adduced by Polycleitus and others to prove that the Tanais and Jaxartes were one and the same, forming the boundary between Europe and Asia. They argued that the fir-tree was confined to Europe, and that it grew near the Tanais in Scythia and also on the northern bank of the Jaxartes, but not in Asia south of the Jaxartes (Strabo 11.7.4, *Erat.*, fr. 24). Eratosthenes, however, refused to accept the joining of the Tanais and Jaxartes, arguing that Alexander's followers had manipulated the topography of this region, in order to show that by reaching the Tanais-Jaxartes Alexander had conquered all of Asia. This propaganda would have corresponded with the Macedonians' relocation of the Caucasus Mountains (Strabo 11.7.4, *Erat.*, fr. 24).¹⁴ Eratosthenes undermined the Macedonians' argument by asserting that the fir-tree in fact grew in India south of the Jaxartes, and that Alexander had built his fleet from fir-wood found

¹⁴ Indeed, during his operations in Bactria and Sogdiana, Alexander had reached the Jaxartes and founded a city, Alexandria-Eschate, on its southern bank. This city was intended as a base for future military

there (Strabo 11.7.4, Erat., fr. 24).¹⁵ The fir-tree's presence south of the Jaxartes in Asia meant that the Macedonians' argument for the combined Tanais-Jaxartes, separating Europe from Asia, was invalid.¹⁶ Thus, Eratosthenes did not confuse the Tanais with the Jaxartes, preferring to maintain the Tanais as a north-to-south flowing river in Scythia, which separated Europe in the west from Asia in the east.¹⁷

4.2. THE PROMONTORIES OF THE MEDITERRANEAN

The previous section has shown that Eratosthenes did, to some extent, delve into the theory of continental division and used the conventional toponyms 'Europe', 'Asia' and 'Libya' throughout the *Geography*.¹⁸ Nevertheless, it is clear that Eratosthenes was sceptical of the usefulness of continents as cartographic building blocks. In respect to his map of the world, he developed cartographic systems of regional division, intended to supersede the concept of continents. Our sources supply details on two systems of

operations against the Scythians of Europe, but it also would have stood as a symbol of the extent of Alexander's dominion in Asia (Curt. 7.6.13; Arr. *Anab.* 4.1.1-4): see esp. Holt 1989: 57-8.

¹⁵ This fragment of Eratosthenes' *Geography* will be cited, translated and discussed in greater detail in the following chapter. Brunt 1976: 524-5 argues that the joining of the Tanais and Jaxartes was a consequence of genuine misunderstanding of the regional topography, rather than a result of Macedonian propaganda.

¹⁶ It may be that Eratosthenes' opposition to the Tanais-Jaxartes theory was derived partially from Aristobulus. Despite knowing of the attempt to merge the Tanais and the Jaxartes, Aristobulus appears to have been troubled by the idea, and possibly maintained that they were two separate rivers: see Arr. *Anab.* 3.30.6-9. For scholarship in favour of this interpretation, see Pearson 1960: 163; Bosworth 1980: 377. Furthermore, Goukowsky 1978: 114 argues that Eratosthenes' opinion was influenced by Demodamas of Miletus' expedition to the Caspian, during the reign of Seleucus I, which proved the Tanais and Jaxartes to be separate rivers ('Sous le règne de Séleucos I, Démodamas de Milet franchit le Syr-Darya et reconnut qu'il s'agissait d'un fleuve distinct se jetant, selon lui, dans la Caspienne. Cette découverte fut enregistrée par Ératosthène et les écrivains ultérieurs distinguent soigneusement l'Iaxarte du Tanaïs').

¹⁷ Strabo 17.3.1, Erat., fr. 100 demonstrates that Eratosthenes believed Asia to be greater in area than Europe and Libya combined. This conception is consistent with the division of Europe and Asia at the Scythian Tanais, and Asia and Libya at the Nile. Contrast this with Herodotus' argument that Europe was far greater in length and width than both Asia and Libya: Hdt. 4.42.1.

¹⁸ For Eratosthenes' use of the toponyms 'Europe', 'Asia' and 'Libya' in the *Geography*, see esp. Strabo 17.3.1, Erat., fr. 100.

regional division: ἄκραι ('promontories') and σφραγιῖδες ('sealstones').¹⁹ Both the ἄκραι and σφραγιῖδες were depicted in relation to the main parallel of Eratosthenes' map. As far as we know, Eratosthenes applied the concept of ἄκραι primarily to the Mediterranean coastline north of the main parallel and the concept of σφραγιῖδες to much of the land south of the main parallel. The highly fragmentary source tradition obscures whether or not these cartographic systems were employed to demarcate other parts of Eratosthenes' map.

There are two passages in Strabo's *Geography* which describe Eratosthenes' ἄκραι. The first derives from Hipparchus:

μεταβαίνει πρὸς τὰ βόρεια μέρη τῆς οἰκουμένης· εἴτ' ἐκτίθεται τὰ λεχθέντα ὑπὸ τοῦ Ἐρατοσθένους περὶ τῶν μετὰ τὸν Πόντον τόπων, ὅτι φησὶ τρεῖς ἄκρας ἀπὸ τῶν ἄρκτων καθήκειν· μίαν μὲν, ἐφ' ἧς ἡ Πελοπόννησος, δευτέραν δὲ τὴν Ἰταλικήν, τρίτην δὲ τὴν Λιγυστικήν, ὑφ' ὧν κόλπους ἀπολαμβάνεσθαι τὸν τε Ἀδριατικὸν καὶ τὸν Τυρρηνικόν ('He [Hipparchus] passes to a discussion of the northern portion of the inhabited world; then he explains what was said by Eratosthenes about the places next to the Pontus, that he says that three promontories come down from the north; one, on which is the Peloponnese; a second, the Italian; and a third, the Ligurian, and these promontories enclose both the Adriatic and Tyrrhenian Gulfs') (Strabo 2.1.40, Erat., fr. 134).

In the second passage, Strabo describes Eratosthenes' ἄκραι in relation to an alternative system proposed by Polybius:

προπεπτωκυίας δὲ τῆς Εὐρώπης ἄκραις πλείοσι, βέλτιον μὲν οὗτος εἴρηκεν περὶ αὐτῶν Ἐρατοσθένους, οὕτω δὲ ἰκανῶς. ἐκεῖνος μὲν γὰρ τρεῖς ἔφη, τὴν

¹⁹ See *LSJ* (1940) s.v. ἄκρα: 54 and σφρηγίς: 1742. Alternative English translations for ἄκρα include 'cape' and 'headland'.

ἐπὶ τὰς στήλας καθήκουσαν, ἐφ' ἧς ἡ Ἰβηρία, καὶ τὴν ἐπὶ τὸν πορθμόν, ἐφ' ἧς ἡ Ἰταλία, καὶ τρίτην τὴν κατὰ Μαλέας, ἐφ' ἧς τὰ μεταξὺ τοῦ Ἀδρίου καὶ τοῦ Εὐξείνου πάντ' ἔθνη καὶ τοῦ Ταναΐδος. οὗτος δὲ τὰς μὲν δύο τὰς πρώτας ὁμοίως ἐκτίθεται, τρίτην δὲ τὴν κατὰ Μαλέας καὶ Σούνιον, ἐφ' ἧς ἡ Ἑλλάς πᾶσα καὶ ἡ Ἰλλυρίς καὶ τῆς Θράκης τινά, τετάρτην δὲ τὴν κατὰ τὴν Θρακίαν χερρόνησον, ἐφ' ἧς τὰ κατὰ Σηστόν καὶ Ἄβυδον στενά, ἔχουσι δ' αὐτὴν Θραῖκες· πέμπτην δὲ τὴν κατὰ τὸν Κιμμερικὸν Βόσπορον καὶ τὸ στόμα τῆς Μαιώτιδος ('With regard to the many promontories of Europe running down [to the sea], what Polybius has said about them is better than that of Eratosthenes, but it is not sufficient either. For Eratosthenes spoke of three promontories: the one that comes down to the Pillars, on which is Iberia; that which comes down to the Strait of Sicily, on which is Italy; and the third comes down to Cape Malea, on which are all the nations in between that Adriatic, Euxine and the Tanais. But Polybius explains the first two promontories in the same manner, and then has a third promontory which comes down to Cape Malea and Sunium, on which are all Greece, Illyria and certain parts of Thrace; a fourth, the Thracian Chersonese, on which is the strait between Sestus and Abydus, and Thracians inhabit it; and a fifth which comes down to the Cimmerian Bosphorus and the mouth of Lake Maeotis') (Strabo 2.4.8, Erat., fr. 135).

The division of the Mediterranean coastline north of the main parallel into three promontories generated a great deal of controversy in antiquity. Although Polybius subscribed to the concept of ἄκραι, he took issue with Eratosthenes' third promontory, which incorporated much of the land between the Adriatic Sea and the river Tanais, including Greece. Polybius considered this promontory to be far too vaguely defined. Instead, he believed that it should be subdivided into three individual promontories,

giving a total of five in Europe. Strabo reiterated Polybius' criticisms, but also questioned the validity of using ἄκρα in a system of regional division (Strabo 2.1.40, 2.4.8). Evidently, Eratosthenes intended to define the contour of Europe's Mediterranean coastline in only a very general, generic manner. Roller describes Eratosthenes' concept of ἄκρα as 'a point of view that seems bizarre today but reflects a Greek perspective that saw Italy and Iberia as intruding into the Mediterranean in the same way as Greece.'²⁰ For Greek geographers, Iberia, Italy and the Greek mainland would have stood out as the most southern parts of Europe's Mediterranean coastline. Indeed, Eratosthenes depicted each of the three promontories as ending on the latitude of his main parallel. As described in the previous chapter, the main parallel of Eratosthenes' map ran through the Straits of Gibraltar, the Strait of Sicily and the southern capes of the Peloponnese, intersecting with the terminal point of each promontory (Strabo 2.1.1, Erat., fr. 47).²¹ Thus, these promontories were the defining features of a system of regional division, mapped in spatial relation to the main parallel.

It is implied by Strabo that the concept of ἄκρα originated from a source earlier than Eratosthenes. This source was Timosthenes of Rhodes, who circumnavigated the Mediterranean and produced a detailed coastal survey as the admiral of Ptolemy II Philadelphus' fleet. Strabo associates both Timosthenes and Eratosthenes with the concept of ἄκρα and he condemns both for what he sees as an erroneous system of regional division (Strabo 2.1.40, Erat., fr. 134). It is highly likely that Eratosthenes derived the concept of ἄκρα from Timosthenes' treatise. The southerly extension of Iberia, Italy and Greece would have been easily perceived by someone navigating their

²⁰ Roller 2010: 213. Eratosthenes also used the term ἄκρα to describe the Sacred Promontory (Cape St. Vincent) in Iberia, the Cabaeum promontory in Celtica (Pointe du Raz), and the eastern and southern capes of India: see Strabo 2.5.14, 1.4.5, 2.1.2, Erat., fr. 53, 37, 47.

²¹ Keyser 2001: 367 presumes that Dicaearchus, and obviously Eratosthenes too, determined the course of the main parallel from records of the observations of the pole or the length of the longest day of the year

way around the whole of the Mediterranean coastline. We know from a citation by Pliny the Elder that Timosthenes sailed in the Persian Gulf, measuring its length and width in terms of days sailed (Plin. *HN*. 6.163). By the same means he calculated the distances between various sites situated along the Mediterranean coast (Plin. *HN*. 5.47, 5.129). Also, he measured the circumference of Cyprus and discussed many other islands in the region (Plin. *HN*. 5.129, 6.198). These insights into Timosthenes' work indicate that he had a keen practical interest in the topography of the Mediterranean. Moreover, it appears that he had the requisite knowledge and skillset to construct a conceptual map of Europe's Mediterranean coastline, dominated by three large promontories.²² Aujac, Harley and Woodward postulate that Timosthenes probably drew some detailed maps to illustrate his treatise.²³ This is speculation, but it is tempting to think that he may have outlined the three promontories of southern Europe on a rough schematic diagram of the Mediterranean coastline, perhaps a forerunner to the portolan charts drawn by European navigators in the Late Middle Ages.²⁴

There is further indication that Eratosthenes' knowledge of the Mediterranean area, especially the territories west of Greece, was heavily reliant on data supplied by Timosthenes. Strabo criticises both Timosthenes and Eratosthenes for their inadequate knowledge of this part of the world, including the regions of Iberia, Celtica, Italy and

at various sites. It seems likely that the southerly extension of Eratosthenes' promontories would have been determined by the same records of observation.

²² Timosthenes possibly also had access to records of astronomical observation at sites located on the three promontories. It is highly likely that Timosthenes used Dicaearchus' *Circuit of the Earth* as a source for his own work: see Fraser 1972, vol. 1: 534. It may be that the astronomical observations which Dicaearchus used to plot the main parallel of his map were subsequently employed for a similar cartographic purpose by Timosthenes.

²³ Aujac, Harley and Woodward 1987b: 153.

²⁴ There is a wide body of literature dealing with European portolan charts. For two brief, but especially useful treatments of the subject, see Hodgkiss 1981: 103-18; Campbell 1987: 371-463.

the Pontus (Strabo 2.1.41, Erat., fr. 131).²⁵ Without doubt, Timosthenes' and Eratosthenes' concept of ἄκραι was a chief target of Strabo's complaints here. Also, it is likely that many of Eratosthenes' distance measurements, which Strabo censures, such as that between Epidamnus and the Thermaic Gulf, and between Alexandria and Carthage, were obtained from estimates of days' sailing time recorded by Timosthenes (Strabo 2.1.40, Erat., fr. 134). Marcianus of Heraclea, a minor Greek geographer of Late Antiquity, asserts that Eratosthenes in fact plagiarised a large portion of Timosthenes' treatise, adding only a few small details of his own (Marc. *Epit. Peripl. Men.* 1.3.25-8). Fraser suggests that Marcianus' charge of plagiarism is perhaps too strong, but believes that Eratosthenes undoubtedly applied the 'scissors-and-paste' method when dealing with Timosthenes' information. Thus, he argues that Eratosthenes' account of the western Mediterranean in many respects reproduced that of Timosthenes.²⁶

4.3. THE SEALSTONES

After the main parallel of latitude, the cartographic system of σφραγιδες ('sealstones') represents the next most important feature of Eratosthenes' world map. The term itself is the plural form of the noun σφραγις, which most commonly denoted an official seal or signet-ring used to stamp an impression of an emblem onto a wax surface. Also, in Ptolemaic Egypt, σφραγις was employed to refer to a governmentally defined, surveyed and numbered area of land.²⁷ With these bureaucratic functions, the word had obvious political connotations. The rationality behind Eratosthenes' adoption of the concept of σφραγιδες and its meaning when applied to the world map have been

²⁵ Strabo's criticism was probably also directed toward Pytheas of Massalia, the main source for Eratosthenes' knowledge of Europe's Atlantic coastlines and beyond. Pytheas' influence on Eratosthenes' map of the world will be considered in chapter six.

²⁶ Fraser 1972, vol. 1: 534-7.

²⁷ *LSJ* (1940) s.v. σφραγις: 1742; Geus 2002: 276; Roller 2010: 26. I follow Roller in translating σφραγιδες as 'sealstones'. Other scholars translate it simply as 'seals'.

much discussed.²⁸ Strabo provides what appears to be a watered-down version of Eratosthenes' explanation:

ὁ μὲν γὰρ ἀκολουθῶν τῇ θέσει τῇ προειρημένη τοῦ τε Ταύρου καὶ τῆς ἀπὸ στηλῶν θαλάττης, διελὼν τῇ γραμμῇ ταύτη τὴν οἰκουμένην δίχα καὶ καλέσας τὸ μὲν βόρειον μέρος τὸ δὲ νότιον, πειρᾶται τούτων ἐκάτερον τέμνειν πάλιν εἰς τὰ δυνατὰ μέρη· καλεῖ δὲ ταῦτα σφραγίδας, καὶ δὴ τοῦ νοτίου μέρους πρώτην εἰπὼν σφραγίδα τὴν Ἰνδικήν, δευτέραν δὲ τὴν Ἀριανήν, ἐχούσας τι εὐπερίγραφον, ἴσχυσεν ἀμφοτέρων ἀποδοῦναι καὶ μῆκος καὶ πλάτος, τρόπον δέ τινα καὶ σχῆμα, ὡς ἂν γεωμετρικός. τὴν μὲν γὰρ Ἰνδικήν ῥομβοειδῆ φησι διὰ τὸ τῶν πλευρῶν τὰς μὲν θαλάττη κλύζεσθαι τῇ τε νοτίῳ καὶ τῇ ἑώρα, μὴ πάνυ κολπώδεις ἴσοντας ποιούσαις, τὰς δὲ λοιπὰς τὴν μὲν τῷ ὄρει τὴν δὲ τῷ ποταμῷ, κἀνταῦθα τοῦ εὐθυγράμμου σχήματος ὑπὸ τι σωζομένου ('For following the aforementioned proposition about the Taurus and the sea from the Pillars, having divided the inhabited world in two by means of this line and having called them the northern part and the southern, he [Eratosthenes] attempts to carve up each again into portions as practicable; and he calls these sealstones. Then saying that the first sealstone of the southern portion is India, and the second Ariana, each having a good form, he could give an accurate account of the length and width of both, and their shape in the manner of a geometrician. For he says that India is rhomboidal because its sides are washed by sea in the south and east, making shores altogether without large gulfs, and the remainder by the

²⁸ For discussion of Eratosthenes' σφραγίδες, see Bunbury 1879, vol. 1: 654-5; Berger 1880: 228-30; van Paassen 1957: 42-3; Dicks 1960: 128-30; Fraser 1972, vol. 1: 531-3; Dilke 1985: 35; Aujac, Harley and Woodward 1987b: 157; Nicolet 1991: 62; Bosworth 1995: 241-2; Geus 2002: 276; Geus 2004: 20-5; Roller 2010: 26, 175.

mountains and the river, preserving a certain rectilinear shape') (Strabo

2.1.22, Erat., fr. 66).

It is implied here that the σφραγίδες functioned first and foremost as geometrical figures. Scholars suggest that Eratosthenes depicted the σφραγίδες as irregular, unequal quadrilaterals, which were devoid of any tangible political connotations, unlike in other contexts.²⁹ Each sealstone represented a cartographically defined region demarcated by natural boundaries and some imaginary lines, with their shape and size outlined on the map and differentiated by ordinal numeration. They were structured so as to fit together like a jigsaw, conveying an improved understanding of the general contour of the οἰκουμένη. Fraser sums up the purpose of σφραγίδες, stating that 'they were invented and employed by Eratosthenes (who, it will be remembered, distrusted the division into continents) to simplify the general structure of the land-mass as projected and to facilitate general reference.'³⁰ Strabo's definition of Eratosthenes' system of σφραγίδες mentions only the first two, India and Ariana. There were, however, two others farther to the west, one between the Caspian Gates and the Euphrates, and the other between the Euphrates and the western boundary of Egypt (Strabo 2.1.22, 2.1.23, 2.1.32, Erat., fr. 66, 83, 92). There is also some suggestion in Strabo's wording that Eratosthenes extended the σφραγίδες to other regions, even those situated to the north of the main

²⁹ Dicks 1960: 128-9 states that by σφραγίδες Eratosthenes 'apparently meant rough geometrical figures of the form of parallelograms.' Fraser 1972, vol. 1: 531 notes that Eratosthenes probably did not have any specific shape of land in mind when applying the concept of σφραγίδες to his map. Geus 2002: 276 concludes that σφραγίδες were abstract geometric figures defined by natural boundaries ('Die einzelnen Segmente waren zwar abstrakte geometrische Figuren, ihre Grenzen sollten aber mit natürlichen Grenzen und Formationen übereinstimmen'). Roller 2010: 26 argues that the geometrical form of the σφραγίδες may suggest the influence of Euclid. Also, see Bunbury 1879, vol. 1: 654-5; Berger 1880: 228-30; van Paassen 1957: 42-3; Bosworth 1995: 241-2; Geus 2004: 20-5.

³⁰ Fraser 1972, vol. 1: 531.

parallel.³¹ Undoubtedly, it would have been a logical step, but we cannot be certain, especially since no later Greek mapmaker utilised Eratosthenes' concept of σφραγίδες.

Eratosthenes' system of σφραγίδες was subjected to severe criticism by Hipparchus. A great deal of what Strabo tells us about the σφραγίδες is offered in response to this critique. Hipparchus believed that Eratosthenes' σφραγίδες, particularly the third and fourth, were inaccurately rendered. He argued that they were geometrically imprecise and dismissed as incorrect many of the dimensions which Eratosthenes gave to them (Strabo 2.1.23, 2.1.27, 2.1.29). Strabo, however, defended Eratosthenes, stressing that he intended the σφραγίδες to provide only rough, approximate (όλοσχερῶς), rather than geometrically exact, cartographic outlines (Strabo 2.1.23, 2.1.24, 2.1.30).³² The following discussion will not dwell on the extensive censures of Hipparchus; instead, it will provide a thorough analysis of Eratosthenes' cartographic representation of the four σφραγίδες about which we know, beginning with the fourth and ending with the first.

³¹ Cf. Strabo 11.12.5, where Strabo states explicitly that Eratosthenes' main parallel bisected the οίκουμένη into north and south and that some of his σφραγίδες were called 'southern' and others 'northern' (Ερατοσθένης δὲ πεποιημένος τὴν διαίρεσιν εἰς τὰ νότια μέρη καὶ τὰ προσάρκτια καὶ τὰς ὑπ' αὐτοῦ λεγομένας σφραγίδας, τὰς μὲν βορείους καλῶν τὰς δὲ νοτίους).

³² For discussion of Hipparchus' and Strabo's conflicting approaches to the concept of σφραγίδες, see esp. Fraser 1972, vol. 1: 533. For modern reconstructions of Eratosthenes' σφραγίδες, see fig 4.2 and fig. 4.3.

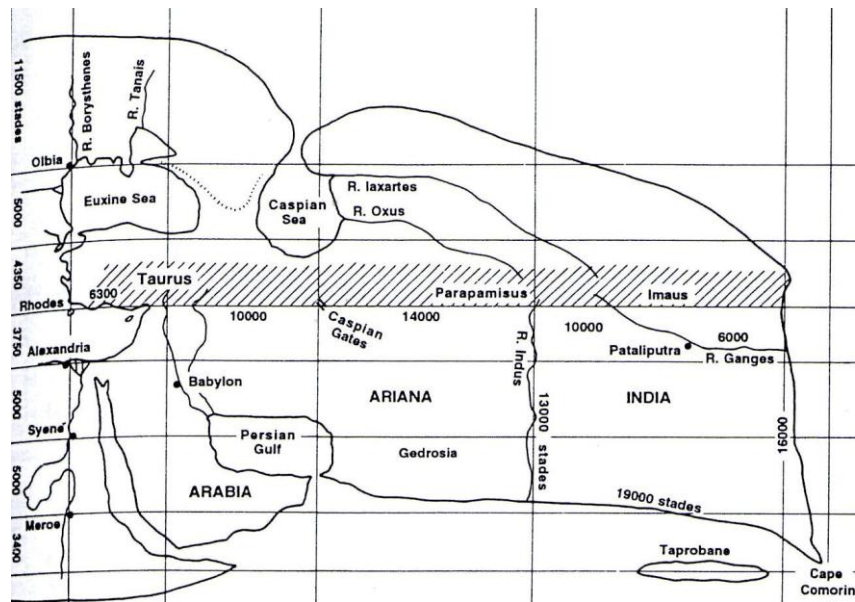


Fig. 4.2: This diagram is a reconstruction of Eratosthenes' mapping of Asia. Eratosthenes' system of parallels and meridians is depicted and the first two σφραγίδες, India and Ariana, are also clearly defined.

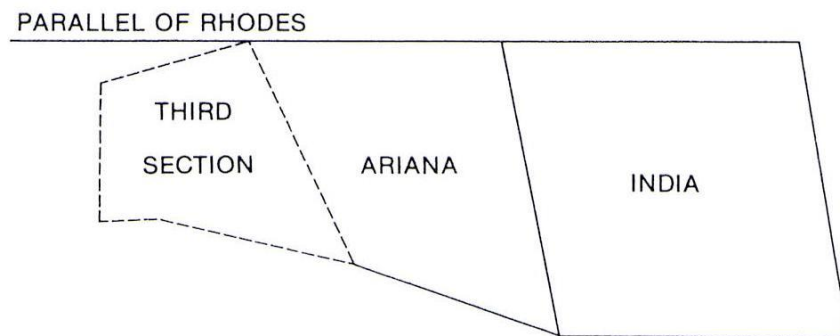


Fig. 4.3: A schematic, geometric representation of India, Ariana and the third sealstone.

Eratosthenes' fourth sealstone is the one about which we know the least. Strabo refers to it only briefly:

τετάρτη δ' ἂν εἴη σφραγίς ἢ συνεστῶσα ἔκ τε τῆς εὐδαίμονος Ἀραβίας καὶ τοῦ Ἀραβίου κόλπου καὶ τῆς Αἰγύπτου πάσης καὶ τῆς Αἰθιοπίας. ταύτης δὲ τῆς μερίδος μῆκος μὲν ἔσται τὸ ἀφοριζόμενον ὑπὸ δυεῖν μεσημβρινῶν· ὁ μὲν γὰρ γράφεται διὰ τοῦ δυσμικωτάτου σημείου τοῦ ἐπ' αὐτῆς, ὁ δὲ διὰ τοῦ ἑωθινωτάτου· πλάτος δὲ τὸ μεταξύ δυεῖν παραλλήλων, ὧν ὁ μὲν γράφεται διὰ τοῦ βορειοτάτου σημείου, ὁ δὲ διὰ τοῦ νοτιωτάτου ('The

fourth sealstone would be the one composed of Arabia Eudaimon, the Arabian Gulf, all of Egypt, and Ethiopia. The length of this sealstone will be that bounded by the two meridians; for one is drawn through the most western point of it, and the other through the most eastern point; and the width will be between two parallels, one of which is drawn through the most northern point, and the other through the most southern') (Strabo 2.1.32, Erat., fr. 92).

First, it should be noted that this sealstone transgressed the traditional boundary between Asia and Libya, highlighting the arbitrary nature of continental divisions. Eratosthenes' depiction of the fourth sealstone was unique in that he appears not to have estimated its dimensions or specified its shape, perhaps because the indentations of the Persian Gulf, Arabian Gulf and eastern Mediterranean Basin created an extremely unusual, irregular outline. Roller emphasises this point, stating that Eratosthenes provided 'an astonishingly dogmatic definition of the territory as bounded by two meridians and two parallels.'³³ The two meridians in question are the one which ran through Alexandria in Egypt and the one which ran through Thapsacus on the river Euphrates, making the river part of the sealstone's eastern boundary. The two parallels in question are the one which was on the latitude of Alexandria in Egypt and the one which was on the latitude of Rhodes and the Taurus Mountains, the main parallel of Eratosthenes' map. Compared with the other three σφραγίδες this one was exceedingly small. Nonetheless, its integration into Eratosthenes' system of parallels and meridians was a persistent feature of the σφραγίδες concept.

The third of Eratosthenes' sealstones was examined in great detail by Strabo. His analysis was articulated largely in response to Hipparchus' extensive critique.³⁴ It

³³ Roller 2010: 192.

³⁴ Dicks 1960: 130-7 provides a detailed commentary on Hipparchus' criticism of Eratosthenes' third sealstone.

appears that the third sealstone comprised roughly the countries of Persia and Mesopotamia and that Eratosthenes discussed the course and length of each of its four sides. Strabo quotes Eratosthenes on the dimensions of the northern, southern and western sides:

τὴν γὰρ τρίτην μερίδα κατὰ τὴν βόρειον πλευρὰν εἰπόντα ἀφορίζεσθαι ὑπὸ τῆς ἀπὸ Κασπίων πυλῶν ἐπὶ τὸν Εὐφράτην γραμμῆς σταδίων μυρίων οὔσης, μετὰ ταῦτα ἐπιφέρειν ὅτι τὸ νότιον πλευρὸν τὸ ἀπὸ Βαβυλῶνος εἰς τοὺς ὄρους τῆς Καρμανίας μικρῶ πλειόνων ἐστὶν ἢ ἑνακισχιλίων, τὸ δὲ πρὸς δύσει πλευρὸν ἀπὸ Θαψάκου παρὰ τὸν Εὐφράτην ἐστὶν εἰς Βαβυλῶνα τετρακισχίλιοι ὀκτακόσιοι στάδιοι, καὶ ἐξῆς ἐπὶ τὰς ἐκβολὰς τρισχίλιοι (‘For having stated that the third portion is defined on its northern side by a line from the Caspian Gates to the Euphrates, 10,000 stadia, later on he [Eratosthenes] adds that the southern side, from Babylonia to the borders of Carmania, is slightly more than 9,000 stadia, and the western side, from Thapsacus along the Euphrates to Babylon, is 4,800 stadia, and to the outlet 3,000 stadia’) (Strabo 2.1.27, Erat., fr. 85).

This passage shows that the western side, measured along the winding course of the Euphrates, was approximately 7,800 stadia in length; the southern side was 9,000 stadia; and the northern side was 10,000 stadia. Furthermore, Eratosthenes described the eastern side, which also formed the western boundary of Ariana, as running along an imaginary line from the Erythraean Sea through Persis and Media to the Caspian Gates, a distance of approximately 12,000 stadia (Strabo 2.1.26, Erat., fr. 83).³⁵

³⁵ Cf. Strabo 15.3.1, which similarly describes the eastern side of the third sealstone. This passage provides a conflicting measurement of approximately 10,000 stadia from the Erythraean Sea to the Caspian Gates. Jones, the editor of the Loeb translation of Strabo’s *Geography*, suggests that the text may be corrupt here (vol. 7, p. 153).

It is clear that Eratosthenes envisioned the third sealstone as an asymmetrical quadrilateral. As with the fourth sealstone, the boundaries of the third were integrated into Eratosthenes' system of parallels and meridians. The western side intersected with the meridian which ran through Thapsacus and the Euphrates. The line which formed the boundary of the eastern side was a segment of the meridian which ran through the Caspian Gates (Strabo 2.1.28-29, 2.1.24, 2.1.34, Erat., fr. 80, 63, 83, 64). The northern side deviated slightly from the main parallel along the Taurus Mountains, running on an angle from the Caspian Gates in the east to Thapsacus in the west, which was located 1,100 stadia to the south of the mountains (Strabo 2.1.1, 2.1.24, Erat., fr. 47, 83) (see fig. 4.2). The southern side, which followed the non-linear course of southern Asia's coastline, was in close proximity to the parallel which ran through Syene in Egypt, the Persian Gulf, Gedrosia and India (Strabo 2.2.2, 2.5.36, Erat., fr. 58, 59).

Eratosthenes represented both the northern and southern sides of this third sealstone as following routes already surveyed by travellers. Strabo asserts that Eratosthenes portrayed the southern side as running along a μεμετρημένη ὁδός 'measured route' from Babylon, through Susa and Persepolis, to the eastern borders of Carmania and Persis (Strabo 2.1.23, Erat., fr. 83). Roller believes that this μεμετρημένη ὁδός would have existed from at least Persian times; however, it is not out of the question that Alexander the Great's bematists measured at least part of the route.³⁶ It is certainly likely that the northern side of the sealstone was surveyed by the bematists. Alexander's army traversed much of the road from Thapsacus to the Caspian Gates during the pursuit of Darius III. Eratosthenes' description of this route has been cited in the previous chapter. To paraphrase, Eratosthenes recorded a series of already established measurements between Thapsacus and the Caspian Gates. From Thapsacus to the place where Alexander crossed the Tigris was 2,400 stadia, and from there along

³⁶ Roller 2010: 186.

the route of Darius' flight through Gaugamela, the Lycus, Arbela, Ecbatana and the Caspian Gates was 7,600 stadia, giving a total of 10,000 stadia (Strabo Erat., fr. 83). According to Roller, Eratosthenes' depiction of the third sealstone demonstrates that in the construction of σφραγίδες, he preferred, whenever possible, to use road itineraries such as this, as opposed to lines that ran across uncharted territory.³⁷ As we will see, Roller's argument is confirmed by Eratosthenes' mapping of the first two sealstones, Ariana and India.

The term 'Ariana' was coined by Eratosthenes to define his second sealstone. 'Ariana' was not a recognised geographical region, but as a sealstone it incorporated several provinces of the old Achaemenid Persian Empire, including Gedrosia, Drangiana, Arachosia, Aria and Paropamisadae.³⁸ Strabo states that Eratosthenes described Ariana as having a clear rectilinear shape, close to that of a parallelogram (παραλληλόγραμμον σχῆμα) (Strabo 2.1.22, Erat., fr. 79) (see fig. 4.2). Strabo also quotes Eratosthenes in connection with a detailed discussion of the outline and dimensions of Ariana:

πολλή δ' ἐστὶ καὶ εἰς τὴν μεσόγαιαν ἀνέχουσα καὶ ἡ Γεδρωσία μέχρι τοῦ
συνάψαι Δράγγαις τε καὶ Ἀραχωτοῖς καὶ Παροπαμισάδαις, περὶ ὧν
Ἐρατοσθένης οὕτως εἶρηκεν (οὐ γὰρ ἔχομέν τι λέγειν βέλτιον περὶ αὐτῶν).
ὀρίζεσθαι μὲν γὰρ φησι τὴν Ἀριανὴν ἐκ μὲν τῶν πρὸς ἔω τῷ Ἰνδοῦ, πρὸς

³⁷ Roller 2010: 186. Bosworth 1995: 242 argues that the σφραγίδες were 'as far as Eratosthenes could ascertain, compiled from factual reports of distances, whether from official records or eyewitness descriptions.'

³⁸ Roller 2010: 181 states that 'The ethnym Arioī was used in Media in the sixth century BC and later applied to a Persian satrapy (Herodotos 7.62, 3.93) located in the vicinity of modern Herat in Afghanistan, where Alexander founded Alexandria Among the Arioī. Yet to use this local toponym to describe the entire region from India to Mesopotamia seems to have been Eratosthenes' idea, which did not take hold. Strabo was inconsistent in his use of it, with "Ariana" applied only when describing Eratosthenes' scheme (2.1.22, 31, 15.1.10) and "Aria" for the district around Herat (2.5.32, 11.8.1), although with some confusion in both cases. But to make his sealstone theory work, Eratosthenes needed a general term for the entire region from India to Mesopotamia.'

νότον δὲ τῆ μεγάλης θαλάττης, πρὸς ἄρκτον δὲ τῷ Παροπαμισῶ καὶ τοῖς ἐξῆς ὄρεσι μέχρι Κασπίων πυλῶν, τὰ δὲ πρὸς ἐσπέραν τοῖς αὐτοῖς ὄροις, οἷς ἡ μὲν Παρθυηνὴ πρὸς Μηδίαν, ἡ δὲ Καρμανία πρὸς τὴν Παραϊτακηνὴν καὶ Περσίδα διώριστα· πλάτος δὲ τῆς χώρας τὸ τοῦ Ἰνδοῦ μῆκος τὸ ἀπὸ τοῦ Παροπαμισοῦ μέχρι τῶν ἐκβολῶν, μύριοι καὶ δισχίλιοι στάδιοι (οἱ δὲ τρισχιλίους φασί)· μῆκος δὲ ἀπὸ Κασπίων πυλῶν, ὡς ἐν τοῖς Ἀσιατικοῖς σταθμοῖς ἀναγράφεται, διττόν. μέχρι μὲν Ἀλεξανδρείας τῆς ἐν Ἀρίοις ἀπὸ Κασπίων πυλῶν διὰ τῆς Παρθυαίας μία καὶ ἡ αὐτὴ ὁδός· εἴθ' ἡ μὲν ἐπ' εὐθείας διὰ τῆς Βακτριανῆς καὶ τῆς ὑπερβάσεως τοῦ ὄρους εἰς Ὀρτόσπανα ἐπὶ τὴν ἐκ Βάκτρων τρίοδον, ἣτις ἐστὶν ἐν τοῖς Παροπαμισάδαις· ἡ δ' ἐκτρέπεται μικρὸν ἀπὸ τῆς Ἀρίας πρὸς νότον εἰς Προφθασίαν τῆς Δραγγιανῆς· εἶτα πάλιν ἡ λοιπὴ μέχρι τῶν ὄρων τῆς Ἰνδικῆς καὶ τοῦ Ἰνδοῦ· ὥστε μακροτέρα ἐστὶν αὕτη ἢ διὰ τῶν Δραγγῶν καὶ Ἀραχωτῶν, σταδίων μυρίων πεντακισχιλίων τριακοσίων ἢ πᾶσα. εἰ δὲ τις ἀφέλοι τοὺς χιλίους τριακοσίους, ἔχοι ἂν τὸ λοιπὸν τὸ ἐπ' εὐθείας· μῆκος τῆς χώρας, μυρίων καὶ τετρακισχιλίων· οὐ πολὺ γὰρ ἔλαττον τὸ τῆς παραλίας, κἂν παραύξωσί τινες αὐτὸ, πρὸς τοῖς μυρίοις τὴν Καρμανίαν ἑξακισχιλίων τιθέντες· ἡ γὰρ σὺν τοῖς κόλποις φανοῦνται τιθέντες ἢ σὺν τῇ ἐντὸς τοῦ Περσικοῦ κόλπου παραλία τῆ Καρμανικῆ ('It [Ariana] is large and Gedrosia projects into the interior as far as the Drangae, the Arachoti and the Paropamisadae, concerning whom Eratosthenes has spoken thus [for I am unable to say it any better than him]. For he says that Ariana is bordered on the east by the river Indus, on the south by the Great Sea, on the north by the Paropamisus Mountains and the mountains in succession as far as the Caspian Gates, and on the west by the same boundaries, which divide Parthia from Media, and Carmania from Paraetacene and Persis. The breadth of the country is the

length of the Indus from the Paropamisus as far as the outlets, 12,000 stadia [but some say 13,000]; and the length of the country from the Caspian Gates, as recorded in the work *Asiatic Stages*, is stated in two ways. As far as Alexandria Among the Arians, from the Caspian Gates through the country of Parthia, there is one and the same road; and then there is a straight route through Bactriana and over the mountain pass into Ortospana to the meeting of the three roads from Bactra, which is in the country of the Paropamisadae; but the other route turns off slightly from Aria toward the south to Prophthasia in Drangiana; and the remainder of it then leads back to the boundary of India, the Indus; so that this route which leads through the country of Drangae and Arachoti is longer, 15,300 stadia in all. If one should remove 1,300 stadia, the remainder would be a straight line; the length of the line would be 14,000 stadia; for the length of the coastline is not much less, although some increase it, adding, in addition to the 10,000 stadia, Carmania with 6,000 stadia; for they appear to have included the gulfs or the seacoast of Carmania within the Persian Gulf⁹) (Strabo 15.2.8, Erat., fr. 78).

According to Eratosthenes, Ariana's northern side followed the course of the Taurus mountain chain along the main parallel of the map, from the Caspian Gates to the river Indus. Eratosthenes derived the distance measurement for Ariana's northern side of 15,300 stadia from the *Asiatic Stages*, which, as has been mentioned, was a road itinerary compiled by Alexander's bematists. In the previous chapter, it was demonstrated that Eratosthenes cited the bematists on distance measurements between various stopping places east of the Caspian Gates (Strabo 11.8.9, Erat., fr. 108; Plin. *HN*. 6.61-2). However, the bematists' measurements did not strictly apply to the

theorised east-to-west course of the Taurus Mountains and Ariana's northern side.³⁹ The distance of 15,300 stadia corresponded to a route traversed by Alexander's army, which, after the Caspian Gates, curved to the south running through Drangiana and Arachosia, before reaching the river Indus.⁴⁰ The eastern side of Ariana was formed by the river Indus, which Eratosthenes believed to run due south from the Hindu Kush to the Erythraean Sea, a total distance of either 12,000 or 13,000 stadia.⁴¹ It is plausible that this estimate was obtained from measurements recorded by members of Nearchus' fleet, during their voyage down the Indus to its outlets.⁴²

Nearchus and his followers were certainly the ultimate source for Eratosthenes' depiction of Ariana's southern side, which ran from the outlets of the Indus to the mouth of the Persian Gulf. The length of this stretch of coastline was stated to be not much less than 14,000 stadia. In another passage, also attributed to Eratosthenes, an itinerary is described, which supplies ethnographic data, a list of distance estimates between ports and a sum of 13,900 stadia for the length of the seacoast:

οἰκοῦσι δὲ Ἄρβιες πρῶτον, ὁμώνυμοι τῷ ποταμῷ Ἄρβει τῷ ὀρίζοντι αὐτοὺς ἀπὸ τῶν ἐξῆς Ὠρειτῶν, ὅσον χιλίων σταδίων ἔχοντες παραλίαν, ὡς φησι Νέαρχος· Ἰνδῶν δ' ἐστὶ μερὶς καὶ αὕτη· εἴτ' Ὠρίται ἔθνος αὐτόνομον· τούτων δ' ὁ παράπλους χιλίων ὀκτακοσίων, ὁ δὲ τῶν ἐξῆς Ἰχθυοφάγων

³⁹ Roller 2010: 181-2 asserts that although Alexander travelled east along Ariana's northern edge, his army moved outside of the boundary line for some distance after passing the Caspian Gates.

⁴⁰ On Alexander's route through Drangiana and Arachosia, see Arr. *Anab.* 3.25.6-8, 3.28.1-4. Also, see Roller 2010: 183.

⁴¹ Cf. Strabo 15.1.11; Arr. *Ind.* 3.1-5, Erat., fr. 69, 72, where Eratosthenes is cited as recording a total of 13,000 stadia for the Indus' length. Strabo 2.1.34, Erat., fr. 64 indicates that Eratosthenes believed the river Indus to flow due south, but Hipparchus argued that it flowed to the southeast. Roller 2010: 174 states that 'the portions of the river known to contemporary Greeks flow south-southwest.'

⁴² Alternatively, the estimate of 13,000 stadia may derive from Megasthenes. Roller emphasises this point, presumably basing his argument on Diodorus' use of Megasthenes for the discussion of India's geography at Diod. 2.35-42: see Roller (2008) *BNJ* s.v. Megasthenes (715); Roller 2010: 176. Nevertheless, throughout this extract the length of the Indus is not mentioned once.

ἑπτακισχίλιοι τετρακόσιοι, ὁ δὲ τῶν Καρμανίων τρισχίλιοι ἑπτακόσιοι μέχρι Περσίδος· ὥσθ' οἱ σύμπαντες μύριοι τρισχίλιοι ἑννακόσιοι ('Ariana is inhabited first by the Arbies, from the same name as the river Arbis, which is the boundary between them and the next tribe, the Oreitae, who have a coastline of 1,000 stadia, as Nearchus says; and this is also a part of India. Then there are the Oreitai, an autonomous people; and a voyage along their seacoast is 1,800 stadia, and along the next, the Ichthyophagi, is 7,400 stadia, and that along the territory of the Carmanians as far as Persis is 3,700 stadia') (Strabo 15.2.1, Erat., fr. 77).

Nearchus, during his voyage, recorded distance estimates between several ports and stopping places. There are some other passages in Strabo and Arrian which also cite distance measurements made by Nearchus along the same stretch of coastline.⁴³ Nearchus probably recorded these distances in terms of the number of days sailed; Eratosthenes may have then transformed them into stadia measurements. It is evident from all this that Eratosthenes' mapping of Ariana was heavily reliant on the various itineraries and reports that emerged out of the campaigns of Alexander the Great.

By the time of Eratosthenes, the country of India had long been the subject of immense curiosity in Greek geography and cartography. Eratosthenes said a great deal about the geography of India, but for the purposes of this study we will deal specifically with the material pertaining to India's function as the first sealstone of Eratosthenes' map. First, it should be noted that India was the archetype for the concept of σφραγιδες. Of all the σφραγιδες, it was the most easily defined. India had long been an established feature of the Greek world map. Under the Achaemenid dynasty in Asia, it became the easternmost province of the Persian Empire, and the Greeks came to know it as the

⁴³ See esp. Strabo 16.3.2-7; Arr. *Ind.* 27.1-7, 29.1-8, 37.1-10, 38.1-9, 39.1-9, 40.1-2, 41.1-8, 42.1-4.

easternmost country of the world.⁴⁴ In terms of the shape and geometry, Eratosthenes considered India to be a quadrilateral, with each of the four sides clearly delineated by natural boundaries which formed theoretically straight lines. More specifically, he postulated that India was shaped like a ‘rhomboid’ (ῥομβοειδὲς), a quadrilateral in which the adjacent sides are unequal in length and the angles are oblique.⁴⁵ Strabo cites Eratosthenes on India’s rhomboidal shape, emphasising that the country is projected to the southeast on account of the southern and eastern sides exceeding the length of their adjacent sides by 3,000 stadia (Strabo 15.1.11, Erat., fr. 69).⁴⁶

The distorted south-eastern projection of Cape Comorin, the southernmost point of the subcontinent, remains an unexplained anomaly of Eratosthenes’ India.⁴⁷ Nonetheless, Eratosthenes appears to have ascertained the general quadrilateral shape and outline of his first sealstone from the *Indica* of Megasthenes. Diodorus Siculus, in the second book of his universal history, provides an account of India’s geography, which closely resembles that of Eratosthenes above and is usually attributed to Megasthenes. In this account, India is described as τετράπλευρος οὖσα τῷ σχήματι (‘four-sided in shape’), with the Emodus Mountain Range forming the northern

⁴⁴ It is worth noting that although the Greeks considered India to be a clearly delineated country, there seems to have been some confusion as to its western boundary. Brunt 1983: 449 and Bosworth 1995: 230 argue that for Megasthenes and Eratosthenes the Indus was the western boundary of India; however, the Alexander vulgate tradition may have believed that India began at the borders of the Paropamisadae, incorporating the peoples of the Cophen valley: see Strabo 15.1.26; Curt. 8.9.1. Furthermore, Tarn 1948, vol. 2: 278 notes that in Diodorus Siculus’ ‘Gazeteer of Asia’, derived ultimately from Hieronymus and Alexander’s bematists, India extended to the west of the river Indus: see Diod. 18.6.1-2. Tarn 1923: 94, n. 8 asserts that the list of satrapies compiled in the ‘Gazeteer of Asia’ had little influence on Eratosthenes’ system of σφραγίδες.

⁴⁵ The earliest known explanation of the term ῥομβοειδὲς can be found in Euc. 1, definition 22: ῥομβοειδὲς δὲ τὸ τὰς ἀπεναντίον πλευράς τε καὶ γωνίας ἴσας ἀλλήλαις ἔχον, ὃ οὔτε ἰσόπλευρόν ἐστιν οὔτε ὀρθογώνιον.

⁴⁶ Cf. Strabo 2.1.22, Erat., fr. 66 on India’s rhomboidal shape and south-eastern projection.

⁴⁷ See esp. Dicks 1960: 129; Bosworth 1995: 246; Karttunen 1997: 103. Bosworth argues that Eratosthenes knew of, if only very vaguely, the existence of Cape Comorin at the extreme south of India, but conceived of it as on the same latitude as the Indus Delta, which is in reality much farther to the north.

boundary, the river Indus defining the western boundary and the Ocean surrounding the eastern and southern sides (Diod. 2.35.1).⁴⁸ Additionally, there is some indication from Arrian that Megasthenes provided Eratosthenes with information relating to India's size relative to the rest of Asia. Arrian asserts that the southern part of Asia, below the Taurus Mountains, is divided into four σφραγίδες and that μεγίστην μὲν μοῖραν τὴν Ἰνδῶν γῆν ποιεῖ Ἐρατοσθένης τε καὶ Μεγασθένης ('both Eratosthenes and Megasthenes make the land of the Indians the largest portion') (Arr. *Anab.* 5.6.2, Erat., fr. 71).⁴⁹ This passage is slightly difficult, in that it can be interpreted to mean that Megasthenes was the first to subdivide southern Asia into σφραγίδες. It is much more likely, however, that Arrian here blended and generalised the accounts of Eratosthenes and Megasthenes, and that Megasthenes' influence on the mapping of India pertained primarily to the region's quadrilateral shape and immense size, rather than its place in a system of σφραγίδες.

Prior to the creation of Eratosthenes' world map there were many popular theories about India's immense size. Both Strabo and Arrian provide passages which outline Eratosthenes' calculations of the shape, size and dimensions of India, before listing the opinions on India's size of several earlier writers. These lists are almost identical in nature, which suggests that Eratosthenes is the ultimate source and that he juxtaposed the earlier theories against his depiction of India as the largest sealstone of southern Asia.⁵⁰ According to Strabo's version, Ctesias believed that India was equal in

⁴⁸ That Diodorus' geography of India was derived from Megasthenes can be determined from the statements at Diod. 2.35.2 that in southern India the Bears are not visible and the shadows fall to the south. Strabo 2.1.19-20 specifically attributes these statements to Megasthenes. Roller 2010: 176 argues that 'Eratosthenes' summary of the shape of India is almost entirely from Megasthenes.' Also, see Brown 1957: 16-17; Roller (2008) *BNJ* s.v. Megasthenes (715).

⁴⁹ For some good commentaries on this passage, see Roller (2008) *BNJ* s.v. Megasthenes (715); Roller 2010: 177-8.

⁵⁰ It is unlikely that Arrian read Strabo's *Geography*, so there must be a common source for these lists, namely Eratosthenes.

size to the rest of Asia; Onesicritus that it comprised a third of the inhabited world; Nearchus that the journey across the Indian plain took four months; Megasthenes that its north-to-south extent from the mountains to the sea was 20,000 stadia; and Deimachus that the breadth of the country was over 30,000 stadia in some places (Strabo 15.1.12).⁵¹ Each of the writers mentioned here emphasised India's vast extent; nevertheless, it is apparent that Eratosthenes deemed their estimates to be inaccurate and imprecise. Eratosthenes' own conception of the size and dimensions of India is best described by Strabo:

τῆς μὲν οὖν ἑσπερίου πλευρᾶς ἀπὸ τῶν Καυκασίων ὄρων ἐπὶ τὴν νότιον θάλατταν στάδιοι μάλιστα λέγονται μύριοι τρισχίλιοι παρὰ τὸν Ἴνδον ποταμὸν μέχρι τῶν ἐκβολῶν αὐτοῦ· ὥστ' ἀπεναντίον ἢ ἑωθινὴ προσλαβοῦσα τοὺς τῆς ἄκρας τρισχιλίους ἔσται μυρίων καὶ ἑξακισχιλίων σταδίων. τοῦτο μὲν οὖν πλάτος τῆς χώρας τό τ' ἐλάχιστον καὶ τὸ μέγιστον. μῆκος δὲ τὸ ἀπὸ τῆς ἑσπέρας ἐπὶ τὴν ἕω· τούτου δὲ τὸ μὲν μέχρι Παλιβόθρων ἔχει τις ἂν βεβαιότερος εἰπεῖν, καταμεμέτρηται γὰρ σχοινίοις, καὶ ἔστιν ὁδὸς βασιλικὴ σταδίων μυρίων· τὰ δ' ἐπέκεινα στοχασμῶ λαμβάνεται διὰ τῶν ἀνάπλων τῶν ἐκ θαλάττης διὰ τοῦ Γάγγου ποταμοῦ μέχρι Παλιβόθρων· εἴη δ' ἂν τι σταδίων ἑξακισχιλίων. ἔσται δὲ τὸ πᾶν, ἢ βραχύτατον, μυρίων ἑξακισχιλίων, ὡς ἐκ τε τῆς ἀναγραφῆς τῶν σταθμῶν τῆς πεπιστευμένης μάλιστα λαβεῖν Ἐρατοσθένης φησί· καὶ ὁ Μεγασθένης οὕτω συναποφαίνεται, Πατροκλῆς δὲ χιλίοις ἔλαττον φησί. τούτῳ δὲ πάλιν τῷ διαστήματι προστεθὲν τὸ τῆς ἄκρας διάστημα τὸ προπίπτον ἐπὶ πλέον πρὸς τὰς ἀνατολάς, οἱ τρισχίλιοι στάδιοι ποιήσουσι τὸ μέγιστον μῆκος· ἔστι

⁵¹ Note that Roller (2010) does not include this passage or Arr. *Ind.* 3.6-8 in his fragments of Eratosthenes' *Geography*. Arr. *Ind.* 3.6-8 provides the same information regarding Ctesias, Onesicritus and Nearchus. However, Megasthenes is cited as estimating the east-to-west extent of India at 16,000 stadia and the north-to-south extent at 22,300 stadia. There is no reference to Deimachus.

δὲ τοῦτο τὸ ἀπὸ τῶν ἐκβολῶν τοῦ Ἰνδοῦ ποταμοῦ παρὰ τὴν ἐξῆς ἡίονα, μέχρι τῆς λεχθείσης ἄκρας καὶ τῶν ἀνατολικῶν αὐτῆς τερμόνων (‘Now the western side from the Caucasus Mountains to the Southern Sea is said to be about 13,000 stadia, along the Indus River to its outlets; just as the opposite side, the eastern, adding the 3,000 of the promontory, will be 16,000 stadia. These then are the least and greatest breadths of the country. The length is from west to east; and one may speak with more certainty about it as far as Palibothra, for it has been measured with lines, and there is a Royal Road of 10,000 stadia. The regions beyond are perceived only by a guess, on account of the voyages from the sea on the Ganges River as far as Palibothra; and this would be something like 6,000 stadia. The entire length, at its minimum, will be 16,000 stadia, which Eratosthenes says he took from the most believable *Record of Stages*; and Megasthenes points out this as well, but Patrocles says 1,000 stadia less. The fact that the promontory stretches out farther to the east again adds to this distance, the extra 3,000 stadia make the greatest length. This is the distance from the outlets of the Indus River along the shore that comes in succession, as far as the aforesaid promontory and the eastern limits’) (Strabo 15.1.11, Erat., fr. 69).⁵²

Eratosthenes considered India’s western boundary along the river Indus to be the shortest of its four sides. India’s northern boundary was measured along the course of the Taurus Mountains and the river Ganges as far as the Eastern Ocean. Strabo states that Eratosthenes obtained from a road itinerary a figure of 16,000 stadia for this side, that Megasthenes recorded the same figure and that Patrocles estimated the distance to be 15,000 stadia. It is also mentioned that the Royal Road from the Indus to Palibothra on the Ganges had a length of 10,000 stadia and that the distance from Palibothra to the

⁵² Cf. Arr. *Ind.* 3.1-5, Erat., fr. 72, which provides a very similar account of Eratosthenes’ India. For a

mouth of the Ganges was a matter of guesswork. We know that Megasthenes traversed the Royal Road to Palibothra, travelling farther into India than any Greek before him (Arr. *Anab.* 5.6.2). Some scholars argue that the agreement between Megasthenes and the *Record of Stages* used by Eratosthenes indicates that the author of the itinerary was involved in or at least had knowledge of Megasthenes' journey.⁵³

It is likely that the *Record of Stages* is the same as the Seleucid itinerary which Pliny the Elder quotes for distance measurements between the river Hyphasis and the mouth of the river Ganges (Plin. *HN.* 6.63-4).⁵⁴ This itinerary probably also measured distances between the river Indus and the river Hyphasis along the Royal Road, a route which had been earlier surveyed by Alexander the Great's bematists, Diognetus and Baeton (Strabo 11.8.9, Erat., fr. 108; Plin. *HN.* 6.61-2). We do not know of any Greek who journeyed beyond Palibothra at this time, so it may be that Megasthenes and whoever compiled the *Record of Stages* ascertained the distance measurements between Palibothra and the Ganges mouth from local merchants and sailors. How Eratosthenes arrived at the estimates of 16,000 stadia for the length of India's eastern coastline and 19,000 stadia for the length of its southern coastline is unknown. Presumably, he obtained them from the likes of Megasthenes and Deimachus, who, although they did not traverse anywhere near the full extent of these coastlines, could have again acquired some distance measurements from local informants.

Eratosthenes recorded one final dimension which was crucial to his depiction of India within the system of σφραγίδες. He adopted Patrocles' theory that the minimum distance from the southern capes of India to its northern boundary, the Taurus Mountains, was 15,000 stadia (Strabo 2.1.2, Erat., fr. 47). Patrocles' theory contradicted

rough approximation of the outline of Eratosthenes' India, see fig. 4.2.

⁵³ See esp. Dicks 1960: 124; Brunt 1983: 455. It has also been postulated that Alexander's bematist Baeton may have been in India at a later date and recorded the measurements: see Roller (2008) *BNJ* s.v. Megasthenes (715); Roller 2010: 177-8.

⁵⁴ Williams (2010) *BNJ* s.v. Patrokles (712).

Megasthenes' and Deimachus' larger estimates of 20,000 and 30,000 stadia respectively for India's north-to-south extent (Strabo 2.1.4, 15.1.12). As discussed in the previous chapter, earlier Greek world maps had depicted India's northern boundary, the Taurus Mountain chain, as curving considerably to the north after the Paropamisus Mountains. Eratosthenes, however, proposed that the Taurus Mountain chain ran along the main parallel of the world map, parallel to the equator (Strabo 2.1.1, Erat., fr. 47). This meant, in Eratosthenes' opinion, that the whole of the Indian subcontinent was located farther to the south than previously imagined.

As a matter of fact, he believed that the southern capes of India were on the same parallel of latitude as Meroë in modern-day Sudan, comparing celestial phenomena observed at Meroë by the Ptolemaic explorer Philo with observations made by Nearchus and Megasthenes in India. At Meroë, Philo used a gnomon to determine that the sun was at its zenith forty-five days prior to the summer solstice, giving an indication that it was located farther south than the summer tropic (Strabo 2.1.20). In India, both Nearchus and Megasthenes stated that the Bears (Ursa Major and Ursa Minor) set over India, an assertion probably based on local authority (Strabo 2.1.19-20, Erat., fr. 67, 68; Plin. *HN*. 6.98). Roller argues that Nearchus and Megasthenes were correct in their assertions about the Bears, which begin to disappear at the Tropic of Cancer and disappear completely around Cape Comorin.⁵⁵ In Eratosthenes' opinion, the latitudinal correspondence of Meroë and southern India, both situated south of the summer tropic, could be confirmed by Patrocles' estimate for India's north-to-south extent. He argued that the 15,000 stadia from India's southern capes to the Taurus Mountains was the same distance as from Meroë to Athens, which was located at the same latitude as the Taurus Mountains, along the main parallel of the map (Strabo 2.1.2,

⁵⁵ Roller 2010: 175.

2.1.19-20, Erat., fr. 47, 67, 68).⁵⁶ Thus, Eratosthenes plotted the sealstone of India in relation to his system of parallels, bounded by the main parallel in the north and by the parallel through Meroë in the south.

This chapter has discussed Eratosthenes' depiction of continents, ἄκραι ('promontories') and σφραγίδες ('sealstones'). It has shown that Eratosthenes' map of the world was original and innovative, displaying systems of regional division that superseded the role of continents. However, neither the concept of ἄκραι nor that of σφραγίδες gained any real mainstream support after the time of Eratosthenes. The next chapter will focus on a more minute but still very important feature of Eratosthenes' map. It will start by examining Eratosthenes' notion of a circumambient Ocean surrounding the οἰκουμένη, before critically analysing his approach to the problem of the Caspian Sea.

⁵⁶ Roller 2010: 176 notes that Meroë is in actual fact over 8° north of Cape Comorin, the southern tip of the subcontinent.

5. ERATOSTHENES' CONCEPTION OF OCEAN AND THE CASPIAN SEA

The limits of the οίκουμένη were of permanent interest to Greek mapmakers. At the edges of the map empirical knowledge gave way to speculation, rumour and even folklore. Romm sums up this feature of Greek geography:

‘We who have seen the whole earth, either as represented on maps and globes or as reproduced in satellite photographs, find it difficult to adopt the perspective of those who have not...For such peoples, mind must take the place of maps in giving shape and structure to the inhabited earth; where empirical data gave out they employ any other means available—theory, myth, and fantasy—to define and depict the space in which they dwell.’¹

In Archaic and Classical Greek geography, a range of strange peoples and mythological landscapes were located in the remotest regions of the οίκουμένη. North of Scythia were the Arimaspians, Griffins and Hyperboreans; in the western Mediterranean and the Atlantic Ocean were the Cyclopes, Laestrygonians, Gorgons, Hesperides and Isles of the Blessed; in the south of Libya were the Macrobian Ethiopians; and to the east in India were the gold-digging ants and dog-headed men, among many others.²

¹ Romm 1992: 9. This way of perceiving space contrasts with that of some ancient Pacific Island peoples. Lusby, Hannah and Knight 2005: 11-17 have suggested that the notion of one travelling from A to B was at odds with Polynesian and Micronesian *etak* principles, where the destination island came toward the navigator as the home island departed astern. The navigator was at all times the stationary centre of his or her world both on the sea and in the related heavens. The authors argue that such reasoning was not conducive to mapping theory.

² The poet Aristeas popularised the notion of the Arimaspians, Griffins and Hyperboreans inhabiting the far north of Europe: see Hdt. 4.13.1. The poets Homer and Hesiod both mentioned mythical borderlands, especially in the western Mediterranean and Atlantic Ocean: see Hom. *Od.* 4.564-8; Hes. *Op.* 170-5; Hes. *Theog.* 215-17, 274-5, 287-94, 334-5; Strabo 1.2.11-14. Herodotus described the Macrobian Ethiopians in southern Libya as the ἄνδρας μεγίστους καὶ καλλίστους καὶ μακροβιωτάτους (‘tallest, most handsome and longest-lived men’): see Hdt. 3.114.1. On the gold-digging ants, see Hdt. 3.104-5. The dog-headed men, located in either India or Libya, were referred to by various authors, including Herodotus, Ctesias and

In the early Hellenistic period, Greek exploration extended empirical knowledge into some of the very remote regions of the οἰκουμένη. As a corollary, in Eratosthenes' *Geography*, the presence of the mythological was considerably less than in the works of his predecessors. Eratosthenes challenged the supposed topographic reality of the geography found in the works of Archaic poets, especially Homer. He argued that the sites visited by Odysseus in the *Odyssey* were for the most part misrepresented as corresponding to actual locations in the western Mediterranean and the Atlantic Ocean (Strabo 1.2.11-15, Erat., fr. 6). At the same time, he seems to have understood that geographical fantasies would always exist on the borders of Greek geographic knowledge (Strabo 1.2.18-19, Erat., fr. 7).³

5.1. THE CIRCUMAMBIENT OCEAN

The most enduring topographic feature to be situated at the limits of the οἰκουμένη was the circumambient Ocean. This concept of Ocean first found expression in Homer's *Iliad*. Homer described a mythological river Ὠκεανός (*Oceanus*), flowing around the edges of a circular οἰκουμένη, acting as the font of all terrestrial rivers (Hom. *Il.* 18.606-7). Greek mapmakers adopted and developed the Ὠκεανός concept. Anaximander and Hecataeus constructed maps of the world, which portrayed the οἰκουμένη as framed by an all-encompassing Outer Sea, set in spatial opposition to the inner Mediterranean Sea (Agath. 1.1). Nearly all Greek geographers and mapmakers followed this line of thought. Notably, toward the end of the Classical period, Aristotle argued for the existence of a continuous Outer Ocean. He believed that the eastern part

Megasthenes: see Hdt. 4.191.3; Plin. *HN.* 7.23; Phot. *Bibl.* 72; Ael. *NA.* 4.46. For scholarship on these mythical border peoples, see esp. Romm 1992: 67-103; Berns 2002: 105; Roller 2006: 44-7.

³ Roller 2010: 116 describes Eratosthenes' perspective on the topography of Odysseus' wanderings: 'But there was much that was invented about myth, and Eratosthenes believed that this, for the most part, was the case with the wanderings, because any attempt at topographical deconstruction would become mired in contradiction.'

of the Ocean, that part most distant from Greece, was in close proximity to the Hindu Kush Mountains and was continuous with the Atlantic Ocean, separating India from the west coasts of Europe and Libya (Arist. *Mete.* 362 b18-30).

This theory, although erroneous, appears to have stimulated Alexander the Great's zealous interest in the Outer Ocean, encouraging him to seek the water's edge east of India. When his army mutinied at the river Hyphasis he then turned his attention to the Erythraean Sea south of India. There is some indication that Alexander initially believed the river Indus to be synonymous with the upper Nile, with India and Libya connected by a land bridge, making the Erythraean Sea an enclosed lake (Strabo 15.1.25; Arr. *Anab.* 5.26.1-2, 6.1.12). However, Nearchus' voyage down the Indus and into the Ocean proved that the Nile and Indus were not connected, and suggested that the Erythraean Sea was contiguous with the Outer Ocean (see fig. 4.1).⁴

One of the few Greeks to disagree with the circumambient Ocean model was Herodotus. Herodotus, in the *Histories*, criticises earlier mapmakers for drawing a circular οἰκουμένη comprised of two continents, Europe and Asia, and surrounded by Ocean (Hdt. 4.36.2). This jibe challenged the geometric symmetry displayed by early Greek maps, especially the idea that the Ocean formed the boundary of the whole οἰκουμένη. Herodotus cites evidence from several known voyages of exploration, which

⁴ This topographic problem has received a good deal of scholarly attention. For modern discussions, see Cary and Warmington 1929: 62, 147; Heidel 1937: 27-8; Brunt 1976: 525; Sedlar 1980: 55; Geus 2003: 236. Geus traces the idea that the Erythraean Sea was an enclosed lake back possibly as far as the fifth century BC, while Heidel suggests that the idea may have originated with maps of the world predating Hecataeus. These are speculations based on Aeschylus' description of Io's wanderings in *Prometheus Bound*, in which there is mention of a river in the east connected to the Nile: see Aesch. *PV.* 1214-26. Berger 1880: vi argues that the explorations of Alexander and his Successors, especially those along the coast of South Asia and in the Caspian Sea, influenced and stimulated interest in the doctrine of the circumambient *Oceanus* ('Die Alexanders des Grossen und die fortwährenden Entdeckungen, welche der Verkehr unter dessen Nachfolgern vermittelte, boten ein reiches, einen gewissen Zustand geographischer Erregung herbeiführendes Material, insbesondere neue Anhaltspunkte für die Lehre vom Okeanos durch Erforschung der Küsten Südasiens und des kaspischen Meeres').

proved that the Erythraean Sea south of Asia and Libya was contiguous with the Atlantic Ocean west of Africa and Europe (Hdt. 1.203.1, 4.42 – 4.44).⁵ However, he argued that no Greek had travelled to the northern and eastern edges of the οἰκουμένη, meaning that there was no empirical evidence for the presence of Ocean in these parts (Hdt. 4.45.1).

Eratosthenes, when discussing the concept of a circumfluent Outer Ocean, found a midway point between theoretical speculation and Herodotus' argument in favour of empirical geographic knowledge. In the fragments of the *Geography*, it is asserted that enough of the world has been sailed around for it to be inferred reasonably that Ocean washes the οἰκουμένη on all sides:

ὅτι δὲ ἡ οἰκουμένη νῆσος ἐστὶ, πρῶτον μὲν ἐκ τῆς αἰσθήσεως καὶ τῆς πείρας ληπτέον. πανταχῇ γάρ, ὅπουποτοῦν ἐφικτὸν γέγονεν ἀνθρώποις ἐπὶ τὰ ἔσχατα τῆς γῆς προελθεῖν, εὐρίσκεται θάλαττα, ἣν δὴ καλοῦμεν ὠκεανόν. καὶ ὅπου δὲ τῆ αἰσθήσει λαβεῖν οὐχ ὑπῆρξεν, ὁ λόγος δείκνυσι. τὸ μὲν γάρ ἐωθινὸν πλευρόν, τὸ κατὰ τοὺς Ἰνδούς, καὶ τὸ ἐσπέριον, τὸ κατὰ τοὺς Ἰβηρας καὶ τοὺς Μαυρουσίους, περιπλεῖται πᾶν ἐπὶ πολὺ τοῦ τε νοτίου μέρους καὶ τοῦ βορείου· τὸ δὲ λειπόμενον ἄπλουν ἡμῖν μέχρι νῦν τῷ μὴ συμμῖξαι μηδένας ἀλλήλοις τῶν ἀντιπεριπλεόντων οὐ πολὺ, εἴ τις συντίθησιν ἐκ τῶν παραλλήλωνδιαστημάτων τῶν ἐφικτῶν ἡμῖν ('That the inhabited world is an island, we may perceive first from our senses and from experience. For in every direction travelled, wherever it has been possible for men to advance to the ends of the earth, sea has been found, which indeed we call *Oceanus*. And wherever we have not been able to perceive it

⁵ Herodotus mentioned the circumnavigation of Libya by the joint Egyptian-Phoenician expedition commissioned under King Necho and also the attempted circumnavigation by the Persian Sataspes, who travelled down the coast of West Africa perhaps as far as Guinea, before turning back: see Hdt. 4.42.2-4, 4.43.1-7.

via our senses, reason has proved it. With respect to the eastern side [of the inhabited world], opposite the Indians, and the western side, opposite the Iberians and Maurusians, it is possible to sail all the way around them and for a considerable way around both the southern and northern parts [of the inhabited world]; and the remaining part unnavigable for us up until now, where those sailing around in opposite directions have never encountered one another, is not large, if we observe from the parallel distances traversed by us') (Strabo 1.1.8, Erat., fr. 39).⁶

While Herodotus could claim empirical evidence for Ocean bordering only the west and south of the οἰκουμένη, Eratosthenes had a far greater body of knowledge at his disposal. With regard to the Atlantic Ocean, Eratosthenes emphasised its enormity by referring to navigators who were forced to return home on account of their loneliness (ἐρημίᾳ) and the difficulties (ἀπορίαι) encountered on the open seas (Strabo 1.1.8, Erat., fr. 39).⁷ Knowledge of the Erythraean Sea south of Asia was first provided by Scylax of Caryanda's voyage from India west to the Arabian Gulf, cited by both Hecataeus and Herodotus (Hdt. 4.44.1-3). With access to the reports of Nearchus, Onesicritus and Androstenes, Eratosthenes acquired new, up-to-date information which expanded upon Scylax's report and suggested that the Erythraean Sea was an infinite expanse of water. The belief that the Erythraean Sea continued round past the eastern capes of India had little empirical basis prior to early Hellenistic exploration. However, for Eratosthenes, with knowledge of Seleucid explorations extending as far as the mouth of the river Ganges in eastern India, the concept of an Eastern Ocean had a much firmer

⁶ Cf. Strabo 1.1.13, 2.5.5.

⁷ Roller 2010: 156-7 suggests that Eratosthenes' description of the Atlantic especially recalled the voyage of the Persian Sataspes, who, in the early fifth century BC, attempted to circumnavigate Libya, but had to turn back somewhere west of the continent because the winds and currents prevented him from sailing farther south. Herodotus also documented Sataspes' voyage: see Hdt. 4.43.1-7.

foundation.⁸ Finally, Pytheas' voyage in the Ocean north of Europe as far as Thule would have provided a strong indication for Eratosthenes that Ocean surrounded the northern portions of the οἰκουμένη.

At first glance, the shape and course of Eratosthenes' Outer Ocean appears self-explanatory, that is, it wrapped around the outer edges of the 'chlamys-shaped' οἰκουμένη. Nonetheless, normally in Greek geography, the οἰκουμένη was perceived as being indented by several gulfs connected with the Outer Ocean. Strabo provides the most thorough summary of this conception:

λέγομεν δ' ἀναλαμβάνοντες ἀπὸ τῆς πρώτης ὑποτυπώσεως, ὅτι ἡ καθ' ἡμᾶς οἰκουμένη γῆ περίρρυτος οὕσα δέχεται κόλπους εἰς ἑαυτὴν ἀπὸ τῆς ἔξω θαλάττης κατὰ τὸν ὠκεανὸν πολλοὺς, μεγίστους δὲ τέτταρας· ὧν ὁ μὲν βόρειος Κασπία καλεῖται θάλαττα, οἱ δ' Ὑρκανίαν προσαγορεύουσιν· ὁ δὲ Περσικὸς καὶ Ἀράβιος ἀπὸ τῆς νοτίας ἀναχέονται θαλάττης, ὁ μὲν τῆς Κασπίας κατ' ἀντικρὺ μάλιστα, ὁ δὲ τῆς Ποντικῆς· τὸν δὲ τέταρτον, ὅσπερ πολὺ τούτους ὑπερβέβληται κατὰ τὸ μέγεθος, ἡ ἐντὸς καὶ καθ' ἡμᾶς λεγομένη θάλαττα ἀπεργάζεται ('Taking up from the first outline we say that our inhabited world, being surrounded by sea, receives into itself many gulfs from the Outer Sea among the Ocean, and four are very large; of these four gulfs the northern one is called the Caspian Sea, but some call it the Hyrcanian; the Persian Gulf and the Arabian Gulf flow from the Southern Sea, the Persian Gulf is mostly opposite the Caspian, and the other is opposite the Pontus; and the fourth, which far surpasses these other ones in size, is composed of that which is called the Inner Sea even according to us') (Strabo 2.5.18) (see fig. 5.1).

⁸ Plin. *HN*. 6.63-4 describes distance measurements as far as the mouth of the Ganges, derived from an anonymous Seleucid source. It may be that a source close to Megasthenes acquired and recorded local information on the distance along the Ganges to the river mouth.

It is often believed that Eratosthenes conceived of the Outer Ocean in very similar terms to this description in Strabo.⁹ Long before the time of Eratosthenes, voyages of exploration had established as fact that the Mediterranean Sea and Arabian Gulf were connected to the Outer Ocean.¹⁰ Eratosthenes derived knowledge of the Persian Gulf and its connection to the Erythraean Sea primarily from Androsthene of Thasos' report (Strabo 16.3.2-6, Erat., fr. 94).¹¹ His views on the Caspian Sea, however, appear to be a little more complicated.

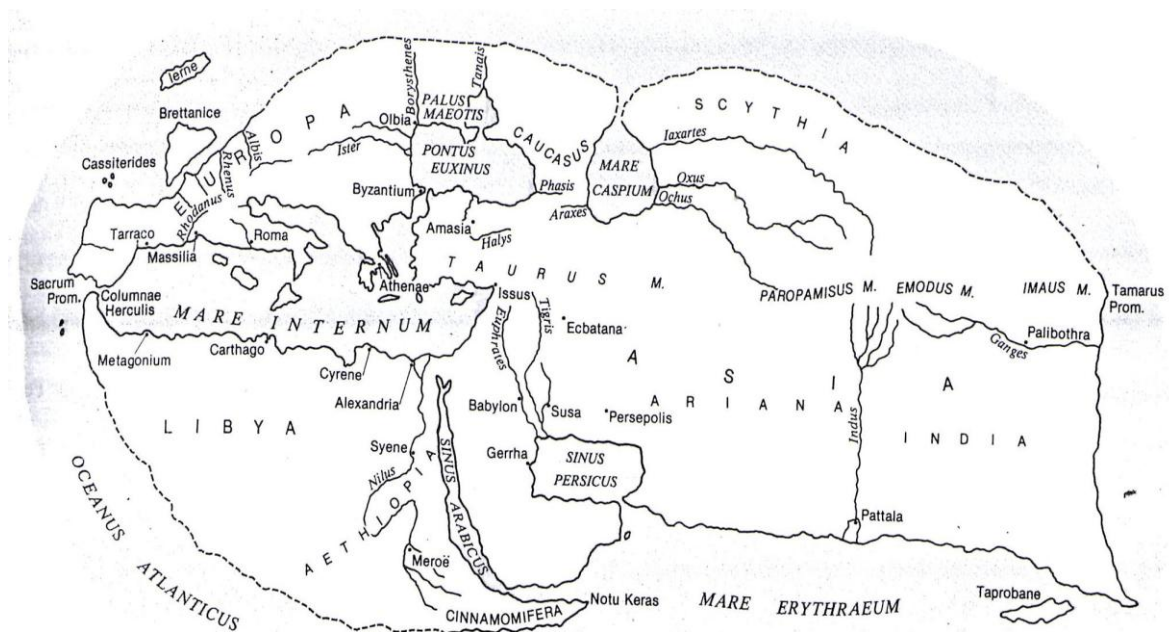


Fig. 5.1: The world according to Strabo. The four gulfs of the οἰκουμένη (the Mediterranean Sea, the Arabian Gulf, the Persian Gulf and the Caspian Sea) are clearly delineated.

⁹ Bosworth 1995: 348; Roller 2010: 146, 156-7.

¹⁰ Colaeus of Samos' voyage through the Pillars of Heracles to the region of Tartessus in western Iberia demonstrated that the Mediterranean Sea was a gulf of the Ocean (Hdt. 4.152.1-4). Moreover, the expedition which Necho commissioned to circumnavigate Libya and the voyage of Scylax along the southern coastlines of Asia and Arabia proved that the Arabian Gulf was a gulf of the Ocean: see Hdt. 4.42.2-4, 4.44.1-3.

¹¹ Androsthene's account provided Eratosthenes with distance estimates along the coast of the gulf and topographic data about coastal cities and islands in the gulf. For a good commentary on Eratosthenes' knowledge of the Persian Gulf, see Roller 2010: 193-5.

5.2. THE PROBLEM OF THE CASPIAN SEA

Whether or not the Caspian Sea was a gulf of the Outer Ocean or an inland lake is a question which had troubled Greek geographers from the time of Hecataeus. It is a dictum of the scholarship on Greek geography that Eratosthenes and all after him, until Claudius Ptolemy, mapped the Caspian as a gulf of the Outer Ocean.¹² Scholars argue that Eratosthenes based his mapping of the Caspian on information provided by Patrocles.¹³ What meagre fragments we have from Patrocles' report show that he undertook a voyage on the Caspian, estimated its size and clearly described it as a gulf. He is cited as stating that it was possible to sail on the Ocean from India to Hyrcania via the Caspian (Strabo 2.1.17, 11.11.6).¹⁴ That Eratosthenes followed Patrocles' line of thought is usually inferred from a single passage in Strabo's *Geography*:

ἔστι δ' ὁ κόλπος ἀνέχων ἐκ τοῦ ὠκεανοῦ πρὸς μεσημβρίαν κατ' ἀρχὰς μὲν ἱκανῶς στενός, ἐνδοτέρω δὲ πλατύνεται προϊών, καὶ μάλιστα κατὰ τὸν μυχὸν ἐπὶ σταδίουσιν πού καὶ πεντακισχιλίους· ὁ δ' εἴσπλους μέχρι τοῦ μυχοῦ μικρῶ πλείονων ἂν εἴη συνάπτων πως ἤδη τῇ ἀοικήτῳ. φησὶ δ' Ἐρατοσθένης τὸν ὑπὸ τῶν Ἑλλήνων γνωριζόμενον περίπλου τῆς θαλάττης ταύτης τὸν μὲν παρὰ τοὺς Ἀλβανοὺς καὶ τοὺς Καδουσίους εἶναι πεντακισχιλίους καὶ τετρακοσίους, τὸν δὲ παρὰ τὴν Ἀναριακῶν καὶ Μάρδων

¹² Ptol. *Geog.* 7.5.4 describes the Caspian Sea as surrounded by land. After Ptolemy, the theory that the Caspian Sea was a gulf reappeared and became the standard doctrine until approximately the fourteenth century AD.

¹³ On the Caspian Sea in Greek geography, specifically the theory that Eratosthenes viewed it as a gulf of the Northern Ocean on the authority of Patrocles, see Bunbury 1879, vol. 1: 401-2, 459, 573-4, 644; Berger 1880: vii, 96-7; Tarn 1901: 10-29; Tarn 1948, vol. 2: 5-19; Thomson 1948: 127; Pearson 1951: 80-5; Tarn 1951: 488-93; Pearson 1960: 14-15, 165; Tozer 1964: 136; Hamilton 1969: 116-17; Hamilton 1971: 106-11; Brunt 1976: 522-3; Goukowsky 1978: 114-15; Bosworth 1980: 373-9; Gardiner-Garden 1987: 13-17, 40-6; Bosworth 1995: 240-1; Rackza 2000: 191-5; Geus 2000: 91-2; Geus 2002: 282; Roller 2006: 59-60; Roller 2010: 140, 203-7; Williams (2010) *BNJ* s.v. Patrokles (712).

¹⁴ Plin. *HN.* 6.58 states mistakenly that Patrocles sailed from India to Hyrcania via the Caspian. In fact, what Patrocles actually reported went along these lines: The Caspian is a gulf of the Outer Ocean. Therefore, it must be possible to sail from India to Hyrcania by way of the Caspian: see Berger 1880: 96.

καὶ Ὑρκανῶν μέχρι τοῦ στόματος τοῦ Ὠξοῦ ποταμοῦ τετρακισχιλίων καὶ ὀκτακοσίων· ἔνθεν δ' ἐπὶ τοῦ Ἰαζάρτου δισχιλίων τετρακοσίων ('The Caspian Sea is the gulf projecting from the Ocean toward the south, considerably narrow at its entrance, but it widens as it proceeds inland, and especially at its inmost recess where the width is up to 5,000 stadia; and the voyage may be a little more from the entrance as far as the inmost recess, as it already somehow borders on the uninhabited world. Eratosthenes says that the circuit of this sea is known by the Greeks, the section beside the Albanians and Cadusians is 5,400 stadia, and the section beside the Anariacians, Mardians and Hyrcanians as far as the mouth of the river Oxus is 4,800 stadia, and from there to the Jaxartes is 2,400 stadia') (Strabo 11.6.1, Erat., fr. 110).¹⁵

In other extracts from Strabo, Patrocles is quoted as documenting similar distance estimates to those recorded here by Eratosthenes. He apparently considered the part of the western coastline inhabited by the Cadusians to be 5,000 stadia in length and the distance by sea from the mouth of the Caspian to the inmost recess to be 6,000 stadia (Strabo 11.7.1, 2.1.17). Also, Patrocles described the Caspian as nearly equal in size to the Black Sea, which Eratosthenes believed to be approximately 23,000 stadia in circumference (Strabo 11.7.1; Amm. Marc. 22.8.10, Erat., fr. 114).¹⁶ It is generally

¹⁵ Cf. Plin. *HN*. 6.36. According to Pliny the Elder, Eratosthenes estimated the Cadusian and Albanian (western) coastline of the Caspian to be 9,000 stadia in length; from there to the mouth of the Zonus River 4,900 stadia; and from there to the mouth of the Jaxartes 2,400 stadia. Roller 2010: 206 suggests that Pliny's text is in error, almost doubling Eratosthenes' measurement for the Caspian's western coastline and replacing the Oxus River with the unknown Zonus River. The Oxus and Jaxartes were believed to empty into the southeast corner of the Caspian: see Strabo 11.7.3, Erat., fr. 109.

¹⁶ Roller 2010: 207 argues that 'There are several extant distances for the circuit of the Black Sea, all between 20,000 and 25,000 stadia, but this is the only citation that mentions Eratosthenes.' Note that the Persian Gulf was also compared to the Black Sea in terms of size. Greek geographers, thus, appear to have seen the Black Sea as a yardstick for measuring the size of other known bodies of water. Williams

assumed that the distance measurements reported by Eratosthenes were based largely on these and other estimates recorded by Patrocles.¹⁷ Though this may be the case, it does not prove that Eratosthenes subscribed to Patrocles' belief that the Caspian was a gulf of the Outer Ocean.

It should be noted that Strabo cites Eratosthenes only in connection with the dimensions of the Caspian, not its exact shape and form.¹⁸ The distance estimates which he reports only refer to the length of the southern coastline, some of the eastern coastline and a greater part of the western coastline. Clearly, Patrocles did not provide Eratosthenes with measurements for the whole of the Caspian's coastline. It seems reasonably likely that Patrocles did not voyage extensively throughout the extreme northern parts of the Caspian; otherwise he surely would have discovered the truth that it was an inland sea.¹⁹ Thus, with access to little information on the Caspian's northern waters, Eratosthenes, in order to view the Caspian as a gulf, would have had to accept Patrocles' assertion that it was 6,000 stadia from the mouth of the Caspian to the inmost recess (Strabo 2.1.17). However, this measurement is not associated with Eratosthenes at all in the extant fragments, though one might have expected it to be mentioned by him in the passage from Strabo.

(2010) *BNJ* s.v. Patrokles (712) notes that the Caspian Sea was a good deal larger in antiquity than it is today.

¹⁷Roller 2010: 203-7. It is possible that Patrocles recorded the Caspian's dimensions in terms of the number of days sailed. These estimates of days' sailing time may have then been transformed into stadia measurements by the likes of Eratosthenes and Strabo.

¹⁸Roller 2010: 99 attributes the whole of Strabo 11.6.1 to Eratosthenes. There is little evidence to support this, and I would argue that the words of Eratosthenes are found only after his mention by name. The phrase φησὶ δ' Ἐρατοσθένης may indicate a change of source from that of the prior statements.

¹⁹Roller 2010: 206, discussing the Caspian Gulf theory, suggests that 'If there were any topographical basis for this belief it may have been due to encountering a river flowing into it from the north (perhaps the Volga) that might have seemed a connection to the Ocean.' Also, see Williams (2010) *BNJ* s.v. Patrokles (712), who argues that Patrocles does not seem to have mentioned any of the tribes which inhabited the Caspian's northern coastline; thus, he probably did not sail in this part of the sea.

When describing the Caspian's shape and form, Strabo uses the word κόλπος to designate it as a gulf, as did several other authors (Strabo 2.5.18, 11.6.1).²⁰ Conversely, Eratosthenes employs the more ambiguous term θάλαττα (Strabo 11.6.1, Erat., fr. 110).²¹ The word κόλπος is not found in explicit connection with the Caspian in the corpus pertaining to Eratosthenes' *Geography*, though it is found in connection with both the Arabian Gulf and the Persian Gulf (Strabo 2.1.32, 16.3.2, 16.3.5, Erat., fr. 92, 94). Since we know Eratosthenes referred to the Arabian Gulf and the Persian Gulf as κόλποι, it seems unusual that the same term is not ascribed to him in the extant fragments regarding the Caspian. While none of this necessarily disproves that Eratosthenes mapped the Caspian as a gulf of the Outer Ocean, it shows that the issue is much more complex and ambiguous than is usually presumed. In order to come to terms with Eratosthenes' views on the matter, a thorough analysis of the history of the Caspian's conception in the context of earlier Greek geography and exploration is required. This analysis will demonstrate that the notion of the Caspian as a lake or landlocked sea became especially popular during the time of Alexander the Great's campaigns. Moreover, with there being only circumstantial evidence for Eratosthenes subscribing to Patrocles' view of the Caspian, it is not out of the question that he followed the opposing theory.

It is commonly thought that the Greeks used two interchangeable names for what we today call the Caspian Sea, the 'Caspian' and the 'Hyrcanian'.²² Williams argues that the term 'Hyrcanian' originally referred to the sea's southern waters and that

²⁰ Cf. Plut. *Alex.* 44.1; Arr. *Anab.* 5.5.4, 5.26.2.

²¹ See *LSJ* (1940) s.v. κόλπος: 781, θάλασσα: 974. Note again that Roller ascribes the whole of Strabo 11.6.1 to Eratosthenes. The word κόλπος is mentioned in the first part of the section prior to the citation of Eratosthenes by name, and thus could be Strabo's terminology rather than that of Eratosthenes.

²² See Hdt 1.203.1; Arist. *Mete.* 354 a3; Strabo 2.5.18. Ath. 2.70a shows that Hecataeus referred to the Caspian Sea as the 'Hyrcanian': see Hamilton 1969: 116. For scholarship on the Hyrcanian/Caspian dichotomy, see Tarn 1948, vol. 2: 5; Hamilton 1971: 111; Roller 2010: 206; Williams (2010) *BNJ* s.v. Patrokles (712).

‘Caspian’ came to denote the whole sea.²³ The first extant author to refer to the Caspian as an inland lake was Herodotus. In the first book of the *Histories*, he states that ἡ δὲ Κασπίη θάλασσα ἐστὶ ἐπ’ ἐωυτῆς, οὐ συμμίσγουσα τῇ ἐτέρῃ θαλάσσει. τὴν μὲν γὰρ Ἑλληνες ναυτίλλονται πᾶσα καὶ ἡ ἔξω στηλέων θάλασσα ἡ Ἀτλαντὶς καλεομένη καὶ ἡ Ἐρυθρὴ μία ἐοῦσα τυγχάνει· ἡ δὲ Κασπίη ἐστὶ ἐτέρῃ ἐπ’ ἐωυτῆς (‘The Caspian Sea is on its own, not connected with the other sea. For that sea on which the Greeks sail and the sea outside the Pillars, called the Atlantic, and the Erythraean Sea all happen to be one; but the Caspian is different by itself’) (Hdt. 1.203.1). Herodotus’ understanding of the Caspian Sea’s true nature contradicted conventional Greek geography, as earlier geographers, like Hecataeus, appear to have viewed it as a gulf of the Outer Ocean.²⁴

There is no record of Greek exploration in the region of the Caspian Sea up until Alexander the Great’s campaigns. Therefore, Herodotus’ conception of the Caspian Sea was probably based on Persian geographic knowledge, derived ultimately from the reports of locals living in Hyrcania along the sea’s coastline. As noted earlier, Herodotus believed that the European landmass extended indefinitely to the north and east of Scythia, with no reliable evidence supporting the existence of Ocean in these parts (Hdt. 4.45.1). It was inherent in this conceptual framework that the Caspian could not be a gulf of the Outer Ocean and that land must border it all round.

The next extant author to describe the Caspian as an inland lake was Aristotle. Scholars have identified what seems to be a relatively obscure reference to the Caspian Sea in Aristotle’s *Meteorology*: ἀλλ’ ἢ γε ὑπὸ τὸν καύκασον λίμνη, ἣν καλοῦσιν οἱ ἐκεῖ θάλατταν· αὕτη γὰρ ποταμῶν πολλῶν καὶ μεγάλων εἰσβαλλόντων οὐκ ἔχουσα ἔκρουν φανερόν ἐκδίδωσιν ὑπὸ γῆν κατὰ Κοραξοῦς, περὶ τὰ καλούμενα βαθέα τοῦ Πόντου (‘But there is indeed a lake by the Caucasus, which the inhabitants there call a sea; for

²³ Williams (2010) *BNJ* s.v. Patrokles (712).

²⁴ Tarn 1948, vol. 2: 5; Raczka 2000: 191. Contra Lukermann 1961a: 271, who argues that Hecataeus did not believe the Caspian Sea to be connected with the Outer Ocean. There is no definitive evidence.

it, being discharged into by many large rivers and having no conspicuous outlets, runs out under the earth in the region of the Coraxians, around the so-called depths of the Pontus') (Arist. *Mete.* 351 a8-13).²⁵ Later in the *Meteorology*, Aristotle vaguely refers to two separate landlocked seas in this same region. He asserts that ἡ δ' Ὑρκανία καὶ Κασπία κεχωρισμένα τε ταύτης καὶ περιοικούμεναι κύκλω, ὥστ' οὐκ ἂν ἐλάνθανον αἰ πηγαί, εἰ κατὰ τινα τόπον αὐτῶν ἦσαν ('The Hyrcanian and Caspian are both separated from this Outer Ocean and are inhabited all round, so that their sources would not escape notice if there were any of them in the region') (Arist. *Mete.* 354 a3-5). This passage has generated significant controversy among scholars of Greek geography, especially since it is the only reference to either toponym in the whole Aristotelian corpus. The use of plural nouns and participles here implies that Aristotle employed 'Hyrcanian' and 'Caspian' to designate two distinct, separate seas, rather than to denote alternative names for the same sea.

One scholarly interpretation postulates that the above passage is ambiguous and it could be that Aristotle thought of the 'Hyrcanian' and 'Caspian' as two different parts of the same sea. Alternatively, he may have misunderstood earlier writers, believing that they were referring to two separate inland lakes, when in fact they were applying two interchangeable toponyms to one body of water.²⁶ Tarn, however, argues that Aristotle purposefully distinguished the Hyrcanian from the Caspian, identifying the name 'Hyrcanian' with what we today know as the Caspian Sea, while using the name 'Caspian' to denote what is now called the Aral Sea, located farther to the east (see fig. 5.2).²⁷ Furthermore, Tarn suggests that Aristotle must have obtained his knowledge of the Caspian-Aral from Persian sources and that he taught the concept of two separate

²⁵ For discussion of this passage, see Gardiner-Garden 1987: 15. Gardiner-Garden suggests that Aristotle's description denotes a single sea combining the characteristics of the Caspian and the Aral.

²⁶ See Bunbury 1879, vol. 1: 401; Tozer 1964: 134-6; Hamilton 1971: 111.

²⁷ Tarn 1948, vol. 2: 5-6.

inland seas to his pupil Alexander the Great, which in turn significantly influenced and complicated the geography of Alexander's followers, Patrocles and even Eratosthenes.²⁸ Whether or not the evidence supports Tarn's belief that both Aristotle and Alexander knew of the Aral Sea is a side-issue that will be returned to later. Of interest to us now is the possibility that Aristotle passed on to Alexander the idea that the sea, known today as the Caspian, was landlocked.

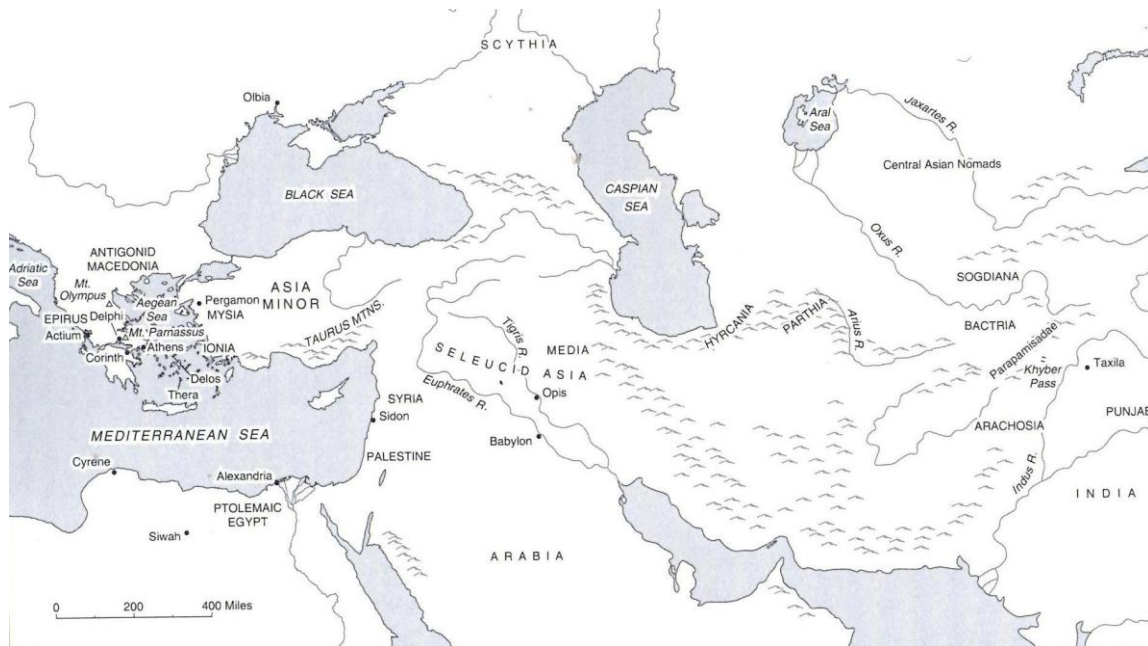


Fig. 5.2: The Hellenistic world, with the true nature of the Caspian and Aral represented.

A convoluted source tradition problematizes our understanding of how Alexander the Great and his followers viewed the Caspian Sea. For the most part, the extant historians of Alexander's campaigns, the earliest of whom wrote 300 years after the events described, referred to the Caspian as a gulf of the Outer Ocean.²⁹ Certainly, this was the canonical view of their time, with Strabo's four-gulf model probably indicative of the current state of knowledge (Strabo 2.5.18). Nevertheless, the extant historians created a great deal of confusion and controversy regarding Alexander the

²⁸ Tarn 1948, vol. 2: 5-19. For some of the most thorough and compelling discussions of the Caspian-Aral question, see Tarn 1901: 10-29; Pearson 1951: 80-5; Hamilton 1971: 106-11.

²⁹ On the Caspian Sea as a gulf, see Curt. 6.4.19; Plut. *Alex.* 44.1-2; Arr. *Anab.* 5.5.4.

Great's personal opinions on the Caspian problem. Plutarch's description of the Caspian's topography illustrates this point:

καὶ πελάγους ἰδὼν κόλπον οὐκ ἐλάττονα μὲν τοῦ Πόντου φανέντα, γλυκύτερον δὲ τῆς ἄλλης θαλάττης, σαφὲς μὲν οὐδὲν ἔσχε πυθέσθαι περὶ αὐτοῦ, μάλιστα δὲ εἴκασε τῆς Μαιώτιδος λίμνης ἀνακοπὴν εἶναι. καίτοι τοὺς γε φυσικοὺς ἄνδρας οὐκ ἔλαθε τάληθές, ἀλλὰ πολλοῖς ἔτεσιν ἔμπροσθεν τῆς Ἀλεξάνδρου στρατείας ἱστορήκασιν ὅτι τεσσάρων κόλπων εἰσεχόντων ἀπὸ τῆς ἔξω θαλάσσης βορειότατος οὗτος ἐστὶ, τὸ Ὑρκάνιον πέλαγος καὶ Κάσπιον ὁμοῦ προσαγορευόμενον ('Having observed a gulf of the open sea which appeared to be no less than the Pontus, but sweeter than the other sea [Mediterranean], he [Alexander] was able to learn no certain information about it, but guessed it to be most probably an arm of Lake Maeotis. And yet indeed, the truth did not escape scientists, but many years before Alexander's expedition they had found out by inquiry that of the four gulfs stretching inland from the Outer Sea this was the most northerly one, which was called the Hyrcanian and Caspian together') (Plut. *Alex.* 44.1-2).

Embedded in this passage are several points of interest. At the beginning, Plutarch suggests that Alexander perceived the Caspian as a gulf of the Ocean. However, the following information entails that this was clearly more Plutarch's own personal view than that of Alexander. Plutarch continues on, acknowledging that Alexander was confused about the Caspian's true nature. Alexander may have postulated that the Caspian was contiguous with Lake Maeotis and sweeter in taste than the Mediterranean; thus, probably not connected with the saline Outer Ocean.³⁰ Plutarch then again starts discussing the opposing theory, arguing that the Caspian was the most

³⁰ The theory that the Caspian was connected with Lake Maeotis appears to have held currency among some of Alexander's followers, principally Polycleitus of Larissa, but perhaps also Cleitarchus and Aristobulus: see Strabo 11.7.4; Curt. 6.4.18; Arr. *Anab.* 7.16.2.

northerly gulf of the οἰκουμένη, in a four-gulf model which he believed to have originated before Alexander's campaigns. We have already met this model in Strabo's description of the Outer Ocean, a description which in traditional scholarship is said to derive from Eratosthenes.³¹ Plutarch's discussion raises the possibility of an alternative, much earlier common source for the four-gulf model. Roller, conversely, contends that it is improbable for this model to have been conceived before the time of Alexander.³² Indeed, it is hard to believe Plutarch when, of the four supposed gulfs, the Persian Gulf was unknown to the Greeks until the voyages of Nearchus and Androstenes.³³ It is possible that Plutarch, in attempting to show that the Caspian Gulf theory predated Alexander, anachronistically applied the four-gulf model to geographers of the Classical Age, who in reality could only have conceived of the Mediterranean, Arabian and Caspian in this sense. Nonetheless, it also could be that, contrary to what Plutarch says, the four-gulf model was first articulated toward the end of Alexander's campaigns.

The passage from Plutarch demonstrates Alexander's own uncertainty regarding the Caspian's true nature. A similar ambiguity is conveyed in a passage from Arrian, possibly derived from Aristobulus, which details the expedition of Heracleides, sent by Alexander to explore the Caspian in 324 BC. Arrian describes Alexander's motivations for this endeavour:

πόθος γὰρ εἶχεν αὐτὸν καὶ ταύτην ἐκμαθεῖν τὴν θάλασσαν τὴν Κασπίαν τε καὶ Ὑρκανίαν καλουμένην ποῖα τινὶ ξυμβάλλει θαλάσση, πότερα τῆ τοῦ πόντου τοῦ Εὐξείνου ἢ ἀπὸ τῆς ἐώας τῆς κατ' Ἰνδοῦς ἐκπεριερχομένη ἢ

³¹ See Brunt 1976: 523; Williams (2010) *BNJ* s.v. Patrokles (712).

³² Roller 2010: 206.

³³ On the discovery of the Persian Gulf by the followers of Alexander the Great, see Arr. *Anab.* 7.16.2. Thomson 1948: 81, 86 notes that Herodotus did not know of the Persian Gulf and argues that it is strange that even by the time of Aristotle the Greeks still did not have knowledge of it. However, Bunbury 1879, vol. 1: 143 suggests that the fragments pertaining to Herodotus' predecessor Hecataeus imply that he may have had some vague knowledge of the Persian Gulf, which was lost until its rediscovery in the time of Alexander.

μεγάλη θάλασσα ἀνακεῖται εἰς κόλπον τὸν Ὑρκάνιαν, καθάπερ οὖν καὶ τὸν Περσικὸν ἐξεῦρε, τὴν Ἐρυθρὰν δὴ καλουμένην θάλασσαν, κόλπον οὔσαν τῆς μεγάλης θαλάσσης. οὐ γὰρ πω ἐξεύρηντο αἱ ἀρχαὶ τῆς Κασπίας θαλάσσης ('For a longing possessed him to examine closely which certain sea joins with this sea, called both the Caspian and Hyrcanian, whether it joins with the Black Sea, or if from the east beside India the great sea circling around empties into a gulf, the Hyrcanian, just as he indeed also discovered the Persian, actually called the Red Sea, to be a gulf of the Great Sea. For up until this time the sources of the Caspian Sea had not been discovered') (Arr. *Anab.* 7.16.2-3).

This expedition was abandoned after Alexander's death in 323 BC. The passage from Arrian shows that Alexander remained undecided about whether the Caspian was an inland lake or a gulf of the Ocean.³⁴ Thus, Roller's assertion that Alexander unequivocally believed the Caspian to be connected with the Ocean does not correspond with the evidence.³⁵ Little credence can be afforded to a speech recorded by Arrian, which Alexander gave to his army at the river Hyphasis, apparently describing the Caspian as joint with the Outer Ocean (Arr. *Anab.* 5.26.1-2). The authenticity of the speech is certainly questionable, with the perception of the Caspian probably reflecting Arrian's geography more so than that of Alexander.³⁶ The weight of evidence shows

³⁴ Support for this interpretation comes from Tarn 1948, vol. 2: 12; Brunt 1976: 522-3; Bosworth 1980: 373; Williams (2010) *BNJ* s.v. Patrokles (712).

³⁵ Roller 2006: 59-60. Roller 2010: 140 states that 'Herodotos and Aristotle were better informed, knowing that the Caspian was an enclosed sea, but Alexander insisted that it was an arm of the Ocean, which fit into his self-view of having reached the Northern Ocean and eventually being able to use it to reach the Western Mediterranean.' Contra Williams (2010) *BNJ* s.v. Patrokles (712), who emphasises that Alexander was very uncertain about the Caspian's true nature.

³⁶ As a matter of fact, the extant sources provide very different accounts of Alexander's words and actions during the mutiny at the river Hyphasis: see Diod. 17.93.3 – 94.5; Curt. 9.2.12-34; Plut. *Alex.* 62.1.4.

that both theories about the Caspian were simultaneously current within Alexander's camp.

One of Alexander's followers, Polycleitus of Larissa, appears to have been the most fervent promulgator of the inland lake theory. Polycleitus advanced many fascinating ideas about the Caspian. In an extract from Strabo, which Roller attributes entirely to Eratosthenes, Polycleitus is said to have manipulated the topography of the Caspian and the surrounding region:

προσεδοξάσθη δὲ καὶ περὶ τῆς θαλάττης ταύτης πολλὰ ψευδῆ διὰ τὴν Ἀλεξάνδρου φιλοτιμίαν· ἐπειδὴ γὰρ ὁμολόγητο ἐκ πάντων ὅτι διείργει τὴν Ἀσίαν ἀπὸ τῆς Εὐρώπης ὁ Τάναϊς ποταμός, τὸ δὲ μεταξὺ τῆς θαλάττης καὶ τοῦ Ταναΐδος πολὺ μέρος τῆς Ἀσίας ὃν οὐχ ὑπέπιπτε τοῖς Μακεδόσι, στρατηγεῖν δ' ἔγνωστο ὥστε τῇ φήμῃ γε κάκεινων δόξαι τῶν μερῶν κρατεῖν τὸν Ἀλέξανδρον· εἰς ἓν συνῆγον τὴν τε Μαιῶτιν λίμνην τὴν δεχομένην τὸν Ταναῖν καὶ τὴν Κασπίαν θάλατταν, λίμνην καὶ ταύτην καλοῦντες καὶ συντετρηῆσθαι φάσκοντες πρὸς ἀλλήλας ἀμφοτέρας, ἑκατέραν δὲ εἶναι μέρος τῆς ἐτέρας. Πολύκλειτος δὲ καὶ πίστεις προφέρεται περὶ τοῦ λίμνην εἶναι τὴν θάλατταν ταύτην (ὄφεις τε γὰρ ἐκτρέφειν καὶ ὑπόγλυκυ εἶναι τὸ ὕδωρ), ὅτι δὲ καὶ οὐχ ἕτερα τῆς Μαιώτιδος ἐστὶ, τεκμαιρόμενος ἐκ τοῦ τὸν Ταναῖν εἰς αὐτὴν ἐμβάλλειν· ἐκ γὰρ τῶν αὐτῶν ὀρῶν τῶν Ἰνδικῶν ἐξ ὧν ὁ τε Ὠχος καὶ ὁ Ὠξος καὶ ἄλλοι πλείους φέρεται καὶ ὁ Ἰαξάρτης ἐκδίδωσί τε ὁμοίως ἐκείνοις εἰς τὸ Κάσπιον πέλαγος πάντων ἀρκτικώτατος. τοῦτον οὖν ὠνόμασαν Ταναῖν, καὶ προσέθεσάν γε τούτῳ πίστιν, ὡς εἴη Τάναϊς ὃν εἶρηκεν ὁ Πολύκλειτος· τὴν γὰρ περαίαν τοῦ ποταμοῦ τούτου φέρειν ἐλάτην καὶ οἰστοῖς ἐλατίνοις χρῆσθαι τοὺς ταύτη Σκύθας, τοῦτο δὲ καὶ τεκμήριον τοῦ τὴν χώραν τὴν πέραν τῆς Εὐρώπης εἶναι, μὴ τῆς Ἀσίας· τὴν γὰρ Ἀσίαν τὴν ἄνω καὶ τὴν πρὸς ἕω μὴ φύειν ἐλάτην. Ἐρατοσθένης δὲ φησι

καὶ ἐν τῇ Ἰνδικῇ φύεσθαι ἐλάτην καὶ ἐντεῦθεν ναυπηγήσασθαι τὸν στόλον Ἀλέξανδρον· πολλὰ δὲ καὶ ἄλλα τοιαῦτα συγκρούειν Ἐρατοσθένης πειρᾶται, ἡμῖν δ' ἀποχρώντως εἰρήσθω περὶ αὐτῶν ('Many falsehoods were also supposed about this sea because of Alexander's love of honour; for since it was agreed by all that the river Tanais separated Asia from Europe, and that the region between the sea and the Tanais, being a considerable part of Asia, had not fallen under the Macedonians' control, a strategy was perceived, so that in legend at least it would seem that Alexander had also conquered those parts of Asia; they therefore joined Lake Maeotis, which receives the Tanais, with the Caspian Sea, also calling this a lake and saying that both were connected with one another by an underground passage, and that each was a part of the other. Polycleitus also produces proofs concerning this sea being a lake [for it rears snakes and its water is sweetish], and that it is also no other than Maeotis, which he infers from the fact that the Tanais runs into it; for from the same Indian mountains, out of which come the Ochus, Oxus and many other rivers, flows also the Jaxartes, which, like those rivers, runs out into the Caspian Sea, and is the most northerly river of them all. This river, therefore, they named Tanais, and in addition to this they provided proof that it was the Tanais, which Polycleitus had mentioned; for the country on the other side of this river produces the fir-tree and the Scythians in this region use fir-wood arrows, and this is also evidence that the country on the other side belongs to Europe, not to Asia; for the upper part and eastern part of Asia do not produce the fir-tree. But Eratosthenes says that the fir-tree is grown also in India and that Alexander's fleet was built out of fir-wood from there. Eratosthenes

attempts to clear up many other such things which are set at variance, but for us I have spoken sufficiently about them') (Strabo 11.7.4, Erat., fr. 24).³⁷

Whether or not this critique of Polycleitus' geography stems exclusively from Eratosthenes is unclear. Again, Eratosthenes is mentioned by name toward the end of the passage and only in connection with the geographic range of the fir-tree. However, because we know that Eratosthenes also criticised the Macedonians' topographic manipulation of the Taurus-Caucasus mountain chain, it is likely that much of the similarly-themed material discussed here can be ascribed to him. If this is the case, it does not necessarily mean that Eratosthenes opposed the theory that the Caspian was an inland lake. The focus of Eratosthenes' argument was to disprove three interrelated assertions made by Polycleitus. Firstly, that the river Tanais, which was known to flow into Lake Maeotis, and the river Jaxartes, which was believed to flow from the Paropamisus Mountains into the Caspian, were connected to one another. Secondly, that the Caspian was joined to Lake Maeotis. Thirdly, that proof of the Tanais and the Jaxartes in fact being one and the same was provided by the fact that the 'European' fir-tree grew near the Tanais in Scythia as well as on the northern bank of the Jaxartes in Sogdiana. Traditionally, the river Tanais was considered to be the boundary between Europe and Asia. With Alexander having extended his empire as far as Alexandria-Eschate on the southern bank of the Jaxartes, Polycleitus' apparent manipulation of topography may have been intended to glorify Alexander as having conquered the whole Asian continent, consistent with the Macedonians' relocation of the Caucasus Mountains.³⁸ Although Eratosthenes disputed Polycleitus' joining of the Tanais and

³⁷ For a good commentary on this passage, see Roller 2010: 139-40.

³⁸ See Tarn 1948, vol. 2: 14-5. Hamilton 1971: 110 suggests that Polycleitus' erroneous topography of the Caspian resulted from genuine misunderstanding more so than propaganda: 'But there are good grounds for thinking that Alexander and his followers genuinely believed that they had reached the Tanais/Don. The 'Gazetteer', a list of satrapies compiled in 324/3 B.C., refers to the Jaxartes by this name, as does Aristobulus, who accompanied Alexander and must have known the truth. It is, indeed, hardly surprising

Jaxartes, and of the Caspian and Lake Maeotis, this does not prove that he mapped the Caspian as a gulf of the Ocean. Based on this evidence, it is just as plausible that he viewed the Caspian as a landlocked sea which was wholly separate from Lake Maeotis, with the Jaxartes and Tanais flowing into each respectively.

Some consideration should now be given to Tarn's interpretation of Polycleitus' geography. We have already encountered his argument that Aristotle knew of two separate inland lakes, the Hyrcanian and the Caspian-Aral. Similarly, he argues that Polycleitus' mention of the Caspian Sea is, in actual fact, a reference to the Aral Sea.³⁹ Two main pieces of evidence are offered to support this conclusion. First, that both the Oxus and Jaxartes rivers flow into the Aral Sea, rather than into the Caspian (see fig. 5.3). Thus, when Polycleitus states that these rivers empty into the Caspian, he must mean the Aral. Secondly, that the Aral Sea has a significantly lower salt concentration than the Caspian Sea, which makes the Aral a more appropriate body of water for Polycleitus to designate as ὑπόγλυκν ('sweetish' or 'nearly fresh').⁴⁰ Tarn's theory of this Caspian-Aral has generated much debate and criticism.⁴¹ His reasoning appears particularly flimsy with regard to the salt concentration of the Aral relative to the modern Caspian. Although the Aral's salt concentration is certainly lower than that of

that the two rivers should have been identified, when we consider what Herodotus and Aristotle had thought of the Jaxartes. For Herodotus had written of the Araxes (he obviously means the Jaxartes) as flowing east from the Caspian and forming with it the boundary between Europe and Asia, while Aristotle had described the Araxes (again the Jaxartes is meant) as rising in the Parnasos (i.e. the Parapamisus or Hindu-Kush) and possessing a branch called the Tanais which flowed into the Maeotis. Moreover, as the name 'Tanais' is derived from a native word meaning 'water', it is easy to see how Alexander and his followers, conversing through interpreters, might obtain the name 'Tanais' for the Jaxartes. Other factors, too, may have predisposed Polycleitus to identify (or link) the Caspian with the Maeotis. Polybius, for example, writes that the Maeotis was 'fresher than the Black Sea', while all ancient writers think of the Maeotis as much larger than it actually is and consequently as extending further east than it does.'

³⁹ Tarn 1901: 21-8; Tarn 1948, vol. 2: 8. Hamilton 1971: 109-11 lends support to Tarn's conclusions.

⁴⁰ See *LSJ* (1940) s.v. ὑπόγλυκῆ: 1877.

⁴¹ For criticism of Tarn's arguments, see Pearson 1951: 80-5; Walbank 1967: 262-3; Bosworth 1980: 373-9.

the Caspian, Bosworth is right to point out that to the Greeks it would have seemed that the Caspian had low-saline, sweetish water compared to their own Mediterranean Sea and of course the Outer Ocean.⁴² Therefore, it is definitely conceivable that Polycleitus and others would have referred to the modern Caspian as ὑπόγλυκον.

Tarn's argument concerning the Oxus and Jaxartes rivers also has its weaknesses. Whether the courses of these rivers were the same in antiquity as they are now is disputed, with some scholars arguing that the Oxus especially may have had a branch that emptied into the Caspian as opposed to the Aral.⁴³ Alexander and his men were perhaps the first Greeks to observe firsthand the Caspian region and the sea itself, meaning that the topography of this part of the world was only vaguely defined.⁴⁴ There is no record of any Greek reaching the shores of the Aral Sea. Consequently, it is indeed very possible that Polycleitus mistook other unidentified rivers flowing into the Caspian to be western branches of the Oxus and Jaxartes. Alternatively, local informants may have provided information about the Aral, which Polycleitus and others misinterpreted, not realising that the Aral was a separate sea, and instead subsuming it, the Oxus and the Jaxartes into the Caspian-Maeotis model.⁴⁵

⁴² Bosworth 1980: 378-9. Hamilton 1971: 111 provides figures on the salt concentration of both the Caspian Sea and the Aral Sea. The Caspian Sea has on average 13 lb of salt to every 1000 lb of water. The Aral Sea has on average 10.7 lb of salt to every 1000 lb of water. By contrast, the Mediterranean has 38-40 lb of salt to every 1000 lb of water.

⁴³ Support for this theory comes from Tozer 1964: 134; Walbank 1967: 262; Brunt 1976: 523; Bosworth 1980: 373; Gardiner-Garden 1987: 13; Williams (2010) *BNJ* s.v. Patrokles (712). Strabo 11.7.3 and Plin. *HN*. 6.52, based on information derived from Aristobulus and presumably Patrocles, describe a supposed trade route from India to the Black Sea via the Oxus and the Caspian. For refutation of this Oxo-Caspian trade route as well as the theory that the Oxus may have once flowed into the Caspian, see Tarn 1901: 10-29; Tarn 1951: 112-13, 488-93.

⁴⁴ Williams (2010) *BNJ* s.v. Patrokles (712).

⁴⁵ Tarn 1948, vol. 2: 8 argues that Alexander and his followers may have learnt of the Aral from Pharasmanes, a king living in the region, who is reported to have visited Alexander in Bactria: see Curt. 8.1.8; Arr. *Anab.* 4.15.4-6.

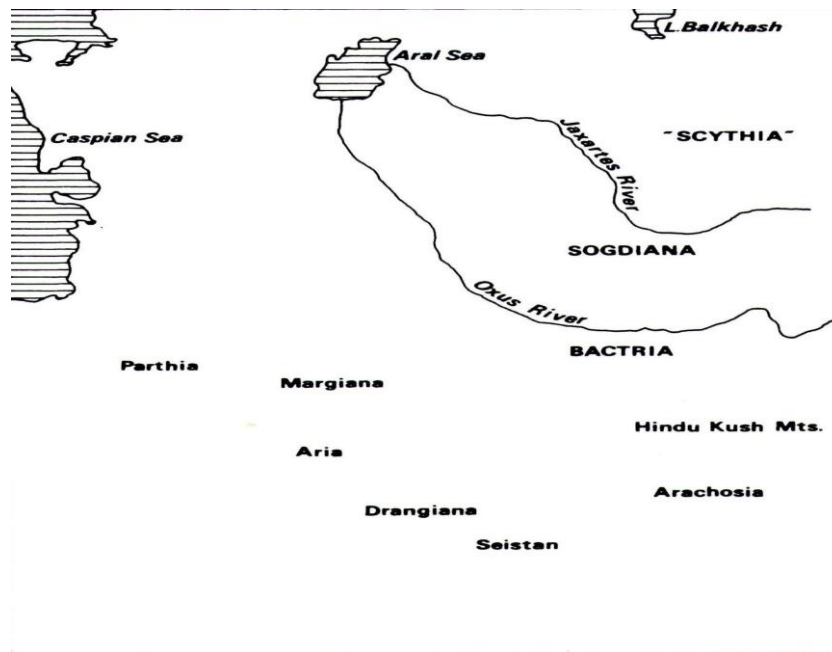


Fig. 5.3: The Caspian-Aral region, with the Oxus (Amu-Darya) and Jaxartes (Syr-Darya) depicted along their modern-day courses, flowing into the Aral.

There is one final piece of information to consider regarding the Caspian's conception prior to Eratosthenes. Reference has already been made to a geographical section in the eighteenth book of Diodorus Siculus' *Library of History*, which supplies a description of the Taurus-Caucasus line and is believed to stem ultimately from the reports of Alexander's bematists. Also included in what Tarn calls the 'Gazetteer of Asia' is an important account of the Caspian Sea. The sea is referred to twice, once as the 'Caspian' and once as the 'Hyrcanian', used clearly in an interchangeable sense. The topography of the Caspian Sea is mentioned during a discussion of Asia's northern satrapies: καὶ πρώτη μὲν τῶν πρὸς τὴν ἄρκτον ἐστραμμένων κεῖται παρὰ τὸν Τάναϊν ποταμὸν Σογδιανὴ καὶ Βακτριανή, καὶ τούτων ἐχομένη Ἄρια καὶ Παρθυαία καὶ Ὑρκανία, δι' ἧς συμβαίνει περιέχεσθαι τὴν Ὑρκανίαν θάλατταν, οὕσαν καθ' αὐτὴν ('The first of those facing toward the north, Sogdiana and Bactriana, lie along the Tanais River, and beside these are Aria, Parthia and Hyrcania, which join together to

surround the Hyrcanian Sea, a sea all on its own') (Diod. 18.5.4).⁴⁶ Here, the Caspian is described explicitly as an inland lake. If indeed the bematists believed the Caspian to be an inland lake, Eratosthenes undoubtedly would have been familiar with the bematists' views on the matter and it is certainly conceivable that they informed his own mapping of the Caspian. Although there is no evidence to verify this, the influence which we know the bematists had on Eratosthenes' mapping of the Taurus-Caucasus line shows that he took their geographical reports very seriously, perhaps even with respect to the Caspian.

The data presented illustrates that in the early Hellenistic period, in the context of Alexander the Great's campaigns, there was a good deal of controversy about whether the Caspian was a landlocked sea or a gulf of the Ocean. Both theories were prominent and no definitive answer to the question was provided. Patrocles' expedition perhaps tipped the scales slightly in favour of the Caspian Gulf theory; however, his idea about the possibility of using the Caspian to sail from India to Hyrcania was obviously based on a fair amount of pure speculation, no different from his predecessors. With no definitive evidence linking Patrocles' perception of the Caspian to Eratosthenes, it must be admitted that it is just as possible and plausible that Eratosthenes considered the Caspian to be an inland lake. Most likely he would have seen Patrocles' opinion as one of many, no more authoritative than those of Herodotus, Aristotle, Alexander, Polycleitus and the bematists.

If it is to be believed that Eratosthenes viewed the Caspian as an inland lake, then it needs to be shown that the Caspian Gulf theory could have reached later proponents, including Strabo, Pliny the Elder, Plutarch and Arrian, through sources other than Eratosthenes. It has already been demonstrated that Plutarch traced the origins of the Caspian Gulf theory back to unidentified sources which preceded

⁴⁶ Tarn 1948, vol. 2: 7 believes that the 'Gazetteer' identifies the Hyrcanian and Caspian as separate seas

Alexander's campaigns. Plutarch's statements indicate that there was an acknowledged historical precedent for the theory. Patrocles' observations and speculations clearly built on this precedent. Both Strabo and Pliny had access to Patrocles' report on the Caspian, either at firsthand or through an intermediary like Eratosthenes. It is entirely conceivable that Patrocles' Caspian Gulf theory would have appealed to and gained extensive popularity among other later writers, even if in some cases their knowledge of Patrocles was derived from Eratosthenes, who may have favoured the alternative view. A testament to the widespread knowledge of Patrocles' account is that the flavour of Patrocles' Caspian Gulf theory can also be found in Curtius' Latin *History of Alexander*. Curtius mentions that India and Hyrcania are thought to be connected by Ocean, plainly reflecting Patrocles' belief that it was possible to sail from India to Hyrcania via the Caspian (Curt. 6.4.19).⁴⁷

Evidently, Patrocles' account of the Caspian became the standard item of proof for all who considered it to be a gulf of the Ocean. Traditional opinion would argue that Eratosthenes popularised Patrocles' Caspian Gulf theory, but this need not be the case. The Caspian Gulf theory had a long history, dating back at least as far as Hecataeus. During the Classical and early Hellenistic periods, it existed concurrently with the notion of the Caspian as a landlocked sea. Both theories seem to have achieved widespread popularity, with the Caspian Gulf theory eventually gaining predominance by the time of Strabo. Accordingly, Strabo and others would have had access to a wealth of popular tradition and literature to inform their impression of the Caspian. From the evidence available to us, it is not possible to determine exactly how Eratosthenes dealt with the Caspian problem. It can be neither proved nor disproved that he viewed the Caspian as a gulf; however, there should be no doubt that the rise to

– the Caspian and Aral. There is no evidence to support this interpretation.

⁴⁷ Curt 6.4.19: *Et quidam credere non Caspium mare esse, sed ex India in Hyrcaniam Oceanum cadere.*

prominence of the Caspian Gulf theory in the Hellenistic Age could have been based on a whole host of sources other than Eratosthenes' *Geography* and map of the world.

The next chapter will diverge slightly from the approach undertaken thus far. Instead of examining specific features of Eratosthenes' map in isolation, it will look at how Pytheas of Massalia's voyage influenced Eratosthenes' mapping, with specific reference to the Atlantic coastlines of Europe and Britain, northern parallels of latitude and the location of Thule.

6. PYTHEAS OF MASSALIA'S CONTRIBUTION TO ERATOSTHENES' CARTOGRAPHY

Pytheas of Massalia's voyage in the North Atlantic Ocean divided opinion among ancient geographers and mapmakers. Some, including Eratosthenes and Hipparchus, appear to have taken most of Pytheas' account at face value. Many others, however, were far less convinced. Polybius thoroughly discredited Pytheas, considering his own voyage in the Atlantic to be a far superior source on the geography of the west. Strabo, whose knowledge of Pytheas' work was based on the earlier citations of Timaeus, Eratosthenes, Polybius, Hipparchus and Posidonius, was also severely critical of Pytheas. Strabo had a very definite mental image of northern and western Europe. By his time, Julius Caesar's excursions into Iberia, Gaul, Germania and even Britain had greatly expanded geographic knowledge of the region, making Pytheas' data seem very much out-of-date.¹ Both Polybius and Strabo heavily criticised Eratosthenes for basing his conception of northern and western Europe on Pytheas' voyage, characterising his data as erroneous and unworthy of mention (Strabo 1.4.2-5, 2.4.1-2). Consequently, the vast majority of the geographic information which Eratosthenes derived from Pytheas has not been preserved in the fragments of his *Geography*.

Eratosthenes came to be regarded as ignorant of the geography of Europe. Strabo identifies Eratosthenes as one of several geographers who lacked sufficient knowledge about this area of the world:

καὶ νῦν δ' εἰρήσθω, ὅτι καὶ Τιμοσθένης καὶ Ἐρατοσθένης καὶ οἱ ἔτι τούτων
πρότεροι τελέως ἠγνόουν τὰ τε Ἰβηρικὰ καὶ τὰ Κελτικά, μυρίῳ δὲ μᾶλλον
τὰ Γερμανικὰ καὶ τὰ Βρεττανικά, ὡς δ' αὐτῶς τὰ τῶν Γετῶν καὶ

¹ Strabo 3.4.10, 4.1.1, 4.3.3, 4.5.1-3 refer to Julius Caesar's involvement in these regions. Krebs 2006: 111-36 provides a detailed examination of Caesar's geographical discourse on Gaul, Britain and especially Germania.

Βασταρνῶν. ἐπὶ πολὺ δ' ἀγνοίας ἐτύγχανον ἀφιγμένοι καὶ τῶν κατ' Ἰταλίαν καὶ τὸν Ἀδρίαν καὶ τὸν Πόντον καὶ τῶν ἐφεξῆς προσαρκτίων μερῶν ('Now let it be said that Timosthenes and Eratosthenes and the still earlier geographers were entirely ignorant with regard to both Iberia and Celtica, and immensely more ignorant about Germany and Britain, just as about the lands of the Getans and Bastarnians. Additionally, they happened to be very much ignorant with respect to Italy, the Adriatic Sea, the Pontus and the regions in succession to the north') (Strabo 2.1.41).

In another passage, Strabo implies that the long tradition of ignorance concerning northern and western Europe was due in large part to Greek geographers' over-reliance on Pytheas' data (Strabo 3.4.4). This point is reaffirmed elsewhere, with Strabo suggesting that Eratosthenes' lack of knowledge, particularly in connection with Iberia, Celtica, Britain and the lands farther to the north, was a result of misleading information provided by Pytheas (Strabo 1.4.3-5, Erat., fr. 37).²

As a corollary of this negative source tradition, we have been left with a very narrow perspective on Eratosthenes' conception of northern and western Europe. Moreover, we have an especially limited impression of how Pytheas' voyage influenced Eratosthenes' map of the οἰκουμένη as a whole. Roller states that 'Anything that Eratosthenes obtained from Pytheas has become so badly corrupted at the hands of Polybios and Strabo that it is almost impossible to retrieve.'³ This chapter seeks to delve further into the issue, critically analysing the relevant testimonia and fragments of Pytheas' *On the Ocean*, principally those contained within the fragments of Eratosthenes' *Geography*. Three features of Eratosthenes' map, each in some way

² Strabo 2.4.1-2, Erat., fr. 14 indicates that Polybios was one of the first writers who believed that Pytheas' data had misled Eratosthenes with regard to the geography of northern and western Europe, especially that of Britain and Iberia.

³ Roller 2010: 128.

influenced by Pytheas, will be discussed. Namely, the depiction of Iberia, Celtica and Britain relative to one other; the demarcation of parallels of latitude; and the representation of Thule as the northernmost land of the οἰκουμένη.

6.1. ERATOSTHENES' CONCEPTION OF IBERIA, CELTICA AND BRITAIN

Strabo is the main extant source for our knowledge of how Pytheas conceived of Europe's Atlantic coastlines. Furthermore, there are several passages in Strabo's *Geography* which enable us to gain insight into Pytheas' influence on Eratosthenes' mapping of Iberia, Celtica and Britain.⁴ The first passage to be considered concerns the extent of Pytheas' voyage, in conjunction with Eratosthenes' general approach to the data on the region:

ταῦτα μὲν τὰ τοῦ Πυθέου, καὶ διότι ἐπανελθὼν ἐνθένδε πᾶσαν ἐπέλθοι τὴν παρωκεανῆτιν τῆς Εὐρώπης ἀπὸ Γαδείρων ἕως Τανάιδος. φησὶ δ' οὖν ὁ Πολύβιος ἄπιστον καὶ αὐτὸ τοῦτο, πῶς ἰδιώτῃ ἀνθρώπῳ καὶ πένητι τὰ τοσαῦτα διαστήματα πλωτὰ καὶ πορευτὰ γένοιτο· τὸν δ' Ἐρατοσθένη διαπορήσαντα, εἰ χρὴ πιστεύειν τούτοις, ὅμως περὶ τε τῆς Βρεττανικῆς πεπιστευκέναι καὶ τῶν κατὰ Γάδειρα καὶ τὴν Ἰβηρίαν ('These are the accounts of Pytheas, and for that reason, having returned from there [Thule], he traversed the whole sea-coast of Europe from Gadeira as far as the Tanais. Now Polybius says that this statement is unreliable, how could a private individual, and a poor man at that, happen to travel such a distance by ship and by foot? But that Eratosthenes, although he was at a loss about whether he should believe these things, nevertheless has believed Pytheas

⁴ The original name for Britain, introduced by Pytheas, was *Prettanike* (Πρεττανικὴ). This toponym incorporated the main island, Ireland (Ierne) and many of the smaller surrounding islands: see Roseman 1994: 132. An example of this form of the toponym can be found at Strabo 2.5.8.

about Britain and the regions around Gadeira and Iberia’) (Strabo 2.4.1-2, Erat., fr. 14).

What exactly Pytheas meant by the assertion that he had travelled all the way from Gadeira on the west coast of Iberia to the river Tanais north of the Sea of Azov is extremely controversial. Brown and Dilke each believe this to be a literal summation of the extent of the route by which he travelled. They suggest that he sailed from Massalia to the Baltic Sea, before hauling overland to the Tanais, during an expedition separate from his voyage to Thule.⁵ By way of contradiction, other scholars argue that the phrase ἀπὸ Γαδείρων ἕως Τανάιδος (‘from Gadeira as far as the Tanais’) was purely metaphorical with little geographic precision. It implied that Pytheas had journeyed a vast distance over the whole of Europe, reaching the limits of the οἰκουμένη.⁶

This interpretation corresponds well with a citation of Pytheas by Eratosthenes found only a few lines later. Here, Eratosthenes questions Pytheas’ statement that ὁ δὲ καὶ μέχρι τῶν τοῦ κόσμου περάτων κατωπτευκέναι τὴν προσάρκτιον τῆς Εὐρώπης πᾶσαν (‘he had discovered the whole northern part of Europe as far as the limits of the cosmos’) (Strabo 2.4.2, Erat., fr. 14). Viewed together, the two statements quoted above highlight that Pytheas was keen to emphasise the immeasurable extent of his voyage in remote regions. It is apparent, however, that Eratosthenes was sceptical of some of Pytheas’ claims. Determining exactly which parts of Pytheas’ account Eratosthenes found disconcerting is difficult. He accepted much of the Massaliot’s information, even his description of Thule, which was otherwise by far the most controversial element of the narrative. Also, as has been shown, our sources emphasise that Eratosthenes trusted

⁵ Brown 1958: 26; Dilke 1985: 136-7. Mette 1952: 7 also reads the phrase literally: ‘Nach seiner Rückkehr von dort, behauptete Pytheas endlich, habe er die Ozeanküste Europas von Gadeira bis zum Tanais bereist.’

⁶ Gadeira, located west of the Pillars of Heracles, was considered to be the western limit of Europe and the οἰκουμένη, while the river Tanais was the eastern limit of Europe. For discussion of the metaphorical

Pytheas with regard to Britain, Iberia and nearby regions, which probably included Celtica. In Greek geography at this time, these toponyms were still quite vaguely defined. 'Iberia' referred to the westernmost peninsula of Europe; 'Celtica', in a similarly indistinct way, denoted all the land between Iberia and Scythia, which began somewhere east of the Jutland Peninsula; while Britain and its surrounding islands were located off the Celtic coast.⁷ Perhaps then, it was Pytheas' description of the Baltic region in Scythia, about which Eratosthenes expressed some doubt.

The testimonia and fragments of Pytheas' work relating to the Baltic region are especially obscure and problematic. Eratosthenes is not cited in connection with any of them; most are instead found in Pliny the Elder's *Natural History* and derive ultimately from Timaeus of Tauromenium's historical work.⁸ Timaeus had a fascination with exploration in northern Europe, discussing Pytheas' voyage in the region and postulating an unusual route for the legendary *Argo*. He had the *Argo* sail into the Northern Ocean via the river Tanais, and then continue south along the Atlantic coastline of Europe into the Mediterranean (Diod. 4.56.3-6). It seems that Timaeus equated his version of the Argonauts' voyage with that of Pytheas.⁹ This of course does not mean that Pytheas travelled to the Tanais and beyond. In fact, it may be that the notion of Pytheas journeying 'from Gadeira as far as the Tanais' originated with Timaeus not Pytheas. Thus, any scepticism toward the extent of Pytheas' expedition, on

nature of the phrase, see Nansen 1911: 70; Hawkes 1977: 2-4; Roseman 1994: 49-51; Cunliffe 2002: 55; Roller 2006: 67-9.

⁷ Thomson 1948: 60-1, 146-7; Dicks 1960: 185-8. Roseman 1994: 26-7 discusses the very vague manner in which Pytheas would have used these toponyms, especially that of 'Celtica'. She states 'That this huge area was handled under a single term is understandable when one remembers that it was seen through the eyes of a 4th century traveler writing about barbarian societies. There were no recognizable cities to be found among the European inhabitants, and their social organizations were largely tribal.'

⁸ See esp. Plin. *HN*. 4.95.

⁹ Brown 1958: 32 states that Alexander and Patrocles revived Greek interest in the northeast and the problem of the Caspian Sea, while Pytheas inspired interest in the northwest and Thule. He argues that Timaeus combined these two areas of interest in his version of the Argonauts' circuitous journey.

the part of Eratosthenes, may have been as much a reaction to Timaeus' hyperbole as to Pytheas' own statements.

Precisely how Pytheas influenced Eratosthenes' cartographic conception of Europe's Atlantic coastline is uncertain. There are a few passages in Strabo's *Geography* which shed some light on the matter. In his third book, Strabo quotes Eratosthenes on aspects of Europe's coast from Calpe (Gibraltar) to the west coast of Celtica:

καὶ Ἐρατοσθένης δὲ τὴν συνεχῆ τῆ Κάλπη Ταρτησίδα καλεῖσθαι φησι καὶ Ἐρύθειαν νῆσον εὐδαίμονα. πρὸς ὃν Ἀρτεμίδωρος ἀντιλέγων καὶ ταῦτα ψευδῶς λέγεσθαι φησιν ὑπ' αὐτοῦ καθάπερ καὶ τὸ ἀπὸ Γαδεΐρων ἐπὶ τὸ ἱερὸν ἀκρωτήριον διάστημα ἀπέχειν ἡμερῶν πέντε πλοῦν, οὐ πλειόνων ὄντων ἢ χιλίων καὶ ἑπτακοσίων σταδίων, καὶ τὸ τὰς ἀμπώτεις μέχρι δεῦρο περατοῦσθαι ἀντὶ τοῦ κύκλω περὶ πᾶσαν τὴν οἰκουμένην συμβαίνειν, καὶ τὸ τὰ προσαρκτικὰ μέρη τῆς Ἰβηρίας εὐπαροδότερα εἶναι πρὸς τὴν Κελτικὴν ἢ κατὰ τὸν ὠκεανὸν πλέουσι, καὶ ὅσα δὴ ἄλλα εἶρηκε Πυθέα πιστεύσας, δι' ἀλαζονείαν ('Also, Eratosthenes says that the country adjacent to Calpe is called Tartessus and Erytheia is called the Fortunate Island. Artemidorus disputes this and says that these things are stated untruthfully by him, just as [Eratosthenes' statement] that the Sacred Promontory is five days' sail distant from Gadeira, when it is in fact no more than 1,700 stadia, and that the ebb-tides came to an end here, when instead they happen in a circle around the whole inhabited world, and that it is an easier passage from the northern parts of Iberia to Celtica [on foot] than to sail along the Ocean, and he asserted many other things trusting Pytheas, on account of his boasting')

(Strabo 3.2.11, Erat., fr. 153).

This passage indicates that Eratosthenes derived a great deal of geographic information about Iberia and Celtica from Pytheas. Although Pytheas is only named at the end, it is generally believed that he was the main source for all the material here attributed to Eratosthenes and subsequently criticised by Artemidorus, a geographer who flourished around 100 BC.¹⁰

As it is presented, the data implies that Pytheas voyaged from Massalia to Calpe. From Calpe, he would have hugged Portugal's Atlantic coastline, sailing past Gadeira, the region of Tartessus and the Sacred Promontory. He would have continued north, before sailing around Iberia's northwest tip and then heading east to Celtica and the Bay of Biscay. Presumably, Pytheas recorded a great deal more about the geography of Iberia than is alluded to in the above passage. The reference to the days of sail between Gadeira and the Sacred Promontory, as well as the mention of several Iberian toponyms imply that he gathered information about coastal localities, described the general contour of the coastline and estimated the distance in days' sailing time between each place. If this is the case, then Pytheas would have provided Eratosthenes with a wealth of detailed material to inform his depiction of Iberia.¹¹

The assertion that travelling overland from northern Iberia to Celtica is easier than travelling by sea is ambiguous and problematic. It is clear that Eratosthenes derived this statement from Pytheas, and that both Artemidorus and Strabo disbelieved

¹⁰ Roseman 1994: 61 argues that the provision of distances given in days' sailing time, the investigation into ocean tides, and the interest in the passage to Celtica referred to in this extract are all characteristic features of the *On the Ocean* corpus. Thus, it can be safely assumed that Pytheas was the ultimate source of information for the extract. Contra Cunliffe 2002: 56-7, who postulates that Eratosthenes could have ascertained each of these details, with the exception of the last, from alternative sources, in particular the *Massaliot Periplus*. Cunliffe's argument seems the weaker of the two, as it ignores the various other thematically related citations of Pytheas. On days' sailing time, see Strabo 1.4.2-5; Plin. *HN*. 2.186-7. On the tides, see Plin. *HN*. 2.217; Aet. *Plac*. 3.17.3. On the passage to Celtica, see Strabo 1.4.3.

¹¹ Roller 2010: 219 notes that at Polyb. 3.57.3 there may be some hint of Eratosthenes' fuller treatment of Iberia, as Polybius cites unnamed authors who commented on the Pillars of Heracles, the Ocean and the mines of Iberia and Britain.

it for some reason. Scholars have varying opinions with regard to what exactly Pytheas meant by τὸ τὰ προσαρκτικὰ μέρη τῆς Ἰβηρίας εὐπαροδότερα εἶναι πρὸς τὴν Κελτικὴν ἢ κατὰ τὸν ὠκεανὸν πλέουσι. The most interesting theory, advanced recently by both Cunliffe and Roller, is that Pytheas made this statement in relation to his route of travel from Massalia; where, rather than sailing the long way around the Iberian Peninsula, he instead used a shortcut, travelling via an overland trade route from Narbo (Narbonne) in northern Iberia (southern France) to Burdigala (Bordeaux) near the Gironde Estuary.¹² According to this interpretation, the evidence that Pytheas sailed around Iberia is seen as dubious, with Roller suggesting that he may have visited the region at another point in his career.¹³ While this is of course a possibility, it is just as plausible that Pytheas did, in the interests of exploration, sail around the Iberian Peninsula from Massalia, although knowing that the overland route, extensively used by Massalioi travellers, was the easiest way to reach Celtica's Atlantic coast.¹⁴ Perhaps it was this overland route from Burdigala to Narbo that he in fact followed on his return journey home to Massalia, having already investigated Iberia. Certainly, it seems that this route in some way accounts for Pytheas' assertion.

Strabo's condemnation of Pytheas extended to the Massalioi's opinion on the geography of northwest Celtica. He is especially critical of how Pytheas conceived of a particular Celtic promontory, which Eratosthenes then incorporated into his world map:

δεῖν δὲ ἔτι προσθεῖναι τὸ ἐκτὸς Ἡρακλείων στηλῶν κύρτωμα τῆς Εὐρώπης,
ἀντικείμενον μὲν τοῖς Ἰβηρσι, προπεπτωκὸς δὲ πρὸς τὴν ἐσπέραν, οὐκ
ἔλαττον σταδίων τρισχιλίων, καὶ τὰ ἀκρωτήρια τὰ τε ἄλλα καὶ τὸ τῶν

¹² Cunliffe 2002: 57; Roller 2006: 69; Roller 2010: 219.

¹³ Roller 2006: 69.

¹⁴ On the archaeological evidence for the use of this route by Massalioi traders, see Cunliffe 2002: 54-8. Cunliffe 1988: 49-52 and Cunliffe 2001: 306-8 suggest that Pytheas may have aimed to establish direct contacts between tin traders in the area of Gironde and the mining region of Cornwall in Britain's southwest.

Ὠστιμίῳν, ὃ καλεῖται Κάβαιον, καὶ τὰς κατὰ τοῦτο νήσους, ὧν τὴν ἐσχάτην Οὐξισάμην φησὶ Πυθέας ἀπέχειν ἡμερῶν τριῶν πλοῦν. ταῦτα δ' εἰπὼν τὰ τελευταῖα οὐδὲν πρὸς τὸ μῆκος συντείνοντα προσέθηκε τὰ περὶ τῶν ἀκρωτηρίων καὶ τῶν Ὠστιμίῳν καὶ τῆς Οὐξισάμης καὶ ὧν φησι νήσων· (ταῦτα γὰρ πάντα προσάρκτια ἐστὶ καὶ Κελτικά, οὐκ Ἰβηρικά, μᾶλλον δὲ Πυθέου πλάσματα) ('It is still necessary to add, [says Eratosthenes], the bulge of Europe outside the Pillars of Heracles, lying across from the Iberians, and leaning to the west not less than 3,000 stadia, both the other promontories, and that of the Ostimioi, which is called Cabaeum, and the islands about it, the remotest of which, Ouxisame, Pytheas says is distant by a three days' sail. And after mentioning these last places, not stretching the length [of the inhabited world], he has added the regions around the promontories, of the Ostimioi, of Ouxisame and of the islands which he mentions; [for all these are northward and Celtic, not Iberian, but rather they are fictions of Pytheas]) (Strabo 1.4.5, Erat., fr. 37).¹⁵

Predominantly, scholars identify the promontory of Cabaeum as Pointe du Raz on the Armorican Peninsula in Brittany. Also, Ouxisame is usually associated with the island of Ushant, which marks the southern entrance to the English Channel.¹⁶ It seems that Eratosthenes, in interpreting Pytheas' data, erroneously believed Cabaeum and Ouxisame to project westward even farther than the Sacred Promontory. Strabo disagrees with this conception, stressing that though the promontory inhabited by the

¹⁵ The Ostimioi mentioned here were known to Julius Caesar as the Osismii: see Caes. *B Gall.* 2.34, 3.9, 7.75. They are distinct from a similarly named tribe (Ostidaioi), which Pytheas seems to have located somewhere east of the Rhine. Unfortunately, Strabo's narrative frequently confuses the two names. For discussion of this problem, see Mette 1952: 5, 16; Lasserre 1963: 107-13; Roseman 1994: 28-9, 39, 68, 122-3.

¹⁶ Roseman 1994: 123-4; Cunliffe 2002: 58-60; Roller 2010: 155-6.

Ostimioi certainly projected westward, it did not extend anywhere near as far as suggested by Pytheas and those who trusted him, namely Eratosthenes (Strabo 4.4.1).

It is evident that Strabo's conception of northern and western Europe was incompatible with that of Pytheas and Eratosthenes. It has been suggested that both Pytheas and Eratosthenes would have defined the regions along the Atlantic coastline of Europe rather imprecisely. Strabo, on the other hand, employed a rigid geographic framework. He perceived the Pyrenees and Rhine as parallel to one another, running north to south. West of the Pyrenees, was Iberia; extending in a northeast direction between the Pyrenees and the Rhine, was Celtica; and east of the Rhine, was the country of Germania (Strabo 2.5.27-30, 4.1.1).

The place of Britain in this framework is a curious issue. Strabo presents his own unusual view of Britain's orientation to the Celtic coast, and then proceeds to criticise Pytheas' contrasting opinion:

αὐτή τε ἡ Βρεττανικὴ τὸ μῆκος ἴσως πῶς ἐστὶ τῇ Κελτικῇ παρεκτεταμένη, τῶν πεντακισχιλίων σταδίων οὐ μείζων, καὶ τοῖς ἄκροις τοῖς ἀντικειμένοις ἀφοριζομένη. ἀντίκειται γὰρ ἀλλήλοις τὰ τε ἐῷα ἄκρα τοῖς ἐῷοις καὶ τὰ ἐσπέρια τοῖς ἐσπερίοις, καὶ τὰ γε ἐῷα ἐγγὺς ἀλλήλων ἐστὶ μέχρις ἐπόψεως, τό τε Κάντιον καὶ αἰ τοῦ Ῥήνου ἐκβολαί. ὁ δὲ πλειόνων ἢ δισμυρίων τὸ μῆκος ἀποφαίνει τῆς νήσου, καὶ τὸ Κάντιον ἡμερῶν τινῶν πλοῦν ἀπέχει τῆς Κελτικῆς φησι ('Britain is approximately the same length as Celtica and lies alongside it, being not greater than 5,000 stadia, and defining the opposite extremities [of Celtica]. For the eastern extremities of one lie opposite the eastern extremities of the other, and it is the same for the western extremities, and indeed their eastern extremities are near enough that they can be seen from one another, and that is Cantium and the mouths of the Rhine. But he [Pytheas] says that the length of the island appears to

be more than 20,000 stadia, and that Cantium is some days' sail distant from Celtica') (Strabo 1.4.3).

This passage demonstrates that Strabo thought the south coast of Britain to be precisely parallel to the Celtic coast, which ran northeast from the Pyrenees to the Rhine. This of course represents a significant divergence from the actual geography, where Kent (Cantium) lies opposite the town of Calais in France and Britain's southwest extremity, Land's End, lies roughly north of France's Armorican Peninsula. Strabo's conception of the spatial relationship between Britain and Celtica made it inconceivable to him that the Cabaeum promontory could extend far to the west above Iberia, as Britain's western extremity, opposite the Pyrenees, blocked such a path. Additionally, the jibe at Pytheas for his statement that Cantium was some days' sail distant from Celtica can be explained as a simple misinterpretation on the part of Strabo. Since no specific location in Celtica is mentioned, it could be that Pytheas was referring to a voyage from the west of Celtica to Cantium, whereas Strabo had heard of a much shorter route from the northeast of Celtica to Cantium (the Dover to Calais crossing).¹⁷

Eratosthenes' opinion on the orientation of Britain to the Celtic coast is not recorded in the extant fragments. However, the discussion thus far has shown Pytheas to be his main source for the geography of Europe's Atlantic coastline and beyond. Pytheas also provided some detailed information on the shape and size of Britain that would have been of great interest to Eratosthenes when constructing his map of the world. Our sources indicate that Pytheas circumnavigated Britain by boat and probably also made several excursions onto the British mainland.¹⁸ Furthermore, he estimated the

¹⁷ Roseman 1994: 27, 122-3 argues that the Dover to Calais crossing was not frequented until the Roman period. Cunliffe suggests that Pytheas reached Britain via a route from Brittany: see Cunliffe 2002: 71.

¹⁸ Strabo 2.4.1 provides a citation of Polybius, who condemned Pytheas for stating that he traversed all of Britain which was accessible by foot. Roseman 1994: 126 argues that 'Unlike the wilder portions of Europe, with which Polybius and Strabo were somewhat familiar, the British Isles had an ancient system of routes by which those traveling by boat had access to many areas of the land. Pytheas would have been

island's perimeter, measuring the length of the coastline in terms of the number of days sailed. These estimates of days' sailing time were subsequently transformed, using a simple formula, into stadia measurements by later writers, most likely including Timaeus and Eratosthenes.¹⁹ Strabo provides a citation of Polybius, which criticises Pytheas' estimate of Britain's perimeter, which is recorded as 40,000 stadia (Strabo 2.4.1, Erat., fr. 14). Pliny the Elder also notes an estimate derived from Pytheas, giving the circumference as 4,875 Roman miles, which, when converted back into stadia, corresponds very closely with the 40,000 mentioned in Strabo (Plin. *HN*. 4.102).²⁰

One of the most comprehensive ancient accounts of Britain's geography can be found in the fifth book of Diodorus Siculus' *Library of History*. Diodorus describes Britain as triangular in shape and records the length of each side: 7,500 stadia along the south coast, 15,000 along the east coast and 20,000 along the west coast, giving a total of 42,500 stadia for the perimeter (Diod. 5.21.3-4).²¹ Diodorus' figure for the west coast is the same as that which Strabo attributes to Pytheas for the length of Britain (Strabo 1.4.3). It can be inferred then that Pytheas was the ultimate source of Diodorus' information on the shape and size of Britain. Undoubtedly, Eratosthenes would have also had access to this same information. Thus, it is probable that he mapped the shape, size and location of Britain relative to the rest of Europe, basing it primarily, if not solely, on Pytheas' data.

able to touch land at a number of points along well-traveled sea routes, and to move inland along the pathways connecting river valleys with the coastal waters.'

¹⁹ Nansen 1911: 50-1; Cary and Warmington 1929: 40; Walbank 1979: 589.

²⁰ Roseman 1994: 88-9 notes that the perimeter of Britain in modern terms is 7580.02 kilometres. When converted into this form, Polybius' estimate equates to approximately 7500 km and Pliny's estimate to 7221.83 km.

²¹ Diod. 5.21-22 also provides some ethnographic material and details on tin extraction and trade in the Cornwall region, probably derived from Pytheas' own observations. If Pytheas believed Britain to be

6.2. PYTHEAS AND THE NORTHERN PARALLELS OF ERATOSTHENES' MAP

The corpus pertaining to Pytheas conveys an image of not just an explorer, but also a skilled scientist and astronomer. During his travels, he observed and analysed a wide variety of natural phenomena.²² He theorised about the tidal action of the Ocean and was the first Greek to discover that there was no Pole Star at the north celestial pole.²³ Important to the subsequent development of cartography were his observations, at various northerly locations, of the length of daylight at the summer solstice, the maximum elevation of the sun at the winter solstice and the ratio of the length of the shadow cast by a gnomon relative to its height at the summer solstice.²⁴ Dicks argues that Pytheas' astronomical observations significantly influenced Hipparchus' cartography: 'Hipparchus was enabled to calculate the latitudes and so obtain a truer picture of the northern part of the *οἰκουμένη* than Strabo or the rest of Pytheas' detractors had.'²⁵ It seems likely that Eratosthenes too, though not able to translate Pytheas' astronomical observations into degrees of latitude, was able to use the raw data to inform his mapping of northern parallels.

Our sources indicate that Pytheas provided information on the latitudinal position of his hometown Massalia. Strabo details a gnomon ratio recorded on the longest day of the year at Byzantium as 120:41 plus 4/5, with 15.25 equinoctial hours of daylight (Strabo 2.5.41). Additionally, he insinuates that this gnomon reading was in fact first made by Pytheas at Massalia and that Hipparchus believed this reading to

triangular in shape, then what we now know as the west coast must have been the hypotenuse, probably running in a northeast direction from Land's End to Scotland's northern tip.

²² Strabo 4.5.5 and 7.3.1 highlight Pytheas' interest in the observation of celestial phenomena and the application of mathematical theory (τὰ οὐράνια καὶ τὰ μαθηματικά).

²³ Dicks 1960: 180. For Pytheas' views on tidal action, see Plin. *HN*. 2.217; Aet. *Plac.* 3.17.3. For his observation of the north celestial pole, see Hipp. 1.4.1.

²⁴ On how the Greeks used celestial phenomena to calculate geographic latitudes, see Dicks 1960: 41-2; Aujac, Harley and Woodward 1987b: 150-1; Roseman 1994: 30-1; Berggren and Jones 2000: 3-10, 28-9.

²⁵ Dicks 1960: 180.

correspond with data which he had for Byzantium: ὄν γὰρ λόγον εἶρηκε Πυθέας τοῦ ἐν Μασσαλία γνώμονος πρὸς τὴν σκιάν, τὸν αὐτὸν καὶ Ἱππαρχος κατὰ τὸν ὁμώνυμον καιρὸν εὐρεῖν ἐν τῷ Βυζαντίῳ φησὶν ('For the ratio of the gnomon to the shadow, which Pytheas has recorded in Massalia, is the same as that which Hipparchus says he found at the same time of year in Byzantium') (Strabo 1.4.4).²⁶ Pytheas' observations at Massalia convinced Hipparchus that Massalia and Byzantium were located at the same latitude and that a parallel running through these two cities should be drawn on the world map (Strabo 2.5.8).²⁷

There is, however, no evidence explicitly linking Pytheas' observations at Massalia with Eratosthenes' northern parallels. In the fragments of Eratosthenes' *Geography*, there is mention of a parallel running through Lysimachia, Mysia, Paphlagonia, Sinope and the regions of Hyrcania and Bactria (Strabo 2.5.40, Erat., fr. 60). There is no extant record of Eratosthenes locating any sites along this parallel west of Lysimachia.²⁸ Lysimachia was situated only slightly to the southwest of Byzantium, the two cities separated from one another by less than one degree of latitude. Thus, it is tempting to think that Eratosthenes, with access to Pytheas' data, could have positioned Massalia on the same parallel as Lysimachia.²⁹ Perhaps Hipparchus then substituted

²⁶ Cf. Strabo 2.1.12, 2.5.8.

²⁷ In reality, Massalia (Marseille) is more than two degrees north of Byzantium (Istanbul): see Dicks 1960: 182-3; Roseman 1994: 53; Roseman 2005: 32.

²⁸ Roller 2010: 171 notes that 'it is astonishing that there was no point in Italy that could be used' to extend the Lysimachia parallel to the west.

²⁹ At Strabo 2.1.16, 2.5.8, 2.5.40, Byzantium and Massalia are said to be at the same latitude. In each instance, this identification is best attributed to Hipparchus or Strabo, rather than Eratosthenes. Thus, I disagree with Roller's assertion that Eratosthenes learnt from Pytheas that 'Byzantium and Massalia were on the same parallel, so Pytheas' travels north of Massalia could be connected to the prime meridian': see Roller 2010: 153. It should be noted that Eratosthenes did not place Byzantium on his prime meridian; instead, he located the Hellespont along it (Strabo 1.4.2). With Lysimachia situated on the Hellespont's northern coast, and therefore on the prime meridian, it would make more sense to speculate that Eratosthenes positioned Massalia and Lysimachia on the same parallel of latitude, so as to connect Pytheas' northern travels to the prime meridian.

Byzantium for Lysimachia, believing he had data which placed Massalia and Byzantium at the same latitude, more so than Massalia and Lysimachia. It may be because of this that Strabo does not cite Massalia in connection with Eratosthenes' Lysimachia parallel (Strabo 1.4.4, 2.1.12, 2.4.3). Though this scenario is highly speculative, it provides a reasonable case for Eratosthenes' use of the gnomon reading at Massalia. It seems slightly inconceivable that he would not have applied such an isolated and important example of observed astronomical data to his mapping of northern parallels.

Moving north from Massalia, Pytheas' material on latitudinal positions is obscured significantly by Strabo. Strabo asserts that Pytheas was wrong to establish Thule as the most northerly inhabited land of the οἰκουμένη. Alternatively, he argues that Ierne (Ireland) was the most northerly inhabited land, located north of Britain and 9,000 stadia distant from Hipparchus' Massalia-Byzantium parallel. Furthermore, he postulates that any regions north of Ireland are uninhabitable because of the cold. Therefore, Pytheas and those geographers who utilise his observations, namely Eratosthenes and Hipparchus, provided exaggerated north-to-south measurements and extended the northern boundary of the οἰκουμένη much too far north. Strabo outlines his argument accordingly:

ἐκ Μασσαλίας δὲ εἰς μέσην τὴν Βρεττανικὴν οὐ πλέον τῶν πεντακισχιλίων ἐστὶ σταδίων. ἀλλὰ μὴν ἐκ μέσης τῆς Βρεττανικῆς οὐ πλέον τῶν τετρακισχιλίων προελθὼν εὐροῖς ἂν οἰκήσιμον ἄλλως πως [τοῦτο δ' ἂν εἴη τὸ περὶ τὴν Ἰέρνην], ὥστε τὰ ἐπέκεινα, εἰς ἃ ἐκτοπίζει τὴν Θούλην, οὐκέτ' οἰκήσιμα. τίνι δ' ἂν καὶ στοχασμῷ λέγοι τὸ ἀπὸ τοῦ διὰ Θούλης ἕως τοῦ διὰ Βορυσθένους μυρίων καὶ χιλίων πεντακοσίων, οὐχ ὀρῶ ('It is not more than 5,000 stadia from Massalia to the middle of Britain. But advancing from the middle of Britain you would find not more than 4,000 stadia of land

inhabited in some kind of way [and this would be the region around Ierne], so that places farther beyond, about which he [Eratosthenes] extraordinarily locates Thule, are no longer habitable. But by what sort of guess could he [Eratosthenes] say that the distance from the parallel through Thule to that through the Borysthenes mouth is 11,500 stadia, I do not see') (Strabo 1.4.4).³⁰

Strabo's reference to the parallel through the Borysthenes mouth here introduces us to Pytheas' next possible influence on the northern parallels of Eratosthenes' map. It is evident that the Borysthenes parallel was first conceived of by Eratosthenes and then adopted by Hipparchus (Strabo 1.4.2, 2.5.8, Erat., fr. 35, 34). Hipparchus located the Borysthenes parallel approximately 3,700 (or 3,800) stadia from his Massalia-Byzantium parallel (Strabo 2.1.12, 2.1.16, 2.5.8). In this vicinity, Hipparchus noted that the longest day of the year had sixteen equinoctial hours, an observation which may have been ascertained from the Pontic Greeks in Olbia (Strabo 2.5.42). Also, Strabo quotes a passage from Hipparchus in which astronomical observations confirm the Borysthenes mouth to be located along the same parallel of latitude as the region of Celtica: φησὶ δὲ ὁ Ἱππάρχος κατὰ τὸν Βορυσθένη καὶ τὴν Κελτικὴν ἐν ὅλαις ταῖς θεριναῖς νυξὶ παραυγάζεσθαι τὸ φῶς τοῦ ἡλίου περιστάμενον ἀπὸ τῆς δύσεως ἐπὶ τὴν ἀνατολήν, ταῖς δὲ χειμεριναῖς τροπαῖς τὸ πλεῖστον μετεωρίζεσθαι τὸν ἥλιον ἐπὶ πήχεις ἐννέα ('At any rate Hipparchus says that in relation to the Borsythenes and Celtica, throughout all the nights in summer, the light of the sun shines dimly, circling round from west to east, and at the winter solstice the sun rises at the most nine cubits')

³⁰ Strabo 2.1.13, 2.5.8, 2.5.14 provide further insight into northerly latitudes and the notion that Ierne is the most northerly inhabited land. For a good discussion of Strabo's conception of the northern part of the οἰκουμένη, see Roseman 1994: 31-6, 43-5, 52-6. There is no mention of Ierne in the corpus pertaining to Pytheas. If, as many believe, he travelled up Britain's western coastline, then certainly he would have seen, or at least heard of, an island to the west. It is extremely unlikely that he would have located Ierne to the north of Britain, as Strabo did.

(Strabo 2.1.18). It is generally believed that Hipparchus derived this information from Pytheas, who probably made the astronomical observations somewhere on the north coast of Brittany.³¹ Hipparchus then equated Pytheas' data for Brittany with what he knew about the Borysthenes region. Again, though Eratosthenes must have known about Pytheas' observations in Brittany, the fragments of his *Geography* are silent on the matter. He certainly envisaged a parallel running through the Borysthenes, but the western extension of this is unknown. Nevertheless, that Eratosthenes conceived of a Borysthenes-Celtica parallel is certainly a distinct possibility.

Following Hipparchus' description of celestial phenomena at the latitude of Celtica and the Borysthenes mouth, Strabo quotes Hipparchus on several other astronomical observations obtained from Pytheas:

ἐν δὲ τοῖς ἀπέχουσι τῆς Μασσαλίας ἑξακισχιλίους καὶ τριακοσίους (οὓς ἐκεῖνος μὲν ἔτι Κελτοὺς ὑπολαμβάνει, ἐγὼ δ' οἶμαι Βρεττανοὺς εἶναι, βορειοτέρους τῆς Κελτικῆς σταδίοις δισχιλίους πεντακοσίους) πολὺ μᾶλλον τοῦτο συμβαίνειν· ἐν δὲ ταῖς χειμεριναῖς ἡμέραις ὁ ἥλιος μετεωρίζεται πήχεις ἕξ, τέτταρας δ' ἐν τοῖς ἀπέχουσι Μασσαλίας ἑνακισχιλίους σταδίου καὶ ἑκατόν, ἐλάττους δὲ τῶν τριῶν ἐν τοῖς ἐπέκεινα, οἱ κατὰ τὸν ἡμέτερον λόγον πολὺ ἂν εἶεν ἀρκτικώτεροι τῆς Ἰέρνης. οὗτος δὲ Πυθέα πιστεύων κατὰ τὰ ἀρκτικώτερα τῆς Βρεττανικῆς τὴν οἴκησιν ταύτην τίθησι, καὶ φησὶν εἶναι τὴν μακροτάτην ἑνταῦθα ἡμέραν ὥρων ἰσημερινῶν δέκα ἑννέα, ὀκτωκαίδεκα δὲ ὅπου τέτταρας ὁ ἥλιος μετεωρίζεται πήχεις ('Among those who are distant from Massalia by 6,300 stadia [whom Hipparchus supposes still to be Celts, but I think they are British, more northern than Celtica by 2,500 stadia] this phenomenon is much more evident; during the winter days, the sun rises six cubits, but it rises four cubits among those who are

³¹ Cunliffe 2002: 60-3. Strabo 2.1.12 provides further detail on the Borysthenes parallel, asserting that it

distant from Massalia by 9,100 stadia, and less than three cubits among those living beyond, who according to my account would be much farther north than Ierne. But Hipparchus himself, trusting Pytheas with regard to the regions south of Britain, establishes this land as inhabited, and says that the longest day there is nineteen equinoctial hours, but it is eighteen where the sun rises four cubits' (Strabo 2.1.18).

This passage shows that Pytheas observed and recorded celestial phenomena far north of the Borysthenes parallel. Roseman argues that the sun-heights and hours of daylight given correspond to latitudes near York and Heligoland (54° N), northern Scotland (58° N) and just north of the Shetland Islands (61° N).³² There is no evidence that either Eratosthenes or Hipparchus used these observations to establish parallels of latitude. Perhaps this was because they did not have access to records of celestial phenomena north of the Borysthenes mouth in Scythia and even farther to the east, which were needed in order to fix the eastern extension of each parallel.

The final place where Pytheas is reported to have made astronomical observations is Thule. Strabo quotes Pytheas on the latitudinal location of Thule: ὁ μὲν οὖν Μασσαλιώτης Πυθέας τὰ περὶ Θούλην τὴν βορειοτάτην τῶν Βρεττανίδων ὕστατα λέγει, παρ' οἷς ὁ αὐτός ἐστι τῷ ἀρκτικῷ ὁ θερινὸς τροπικὸς κύκλος ('So Pytheas of Massalia says that the very last regions are those around Thule, the most northerly of the Brettans, near which the summer tropic circle is the same as the arctic circle') (Strabo 2.5.8).³³ By this, Pytheas meant that the variable arctic circle and the latitude of Thule were the same distance from the Pole as the summer tropic was from the equator. Therefore, it appears that Pytheas located Thule at the equivalent of approximately 66°

ran through the τῆς Κελτικῆς παρωκεανίτιδος ('sea-coast of Celtica').

³² Roseman 1994: 43. Contra Cunliffe 2002: 98-100, 133, who postulates that Pytheas made these observations on the Isle of Man, the northern part of the Outer Hebrides archipelago and the Shetland Islands.

³³ Cf. Cleom. 1.4.208-10.

N. Relevant also is a passage from Geminus, which cites Pytheas in relation to observations of the length of daylight made in the northernmost regions of the οἰκουμένη (Gem. 6.8-9). Similarly, Pliny the Elder contends that at Thule during the summer solstice there were no nights, while during the winter solstice there were no days (Plin. *HN*. 4.104). Although this data is not linked explicitly to Pytheas, it is usually thought to derive from him due to the fact that very similar solstice information is cited elsewhere by Pliny in connection with Pytheas (Plin. *HN*. 2.186-7).³⁴

The data which Pytheas recorded on Thule's celestial phenomena had a definitive impact on Eratosthenes' map of the world. Based on Pytheas' observations, Eratosthenes depicted Thule as the northernmost land in the οἰκουμένη and drew a parallel through it, which formed the northern edge of his map. Strabo quotes Eratosthenes regarding the breadth of the οἰκουμένη, mentioning a few of the parallels on his map and their intersection with the prime meridian:

ἐξῆς δὲ τὸ πλάτος τῆς οἰκουμένης ἀφορίζων φησὶν ἀπὸ μὲν Μερῶς ἐπὶ τοῦ δι' αὐτῆς μεσημβρινοῦ μέχρι Ἀλεξανδρείας εἶναι μυρίους, ἐνθένδε εἰς τὸν Ἑλλήσποντον περὶ ὀκτακισχιλίους ἑκατόν, εἴτ' εἰς Βορυσθένη πεντακισχιλίους, εἴτ' ἐπὶ τὸν κύκλον τὸν διὰ Θούλης (ἣν φησι Πυθέας ἀπὸ μὲν τῆς Βρετανικῆς ἕξ ἡμερῶν πλοῦν ἀπέχειν πρὸς ἄρκτον, ἐγγὺς δ' εἶναι τῆς πεπηγυίας θαλάττης) ἄλλους ὡς μυρίους χιλίους πεντακοσίους ('Next, defining the breadth of the inhabited world, he [Eratosthenes] says that from the meridian at Meroë to the southern part as far as Alexandria it is 10,000 stadia, and from here to the Hellespont it is nearly 8,100 stadia, then to the Borysthenes it is 5,000 stadia, then to the circle through Thule [which Pytheas says is six days' sail distant from Britain to the north, and is near

³⁴ Cf. Mart. Cap. 6.595.

the frozen/congealed sea] it is another 11,500 stadia') (Strabo 1.4.2, Erat., fr. 35).

Eratosthenes' depiction of Thule is an issue worthy of further discussion. In the past, scholars have concerned themselves primarily with analysing Pytheas' description of Thule in order to discover its actual location and identity. The next section will deal critically with this issue, but will also consider what Thule meant to Eratosthenes, who was probably the first Greek to include Thule on a map of the world.³⁵

6.3. THULE

The true identity of Thule is a mystery. Various hypotheses have been put forward as to its location, including but not restricted to the Shetland Archipelago, the Faroe Islands, Iceland, the west coast of Norway and Greenland.³⁶ No other ancient explorer ever reached Thule, a fact which greatly troubled Strabo three centuries after Pytheas' voyage. He states that *καὶ οἱ τὴν Βρεττανικὴν Ἰέρνην ἰδόντες οὐδὲν περὶ τῆς Θούλης λέγουσιν, ἄλλας νήσους λέγοντες μικρὰς περὶ τὴν Βρεττανικὴν* ('Those who have seen Britain and Ierne do not talk about Thule, although speaking of other islands, small ones, about Britain') (Strabo 1.4.3). Elsewhere, Strabo, on the authority of Polybius, implies that Pytheas himself stated that he only knew about Thule from hearsay (*λέγειν ἐξ ἀκοῆς*) (Strabo 2.4.1). Of course, Polybius and Strabo were completely antithetical to the idea of Thule, and were therefore presupposed to believe that Pytheas did not reach the mysterious land. As has been discussed, Strabo thought

³⁵ Dicaearchus may have, at an earlier date, placed Thule at the top of his world map. However, the information relating to Pytheas' influence on Dicaearchus is so miniscule and ambiguous that no definitive answer can be provided: see Strabo 2.4.1-2.

³⁶ For discussion of the possible locations of Thule, see Bunbury 1879, vol. 1: 599-600; Nansen 1911: 43-73; Cary and Warmington 1929: 37; Hyde 1947: 129-31; Thomson 1948: 149-51; Dicks 1960: 179-82; Tozer 1964: 159-60; Hawkes 1977: 34-5; Whitaker 1982: 148-64; Dilke 1985: 136; Aujac, Harley and Woodward 1987b: 151; Romm 1992: 157-8; Roseman 1994: 157-8; Cunliffe 2002: 116-35; Roller 2006: 78-87.

that Ierne was the northernmost land of the οἰκουμένη, 9,000 stadia north of Hipparchus' Massalia-Byzantium parallel, and that any regions farther to the north would be uninhabitable on account of the cold (Strabo 1.4.4, 2.1.13, 2.5.8, 2.5.43). There is, however, another tradition which places Pytheas at Thule, with Cleomedes plainly emphasising that the Massaliot examined celestial phenomena there (Cleom. 1.4.208-10). As a matter of fact, the astronomical observations recorded by Pytheas afford the clearest indication that he actually visited Thule and personally observed the vast majority of what he described. Unfortunately, Strabo's dismissive approach toward Thule has obscured what Pytheas said about Thule's location and its place in Eratosthenes' cartography.

In antiquity, various authors attempted to identify Pytheas' Thule, but no consensus could be reached. By virtue of its enigmatic nature, Thule eventually became *Ultima Thule*, perceived as a figurative realm, rather than a real location, which signified the absolute limits of the world. Roller argues that 'Thule has become not only a major geographical crux from Hellenistic to modern times but a significant cultural paradigm, beginning in the Roman period. It became the stock formula for remoteness...'³⁷ This notion of *Ultima Thule* was substantially removed from Pytheas' Thule. Nonetheless, the evidence suggests that Eratosthenes conceived of Thule as a real and identifiable location, occupying an important place on his map of the world.

Scholarship on the identity of Thule can be divided into three main schools: those who believe Thule to be Iceland, those who believe it to be a portion of central Norway's coastline, perhaps in the vicinity of the Namdalen district, and those who believe it to be some other northern location. In the early twentieth century, Norway was the most popular location for Thule, but recently, the theory that Thule is Iceland

³⁷ Roller 2006: 78-9. On the cultural meaning of *Ultima Thule*, see Romm 1992: 121-71.

has gained prominence.³⁸ Norway and Iceland each match much of the evidence found in the testimonia and fragments of *On the Ocean*. Pytheas' positioning of Thule at the equivalent of approximately 66° N and his observation of extremely long days during the summer solstice are consistent with both proposed locations. Similarly, Pytheas' assertion that Thule is ἀπὸ μὲν τῆς Βρεττανικῆς ἕξ ἡμερῶν πλοῦν ἀπέχειν πρὸς ἄρκτον ('six days' sail distant from Britain to the north') is most likely an approximation that can be interpreted in favour of either alternative (Strabo 1.4.2, 2.5.8).³⁹

Pliny the Elder notes that the expedition to Thule began from the large island of 'Berrice', variously identified as an island in the Outer Hebrides, Orkney Islands, Shetlands, or Faeroes (Plin. *HN*. 4.104).⁴⁰ The stated direction and length of a voyage embarking from an island around the north of Scotland is often considered to suit perfectly a destination of Iceland, given the appropriate winds and currents. Moreover, the migratory path of the whooper swan between northern Scotland and Iceland is frequently believed to have served as a clear indicator to the local Britons and Pytheas that there was land far to the north.⁴¹ In contrast, Nansen argues that the six days' sail would better suit a voyage to Norway, as the currents and prevailing winds would have pushed Pytheas in a northeast direction toward the upper Norwegian coastline. Additionally, he suggests that the northerly course attributed to Pytheas' voyage need not indicate an exact heading. Rather, it may have simply meant that Thule was located

³⁸ The idea that Thule is Norway was compellingly advanced by Norwegian explorer and scholar Nansen and was subsequently supported by Cary and Warmington: see Nansen 1911: 43-73; Cary and Warmington 1929: 37. For arguments in favour of Iceland, see Dicks 1960: 179-82; Hawkes 1977: 34-5; Cunliffe 2002: 116-35; Roller 2006: 78-87. Dilke 1985: 136 argues that the Faeroe Islands are a more likely location for Pytheas' Thule. In the second century AD, the geographer Claudius Ptolemy equated Thule with Mainland in the Shetland Islands: see Ptol. *Geog*. 2.2.

³⁹ Plin. *HN*. 2.187 reiterates the idea that Thule is six days' voyage from the northern tip of Britain (*quod fieri in insula Thyle Pytheas Massiliensis scribit, sex dierum navigatione in septentrionem a Britannia distante*).

⁴⁰ Roseman 1994: 94; Cunliffe 2002: 127; Roller 2006: 78, 87.

⁴¹ Hawkes 1977: 34-5; Cunliffe 2002: 120, 127; Roller 2006: 81.

farther to the north at a higher latitude than Britain, which is a reasonable assumption given that Pytheas had no way of fixing his longitude and that, if sailing in overcast weather, he could not have determined his course through observation of the sun and stars.⁴²

Pytheas also described a few of Thule's topographic details, from which scholars have attempted to identify its location. Strabo, citing Pytheas, notes that Thule is ἐγγὺς δ' εἶναι τῆς πεπηγυίας θαλάττης ('near the frozen/congealed sea') (Strabo 1.4.2). Pliny is more precise, stating that the frozen/congealed sea is one day's sail from Thule (Plin. *HN*. 4.104). This 'frozen/congealed' sea is usually interpreted as a reference to drift ice, which Pytheas could have seen north of either Iceland or Norway. Alternatively, he may have only heard about this phenomenon from local informants in Britain or Norway.⁴³ Of interest also is Pytheas' reference, cited by Polybius, to a πλεύμονι θαλαττίῳ ἔοικός ('sea-lung'), complexly described as a suspended mixture of elements about Thule, which formed a barrier to any further travel (Strabo 2.4.1). This description has been variously explained as an allusion to jellyfish, ice-sludge, sea-fogs off the Norwegian coast, or a figurative, metaphysical depiction of conditions at the ends of the earth.⁴⁴ The figurative explanation is especially compelling, as it provides a context for Pytheas' claim, cited by Eratosthenes a few lines later, that ὁ δὲ καὶ μέχρι τῶν τοῦ κόσμου περάτων κατωπτευκέναι τὴν προσάρκτιον τῆς Εὐρώπης πᾶσαν ('he

⁴² Nansen 1911: 60-1.

⁴³ Nansen 1911: 67-8 asserts that it is implausible that Pytheas ventured far enough north of Norway to see drift ice. Instead, he suggests that Pytheas may have seen something like this but on a smaller scale if he wintered in Norway, or that the natives told him of the frozen sea to the north. Contra Cunliffe 2002: 127; Roller 2006: 85, who argue that Pytheas described drift ice in the vicinity of Iceland. Pytheas' description of the 'frozen/congealed sea' can be juxtaposed against the reference, in the Scholia to Apollonius of Rhodes, to a place around Thule where the sea 'boils' or 'breathes': see schol. Ap. Rhod. *Argon.* 4.761-5a. Roller 2006: 85 has interpreted this as an allusion to the volcanic activity of Iceland, but the meaning could also be metaphysical.

⁴⁴ For discussion of this issue, see Nansen 1911: 67-8; Cary and Warmington 1929: 37; Thomson 1948: 139; Romm 1992: 22-3; Roseman 1994: 127-31; Cunliffe 2002: 130-1; Roller 2006: 85-6.

had discovered the whole northern part of Europe as far as the limits of the cosmos') (Strabo 2.4.2).⁴⁵ None of this, however, provides authoritative evidence for where we should locate Pytheas' Thule.

There is another body of evidence which allows greater insight into Thule's identity. First, Pytheas' statement, quoted by Strabo, that Thule is τὴν βορειοτάτην τῶν Βρετανίδων ('the most northerly of the Prettans/Brettans') is of substantial import (Strabo 2.5.8).⁴⁶ It should be noted that, though Pytheas considered Thule to be part of the British Isles, the terminology used here does not make it clear whether he viewed Thule itself as an island. In fact, throughout the corpus, there is no definite identification of Thule as an island that can be traced back to Pytheas, which still leaves Norway as a possibility.⁴⁷ Pytheas' association of Thule with Britain and its surrounding islands could at first glance seem to rule out both Iceland and Norway as potential locations for Thule, given that both are far removed from what we know today as the British Isles. However, in the context of Pytheas' voyage, it may have been quite natural for either of these locations, six days' sail away from northern Scotland, to be considered part of the larger British group. More importantly, Thule's association with the British Isles implies that there was some form of communication between Thule and the inhabitants of Britain. The locals of northern Scotland must have known of Thule and it is most likely that some had travelled there. If this supposition is correct, then it is doubtful that Iceland was Pytheas' Thule. The archaeological record shows no evidence of human

⁴⁵ The 'sea-lung' concept may derive from Platonic and Aristotelian metaphysics: see Nansen 1911: 68; Roseman 1994: 127-9; Roller 2006: 85.

⁴⁶ In the passage referred to here the original manuscript reading was Πρεττανίδων: see Roseman 1994: 132.

⁴⁷ Nansen 1911: 62, arguing the case for Norway as Thule, suggests that even if Pytheas thought Thule to be an island, it would not be out of the ordinary for him to have mistaken a portion of the Norwegian coast as an island. He cites Pliny's confusion about whether or not Sweden was an island as a similar example: see Plin. *HN*. 4.96. Later writers certainly came to believe that Thule was an island: see Plin. *HN*. 2.187; Mart. Cap. 6.595.

habitation on Iceland at this time, meaning that the locals of northern Scotland would have had little reason to travel such a distance, unless of course they used the island as a base for seasonal hunting and fishing.⁴⁸ The coastline of central Norway, on the other hand, was occupied at this time by the indigenous Sami people, with whom the Britons may have had regular contact, perhaps for the purpose of trade and exchange, although the archaeological record is not forthcoming on this matter.

Whether or not Pytheas described Thule as inhabited is a contentious issue, which arises from two fragments of the Massaliot's work. The first, from Geminus, relates how indigenous locals conveyed celestial phenomena to Pytheas: Φησὶ γοῦν ἐν τοῖς Περὶ τοῦ Ὠκεανοῦ πεπραγματευμένοις αὐτῶ, ὅτι “ἐδείκνυον ἡμῖν οἱ βαρβάροι, ὅπου ὁ ἥλις κοιμᾶται” (‘He [Pytheas] says, for instance, among the things reported by him in *On the Ocean*, that the barbarians showed to us the place where the sun rests’) (Gem. 6.9). Although it is implied that Pytheas was present at a far north location where the sun is hidden for large parts of the day during winter, consistent with what he elsewhere reports about Thule, there is no explicit mention of Thule in this passage.⁴⁹ In the fourth book of his *Geography*, Strabo preserves a quotation from Pytheas which is of serious importance to the question of Thule's habitation. This quotation is at the end of a section where Strabo discusses in succession the geography of Britain, Ireland and Thule (Strabo 4.5.1-5). Strabo derides Pytheas, arguing that much of what he said about nearby places was fabricated, and therefore what he said about places farther away, namely Thule, must be even more unreliable (Strabo 4.5.5). Strabo then provides the following discussion to illustrate his point:

⁴⁸ This scenario is postulated by Roseman 1994: 157.

⁴⁹ After Geminus' quotation of Pytheas, there is a sentence stating that at this location the nights are extremely short, only two or three hours long. Some scholars attribute this explanation to Pytheas, suggesting that he was definitely talking about Thule, whereas others assign it to Geminus, arguing that Pytheas did not have the knowledge or equipment to determine the length of night so accurately. For a good overview of this problem, see Roseman 1994: 140-3.

τοῖς τῆ κατεψυγμένη ζώνῃ πλησιάζουσι τὸ τῶν καρπῶν εἶναι τῶν ἡμέρων καὶ ζῴων τῶν μὲν ἀφορίαν παντελῆ τῶν δὲ σπάνιν, κέγχρω δὲ καὶ ἀγρίοις λαχάνοις καὶ καρποῖς καὶ ρίζαις τρέφεσθαι· παρ’ οἷς δὲ σῖτος καὶ μέλι γίνονται, καὶ τὸ πόμα ἐντεῦθεν ἔχειν· τὸν δὲ σῖτον, ἐπειδὴ τοὺς ἡλίους οὐκ ἔχουσι καθαρούς, ἐν οἴκοις μεγάλοις κόπτουσι, συγκομισθέντων δεῦρο τῶν σταχύων· αἱ γὰρ ἄλως ἄχρηστοι γίνονται διὰ τὸ ἀνήλιον καὶ τοὺς ὄμβρους ([Pytheas says that] those people who are approaching on the chilly zone have a complete lack of some cultivated fruits and domesticated animals, and a scarcity of others, and that they are fed by millet and by wild vegetables, fruits and roots; and where there are grain and honey, the people obtain their drink also from them; and the grain, since they have no pure sunlit days, they thresh in large houses, after gathering together the ears there; for the threshing floors become useless because of the lack of sunshine and the rains’) (Strabo 4.5.5).

This account of human habitation and sedentary lifestyle has been interpreted as proving that Pytheas described Thule as inhabited, and therefore that Thule is Norway.⁵⁰ Many scholars, however, are sceptical, arguing that the term ἡ κατεψυγμένη (‘chilly zone’) has no geographical precision, and that perhaps Pytheas was referring generically to the lifestyle of people living in northern latitudes, rather than particularly to the inhabitants of Thule.⁵¹ Diodorus’ descriptions of the inhabitants of Gaul and Britain, which have some features in common with this passage, are often cited to affirm this

⁵⁰ Nansen 1911: 63-4; Cary and Warmington 1929: 37. The reference to honey, suggestive of the presence of bees, would rule out Iceland as a possible location of Thule, as bees are not able to live in Iceland’s climate on the fringe of the Arctic Circle. By way of contrast, the central Norwegian coastline extends far enough south to be within the range of bees.

⁵¹ Whitaker 1982: 160; Roseman 1994: 135-9; Cunliffe 2002: 132; Roller 2006: 81.

possibility (Diod. 5.21.5-6, 5.26.2-3).⁵² Nonetheless, this does not prove that Pytheas' account of human habitation was directed toward a locality other than Thule. In fact, there are several reasons why we should maintain Thule as the subject of Pytheas' comments.

Firstly, as has been mentioned, the whole narrative section from which this passage comes, is devoted specifically to Thule, and thus it would be natural for the reader to interpret Pytheas' words as applying to this same location. Secondly, the references to the extreme lack of sunshine are indicative of what is said about Thule elsewhere in the corpus.⁵³ Thirdly, Strabo presents the above description as an errant fabrication because it concerns a region which lies beyond his northern boundary of the οἰκουμένη. Since Strabo had just discussed the geography of both Britain and Ireland, the northernmost land of his οἰκουμένη, it must be presumed that Pytheas had described this 'chilly zone' as located farther to the north, leaving Thule as the most likely subject. More specifically, Strabo's objection to the 'chilly zone' is a reaction to Pytheas' description of it as inhabited. On various other occasions Strabo emphasises that the regions north of Ireland cannot sustain human habitation on account of the cold (Strabo 1.4.4, 2.1.13, 2.5.8, 2.5.43). Roseman shrewdly points out that 'If he [*Pytheas*] had specifically stated that Thule was not inhabited, Strabo might have been expected to mention this, as it would have provided some support for his own notions about the οἰκουμένη.'⁵⁴ Given the evidence, there seems to be sufficient grounds to argue that Thule was the main subject of Pytheas' inhabited 'chilly zone', and therefore that Thule is probably Norway.

⁵² Diod. 5.21.5-6 mentions the harvesting of grain in Britain's cold environment. Diod 5.26.2-3 describes Gaul's cold climate, the presence of honey and the brewing of beer from barley.

⁵³ See Plin. *HN*. 2.186-7, 4.104; Gem. 6.8-9; Mart. Cap. 6.595.

⁵⁴ Roseman 1994: 135. It should be noted that Strabo presents a biased Hellenocentric view of the world, in which civilised people, who live in large communities with cultivated crops and domesticated animals,

A new perspective on the question of Thule's identity can be provided by an analysis of how Eratosthenes conceived of this distant land. The fragments of Eratosthenes' *Geography* provide us with only a few details. Strabo indicates that Eratosthenes agreed with a great deal of Pytheas' account of Thule (Strabo 1.4.2-5, Erat., fr. 35, 37). Based on what he had learnt from Pytheas, Eratosthenes perceived Thule as the northernmost land of the οἰκουμένη. He located Thule at the very top of his world map. It was the defining landmass of his map's northernmost parallel of latitude, which was located 11,500 stadia north of the Borysthenes parallel and coincided with the variable arctic circle (Strabo 1.4.2, Erat., fr. 35). Thule, thus, was an integral part of Eratosthenes' οἰκουμένη and an important named location on his map. The fact that Eratosthenes so clearly included Thule within his οἰκουμένη and map suggests that Pytheas had described it as inhabited. This is because the Greeks understood the οἰκουμένη, as a geographic concept, to denote the world which they knew to be inhabited. Hence, the vast majority of toponyms included on maps of the world, like Thule, were used to refer to places and regions of human habitation.

Throughout the literature of Greek geography, various examples of this conception of the οἰκουμένη can be found. In the *Histories*, Herodotus often employs the participle of οἰκουμένη to describe densely populated land, while the noun is used in reference to regions thought to be at the terminal limit of human habitation.⁵⁵ The lands of the οἰκουμένη are set in direct contrast to ἔρημοι, destitute, uninhabitable tracts of land beyond the borders of the inhabited world.⁵⁶ Similarly, Xenophon uses οἰκουμένη

are found around the Mediterranean in the centre of the οἰκουμένη, while uncivilised, wild savages inhabit the world's edges. His descriptions of Ireland at Strabo 2.5.8 and 4.5.4 illustrate this point.

⁵⁵ For some good examples, see Hdt. 1.27.4, 1.170.3, 3.106.2, 3.114.1, 4.110.2, 5.73.3, 8.115.4.

⁵⁶ Berns 2002: 105 expertly sums up Herodotus' conception of a cultivated and populous οἰκουμένη surrounded by barren ἔρημοι: 'Herodot gliederte die Welt vielmehr in die bevölkerte und deshalb kommunizierende Oikumene, sowie die leeren, unbegrenzten Gegenden im Norden, Indien im Osten und Libyen im Süden. Über diese leeren Gegenden sei, da sie keine Bewohner hätten, kein Wissen verfügbar.'

to describe populous and cultivated land, especially those of city-states (Xen. *An.* 1.2.20; Xen. *Cyr.* 3.3.2). Furthermore, Aristotle defines the οἰκουμένη as the inhabited/inhabitable world, situated within the northern temperate zone of the earth and bordered by uninhabitable regions to the north and south (Arist. *Mete.* 362 a31-b9, 362 b27-8). Eratosthenes' perception of the οἰκουμένη, quoted by Strabo, also clearly entails human habitation: περὶ δὲ τῆς οἰκουμένης – καλοῦμεν γὰρ οἰκουμένην ἣν οἰκοῦμεν καὶ γνωρίζομεν ('But concerning the inhabited world, we call inhabited that which we inhabit and know') (Strabo 1.4.6, Erat., fr. 33). All this suggests that if Pytheas did not describe Thule as inhabited, then Eratosthenes would have excluded it from his map, which was described explicitly as a τὸν τῆς οἰκουμένης πίνακα ('map of the οἰκουμένη') (Strabo 2.1.1, Erat., fr. 47). He may still have mentioned Thule in his *Geography*, but he would have had no reason to consider it part of the οἰκουμένη and include it on his map of the world. It should be noted that the other extremities of Eratosthenes' map – Cerne in the west, the Cinnamon-producing country (Somaliland) and Taprobane in the south, and India in the east – were all known to be inhabited (Strabo 1.3.2, 1.4.2, 2.5.7; Plin. *HN.* 6.81, Erat., fr. 13, 35, 34, 76).⁵⁷ Thus, the evidence from the fragments of Eratosthenes' *Geography* implies that Pytheas must have described Thule as inhabited and supports the identification of Thule as Norway.

This chapter has drawn attention to the immense impact which Pytheas of Massalia's voyage had on Eratosthenes' map of the world. Pytheas provided valuable geographic information on a part of the world, about which, at the time, the Greeks only

⁵⁷ Cerne was a Carthaginian trading outpost off the coast of West Africa, possibly the modern-day island of Herne: see Cary and Warmington 1929: 48-50; Tozer 1964: 104-5; Walbank 1979: 638; Roller 2010: 127. Cerne was first introduced into Greek geography by the Carthaginian expedition led by Hanno. Berger 1880: 212 argues that Eratosthenes' knowledge of the southwest coastline of the οἰκουμένη was derived primarily from Hanno ('Im Bezug auf die Südwestküste der Oekumene folgte er dem Berichte des Hanno').

had very rudimentary knowledge. Also, an attempt has been made to introduce a new angle to the debate about the identity of Thule, using evidence from Eratosthenes' *Geography* to support the idea that it was an inhabited land.

CONCLUSION

Some concluding remarks are pertinent. As a whole, the modern scholarship concerned with Eratosthenes gives the impression that our understanding of his map of the world is comprehensive, having enough knowledge to reconstruct what it would have looked like to a high degree of accuracy. This is because the fragments of Eratosthenes' *Geography*, despite constituting only a small portion of the total work, are predominantly cartographic in nature, conveying a good spread and depth of information regarding how the οἰκουμένη should be drawn. As an adjunct, it is proverbial that Eratosthenes' map represented a significant departure from earlier Greek cartography. Scholars have frequently expounded that Eratosthenes was one of the first and foremost proponents of scientific cartography. Earlier maps were often ethnologically driven, communicating a Hellenocentric worldview in which the Greeks in the centre of map were juxtaposed against the barbarian peoples of the periphery. By way of contrast, Eratosthenes' parallels, meridians, ἄκραι, σφραγίδες and other cartographic systems are believed to have engendered a far more systematic and objective image of the world.

However, it should also be remembered that Eratosthenes' map of the world was a product of its sources. This thesis has shown that Eratosthenes was especially reliant on the geographic information recorded by early Hellenistic explorers. Thus, to truly comprehend the appearance and meaning of his map it has been necessary to ascertain how these explorers perceived the world and how Eratosthenes used their information and ideas to inform his own cartographic worldview.

It has been demonstrated that the influence of early Hellenistic explorers permeated almost every aspect of Eratosthenes' map. The system of parallels invented by Eratosthenes owed much to the astronomical observations and road surveys made by early Hellenistic explorers. Pytheas of Massalia was of immense importance, as his

observations of celestial phenomena established the latitudinal position of several sites in northern Europe. Similarly, the Ptolemaic explorer Philo used astronomy to confirm the latitudinal position of Ethiopia, and the same can be said for Nearchus, Onesicritus, Megasthenes and Deimachus with regard to India. The centrepiece of Eratosthenes' system, a line of zero latitude running from the Pillars of Heracles to the Himalayas, had its origins in the reports of Alexander's bematists. These men, as they marched across Asia, perceived the Taurus-Caucasus Mountains, stretching from Cilicia to India, as bisecting the continent in half. Furthermore, they recorded a multitude of distance estimates and perhaps also astronomical observations in the vicinity of the mountains. This allowed Eratosthenes, following Dicaearchus, to adapt the Taurus-Caucasus line so that it formed the basis of his map's main parallel.

Thorough analysis has indicated that the reports of early Hellenistic explorers were also fundamental to Eratosthenes' cartographic systems of regional division. Although the theory that the world was divided up into continents maintained currency during the Hellenistic Age and beyond, Eratosthenes' concepts of ἄκραι and σφραγίδες provided alternative ways of subdividing the world into comparatively small, manageable portions. The division of southern Europe into three ἄκραι can be traced back to Timosthenes of Rhodes. It would have been natural for a navigator, who had skirted around the whole of Europe's Mediterranean coastline, to perceive the three largest southerly extensions of the coast as the principal geographic features of the region. In contrast to Eratosthenes' system of ἄκραι, the concept of σφραγίδες, as far as we know, did not originate before Eratosthenes. There is no consistent correlation between the structures of the σφραγίδες and either the satrapies of the old Achaemenid Persian Empire or conventional ethnographic divisions. The σφραγίδες provided an original means to order and arrange the terrestrial space of the οἰκουμένη. Unusually, the first and archetypal sealstone was the one at the map's eastern edge, India. In all

likelihood, this was because with India having been a subject of Greek fascination and curiosity for centuries, early Hellenistic explorers had recorded a wealth of geographic information about it which was not available in such quality or quantity for the other three regions. In order to define India's outline and shape as a sealstone, Eratosthenes utilised extensively the primary accounts of Alexander's campaigns, the road surveys of the bematists and the reports of Seleucid officials. Each of these works commented on the dimensions of India. Eratosthenes was therefore able to project these dimensions onto his map of the world and plot India in spatial relation to the other σφραγίδες and the οἰκουμένη as a whole. His projection of the other three σφραγίδες owed a lot to the distance measurements which the bematists recorded between places, while travelling through Egypt, Mesopotamia, Iran and Central Asia.

Perhaps the most controversial aspect of this thesis is the discussion of how Eratosthenes conceived of and mapped the Caspian Sea. The theory that Eratosthenes depicted the Caspian Sea as a gulf of the Outer Ocean is an accepted fact of Classical scholarship. However, critical examination of the fragments of Eratosthenes' *Geography* shows that there is no firm evidence for such an inference. Scrutiny of the views of Herodotus, Aristotle, Alexander, Polycleitus and the bematists demonstrates that the opposing theory, that the Caspian was a landlocked sea, was prevalent among Eratosthenes' sources. Of all Eratosthenes' sources, the Seleucid explorer Patrocles is the only one known to have definitely believed that the Caspian was connected to the Outer Ocean. The evidence usually cited to prove that Eratosthenes subscribed to Patrocles' theory is far from conclusive. In fact, there is just as much reason to suppose that Eratosthenes followed his other sources, especially Alexander and the bematists, mapping the Caspian as an inland lake.

The profound impact which early Hellenistic explorers had on Eratosthenes' map of the world is epitomised by the case study on Pytheas of Massalia. Pytheas'

voyage throughout northern and western Europe was so unique and influential that it would not be far off the mark to assert that Eratosthenes' knowledge of this region was derived almost entirely from *On the Ocean*. Pytheas surveyed the Atlantic coastline of Europe at least as far as Jutland, circumnavigated Britain and travelled as far north as the land of Thule. His observations of celestial phenomena in these regions shaped his depiction of parallels of latitude north of Massalia. A rather more contentious issue concerns the identity of Pytheas' Thule. Eratosthenes included Thule as the northernmost named location on his map. Given that Eratosthenes concerned himself only with mapping the οἰκουμένη, the world known to be inhabited, it is highly likely that Pytheas described Thule as an inhabited land. Hence, the most suitable location for Pytheas' Thule is Norway rather than the then uninhabited Iceland.

Undoubtedly, early Hellenistic explorers changed the face of Greek cartography during the Hellenistic Age, enabling Eratosthenes to utilise new geographic information and develop cartographic systems that redefined how the Greeks viewed the world. With Eratosthenes' map, the world became a lot larger, as it was the first time that a Greek mapmaker had at his disposal a vast amount of geographic knowledge about places far from the centre of the map, such as Britain, Central Asia, India and Ethiopia. At the same time, however, the world would have seemed a lot closer and smaller, as these peripheral regions were now wholly included within the οἰκουμένη. The new, sophisticated cartographic systems which Eratosthenes integrated into his map would have given the viewer an impression that the world was thoroughly known and explored, as well as empirically measured, defined and mapped. By illuminating the source material which informed Eratosthenes' cartography, it is hoped that this thesis has supplied the reader with a vivid mental image of Eratosthenes' world map, more complete and nuanced than previously imagined.

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