

# The Iberian Peninsula in Ptolemy's Geography

ORIGINS OF THE COORDINATES  
AND TEXTUAL HISTORY

Olivier Defaux

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CLAUDIUS PTOLEMY composed his *Geography* in the city of Alexandria, one of the most prominent intellectual centres of the Roman Empire. His work offers a comprehensive description of the known world as well as insight into the practice of scholarly geography during the second century CE. Ptolemy's most important innovation in this field was his use of geographical coordinates to create maps of the world, and his catalogue, with its latitudes and longitudes of thousands of localities, is one of our most valuable sources on the antique *oikoumenē*. Very little is known, however, about the sources and working methods that Ptolemy employed to produce his *Geography*. This book focuses on Ptolemy's description of the Iberian peninsula and examines two problematic and interlinked topics relating to the origins of the catalogue of localities: Ptolemy's sources and scientific methods on the one hand, and the textual transmission of the *Geography*, from Ptolemy to the extant manuscripts, on the other.





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## Preface

This book is the result of a three-year doctoral research project that was conducted between February 2013 and January 2016 within research area D (Group D-1 ‘Space of Nature’) of the Excellence Cluster EXC 264 Topoi, Berlin. Group D-1 was devoted to the study of the natural sciences and their development in Antiquity, and was led by Gerd Graßhoff and Mathieu Ossendrijver. The thesis was part of a doctoral programme (History of Ancient Science) offered by the Berlin Graduate School of Ancient Studies and was funded by a research grant awarded by the Excellence Cluster Topoi.

The present study on Ptolemy’s *Geography* is part of a long-term research project initiated by the Ptolemy Research Unit of the University of Bern, Switzerland, which gave rise to the 2006 edition of Ptolemy’s *Geography*, and the Ancient Cartography project of the university’s former Karman Center for Advanced Studies in the Humanities. It is thanks to these two projects that the research material and the scientific basis for further studies of Ptolemy’s *Geography* were updated and strengthened, thereby considerably influencing my work.

I owe thanks to a great many people without whom this thesis would not have been possible. First of all, I am indebted to Gerd Graßhoff for having given me the opportunity to carry out this project; his guidance and steadfast support were greatly appreciated. Special thanks go to Elisabeth Rinner for providing me with substantial and crucial technical assistance, and to Mathieu Ossendrijver for his help and support. I am also deeply grateful to Pascal Arnaud and Jehan Desanges for their early encouragement and help, and to all my colleagues at the Excellence Cluster Topoi, especially Anette Schomberg, Émilie Villey and Fabio Guidetti, as well as to members of the administration and fellow doctoral and postdoctoral students for their day-to-day support and for the many stimulating and enriching discussions we shared. In addition, I would like to thank Carmen Marcks-Jacobs, coordinator for Humboldt University students at the Berlin Graduate School of Ancient Studies, and Roberto Lo Presti, History of Ancient Science programme coordinator, for the assistance they gave me on the doctoral programme. My thanks go also to members of the Edition Topoi team, especially Nadine

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Olivier Defaux

# Introduction

In the minds of many modern scholars, Ptolemy's *Geography*, which was written in the second century of the Common Era (CE), is a document that provides almost direct access to the known world of his time. It acts as a portal to the Roman Empire at the height of its power – the world of Trajan, Hadrian and Antoninus – to its countries with their numerous cities and harbours, crossed by roads, bridges and aqueducts, to oceans sailed, as far as the British Isles in the west and China in the east, taking Rome's greatness well beyond the frontiers of the *Imperium*.

Above all, Ptolemy's maps allow us to indulge in our fantasies. There is a strong tendency to project on to Ptolemy some of our modern geographical and cartographical practices: historians like to find in Ptolemy's *Geography* a pictorial representation of the Antonine world, while archaeologists are often tempted to use his data to rediscover lost or forgotten cities. The incredible modernity of Ptolemy's approach is surely responsible for these temptations. Ptolemy developed new ways of drawing a globe on to a plane surface and he proposed a method for determining the position of any place on Earth by the means of measuring instruments and by making celestial observations. Most importantly of all, though, he was the first to arrange, in a unique table, the geographical coordinates (the longitude and latitude) of several thousand localities, from the most prestigious Mediterranean cities to obscure tributaries flowing through the lands of Scythia.

In the foreword to her 1993 book on the second-century geographer, Germaine Aujac wrote that 'Ptolemy is an author about whom much is said but who one rarely reads.'<sup>1</sup> This regrettable state of affairs was rectified after the publication of the English translation of parts of Ptolemy's *Geography* by J. Lennart Berggren and Alexander Jones in 2000 and the critical edition of the entire Greek text of the work, edited by Alfred Stückelberger and Gerd Graßhoff, in 2006, both of which gave rise to a formidable number of publications in a relatively short period of time. More than twenty years after Aujac

1 Aujac 2012 (first edition 1993), 5: 'Ptolémée est un auteur dont on parle beaucoup, mais qu'on lit peu.'

made this statement, one can now rightly say that Ptolemy is an author about whom much has been written, although his work remains poorly understood.

The principal objective of this study is to redefine Ptolemy's *Geography* as a historical source of the second century CE in order to improve our understanding of its specificity and to draw attention to how mathematical geography was practised in Antiquity. As long as the latter issue remains unresolved, all modern attempts to interpret or uncover the antique *oikoumenē*, that is, the then known world from the *Geography* are likely to fail.

Ptolemy was the heir to the geography practised by Eratosthenes and Hipparchus during the Hellenistic period. As such, his goal was to produce a map of the world on which each country could be shown in proportion to other countries and to the *oikoumenē* as a whole and on which each locality could be correctly situated with respect to all the other localities. Furthermore, it was imperative that such a map was easy to draw and could be reproduced with the minimum of errors. To this end, Ptolemy wrote a handbook dedicated to cartography, the central part of which comprises a list of localities with their coordinates in the form of a catalogue. This was, he believed, the most reliable way of fulfilling his cartographical objectives. As long as an appropriate grid of parallels and meridians was available, anyone could use the coordinates to mark down localities and draw coastlines and territories in exactly the same way that Ptolemy had done.

Very little is known, however, about the geographical sources and the working methods that Ptolemy employed to produce his *Geography*. Although he was the first geographer to put together a list of coordinates, he mentions very few of his sources, which is particularly surprising considering that he included so many areas on his maps. This could give the impression that all the information he provided came somehow *ex nihilo*. His methodological explanations were mainly focused on the *ideal* way of determining a locality's coordinates, but he himself admitted that he had not been able to do this for each locality listed in his catalogue. One is, therefore, confronted with a source that appears radically different from other antique geographical works but whose origins are extremely unclear.

Modern historians tend to make a certain number of assumptions on Ptolemy's sources and methods, interpreting some of the author's assertions in the introduction to the *Geography* without really being able to demonstrate how Ptolemy's explanations allow us to reconstruct the origins of the coordinates. In any examination of Ptolemy's sources and methods, the list of localities and the coordinates themselves need to be the main research topics.

Ptolemy's catalogue of localities is, however, a hybrid document, comprising both text and a great amount of numerical data. The methods used to study the catalogue

and, above all, to establish the *Geography's* text thus needed to be adapted. The textual history of each antique work is unique, with its own particularities and difficulties. The transmission history of Ptolemy's *Geography* is well known from the epic story of Maximus Planudes, a Byzantine scholar who claimed that he 'rediscovered' Ptolemy's *Geography* – which was said to have been lost for centuries – after an arduous quest in Constantinople at the end of the thirteenth century. This so-called rediscovery revived scholarly interest in Ptolemy and in antique geography in general during the Quattrocento. Whether the *Geography* 'disappeared' or not (its disappearance certainly needs to be qualified), the oldest extant manuscripts of the *Geography* all date to the period of Planudes, which means that virtually nothing is known of the *Geography's* textual transmission from the time of its creation to its supposed rediscovery – a period of more than eleven centuries. Moreover, the text was passed down in two quite different versions; the very existence of dissimilar manuscripts is still being discussed, while the role of each primary manuscript in the production of critical editions of the *Geography* always arouses intense debate.

Instead of treating these two themes separately – that is, searching for the most reliable textual basis and studying the origins of Ptolemy's coordinates – it became clear that it would only be possible to achieve a better understanding of these two features if they were examined together. Unravelling the origins of Ptolemy's coordinates thus required a dialectical investigation into both the origins of the *Geography* and the best way to establish the text.

Ptolemy's *Geography* contains far too many localities and coordinates to be studied in its entirety. Therefore, this study focuses on Ptolemy's description of Iberia (that is, the Iberian peninsula in modern terms), which was a well-defined geographical feature in the second century CE. Ptolemy's map of Iberia is certainly one of the most accomplished parts of the *Geography*: it deals with more than 500 toponyms and their coordinates and offers a solid foundation from which comparisons can be made with other geographical sources of Antiquity as well as providing a substantial set of localities with which to test hypotheses and develop a model that explains how Ptolemy determined his coordinates. However, although the traditional methods of textual criticism allow us to understand the textual transmission to a certain extent, they fail to clarify many other problematic aspects. In particular, they are of limited use when it comes to developing a model to help shed light on Ptolemy's methods and sources.

It has, therefore, proved necessary to develop a new approach in order to complement the knowledge gained by the philological, codicological and palaeographical analyses undertaken. In her 2013 study on the genesis of the coordinates of the localities of Asia Minor listed in the *Geography*, Elisabeth Rinner developed an innovative procedure for improving our understanding of the way Ptolemy constructed his maps and deter-

mined the geographical coordinates. Her proposal of a model to elucidate Ptolemy's work and sources constitutes real progress in research on the *Geography*. From the clearly visible distortions that appear when one compares Ptolemy's coordinates with their equivalent modern-day locations, Elisabeth Rinner constructed a model (based on antique sources and precise procedures) that explains the origins of the coordinates in the light of these distortions. In this study, the localities of Ptolemy's Iberian peninsula are analysed following Rinner's methodological principles.

This book has, therefore, been divided into three main interlinked sections. The first part focuses on the particularities of the *Geography*'s text as it has been transmitted: it presents Ptolemy's writings within their historical context and the key characteristics of his geographical project (Chapter 1); investigates the historiography of the *Geography*'s textual transmission, including new evidence on its complex history (Chapter 2); and examines Ptolemy's Iberia in relation to the *Geography*'s primary manuscripts (Chapter 3). The objective of the second part of this book is to improve our understanding of the links between Ptolemy and his sources and geographical method as well as to show how it is possible to analyse these links using an appropriate research method. This section deals, therefore, with the information given by Ptolemy in the introduction to the *Geography* (Chapter 4), the extant sources pertaining to the Iberian peninsula in Antiquity (Chapter 5) and the development of a research method that could be used to investigate both Ptolemy's sources and his geographical methods (Chapter 6). The third and final part of this study examines the origins of Ptolemy's map of Iberia, analysing, in two stages, the coordinates of the peninsula's coastal localities (Chapters 7 and 8) and those of the inland localities (Chapter 9).

## Signs and abbreviations

### Manuscripts of Ptolemy's *Geography*:

A	Vaticanus Palatinus graecus 388
B	Florentinus Laurentianus Pluteus 28.38
C	Parisinus suppl. graecus 119
D	Parisinus graecus 1402
E	Parisinus graecus 1403
F	Fabricianus Bibliothecae Universitatis Hauniensis 23,2°
K	Constantinopolitanus Seragliensis GI 57
L	Athous Vatopedinus 655/British Library Additional 19391/ Parisinus suppl. graecus 443A
O	Florentinus Laurentianus Pluteus 28.49
P	Florentinus Laurentianus Pluteus 28.42
R	Venetus Marcianus graecus Z. 516 (coll. 904)
S	Florentinus Laurentianus Pluteus 28.9
U	Vaticanus Urbinas graecus 82
V	Vaticanus graecus 177
v	Londoniensis Codex Burney 111
W	Vaticanus graecus 178
X	Vaticanus graecus 191
Z	Vaticanus Palatinus graecus 314
Ω	all or most of the manuscripts of the Ω recension
Ξ	Ξ recension
U <sup>t</sup> , K <sup>t</sup> , R <sup>t</sup> and O <sup>t</sup>	Maps in manuscripts U, K, R and O

in ⟨ ⟩	addition to fill a gap in the text
in [ ]	addition to explain the translation
[...]	omission of a part of a text or a translation
in † †	corrupted passage
<i>Alm.</i>	Ptolemy, <i>Almagest</i>
Appian, <i>Ib.</i>	Appian of Alexandria, <i>History of Rome</i> , 'the Wars in Spain'
<i>c.</i>	<i>circa</i>
Caesar, <i>Bell. Civ.</i>	Julius Caesar, <i>The Civil War</i>
<i>Chrest.</i>	<i>Chrestomathies</i> from Strabo
<i>CIL</i>	<i>Corpus Inscriptionum Latinarum</i>
cod., codd., codd. cett.	manuscript, manuscripts, the other manuscripts
conj.	conjecture
Const. Porphy. <i>De adm. imp.</i>	Constantine VII Porphyrogenetos, <i>De administrando imperio</i>
corr.	correction
<i>Eux.</i>	<i>Periplous of the Euxine Sea</i>
f.	folio
Fig.	figure
<i>Geogr.</i>	Ptolemy, <i>Geography</i>
GGM <sup>1</sup>	K. Müller, <i>Geographi Graeci Minores. Volumen Primum</i> , 1855
GGM <sup>2</sup>	K. Müller, <i>Geographi Graeci Minores. Volumen Secundum</i> , 1861
<i>It. mar.</i>	<i>Itinerarium maritimum</i>
<i>It. prov.</i>	<i>Itinerarium provinciarum</i>
Marcian, <i>Epit. Men.</i>	Marcian of Heraclea, <i>Epitome of Menippus' Periplous</i>
Marcian, <i>Per. mar. ext.</i>	Marcian of Heraclea, <i>Periplous of the Outer Sea</i>
Mela	Mela, <i>De Chorographia</i>
om.	omit(s), omitted
<i>P. Artemid.</i>	'Artemidorus Papyrus'
Pl.	Pliny, <i>Natural History</i>
Ps.-Scylax	Pseudo-Scylax, <i>Periplous</i>
r.	recto
<i>Rav.</i>	<i>Ravenna Cosmography</i>
RE	<i>Realencyclopädie der classischen Altertumswissenschaft</i> , 1894–1978
<i>Stadiasmos</i>	<i>Stadiasmos of the Great Sea</i>
St. Byz. <i>Ethn.</i>	Stephanus of Byzantium, <i>Ethnika</i>
Str.	Strabo, <i>Geography</i>
s.v.	<i>sub voce</i> , under a specified word
<i>Tab. Peut.</i>	Peutinger Map
v.	verso
ε	obliquity of ecliptic
φ	latitude
λ	longitude

## Note on translations and the usage of terms

Most of the quotations used in this book are translations that have been modified by the author. They include: the quotations from the *Geography* and the *Almagest* that were taken from Berggren and A. Jones 2000 and Toomer 1984 respectively; the quotations from Strabo's *Geography* and Pliny's *Natural History* that were taken from the Loeb Classical Library series; and the quotations from Pomponius Mela that were taken from Romer 1998. The English translation of Strabo carried out by Roller 2014 was occasionally consulted. In all the other cases, the quotations were translated by the author, unless otherwise stated.

Transcribing Greek or Latin toponyms, translating Greek technical words and concepts are always delicate tasks. Perfect and consensual solutions rarely exist while translations are often debatable. How should one translate the city's name Καρχηδῶν Νέα? Karchēdōn Nea (one possible transliteration)? Carthago Nova (the Latin name)? New Carthage (a translation of the name)? Cartagena (the modern name of the city)? Usages and transcribing practises have changed over the time, particularly the last ten years. Greek toponyms, proper nouns or even technical words are more and more transcribed very closely from the Greek (in articles as well as in English-speaking reference manuals), whereas the common practice in the twentieth century was to Latinise or anglicise as much as possible.<sup>1</sup> As far as geographical proper nouns are concerned, there are issues that concern the antique geography in general and other that are specific to Ptolemy's text: Ptolemy wrote in Greek but most of the toponyms and ethnonyms of the Iberian peninsula he was dealing with are not of Greek origin but have Celtic and Latin roots. Moreover, many of these names are known only thanks to him, whereas the manuscripts of his *Geography* sometimes give different spellings.

One often needs to distinguish between the name of the antique locality used by Ptolemy and the modern name of the same locality (though more familiar to the reader). Both names can be well-known and well-identified but they always designate different things: a historical entity on one hand, a modern, geographical reality on the other. It is often useful to preserve the Greek or Latin spelling to help readers to avoid confusion. To translate the name of Ταρράκων mentioned in Ptolemy's *Geography*, for instance, I preferred to use 'Tarraco', which is the widespread Latin spelling at Ptolemy's time rather than 'Tarragona', the modern Spanish name of the city, used today in English.

When possible and when it makes sense, I hence used the Latin equivalent of Ptolemy's toponym or ethnonym, which remains the common practice in English literature: 'Caesaraugusta' instead of 'Kaisaraugosta', 'Carthago Nova' instead of 'Karchēdōn Nea', the 'Carpetani' instead of the 'Karpētanoi'. It is also useful when the manuscripts of

<sup>1</sup> See pertinent remarks in Evans and Berggren 2006, 108–109 and Roller 2014, 30–34.

the *Geography* give slightly different spellings, for instance 'Baelo' while the manuscripts give Βαίλων or Βέλων. I mostly used endings with '-um' rather than '-on' ('Interamnium' for 'Interamnion' for example). Sometimes, when the toponym is unknown outside Ptolemy's *Geography*, I chose a transcription very close to Ptolemy's spelling, such as 'Alōnai' (Αλωναί) or the 'Cape of Charidēmos' (Χαριδήμου ἀκρωτήριον). Some antique names mean something very concrete in Greek or Latin. These cases are, admittedly, rare in the Iberian peninsula. I kept the translated name when it is common in modern literature – 'Sacred Cape' for Ἱερὸν ἀκρωτήριον, for instance.

Antique names can sometimes be used nowadays to designate something different than in antique sources, which is particularly frequent for names of areas. For example, 'Cantabria' does not cover the same territory in the mind of Strabo, Ptolemy, for the Roman administration in the second or the fifth century CE, and does not match of course the modern Spanish autonomous community of the same name. In the Greek texts of Antiquity, the name Λιβύη ('Libyē') denotes the African continent in the modern sense – or at least, the part of the continent that was known at the time. Ptolemy uses the term 'Africa' (Ἀφρική) to refer to the Roman province of the same name. When dealing with the African continent, I kept the transcription 'Libyē' to avoid confusion with modern Libya. In general in this book place names refer to the antique entity whereas the modern equivalent is often precised in brackets if applicable.

A certain number of technical words related to the antique geography and cartography are problematic. In some tricky cases, they have had several meanings in the Antiquity (each author rarely made his own usage explicit), they gave birth to words that survived and used today to denote different modern concepts. There are basically three possible strategies dealing with these terms: translating the terms into English, transcribing them or using the word as is (that is, in Greek or Latin). The important words are explained in any case, whether in the main text or in footnotes.

For some widespread words, the most common translation has been preferred, such as: 'geography' for γεωγραφία, 'map' for πῖναξ, 'city' for πόλις and 'people' for ἔθνος. The translations for the last two words in particular can be debated, since their respective meanings in Antiquity were very variable depending on the context. Ptolemy, however, used them relatively loosely: under πόλις he understood any kind of settlements while ἔθνος could correspond to 'people', 'tribe', 'nation', 'community', disregarding the administrative or political connotations and status that these two Greek words can take. More precisely in the *Geography*, πόλις tended to be given to any inhabited location identifiable on the map by a point with two coordinates, whereas ἔθνος covered, in Ptolemy's mind, a territory, a portion of the map. The translations 'city' and 'people' are hence questionable but remain identifiable for the modern reader and make the best of Ptolemy's binary approach.

For a certain number of technical words I used transcriptions that have often imposed in modern publications: *periplous* (περίπλους), *klima* (κλίμα), *oikoumenē* (οικουμένη). I preferred ‘stadion’ (plural ‘stadia’) to ‘stade(s)’ or ‘stadium’ to transcribe the length unit στάδιον. However, I stuck to the widespread names *Geography* and *Almagest* for Ptolemy’s works, although one observes in modern scientific publications a certain resurgence of popularity for transcribed titles (‘Geographike Hyphegesis’ and ‘Mathematike Syntaxis’). Finally, in very few cases the word in the original language has been preserved (*circulus*, περιορισμός, διόρθωσις, ύπογραφή for instance).



# I Ptolemy and the *Geography*

## 1.1 Ptolemy: astronomer, astrologer and geographer

Like Eratosthenes three and a half centuries before him, Claudius Ptolemy (c. 95 – c. 170 CE) was a polymath who produced several high-quality scientific works that were considered authoritative for many centuries. An astronomer and astrologer first, Ptolemy turned to the discipline of geography relatively late in his life. Thus, in order to understand the specificity of Ptolemy’s *Geography*, it is necessary to present the writings of the scholar in their wider scientific and historical contexts.<sup>1</sup>

### 1.1.1 Biographical elements

As is the case for many authors of Antiquity, the little that is known about Ptolemy’s life comes, for the most part, from inferences from his own writings. In the *Almagest*, Ptolemy mentions that he made several astronomical observations between 127 and 141 CE.<sup>2</sup> A lunar eclipse that took place in 125 CE and that is quoted in the *Almagest* might also have been observed by Ptolemy – as is sometimes stated in modern publications<sup>3</sup> – although there is nothing in the text to corroborate this.<sup>4</sup> The so-called Canobic Inscription suggests that Ptolemy was active as an astronomer in the tenth regnal year of

- 1 The heading of this section was inspired by the work of G. Aujac, *Claude Ptolémée. Astronome, astrologue, géographe : Connaissance et représentation du monde habité*, which was first published in 1993 and remains one of the few attempts to synthesise the many facets of Ptolemy’s work by setting it in its scientific and historical contexts.
- 2 He writes that he observed Saturn reaching opposition to the Sun in the eleventh year of the reign of Hadrian (*Alm.* 11.5) and that he measured Mercury at its greatest elongation from the Sun in the fourth year of Antoninus (*Alm.* 9.7). The other personal

observations that he cites all fall within this period. See Burri 2013, 9; Toomer 1984, 1–2.

- 3 Stückelberger and Graßhoff 2006, 9; Aujac 2012, 9.
- 4 *Alm.* 4.9: ‘The second eclipse we used is the one observed in Alexandria in the ninth year of Hadrian [...]’. Compare the impersonal formulation in the sentence just quoted ‘τὴν τετηρημένην [ἔκλειψιν]’ (‘the one observed’) with the more personal ‘ἔτηρησαμεν ἡμεῖς’ (‘we observed’), which is what Ptolemy typically uses when referring to his own observations. See p. 172.

Antoninus Pius (146/147 CE), but it is generally believed that the *Almagest* was written after this date.<sup>5</sup>

The secondary sources that contain information on the life of Ptolemy – mostly Greek and Arabic notes from the Middle Ages – are of unequal value.<sup>6</sup> Besides the many sources that confuse Ptolemy with one of the Ptolemaic rulers of Hellenistic Egypt,<sup>7</sup> several of them also have Ptolemy alive during the reign of Marcus Aurelius (161–180 CE), even though it was commonly known that Ptolemy was active during the reigns of Hadrian (117–138 CE) and perhaps also of Antoninus (138–161 CE). According to the mid eleventh-century Egyptian scholar Abū al-Wafā' Mubashir ibn Fātik, Ptolemy lived for seventy-eight years. Even though his testimony is not free of disputable details, there is no objective reason to reject categorically this piece of information.<sup>8</sup>

In summary, it is reasonable to postulate that Ptolemy was born around the turn of the first and second centuries CE and that he died around the middle of the reign of Marcus Aurelius. From his first name Κλαύδιος (Claudius), one can also surmise that he had Roman citizenship. It is clear that he spent much of his life in Egypt, in particular in Alexandria.<sup>9</sup> He began his scientific work during the reign of Hadrian and was possibly still active under the rule of Marcus Aurelius. Almost nothing, however, is known about his scientific education.

- 5 Burri 2013, 9–10 and 23. The textual history and meaning of the Canobic Inscription are still being debated, although several publications claim to have now demonstrated its authenticity (see Hamilton, Swerdlow, and Toomer 1987). It is a votive inscription, erected at Canopus (to the north-east of Alexandria), containing the numerical results of Ptolemy's research. Since 'in the *Almagest*, Ptolemy repudiated some of the data in the inscription' (A. Jones 2013, 1299), many scholars have deduced that the *Almagest* was written after this date. However, the content of the inscription is known only through transcriptions in the medieval codices of the *Almagest*. The text of the inscription was edited by Heiberg 1907, 149–155, on the basis of three manuscripts: the Venetus Marcianus gr. Z. 313 (coll. 002) (ff. 28v–29r), the Parisianus gr. 2390 (ff. 13v–14v) and the Vaticanus gr. 184 (ff. 23v–24v).
- 6 Two recent and comprehensive synopses of biographical testimonies are provided by Gamba 2000 and Burri 2013, 11–19.
- 7 Even respectable authors, such as Isidore of Seville (c. 560–636 CE), confused the second-century

scholar with members of the Ptolemaic dynasty. See *Etym.* 3.26.

- 8 This is a late text that was only transmitted through its Latin versions (possibly based on an old Spanish translation): Burri 2013, 14–16. Although the last part of the note of Abū al-Wafā' gives some colourful descriptions that should be treated with caution (such as Ptolemy's 'missing teeth' and his 'taste for shiny clothes'), the first part includes some interesting details: the origin of the name *Almagest*; that, under the reign of Hadrian, Ptolemy carried out astronomical observations in Alexandria with the help of a particular astronomical instrument; that he used Hipparchus' observations; and that he should not be mistaken for one of the Ptolemaic rulers.
- 9 In one passage of the *Geography*, it is possible to see an allusion to one or more journeys that Ptolemy might have undertaken, but the text is extremely vague: 'We, too, having seen some things ourselves (τὰ μὲν ἑωρακότες), and also having taken over other things accurately from [the earlier writers], have forethought to sketch, as it were, a sort of map of the entire *oikoumenē* [...]' (*Geogr.* 7.5.1)

### 1.1.2 List of works and chronology

Ptolemy wrote on a variety of subjects, the most thorough and extensive of his writings being the *Almagest* (on mathematics and astronomy), the *Tetrabiblos* (on astrology) and the *Geography*. To this trilogy one can add the *Handy Tables*, which are a collection of astronomical, chronological and geographical tables. These four texts remained, right until the late Renaissance, by far the most celebrated of Ptolemy's works. His other texts, which are sometimes classified as minor and which have not always been transmitted in a complete or direct form, are nevertheless evidence of his wide-ranging interests, including music and optics. Late antique and medieval sources also refer to a number of other works, but they are no longer extant, so their content is, therefore, hard to identify precisely. Ptolemy is said, for example, to have written treatises on mechanics, the weight of air and water, the elements and dimensions, and on the so-called 'parallel postulate'.<sup>10</sup>

Ptolemy's Μαθηματικὴ σύνταξις (*Mathematical Compilation* or *Mathematical Composition*) is generally referred to as the *Almagest*, which derives from the Arabic word *al-mağṣṭī*.<sup>11</sup> The *Almagest* can rightly be regarded as Ptolemy's masterpiece and as one of the most influential works in the history of science. In a total of thirteen books, Ptolemy covered virtually every aspect of what was known of mathematical astronomy: the motions of celestial bodies, heavenly phenomena (for instance, eclipses), the layout of star constellations, as well as many definitions of concepts, various tables for carrying out astronomical computations, mathematical demonstrations, instructions for the construction of astronomical instruments, and so forth.<sup>12</sup> The whole treatise was carefully structured and was intended to be used as a didactic manual.

The Πρόχειροι κανόνες (*Handy Tables*) comprise a series of tables for carrying out astronomical computations. Although the tables were largely compiled using data from the *Almagest*, Ptolemy designed them as an independent, comprehensive and accessible work. The *Handy Tables* begin with a short, introductory text: usually called the 'Manual'; it specifies the purpose of the different tables and how they should be used.<sup>13</sup> Originally,

10 See, in particular, the entry on Ptolemy in the tenth-century *Souda s.v.* Πτολεμαῖος; Simplicius, in *Cael.* 9 and 710; and Proclus, in *Euc.* 191. See Burri 2013, 29–30.

11 The usual modern name *Almagest* comes from the Latin translation (*almagesti*, later *almagestum*) of the Arabic word *al-mağṣṭī*. The latter comes from a transcription of the Greek word μεγίστη, meaning 'the greatest' or 'the very great' ('compilation' is implied). The expression 'ἡ μεγάλη σύνταξις' as the shorter form of Μαθηματικὴ Σύνταξις can be found in quite early Greek sources, but the superlative 'ἡ

μεγίστη σύνταξις' is not attested until the eleventh century and may stem from the usual Arabic designation. See Kunitzsch 1974, 115–125; Burri 2013, 26; Tihon 2014, 73–74.

12 For the Greek edition of the text, see Books 1 to 6 in Heiberg 1898 and Books 7 to 13 in Heiberg 1903; for the English translation, see Toomer 1984. A synopsis of the *Almagest* can be found in Toomer 1975, 188–197.

13 The 'Manual' was transmitted independently of the rest of the tables. See the Greek edition in Heiberg

the *Handy Tables* would have comprised about twenty tables related to the motion of celestial bodies and other astronomical phenomena, a chronological table (that is, a list of the reigns of emperors, including dates) as well as the *Κανὼν πόλεων ἐπισημῶν* (or 'Table of Noteworthy Cities'), a geographical table containing the longitude and latitude of the important localities of the *oikoumenē*.<sup>14</sup> The *Handy Tables* were extremely successful throughout Antiquity and the Middle Ages: from at least the third century CE they were the subject of much comment and discussion among generations of Greek astronomers, in Alexandria as well as in Byzantium. They were also used to a large degree in Syriac and Arabic milieus.<sup>15</sup>

Ptolemy wrote other shorter treatises related to astronomy, which were probably less widely disseminated. Parts of the *Ἵποθέσεις τῶν πλανωμένων* (*Planetary Hypotheses*) were transmitted in Greek, although the complete work is known through Arabic translations.<sup>16</sup> The text provides models for the motions of the celestial bodies and theories on the size and the absolute distances of the planets.<sup>17</sup> The *Φάσεις ἀπλανῶν ἀστέρων* (*Phases of the Fixed Stars*) is another short (two-volume) astronomical treatise that deals with the heliacal rising and setting of the bright stars. The first book is known only through fragments of an Arabic translation, while the second book has been preserved in Greek and consists mainly of calendar tables that relate to the celestial phenomena set out in the previous book.<sup>18</sup> The treatise *Περὶ ἀναλήμματος* (*On the Analemma*) deals with sundials, in particular how to determine the angles that are needed to construct these devices.<sup>19</sup> Finally, in a treatise that is generally called by its Latin name *Planisphaerium* – it may correspond to the *Ἀπλωσις ἐπιφανείας σφαιράς* (*Simplification of a Spherical Surface*)

1907, 157–185, and the recent (but not complete) English translation in Mercier 2011, 178–181.

- 14 The organisation of the collection and the number and order of the tables in the surviving manuscripts differ quite considerably from Ptolemy's original concept. Tables were successively added and some of the original tables were updated (for instance, the chronological and geographical tables). The hypothesis that the extant tables have only been preserved in Theon of Alexandria's revised version (as in Toomer 1975, 196, and Burri 2013, 27, e.g.) needs to be treated with caution, for the extant manuscripts show textual reworkings of several different periods. See p. 85 as well as Tihon 2004, Tihon 2011, 5–55, Mercier 2011, 152–155, and Lempire 2016. There is no complete critical edition of the *Handy Tables*. The old edition and French translation of N. Halma (1822) are respectable, but the Greek text is not always reliable and the translation is often inaccurate. There are two recent Greek editions of the first astronomical tables, with an En-

glish translation, by Tihon 2011 and Mercier 2011. See Koch, Mittenhuber, and Stückelberger 2009 for a new Greek edition of the 'Table of Noteworthy Cities' with a German translation.

- 15 Tihon 2011, 50–53; Villey 2014, 170–172.  
 16 For an edition of the Greek part of the text (which corresponds to the first book of the treatise), see Heiberg 1907, 70–106. The complete work in Arabic was edited and translated by Goldstein 1967. His edition is, in fact, a facsimile of the British Museum MS. Arab. 426 (Add. 7473), with variant readings in the footnotes.  
 17 Toomer 1975, 197; Feke 2009, 201–220. As in the *Geography*, in *Planetary Hypotheses* Ptolemy assumes that the Earth's circumference is 180 000 stadia.  
 18 Toomer 1975, 197; Burri 2013, 27. For the Greek edition, see Heiberg 1907, 3–67.  
 19 Toomer 1975, 197 and 205; Burri 2013, 27. Aside from some Greek fragments in a palimpsest, the full text is known only from a Latin translation based on a Greek version.

that is mentioned in the *Souda*<sup>20</sup> – Ptolemy explains how to project the celestial sphere onto a plane and provides the mathematical basis for using an astrolabe.<sup>21</sup>

One of Ptolemy's major works is his astrological composition known today as the Αποτελεσματικά (approximately, *Influences of the Celestial Bodies*) or more usually the Τετράβιβλος (*Tetrabiblos*), as it was divided into four books. Today, astrology (understood as the art of making predictions) and astronomy are considered two distinct fields; indeed, astrology is generally regarded as a pseudoscience. However, this distinction did not exist in Antiquity, and Ptolemy would certainly have regarded the *Tetrabiblos* as a natural follow-on to the *Almagest* – like two sides of the same unique field of research. The *Tetrabiblos* can be regarded as a practical and predictive application of mathematical astronomy:<sup>22</sup> the first book presents technical definitions (of the planets, the zodiac, and so on); the second studies the influences of celestial bodies and phenomena on the *oikoumenē*, which leads to a type of astrological schematic map of the known world, where peoples are roughly located according to the cardinal directions; and the third and fourth books deal with the predictions that can be made from horoscopes.<sup>23</sup>

Ptolemy also wrote a five-volume treatise on optics, the original title of which is unknown. The Greek version has not survived, but there was an Arabic translation, covering Books 2 to 4 and the beginning of Book 5, which has also been lost but is known from its twelfth-century Latin translation, *De aspectibus*, by Eugenius of Palermo. The work dealt with many aspects of vision and outlined the theories of a number of optic phenomena: light, colour, the perception of objects, reflection and refraction.<sup>24</sup> In the three-volume Αρμονικά (*Harmonics*), Ptolemy studied the intervals between musical notes and demonstrated their mathematical relationships.<sup>25</sup>

Finally, a text that was transmitted with the title Περὶ κριτηρίου καὶ ἡγεμονικοῦ (*On the Faculties of Judgement and Command*) has a special place in Ptolemy's corpus, for it does not have anything directly to do with mathematics but reflects on the criterion of truth and on the process of the elaboration of knowledge. Although the authorship of this text

- 20 *Souda*, s.v. Πτολεμαῖος. See Burri 2013, 12 and 26. Neugebauer 1949, 871, believed that the Greek title was originally Ἐξάπλωσις ἐπιφανείας σφαιράς, that is, 'unfolding' or 'projection of a spherical surface'.
- 21 Toomer 1975, 198; Burri 2013, 27. The text has only been transmitted through Arabic translations, in particular Al-Majrīṭī's version (*d.* in Córdoba, c. 1007) and through a Latin translation of the latter in 1143 (given in Heiberg 1907, 227–259). Other textual testimonies are given in Toomer 1975, 205.
- 22 Toomer 1975, 198: 'From the obvious terrestrial physical effects of the sun and moon, [Ptolemy] infers that heavenly bodies must produce physical effects [...]. By careful observation of the terrestrial

manifestations accompanying the various recurring combinations of celestial bodies, he believes it possible to erect a system which [...] will enable one to make useful predictions.'

- 23 Toomer 1975, 198; Aujac 2012, 69–105. For an edition of the Greek text, see Boll and Boer 1954.
- 24 Toomer 1975, 200–201, 205; Burri 2013, 28. A critical edition of the Latin text, together with useful commentaries, can be found in Lejeune 1989.
- 25 Toomer 1975, 201; Feke and A. Jones 2010, 199; Barker 2004, 270–391. For a Greek edition, see Düring 1930. The last sections of Book 3 have not survived.

has been disputed – according to G.J. Toomer, for instance, the ascription to Ptolemy ‘seems dubious’<sup>26</sup> – recent studies tend to confirm Ptolemy’s authorship.<sup>27</sup> According to M. J. Schiefsky, the text was ‘intended to be a prolegomena to his scientific works.’<sup>28</sup> By contrast, a collection of astrological aphorisms, known by its Latin name *Centiloquium* – and also sometimes called Καρπιός, based on the Arabic title *Kitab al-Tamara* (*Book of the Fruit*) – although very successful during the Middle Ages, is generally not considered to have been written by Ptolemy.<sup>29</sup>

Although the exact dating of Ptolemy’s different works is still open to debate, there is generally agreement on the order in which they were written: first the *Almagest*, then the *Tetrabiblos* and finally the *Geography*. Ptolemy alludes to the *Almagest* in the incipit of the *Tetrabiblos* and mentions it in the ‘Manual’ of the *Handy Tables* as well as in the *Geography*.<sup>30</sup> One passage of the *Almagest* also gives the impression that Ptolemy intended to write a geographical work.<sup>31</sup> The posteriority of the *Geography* to the *Tetrabiblos* cannot be properly demonstrated, and for this reason the supposition, though plausible, remains unproven. The *Handy Tables* also post-dates the *Almagest*, although the creation of the former might have covered a longer period: the making of the ‘Table of Noteworthy Cities’ (part of the *Handy Tables*), the *Geography*’s catalogue of localities as well as Book 8 of the *Geography* were probably linked, so that establishing a strict chronological order is certainly not relevant to understanding the origin of the works.<sup>32</sup> In addition, it is worth pointing out that the format chosen by Ptolemy for the *Handy Tables* made it easy to carry out revisions: tables could easily be added or extended, and it is possible that Ptolemy himself revised the main body of the *Handy Tables* over a period of time.<sup>33</sup> Among Ptolemy’s other works, the *Planetary Hypotheses*, the *Harmonics* and the treatise on optics all probably post-date the *Almagest* and the *Tetrabiblos*.<sup>34</sup>

### 1.1.3 Alexandria and the Roman world in the second century CE

Ptolemy’s dates correspond closely to the years of the Antonine dynasty (96–192 CE), one of the most prominent eras in Roman history. Some contemporary witnesses, such as the rhetor Aelius Aristides (117 – c. 180 CE) and the historian Appian of Alexandria (c. 95–165 CE) regarded their epoch as exceptional.<sup>35</sup> The successively long reigns

26 Toomer 1975, 201.

27 Feke and A. Jones 2010, 199; Feke 2012, 585. Feke 2009, 6–7, gives a comprehensive overview of the debate.

28 Schiefsky 2014, 301.

29 Burri 2013, 30.

30 *Geogr.* 8.2.3.

31 *Alm.* 2.13, see p. 84.

32 See p. 88.

33 The history of the transmission of the *Handy Tables* shows that the collection was a ‘living’ document from its inception up to medieval times. See pp. 84–91, and Tihon 2011, 12–13.

34 Burri 2013, 30–33. Feke and A. Jones 2010, 201, date the *Harmonics* to before the *Almagest*.

35 Aelius Aristides, *On Rome* (written in 143 or 144 CE); Appian, *Roman History*, preface § 7: ‘From the advent of the emperors to the present time is nearly

of Trajan, Hadrian, Antoninus and Marcus Aurelius contributed to a stable and fairly calm political life in Rome, at least in comparison with the preceding century. With the exception of the Dacian Wars (between 101 and 105 CE) and the wars against the Parthians (between 114 and 117 CE), the Empire was relatively peaceful until the campaigns of Marcus Aurelius from 161 CE onwards: the Parthian War of Lucius Verus (161–166 CE), the long campaigns along the Danubian frontier (166–180 CE), several invasions or revolts in Europe and in the Near East between 170 and 180 CE as well as the disastrous Antonine Plague (165/169 CE – c. 190 CE) finally ruined the previously untainted reputation of the Age of the Antonines.

As for Rome's territories, few new provinces were created during this period.<sup>36</sup> From Trajan to Marcus Aurelius, Rome adopted a progressively defensive military strategy – Hadrian's Wall, begun in 122 CE, can be seen as a symbol of this change of perspective. By the time of Trajan's death in 117 CE, the Roman Empire had reached its greatest extent, from Britain to the Danube, and from the Atlantic coast of Mauretania to Arabia, Mesopotamia and the Caucasus. The provincial administration remained stable throughout the period, although the political and cultural integration of each province into the *imperium Romanum* did vary. Whereas the western provinces and the Greek-speaking elites of the eastern Mediterranean were well integrated into Roman politics, some of the territories in northern Europe (Britain and Dacia, for instance) and Asia (Mesopotamia) remained in Roman hands for only a short time.

Like the preceding Julio-Claudian and Flavian dynasties, the Antonine era was characterised by a great degree of mobility. The infrastructure of the Mediterranean area (roads, bridges, harbours) was preserved and improved on, as exemplified by the renovation and enlargement of Portus, a harbour complex 3 km north of Ostia (southwest of Rome), during the reign of Trajan.<sup>37</sup> Maritime and terrestrial routes were extended to the outer provinces at the fringes of the Empire. Rome's control of the trade routes to the Indian Ocean increased under the reigns of Trajan and Hadrian.<sup>38</sup> Contact with northern Europe was less important, although the fluvial systems of the Danube and Rhine rivers facilitated the exchange and integration of goods into the Roman public

two hundred years more, in the course of which the city has been greatly embellished, its revenue much increased, and in the long reign of peace and security everything has moved toward a lasting prosperity. The whole preface consists of an idealised portrait of Rome at this time.

36 A province of Dacia, including territories to the north of the lower Danube River, was created in 107 CE (and reorganised under Marcus Aurelius), and the province of Pannonia was redefined between 103 and 106 CE. Trajan's attempt to create

a province that encompassed Assyria, Armenia and Mesopotamia was abandoned by Hadrian as early as the end of 117 CE. See Lightfoot 1990.

37 Keay 2012.

38 Desanges 1978, 326–339; Brun 2015. The harbours of Myos Hormos (modern-day Quseir al-Quadim) and Berenikē on the Red Sea coast were particularly active and were connected to Koptos (on the Nile), thanks to roads built and patrolled by the Romans. The *Via Nova Hadriana* connected Antinoopolis (founded by Hadrian in 130 CE) and Berenikē.

and private trading network.<sup>39</sup> The Antonine era was relatively prosperous – albeit uneven throughout the Empire – in many domains: agriculture, industrial production, urban construction, and so forth. Large-scale communication networks concerned not only people and merchandise but also the transmission of information, technology, knowledge and ideas.

The Age of the Antonines saw a renewed interest in Greece. The Greek language, which was spoken in the eastern Mediterranean world, also became popular among the Roman elite, which, like Hadrian, was fascinated by Athens and the glorious history of Classical Greece. It was this eastern part of the Empire that saw the greatest scholarly and scientific activity during the second century CE. While those seeking a successful political career needed to be based in the centre of power, that is, in Rome, those in search of an intellectual education needed to make their way to Athens, Alexandria or Pergamon.<sup>40</sup> The second century CE saw the growth of the so-called Second Sophistic movement: Herodes Atticus (c. 101–177 CE), Aelius Aristides, Lucian of Samosata (c. 120 – c. 180 CE) and Maximus of Tyre (c. 130 – after 192 CE), among others, were all Greek-speaking rhetors who belonged to the Roman elite and travelled between the major cities of the Empire.<sup>41</sup>

Famous historians such as Plutarch (c. 45 – after 120 CE), Appian of Alexandria and Philo of Byblos (c. 70 – c. 160 CE) came from Rome's eastern territories. The most prominent scholars and engineers of the time included: in medicine, Galen of Pergamon (129 – c. 199 CE); in architecture, Apollodorus of Damascus (c. 60 – c. 130 CE); in mathematics and astrology, Menelaus of Alexandria (c. 50 – c. 120 CE) and Theon of Smyrna (early second century CE); and, in astrology, Vettius Valens (late second century CE). Pausanias of Magnesia (fl. 150–180 CE), Dionysius Periegetes (fl. 130–138 CE) and Arrian of Nicomedia (c. 85 – after 146 CE) were active scholars dealing with geography during Ptolemy's lifetime. The intense intellectual life under the Antonines in the eastern Mediterranean world coincided with the last stage of Middle Platonism, which focused attention on the eclecticism and syncretism between Plato's writings and Pythagorean or Aristotelian ideas.<sup>42</sup> It was a period in which Stoicism maintained a strong influence on philosophy and politics – see Epictetus (c. 55 – c. 135 CE) or Marcus Aurelius himself – but also one in which astrology, oriental cults and mysteries retained their popularity.

The status of Alexandria *near* Egypt – *ad Aegyptum* or πρὸς Αἰγύπτῳ<sup>43</sup> – was well established in the Hellenistic world and the city maintained its standing after the Roman

39 A. Wilson 2008.

40 Aujac 2012, 14; Matthaios 2015, 233–247.

41 See also Matthaios 2015, 250–262, on philologists and grammarians of the Imperial era.

42 Moore 2015.

43 See, e.g., Str. 1.1.12. Alexandria enjoyed special administrative status and was treated separately from the Roman province of Egypt. See Bell 1946.

conquest. Founded in 331 BCE by Alexander the Great, Alexandria lies at the westernmost part of the Nile Delta, between the Mediterranean Sea and Lake Mareotis. Sailing from Alexandria, one could reach Rhodes in four days and, optimal weather conditions prevailing, Rome in a little more than two weeks.<sup>44</sup> Alexandria, together with its harbour complex, was a crucial stopping-place on the maritime and terrestrial routes between the Red Sea, the Indian Ocean and the Mediterranean Sea: thanks to its commercial taxes, the Roman administration was able to draw substantial incomes from the city and thus it had a strategic economic stake in the city. Furthermore, Egypt was the first (and virtually the only) country in Antiquity that manufactured papyrus.

During the Antonine era, Alexandria was one of the most important – if not the greatest – intellectual and scientific centres of the Roman world, more for historical than political reasons. Alexander the Great's expeditions and conquests, as well as those of his successors – the Seleucid and Ptolemaic rulers – had widened the known world's horizons. Alexandria not only developed into a major political centre but also, from the third century BCE onwards, became an important cultural centre that attracted the leading minds of the Hellenistic world, who studied and taught at the same institutions, thereby most probably influencing each other.<sup>45</sup> After Alexander's death in 323 BCE, his generals fought for control of his empire, which involved continuing Alexander's cultural legacy; in so doing, the Ptolemies made Alexandria one of the most dynamic cultural and scientific centres of the Mediterranean world.<sup>46</sup>

The political support for the development of scholarship in Alexandria cannot be dissociated from the foundation of the Museum of Alexandria and its Library by Ptolemy I Soter (ruler of Egypt from 323 to 283 BCE). Scholars who were connected with the museum enjoyed a special status, which involved privileges and substantial grants. An additional two libraries were also established: the Library of the Serapeion, which was particularly active in Roman times; and the Library of the Caesareum, a temple founded under the reign of Augustus. Although a certain amount is known about the literary and scientific life at the museum during the Hellenistic period, there is scant information on its exact organisation and the way it functioned during the Antonine era. Nevertheless, in the second century CE Alexandria continued to attract scholars owing to its vibrant scientific and intellectual life.<sup>47</sup>

44 Arnaud 2005, 128, 214–215, 217.

45 Pfeiffer 1968, 87–104; Montana 2015, 76–143.

46 Dan 2014, 403.

47 It is known that the Museum of Alexandria's Library was enlarged under the reign of Claudius and that Hadrian met scholars of the museum during his Egyptian travels (130–131 CE), for instance. On

the museum, its library and scholarship in Alexandria, see: Pfeiffer 1968, 87–233; Sirinelli 1995; Staikos 2000; Berti and Costa 2010; Canfora 2012a; Montana 2015, 70–90. On the history of Alexandria in Roman times, see Claus 2004, 121–329. On the Serapeion and its library, see, in addition, Fernández Abad 2008.

Alexandria can arguably be described as the birthplace of geographical science – certainly as practised by Ptolemy. In this city, geography was able to take advantage of its intimate relationship with mathematics and astronomy as well as with the development of Alexandrian philology.<sup>48</sup> Eratosthenes (c. 276 – c. 194 BCE), who was the Library's second chief librarian, and who possibly invented the term γεωγραφία ('geography'), rejected Homeric exegesis as a way of describing the world and linked geography with a mathematical knowledge of the Earth and astronomical observations.<sup>49</sup> In spite of his criticisms of Eratosthenes, Hipparchus (c. 190 – c. 126 BCE) defined geography in the same way.<sup>50</sup> It is possible that Hipparchus worked (at least, occasionally) in Alexandria and he was certainly one of Ptolemy's most important sources. During the Roman period, Strabo (64 BCE – after 23 CE) studied the Hellenistic geographers' works in Alexandria between 25 and 20 BCE,<sup>51</sup> and, shortly before Ptolemy, Marinus of Tyre (first/second century CE) composed his 'revisions of the geographical map' in the city.

However, Alexandrian geography concerns more than just Eratosthenes and his scientific heirs. Dionysius of Periegetes, a contemporary of Ptolemy, wrote a description of the *oikoumenē* in verse that became very well known.<sup>52</sup> During the same period, Ap- pian of Alexandria structured his *Roman History* in geographical units.<sup>53</sup> In the course of the centuries following Ptolemy, Alexandria remained an intellectual centre, with a number of notable scholars conducting research into geography – including Pappus of Alexandria of the fourth century CE, John Philoponus (c. 490–574 CE) and, in another tradition, the sixth-century CE Cosmas Indicopleustes.<sup>54</sup>

- 48 See p. 177. Nonetheless, R. Pfeiffer 1968, 152, has rightly remarked: 'Scholarship grew up in Alexandria as a creation of the new age, but science descended by a long tradition from the Ionian and Attic past. Strato ὁ φυσικός under Ptolemy I and others were the links between the Athenian school of Aristotle and the Alexandrian Museum; an efflorescence of mathematics and the natural sciences was the result.' Montana 2015, 76–79, stresses that the initiative of the Ptolemies was closely linked to the Peripatetic school at Athens.
- 49 Str. 1.2.3. See Geus 2011, 262. In all likelihood, Eratosthenes' geography and cartography were rooted in the works of Eudoxus of Cnidus (c. 395–342 BCE), Dicaearchus of the fourth century BCE (a disciple of Aristotle) and Pytheas of Massalia (second half or end of the fourth century BCE), all of whom

seem to have already developed mathematical and astronomical concepts, orientated towards the study of the Earth and the known world. See Großhoff, Rinner, et al. 2016.

- 50 Str. 1.1.12: 'Hipparchus demonstrates in his work against Eratosthenes that it is not possible for anyone – whether an amateur or scholar – to undertake geographical research without determination of heavenly phenomena or the eclipses that have been observed.'
- 51 Strabo lived in Alexandria when his friend Aelius Gallus was prefect of Egypt (Str. 2.3.5, 2.5.12 and 17.1.46). See Claus 2004, 17, and Roller 2014, 9–10.
- 52 Counillon 1991; Ilyushechkina 2010, 302–309.
- 53 Dan 2014, 403–405.
- 54 Inglebert 2001, 73–108.

#### 1.1.4 Ptolemy and the sciences of his time

No information has come down to us on Ptolemy's personal entourage and colleagues or on his official academic position. His astronomical treatises are dedicated to a certain Syrus of whom absolutely nothing is known.<sup>55</sup> From the breadth of his work, it is clear that Ptolemy had no major financial constraints.<sup>56</sup> It is also possible, given the size of the undertaking, that Ptolemy worked with several collaborators or assistants on the *Geography*.

Ptolemy studied several fields of knowledge, which was by no means unusual in Antiquity. He was also, to a certain extent, a designer and engineer: he invented (and perhaps made or had made for him) tools and instruments to be used in astronomy (such as the dioptré, the armillary astrolabe and the meteoroscope) and cartography (his different methods for building maps).<sup>57</sup> The fact that he designed tables that were intended to be used to make further observations and computations is also evidence of his pragmatic approach to the practice of science. The writing of comprehensive compendia, the attention given to didactics and the popularisation of knowledge were all characteristics of the scholarship of the Antonine era.<sup>58</sup>

Ptolemy's astronomical and astrological works are considered by many to represent the apogee of Greek and Roman science. Nonetheless, Ptolemy was more a product of the mathematical and astronomical sciences of his time than is commonly admitted. In the incipit of the *Almagest*, Ptolemy discusses the different branches of science and the place of mathematics in science. He refers explicitly to Aristotle's division of the theoretical sciences, which he took as being correct from an ontological point of view.<sup>59</sup> Likewise, Ptolemy's cosmological and astronomical premises – that the Earth is spherical and is located at the centre of a spherical universe, and so forth – are mainly Aristotelian.<sup>60</sup> However, unlike Aristotle, who considered theology to be the 'primary science' (ἡ πρώτη φιλοσοφία),<sup>61</sup> Ptolemy regarded mathematics as the most important of the theoretical sciences, since:

55 Burri 2013, 30; Tihon 2014, 82.

56 Tihon 2014, 83.

57 Tihon 2014, 80–82.

58 See, e.g., the Galenic corpus or Vettius Valens' astrological *Anthology*. Theon of Smyrna's treatise *On Mathematics Useful for the Understanding of Plato* was a textbook on general mathematics. Dionysius' *Periegesis*, in which the whole *oikoumenē* is described, was meant to be easily memorised and studied in schools. Cleomedes (first or second century CE) wrote an astronomical textbook entitled *On the Cir-*

*cular Motions of the Celestial Bodies* and Nicomachus of Gerasa (late first or early second century CE) produced an *Introduction to Arithmetic*.

59 *Alm.* 1.1: 'For Aristotle divides theoretical philosophy too, very fittingly (πάνυ ἐμμελῶς) into three primary categories, physics, mathematics and theology.' Here Ptolemy is alluding to Aristotle, *Metaphysics* 6.1 (1025b-1026a).

60 *Alm.* 1.3–8. These concepts were defended by Aristotle in *De Caelo*. See Tihon 2014, 84.

61 Aristotle, *Metaphysics* 6.1 (1026a, 24–25).

Only mathematics can provide sure and unshakeable knowledge to its devotees, provided one approaches it rigorously. For its kind of proof proceeds by indisputable methods, namely arithmetic and geometry.<sup>62</sup>

Furthermore, Ptolemy believed that contemplating and understanding 'divine and heavenly things' thanks to mathematics could lead to spiritual elevation. This relationship between science, contemplation and ethics is Platonic in inspiration.<sup>63</sup> Ptolemy's multiplicity of influences is interpreted by J. Feke and A. Jones as a 'Platonic empiricism'. They explain:

Ptolemy's texts, in fact, reveal him to be a Platonic empiricist. He adopts Platonic, Aristotelian, and, to a lesser extent, Stoic ideas, but the manner in which he mixes these philosophical influences depends heavily on contemporary Platonic concerns. [...] He adapts these Platonic ideas to his theory of knowledge, which is best described by the anachronistic term 'empiricism', and he bases this so-called empiricism on an ontology that is distinctively Aristotelian.<sup>64</sup>

It should be stressed that Ptolemy's eclecticism was also typical of the intellectual milieu of Middle Platonism during the second century CE.<sup>65</sup>

The extent to which Ptolemy's astronomy was integrated into the scientific practice of his time is not easy to estimate with any precision. Vettius Valens, an Alexandrian astrologer of the late second century CE, wrote that many astronomical tables, in particular those related to Babylonian astronomy and to Hipparchus, were then in circulation.<sup>66</sup> As for predictive astronomy in Antiquity, A. Jones objects to Ptolemy's conception, which was based on kinematic models and tables, of a practice that involved arithmetical operations without the use of trigonometry.<sup>67</sup> He has also observed that the papyrological documentation provides almost no evidence that Greek astronomers used kinematic models before Ptolemy, which would make the latter a scientific exception.<sup>68</sup> By contrast, A. Tihon and J.-L. Fournet have recently edited a papyrus – Papyrus Fouad Inv. 267 A, conserved in Cairo – that was quite possibly an excerpt of a course on astronomy given in the first half of the second century CE, perhaps even in Alexan-

62 *Alm.* 1.1. In the same paragraph, Ptolemy specifies that theology and physics 'should rather be called guesswork than knowledge, theology because of its completely invisible and ungraspable nature, physics because of the unstable and unclear nature of matter.'

63 *Alm.* 1.1. See Feke and A. Jones 2010, 208–209. J. Feke 2009, 43, adds that Ptolemy's distinction between conjecture/guesswork (in theology and

physics) and knowledge (mathematics) resembles the Platonic dichotomy between *δόξα* (opinion) and *ἐπιστήμη* (knowledge).

64 Feke and A. Jones 2010, 197.

65 See also Feke 2012.

66 Tihon 2014, 85; Fournet and Tihon 2014, 131–133.

67 A. Jones 1999, 15–34.

68 A. Jones 1999, 16–17.

dria.<sup>69</sup> The papyrus deals with the longitude of the Sun, the obliquity of the ecliptic and refers to a ‘table’ (κωνών). The author of the table manifestly based some of his calculations, as Ptolemy did, on Hipparchus, who is mentioned three times in the papyrus. The astronomical knowledge reflected in the papyrus refers to a practice that is similar to Ptolemy’s but with some differences in the values and content.<sup>70</sup> Thus, Ptolemy’s astronomical activity was not as isolated as one might have believed.<sup>71</sup>

Although Ptolemy’s realisation of a *Handbook of Geography* (if one attempts to render the exact meaning of its title, Γεωγραφικὴ ὑφήγησις) that combines the intelligibility of a manual and the completeness of a compilation fully captures the *Zeitgeist* of the Antonine era, the way Ptolemy practised geography was, by contrast, decidedly out of step with the other geographers of his time. According to Ptolemy’s own definition, any geographical investigation needs a mathematical method and astronomical observations,<sup>72</sup> which clearly indicates that Ptolemy was continuing the tradition of mathematical geography as practised by Eratosthenes. In the introduction to the *Geography*, he describes the discipline’s *raison d’être*:

All this belongs to the loftiest and loveliest of intellectual pursuits (θεωρίας), because it exhibits to human understanding through mathematics the heavens themselves in their physical nature, since [the heavens] can be seen in its revolution about us, but [it exhibits] the earth [only] through a picture (διὰ τῆς εἰκόνοσ), since the real earth, being enormous and not surrounding us, cannot be inspected by any one person either as a whole or part by part.<sup>73</sup>

Aristotle’s definition of scientific knowledge did not explicitly mention studying the *oikoumenē* and it is not known how Eratosthenes defined geography ontologically speaking. Both Hipparchus and Strabo were aware of the mathematical requisites for practising geography, but Ptolemy was, as far as is known, the first to define the subject as a theoretical science in the sense of Aristotle, that is, as knowledge for its own sake.<sup>74</sup> Unlike

69 Greek edition and French translation in Fournet and Tihon 2014; English translation, with a thorough technical discussion, in A. Jones 2016. The papyrus, which may be a reworking of notes written down for a course, presents, among other things, a practical example of computation for the year 130 CE. A second fragment of the same papyrus folio has recently been identified (PSI Inv. 2006, preserved in Florence), see Tihon and Fournet 2016.

70 In particular, the author of the table used an observation that was recorded by Hipparchus in 158 BCE but that does not appear in the dozens of observations concerning Hipparchus that are cited in Ptolemy’s *Almagest*; one also finds a length of

the tropical year in the papyrus that differs from Ptolemy’s value. See A. Jones 2016.

71 See also Tihon 2004, 235, Fournet and Tihon 2012 and Tihon 2014, 86–88.

72 See pp. 163–177.

73 *Geogr.* 1.1.9.

74 By contrast, Strabo (1.1.1) was, for example, of the opinion that geography is ‘a concern of the philosopher’ (τῆσ τοῦ φιλοσόφου πραγματείας), although his approach did allow for a practical use of geographical knowledge. He states (1.1.22): ‘In short, the present treatise should be generally useful – useful alike to the citizen and to the public at large (καὶ πολιτικὸν καὶ δημωφελὲσ) – as was my work on history.’

the study of the stars and planets, however, mathematics does not directly provide 'sure and unshakeable knowledge' of the Earth and its parts but is only a device to fabricate a picture (εἰκῶν). The incipit of the *Geography* defines geography as an imitation (μίμησις) of the known parts of the world, and so it should be regarded as a kind of substitute for directly contemplating the Earth.<sup>75</sup> The position of mathematical geography within this concept was, therefore, slightly ambiguous: although it was a theoretical science – that is, neither 'practical' (πρακτική) nor 'poetic' (ποιητική) – it gave only indirect access to its subject, since one is compelled to contemplate the world through the eyes of the cartographer.<sup>76</sup>

The way Ptolemy practised geography differed quite markedly from the methods of the other geographers of his time. Admittedly, Ptolemy frequently referred to Marinus of Tyre, who slightly predates him and who practised mathematical geography. They both used the value of 180 000 stadia for the circumference of the Earth, which did not match the more common Hellenistic values of 252 000 or 250 000 stadia; a circumference of 180 000 stadia had only been postulated since the time of Posidonius (c. 135 – c. 51 BCE).<sup>77</sup> Nevertheless, the *Geography* falls within a resurgence of interest in the scientific tradition of a description of the world that had lain largely dormant since Hipparchus and Eratosthenes before him. Ptolemy's preference for Hellenistic geographers – Hipparchus and Timosthenes (third century BCE) – was less a matter of personal taste than of practical necessity. It is not known to what extent the descriptions of the *oikoumenē* and its parts by Artemidorus (fl. c. 101–104 BCE) and Posidonius – two great geographical authorities in Antiquity – were linked with mathematical and astronomical concepts. Gnomonic procedures (that is, measuring a place's latitude with the help of specific instruments) and theories on climatic zones (that is, the study of the meteorological, zoological and anthropological characteristics of places as a function of

Strabo intended to 'devote [his] attention to what is noble and great, and to what contains the practically useful, or memorable, or entertaining (τὸ πραγματικὸν καὶ εὐμνημόνευτον καὶ ἡδὺ διατρίβειν)' and to focus on 'things [that] may stir the interest of the studious or the practical man (τὸν φιλειδήμονα καὶ τὸν πραγματικόν)'. (1.1.23)

75 The assumption of Feke and A. Jones 2010, 205, that, in *Geogr.* 1.1.9, Ptolemy asserts that 'mathematics reveals the physical nature of the heavens and earth' needs to be qualified. This idea was certainly influenced by the translation of Berggren and A. Jones 2000, who, I believe, have slightly over-interpreted the passage: '[...] to exhibit to human understanding through mathematics [both] the heavens themselves in their physical nature (since they can be seen in their revolution about

us), and [the nature of] the earth through a portrait [...]'. Two elements in the passage – 'the heavens themselves' (τὸν μὲν οὐρανὸν αὐτόν) and 'the earth through a picture' or 'through a portrait' (τὴν δὲ γῆν δια τῆς εἰκόνας) – appear to me to be in opposition to one another, which the translation of Berggren and Jones does not convey.

76 Ptolemy's choice of vocabulary – μίμησις, εἰκῶν – is reminiscent of the discussion on imitation and copy-making in Plato's *Sophist* (235–236). Another term that Ptolemy used frequently (συμμετρία, see p. 163) also finds echoes in this passage of Plato. Note that the ontological classification of geography as a theoretical science does not imply that a geographer does not need any 'practical' skills.

77 *Geogr.* 7.5.12; *Str.* 2.2.2. See Stückelberger 2009b, 223–224, and Geus and Tupikova 2013a.

the latitude) had been developed from the Classical Greek period until Roman times. However, these concepts and theories had been merely abstract studies of the Earth as a sphere and had rarely been connected to the realisation of a map of the *oikoumenē*.

The works of Eratosthenes and Hipparchus had not remained hidden over the centuries: Roman elites referred to them, but their relations with mathematical geography were equivocal. Julius Caesar (100–44 BCE) commented on Eratosthenes, although this does not mean that he knew his work directly;<sup>78</sup> on the advice of his friend Atticus, Cicero (106–43 BCE) started to put together a geographical work on the model of Eratosthenes but, despite much reading, abandoned this project;<sup>79</sup> Pliny the Elder (23/24–79 CE) praised the achievements of Hellenistic mathematical geography, although this was, in fact, his way of distancing himself from the subject;<sup>80</sup> and Strabo put together a thorough presentation of Eratosthenes and Hipparchus but did not continue with or improve on their research. Ptolemy observed the scarcity of the tradition of mathematical geography and deplored the difficulty of finding sources that could supply useful information on the latitude and longitude of localities.<sup>81</sup> A. Haushalter has demonstrated that the relative disregard for mathematical geography during the Roman period was not a question of the cultural differences between practical Roman knowledge and pure theoretical Greek science.<sup>82</sup> During the time of Pliny and the Antonine period, mathematical geography was still considered a valid subject; it was just that it belonged to the past rather than to current scholarship, be it in Latin (Mela, Pliny) or Greek (Dionysus Periegetes, Arrian, Pausanias).

The Antonine era gave over much space to rhetoric and panegyrics. Descriptions of the world – that is, the Roman world, ruled by the *Princeps* – were often written just to praise Rome and acknowledge its greatness, as reflected by Aelius Aristides' *On Rome* or the incipit of Appian's *Roman History*, for example.<sup>83</sup> Arrian dedicated his *Periplus of the Euxine Sea* to Hadrian, who had ordered this exploratory sea journey for diplomatic and military purposes.<sup>84</sup> Geography was hence a matter of politics and history. By contrast, Ptolemy's *Geography* is almost apathetic in tone.<sup>85</sup> As A. Jones has noted: 'Ptolemy gives not the slightest indication that there exists such an entity as a Roman empire.'<sup>86</sup> His

78 Caesar, *Civ.* 6.24.

79 Cicero, *Att.* 2.6: 'The geography which I had purposed is really a big undertaking. Eratosthenes, whom I had meant to follow, is sharply censured by Serapion and Hipparchus. What if Tyrannion joins in? And by Hercules! The material is hard to set out, monotonous, not so easy to embellish as it looked, and (the main point) I find any excuse good enough for doing nothing.' (Transl. Shackleton Bailey modified). See note 11, p. 213.

80 Pl. 6.211, also 2.95, 2.164 and 6.171. See Haushalter 2015, 224–225.

81 See p. 169.

82 Haushalter 2015, 222–225.

83 See pp. 18–19.

84 Combining this experience with his personal notes from lectures, Arrian produced a geographical treatise in which he achieved both political and scientific objectives. See Stadter 1980, 32–41.

85 Aujac 2012, 185–191.

86 A. Jones 2012, 127. Note that, according to Ptolemy, the Asian and Libyan (that is, African) continents were bordered, respectively, to the north and south

*Geography* seems totally dissociated from Roman politics and the contingencies of history. The *terrarum caput*, Rome, which enthralled every geographer who visited it and the descriptions of which, at least since the time of Polybius (c. 208 – c. 120 BCE), were always extravagant, was described by Ptolemy with a laconic Ἄστυ Ῥώμη ('City of Rome').<sup>87</sup> This is characteristic of Ptolemy's style of geography: cold, sober, austere even. When he considers the possibility of adding improvements to the catalogue of localities, Ptolemy contemplates improving the values of the coordinates rather than adapting the catalogue to political and historical changes. While his contemporaries acclaimed Rome, its emperors and its glorious history, Ptolemy exalted atemporal mathematics.

Although Ptolemy's style might not have been in fashion, the content of the *Geography* is not, for the most part, outdated. Ptolemy added up-to-date knowledge of the known world to the principles of mathematical geography, while his antique sources included travel accounts and military reports, mainly from the Roman period.<sup>88</sup> On his map of Palestine, for example, he refers to 'Hierosolyma, which is today called Aelia Capitoli(n)a',<sup>89</sup> which was the name given by Hadrian to the Roman colony built on the site of Jerusalem after the Bar Kokhba revolt of 132–135 CE. Hadrian also founded the city of Antinoopolis in Egypt in 130 CE and colonia Mursia in Pannonia Inferior in c. 133 CE – both of which were recorded in Ptolemy's *Geography*.<sup>90</sup>

## 1.2 Structure of Ptolemy's *Geography*

Ptolemy's *Geography* is methodically organised, clear and instructional and, despite the differences in the content of each section, its structure is coherent. Ptolemy managed to produce not only a living document,<sup>91</sup> but also a work in which every part is, at the same time, indispensable and interlinked, as well as being arranged in such a way that the sequence of sections (almost always) makes complete sense.

Ptolemy organised his work into three main parts: an introduction, a catalogue of localities and a part devoted to maps. They do not exactly fit the division into eight books (βιβλία) and it is possible that the division simply corresponded to the number of papyrus rolls that were needed to contain the *Geography* rather than to a distribution

by 'unknown countries' (ἄγνωστος γῆ, *Geogr.* 7.5.2), whereas most geographers of the time regarded the *oikoumenē* as a great island surrounded by an ocean. This is another example of the originality of Ptolemy's *Geography*.

87 *Geogr.* 3.1.61. The expression Ἄστυ Ῥώμη could mean 'main city' or 'capital city', but in this context the Greek Ἄστυ is certainly to be understood as a translation of the Latin *Urbs*, that is, simply 'the city'.

In his *Roman History*, Appian frequently uses ἄστυ when referring to 'the city', that is, Rome.

88 *Geogr.* 1.7.6, 1.8.5, 1.9.1–4, 1.10.2, 1.11.7, 1.14.1–4. See Stückelberger 2009c, 123–124.

89 *Geogr.* 5.16.8.

90 *Geogr.* 2.15.8 and 4.5.61. See Stückelberger and Graßhoff 2006, 18.

91 The catalogue of localities anticipates later corrections and modifications (*Geogr.* 2.1.2–3). See p. 115.

related to different units of meaning. The division of the books into sections or chapters (κεφάλαια) had ulterior motives: the chapters in the introduction define the different topics of discussion; in the catalogue of localities, they correspond to geographical units; and in the cartographical part, they contain, in sequence, the different regional maps. There is no reason to doubt that the division of the text into κεφάλαια and the formulation of their titles – they are similar in every manuscript – was the work of Ptolemy himself, even though later modifications were always possible.<sup>92</sup>

### 1.2.1 The introduction, *Geogr.* 1.1–24 (and 7.6)

The first part of the *Geography* comprises a theoretical and methodological introduction, most of which is contained in the first book. Ptolemy discusses a series of definitions, gives an outline of his project and provides advice on how to use his work.

The incipit deals with the fundamental definitions of *geography* and *chorography*, including their respective objectives and methods (*Geogr.* 1.1). Ptolemy then explains the basis of a geographical work, that is, the information that is required to construct a map of the *oikoumenē* and the appropriate method for determining the position of a place on the Earth (*Geogr.* 1.2–5). An important part of his introduction is given over to a critical revision (διόρθωσις) of several aspects of the work of Marinus of Tyre, a geographer who is presented as being the most recent authority on the subject. In particular, Ptolemy corrects Marinus' figures for the longitudinal and latitudinal extent of the *oikoumenē* (*Geogr.* 1.6–14) and points out the contradictory elements of his predecessor's work (*Geogr.* 1.15–17). After discussing the inconvenience of using Marinus' information to draw a map (*Geogr.* 1.18–20), Ptolemy finally gives instructions on how to design (καταγράφειν) a grid of parallel circles and meridians on a plane surface (ἐν επίπεδῳ) as well as on a globe (ἐν σφαίρᾳ), in order to map the whole *oikoumenē* (*Geogr.* 1.21–24). Surprisingly, at the end of the catalogue of localities, Ptolemy describes how to draw, on a planar surface, a picture of the globe surrounded by rings depicting celestial circles (*Geogr.* 7.6), which requires a specific map projection. It might have made more sense for Ptolemy to position the instructions he gives here at the end of the introduction, which is where he presents the essential requisites for constructing (καταγραφῆ) a world map.

The introductory section is crucial to understanding the objectives of the *Geography* and is the part that has generated the greatest variety of textual interpretations.

92 Berggren and A. Jones 2000, 4, have raised doubts about whether Ptolemy was responsible for the headings, in particular since 'some of the chapter titles in the *Geography* break the text in awkward

places or inadequately describe the contents'. However, the fact that the division does not seem to be 'perfect' in the eyes of modern scholars does not mean that Ptolemy was not responsible for them.

Ptolemy's language is rather sober, concrete, technical but clear and corresponds to the Koine Greek prose of the second century CE.<sup>93</sup> The modern translations of G. Aujac, J. L. Berggren and A. Jones, A. Stückelberger and G. Graßhoff as well as K. Müller show important differences, mainly because Ptolemy's technical vocabulary does not always have simple modern equivalents. For example, Ptolemy's definitions of 'geography', 'topography' or 'geometry' all differ from their respective modern meanings. The exact sense of some terms are debatable – ιστορία περιοδική, ἀκριβέστεροι πίνακες, ὑπομνήματα, for instance.<sup>94</sup> Furthermore, the apparent modernity of the *Geography* – its system of geographical coordinates, the graticules that resemble modern cartographical projections, the importance of mathematics, and so on – can lead to anachronistic interpretations.

### 1.2.2 The catalogue of localities, *Geogr.* 2.1.1–7.4.14

The part of the *Geography* that one calls, for the sake of convenience, the 'catalogue of localities' makes up the greater part of the *Geography*. It is introduced by a foreword (πρόλογος) in which Ptolemy gives a synopsis of his project:

Let this be the end of our outline of the general assumptions about geography and the revision of the map (διόρθωσις τῆς καταγραφῆς) that would be performed in accordance with, firstly, up-to-date accounts (ιστορίαι) of the known parts of the earth – that is, our *oikoumenē* – and, secondly, both the correct proportion (ἐν τῇ συμμετρίᾳ) of the places with respect to each other and the greatest possible similarity in shape [to the real *oikoumenē*], and finally with the nature of map representation.<sup>95</sup>

Ptolemy then explains how he has structured his catalogue of localities: each place is listed in a table, with one column (σελίδιον) given over to the longitude (μῆκος) and another column to the latitude (πλάτος), which facilitates the making of later additions or emendations.<sup>96</sup> In the foreword, Ptolemy introduces two crucial ideas about the content and the structure of the catalogue: firstly, not all the geographical coordinates are equally accurate with respect to the actual locations;<sup>97</sup> and, secondly, the order (τάξις) of the localities in the catalogue follows a spatial principle, that is, to make drawing the maps easier, the lists begin with the more northerly and westerly localities and end with the more southerly and easterly places.<sup>98</sup> Finally, he gives a description of the outer

93 Stückelberger 2009e, 432–439, gives a useful analysis of Ptolemy's language.

94 See the discussions in A. Jones 2012, 115–116, and Hindermann 2009.

95 *Geogr.* 2.1.1.

96 *Geogr.* 2.1.3. See p. 115.

97 *Geogr.* 2.1.2. See p. 175.

98 *Geogr.* 2.1.4–5. In fact, 'easier' for right-handed cartographers...

fringes of Europe, Libyē (that is, the African continent)<sup>99</sup> and Asia (*Geogr.* 2.1.6–7) as well as an introduction to creating world and regional maps (*Geogr.* 2.1.8–10).

The ‘catalogue of localities’ is presented by Ptolemy as ἡ κατὰ μέρος ὑφήγησις (‘the detailed instructions’) or as ἡ κατὰ μέρος ἔκθεσις (‘the description part by part’).<sup>100</sup> According to the calculations of A. Stückelberg and G. Graßhoff, the catalogue lists 6 345 localities with their geographical coordinates and approximately 1 600 names of regions, seas and peoples without coordinates.<sup>101</sup> The places are sorted in sections (περιορισμοί) that correspond to the description of one region<sup>102</sup>: first, the countries of Europe (*Geogr.* 2.2–3.17); then those of Libyē (*Geogr.* 4.1–8); and finally those of Asia (*Geogr.* 5.1–7.4). The catalogue concludes with a short paragraph (*Geogr.* 7.4.14) that refers to the foreword and links the list of localities with the realisation of the maps.

### 1.2.3 The cartographical section, *Geogr.* 7.5–7 and 8

The last part of the *Geography* is allocated to maps (πίνακες), which represent the concrete application of the catalogue’s data. Whereas the first book gives instructions on designing maps (καταγραφή) and the catalogue provides the data that are to be marked on the maps, the last section, aside from the maps themselves, supplies information that is meant to accompany the world and regional maps. The term that Ptolemy uses – ὑπογραφή – seems to indicate that the information concerns text that should be written on or around the maps, very possibly captions. The first ὑπογραφαί concern the world map (ὁ τῆς οἰκουμένης πίναξ), done according to three different projections, while the whole of Book 8 is given over to regional maps (οἱ κατὰ μέρος πίνακες) and their ὑπογραφαί. The accompanying text for the world map consists of a summarised description of the whole *oikoumenē*, to be exact its borders, followed by lists of the world’s most noteworthy geographical features (seas, gulfs, islands) and, finally, a summary of the latitudinal and longitudinal dimensions of the *oikoumenē* (*Geogr.* 7.5.2–16 and 7.7).

Book 8, with its twenty-six regional maps and ὑπογραφαί, has a different structure than the chapters in Book 7 on the world map: it has its own introduction (*Geogr.* 8.1–2) and each regional map has its own section in which between one and seven regions (περιορισμοί) of the catalogue have been drawn. Ptolemy presents the content of each section as follows:

We have set out the captions (τὰς ὑπογραφὰς) for each [map], putting first the continent to which the map belongs, its ordinal number, what countries it

99 In Ptolemy’s *Geography* and in the geographical texts of Antiquity, the name Λιβύη (translated here as ‘Libyē’) to avoid confusion with modern Libya) denotes the African continent in the modern sense.

Ptolemy uses the term ‘Africa’ (Ἀφρική) to refer to the Roman province of the same name.

100 *Geogr.* 1.18.1, 2.1.2, 2.1.11.

101 Stückelberger and Graßhoff 2006, 23.

102 See p. 127.

contains, approximately what ratio the parallel through its middle has to the meridian, and what the boundary of the whole map is. We have put below [this information] the elevations of the pole for the principal cities (τῶν διασημῶν πόλεων) in each country, converted into the length of the longest days [that occur] there; and their longitudinal positions [converted] approximately into intervals from the meridian through Alexandria, whether to the east or to the west, in units of equinoctial hours; and for those that the ecliptic stands over, [we have recorded] whether the sun passes through the zenith once or twice [in a year], and how [the sun] is situated [on the ecliptic] with respect to the tropic points [when this happens].<sup>103</sup>

Thus these instructions dealing with the text to be written on or around the maps also concern the design (καταγραφή) of the maps as each regional map is defined by the specific ratio of its central parallel to the meridian. This final book has raised many questions in modern studies regarding its specificity, which sets it apart from the *Geography's* other books. Its introduction seems to be an attempt to justify the making of regional maps, and its quite long and sometimes redundant explanation (*Geogr.* 8.1.1–7) refers back to the work's main introduction in which Ptolemy defines 'geography' (γεωγραφία) as the science of making world maps and 'chorography' (χωρογραφία) as the science of making maps of smaller areas.<sup>104</sup>

Book 8 thus appears to be a kind of continuation of Ptolemy's original project. It is the only book in which the title of the *Geography* (γεωγραφικὴ ὑφήγησις<sup>105</sup>) is mentioned *in extenso* and in which he refers to the *Almagest* (μαθηματικὴ σύνταξις) by name. Although every locality was marked on the maps with the help of the coordinates given in the catalogue, a different reference system was intentionally used to convert the longitudes and latitudes of the important cities. So, although Book 8 is very much a part of the *Geography*, since it has its own prologue and structure, it can, to a certain extent at least, be regarded as self-contained.

#### 1.2.4 Paratexts and scholia

Besides the three main parts of the *Geography* – the introduction, the catalogue and the cartographical section – a number of additional texts were transmitted in some of its

103 *Geogr.* 8.2.1.

104 *Geogr.* 1.1.1 See p. 163.

105 *Geogr.* 8.1.1. It is the only mention of the title in the whole work, if one does not take the heading transmitted by the manuscripts into account. The title is

also given in an ancient scholion to Plato's *Ion*; see p. 107. In *Geogr.* 7.4.14 and 8.1.6, Ptolemy uses the term σύνταξις to refer to his own geographical work, whereas in the introduction (*Geogr.* 1.22.5) he refers to his 'writings' (ἐν τοῖς ὑπομνήμασι).

manuscripts.<sup>106</sup> There is an epitome, that is, a list that repeats the headings of each section (περιορισμός) of the catalogue (the lists of the various manuscripts are inconsistent)<sup>107</sup> as well as several scholia, which mostly seem to concern cartographical instructions. The scholia clearly post-date the redaction of the *Geography*, but the origin of the paratexts remains largely unidentified. Of all the paratexts, the so-called *scriptio* of Agathodaimōn has aroused the greatest interest. The text reads as follows:

ἐκ τῶν Κλαυδίου Πτολεμαίου γεωγραφικῶν βιβλίων ὀκτῶ τῆν οἰκουμένην πᾶσαν  
Ἀγαθὸς Δαίμων Ἀλεξανδρεὺς μηχανικὸς ὑπετύπωσα [οἱ ὑπετυπώσατο, ὑπετύπωσε]

On the basis of the eight geographical books of Klaudios Ptolemaios, I Agathodaimōn, engineer from Alexandria, have sketched the whole known world [or: Agathodaimōn has sketched...].

This *scriptio* appears at the end of Ptolemy's text and has been transmitted by one group of manuscripts. It has been intensively discussed and interpreted within the framework of the textual and cartographical history of the *Geography*. Nonetheless, the exact role of the frequently mentioned Agathodaimōn and the context of his involvement (that is, its date) remain a mystery.<sup>108</sup>

### 1.3 Geographical coordinates

#### 1.3.1 The coordinates in the *Geography*

That only two geographical coordinates (that is, latitude and longitude) are needed to determine the position of a locality on Earth is by far Ptolemy's most notable contri-

106 See Burri 2013, 120–140, for a thorough codicological study of these 'extra' texts.

107 See Stückelberger and Graßhoff 2006, 909–915, in particular notes 75 and 76, 909; Burri 2013, 133–134.

108 Stückelberger 2009d, 321–322; Mittenhuber 2009, 322–323; Burri 2013, 138–139. I find the choice of verb (to sketch/outline) used in the *scriptio* in the sentence 'I have sketched the whole known world' (ὑπετύπωσα), somewhat curious. As Ptolemy himself uses the verb καταγράφειν ('to design') to describe the making of a map, one would have expected that an Alexandrian μηχανικός used the same technical verb (κατέγραφα: 'I have designed'). Agathodaimōn's expression is in fact taken almost word for word from a passage at the end of Book 7, where Ptolemy states: '[We have forethought] to sketch,

as it were, a sort of map of the entire *oikoumenē*' (πίνακος ὡσπερ τρόπον πάσης τῆς οἰκουμένης ὑποτυπώσαι, *Geogr.* 7.5.1). Agathodaimōn, however, neither uses the word 'map' nor does he specify whether he sketched just a picture of the whole world or the regional maps as well. Furthermore, it is not clear whether Agathodaimōn was responsible for the whole mapping procedure and designed the grid(s), plotted the localities, drew the coasts, islands and mountains, applied colours, wrote the captions, and so on, or whether he just participated in one step of the production process. Finally, although Agathodaimōn described himself as a μηχανικός, that is, an 'engineer', without any precise historical context, it is impossible to be sure what this term implied exactly.

bution to the history of geography and cartography. Although there is no Greek word for 'coordinates' – in the *Geography* Ptolemy writes simply 'position in latitude' or 'position in longitude' – the modern use of the term corresponds well to Ptolemy's concept of latitude and longitude, even though 'coordinates' is somehow anachronistic. In the *Almagest*, which predates the *Geography*, Ptolemy supplies a catalogue of the fixed stars, the concept of which he describes as follows:

In order to display the arrangement of stars on the solid globe according to the above method, we have set it out below in the form of a table (κανονικῶς) in four sections. For each star (taken by constellation), we give, in the first section, its description as a part of the constellation; in the second section, its position in longitude (τὰς κατὰ μῆκος ἐποχὰς), as derived from observation [...]; in the third section we give its distance from the ecliptic in latitude (κατὰ πλάτος), to the north or to the south as the case may be for the particular star; and in the fourth, the class to which it belongs in magnitude.<sup>109</sup>

The vocabulary of the *Geography* and the idea of tables with geographical coordinates had, therefore, already taken root in the star catalogue. In addition, the idea that only two pieces of data – a longitude and a latitude – were needed to determine the position of a star in the sky was certainly the origin of the notion that two geographical coordinates could determine the position of a locality on Earth.

Geographical coordinates cannot be used without a reference system. The latitude of Ptolemy's stars were, for instance, related to the ecliptic. In the *Almagest*, Ptolemy stated his intention to create a geographical work in which terrestrial places would be located using a latitude that had been determined in relation to the Equator, and a longitude determined in relation to the meridian through Alexandria.<sup>110</sup> The utilisation of two terrestrial circles, which are, in fact, projections of celestial circles on the Earth, made it possible for Ptolemy to establish the *absolute* location of each place, that is, how to locate places independently of each other, rather than the *relative* location, that is, how to locate a place relative to other landmarks. In the *Geography*, Ptolemy presents the system he intended to use in his catalogue of geographical localities:

Hence we have put together, for all the provinces, the following information: the definition of the boundaries (τὰς περιγραφὰς) for each part, that is, the position in longitude and latitude (θέσεις κατὰ τε μῆκος καὶ κατὰ πλάτος), the relative situations of the more important peoples in them and the accurate location (τὰς ἀκριβεῖς ἐποχὰς) of the more noteworthy cities, rivers, bays, mountains and other things that ought to be in a map of the *oikoumenē* – that is, the number

109 *Alm.* 7.4.

110 *Alm.* 2.13, see p. 84.

of degrees (of such as the great circle is 360) in longitude along the Equator between the meridian drawn through the place and the meridian that marks off the western limit (τὸ δυσημικὸν πέρας) [of the *oikoumenē*], and the number of degrees in latitude between the parallel drawn through the place and the Equator, [measured] along the meridian.<sup>111</sup>

In other words, in the *Geography's* catalogue of localities, Ptolemy retains the use of the Equator as a reference circle to compute the latitudes. However, the reference meridian, which is comparable to our modern concept of the prime meridian, does not go through Alexandria but through the western border of the *oikoumenē*. By scrutinising the other passages of the introduction, it is clear that this boundary line went through the Fortunate Isles, an archipelago of six islands at the western edge of Ptolemy's *oikoumenē*.<sup>112</sup> This means that every longitude, expressed in degrees, can be said to lie to the east of this meridian, and not, as with the meridian through Alexandria, for example, partly to the west and partly to the east of this line, which would have necessitated a specification for each longitude.<sup>113</sup>

However, in the catalogue of localities, the longitude of the Fortunate Isles is, according to most of the manuscripts, 1° west. Only one manuscript gives the longitude as 0° for four of the islands and 1° for the remaining two.<sup>114</sup> In antique papyri and medieval codices, such as those of the *Handy Tables* and the *Almagest*, before the introduction of the Arabic zero, nought was often written with a small circle plus a diacritical sign, most frequently a diplē or a simple raised dash:  $\overline{\circ}$ .<sup>115</sup> A misinterpretation of one

111 *Geogr.* 1.19.2.

112 *Geogr.* 1.11.2: '[...] where we, [like Marinus,] set the Fortunate Isles at the westernmost limit (ἐπὶ τοῦ δυσημικωτάτου πέρατος); cf. with *Geogr.* 1.12.11 and 1.14.9. The Fortunate Isles (both Ptolemy and Pliny called one of the islands Canaria) tend to be identified with the modern-day Canary Islands, although Ptolemy's and Pliny's descriptions (*Geogr.* 4.6.34 and Pl. 6.202–205) do not absolutely match the actual location and configuration of the archipelago. When the latter was (re)discovered in the fourteenth century, the islands were named after the Fortunate Isles of Antiquity, hence its proximity to the toponyms of Pliny and Ptolemy. See also the description of the Fortunate Isles and their *mirabilia* in Mela 3.102 and Plutarch, *Sertorius*, 8–9. Whatever the case may be, there is very little documentation on these islands in the sources of Antiquity.

113 For the localities situated on the Equator, Ptolemy writes ἰσημερινός ('equator'). For latitudes south of the Equator, he states systematically νότ[ιτος]

('southern'). In some cases that could be confusing, though, he also writes βόρειος ('northern'), but since most of the localities he deals with are situated in the northern hemisphere, the latitudes given do not usually have this detail. Thus, using the westernmost meridian as a reference point enables Ptolemy to simplify the system of longitude.

114 *Geogr.* 4.6.34. The manuscripts of the Ω recension (see p. 60) all give a longitude of 1°, whereas manuscript X gives a longitude of 0°, using the Arabic zero (see p. 78), for the islands of Aprositos, Pluvialia, Capraria and Pintouaria.

115 See A. Jones 1999, 61–62, and Tihon 2011, 58–59. The P. Oxy. 4167 of the *Handy Tables* (third or fourth century CE) as well as many astronomical papyri from the first to third centuries CE used  $\overline{\circ}$  – P. Colker (see A. Jones 1997), P. Fouad inv. 267 A, P. Oxy. 4152, 4165, 4174, etc. – although the form varied from one copyist to another. See also Roberts 1938, 149.

of the symbols for zero could explain the divergent readings in the manuscripts.<sup>116</sup> The problem of their exact longitude is, however, of secondary importance, since the naming of the Fortunate Isles as the westernmost meridian was primarily undertaken for practical reasons.

### 1.3.2 The invention of geographical longitude and latitude

Although Ptolemy was the first to combine geographical longitude and latitude, he did not invent the concepts. The Greek word commonly used – by Ptolemy among others – to refer to the longitude of a place was τὸ μῆκος, which originally meant the *length* of an object, that is, an object's largest dimension compared with its smaller one. Likewise, the word for latitude (τὸ πλάτος) originally signified the *width* of an object.<sup>117</sup> Thus, the μῆκος and the πλάτος of a country referred simply to its length and width.

However, in the context of an oriented space (thanks to the cardinal directions), the word μῆκος by convention signifies not the largest dimension of a country but its east-to-west extent, whatever the measurements of its dimensions. Likewise, πλάτος refers to a country's north-to-south extent. One cannot date with certainty the emergence of this geographical convention; it is reasonable to assume that Eratosthenes formalised it in his own work, although it was Strabo who first explained it clearly:

Generally it must be observed that length and width cannot be described in the same way for a whole as for a part. In regard to a whole the greater distance is called the *length* and the lesser the *width*, but with parts the *length* is that section which is parallel to the length of the whole, and the *width* is the section that is parallel to the width of the whole, whichever [dimension] is greater, even if the distance taken in the width is greater than the distance taken in the length.

Thus, since the *oikoumenē* has a length from east to west, and has a width from north to south – with its length drawn parallel to the equator and the width [parallel to] a meridian – it is necessary in regard to its parts to take as length the sections parallel to the length and as widths those [parallel to] the width.<sup>118</sup>

This geographical convention is clearly based on the Hellenistic picture of the *oikoumenē*. According to Democritus, Aristotle and to many scholars after them, the *oikoumenē*'s length ran in an east–west direction and its breadth in a north–south direction.<sup>119</sup> By

116 I am not convinced by the supposition that the Greek letter  $\bar{\alpha}$  might have been used as an *ad hoc* substitute for zero and was later misinterpreted as  $\alpha$  (that is, '1'), as suggested by Stückelberger 2009b, 219–220. There is no evidence to corroborate this use of the letter  $\alpha$ .

117 See the fundamental definitions of Euclid (*Elem.* 1 Definitions 2 and 5) and Aristotle (*Phys.* 4.1 [209a]).

118 Str. 2.1.32.

119 Democritus in Agathemerus, *Hypotyyp.* 2; Arist. *Meteor.* 2.5 (362b).

Ptolemy's time, the assimilation of the term μήκος with the concept of the east–west direction (and πλάτος with the north–south direction) had become well and truly established.<sup>120</sup>

With the development of a framework made up of parallels and meridians, the terms μήκος and πλάτος acquired over time the modern meaning of the *longitude* and *latitude* of a locality. Thus, ancient Greek geographers had only one word (μήκος) to describe the length of a territory, the east–west extent of a territory and the longitude of a locality, and, likewise, only one word (πλάτος) to refer to the width of a territory, the north–south extent of a territory and the latitude of a locality. The semantic change in the meanings of the words μήκος and πλάτος during Antiquity is not insignificant, for it might well have led to different interpretations as well as misinterpretations of the same source. Ptolemy was aware of the polysemy of these words in the field of mathematical cartography. When he described the shape of Ireland, for example, he clearly felt that it was necessary to specify 'its length (μήκος) from east to west,' because the largest dimension of this island (its *geometrical* length) is in its north–south direction.<sup>121</sup>

The specific meanings of the terms μήκος and πλάτος to denote 'longitude' and 'latitude' were certainly inspired by Ptolemy's astronomical work and his catalogue of stars. The influence of astronomy is also clear from the prepositions he used. When Ptolemy needed to give an absolute latitude, a particular place always lay *under* (ὕπὸ) a parallel and he took the celestial sphere as the reference point of the location.<sup>122</sup> Likewise, a locality at a precise longitude lay *under* a meridian. However, in two cases meridians and parallels were taken to be the projection of celestial lines on the Earth's surface: when Ptolemy and, with some exceptions, Strabo measured a location's longitudinal or latitudinal distance, it was always *on to* (ἐπὶ) a parallel or meridian circle;<sup>123</sup> and when a parallel or a meridian was used to list places, the circle always went *through* (διὰ) the cities and countries.<sup>124</sup>

### 1.3.3 The multiplicity of latitude data

In the *Geography*, Ptolemy gives the latitudes of localities, that is, their positions along a north–south axis, and expresses them in degrees along a meridian. Long before Ptolemy,

120 *Alm.* 2.1; *Geogr.* 1.6.3–4.

121 *Geogr.* 1.11.8.

122 *Geogr.* 1.1.8: 'So that it will be possible to specify under (ὕπὸ) which parallels of the celestial sphere (τῆς οὐρανοῦ σφαίρας) each of the localities in this known part lies'. See also *Geogr.* 1.4.2.

123 *Geogr.* 1.11.2: 'One should follow the number of stadia from place to place, set down by Marinus [...]

as measured on to the parallel (ἐπὶ τοῦ παραλλήλου) through Rhodes.'

124 *Str.* 2.5.14: 'The Sacred Cape [...] lies approximately on the line that passes through Gades (διὰ Γαδείρων), the Pillars, the Strait of Sicily and Rhodes'. *Geogr.* 1.15.9: 'In the description of the parallels, Marinus puts the parallel through Byzantium (διὰ Βυζαντίου), through Satala (διὰ Σατάλων) and not through Trapezous (διὰ Τραπεζοῦντος).'

scholars had thought of several different ways of situating localities in relation to the north or south poles. For example, the latitude of a locality corresponds to the elevation of the pole above the horizon at this locality. There is also a relationship between the latitude of a locality and the angle at which the Sun's rays strike the Earth's surface at a given locality. Thus, the ratio of a gnomon (γνώμων) to its shadow – that is, any pointer and its shadow of, for example, a sundial – is linked with the latitude of the place on Earth where the gnomon lies. The use of a gnomon to determine the latitude of a place goes back (at the very least) to the Hellenistic period. Moreover, in localities at the same latitude, the length of the day (understood as the time between sunrise and sunset) is the same all year round. Therefore, the length of the longest day of the year (on the summer solstice) and the length of the shortest day (on the winter solstice) can be measured, which characterises the latitude of a place on Earth.<sup>125</sup>

Hellenistic geographers had developed the concept of *klima* (κλίμα, plural κλίματα). The term stems from the verb κλίνω (to slope, to incline) and denoted the inclination (or angle) of the celestial pole above the horizon. In astronomy and geography, *klima* refers to parallel strips on the Earth, of varying widths (on either side of a parallel circle or between two parallels), where the places within the strip lie more or less on the same latitude.<sup>126</sup> The term is, however, polysemic and can be associated, in some contexts, with weather conditions (as in the modern sense of climate) or with cardinal points. In geographical texts, *klima* (or its Latin equivalent, *clima*) could be used simply to indicate an approximate order of latitude. From the time of Eratosthenes, there existed a (quasi) canonical list of seven *klimata* that was commonly used in astrology. Each *klima* was labelled with a number and a geographical reference place, and was counted from south to north: (1) Meroë; (2) Syēnē; (3) Alexandria; (4) Rhodes; (5) Hellespont; (6) the Middle of the Pontus; and (7) the mouth of the Borysthenes (the Dnieper) River. Perhaps because of its polysemy, Ptolemy rarely uses the word *klima*, employing, by preference, 'parallel'. The so-called seven *klimata* were widely referred to in the sources of Antiquity and their influence on geography, astronomy and astrology in Greek, Syriac and Arabic milieus went far beyond Ptolemy.<sup>127</sup>

The elevation of the celestial pole, the ratio of a gnomon to its shadow as well as the lengths of days had all been used in mathematical geography before Ptolemy, in particular by Eratosthenes and Hipparchus, but they had also been mentioned by Vitruvius (first century BCE), Pliny, Strabo and Marinus of Tyre.<sup>128</sup> In the *Almagest*, that is, before

125 See *Alm.* 2.2–6; Berggren and A. Jones 2000, 8–10; Stückelberger 2009b, 225–234.

126 See Honigmann 1929; Neugebauer 1975, 333–337; Marcotte 1998; Marcotte 2002, lvi; Aujac 2003b,

186–187; Stückelberger and Mittenhuber 2009, 45, 135–136.

127 Stückelberger and Mittenhuber 2009, 347–351; Defaux 2014, 108–110 and 135–139.

128 See pp. 188–197.

he began to work on the *Geography*, Ptolemy proposed a list of parallel circles, from the Equator to the North Pole, for which he provided various data, as in the following:

The eleventh is the parallel with the longest day of  $14 \frac{1}{2}$  equinoctial hours. This is  $36^\circ$  from the Equator, and goes through Rhodes. In this region, for a gnomon of 60 [parts], the summer [solstitial] shadow is  $12 \frac{11}{12}$  [parts], the equinoctial shadow is  $43 \frac{3}{5}$  [parts] and the winter [solstitial] shadow is  $103 \frac{1}{3}$  [parts].<sup>129</sup>

Ptolemy knew very well that all these data were mathematically linked, and in the *Almagest* he provided mathematical methods for converting these data;<sup>130</sup> in particular, the ratio of a gnomon to its shadow as well as the lengths of the days could be converted into latitudes in degrees.<sup>131</sup>

### 1.3.4 Uses of geographical coordinates

In a world where computer maps and global positioning systems are the norm, everyone understands the value of geographical coordinates: they help us to get our bearings in traffic jams and to find our way to our holiday destinations, to locate people who need rescuing or animals that we want to study. Ptolemy's intentions, however, were very far from developing a system that could be used on a daily basis to get one's bearings on Earth. The uses and applications of Ptolemy's coordinates are important, since they are closely connected to their development. In the *Almagest* as well as in the very beginning of the *Geography*, Ptolemy makes a link between the position of a locality on Earth and calculating celestial phenomena:

Now that the treatment of the angles [between the ecliptic and the principal circles] has been methodically discussed, the only remaining topic in the foundations [of the rest of the treatise] is to determine the position in latitude and longitude of the important cities in each province which deserve note, in order to calculate the [celestial] phenomena for those cities.<sup>132</sup>

Moreover [it will be possible to specify] under which parallels of the celestial sphere each of the localities in the [known part of the world] lies. From this last, one can also determine the lengths of nights and days, which stars reach the zenith or are always borne above or below the horizon and all the things

129 *Alm.* 2.6.11. See Neugebauer 1975, 43–45.

130 *Alm.* 2.2–6.

131 For a good synopsis of Ptolemy's computational methods with useful modern mathematical formulations, see Rinner 2013, 26–29.

132 *Alm.* 2.13. See p. 84.

that we associate with the properties of terrestrial localities (τῶ περὶ οἰκίσεως λογῶ).<sup>133</sup>

Book 8 of the *Geography* contains a certain amount of information that is of use in astronomy, such as the lengths of the longest days of the year. The most important datum Ptolemy includes is the *latitude* of a locality, which plays an important role in astronomical observations and calculations. According to Strabo, Eratosthenes considered that one needed a difference in latitude of at least 400 stadia between two localities in order to be able to detect a noticeable difference in astronomical phenomena occurring at these localities.<sup>134</sup> In the *Geography*, Ptolemy writes that one degree along a great circle of the terrestrial sphere equals 500 stadia, while in his catalogue the smallest possible latitudinal gap between two localities is a twelfth of a degree, that is, *c.* 80 stadia. In the context of astronomical computations, such a high level of precision is unnecessary, even if Ptolemy improved the accuracy of both observations and calculations. Moreover, Ptolemy never explicitly discusses the uses of geographical *longitude* when making astronomical observations.

In the *Geography*, coordinates are used, above all, for drawing maps, thereby achieving several objectives. Ptolemy deplored the disorder of Marinus' geographical compilation and the practical difficulties of constructing a map that arose from following his work. In particular:

[One finds in Marinus'] works, in one place maybe just the latitudes, say in the exposition of the parallels, and in some other place just the longitude, say in the description of the meridians. Moreover, the same localities are not found in each section: the parallels are drawn through some places and the meridians through others, so that such localities lack one or the other position. In general, one needs to have practically all [Marinus'] writings to make the investigation for each locality that is to be set down, because something different is said about the same locality in every one of them.<sup>135</sup>

Using two coordinates to situate a locality was Ptolemy's direct response to the inconvenient and unhelpful work of his predecessor. For Ptolemy, placing a longitude and

133 *Geogr.* 1.1.8. The Greek term οἰκίσις (from οἰκέω, 'to inhabit') is hard to comprehend and translate accurately. It signifies, in a rather abstract way, a terrestrial place or locality with its own properties, generally linked with its latitude. Berggren and A. Jones 2000, 58, translate Ptolemy's passage as follows: '[...] and all the things we associate with the subject of habitations' – the word 'habitations' meaning, according to Berggren and Jones, 'the determina-

tion of the astronomical phenomena characteristic for particular terrestrial latitudes.' I believe, however, that οἰκίσις means first of all a place with its properties, rather than the 'determination' of these properties. Like the word *klima*, the term οἰκίσις was general enough to be used in a variety of ways.

134 *Str.* 2.1.35.

135 *Geogr.* 1.18.4.

a latitude together was one of the prerequisites for a user-friendly and comprehensive handbook of geography. Furthermore, map-making by plotting localities on to a grid, on the basis of coordinates, was, Ptolemy believed, a much more reliable way of mapping than the common copying processes of his time:

After all, continually transferring [a map] from earlier exemplars to subsequent ones tends to bring about grave distortions in the transcriptions through gradual changes. If this method based on a text did not suffice to show how to set [the map] out, then it would be impossible for people without access to the picture to accomplish their object properly.<sup>136</sup>

Ptolemy considered that drawing a map on the basis of a geometrical construction was more reliable than some of the ‘artistic’ imitations of earlier models. Thanks to his catalogue, he made it possible for anyone to create a map, even without a model. In concrete terms, Ptolemy proposed that some graduations needed to be drawn on the graticule of each map, along a meridian and a parallel, and that the resulting divisions would then enable one to plot the localities easily and precisely on to the map.<sup>137</sup> Furthermore, geographical coordinates allowed one to draw a map using any type of projection or on to a globe as long as a grid of parallels and meridians was used.<sup>138</sup>

Thus, coordinates not only represented the geographical characteristics of places on the Earth but also (and perhaps, above all) offered a practicable and reliable way of constructing a map. Using two geographical coordinates was Ptolemy’s practical response to the requirements that underlay his method of map-making: the proportionality (or the commensurateness) of the positions (συμμετρία);<sup>139</sup> the reliability of the procedure of transmitting maps; the user-friendliness (εὐχρηστον) of the handbook;<sup>140</sup> and, finally, the flexibility of the system (correcting the positions of localities and mapping the localities on to different supports needed to be trouble-free).

## 1.4 Ptolemy’s map projections

### 1.4.1 Requirements for an accurate representation of the *oikoumenē*

In the incipit of the *Geography*, Ptolemy states that geography involves making pictorial representations of the *oikoumenē*:

136 *Geogr.* 1.18.2–3.

137 *Geogr.* 1.24.9.

138 *Geogr.* 1.22.5. The realisation of a globe with a picture of the *oikoumenē* has a pendant in the *Almagest* (7.3), where Ptolemy gives instructions on con-

structing a celestial map on to a globe, using the catalogue of stars.

139 *Geogr.* 1.1.5, see p. 163.

140 *Geogr.* 1.6.2, 1.18.2, 2.1.4.

Geography (ἡ γεωγραφία) is an imitation through drawing (μίμησις διὰ γραφῆς) of the entire known part of the world together with the things that are, broadly speaking, connected with it.<sup>141</sup>

To make a picture of the *oikoumenē* that resembles the actual world as closely as possible, one needs to represent the countries and distances between the localities in proportion (σύμμετρος) to each other.<sup>142</sup> As seen earlier, using the geographical coordinates of each locality enables one to position these places correctly on to a map. The making or design (καταγραφὴ) of a world map should fulfil these demands as well. According to Ptolemy, the whole known world covered virtually half of the globe's circumference in longitude (that is, *c.* 180°)<sup>143</sup> and stretched in latitude over *c.* 80°.<sup>144</sup> Therefore, the fundamental issue that underlay Ptolemy's drawing of a world map was how to represent the whole extent of the *oikoumenē* (the surface of which was, of course, spherical) on a plane map, while keeping the distances in proportion:

Drawing the map on a globe instantly gets the likeness of the earth's shape and it does not call for any additional device to achieve this effect; but it does not conveniently allow for a size [of map] capable of containing most of the things that have to be inscribed on it, and the eye cannot grasp the whole shape [of the *oikoumenē*] all at once [...]. Drawing the map on a plane eliminates these [difficulties] completely; but it does require some method to achieve a resemblance (ὁμοιότητα) to a picture of a globe, so that on the flattened surface, too, the intervals established on it will be in as good proportion (σύμμετρος) as possible to the true [intervals].<sup>145</sup>

Ptolemy had noted that Marinus 'paid considerable attention to this problem and found fault with absolutely all the existing methods of making plane maps.'<sup>146</sup> Marinus would have used some map-making method, however inconvenient, since he drew parallels and meridians as straight lines, with the parallels perpendicular to the meridians. Admittedly, Marinus did try to preserve the correct ratio of the parallel through Rhodes to the meridian, although this ratio did not allow one to map the entire *oikoumenē* without major distortions occurring.<sup>147</sup>

141 *Geogr.* 1.1.1.

142 *Geogr.* 1.1.1–8.

143 *Geogr.* 1.11.1, 1.12.12, 1.14.10.

144 *Geogr.* 1.10.1.

145 *Geogr.* 1.20.1–2.

146 *Geogr.* 1.20.3.

147 *Geogr.* 1.20.2–5. See Rinner 2013, 72, 76–77.

### 1.4.2 The world map ‘projections’

In his instructions on how to construct world maps, Ptolemy presents three different methods. For the sake of convenience, most modern scholars use the term ‘projection’ to describe the three kinds of grids that Ptolemy suggests should serve as frames for drawing maps. P. Gautier Dalché strongly disapproves of the use of ‘projection,’ since, according to him, Ptolemy ‘did not give a theoretical exposé of projection’ but ‘provided empirical descriptions of how to transcribe a sphere onto a plane surface.’<sup>148</sup> It is certainly the case that Ptolemy did not have a concept for a ‘cartographical projection,’ using instead ‘μέθοδος εἰς τὴν ἐν ἐπιπέδῳ καταγραφὴν,’ which could be roughly translated as a ‘method for making a plane map.’<sup>149</sup> To speak of ‘conic’ or ‘cylindrical’ projections is clearly anachronistic. However, the standard modern definition of a ‘map projection’ can be quite inclusive: the Oxford English Dictionary, for instance, defines it as ‘a representation on a plane surface, on any system, geometrical or other, of the whole or any part of the earth.’<sup>150</sup> Ptolemy’s method of representation did not rely on a mathematical transformation but on empirical procedures. However, as the modern definition matches his ‘map-making method,’ it is reasonable to use the term ‘projection’ as long as one understands it in the broader sense of the word.<sup>151</sup>

Ptolemy’s aim was to reproduce on the plane map the aspect of a sphere.<sup>152</sup> He notes that, when one looks at a globe, the parallels and meridians generally resemble curves:

When the line of sight is initially directed at the middle of the northern quadrant of the sphere, in which most of the *oikoumenē* is mapped, the meridians can give an illusion of straight lines when, by revolving [the globe or the eye] from side to side, each [meridian] stands directly opposite [the eye] and its plane falls through the apex of the sight. The parallels do not do so, however, because of the oblique position of the North Pole [with respect to the viewer]; rather, they clearly give an appearance of circular segments bulging to the south.<sup>153</sup>

Thus, in Ptolemy’s so-called first map projection the meridians are kept as straight lines (εὐθεῖαι γραμμαί) that intersect at the North Pole on the map, while the parallels are drawn as the arcs of a circle (ἐν τμήμασι κύκλων). In addition, the parallel through Rhodes needs to be in proportion to the meridian (Fig. 1).<sup>154</sup> Ptolemy also presents

148 Gautier Dalché 2007, footnote 4, 285. See also Gautier Dalché 2009b, 11 (where he writes about ‘empirical recipes’), and Gautier Dalché 2001, 122.

149 For instance, *Geogr.* 1.20.3 and 1.24.1.

150 *The Oxford English Dictionary*, second edition, 1989.

151 See also A. A. Jones 2011, 20: ‘[Ptolemy] defines these with enough mathematical precision so that they may legitimately be described as projections.’

152 For a comprehensive discussion on Ptolemy’s map-making method, see Rinner 2013, 49–72.

153 *Geogr.* 1.20.6.

154 *Geogr.* 1.21.1–2.

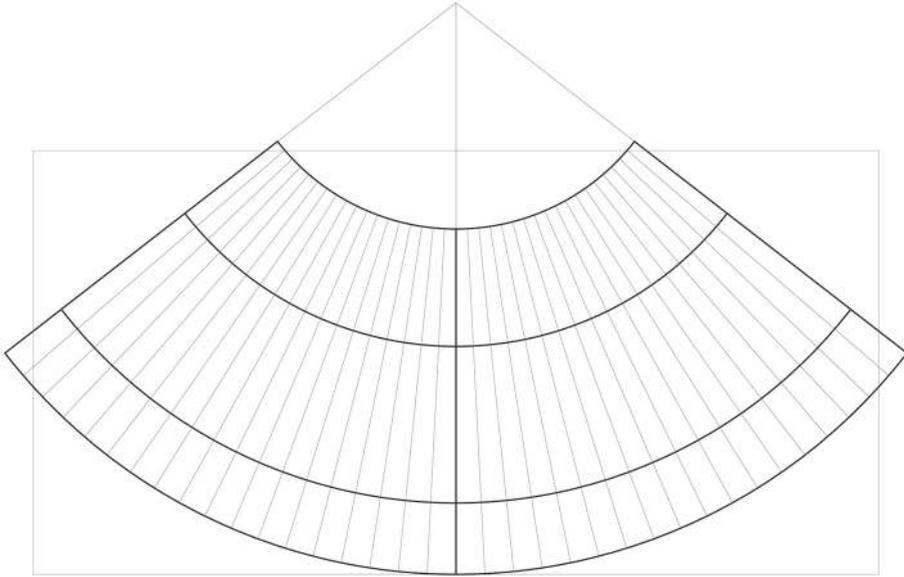


Fig. 1 Grid of Ptolemy's so-called first map projection (Rinner 2013).

a variant of this projection, in which the lines that represent the meridians become increasingly inflected the closer they get to the Equator. This allows Ptolemy to reconstruct approximately the curve of the meridians south of the Equator when looking at the northern hemisphere of a globe (Fig. 2).<sup>155</sup>

Ptolemy then presents his second map projection, in which both meridians and parallels are drawn as the arcs of circles. His objective was to construct a grid:

on the hypothesis that the globe is so placed that the axis of the visual rays passes through both (1) the intersection nearer the eye of the meridian that bisects the longitudinal dimension of the known world and the parallel that bisects its latitudinal dimension, and also (2) the globe's centre.<sup>156</sup>

The construction of this grid is more complex than the first method but it has the advantage of giving a better impression of a sphere (Fig. 3). For each of his methods, Ptolemy explains in detail the dimensions of the required surface and describes every step of the ruler-and-compass geometrical construction. Finally, Ptolemy presents a specific projection that enables one to draw, on a planar surface, a representation of the globe surrounded by rings depicting celestial circles; the *oikoumenē* and the circles need to be

155 *Geogr.* 1.24.7.

156 *Geogr.* 1.24.10.

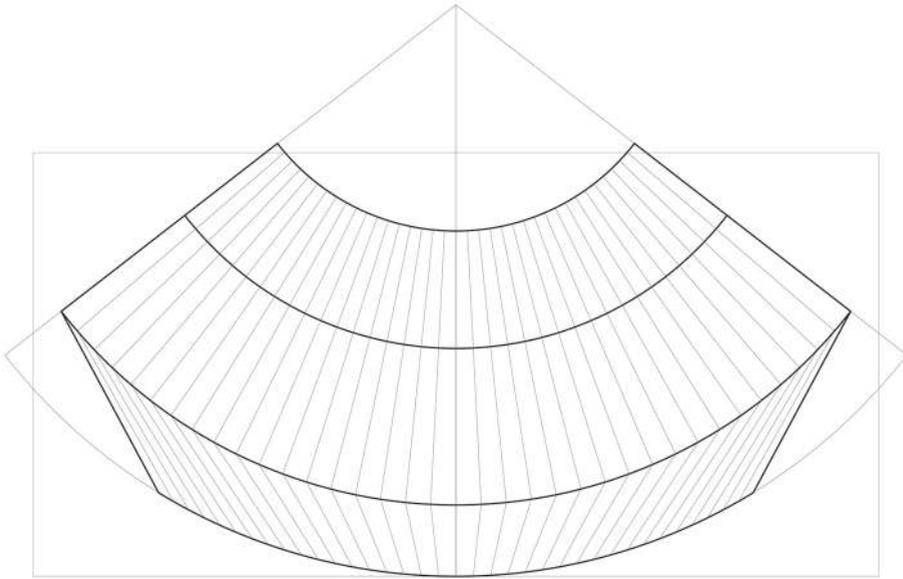


Fig. 2 Grid of Ptolemy's first map projection with modifications (Rinner 2013).

carefully and accurately positioned in order to give the idea that one is looking at a real globe.<sup>157</sup>

According to Ptolemy, all his projections enable one to construct a map in which the proportions of the *oikoumenē* and the ratio of the parallels to meridians are respected. He concedes that the second map projection is more arduous to draw than the first but states that it is clearly superior to the first projection:

We could make the map of the *oikoumenē* on the [planar] surface still more similar (ὁμοιότερον) and similarly proportioned (συμμετρότερον) [to the globe] if we took the meridian lines, too, in the likeness of the meridian lines on the globe [...].<sup>158</sup>

Ptolemy specifies the number of parallels and meridians that should constitute the grid and states that the lines should give a good visual representation of a globe but at the same time not overload the drawing. He recommends drawing meridians at 5° intervals, and then gives a list of twenty-one parallel circles that are to be drawn north of the Equator and two parallels south of the Equator. This list of main parallels does not use whole numbers of degrees but relies on the lengths of the longest days with intervals

157 *Geogr.* 7.6. See Rinner 2013, 67–69.

158 *Geogr.* 1.24.10.

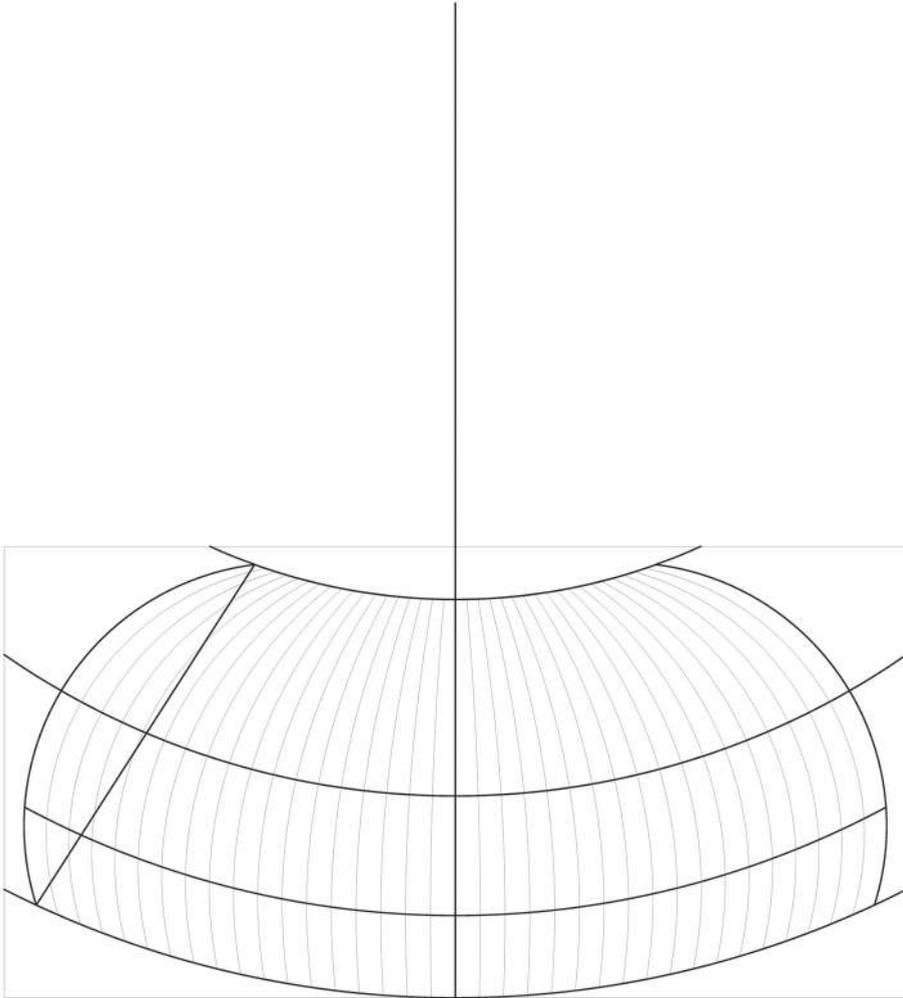


Fig. 3 Grid of Ptolemy's so-called second map projection (Rinner 2013).

of a quarter-hour, a half-hour and one hour.<sup>159</sup> Each parallel circle is numbered and Ptolemy specifies the number of degrees in latitude that correspond to each of them. The list is built on the model of the list of parallels in the *Almagest*<sup>160</sup> and has its roots in the parallel circles recorded by Hipparchus.<sup>161</sup> However, the lists of the *Geography* and the *Almagest* do not resemble each other: the latter is more complete (there are thirty-eight parallels), the numbering differs, the latter gives geographical reference places for

159 *Geogr.* 1.23.

160 See p. 47.

161 See p. 189.

the majority of the parallels, including the ratio of gnomons to shadows, and the degrees of latitude are rounded to five minutes in the list of the *Geography* but to a more precise one minute in the *Almagest*.<sup>162</sup>

E. Rinner has noted that Ptolemy's evaluation of his own projections was based on a particular criterion, namely, the correct ratio of the meridians to the parallel circles. Otherwise said, the proportion of distances on the Earth are accurately represented on the map if they run in north–south or east–west directions – the primary objective being to represent the whole *oikoumenē* in proportion.<sup>163</sup> When one evaluates, using a modern procedure such as a Tissot's indicatrix, the characteristics of the local distortions (compared with locations on the sphere) with Ptolemy's first and second map projections, it appears that in both cases there are important distortions at the edges of the grids. Ptolemy's first projection preserves the distances in every direction (that is, not only along the meridians and parallels) better than the second method, in particular in the area of the Mediterranean region. Generally, then, the first projection creates fewer distortions than the second. If one focuses on the sole ratio of the meridian to the parallels, which was Ptolemy's main criterion, however, the second projection leads to a more accurate result.<sup>164</sup>

### 1.4.3 Regional maps

Ptolemy adopts a different strategy for the regional maps in Book 8, where he opts for a simpler projection:

It will not be very inaccurate, as we said at the beginning of the compilation,<sup>165</sup> if we inscribe straight lines in place of the [meridian and parallel] circles for the regional maps at least, and if moreover the meridians are [drawn as] not converging, but also parallel to one another. For in the case of the whole *oikoumenē*, the limits of the latitudinal and longitudinal dimensions, because they were taken at great intervals, make the distortions in the extreme circles significant, but in the case of each of the [regional] maps this is no longer so.<sup>166</sup>

Ptolemy's chief concern is still that the parallels should be proportional to the central meridian, but now the ratio needs to be adapted to the location of the geographical area

162 See the comparative table in Stückelberger 2009b, 233–234.

163 Rinner 2013, 64.

164 Rinner 2013, 64–67.

165 Cf. *Geogr.* 2.1.10: 'In this [regional map] it will not much matter if we make the lines for the meridi-

ans parallel, and the lines for the parallels [of latitude] straight, so long as the degree intervals on the meridians have the same ratio to those on the parallels as a great circle has to the parallel that is to be in the middle of this map.'

166 *Geogr.* 8.1.6.

drawn on to the regional map and to the dimensions of the territories included on the map:

Hence we said that the division into degrees should be made according to the ratio of the parallel [circle] that bisects the map to the great circle [a meridian], so that we will fail to take account, not of the defect [accrued] over the entire dimension of the map, but only that over the [interval] from the middle to either boundary of the maps.<sup>167</sup>

Each of the regional maps comprises a portion of territory of varying importance: for instance, the second map of Europe contains the Iberian peninsula, whereas the fourth map of Libyē includes regions extending from the Atlantic Ocean in the west to the Red Sea in the east. Thus, the constraints of a map's support – the height of a papyrus roll was, in principle, constant – force Ptolemy to adapt each grid and, at the same time, maintain an appropriate ratio of parallels to meridians. Therefore, for each regional map, Ptolemy provides the ratio of the central parallel to the meridian.<sup>168</sup> In the case of Ptolemy's map of the Iberian peninsula, for example, one degree along a parallel on the map had to be three-quarters smaller than one degree along a meridian.<sup>169</sup> This ratio was based on the fact that the parallel circle which goes through the centre of this map (the parallel circle, where the longest day is fifteen hours, that is, where the localities have a latitude of  $40^{\circ}55'$ ) is approximately three-quarters smaller than any meridian. Using a modern trigonometrical calculation, one can show that this ratio corresponds approximately to  $\cos(40^{\circ}55') = 0.756$ .<sup>170</sup> Ptolemy could have carried out a similar calculation using his own table of chords.<sup>171</sup> With such a ratio, it then becomes possible, at least in principle, to draw all the regional maps on small-format papyri as well as on larger supports.

167 *Geogr.* 8.1.7.

168 Stückelberger and Mittenhuber 2009, 48–51.

169 *Geogr.* 8.4.1.

170 See Rinner 2013, 70–71.

171 *Alm.* 1.10–11; Neugebauer 1975, 21–26; Stückelberger 2009b, 237–239.

## 2 Textual tradition of the *Geography*

### 2.1 The *Geography*'s transmission: *status quaestionis*

#### 2.1.1 Corpus of the Greek manuscripts of the *Geography*

The Greek text of Ptolemy's *Geography* survives in more than fifty manuscripts, complete or fragmentary, which date from between the thirteenth to sixteenth centuries.<sup>1</sup> According to A. Stückelberger and G. Graßhoff, the editors of the most recent critical edition of the *Geography*, five of the manuscripts are particularly relevant to the edition (the *codices primarii*).<sup>2</sup> They number among the oldest of the manuscripts and at least four of the five were produced in Constantinople. The other manuscripts were classified into two groups by the editors: eleven secondary codices (*codices secundarii*), which they regard as sometimes being pertinent to the edition, while the others, which are derived, for the most part, from the former, are regarded as irrelevant.<sup>3</sup>

The *codices primarii* of the *Geography* are quite late in comparison with the textual traditions of Ptolemy's other works.<sup>4</sup> His 'Table of Noteworthy Cities' has come down to us in three manuscripts written in majuscule, which date from the ninth century, plus one fragmentary papyrus of the early third century.<sup>5</sup> At least three Greek manuscripts of the *Almagest* can be dated to between the ninth and tenth centuries.<sup>6</sup> By contrast, the *codices primarii* of the *Geography* were copied during the early Palaeologan Renaissance (1261 – c. 1330), were all written in Greek minuscule and their respective scribes

1 Fifty-three manuscripts in total, according to Stückelberger and Mittenhuber 2009, 12–20, as well as Mittenhuber 2009, 15. R. Burri 2013, 97–102, however, lists sixty-four manuscripts, of which five were copied after the sixteenth century.

2 Mittenhuber 2009, 16, thinks that eight manuscripts (U, K, F, V, R, X, O, A) are relevant in studies of the text and the history of the maps, while I. Ronca 1971, 10, is of the opinion that twelve (U, K, V, R, X, O, A plus C, N, Z, W, v) are pertinent.

3 R. Burri 2013, 88, regrets – justifiably – that the choice of eleven *codices secundarii* by Stückelberger and Graßhoff 2006 is unexplained.

4 Schnabel 1938, 5.

5 See p. 85.

6 The Parisinus graecus 2389 (in majuscule, ninth century), the Vaticanus graecus 1594 (in minuscule, ninth century) and the Vaticanus graecus 180 (in minuscule, tenth century?). See Toomer 1984, 3, and Heiberg 1898, III–VI.

are mostly unknown. The name of Maximus Planudes (c. 1255–1305) is irretrievably linked with the 'rediscovery' of manuscripts of the *Geography*, although his exact role and connection with the *codices primarii* are still being debated.<sup>7</sup>

The Vaticanus Urbinas graecus 82 (U)<sup>8</sup>, the Constantinopolitanus Seragliensis GI 57 (K), the Vaticanus graecus 177 (V) and the Vaticanus graecus 191 (X) can be dated to c. 1300 and were copied in Constantinople.<sup>9</sup> The Venetus Marcianus graecus Z. 516 (R) was produced several decades later but its place of composition is unknown. The basic descriptions of the *codices primarii* are as follows:

- The Vaticanus Urbinas graecus 82 (U) is a large-format (575 × 418 mm), luxury copy on parchment, written by one hand<sup>10</sup> in imitation of the *Perlschrift* style (a minuscule style used from the tenth century onwards). Thus, it has been dated to between the eleventh to twelfth centuries by O. Cuntz and P. Schnabel. It comprises solely Ptolemy's *Geography* and was brought from Constantinople to Florence in 1397 by Manuel Chrysoloras (c. 1355–1415).<sup>11</sup>
- The Constantinopolitanus Seragliensis GI 57 (K) is a large-format (572 × 422 mm), luxury copy of the *Geography* on parchment in calligraphic minuscule by two different hands,<sup>12</sup> rediscovered only in 1927 in the Topkapı Palace, Istanbul, by A. Deissmann.<sup>13</sup> Thus, it has only recently been incorporated into critical editions of the text. It is quite badly preserved – it was damaged by water and mould – so that many of the folios are incomplete or practically illegible.<sup>14</sup>
- The Vaticanus graecus 177 (V) was written on small-format paper (240 × 160 mm) in minuscule. An ex libris in Latin on folio 1r is traditionally interpreted as evidence that Maximus Planudes was the owner of the codex<sup>15</sup> – the hypothesis has, however, not yet been confirmed.<sup>16</sup>

7 Pontani 2015, 403–419; Stückelberger 2009d, 325–331; Burri 2013, 521–534.

8 The sigla used to denote the manuscripts were taken from Stückelberger and Graßhoff 2006, which were, in turn, taken from Schnabel 1938.

9 R. Burri believes it is plausible that manuscripts U and K were produced during Maximus Planudes' so-called 'rediscovery' of the *Geography*. Thus, she believes they were made between 1295 and 1303. Manuscript V is difficult to date with precision. The compilation of the Vaticanus gr. 191 codex can be dated to 1303, while the different texts of the codex

were probably copied between 1296 and 1298. See Burri 2013, 479, 502 and 523.

10 Two other hands, probably contemporaries with the main scribe, annotated and corrected the manuscript, see Burri 2013, 481.

11 Burri 2013, 486.

12 The main hand, according to A. Diller, also copied the Parisinus graecus 1393, one of the *codices primarii* of Strabo's *Geography*, Diller 1975b, 70 and 89.

13 Fuchs and Oltrogge 2009, 26.

14 Mittenhuber 2009, 17; Fuchs and Oltrogge 2009; Burri 2013, 505–515.

15 Mittenhuber 2009, 18.

16 Burri 2013, 524.

- The Vaticanus graecus 191 (X) is a large scholarly codex of 397 folios of paper (340 × 250 mm), which contains numerous scientific texts, including many astronomical and mathematical works.<sup>17</sup> Ptolemy's *Geography* occupies folios 128v to 169v, in which four main hands can be distinguished. The scribes omitted the coordinates from *Geogr.* 5.13.16 but transcribed the lists of toponyms and the full text of Books 7 and 8. Book 1 (ff. 128v–138r) contains many scholia written by Manuel Chrysoloras.<sup>18</sup>
- The Venetus Marcianus graecus Z. 516 (coll. 904) (R) is a paper manuscript (307 × 223 mm) that is slightly later than the others and is generally dated to the early fourteenth century,<sup>19</sup> although R. Burri's re-evaluation of the manuscript suggests that it more probably dates from the last few decades of the fourteenth century.<sup>20</sup> The *Geography* occupies folios 5r to 139v of a larger corpus of scientific and technical works. The main copyist of the codex (among them the folios of the *Geography*) was Andreas Teluntas, son of Phrangos from Nauplia in Argolis (*subscriptio* f. 208v). The place of composition of the codex cannot be precisely identified but was somewhere in the Eastern Mediterranean area.<sup>21</sup>

Besides the *codices primarii*, there are several manuscripts that serve as important textual and cartographical witnesses. The Fabricianus Bibliothecae Universitatis Haunien-sis 23,2° (F) is close to manuscripts U and K philologically and chronologically, but only two folios have been preserved. The Parisinus graecus 2423 (G), which contains only some parts of Books 1 and 2 of the *Geography*, has been classified as irrelevant to the edition by A. Stückelberger and G. Graßhoff; however, the place of this paper manuscript, which can be dated to *c.* 1300, in the edition and in the history of the text certainly needs to be re-evaluated.<sup>22</sup> The Oxoniensis Archivi Seldeniani B.46 (N) was copied around 1300 in Constantinople and is a 'sister manuscript' of U and K; it was annotated by Planudes and Demetrius Triclinius (*c.* 1280 – *c.* 1340).<sup>23</sup> The Florentinus Laurentianus Pluteus 28.49 (O) can be dated to the early fourteenth century and

17 Autolycus of Pitane, Hypsicles, Eutocius, Aratus, Eratosthenes, Hipparchus, Diophantus, Euclid, etc.

18 Burri 2013, 497–505. Several hypotheses have been put forward concerning the identity of the owner(s) of the codex (Gregory Chioniadēs or Maximus Planudes himself) and its history, but the ownership cannot be attributed with any certainty. See also Bianconi 2004, 328–335.

19 Stückelberger and Mittenhuber 2009, 12.

20 Burri 2013, 448 and 456, on the basis of a re-evaluation of the watermarks.

21 Burri 2013, 456.

22 Burri 2013, 411–425 and 521–540. R. Burri has suggested that manuscript G was produced by members of Planudes' circle. After a brief examination of the black and white microfilm provided by the website of the Bibliothèque nationale de France, I have found that there are a great number of readings in G that are close or identical to the  $\Xi$  recension and/or to readings from the first hand of manuscript U that were later emended. Therefore, a complete survey of this manuscript needs to be undertaken.

23 See N. Wilson 1981, Bianconi 2005, 116–117, Burri 2013, 315–330 and Burri 2016, 171.

was perhaps copied in Constantinople. It has the particularity of containing sixty-four provincial maps rather than Ptolemy's original twenty-six regional maps. The folios of the Vaticanus Palatinus graecus 388 (A), copied in Constantinople between 1435 and 1437, are not in the correct order, an error that inexplicably occurred after the manuscript had been copied. Among the remaining important manuscripts, there are: the Florentinus Laurentianus Pluteus 28.38 (B); the Parisinus suppl. graecus 119 (C); the Parisinus graecus 1402 (D); the Parisinus graecus 1403 (E); the Athous Vatopedinus 655 (L);<sup>24</sup> the Vaticanus Palatinus graecus 314 (Z); and the Londoniensis Codex Burney 111 (v).

The structure of Ptolemy's catalogue of localities is essentially identical in all the *codices primarii*. The order of the localities within the lists is also almost always the same, with the exception of a few local inversions, errors and/or the addition of lines. Admittedly, the texts of the introduction to the *Geography* and the cartographical section show isolated but sometimes important variations. In manuscripts U and K, for example, there is a significant homoioteleuton gap in *Geogr.* 1.24.17. A second hand later completed the passage in manuscript U. The sentence appears, with slight variations, in all the other manuscripts.<sup>25</sup> The appendices, the table of contents as well as the illustrations – which, in some cases, must be later additions – are not displayed in exactly the same way in the five manuscripts. In the overview of the chapters contained in the first book of the *Geography*, manuscript X lists twenty-four chapters, while in UKV there are only twenty-three chapters as Chapters 8 and 9 are counted together. The text of Book 1 is nevertheless divided into twenty-four chapters in all the manuscripts.<sup>26</sup> Manuscript X contains two extra diagrams in *Geogr.* 1.2.5 and 1.2.8.<sup>27</sup> Finally, the so-called *subscriptio* of Agathodaimōn occurs in UKVR and the manuscripts that are derived from them but not in X.<sup>28</sup> In spite of these differences, all the *codices primarii* and *secundarii* allow scholars to trace back the manuscripts to an archetype of the *Geography*.<sup>29</sup>

24 Seven folios from the Vatopedinus are held in Paris (Parisinus suppl. graecus 443A) and twenty-one in London (The British Library, Additional 19391):

Burri 2013, 238–239.

25 Burri 2013, 122–124.

26 Burri 2013, 121–122; Stückelberger and Graßhoff 2006, 50.

27 Burri 2013, 123–126.

28 Mittenhuber 2009, 322–323; Burri 2013, 138–139.

29 Stückelberger and Graßhoff 2006, 28. No other word has created so much confusion and such interesting debate in philology and textual history as the term 'archetype'. It has basically two meanings: from the perspective of the history of a text, the 'archetype' (1) can refer to the 'official version', the 'authoritative exemplar' from which all wit-

nesses that have ever existed stem; in textual criticism, particularly when dealing with *stemmata codicum*, however, the 'archetype' (2) is the text that is reconstructed on the basis of all the *extant* manuscripts, in other words, 'the point in the *stemma* beyond which the surviving tradition does not allow them to reach' (Trovato 2014, 66). I use the second meaning of this term, which is not necessarily the case for all the scholars to which I refer in this book. I cannot guarantee, however, that the way I use the word (and its derivatives) is always unambiguous and accurate. The dividing line between *Textkritik* and *Textgeschichte* is sometimes not as unequivocal as one would like. The vast bibliography on this subject includes: Dain 1975, 108; Irigoin 1977; Irigoin 1981;

On the basis of the textual variants, the manuscripts can be divided into two groups: manuscripts UKVR and manuscript X. Both groups show many variations in the spellings of the toponyms as well as variations in the geographical coordinates. The differences between UKVR and X are not superficial and insignificant; indeed, they are so numerous and extensive that scholars generally speak of two ‘recensions’ (following P. Schnabel’s use of the term) of the *Geography*: the  $\Omega$  recension, which comprises UKVR, and the  $\Xi$  recension, which consists of manuscript X.

It was O. Cuntz who introduced the term *Rezensionen* to interpret the families of Ptolemy’s manuscripts that share similar traits, although he preferred to use *Klasse*, *Familie* or *Tradition*.<sup>30</sup> The word *Rezension* was then reused by P. Schnabel<sup>31</sup> and thereafter largely accepted. The word means *sensu stricto*, particularly in the context of Cuntz’s model, ‘a revised edition of a text’ or a ‘critical revision of a text’ (*re-censere*). It often seems to be used in publications to mean simply ‘version’, although the term is meant to encompass different groups of manuscripts that come from several revisions (an original version plus a later revision) or reworked versions (two different editions), which implies that intentional corrections and emendations were made to the text, whether by Ptolemy or later revisers. In fact, the questions of the nature and the origins of different *versions* of the *Geography* have not yet been resolved. In this book, the term ‘recension’, which is now accepted by most modern scholars, is, therefore, used along these lines, but with the above clarification.

### 2.1.2 Manuscript maps of the *Geography*

The maps of the oldest manuscripts were passed down with some of the *codices primarii* of the *Geography*. Although they are not the subject of this investigation, the history of how they were transmitted and, in particular, their link with the transmission of the rest of the *Geography* can help us understand Ptolemy’s catalogue of localities more fully.

Manuscripts U and K contain twenty-six regional maps, incorporated into Book 8 of the *Geography*, and one world map. Manuscript F should originally have contained the same map set, but only a few folios have been preserved.<sup>32</sup> This format – of a world map at the end of Book 7 and twenty-six regional maps in Book 8 – goes back to Ptolemy’s original concept for the *Geography*. Manuscript R contains twenty-two complete regional maps, plus two halves of a map, all placed at the end of Book 8. The other maps

Timpanaro 2016, 223–224; Reeve 2011, 107–134; Trovato 2005; Trovato 2014, 63–67 and 144–155.

30 Cuntz 1923, 9–16. See p. 71.

31 Schnabel 1930, 234, then Schnabel 1938, 6 and *passim*. More precisely, P. Schnabel used the term *Textrezension*.

32 Mittenhuber 2009, 136. Today, manuscript F contains the eastern part of the second and fifth maps of Europe as well as the western part of the sixth map of Europe. As in manuscripts U and K, these maps were incorporated into the text of chapters *Geogr.* 8.3–28.

must have been removed at a later date. The cartographer of R (or its exemplar) clearly did not respect Ptolemy's instructions relating to the proportion of each regional map. Most of the maps were arranged on a double page, which led to a number of significant distortions.<sup>33</sup> The small format of the codex evidently gave rise to problems in composition, as a scholion on the third map of Africa testifies.<sup>34</sup> Instead of the usual twenty-six regional maps, manuscript O contains sixty-four maps, on which one or two (very occasionally three or four) provinces were drawn. They were incorporated directly into the catalogue of localities, at the end of the description of each province.<sup>35</sup> The remaining manuscripts with maps typically contain twenty-six regional maps and one world map.<sup>36</sup>

The maps of the manuscripts have been at the centre of much intense historiographical debate and controversy. Several modern scholars question whether Ptolemy actually drew his own maps,<sup>37</sup> while others believe that all the extant maps are Byzantine reconstructions from Planudes, quasi *ex nihilo*. The hypothesis of J. L. Berggren and A. Jones is a prime example of the systematic doubt that prevails in a large part of the historiography:

There is no more reason to imagine that Ptolemy published his *Geography* in a form that incorporated the maps than there is to think that he provided a star globe along with the *Almagest* [...]. The transmission of Ptolemy's text certainly passed through a stage when the manuscripts were too small to contain the maps. Planudes and his assistants therefore probably had no pictorial models [...]. The copies of the maps in later manuscripts and printed editions of the *Geography* were reproduced from Planudes' reconstructions.<sup>38</sup>

Such an assumption is based only on a series of hypotheses, in particular about the issue of the size of parchment needed to draw the maps and the interpretation of Planudes'

33 Mittenhuber 2009, 210 and 260.

34 Manuscript R, f. 129r: γύρισαι τὸν α̅' πίνακα τῆς Ἀσίας καὶ εὐρήσεις τὸν δ̅' πίνακα τῆς Λιβύης ἐπεὶ διὰ τὴν σμικρότητα τῶν μοιρῶν καὶ τὴν στενότητα τοῦ τεύχους ἐτέθη ἐκεῖσεν ὡς ἐτέθη [vel ἔχεται]. ('Turn the first map of Asia and you will find the fourth map of Africa, since because of the smallness of the degree [on the grid] and the narrowness of the book [i.e. the low page height], it was set up thither as it is?') Some parts of the scholion are hard to decipher, which has led to different readings and elucidations. See Burri 2013, 446–447 and 456–457 and, for different interpretations, Mittenhuber 2009, 327–328, and Bernardinello 1997, 51–52.

35 Mittenhuber 2009, 265.

36 Manuscript L contains a world map but only twenty-four complete regional maps plus two halves of a map. See Stückelberger and Mittenhuber 2009, 35.

37 The viewpoints go from simple circumspection about map-making in Antiquity to the intense criticism of L. Bagrow, who believed he could demonstrate that the *Geography* was 'compiled by a Byzantine scholar, unknown to us, of the 10–11th century' and that 'the maps are of later origin than the text' (Bagrow 1945, 387). See also Dilke 1985, note 28, 207, and the synopsis in Mittenhuber 2009, 45–46.

38 Berggren and A. Jones 2000, 49–50.

poem,<sup>39</sup> and not on a precise investigation into the maps and their content. In the face of the thorough historical, philological as well as codicological studies that have since been carried out on the maps, this stance must be qualified.

The different stages of the transmission process of the maps have recently been examined by F. Mittenhuber.<sup>40</sup> According to him, the UKF maps, like their texts, constitute a separate and coherent group and were produced in Constantinople.<sup>41</sup> The maps themselves show small divergences, and manuscripts K and E, which are very similar, might have been drawn by members of Planudes' circle.<sup>42</sup> The maps of O and R are the products of two different reworkings of the regional maps. The hyparchetype of R's maps probably goes back to the ninth century and is close to manuscripts UKF as well as to manuscript X. In contrast to manuscripts UKFR, the text and the maps of O are totally in accord. The sixty-four provincial maps, integrated into the catalogue of localities rather than into Book 8, testify to a thorough revision of the maps, which must be relatively recent (fourteenth century).<sup>43</sup> F. Mittenhuber investigates, above all, the world maps and the first five regional maps of Europe in manuscripts UKFRO. According to him, the maps generally match the catalogue, but the numerous differences between the texts and the maps can be explained only by examining the history of the transmission of the maps, which is, at least partially, unrelated to the transmission of the text. The maps are composed of both drawings and text, which were not necessarily copied and drawn by the same person or following the same processes. F. Mittenhuber notes:

Strictly speaking, the transmission of the maps is, at the same time, horizontal (the text) and vertical (the maps). [...] These mechanisms apply only to a more or less normal copying process and not to a radical revision (as in the late transmission of the UKF and R maps). In the [usual] case, the text was copied from the textual exemplar, while the maps were copied from the map exemplar. Thus, the vertical transmission predominated. The decisive element here is the care of the copyist, that is, how accurately he coordinated the text and maps.<sup>44</sup>

39 Stückelberger 2009d, 325–330.

40 See also important remarks in A. Jones 2011, 19–24.

41 Mittenhuber 2009, 204.

42 Mittenhuber 2009, 356.

43 Mittenhuber 2009, 359.

44 Mittenhuber 2009, 361: 'Streng genommen handelt es sich also bei den Karten um eine horizontale Überlieferung (Text) und eine vertikale Überlieferung (Bild) in einem. [...] Diese Mechanismen spielen jedoch nicht, wenn – wie in der weiteren Über-

lieferung der Karten von UKF bzw. R – nicht eine grundlegende Überarbeitung, sondern lediglich ein mehr oder weniger normaler Kopiervorgang erfolgt ist: In diesem Fall wurde der Text jeweils von der Textvorlage abkopiert, die Karten hingegen von der Kartenvorlage. Die vertikale Überlieferung überwiegt also. Entscheidend ist hier die Sorgfalt des Kopisten, d.h., wie genau er bei seiner Arbeit Text und Karten aufeinander abgestimmt hat.'

The differences between the catalogues and their respective maps include not only toponyms that have been incorrectly copied and localities that have been positioned differently, but also peoples who have been situated in different locations in comparison to the geographical indications of the catalogue. The crucial fact is that the maps of manuscripts U and K sometimes provide better readings than their respective catalogues and that in several cases the maps of manuscripts U and K correspond more closely to the text of X than to their own catalogues, both of which bring Mittenhuber to the conclusion that the maps in UKF date back to an earlier, probably late antique tradition.<sup>45</sup> R. Burri is not convinced by F. Mittenhuber's arguments and reminds us that there is no proof that Planudes had access to exemplars of the *Geography* with maps; this does not, however, mean that the maps were not in circulation during Antiquity and the Middle Ages.<sup>46</sup>

### 2.1.3 Epistemological specificity

The collation of a text as complex as the *Geography*, even on the basis of a small number of manuscripts, is extremely challenging. The existence of several unfinished critical editions of the *Geography* – Wilberg and Grashof (1838–45), Müller (1883–1901, completed by C. T. Fischer at a later date)<sup>47</sup> – exemplifies the difficulty of the task. Indeed, most of the studies and attempts to construct a *stemma codicum* rely only on a part of the *Geography*, rarely on the entire work.<sup>48</sup> Hence, the (sometimes) divergent appraisals are not necessarily as radically incompatible as they might at first seem. R. Burri points out the limits of the traditional *Textkritik* for establishing a clear *stemma* of the manuscripts:

The relationships between most of the manuscripts appear not only to differ for each book of the *Geography* but can also occasionally even be determined paragraph by paragraph. Thus, one should apparently expect little clarification on the place of each manuscript in the *stemma codicum* from a traditional collating method. [...] It raises, therefore, the question of whether and to what extent new knowledge can be gained from the conventional methods of textual criticism, whether through individual manuscripts, the *stemma codicum* or the textual history of the *Geography*.<sup>49</sup>

45 Mittenhuber 2009, 355–357.

46 Burri 2013, 522.

47 The text of Nobbe (1843–45) is not a critical edition.

48 Cuntz 1923 used *Geogr.* 2.7–3.1, Renou 1925 used *Geogr.* 7.1–4 and Ronca 1971 used *Geogr.* 6.9–21. See Burri 2013, 89. For instance, P. Schnabel 1930, 233, cast doubt on O. Cuntz' classification of his 'RW Klasse': 'Because he restricted himself to [Books]

2.7–3.1, Cuntz obtained a misleading and partial result.' A. Diller 1939, 228, noted that the *Geography* 'presents an unusual number of problems in structure and arrangement, the relation and authenticity of its various parts often being questionable.'

49 Burri 2013, 90–91: 'Die Bezüge der meisten Handschriften zueinander präsentieren sich nicht nur für jedes Buch der *Geographie* anders, sondern

In her study of Book 6 of the *Geography* and its secondary tradition, M. G. Schmidt declines to give an unequivocal model to explain the relationship between Book 6 of the catalogue, Book 8 and the ‘Table of Noteworthy Cities,’ and concludes:

In summary, one should make clear that the mutual influences of Book 6, Book 8 and the *Kanon* [that is, the ‘Table of Noteworthy Cities’] cannot be defined as precisely as one would have wished from the perspective of the history of the text and textual criticism. In the final analysis, there is arguably no possibility of clarifying the partly contradictory information on the transmission and of thus tying up the loose ends.<sup>50</sup>

A. Stückelberger writes of the same problem in building a satisfying model, mentioning the difficulty of precisely evaluating the role of contamination between the manuscripts as well as the possible influence of manuscripts that have not survived.<sup>51</sup>

The fifteenth-century Florentinus Laurentianus Pluteus 28.9 (S), 28.38 (B) and 28.42 (P), grouped by P. Schnabel into the  $\sigma$  family, perfectly exemplify the role that contamination and the influences of different manuscripts play in the history of the transmission. The hyparchetype of the  $\sigma$  family follows the  $\Xi$  recension (especially two diagrams from manuscript X attributed to Manuel Chrysoloras) until *Geogr.* 2.10. From *Geogr.* 2.11 to 5.19, according to P. Schnabel, these manuscripts closely resemble manuscripts N and G, both of which belong to the  $\Omega$  recension, although they were ‘contaminated’ by  $\Xi$ ; from *Geogr.* 5.20 until the end of the work, however, the hyparchetype of  $\sigma$  could be a flawed copy of O, which is a mixed manuscript.<sup>52</sup> According to A. Diller, the exemplar used for the first part of manuscripts S and B (*Geogr.* 1–2.11.2) was X, then G was the exemplar for the rest of Book 2; from the beginning of Book 3 right up until *Geogr.* 5.19, he suggested that the exemplar was manuscript O or possibly the completed manuscript G, when the latter was complete.<sup>53</sup>

Another example concerns manuscript Vaticanus graecus 191 (X) itself.<sup>54</sup> In the introduction, the catalogue, Book 8 as well as on the maps, manuscript X almost always

sind bisweilen gar abschnittweise zu definieren. Traditionelles Kollationsverfahren lässt daher anscheinend wenig Klärung für die Position einzelner Handschriften im *Stemma codicum* erwarten. [...] Es stellt sich somit die Frage, inwiefern durch konventionelle textkritische Methoden noch weitere Erkenntnisse gewonnen werden können, sei dies zu einzelnen Handschriften, zum *Stemma codicum* oder zur Textgeschichte der *Geographie*?

exakt abgrenzen lassen, wie es vom textgeschichtlichen und textkritischen Standpunkt aus gesehen wünschenswert wäre. Es gibt wohl letztlich keine Möglichkeit, die teilweise widersprüchlichen Angaben der Überlieferung zu klären und damit den Anfang des Fadens zu finden.

50 Schmidt 1999, 256: ‘Zusammenfassend muß festgestellt werden, daß sich die gegenseitigen Einflüsse von Buch 6, Buch 8 und dem *Kanon* nicht

51 Stückelberger and Graßhoff 2006, 32. These problems were raised as early as the nineteenth century (see Müller 1867, 288).

52 Schnabel 1938, 56.

53 Diller 1966, ix–x.

54 Schnabel 1938, 116–118.

uses the spelling Σοήνη, rather than Συήνη, which is used in all the other manuscripts, for the name of the city of Syēnē.<sup>55</sup> The three occurrences in X of Συήνη are from hand D in *Geogr.* 1.24. In *Geogr.* 1.7.9, the reading Σοήνης by hand E was changed, by the same hand D, to Συήνης, although manuscripts OBSP all use the Σοήνη version in *Geogr.* 1.24.<sup>56</sup> Συήνη is the classical spelling of the city, but the Σοήνη version is given in Ptolemy's 'Table of Noteworthy Cities,' in some astronomical tables of the *Handy Tables* and in all the manuscripts of the *Almagest*.<sup>57</sup> Σοήνη is, according to P. Schnabel, 'the true Ptolemaic form.'<sup>58</sup> Hand D of manuscript X must, therefore, have had an exemplar related to the Ω recension, at least for *Geogr.* 1.24, although the copyists of OBSP (partially) preserved the Ξ version of this chapter.

Several manuscripts of the *Geography* were copied around 1300 or in the first decades of the fourteenth century in Constantinople. These manuscripts might have been contaminated and influenced by other manuscripts, plausibly lost today, making these changes not only hard to detect but also difficult to place in a simple transmission model. In the exemplar of manuscripts UKN, for instance, a marginal scholion has been wrongly integrated into the main text; thus it must go back to an earlier, annotated exemplar. This scholion states: 'ἐν ἑτέροις ἀντιγράφοις...' ('in other exemplars [one reads]...') and is followed by an alternative reading.<sup>59</sup> The scribe of manuscript R supplies many *variae lectiones* in the margins of the catalogue, sometimes introduced by the words 'γέγραπται ἐν ἄλλω...' ('in another [exemplar] it is written...'); these readings are similar to those of other manuscripts of the Ω recension (see ff. 62v, 69r, and so on) but they are sometimes also similar to the Ξ recension (f. 107r, for example). Although rather demanding, P. Schnabel's complex *stemma codicum* (Appendix A) illustrates how the different groups of manuscripts and their multiple – horizontal *and* vertical – influences can overlap. Finally, the isolation of manuscript X raises epistemological issues. For example, a specific reading common to all the Ω manuscripts should go back to the Ω hyparchetype, whereas a specific reading in X could be the result of a miscopying or a correction that occurred at some time between the archetype and the copying of X.

55 *Geogr.* 1.7.9, 1.9.9, 4.5.73, 7.5.15–16, 7.6.2–7, 7.7.1–3, 8.15.15.

56 *Geogr.* 1.24.12: Σοῦνης OBSP; *Geogr.* 1.24.17: Σοήνης OBS; Συήνης P; *Geogr.* 1.24.20: Σοήνης O, Συήνης BSP.

57 Table of Noteworthy Cities, 13.5; *Handy Tables*, A2.2 (in Tihon 2011, 105–108); *Alm.* 2.6, 2.8 and 3.13.

58 In the *Chrestomathies* from Strabo (see p. 104), Σοήνη is used four times (*Chrest.* 2.19 twice, 2.24, 17.39) and Συήνη (17.7, 10 and in diagram f. 67r) three times. The remaining manuscripts of Strabo's *Geography* systematically use Συήνη, according to the editions of S. Radt and G. Aujac.

59 *Geogr.* 1.24.18. U f. 9v, K f. 10r. See Burri 2013, 328.

#### 2.1.4 Construction and interpretation of a *stemma codicum*

Working in the mid nineteenth century, K. Müller was the first scholar to attempt a systematical classification of the forty-two manuscripts he had at his disposal.<sup>60</sup> He divided them into two groups (an ‘Asian group’ and a ‘Byzantine group’) and classified manuscript X separately, as the sole representative of its own family.<sup>61</sup> O. Cuntz, who examined forty-six manuscripts, distinguished between two ‘*Klassen*’ that were based on seven main manuscripts: URXOZ, the Florentinus Laurentianus Pluteus 28.9 (S) and the Vaticanus graecus 178 (W). The so-called ‘X-Klasse’ contained, of course, manuscript X, plus S until *Geogr.* 2.10, and the other group was named the ‘RW-Klasse’, since the closely resembling R and W manuscripts came from the same hyparchetype. O. Cuntz believed that manuscripts UOZS were mixed texts as they shared elements from both ‘*Klassen*’. Each of the seven main manuscripts was believed to be the best representative of its own family.<sup>62</sup> L. Renou, who agreed with the conclusions of O. Cuntz but based his study only on *Geogr.* 7.1–4, placed manuscript A in its own group.<sup>63</sup>

P. Schnabel’s fundamental study<sup>64</sup> criticised the groupings of K. Müller, O. Cuntz, L. Renou and, in particular, J. Fischer<sup>65</sup> and proposed a new classification, which was adopted by all later editions. P. Schnabel assembled fifty-one manuscripts, which he divided into eleven ‘*Textfamilien*’ and grouped into two recensions ( $\Xi$  and  $\Omega$ ; see Appendix A). One of the eleven families was *Textfamilie*  $\xi$ , which was part of the  $\Xi$  recension and was represented by manuscript X.<sup>66</sup> The ten other families were grouped into the  $\Omega$  recension, which he split into two: UKFN were part of the so-called  $\Delta$  group, while V and R represented the  $\Pi$  group. The differences between the groups concerned small textual variants, related to the toponyms or the geographical coordinates. P. Schnabel believed that manuscripts OASZ contained ‘mixed texts’, since he was of the opinion that they were derived from copies of both recensions.<sup>67</sup> He found that manuscript O was related to X and to the  $\Omega$  manuscripts of the  $\Delta$  group, while A was also close to X and the manuscripts of the  $\Pi$  group.

I. Ronca’s study, based on *Geogr.* 6.9–21, diverges from P. Schnabel’s groupings on several points; he combined P. Schnabel’s *Textfamilie*  $\zeta$  (Z) with  $\rho$  (RVCW), for instance. I. Ronca was of the opinion that manuscripts A and Z belonged to the  $\Xi$  recension but

60 Müller knew of the existence of manuscript U but was unable to find it (Müller 1867, 283). K was re-discovered after the publication of Müller’s report.

61 Müller 1867.

62 Cuntz 1923, 9–14

63 Renou 1925; Burri 2013, 80–81; Mittenhuber 2009, 36.

64 The conclusions presented here and below are taken from the work edited in 1938 by A. Herrmann, after

P. Schnabel was unable to complete his book owing to illness. The study he published personally some years earlier – Schnabel 1930 – diverged on many points regarding the textual transmission of the *Geography*. See the summary in Schmidt 1999, 9–11.

65 Schnabel 1938, 38–46

66 Schnabel 1938, 6.

67 Schnabel 1938, 55–56.

had been contaminated by variant readings from the  $\Pi$  group, whereas O belonged to the  $\Delta$  group and had been contaminated by an exemplar of Z. He also believed that P. Schnabel's *Textfamilie*  $\sigma$  (BSP) was derived from mixed manuscript O. More recently, H. Humbach and S. Ziegler have investigated the whole of the *Geography's* Book 6. They support the existence of two recensions ( $\Xi$  and  $\Omega$ ) with two  $\Omega$  subgroups but identify a third group of mixed manuscripts (AZv), whose relationships with  $\Xi$  and  $\Omega$  are unclear. They regard manuscript O as belonging to the  $\Delta$  group, and do not believe that it was influenced by the  $\Xi$  recension.<sup>68</sup> R. Burri agrees with most of P. Schnabel's conclusions, especially the grouping of the corpus of manuscripts into two recensions and eleven families. However, she has placed several secondary manuscripts into different families and has re-evaluated certain relationships between the manuscripts. Her codicological and palaeographical study shows, among other findings, that manuscripts UKN are apographs from the same exemplar of the *Geography*. Moreover, she concludes that v, for example, belongs to *Textfamilie*  $\alpha$ , along with A, rather than to *Textfamilie*  $\omega$ , and that B and P of *Textfamilie*  $\sigma$  are probably derived from S, rather than that these three manuscripts stem from a single exemplar.<sup>69</sup>

The principal conclusions of P. Schnabel's study have more recently been noted down by A. Stückelberger and G. Graßhoff. The achievement of their critical edition and the different studies associated with the project<sup>70</sup> have renewed, to a certain degree, our comprehension of the relationships between the remaining manuscripts of the *Geography*. For instance, on the basis of an up-to-date codicological investigation (in particular concerning manuscript K)<sup>71</sup> and several analyses of the text and the maps, F. Mittenhuber and A. Stückelberger have drawn up a *stemma codicum* (Fig. 4), which they modestly present as a 'rough sketch' (*Entwurf, Skizze*) of the relationships between the principal manuscripts. One of the main differences between this and former studies is that the authors have not explicitly linked manuscripts EZ and BS to the other main groups. And, unlike R. Burri, they maintain that R can be dated to the early fourteenth century. The authors also believe that there is a connection between manuscript O and the  $\Xi$  recension (especially manuscript U) and that A is linked only with the  $\Xi$  recension and the  $\Pi$  group, and not with any of the identified manuscripts. In addition, they have placed manuscript G in the  $\Delta$  group, even though this manuscript is clearly linked with the  $\Xi$  recension. Their *stemma* shows the main groups of manuscripts and their relationships (UK, VR and X, plus OA as mixed manuscripts), although the way the authors

68 Humbach and Ziegler 1998, 6. F. Mittenhuber 2009, 42, disagrees with their evaluation of manuscript O. However, the idea that Book 6 in O could be almost free of the influence of  $\Xi$  is not that far-fetched.

69 Burri 2013, 209, 526–531 and 540.

70 Mittenhuber 2009; Stückelberger and Mittenhuber 2009; Burri 2013; Rinner 2013.

71 Fuchs and Oltrogge 2009.



textual recensions of the *Geography* can possibly even be dated back to the third century.<sup>72</sup>

Unless one postulates that the  $\Omega$  recension is necessarily closer to Ptolemy's original than the  $\Xi$  recension – for which a strong argument would need to be presented – one cannot use the Rylands Library Papyrus No. 522 to date the bifurcation of the manuscript tradition. This papyrus contains not the *Geography*'s catalogue of localities but a list from the *Handy Tables*. At best, it proves that a version of the 'Table of Noteworthy Cities,' close to the  $\Xi$  recension of the *Geography*, existed in the early third century and thus that  $\Xi$  was also in existence at this time. However, it does not tell us when the  $\Omega$  recension first appeared.

The high number of majuscule variants in both the recensions – noted first by O. Cuntz – has led A. Stückelberger and F. Mittenhuber to assume that the archetype of the tradition was written in majuscule. They date this archetype to the third or fourth century. In principle, however, the range of possible dates for the creation of a copy in majuscule is quite large, and could extend right up to the eighth century (from the ninth century onwards, scribes generally used the Greek minuscule). Their proposition that the  $\Omega$  recension was divided into two subgroups between the fifth and sixth centuries is plausible, although their use of the date of the *Diagnōsis* as an argument for dating the bifurcation of the tradition is disputable.<sup>73</sup>

### 2.1.5 The role of manuscript X and the $\Xi$ recension in the textual tradition

The crucial factor in reconstructing the original text of the *Geography* is to interpret the existence of two different versions of the work, the so-called  $\Omega$  and  $\Xi$  recensions. The latter do not appear to be evenly balanced: manuscript X is the only manuscript of the  $\Xi$  recension and it is incomplete, for it contains neither the coordinates after *Geogr.* 5.13.16, nor any maps. In addition, the date and copying context of manuscript X are close to those of the  $\Omega$  manuscripts, although the influence of  $\Xi$  on the other manuscripts has not yet been elucidated. Hence, the place of manuscript X in establishing the original text<sup>74</sup> and reconstructing the textual history of the *Geography* is both essen-

72 Mittenhuber 2009, 365: 'Dank dem Papyrus Rylands 522, einem Papyrusfragment aus dem Anfang des 3. Jahrhunderts, das Teile des *Kanons bedeutender Städte* enthält und noch keine Spuren einer Überarbeitung aufweist, lässt sich die Aufteilung in die beiden grossen Textrezensionen der *Geographie* möglicherweise sogar bis ins 3. Jahrhundert zurückdatieren.' See also Stückelberger and Mittenhuber 2009, 23, 143 and 321.

73 See p. 101. Even if there is a connection between the text of the *Diagnōsis* and the  $\Delta$  group, this does not mean that the  $\Pi$  group 'appeared' at the same time.

74 I use the equivocal term 'original,' although historically this 'original' version could have been Ptolemy's autograph, an exemplar that Ptolemy reviewed or one that he just authorised, etc. See E. Montanari 2003, 9–15.

tial and problematic. In his ‘Rapports sur les manuscrits de la Géographie de Ptolémée’, published in 1867, K. Müller noted the particularity of X and its important role in the history of the text. He used only the text and the toponyms of the catalogue to carry out his evaluation, not the geographical coordinates:

Manuscript X (Cod. Vatican. 191) is until now the only representative of a family that I consider to be the most ancient of all. [...] Manuscript X is without any doubt the best of all [the manuscripts]. [...] With the exception of the two glosses already mentioned, the text is free of external elements. If there are frequent orthographic corruptions of some geographical names, it should also be said that, in many places, this is the only manuscript in which the authentic forms have been preserved.<sup>75</sup>

According to Müller, the last scholion of manuscript X (f. 169v), together with the readings of the toponyms of Macedonia, indicate that the manuscript’s exemplar came from Macedonia.<sup>76</sup> This scholion reads:

(ἐ)νταῦθα κ̄ς πίνακες [sic] κα(τα)τάσσει· ἐν αὐτῇ δὲ τῇ καταγραφῇ κ̄ζ· τὸν γὰρ ἰ πίνακα τῆς Εὐρώπης εἰς δύο διαιρεῖ· εἰς ἕνα μὲν τάσσων τὴν Μακαιδονίαν· εἰς δὲ ἕτερον Ἠπειρον καὶ Ἀχαΐαν καὶ Πελοπόννησον καὶ Κρήτη καὶ Εὐβοίαν·

(Here he inserts twenty-six maps. In the drawing, though, there are twenty-seven. He splits up the tenth map of Europe into two maps: he puts Macedonia on one, Epirus, Achaia, the Peloponnese, Crete and Euboea on the other.)

Müller’s demonstration, although ingenious, is not entirely convincing. Nevertheless, the scholion is interesting as it indicates that manuscript X derives from an exemplar in which the regional maps were treated differently, which implies that Ptolemy’s original map presentation was slightly revised.<sup>77</sup>

O. Cuntz used the many majuscule mistakes and variant readings in the Ω and Ξ recensions to demonstrate that the archetype was written in majuscule. According to Cuntz, the presence of numerous errors in the spelling of certain toponyms (even well-known places), which all the manuscripts have in common, shows that the archetype cannot have been Ptolemy’s autograph.<sup>78</sup> It is possible that the use of Βελτικῆ rather than

75 Müller 1867, 290–292: ‘Le manuscrit X (Cod. Vatican. 191) est jusqu’à présent le seul représentant d’une famille que je regarde comme étant la plus ancienne de toutes. [...] Le manuscrit X est, sans aucun doute, le meilleur de tous. [...] Si l’on excepte les deux gloses mentionnées plus haut, le texte est pur de tout élément étranger. Si certaines corrup-

tions de l’orthographe des noms géographiques y sont fréquentes, il faut dire aussi qu’en beaucoup d’endroits ce manuscrit est le seul qui en ait conservé les formes authentiques.’

76 Müller 1867, 291–292.

77 Cf. with Mittenhuber 2009, 324–325.

78 Cuntz 1923, 15.

Βελγική for Belgica was too crude a mistake to make for a geographer such as Ptolemy; the other examples presented by O. Cuntz are not as relevant as they concern quite obscure toponyms. Thus, he concluded that the archetype was a manuscript that was written some time after Ptolemy's original work. He then placed both versions on an equal footing, for he regarded them as two different *recensions* or *redactions* of the autograph:

It seems to me without question that the archetype goes back to Ptolemy's autograph. I infer from my observations that the two manuscript classes show themselves to be two recensions or redactions of the text. A large number of the names survive not in one but in two forms, both of which are corroborated by the rest of the geographical tradition.<sup>79</sup>

Again, O. Cuntz put forward a list of readings of toponyms in which both recensions differed but for which there were attestations in other sources. He excluded categorically that a mechanical corruption (that is, errors made during the copying) of the text led to the two recensions. In addition, he found the argument that a later editor intentionally revised the catalogue of localities unconvincing, refusing to imagine that there could have been another scholar as competent as Ptolemy, in particular one who used similar data and methods.<sup>80</sup> O. Cuntz's central hypothesis relies on the fact that Ptolemy deliberately chose the framework of a catalogue in order to facilitate the making of future modifications.<sup>81</sup> He maintained that Ptolemy made use of this possibility and emended his own text – the place names as well as their geographical coordinates. One of Ptolemy's autographs would have preserved the different readings and corrections. Then, it would have been copied later, always with all these variants, to give the exemplar from which the archetype derived or to give the archetype itself (which would explain the archetypal and non-authorial errors). Finally, the scribes of the Ω and the Ξ exemplars would have independently simplified or harmonised the text by, for example, using only one spelling for a place name and one double coordinate for each locality. The different editing processes and random (*beliebig*) editing choices thus led to the emergence of two dissimilar *recensions* of the catalogue.<sup>82</sup>

In a monograph on the *Geography* that was published in 1925, L. Renou based his assessment of the text on the descriptions of India, Taprobanē (Sri Lanka) and the land

79 Cuntz 1923, 15: 'Andererseits scheint es mir jedoch fraglos, daß der Archetypus auf das Handexemplar des Ptolemaeus zurückgeht. Ich erschließe das aus meinen in den beiden Kommentaren gemachten Beobachtungen, daß die beiden H[andschrifts]klassen sich oft als zwei Rezensionen oder Redaktionen des Textes darstellen. Eine

größere Anzahl Namen wird nämlich nicht in einer Form überliefert, sondern in zwei, die beide durch die übrige antike Tradition geschützt sind.'

80 Cuntz 1923, 16.

81 See p. 115.

82 Cuntz 1923, 16. See Burri 2013, 77.

of the Sinai (*Geogr.* 7.1–4), for which manuscript X does not have the geographical coordinates.<sup>83</sup> As much as was possible, he compared the toponyms and ethnonyms of the *Geography* with other ancient sources (notably Pliny the Elder) and modern toponymy. He regarded X as being superior to all the other manuscripts,<sup>84</sup> although his comparison between X and the other manuscripts cannot be considered complete because of the absence of geographical coordinates in manuscript X. Thus, in his edition, L. Renou used the X readings for the toponyms, together with the coordinates from manuscript A, which he believed to be closest to the X family.<sup>85</sup>

P. Schnabel believed that the  $\Xi$  recension was the most valuable version of the *Geography* and, therefore, that the text of manuscript X was closest to the original, despite its poor state, the flawed exemplar from which it derived,<sup>86</sup> its later completion date and its lack of coordinates:

Our manuscript X is a very sloppy copy of an extremely valuable lost exemplar.<sup>87</sup>

By contrast, he regarded the  $\Omega$  recension as a corrupt version of the supposedly ‘original’ redaction of the *Geography*. P. Schnabel disagreed with J. Fischer’s viewpoint,<sup>88</sup> and presented a list of cases, taken from the catalogue and from Book 8, to demonstrate his belief that, in general, the text of manuscript X was closer to the original than the  $\Omega$  manuscripts. He also considered that, when the  $\Delta$  group readings tally with X, then the text of the  $\Pi$  group is corrupt – and vice versa.<sup>89</sup> He concluded unequivocally:

Eventually it became clear that: (1) the original manuscript of the  $\Omega$  recension shows variations from the text that we assume to be the original text of this recension; (2) this original manuscript of the  $\Omega$  recension (which one can reconstruct with the methods of textual criticism) differs dramatically from the text of the *Geography* as Ptolemy wrote it; and (3) we have to assume that, be-

83 Renou 1925.

84 Renou 1925, viii: ‘[Manuscript] X often supplies better forms, never inferior to the other manuscripts’ (‘X donne souvent une forme meilleure, jamais inférieure aux autres manuscrits’); ix: ‘The tradition that [manuscript X] represents is certainly superior to the other manuscripts.’ (‘La tradition qu’il [sc. X] représente est certainement supérieure à celle des autres manuscrits.’)

85 Renou 1925, ix. L. Renou used the letter  $\Gamma$  to refer to the Vat. Pal. gr. 388.

86 Schnabel 1938, 9: ‘The exemplar [of X] was very hard to read and all three scribes, working around the same time, put much effort into reading it’

(‘Die Vorlage [von X] war sehr schlecht zu lesen, und alle drei Schreiber haben sich gleichzeitig um ihre Lesung bemüht.’)

87 Schnabel 1938, 44: ‘Unsere jetzige Handschrift X ist eine sehr liederliche Kopie einer sehr wertvollen verlorenen Vorlage.’

88 Schnabel 1938, 46: ‘Virtually nothing that Joseph Fischer utters on the value of the *Geography*’s manuscripts on the level of textual criticism can be used.’ (‘Man kann [...] fast alles, was Joseph Fischer textkritisch über den Wert der ‘Geographie’-Handschriften äußert, nicht verwenden.’)

89 Schnabel 1938, 56.

tween [the  $\Omega$  recension] and Ptolemy, there were a great number of intermediate copies which strayed very arbitrarily from Ptolemy's authentic text.<sup>90</sup>

P. Schnabel remained resolute on the value of both recensions but was unclear about the origin of the corruptions in the  $\Omega$  recension. He even seemed to suggest that Ptolemy made the two 'editions' himself.<sup>91</sup> Furthermore, he showed that hand D<sup>92</sup> of manuscript X used an exemplar that was similar to the  $\Omega$  recension for some parts of his copy:

It becomes apparent that the scribe [that is, hand D] who completed *Geogr.* 1.1–2 and then *Geogr.* 1.19 (end) to 23 as well as *Geogr.* 2.1–2 undoubtedly used a manuscript of the  $\Xi$  recension and not of the  $\Omega$  recension, [...] and that he was also able to consult the lost exemplar that was used by the former scribes. The situation in Chapter 1.24 is, however, very different. The D text tallies [there] entirely with the manuscripts of the  $\Omega$  recension, while the text of the  $\Xi$  recension has passed down to us completely in [manuscript] S, for a large part in O, too, but only rarely in Z.<sup>93</sup>

90 Schnabel 1938, 68: 'Klar wird aber dadurch, daß die für uns herstellbare Urhandschrift der Textrezension  $\Omega$  Abweichungen von dem Text zeigt, den wir [...] als den Urtext dieser Rezension voraussetzen müssen, daß diese mit den mechanischen Mitteln der textkritik herstellbare Urhandschrift der Textrezension  $\Omega$  von dem Text der "Geographie", wie ihn Ptolemäus selbst geschrieben hat, sehr weit absteht, und daß wir zwischen ihr und Ptolemäus eine groß Anzahl von Mittelgliedern, die mit dem echten Ptolemäustext sehr willkürlich umgesprungen sind, anzunehmen haben.'

91 P. Schnabel's discussion of the south-eastern coast of Africa, where the coastlines in  $\Xi$  and  $\Omega$  are very different, is rather curious. He wrote that the  $\Omega$  coastline was said to have supplied an older version of Ptolemy's work, in which Ptolemy only corrected Marinus' work superficially, and that, by contrast, the text of the  $\Xi$  recension had been more thoroughly corrected (Schnabel 1938, 75–76). However, he did not draw the logical conclusion from these observations; cf. with Rinner 2013, 320–322, and Mittenhuber 2009, 107–109, on this precise case. As M. G. Schmidt 1999, 9, has noted, the *stemma codicum* drawn up by A. Herrmann (Appendix A) on the basis of P. Schnabel's investigation is misleading, since the schema postulates that there was a sin-

gle archetype for the  $\Xi$  and  $\Omega$  recensions, when in fact P. Schnabel hinted that Ptolemy himself might have created two copies, which were later used as the exemplars for each recension.

92 P. Schnabel used the siglum X<sup>2</sup> to designate this hand, which corresponds to the hand D in A Turyn and R. Burri's nomenclature that copied ff. 128v–129v (*Geogr.* 1.1–2) and ff. 135r–138r (*Geogr.* 1.19–2.2). I use R. Burri's sigla and have modified Schnabel's quotations accordingly. Hand D is more recent than the other hands of the manuscript: it can be dated to the fourteenth century but is older than the scholia of Manuel Chrysoloras (c. 1355–1415).

93 Schnabel 1938, 116: 'Hierebei stellt sich sofort heraus, daß der Ergnzer fur [*Geogr.*] 1.1–2 und dann 1.19 Ende bis 23 und 2.1–2 zweifelsohne eine Handschrift der Rezension  $\Xi$  benutzt hat und nicht eine der Rezension  $\Omega$  [...] und da er] in der Lage war, die verlorene Vorlage von X, die die alten Schreiber benutzt haben, ebenfalls zu Rate zu ziehen. Ganz anders ist die Lage in dem Kapitel 1.24. Hier geht der Text von [D] durchwegs mit den Handschriften der Rezension  $\Omega$ , wahrend der Text der Rezension  $\Xi$  uns vollstandig in S, dem O meist und Z seltener zur Seite treten, erhalten ist.'

Schnabel's argument concerning the spelling of Σύληη/Σοήληη is convincing.<sup>94</sup> Moreover, he postulated the existence of at least three different lost manuscripts of the Ξ recension, accessible to the scribes of A, OZ and S, who used them (in different ways) for some parts of the *Geography*.<sup>95</sup>

E. Polaschek's long article on the *Geography* stressed and even overestimated the role of X in the textual history of the catalogue. He believed that manuscript X was a copy of Ptolemy's autograph:

If we summarise these observations on the text of manuscript X, then its original exemplar appears to be Ptolemy's autograph (from which every manuscript originates) and from which he prepared a new edition of his *Geography* – though unfinished.<sup>96</sup>

E. Polaschek was well aware of the audacity of his hypothesis; indeed, he was unable to explain how such a special exemplar of the *Geography* could have survived, carefully copied and integrated into a scholarly codex, for so long:

If the exemplar of manuscript X was Ptolemy's working copy for a new edition of his *Geography*, then one justifiably wonders how [this copy] was still extant in the thirteenth century, when it was already barely legible and most probably in a wretched condition.<sup>97</sup>

He interpreted the last scholion of X (f. 169v)<sup>98</sup> as referring to Ptolemy's own reorganisation of the regional maps. Although E. Polaschek believed that manuscript X was not free of later modifications, his examples and arguments for the supposedly 'post-Ptolemaic characteristics' (*nachptolemäische Züge*) are not always convincing.<sup>99</sup> He was also of the opinion that the manuscript was later revised, and that this was still discernible in the other manuscripts of P. Schnabel's *Textfamilie* ξ as well as in Agathodaimōn's realisation of a set of maps.<sup>100</sup> As far as the Ω recension is concerned, E. Polaschek failed to establish exactly what kind of changes were made to the Ω catalogue, and when or why the revision occurred.

94 See p. 65.

95 Schnabel 1938, 55–56.

96 Polaschek 1965, col. 717: 'Fassen wir diese Beobachtungen am Text von cod. X zusammen, präsentiert sich somit dessen Erstvorlage als das alle Handschriften beherrschende Handexemplar des Pt[olemaios], mit welchem dieser eine neue Auflage seiner *Geographie* vorbereitete, doch nicht zu Ende führte.'

97 Polaschek 1965, col. 721: 'War aber die Vorlage von Hs. X das von Pt[olemaios] unfertig zurückgelassene Vorbereitungsexemplar einer Neuauflage seiner *Geographie*, veranlassend daher zu andershändiger Fortführung, wundert man sich mit Recht, daß sie im 13. Jhd. noch erhalten war, wenn auch bereits schwer lesbar und in einem vermutlich desolaten Zustand.'

98 See p. 71.

99 Polaschek 1965, col. 722.

100 Polaschek 1965, col. 737–739.

In their translation of the 'theoretical chapters' of the *Geography*, J. L. Berggren and A. Jones give their interpretation of the existence of two groups of manuscripts (they use 'family' rather than 'recension'). The authors argue that the first 'family' emerged in the context of Planudes' discovery:

The manuscripts of this family present a distinct recension of the text of the *Geography* characterized by extensive corrections of perceived errors in the text. [...] Such emendations are obviously a scholar's work. We will refer to this version below as the 'Byzantine revision'.<sup>101</sup>

According to the authors, this family contains manuscripts UKFRVW, the Oxoniensis Archivi Seldeniani B. 46 (N) and the Parisinus suppl. graecus 119 (C). This 'Byzantine revision' would have affected both the spelling of the toponyms and the geographical coordinates:

The text of the *Geography* in this family shows clear signs of having undergone deliberate changes, which become apparent through comparison with other manuscripts [...]. The redactor has here and there attempted to correct or smooth over difficulties in the sense and harshnesses in the language, often detecting real corruptions in the received text, but sometimes, one suspects, correcting Ptolemy himself. The spelling of many place names and some of the coordinates have been altered, evidently to resolve inconsistencies that became apparent in drawing maps.<sup>102</sup>

The authors then present a group of manuscripts 'that are partly or entirely free of the Byzantine revision', among them X, which they call 'a manuscript of the greatest importance for the text of the *Geography*, because it is the only copy that is uninfluenced by the Byzantine revision'.<sup>103</sup> This categorical interpretation of J. L. Berggren and A. Jones,<sup>104</sup> who overlook the other important manuscripts of the *Geography* (particularly O and A), is fragile as they singularly fail to introduce any examples or valid arguments to their analysis. Their hypothesis may be plausible, but the authors do not give any examples of possible 'Byzantine corrections' or disclose any 'clear signs of [...] deliberate changes'.

A. Stückelberger, G. Graßhoff and F. Mittenhuber, the directors of the most recent edition of the *Geography* and of its supplementary volume did not reach the same conclusions as J. L. Berggren and A. Jones. In the introduction to their edition, manuscript

101 Berggren and A. Jones 2000, 43.

102 Berggren and A. Jones 2000, 44.

103 Berggren and A. Jones 2000, 44. The authors add manuscript Z and the Londiniensis Codex Burney

111 (v) to the manuscripts of this category. The Burney 111 is denoted in their book by the letter T.

104 Their thesis was accepted unreservedly by P. Gautier Dalché 2009a, 286–287.

X is portrayed as a poor copy of a valuable exemplar (also P. Schnabel's opinion),<sup>105</sup> although, according to the authors, the  $\Xi$  recension shows signs that the geographical coordinates were revised:

While the toponyms of both groups clearly go back to the same archetype, the  $\Xi$  recension has undergone a comprehensive revision of its coordinates: the catalogue of localities in manuscript X features [...] about 1 300 coordinates that depart from the  $\Omega$  recension, [variants] which reflect a different but coherent picture and which cannot be explained by simple scribal errors.<sup>106</sup>

The authors do not state explicitly what they consider to be a reading 'which cannot be explained by simple scribal errors.' They note that the number of variant readings for the coordinates between the  $\Xi$  and  $\Omega$  recensions decreases from Book 2 to Book 5, which they believe is evidence that the  $\Xi$  recension was systematically revised.<sup>107</sup> As far as the place names are concerned, the conclusion is much more nuanced. In the supplementary volume to the *Geography*, A. Stükelberger compares the variant readings in manuscripts UKVRX that can be attributed to typical majuscule mistakes.<sup>108</sup> After studying Book 2 of the *Geography*, he determines what he believes to be the 'correct reading' (*als richtig erachtete Lesart*) of each of the sixty-one selected readings. His analysis confirms that manuscripts UKVR and X belong to very different groups. When it comes to the number of (supposedly) accurate toponym readings, A. Stükelberger concludes that neither of the recensions has incontestably the better text.<sup>109</sup> A. Stükelberger reaches

105 Stükelberger and Graßhoff 2006, 33: '[Manuscript X] is an extremely flawed copy (without maps) of a valuable, majuscule exemplar [originally] furnished with maps, which is evidence of a largely independent strand of the transmission ( $\Xi$  recension): ('Es handelt sich [sc. bei X] um eine recht fehlerhafte, kartenlose Abschrift einer wertvollen, mit Karten versehenen Majuskelvorgabe, die einene weitgehend eigenständigen Überlieferungsstrang [ $\Xi$ -Rezension] dokumentiert.)'

106 Stükelberger and Mittenhuber 2009, 23: 'Während die Ortsnamen beider Gruppen offensichtlich auf denselben Archetypus zurückgehen, ist die  $\Xi$  Rezension einer umfassenden Überarbeitung der Koordinaten unterzogen worden: Die Hs. X weist im Ortskatalog [...] etwa 1300 von der  $\Omega$ -Rezension abweichende Koordinatenangaben auf, die ein anderes, in sich durchaus stimmiges Bild ergeben und nicht durch simple Abschreibefehler erklärt werden können.'

107 Stükelberger and Graßhoff 2006, 40: Book 2 has c. 460 variant readings (19%), Book 3 has c. 380 (15%), Book 4 has c. 260 (14%) and Book 5 has c. 185 (10%). A revision of one of the recensions is not the simplest hypothesis. A poorly preserved exemplar of one of the recensions and a scribe's inability to read and understand accurately the system of writing the coordinates could explain the steadily decreasing number of variant readings. Furthermore, a complete comparison is impossible, since the coordinates of Books 6 and 7, as well as a good part of Book 5, of manuscript X are missing.

108 That is, divergent readings that can be explained by a simple misreading of a copy that was written in Greek majuscule, e.g. when  $\Lambda$  and A are confused. By contrast, their respective minuscules ( $\lambda$  and  $\alpha$ ) cause much less confusion.

109 Stükelberger 2009a, 114–116. This conclusion differs from that of Renou 1925, who, unlike the former, studied only *Geogr.* 7.1–4.

the same conclusion in his comparison of the number of 'missing' lines in the manuscripts: both recensions have more or less the same number of omissions.<sup>110</sup> He maintains – I believe because of the variants in the coordinates – that X is the product of an early revision of the *Geography* (possibly in the third or fourth century), although he does not specify the reasons and the exact context of such a revision.<sup>111</sup> This interpretation explains the editing choices of A. Stückelberger and G. Graßhoff: the X variants for the geographical coordinates are systematically set in parentheses next to the  $\Omega$  readings. As for the toponyms, the editors prefer the  $\Omega$  spellings, unless, according to them, the text in X more closely approximates the original.<sup>112</sup>

In his study of the manuscript maps, F. Mittenhuber distances himself from A. Stückelberger's interpretation of the *stemma codicum* that they drew up together in Stückelberger and Mittenhuber 2009. F. Mittenhuber still dates the bifurcation of the two recensions to the third century CE on the basis of the Rylands Library Papyrus No. 522,<sup>113</sup> although he believes that the  $\Xi$  recension may provide the closest text to the original (*die ursprünglichere [Rezension]*) because of the cartographical evidence as well as the indirect tradition (that is, antique and late antique quotations from Ptolemy's *Geography*), which seems to be related, above all, to the  $\Xi$  recension.<sup>114</sup>

In her recent codicological and palaeographical investigation, R. Burri emphasises the complexity of the history of the vast corpus of texts provided by the Vat. gr. 191, for which there is no general consensus.<sup>115</sup> She puts forward the hypothesis that the codex was created in the milieu of Planudes: several of the hands of Vat. gr. 191 are linked with his circle and its scientific content accords with Planudes' fields of interest – especially the *Arithmetica* of Diophantus.<sup>116</sup> This hypothesis has also been supported, albeit cautiously, by other specialists, such as N. Wilson<sup>117</sup> and, more recently, D. Bianconi.<sup>118</sup> We can support R. Burri's hypothesis with another piece of information. One of the scribes of manuscript X used the Arabic number zero together with the Greek numeral system in several places of Ptolemy's catalogue of localities (see Fig. 5, for example). We know that Planudes wrote one of the first Byzantine treatises on Arabic numerals,<sup>119</sup> so

110 A. Stückelberger seems systematically to interpret a toponym that is available only in one recension as an omission and not as a plausible later addition, which cannot always be precisely demonstrated (see p. 135.)

111 Stückelberger 2009d, 331.

112 Stückelberger and Graßhoff 2006, 33.

113 Mittenhuber 2009, 113, 208 and 365. This bifurcation could also coincide, according to the author, with the transcription of the *Geography* from papyrus rolls to a codex, i.e. between the third and fourth centuries.

114 Mittenhuber 2009, 112–113.

115 Burri 2013, 502.

116 Burri 2013, 503.

117 N. Wilson 1981, 395: 'The best manuscript of the *Geography* (Vat. gr. 191) is a composite volume in which the choice of the texts included may be thought to show the influence of Planudes, even though there is no sign of his handwriting in the book.'

118 Bianconi 2004, 333.

119 Gerhardt 1965.

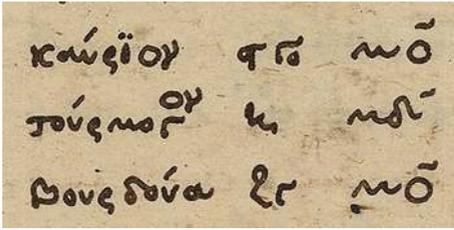


Fig. 5 Use of the Arabic zero by one of the scribes of manuscript X, f. 140r, col. 4, l. 24–26 (= *Geogr.* 2.5.8). The number  $\mu\bar{\omega}$  should be understood as  $40^\circ$  rather than the expected  $\bar{\mu}$ . See also f. 140r, col. 3, l. 41–42 (= *Geogr.* 2.5.6). © 2017 Biblioteca Apostolica Vaticana.

that if codex Vat. gr. 191 was created in the milieu of Planudes, the appearance of this uncommon numeral would not be that surprising.

E. Rinner has studied the two recensions of Ptolemy's text on the basis of the chapters related to Asia Minor (*Geogr.* 5.1–8). For the most part, the differences between the  $\Xi$  and  $\Omega$  recensions concern the drawings of the coastlines, as the inland areas are much less affected. First of all, she notes several inconsistencies in the text of X, for instance, in the area of Chalcedon, where the X coordinates lead to an illogical coastline.<sup>120</sup> With the exception of a small number of instances where X is obviously erroneous, both recensions lead to two different but plausible coastlines. According to E. Rinner, the coherence in both cases indicates that the coastline in one of the recensions was intentionally revised:

It is absolutely remarkable that [differences either in longitude or in latitude] also occur in large groups of coordinates, which by chance result in reasonable coastlines, and for which the frequent occurrence of scribal errors provides a rather implausible explanation. Furthermore, the occurrence of such groups of [variant readings], for coasts only, indicates that a possible revision of the *Geography* (as potentially reflected in the division into two recensions) could have concerned only the coastline, in the area of [Ptolemy's] first map of Asia.<sup>121</sup>

Then, on the basis of an investigation into Ptolemy's methods and sources, E. Rinner shows that the coastline in the  $\Xi$  recension can be explained by combining information that was passed down in the antique sources (such as Hipparchus, Strabo or some common sources, for example) with adequate geometrical and graphical processes. Such an explanation does not, however, work when the coordinates of the  $\Omega$  recension are used:

<sup>120</sup> Rinner 2013, 160.

<sup>121</sup> Rinner 2013, 163: 'Dass er aber auch bei den grösseren Gruppen betroffener Koordinaten auftritt, bei denen eine Erklärung durch das gehäufte Auftreten von Schreibfehlern, die zufällig sinnvolle Küstenverläufe ergeben, eher unwahrscheinlich ist, ist durchaus bemerkenswert. Ausserdem deutet das

alleinige Auftreten dieser Gruppen von Differenzen an den Küsten darauf hin, dass eine mögliche Überarbeitung der *Geographie*, die sich dann in der Aufspaltung in die beiden Rezension niedergeschlagen haben könnte, im Bereich der ersten Asienkarte nur die Küstenlinie betroffen haben könnte.'

The process of determining the coastlines, which has been described, can explain the appearance of the western coast of Asia Minor only in the case of the  $\Xi$  recension. By contrast, the  $\Omega$  recension does not show the characteristic features of this process. Alternative explanations of the coast in the  $\Omega$  recension, based on information from the antique sources, have not been found. In fact, a correction of the most striking differences in the  $\Xi$  recension's coastline with respect to the actual coast gives a more likely explanation [of the coast in  $\Omega$ ]. Consequently, it is likely that the values of the  $\Xi$  recension are the original longitude and latitude data.<sup>122</sup>

The  $\Omega$  catalogue for Asia Minor is thus taken to be a plausible revision (*spätere Überarbeitung*) of the *Geography*, the date of which has not yet been identified.<sup>123</sup> The  $\Xi$  recension was not included in this revision, which indicates, according to E. Rinner, that the latter is closer to Ptolemy's original than  $\Omega$ . Admittedly, this conclusion only applies to a small part of the *Geography*, but it nevertheless accords with the older philological evaluations of K. Müller, L. Renou and P. Schnabel.

### 2.1.6 Synopsis

To sum up, the predominant standpoint is that manuscript X (and with it the  $\Xi$  recension) represents the best approximation of Ptolemy's original *Geography*, even though J. Fischer drastically played down the importance of this manuscript in the textual tradition and A. Stückelberger believes that the coordinates of the  $\Xi$  recension were reworked or revised. Generally, the  $\Omega$  recension appears, by comparison, to be considered the more corrupt version, especially on the basis of the variant readings of the toponyms (K. Müller, L. Renou) but also with respect to the map and textual traditions of the *Geography* (F. Mittenhuber). Scholars oscillate between believing in a mechanical corruption of the text or intentional revisions that were carried out at different periods: by Ptolemy himself (O. Cuntz), during late Antiquity (A. Stückelberger) or during the Byzantine era (J. L. Berggren and A. Jones).

What is striking is the difficulty scholars have had in introducing concrete arguments for a post-Ptolemaic revision of the work (in one or other of the recensions). That

122 Rinner 2013, 317: 'Das beschriebene Verfahren zur Bestimmung des Küstenverlaufs kann an der Westküste Kleinasiens nur den Verlauf der Küste der  $\Xi$ -Rezension erklären. Bei den Hauptfehlern der  $\Omega$ -Rezension handelt es sich im Gegensatz dazu nicht um die charakteristischen Fehler dieses Verfahrens. Es konnte auch keine andere Erklärung der Küste der  $\Omega$ -Rezension durch Angaben antiker Quellen

gefunden werden. Vielmehr liegt eine Erklärung als Korrektur auffälliger Differenzen des Küstenverlaufs der  $\Xi$ -Rezension zur eigentlichen Küstenlinie nahe. Demnach dürfte es sich bei den Werten der  $\Xi$ -Rezension um die ursprüngliche Version der Längen- und Breitenangaben handeln.'

123 Rinner 2013, 323.

the text of manuscript X contains place names that are closer to the antique sources does not in itself help to explain the divergence of the  $\Omega$  manuscripts. E. Rinner has introduced tangible elements in favour of a revision of the *Geography* to the debate but she has not been able to estimate when and where such emendations would have occurred. And A. Diller, in spite of his profuse writings on geographical manuscripts, in particular on Ptolemy's *Geography*, failed to synthesise his views about the existence of two groups of manuscripts. He did, though, put manuscript X on top of the list of codices in the preface to the 1966 reprint of Nobbe's 1845 edition of the *Geography*,<sup>124</sup> even though he had described it in a previous publication as being 'very defective'.<sup>125</sup>

## 2.2 The recensions in Book 8 of the *Geography* and the *Handy Tables*

### 2.2.1 The important cities in Book 8 of the *Geography*

Book 8 of the *Geography* contains instructions on constructing and drawing twenty-six regional maps. Every instruction includes the appropriate ratio of the central parallel of the map to the meridian as well as a list of the 'important cities' (διασήμοι πόλεις<sup>126</sup>) of each province. For each important locality, Ptolemy gives the duration of the longest day of the year (which corresponds to the latitude) and the distance in hours from Alexandria (that is, a relative longitude). Ptolemy states that he converted the values himself:

We have put below the elevations [of the pole] for the principal cities in each country, converted into (μετελημμένα εις) the length of the longest days [that occur] there; and their longitudinal positions [converted] approximately (ἔγγιστα) into intervals from the meridian through Alexandria, whether to the east or to the west, in units of equinoctial hours.<sup>127</sup>

A thorough comparison between the values of the catalogue and Book 8 does indeed confirm that both data sets differ slightly in longitude and latitude but also that the hourly values in Book 8 did not precede the degrees given in the catalogue.<sup>128</sup> Moreover, F. Mittenhuber and L. Koch have put forward the hypothesis that the conversion from

124 Diller 1966, v.

125 Diller 1939, 229: 'Moreover, X is very defective. In large parts of the work it omits titles, synopses, subscriptions, and even the numbers for longitude and latitude.'

126 *Geogr.* 8.2.1 and *passim* in Book 8. In addition, one finds the expression ἐπίσημοι πόλεις (*Geogr.* 8.3.4), which also appears in the title 'Table of Notewor-

thy Cities,' and the comparative forms διασημότεροι (*Geogr.* 8.6.3, 8.6.8, 8.10.3, 8.25.3, 8.28.3) and ἀξιολογότεροι (*Geogr.* 8.22.17), that is, 'the very important' or 'most important' cities.

127 *Geogr.* 8.2.1.

128 Mittenhuber and Koch 2009, 46–48; Rinner 2013, 37–41.

degrees to hours occurred after the two recensions had come into existence, since the data of Book 8 in the  $\Omega$  and  $\Xi$  recensions match their respective catalogues.<sup>129</sup>

Although the important localities are arranged by provinces in the catalogue as well as in Book 8, the order of both toponymic lists differs in a number of ways. The order of place names in the catalogue follows a spatial principle, which is clearly explained by Ptolemy: they are arranged from north to south and from west to east.<sup>130</sup> In her examination of the first map of Europe, E. Rinner thinks that a similar spatial ordering was used for the important localities listed in Book 8, not on the basis of the regional maps but on the basis of a world map, using Ptolemy's first or second projection. In these projections, the meridian and the parallel circles are drawn as arcs, which lead to some distortions in the shapes of countries, particularly those situated at the edges of the map.<sup>131</sup> Thus, if one composes a list of cities from a map, beginning with the localities on the top and to the left of the map, the order of the localities selected from a regional or a world map will differ slightly. E. Rinner's hypothesis is plausible, although it needs to be systematically tested on each of the regional maps.

The second map of Europe (Appendix C) comprises a short introduction, which is exactly the same in both recensions: a list of the contents (the three Iberian provinces and adjacent islands), the ratio of the central parallel to the meridian (3:4) and a περιορισμός of the map, that is, a description of the borders of the map. In the case of the second map of Europe, it corresponds to a geographical definition of the Iberian peninsula.<sup>132</sup> All the information here accords with the catalogue.

A list of ten important localities on the Iberian peninsula then follows. The order of this list is the same in both recensions, although the list of Book 8 does diverge slightly from the arrangement in the catalogue: the two localities in the province of Lusitania have been placed before the Baetican cities, while the island of Gades has been moved to the end of the list in Book 8. In addition, the order of the localities in the province of Tarraconensis also differs, since Asturica Augusta has been placed before the coastal cities of Carthago Nova and Tarraco.<sup>133</sup> This organisation goes back to the archetype of Book 8. E. Rinner demonstrates that a world map using Ptolemy's second projection was employed to compose the list of important cities of Book 8 for the British Isles. However, as far as the Iberian peninsula is concerned, the use of a world map instead of a regional map does not satisfyingly explain the order of the list, nor does it elucidate the differences between the list in Book 8 and the order of the localities in the catalogue.

There are very few variations in the text between the  $\Xi$  and  $\Omega$  recensions: 'Hispania', which should precede the place names 'Baetica' and 'Tarraconensis', has been omitted

129 Mittenhuber and Koch 2009, 47. The hypothesis is, however, supported on the whole by only one example.

130 See p. 157.

131 Rinner 2013, 42–44.

132 *Geogr.* 8.4.1–2; see p. 127.

133 *Geogr.* 8.4.3–5.

in manuscript X and there are two minor toponymic variants for Tarraco and Caesar Augusta.<sup>134</sup> Both recensions of Book 8 use the spelling Νέα Καρχηδών for Carthago Nova, rather than Καρχηδών Νέα, and Κλουνία for Clunia Colonia, rather than Κλουνία Κολωνία in the catalogue.<sup>135</sup> By contrast, there are many numerical variants between the Ξ and Ω recensions. Twenty values in hours and fractions of hours are given in the list, nine of which are different in the two recensions; on six occasions the differences concern the distance from Alexandria. Since the formats of the longitude and latitude values in the catalogue and Book 8 are different,<sup>136</sup> it is difficult to make a precise comparison between both parts. However, since the concerned cities have the same coordinates in the catalogues of the Ξ and Ω recensions, a more general comparison is still possible.

In the three cases where the duration of the longest day differs in Book 8, the value given in the Ξ recension is clearly erroneous, since it would, for example, shift Asturica Augusta approximately 4° southwards, when compared with the catalogue, and also place Clunia *in* the Cantabrian Ocean. As for the remaining six cases, in two instances the catalogue is closer to the Ω recension and in two other cases it is closer to the Ξ recension. Both recensions also have different values for the longitude of Carthago Nova in Book 8, although, because of the difference in longitude for Alexandria in the catalogue, the two values still lead to the same relative longitude for the city.<sup>137</sup> Finally, both values for the distance between Alexandria and Clunia differ markedly from the value in the catalogue. Some of the differences between the Ξ and Ω recensions are very certainly the result of common copying errors or misreadings – confusion between majuscule letters (ε/ζ) or omission of one sign. In one case, though, the difference suggests that a particular kind of modification was made:

	Ω recension	Ξ recension
Longitude of Tarraco in hours to Alexandria (Book 8)	$\bar{\beta}$ Λγτιβ'	$\bar{\gamma}$
	[2 $\frac{1}{2}$ hours]	[3 hours]
Conversion into longitude, from the Fortunate Isles	16°15'	15°30'

A simple misreading or copying error can be ruled out here, and the Ω recension figure is clearly the *lectio difficilior*. Since the longitude of Tarraco is the same in the catalogues of the Ω and Ξ recensions (16°20'), which is much closer to the figure in Book 8 of the Ω recension (2  $\frac{11}{2}$  h to the west of Alexandria, that is, 16°15'), one could surmise that

134 *Geogr.* 8.4.5: Ταρράκων Ω, Ταράκωνη X; Καισαραυγούστα UK, Καισάρεια Αύγουστα VRXA. There are anyhow variant spellings of Caesar Augusta (*Geogr.* 2.6.63) in all the *codices primarii* as well as in the maps.

135 *Geogr.* 2.6.14 and 2.6.56.

136 Longitude is expressed in degrees in the catalogue of localities, counting eastwards from the meridian through the Fortunate Isles, whereas in Book 8 it is expressed in hours, counting from Alexandria.

137 See Stückelberger and Mittenhuber 2009, 149.

the reading in  $\Xi$  (3 h) was the result of a scribe or an editor rounding up the data in hours of the  $\Xi$  recension's manuscripts. This interpretation, however, is at odds with that of F. Mittenhuber and L. Koch, who show that Book 8 of the  $\Xi$  recension generally tends to be more precise than Book 8 of the  $\Omega$  recension.<sup>138</sup> However, since no other cases can be found in the rest of Book 8, interpretations of this variant should be treated with caution.

### 2.2.2 'Table of Noteworthy Cities'

Ptolemy's *Handy Tables* includes a list of localities with geographical coordinates that cover the whole *oikoumenē*. Known as the 'Table of Noteworthy Cities', this list contains approximately 520 localities, with the geographical coordinates given in degrees of arc and the longitudes counted from the parallel that ran through the Fortunate Isles, the westernmost point of the *oikoumenē*. The localities are arranged by provinces, on the model of the *Geography's* catalogue of localities. Modern scholars often link this table with a passage from the *Almagest*, in which Ptolemy discloses his intention to write a proper geographical treatise, supplying coordinates for the 'important cities' of each province. In the second book of the *Almagest*, after discussing some aspects of spherical astronomy that are related to the observer's position on Earth,<sup>139</sup> Ptolemy writes:

Now that the treatment of the angles [between the ecliptic and principal circles] has been methodically discussed, the only remaining topic in the foundations [of the rest of the treatise] is to determine the position in latitude and longitude (κατὰ μῆκος καὶ κατὰ πλάτος) of the important cities (ἀξιῶν πόλεων) in each province which deserve note, in order to calculate the [celestial] phenomena for those cities. However, the discussion of this subject belongs to a separate, geographical treatise (ἐξαιρέτου καὶ γεωγραφικῆς πραγματείας), so we shall expose it to view by itself [in such a treatise], in which we shall use the accounts (ιστορίας) of those who have elaborated this field to the extent which is possible.

We shall list [there] for each of the cities its distance in degrees (μοίρας) from the equator, measured along its meridian, and the distance in degrees of that meridian from the meridian through Alexandria, to the east or to the west, measured along the equator, for that [Alexandria] is the meridian for which we establish the times of the positions [of the heavenly bodies].<sup>140</sup>

138 Mittenhuber and Koch 2009, 47: 'The  $\Xi$  values have a tendency to be precise, whereas the  $\Omega$  values are rather more approximate.' ('Die  $\Xi$ -Werten [streben]

tendenziell nach Präzision, während es sich bei den der  $\Omega$ -Werten eher um Näherungen handelt.')

139 Toomer 1984, 5.

140 *Alm.* 2.13.

None of Ptolemy's later geographical works – the catalogue of localities, the 'Table of Noteworthy Cities' (in which longitude is counted from the Fortunate Isles) and Book 8 of the *Geography* (which gives values in hours not degrees) – corresponds exactly to the project disclosed in the *Almagest*. However, only the 'Table of Noteworthy Cities' can be regarded as a separate entity that was intended for mathematical and astronomical use (as disclosed in the *Almagest*), while Book 8 of the *Geography* is clearly part of Ptolemy's comprehensive geographical project and is intrinsically linked with the realisation of the regional maps.

The 'Table of Noteworthy Cities' survives, together with the rest of the *Handy Tables*, in forty-four manuscripts.<sup>141</sup> Three of them are ninth-century copies:

- The Vaticanus graecus 1291 (V\*) is a luxury parchment manuscript (283 × 205 mm) copied in ogival majuscule, shortly after the reign of Nicephorus I (802–815 CE).<sup>142</sup> According to A. Tihon, the manuscript is a copy of an exemplar that goes back to the early sixth century and it was probably made in Constantinople. The 'Table of Noteworthy Cities' occupies folios 17v–21v.<sup>143</sup>
- The Leidensis graecus 78 (L\*) is a small-format, composite parchment manuscript (190 × 145 mm), with sections dating from different periods (from between the ninth to fourteenth centuries). The 'Table of Noteworthy Cities' (ff. 66r–70v and 72r–73v) belongs to the oldest section, which was probably copied during the reign of Leo V the Armenian (813–820 CE). The exemplar of L\* could go back to the reign of Heraclius (610–641 CE) and thus be temporally very close to the composition of the *Commentary to the Handy Tables* attributed to Stephanus of Alexandria (c. 618 – 619 CE).<sup>144</sup>
- The Venetus Marcianus graecus Z. 331 (coll. 552) (M\*) is a small-format, badly damaged parchment manuscript (165 × 120 mm). Only the first folio contains a fragment of the 'Table of Noteworthy Cities'. The date of the copy is uncertain; it was possibly executed during the reign of Leo VI (886–912 CE). It contains the list from the British Isles to Moesia Inferior, omitting the cities of the province of Dacia.<sup>145</sup>

141 See, first of all, Mittenhuber 2009 and Tihon 2011 for the *status questionis* of the manuscript tradition, a proposed *stemma codicum* in Mercier 2011, 152–155, and also Honigmann 1929, 74–78, 193 and 209–210, Schnabel 1930, 221–225, and Stückelberger and Mittenhuber 2009, 141–143.

142 Several dates have been proposed for this copy, from the end of the eighth century until the middle of the ninth century. See Tihon 2011, note 69, 34.

143 Mittenhuber and Koch 2009, 33–35; Tihon 2011, 34–40.

144 Mittenhuber and Koch 2009, 35–36; Tihon 2011, 24–31 and 40. On the *Commentary* attributed to Stephanus of Alexandria, see Lempire 2016.

145 Mittenhuber and Koch 2009, 36; Tihon 2011, 31–33 and 40.

A fourth manuscript copied in the ninth century (certainly during the reign of Leo VI – the Florentinus Laurentianus graecus 28.26 (f<sup>s</sup>) – most probably originally contained the ‘Table of Noteworthy Cities,’ but the folios were lost and, during the fourteenth century, were later replaced by a copy in minuscule (ff. 51r–54v), which was carried out by the same hand that executed the *Small Commentary* of Theon (ff. 2r–31v), with the monastery of Chōra, Constantinople, possibly its place of composition.<sup>146</sup> In the list that replaced the lost folios, there is a gap which affects approximately 100 to 120 localities.<sup>147</sup> In addition to the four manuscripts described above, A. Tihon lists another forty manuscripts of the *Handy Tables*, dated from between the end of the thirteenth to the seventeenth centuries, which mostly derive from the former.<sup>148</sup>

A fragment of the ‘Table of Noteworthy Cities’ has been passed down in the Rylands Library Papyrus No. 522 (Fig. 8).<sup>149</sup> In the 1930s C. H. Roberts estimated that the papyrus was copied not later than the middle of the third century. Two columns of text with the cities and the geographical coordinates of localities from Iberia to Corsica have been preserved, albeit in a very fragmentary state, on the verso of the papyrus.<sup>150</sup> The format of the table, in which each column has been underlined with a double line in red ink and the toponyms have been divided from the longitudes and latitudes with vertical lines, closely resembles the design and layout of the medieval codices.<sup>151</sup> Moreover, several of the papyri from Oxyrhynchus (Egypt), dating from between the third and fifth centuries, include parts of the *Handy Tables*,<sup>152</sup> although only one small fragment of the fourth-century P. Oxy. 4168 contains a few geographical names that can also be found in the ‘Table of Noteworthy Cities.’ This papyrus is, though, too fragmentary and does not match the ‘Table of Noteworthy Cities’ as it has come down to us.<sup>153</sup>

Unlike the *Geography*, the *Handy Tables* were disseminated relatively widely throughout the Middle Ages, and then completed, added to, used and commented on in Constantinople right up until the Renaissance.<sup>154</sup> The work involved completing the chronological tables, the realisation of astronomical tables for the *klima* of Constantinople (probably during the sixth century by Stephanus of Alexandria), the addition of a number of tables and diagrams<sup>155</sup> as well as the incorporation of numerous localities to the ‘Table of Noteworthy Cities.’

146 Tihon 2011, 19–24 and 40.

147 Mittenhuber and Koch 2009, 36–37.

148 Tihon 2011, 47–49.

149 Roberts 1938, 142–146, and plate 4.

150 The recto includes a fragment of Ptolemy’s ‘Table of the oblique ascensions’ for the *klimata* of Rhodes, Hellespont and the Middle of the Pontus. See Roberts 1938, 147–150, and Mercier 2011, 120–142.

151 The table’s layout – with red and doubles lines – was very common in antique and late antique astronomical and mathematical papyri. See, e.g., P. Oxy. 4169

(*Handy Tables*, third century), P. Oxy. 4155 (epochs of Mercury, late second century) and P. Oxy. 4216 (arithmetical table).

152 Tihon 2011, 49–50.

153 A. Jones 1999, 140–141 and 162–164.

154 Tihon 1992, 47; A. Jones 2011, 15: ‘The *Handy Tables* were Ptolemy’s best-seller in antiquity, the only production of his pen that has so far been discovered on papyri.’

155 Tihon 2011, 8–17.

The textual tradition of the ‘Table of Noteworthy Cities’ is extremely complex, primarily because the text in all the oldest manuscripts is highly corrupt and often fragmentary but also because the manuscripts do not all contain the same set of place names. F. Mittenhuber and L. Koch have identified a ‘common base’ of 367 ‘noteworthy cities’, which must date back to the realisation of the table by Ptolemy himself.<sup>156</sup> The authors have added 150 ‘extra toponyms’ with their coordinates to these localities. The latter are not uniformly dispersed in the manuscripts, for none of the manuscripts contains exactly the same additions.<sup>157</sup> Sometimes the ‘extra toponyms’ were integrated into the catalogue with the localities of the same area (especially in M\* and f\*), sometimes they were inserted in the margins (mainly in L\*) and at other times they were placed at the end of the table (as in V\*, for instance). The ‘common base’ and the ‘extra toponyms’ of the ‘Table of Noteworthy Cities’ correspond only to localities given in the catalogue of the *Geography*, often with the same geographical coordinates.<sup>158</sup>

Although the secondary tradition of the *Handy Tables* between Ptolemy’s time and the oldest manuscripts is substantial,<sup>159</sup> there are far fewer references to the ‘Table of Noteworthy Cities’ than to the other astronomical tables contained in the *Handy Tables*. Theon of Alexandria, in his *Great Commentary*, notes that:

[Ptolemy] provides now a first table (πρώτου κανόνιου), which gathers the names of the noteworthy cities (ἐπισημοτέρων πόλεων) of the northern [area] of our inhabited world; following the geographical treatise (ἐκ τῆς γεωγραφικῆς πραγματείας) he has composed, he adds to them in the first column their positions in longitude, in the second in latitude; he counts the value in longitude from the west [of the world], as he says himself in the *Geography* (ἐν τῇ Γεωγραφίᾳ).<sup>160</sup>

Theon does not give any further details about the geographical contents of the table.<sup>161</sup> Two scholia to Theon’s *Great Commentary* in the Vaticanus graecus 190 can be dated to c. 462 – they go back to a scholiast from Apamea (Syria) – and imply that there existed a table of the noteworthy cities that was arranged by *klimata*.<sup>162</sup> Severus Sebokht used and

156 Mittenhuber and Koch 2009, 37 and 52.

157 Mittenhuber and Koch 2009, 39–42.

158 Mittenhuber and Koch 2009, 37.

159 Tihon 1992, 70–79; also Tihon 2011, 50–53; Mercier 2011, 2–4.

160 Theon of Alexandria, *Great Commentary to the Handy Tables*, I.1. In the version used and commented on by Theon, the ‘Table of Noteworthy Cities’ is, therefore, the first table, which matches Ptolemy’s ‘Manual’ of the *Handy Tables*: ‘The first tables (οἱ πρώτοι κανόνες) have the positions in longitude and latitude of the noteworthy cities (ἐπισημοτέρων πόλεων) of our inhabited world: The ‘Manual’ was transmit-

ted separately from the tables and its text is rather corrupt; see Chapter 1, p. 23; Tihon 2011, 6–7. The tables are arranged differently in the main manuscripts of the *Handy Tables*, with the ‘Table of Noteworthy Cities’ never positioned first.

161 Tihon and Mogenet 1985, 94–96, 160–162, 222–233.

162 Vat. gr. 190, f. 293r: ἐν τῷ ἐμῷ κανόνι διαιρεῖται ἐκάστη ἐν τῷ οἰκίῳ κλίματι (‘In my own table, each [city] has been placed in the proper *klima*.’); f. 299v: ἐν τῷ ἐμῷ κανόνι κατὰ κλίμα αἱ πόλεις ἔγκεινται ὡς μὴ δεῖσθαι τῆς τοιαύτης ἐφόδου (‘In my own table, cities have been set by *klima*, so one does not need

explicitly mentions the 'Table of Noteworthy Cities' in his *Treatise on the Constellations*, composed in 660 CE.<sup>163</sup>

The textual relationships between the catalogue and Book 8 of the *Geography* (transmitted in two recensions) and the 'Table of Noteworthy Cities' are highly intricate and have been the subject of contradictory evaluations. Some early twentieth-century scholars, such as W. Kubitschek, O. Cuntz and J. Fischer, believed that the 'Table of Noteworthy Cities' was an excerpt from Book 8 of the *Geography*, with, of course, modifications made at later stages.<sup>164</sup> E. Honigmann considered that the Vaticanus gr. 1291 (V\*), despite its text having been corrupted during the transmission process, was based on the textual recension of the *Handy Tables* that had been revised by Pappus of Alexandria himself, while the Leidensis gr. 78 (L\*) reflected Theon of Alexandria's revised version.<sup>165</sup> By contrast, P. Schnabel developed a more complex model: he considered that the  $\Xi$  version of Book 8 of the *Geography* was older than the 'Table of Noteworthy Cities' and that the latter had been composed on the basis of the  $\Omega$  recension of the *Geography*.<sup>166</sup> Finally, E. Polaschek believed that there was an exemplar common to the 'Table of Noteworthy Cities' and to Book 8 of the  $\Xi$  recension and that this exemplar was one of the main sources for the catalogue of localities.<sup>167</sup>

On the basis of the 2006 critical edition of the *Geography* and of a new edition of the 'Table of Noteworthy Cities', F. Mittenhuber and L. Koch have presented an up-to-date model to help us comprehend the links between Ptolemy's different geographical works. They emphasise that much of our difficulty in understanding the 'Table of Noteworthy Cities' is a result of the progressive improvements that Ptolemy himself made to his geographical and cartographical project – what they call 'a multistage and multipolar production process'<sup>168</sup> – on the one hand, and of the scope Ptolemy gave to later scholars and scribes to correct and supplement his data, on the other hand.<sup>169</sup> The authors believe that there exist mutual (hence horizontal) influences between the catalogue of localities, Book 8 and the 'Table of Noteworthy cities',<sup>170</sup> rather than simply a vertical

such a method.) See Mogenet and Tihon 1981, Tihon and Mogenet 1985, 73–80, and Tihon 1992, 74.

163 Severus Sebokht, *Const.* 14.10: 'So if one wants to indicate the inclination of the poles above the horizons which we talked about, for example concerning the island named Thulē – the *Book of Geography* and Ptolemy's *Procheiros* (that is, the table of the cities) say that its latitude is 63° – at this locality, hence, the elevation of both poles is [63°]: See Villety 2014, 171.

164 Kubitschek 1915, 76; Cuntz 1923, 37–39. J. Fischer 1932, 99, concluded that the 'Table of Noteworthy Cities' was a revised and extended edition of Book 8 of the *Geography*.

165 Honigmann 1929, 71–75.

166 Schnabel 1930, 214, 225 and 242.

167 Polaschek 1965, cols. 681–692.

168 Mittenhuber and Koch 2009, 52: 'in einen mehrstufigen und mehrpoligen Produktionsprozess.'

169 Mittenhuber and Koch 2009, 31.

170 Mittenhuber and Koch 2009, 37: 'The three groups are involved in a kind of ménage à trois.' ('Die drei Gruppen stehen also in einer Art Dreiecksverhältnis zueinander?'); 52: 'It can be stated that there are mutual influences between the catalogue of localities, Book 8 and the "Table of Noteworthy Cities" [...]:' ('Es sind wechselseitige Beeinflussungen zwischen Ortskatalog, Buch 8 und *Kanon* festzustellen [...].')

model of development.<sup>171</sup> The original list – that is, the toponymic base common to the manuscripts of the ‘Table of Noteworthy Cities’ – is structurally linked with Book 8 of the  $\Xi$  recension (the spelling of the toponyms also corresponds more closely to the  $\Xi$  recension), although the coordinates were taken from the catalogue:

The ‘Table of Noteworthy Cities’ is not the result of the transference of altered data from Book 8. Rather, the coordinates of the ‘Table of Noteworthy Cities’ were taken directly from the catalogue of localities. The same data set was then independently transformed into hourly values in Book 8.<sup>172</sup>

The various manuscripts of the ‘Table of Noteworthy Cities’ show that 150 localities were added to the original list: all of them can be found in the catalogue of localities of the *Geography* with generally concordant coordinates.<sup>173</sup> On the whole, the coordinates in the ‘Table of Noteworthy Cities’ show characteristics from both recensions of the *Geography*. More precisely, it seems that the original list of the *Handy Tables* was very close to the  $\Xi$  recension, although certain corrections and later additions point to the influence of the  $\Omega$  recension.<sup>174</sup>

The text related to localities on the Iberian peninsula in the ‘Table of Noteworthy Cities’ is extremely corrupt. The partial edition given in Appendix D reveals the variability of the numerical values and the high number of alterations made to the toponyms (iotacisms, dittographies, majuscule mistakes, and so forth). The Leidensis gr. 78, in particular, contains many duplicated errors as well as misplaced coordinates. Nevertheless, its structure is still similar to the list in Book 8 of the *Geography*: the localities of the province of Lusitania precede the Baetican toponyms, while Gades is at the bottom of the list, below Tarraconensis. The list of ten Iberian localities in the ‘Table of Noteworthy Cities’ and in Book 8 is exactly the same, the only small difference being that the positions of Augusta Emerita and Nörba Caesarina have been switched. The spelling of the toponyms is generally the same in the ‘Table of Noteworthy Cities’, the catalogue and Book 8.<sup>175</sup> The coordinates are, on the whole, similar to those in the catalogue –

171 E. Rinner 2013, 46-47, shows that a strict chronological classification, as undertaken by P. Schnabel in his example of the localities south of the Equator, is inaccurate.

172 Mittenhuber and Koch 2009, 52: ‘Im *Kanon* ist also keine Datentransformation aus dem 8. Buch der *Geographie* erfolgt; vielmehr wurden die Koordinaten des *Kanons* aus dem Ortskatalog direkt übernommen. Unabhängig davon wurde derselbe Datenpool in die Stundenwerte des 8. Buches transformiert.’

173 Mittenhuber and Koch 2009, 42: ‘Although the use of non-Ptolemaic lists of coordinates to supplement it is, in principle, possible, given the closeness of the

coordinates to [Ptolemy’s] catalogue of localities, this is, however, highly improbable.’ (‘Eine Verwendung nichtptolemäischer Koordinatenlisten zur Ergänzung ist zwar prinzipiell möglich, jedoch auch aufgrund der Nähe der Koordinaten zum Ortskatalog sehr unwahrscheinlich!’)

174 Mittenhuber and Koch 2009, 53. See, also, the excellent synopsis in Rinner 2013, 44-48.

175 The ‘Table of Noteworthy Cities’ and the catalogue ( $\Xi$  and  $\Omega$  recensions) use Καρχηδών Νέα for the spelling of Carthago Nova, whereas Book 8 uses Νέα Καρχηδών.

with the exception of the many textual corruptions. Because of the small number of concerned localities, it is impossible to establish which recension of the catalogue most approximates the 'Table of Noteworthy Cities':

The Leidensis gr. 78 (L\*) is the only extant manuscript of the 'Table of Noteworthy Cities' to contain two Iberian toponyms that do not appear in Book 8; they were integrated into the table with the same hand as the other localities. Both places are part of the province of Baetica:

- Malaca, which has been misspelled as Μαλάχη. The latitude matches the value in the Ω catalogue;<sup>176</sup> The misspelling Μαλάχη probably arose out of a miscopying of Μαλάκη, which is attested by Stephanus of Byzantium, whose primary source in this instance was Marcian of Heraclea.<sup>177</sup> By contrast, both Strabo and Ptolemy use the spelling Μάλακα in their *Geographies*.<sup>178</sup>
- Pityoussa Island, misspelled as Π(ι)τύο(υ)σα νῆσος. The singular form suggests that only one island was considered, most probably Ebusus (modern Ibiza).<sup>179</sup> L\* has a value for the island's longitude that differs significantly from the catalogue (18°30' rather than 14°). The value for the island's latitude is missing.<sup>180</sup>

The addition of these toponyms (Malaca and Pityoussa) to the manuscript could make sense in the context of the conquests of Justinian I in the frame of his *renovatio imperii*. From 552 CE onwards, the southern part of the Iberian peninsula, including the Balearic Islands, lay under the domination of Constantinople.<sup>181</sup> Minorca, Mallorca as well as Ibiza (that is, Pityoussa) were rapidly occupied,<sup>182</sup> and Malaca and Carthagenae became the two main political and military cities of the so-called province of Spania.<sup>183</sup> One could, therefore, date the addition of Malaca and Pityoussa to Ptolemy's list – which already contained Carthago Nova, Corduba and Gades – to this particular period of Byzantine domination.<sup>184</sup> It would certainly explain this particular reworking, which

176 *Geogr.* 2.4.7.

177 *St. Byz. Ethn. s.v.* Μαλάκη. Stephanus took this reference from the epitome of Artemidorus of Ephesus' *Geographoumena*, written by Marcian.

178 *Str.* 3.4.2.

179 *Geogr.* 2.6.77. Although Ptolemy places both Ophiusa and Ebusus together in the plural form Πιτυούσσαι νῆσοι, the singular Πιτυούσσα could also be used for Ebusus only. See p. 360.

180 Folio 66r, which comprises the Iberian localities, shows traces of numerous erasures, although they are not in the area occupied by the latitude of Pityoussa Island.

181 Evans 2000, 180–181; Vizcaíno Sánchez 2009, 33–73; Vallejo Girvés 1993; also Goubert 1945 and Goubert 1946.

182 Procopius, *Vand.* 2.5; see Wood 2010, 294.

183 Evans 2000, 180; Wood 2010, 300–307. Both these coastal cities grew in importance after the loss of Cordoba, which was taken by the Visigoths in 572 CE. Note that the spelling Σπανίας, which is the usual name of the Byzantine province of Spania, is used in L\* (Appendix D, I. 1). See the so-called inscription of Comentiolus (589/590 CE), *magister mil(itum) Spaniae* (*CIL* II 3420) or Const. Porphyry, *De adm. imp.* 23.

184 The province of Spania was taken by the Visigoths in 625 CE but came under Arabic domination in the eighth century.

would have occurred in the second half of the sixth century or at the beginning of the seventh century, and it also corresponds exactly to the hypothesis of A. Tihon, who shows, on the basis of the chronological tables in L\*, that its exemplar must have been a copy that was made during the reign of Heraclius (610–641 CE).<sup>185</sup>

If this hypothesis is correct, it would mean that the *Geography* and the ‘Table of Noteworthy Cities’ were available in Constantinople in the sixth to seventh centuries. A comparison between the coordinates found in the two recensions shows that the latitude of Malaca in L\* matches the value in the  $\Omega$  recension. However, as the differences between both recensions concern letters that are frequently confused (L’/ζ’), it is possible that a simple misreading occurred at a different stage of the transmission process of the ‘Table of Noteworthy Cities’ and the catalogue. Thus, this unique aspect of L\* is not entirely relevant to evaluations of the link between the ‘Table of Noteworthy Cities’ and the recensions of the *Geography*.

### 2.3 Secondary traditions and the recensions of the *Geography*

#### 2.3.1 The *Geography*’s journey before Planudes

A masterpiece that ‘lay hidden for countless years,’ an intense and arduous quest, the intervention of the emperor himself, the finding of an ancient manuscript, an epic poem written in celebration of the event<sup>186</sup> – Maximus Planudes clearly knew how to orchestrate and publicise his undeniably important ‘rediscovery’ of Ptolemy’s *Geography*. However, Planudes’ dramatic story and the clear absence of Greek manuscripts of the *Geography* that predates his activity have tended to eclipse the transmission, diffusion and use of the text and the maps by a number of authors before the so-called Byzantine rediscovery. Traces of Ptolemy’s *Geography* and, in particular, its catalogue of localities can be found in a number of sources and in various forms (lists of toponyms, excerpts, paraphrases, scholia) before the late thirteenth century.

Ptolemy and his *Geography* were known and used (directly and indirectly) in Alexandria almost continually until the sixth century CE. It is possible that Pappus of Alexandria (early fourth century CE) was able to consult a copy of the *Geography*,<sup>187</sup> while

185 Tihon 2011, 31.

186 See Stückelberger 2009d, 326–329, and Burri 2003. For an overview of Planudes’ scholarship in the context of the so-called early Palaeologan Renaissance, see N. Wilson 1996, 230–241, and Fryde 2000, 226–267.

187 Pappus of Alexandria is the author of a *Chorography of the Known World* (Χωρογραφία οἰκουμένης), which

is thought to have been based on Ptolemy’s *Geography*. The original Greek text of his work has been lost but an Armenian geographical text, known as the *Exposition of the World* (Աճարհա՛օյո՛ւց), lists Pappus and Ptolemy among its main sources. The influence of Ptolemy on the Armenian text, which could date from the fifth or seventh century, is visible, although the information taken from the *Geography*

Theon of Alexandria mentions the *Geography* in his *Great Commentary to the Handy Tables*, written in c. 364 CE.<sup>188</sup> It also seems that Ptolemy and his picture of the *oikoumenē* were, in the middle of the sixth century CE, among the topics of the exegetical debate that took place in Alexandria between John Philoponus and Cosmas Indicopleustes.<sup>189</sup>

The earliest clues that attest to the presence of Ptolemy's *Geography* in Constantinople go back to Marcian of Heraclea, that is, to the fifth or sixth century. Material taken from the *Geography* was used in the scholia to Byzantine manuscripts of Strabo and Plato as well as in short geographical treatises, some of which had been written several centuries before Planudes. Dionysius' *Periegesis* was already popular in the second century CE: scholia, commentaries and paraphrases became part of its transmission process relatively soon after it had been written.<sup>190</sup> Many of the scholia to Dionysius that have passed down to us mention and quote Ptolemy, provide paraphrases of some parts of the *Geography* and give lists of peoples taken from the catalogue (or the maps). More than one century before Planudes, in a letter to Theodore Prodromos written in Constantinople around 1135 or 1140, Michael Italikos supplies a short geographical presentation of Pamphylia and Syria, in which he quotes Ptolemy's catalogue almost word for word.<sup>191</sup> A few years later, John Tzetzes (c. 1120 – c. 1185) had access, in Constantinople, to geographical material taken from Ptolemy's catalogue that related to southern Iberia, the British Isles, Moesia (a region to the north of Macedonia and Thrace) as well as Mysia (a western part of Asia Minor).<sup>192</sup> P. Gautier Dalché, who has devoted an important part of his study on Ptolemy's *Geography* to its diffusion around the Mediterranean Sea until Planudes, concludes that 'the *Geography* was quite widely available in several parts of the empire, whether in its original or derived form' and has noted that 'in Byzantium, until the thirteenth century, the *Geography* never really faded into oblivion'.<sup>193</sup>

Some of the sources that used and quoted Ptolemy have already been comprehensively studied, but many of them have not been investigated in connection with the recensions of Ptolemy's *Geography*. In several cases, the transmission of the *Geography* to non-Greek speaking milieus (especially to Syriac and Armenian centres of learning)

has been rearranged. See Gautier Dalché 2009b, 24–33; Hews 1992; Schmidt 1999.

188 See p. 87.

189 In *On the Creation of the World* (= *De officio mundi*) 4.5, Philoponus quoted, in a discussion on the Nile, from the *Geography* (4.8.3) and noted that some scholars had misunderstood the passage by having read the end of the sentence as αἱ τοῦ Νείλου πηγαί ('the sources of the Nile'), whereas the actual text of the *Geography* reads αἱ τοῦ Νείλου λίμναι ('the lakes of the Nile'). The extant manuscripts of the *Geogra-*

*phy* rule in Philoponus' favour. See Inglebert 2001, 85–88, and Gautier Dalché 2009b, 54–56.

190 Counillon 1991; Ilyushechkina 2010, 297–309.

191 Michael Italikos, *Letter to Theodore Prodromos*, ed. Gautier 1972, 99–101. He also took material from Strabo's *Chrestomathies*. See Marcotte 2015, 106–110.

192 John Tzetzes, *Chil.* VIII, 700–714, and XI, 890–969. See Gautier Dalché 2009b, 80–81.

193 Gautier Dalché 2009b, 84–85: '[O]n est conduit à conclure que la *Géographie* fut assez largement disponible en divers lieux de l'Empire, sous forme originale ou dérivée; 'À Byzance, jusqu'au XIIIe siècle, la *Géographie* tomba dans un oubli tout relatif.

would make a careful study of the recensions' dissemination particularly arduous, besides requiring advanced fluency in the relevant languages. Nonetheless, an investigation into works such as the Syriac *Hexaemeron* of Jacob of Edessa would contribute greatly to studies on the history of the *Geography's* transmission. The objective of section 2 of this chapter is not to investigate how the text and the maps of the *Geography* were disseminated between the time of their creation in Alexandria and the end of the thirteenth century. Rather, it is to examine whether it is possible to detect, in the secondary traditions of the text, information that could help us understand the main tradition better, especially through the roles of the  $\Xi$  and  $\Omega$  recensions of the *Geography*.<sup>194</sup>

### 2.3.2 Marcian of Heraclea and the oceanic coasts of Iberia

Marcian of Heraclea (fifth/sixth centuries CE)<sup>195</sup> is the author of three geographical works that were transmitted, together with other geographical texts, within the so-called Paris corpus of Minor Greek Geographers, which was certainly compiled by Marcian himself.<sup>196</sup> Marcian's works are: a *Periplus of the Outer Sea*, an epitome of Artemidorus of Ephesus' *Geographoumena* and an epitome of the *Periplus of the Inner Sea* by Menippus of Pergamon.<sup>197</sup>

The two-volume *Periplus of the Outer Sea* has not survived intact: a later editor or scribe reworked and shortened Marcian's text, and several folios in the sole extant man-

194 For reasons of time I was compelled to abandon my plans to present the relevant elements I found in the writings of Tzetzes and the scholia to Dionysius in this section. In addition, since the textual history of Dionysius' *Periegesis*, its numerous scholia and commentaries is so complex and is still being debated, I would not have been able to guarantee that an analysis of this material would have contributed to some of the conclusions of this section.

195 Marcotte 2002, xix and cxvii–cxxxxv. The fact that Stephanus of Byzantium (sixth century) used Marcian's three texts indicates that they had been written by 530/560 CE. A. Diller 1952, 45–46, suggested that Marcian might have been close to Stephanus' circle. D. Marcotte 2007a, 172, and B. Altomare 2013, 9–15, take as plausible the hypothesis that Marcian was the *corrector Paphlagoniae* (i.e. governor of Paphlagonia, a region to the north of Anatolia) mentioned in a letter of Synesius and dated to the first years of the fifth century (Synesius, *Ep.* 119) and potentially the same Marcian, a scholar active in

Constantinople, whom Synesius had met in person (*Ep.* 101, text in Altomare 2013, 12). F. Mittenhuber 2009, 335, thus dates Marcian's period of activity to the fourth or fifth century, whereas P. Gautier Dalché 2009b, 45, has opted for a wider chronological span – between the third and the fifth centuries and possibly the beginning of the sixth century.

196 See p. 99.

197 Marcian, *Epit. Men.* 4. The exact nature of Marcian's work on Menippus' *periplus* is unclear. Marcian states: 'I made an epitome (ἐπιτομήν ἐποίησάμην) of Artemidorus Ephesius' eleven books'. Later on in the same passage he mentions Menippus' *periplus*: 'I made an edition (ἐκδοσιν ἐποίησάμην) of [his] three books' on the basis of a personal revision (διόρθωσις) of Menippus' text. At the end of the paragraph, though, he refers to 'two epitomes', which must refer to his summaries of the works of Artemidorus and Menippus. See also Altomare 2013, 14–15.

uscript have been lost.<sup>198</sup> In the *Periplus*, Marcian explains that Ptolemy's *Geography* was one of his sources, and he is full of praise for the work's author:

We chose to write in two books a *periplous* of both oceans, the Eastern and the Western, [...] from the *Geography* of the divine and very erudite Ptolemy and from the measurements in stadia that Protagoras added to his book about geography, as well as from many other ancient authors [...].<sup>199</sup>

Marcian gives the impression that he knew the *Geography* both directly and through the work of Protagoras – of whom we know very little.<sup>200</sup> The beginning of the first volume of the *Periplus of the Outer Sea* consists of a summary of standard geographical subjects: the reliability of itinerary measurements, the circumference of the Earth, the dimensions of the *oikoumenē*, and so on.<sup>201</sup> Then, in contrast to the *Geography* with its list of geographical coordinates, the *Periplus* goes on to list coastal places and intermediate distances in stadia, which seem to have been obtained from Ptolemy's coordinates. The *Periplus*' first volume deals with the coasts of the Indian Ocean, while the second volume describes the coasts of the Western Ocean.<sup>202</sup> In the first volume, the distances are given in stadia, with numbers rounded up or down, while in the second the values are almost always given with lower and upper limits, following the style of Protagoras.<sup>203</sup>

There has been much discussion on the role of Protagoras and his work on Ptolemy's data and on whether Marcian used any texts and/or maps from the *Geography* when writing his own texts.<sup>204</sup> That Marcian used material from the *Geography* is evident when one compares the list of localities of his *Periplus of the Outer Sea* with Ptolemy's catalogue as well as Marcian's choice of vocabulary.<sup>205</sup> P. Gautier Dalché also believes that it is plausible that Marcian used Ptolemy's maps.<sup>206</sup>

As for Marcian's description of the Iberian peninsula, some features look as if they were taken from some form of pictorial representation rather than from a catalogue

198 Marcotte 2002, xxxv; Altomare 2015. Critical edition of the *Periplus of the Outer Sea* in Müller 1882, 515–562.

199 Marcian, *Per. mar. ext.* 1.1: 'τῶν ὀκεανῶν ἑκατέρων τοῦ τοῦ ἐώρου καὶ τοῦ ἐσπερίου [...] ἐκ τῆς γεωγραφίας τοῦ θειοτάτου καὶ σοφωτάτου Πτολομαίου ἐκ τῆς Πρωταγόρου τῶν σταδίων ἀναμετρήσεως, ἦν τοῖς οἰκείους τῆς γεωγραφίας βιβλίοις προστέθεικεν, ἔτι μὴν καὶ ἑτέρων πλείστων ἀρχαίων ἀνδρῶν, τὸν περίπλου ἀναγράψαι προειλόμεθα ἐν βιβλίοις δυσὶ [...]'

200 According to Photius (*Bibliotheca*, codex 188), Protagoras wrote a *Geometry* (or *Measurement*) of the *Known World*, which contained a 'description' (περιήγησις) of the three continents. See also Marcian, *Epit. Men.* 2.2, 2.5 and 2.38.

201 Marcian, *Per. mar. ext.* 1.1–10.

202 The second volume also contains a prologue in which a number of general subjects are set forth (*Per. mar. ext.* 2.1–5).

203 Marcian, *Per. mar. ext.* 2.5.

204 Gautier Dalché 2009b, 45–49.

205 See p. 138 and p. 143.

206 Gautier Dalché 2009b, 46: 'The basis of Marcian's work includes the text and the maps of the *Geography*' ('La base du travail de Marcien est constituée par le texte et les cartes de la *Géographie*'); 47: 'Many passages seem to have been composed from the maps [...]': ('De nombreux passages paraissent composés à partir de cartes [...].')

of localities. Marcian describes the island of Gades after his description of the Strait of Hercules, together with the localities that lie exactly in front of the island, as on a map.<sup>207</sup> In Ptolemy's catalogue, the coordinates of Gades are relegated to the end of the list of Baetican localities, that is, after the coasts, the inland localities and the mountains. Moreover, the island of Londobris, part of the province of Lusitania, is described by Marcian in a similar way, that is, after the description of the coast in front of which the island lies, while Londobris is placed at the end of Ptolemy's catalogue of Lusitanian localities.

The way Marcian introduces the islands corresponds, for example, to the practice used in the *Periplus* of Ps.-Scylax.<sup>208</sup> Typical words or expressions, such as 'in sailing forth in the strait' (ἐκπλέουσι ἐπὶ τὸν πορθμὸν) or 'keeping Iberia to the right' (δεξιὰν τὴν ἡπειρον Ἰβερίας ἔχοντι)<sup>209</sup>, can be found, not only in the *periploi*, with which Marcian was familiar, but more generally in most of the geographical literature.<sup>210</sup> If Marcian's intention had been to transform Ptolemy's *Geography* into a *periplus*, then it would have made more sense for him to use the maps rather than the catalogue. However it is worth noting that not once does Marcian refer to 'maps' in the *Periplus of the Outer Sea*.<sup>211</sup>

The toponyms employed as well as the distances in stadia calculated from Ptolemy's coordinates can be used as relevant points of comparison to determine whether Marcian's information is related to one of the recensions. The summaries at the end of each province, where Marcian restates the number of noteworthy features (cities, mountains, rivers, and so on) and gives the dimensions (width and length) of each province, are not relevant for the study.<sup>212</sup> The differences between the recensions of the *Geography* do not affect the number of geographical features – apart from the number of cities, for which the omissions are generally balanced between the Ω and Ξ recensions – and so they cannot be taken to be indicative of the use of one recension or the other in Marcian's text. Moreover, Marcian's figures are frequently at odds with those in Ptolemy's catalogue.<sup>213</sup>

207 Marcian, *Per. mar. ext.* 2.9: 'In front of these places [the promontory with the temple of Hera and the Port of Menestheus] lies the island Gades or Gadeira in the external Sea, with the city of Gadeira. From the promontory, where there is the Strait, until the island Gadeira, there are [no more than] 270 stadia, [no less than] 240 stadia.'

208 E.g., Ps.-Scylax 13 and 47.

209 Marcian, *Per. mar. ext.* 2.9. The systematic use of the prepositions ἀπό (from) and εἰς (to), which structure Marcian's text, are typical of *periploi*.

210 Compare Marcian's vocabulary with Str. 2.5.26 and Mela 3.3. Note that Ptolemy does not use *periploi* terminology in his *Geography*, except in the introduction, where he reproduces a description of

the south-eastern coast of Libyë that was taken from merchants who had sailed to the area (*Geogr.* 1.17.7–12).

211 One hypothesis could be that Protagoras (Marcian's source) did use some maps to deduce the distances between certain points and that Marcian, using the latter's work, formatted his description into the style of a *periplus* in order to make it conform to his corpus of geographical texts.

212 Marcian, *Per. mar. ext.* 2.10, 11, 14, 15, 17 and 18.

213 Marcian notes, e.g., that there are five 'noteworthy mountains' in Lusitania, whereas there is no mention of any such mountain in the *Geography*. Marcian also writes that there are five different groups of

Appendix E lists the Iberian toponyms showing divergent readings in Marcian and Ptolemy. In several instances, Marcian's work differs from both the recensions of the *Geography*; when both recensions diverge, Marcian's readings match the  $\Xi$  recension in most of the cases. Thus, as far as the text is concerned, the source (text or map) that was used for the *Periplus* is closer to the  $\Xi$  recension. The readings for Calpē, Carteia and the estuary near Asta, as well as the treatment of the Turduli as a people,<sup>214</sup> are the most striking features that link Marcian's work with the  $\Xi$  recension.

Furthermore, some features of the *Periplus* suggest that its source was a version of the *Geography* that predates the bifurcation of the manuscript tradition. The toponym Ὀνοβαναιστουρία, despite having been joined together – it should read [ἐν] Ὀνοβαν Αἰστουρίαν, that is, 'to Onoba Aestuaria' – does not repeat the majuscule mistake, which features in the text and the maps of both recensions of the *Geography*, in the place name Λιστουρία.

According to Ptolemy's catalogue, in both the  $\Omega$  and  $\Xi$  recensions, the Baetis River has only one mouth, although it does refer specifically to the 'eastern mouth of the Baetis'.<sup>215</sup> Two mouths are, however, clearly shown on the maps in the UKRO manuscripts, and Pomponius Mela, Strabo and Pausanias all mention this characteristic of the river.<sup>216</sup> All these factors strongly suggest that Ptolemy originally supplied the coordinates for a western mouth as well; the omission of the coordinates in the later manuscripts could perhaps be attributed to a simple homoioteleuton gap.<sup>217</sup> Since both recensions are affected by this important omission, the error in copying must have occurred before the bifurcation of the manuscript tradition. And as Marcian refers to 'the more eastern mouth of the Baetis',<sup>218</sup> it is clear that the reference to the western mouth of the river was already missing in his source.

A similar case concerns the Anas River: the catalogues of both the  $\Omega$  and  $\Xi$  recensions refer only to 'the more eastern mouth of the Anas River',<sup>219</sup> whereas the maps in the UKRO manuscripts show two mouths, as do other geographical antique texts.<sup>220</sup> The coordinates of the western mouth must have been lost after Ptolemy. Marcian mentions

peoples in Baetica, whereas the *Geography* lists only four.

214 In the  $\Omega$  recension, geographical coordinates have been added to the name Turduli, as if it were a locality, not a people (*Geogr.* 2.4.5).

215 *Geogr.* 2.4.5: Βαίτιος ποταμοῦ τὸ ἀνατολικὸν στόμα.

216 Str. 3.1.9; Mela 3.5; Pausanias, *Per.* 6.19.3.

217 It is also possible, but much less credible, that a later editor or scribe of the *Geography* added a western mouth to the Baetis River. See Mittenhuber 2009, 180–181. Although when he discusses the length of the *oikoumenē*, Ptolemy mentions 'the mouths of the

Baetis' (ἐπὶ τὰς τοῦ Βαίτιος ἐκβολὰς, *Geogr.* 1.12.11), since the plural form ἐκβολαί was always used to designate the mouth of a river, one cannot definitely conclude that in this instance Ptolemy was referring to two mouths.

218 Marcian refers twice to 'the more eastern mouth'. See *Per. mar. ext.* 2.9: τὸ τοῦ Βαίτιος ποταμοῦ ἀνατολικώτερον στόμα.

219 *Geogr.* 2.4.3: τὸ ἀνατολικώτερον στόμα Ἰβη τοῦ ποταμοῦ.

220 Str. 3.1.9; Avienus, *Or. mar.* 208.

only ‘the mouths’ of the Anas and uses αἱ ἐκβολαὶ rather than τὸ στόμα.<sup>221</sup> Moreover, he also does not refer specifically to ‘eastern’ or ‘western.’ Nevertheless, the distances given by Marcian are compatible with Ptolemy’s catalogue, but only if Marcian was referring to Ptolemy’s eastern mouth.<sup>222</sup> Even though the case of the Anas is more ambiguous than the Baetis, it is likely that the reference to the western mouth of the Anas River was also already missing in Marcian’s source.

A comparison between Marcian’s distances in stadia and Ptolemy’s coordinates is more problematic. As figures are more easily corrupted than text, they are always the least dependable elements of a textual transmission. Furthermore, only one manuscript of the *Periplus* (plus two later apographs) exist, so no comparisons can be made with other versions to assess and identify occurrences of scribal corruption.<sup>223</sup> Marcian almost systematically provides values with lower and upper limits, the ranges of which can be quite large, whereas the differences between the coordinates in the Ξ and Ω recensions are rarely that significant – small differences in the coordinates can be hidden by the range of distances. Since such a comparison can only be regarded as approximate, it will not be so straightforward to establish how closely the *Periplus* resembles the Ξ or Ω recensions.

Among the twenty-seven values – given with lower and upper limits and expressed in stadia – that Marcian supplies for Iberia, the recensions are more or less evenly balanced: in sixteen cases the coordinates in both the Ξ and Ω recensions agree with Marcian’s distances, even when the recensions diverge, while the coordinates in both recensions are inconsistent with Marcian’s distances in only three cases. The eight remaining cases are evenly divided: the coordinates of the Ω recension match Marcian’s values four times (while the Ξ coordinates are at odds with Marcian’s figures); and the coordinates of the Ξ recension agree with Marcian’s values four times (while the Ω coordinates are incompatible).

Several instances of inconsistencies between the coordinates of the Ξ recension and Marcian’s values can be easily explained, that is, a simple misreading or scribal error occurred in X or in the copies from which it depended: L’ is used instead of ζ’ for the latitude of Barbesula; the uncommon Lζ’ (40°) is used for the latitude of Gades and the mouth of the Tagus River; and the insertion of a letter (β), which results in  $\overline{\mu\beta}$  γο’

221 There are four occurrences of αἱ ἐκβολαὶ τοῦ Ἄνα ποταμοῦ (‘the mouths of the Anas River’): *Per. mar. ext.* 2.9–11.

222 Marcian estimates that there are between 150 and 210 stadia between Onoba and the Anas River, and 380 stadia between the Anas River and Balsa (*Per. mar. ext.* 2.9 and 13). If one reconstructs Ptolemy’s coordinates of the western mouth from

the maps, one gets approximately 4°10’ 37°35’ using U<sup>l</sup>, and 4° 37°40’ using K<sup>l</sup>. The distance between the western mouth and Balsa is, in any event, less than 200 stadia, while the distance between the eastern mouth and Balsa tallies perfectly with the 380 stadia given.

223 See Marcotte 2002, LXXXIV–LXXXVII.

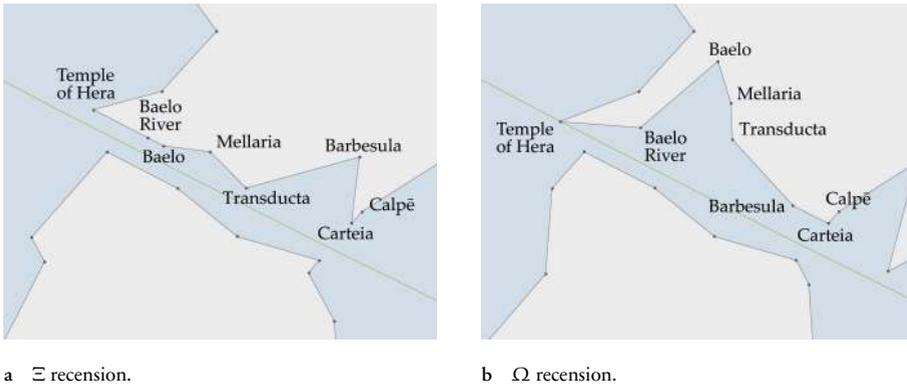


Fig. 6 The Strait of Hercules in Ptolemy's *Geography*.

( $42^{\circ}40'$ ) instead of  $\bar{\mu} \gamma \omicron'$  ( $40^{\circ}40'$ ), for the latitude of Mount Selēnē.<sup>224</sup> Two cases where the coordinates of the Ω recension and Marcian's values are at variance can be explained in a similar way.<sup>225</sup> However, the other instances, in particular where the coordinates of the Ω recension are inconsistent with Marcian's distances, cannot be attributed to common writing errors.

In addition, the outline of the Strait of Hercules, reconstructed using Marcian's distances, is much closer to the Ξ recension than to the Ω recension. In the Ξ recension, the Strait is remarkably symmetrical and forms a regular channel divided by the parallel through Rhodes. Only the position of Barbesula, with its angular coastal indentation, breaks up this regularity (Fig. 6a). As suggested above, the latitude of Barbesula in the Ξ recension probably stems from a copying error, so it is unlikely that Ptolemy drew up this coastal indentation himself. In contrast to the Ξ recension, the two coasts of the Strait in the Ω recension (Fig. 6b) are asymmetrical, and there is a pronounced, angular gulf around the city of Baelo, which has created a narrow peninsula, at the tip of which is located the Temple of Hera. This strikingly different coastal feature was brought about by a group of localities, not by just one place, and so cannot be attributed to a single copying error.

The distance between Carteia and Barbesula is, according to Marcian, 100 stadia, which is too large to match the coastal indentation formed by Barbesula in the X manuscript. If one corrects the latitude of Barbesula (to ζ' instead of L'), Marcian's remaining distances from Carteia to the Temple of Hera correspond well to the Ξ coordinates. By

224 This erroneous reading in manuscript X gives an illogical coastline, and so is probably not an authorial mistake.

225 In the Ω recension, L' is used instead of ζ' in the latitude of Mellaria, while ζ' is used instead of L' in the latitude of the mouth of the Vacua River.

contrast, the large gulf around Baelo in the  $\Omega$  recension is totally at variance with Marcian's values: the distance from Barbesula to Transducta was, according to Marcian, 'between 145 and 200 stadia,' although the distance in the  $\Omega$  recension manuscripts greatly exceeds 200 stadia; from the city of Baelo to the river of the same name, Marcian gives a distance of 'between 50 and 75 stadia,' but there are *c.* 250 stadia according to the  $\Omega$  recension; finally, although Marcian's figures seem to be corrupt in the manuscript, the distance in  $\Omega$  between Transducta (Iulia Traducta) and Mellaria (less than 100 stadia) is smaller than Marcian's figure (between 123 and 155 stadia).<sup>226</sup> Moreover, when Marcian calculates the latitudinal extent of Baetica, he uses both the Temple of Hera and the city of Baelo as boundary marks for the southern limit of Iberia,<sup>227</sup> which is only understandable from the point of view of the  $\Xi$  configuration.

Marcian writes that, for his *Periplous of the Outer Sea*, he relied above all on Ptolemy and Protagoras, who also worked on the *Geography*. Thus, the Ptolemaic material used in Marcian's *Periplous* dates back to a primary as well as a secondary source. Since it is impossible to know what Marcian borrowed from Protagoras, there will always be an element of uncertainty about this secondary source. However, let us postulate that all the Ptolemaic source(s) in question correspond to one version of the *Geography*: the latter is closer to the  $\Xi$  recension than to the  $\Omega$  recension as far as the text *and* the distances are concerned. Apart from a few rare exceptions,<sup>228</sup> there are no typical  $\Omega$  features in the *Periplous*. Marcian's text has characteristics that are common to  $\Xi$  and to  $\Omega$  (the omission of river mouths, for example), but there are also two features in Marcian's text – the toponymic spellings mentioned above and the appearance of the Strait of Hercules – that seem closer to Ptolemy's original work than to the recensions.

I propose, therefore, the following hypothesis: Marcian's source used a copy of Ptolemy's *Geography*, the text of which was already slightly corrupt; Marcian's version of the *Geography* might very well have corresponded to the  $\Xi$  recension at an earlier stage of transmission than manuscript X's exemplar; it is also plausible that the bifurcation of the tradition post-dates Marcian's version of the *Geography*.

### 2.3.3 Ptolemy's *Geography* in the corpus of Minor Greek Geographers

Among the collection of texts that is generally known as the Minor Greek Geographers, several late antique texts contain references to Ptolemy and his *Geography*. The works

226 As Marcian's figures were generally rounded up or down to five stadia, the figure '123 stadia' is decidedly strange.

227 Marcian, *Per. mar. ext.* 2.10.

228 For example, Marcian's work and the  $\Omega$  recension both have the correct reading for the *cognomen* of the Bastuli (τῶν καλουμένων Ποιηῶν), while man-

uscript X has τῶν καλουμένων Ἰτύων, because of a majuscule mistake (Π/Τ) and a divergent iotacism (οι/υ). The other instance where Marcian's work and the  $\Omega$  recension are more accurate than  $\Xi$  is a simple divergent iotacism in the X manuscript of Οὔρκει and Οὔρηκη. See table E.

of the 'Minor Greek Geographers' were transmitted in two medieval corpora, which comprise separate texts: the so-called Paris corpus, which was certainly compiled before the sixth century, and the Heidelberg corpus, which was compiled in the ninth century in Constantinople.<sup>229</sup> Since the oldest witnesses of these corpora are quite early (they date from the ninth and thirteenth centuries), they provide invaluable information on Ptolemy's indirect tradition. Marcian of Heraclea's works, discussed in section 2.3.2, were passed down in the Paris corpus, of which he was certainly the original editor.<sup>230</sup> The rest of this subsection investigates three texts from the Heidelberg corpus: the *Hypotypōsis*, the *Diagnōsis* and the *Chrestomathies* from Strabo.

### *The Hypotypōsis*

One of the works transmitted in the Heidelberg corpus is an anonymous geographical treatise entitled Ὑποτύπωσις γεωγραφίας ἐν ἐπιτομῇ (*Synopsis of Geography*), which is usually abbreviated to *Hypotypōsis*.<sup>231</sup> It consists of a compilation of a variety of geographical data on the *oikoumenē* and can be divided into six main parts: a description of the three continents, their countries and peoples (*Hypotypōsis* 1–26); a thematic classification of noteworthy islands, mountains and rivers (27–31); a description of the Indian Ocean (32–36); a description of a wind rose with a diagram (37–38); a compilation of the dimensions of the *oikoumenē* and its seas (39–44); and a description of the ocean and of the different parts of the Mediterranean Sea (45–53).

Although the author of the *Hypotypōsis* took important material from Strabo and Ptolemy, he also clearly referred to many other sources, in particular other texts on natural history and typical *mirabilia*. Ptolemy's maps were certainly consulted to compose the treatise.<sup>232</sup> I cannot go into any detail here about the geographical information in the *Hypotypōsis*, its links with Ptolemy's *Geography* and with the texts of the other Minor Greek Geographers; as the basis of my comments I have used F. Mittenhuber's comprehensive commentary and his critical edition of the *Hypotypōsis*.<sup>233</sup>

229 I prefer to use the names devised by D. Marcotte 2002 rather than the corpus A and corpus D used in Diller 1952, where A and D designate the main manuscripts of both corpora. The relationships between Ptolemy's *Geography* and the corpora have not yet been examined in detail, but such a study would be of great value. The 'Heidelberg corpus' of geographers belongs to the so-called Philosophical Collection (the manuscript family related to the Parisinis gr. 1807); see section 2.3.4 and Pontani 2015, 331–344. F. Ronconi 2013 has, however, recently proposed that one should reject the idea of a unique collection, stating that three different groups

can be differentiated from these manuscripts, and that they were all produced independently.

230 Marcotte 2002, cxvii–cxxvii; Altomare 2015, 14–15.

231 The text can be found in the Palatinus Heidelbergensis gr. 398 and the Athous Vatopedinus 655 codices. In addition, some excerpts from the *Hypotypōsis* can be found in two manuscripts (of the thirteenth and fourteenth centuries) of Constantine Porphyrogenetos' text *De thematibus*, which was written in the tenth century. See Marcotte 2002, xl–xli, and Mittenhuber 2011b.

232 Gautier Dalché 2009b, 72–76.

233 Mittenhuber 2011b.

There are a few toponyms in the *Hypotypōsis* that can be compared with the equivalent place names in the recensions of Ptolemy's *Geography*. Among the peoples of Libyē and Aithiopia given in the *Hypotypōsis*, one finds the 'Girrhoi,' the reading of which is quite close to the Ξ recension, while the Ω reading is markedly different.<sup>234</sup> To a lesser extent, the readings in the *Hypotypōsis* for the 'Blemmyes,' the 'Attiroi' and the 'Katoipoi' are also slightly closer to the Ξ recension than to the Ω recension.<sup>235</sup> Furthermore, there are cases where the *Hypotypōsis* gives readings that differ slightly from both recensions of the *Geography*, but it is difficult to establish whether the *Hypotypōsis* readings are closer to Ptolemy's original than to the two recensions. In summary, although there is little evidence, the *Hypotypōsis* shows toponymic characteristics that are closer to the Ξ recension of Ptolemy's *Geography* than to the manuscripts of the Ω recension.

The redaction of the *Hypotypōsis* cannot be precisely dated. Since it includes a sentence taken almost word for word from Marcian's *Periplus of the Outer Sea*,<sup>236</sup> one can reasonably assume that the *Hypotypōsis* was written after Marcian, that is, not earlier than the fifth or sixth century. The date of the Palatinus Heidelbergensis gr. 398 codex (second half or the last quarter of the ninth century) provides a *terminus ante quem*.<sup>237</sup>

### The Diagnōsis

Another shorter anonymous treatise of the Heidelberg corpus<sup>238</sup> is entitled Διάγνωσις ἐν ἐπιτομῇ τῆς ἐν τῆς σφαίρα γεωγραφίας (*Abridged Exposition on the Drawing of the Earth on a Sphere*). The text gives the dimensions of the *oikoumenē*, some elements about the motion and position of the Sun relative to the Earth and, at the end, a list of parallel circles. The treatise is presented as a lesson, dedicated to a friend or a student,<sup>239</sup> and contains four diagrams, which are discussed in the main text. The author's main source

234 *Hypotypōsis* 16: Γίρροι; *Geogr.* 4.6.16: Γίγγοι X, Πυρραίοι Ω.

235 *Hypotypōsis* 18: Βλέμμυες; *Geogr.* 4.7.31: Βλέμμυες XVRA, Βλέμμυες UK. *Hypotypōsis* 18: Κάτοιποι; *Geogr.* 4.7.34: Καθωποί X, Καθοῦποι Ω. *Hypotypōsis* 18: Ἄττιροι; *Geogr.* 4.7.29: Ἄττιροι X, Ἄπροι Ω.

236 Cf. *Hypotypōsis* 36 with Marcian, *Per. mar. ext.* 1.9.

237 Mittenhuber 2011b; Marcotte 2002, xxxiv. Since the *Hypotypōsis* and the *Chrestomathies* from Strabo combine material taken from Strabo and Ptolemy, A. Diller 1952, 101, proposed that both texts were produced in a similar context – in the milieu that produced the Parisinus gr. 1807 and the Palatinus Heidelbergensis gr. 398 – and so can be dated to the second half of the ninth century.

238 Atypically, the *Diagnōsis* is not included in the Palatinus Heidelbergensis gr. 398, which is the principal witness of the Heidelberg corpus. This treatise was

originally part of the Athous Vatopedinus 655, but the latter was divided up in the nineteenth century and the text of the *Diagnōsis* transferred to the folios preserved in the Parisinus suppl. gr. 443 A (f. 10). The *Diagnōsis* can also be found in the Cantabrigienensis Bibl. Univ. Gg. II. 33, ff. 124r–125, an apograph of the Vatopedinus, which was copied in the 1530s and in which the *Diagnōsis* was (incorrectly) attributed to Agathemerus. See Marcotte 2002, c–cix. Greek editions are given in: GGM<sup>2</sup>, 488–493; Diller 1943, 40–46; and Mittenhuber 2011a.

239 *Diagnōsis* 1: 'We decided to summarise the whole material so that you, my dearest friend (ὦ φίλων ἄριστε), keep in mind what you also received from us viva voce.' Unlike Mittenhuber 2011a, I understand ὦ φίλων ἄριστε to mean 'my dearest friend' and not 'my dear Philo'. See Diller 1943, 48, and Marcotte 2002, xli.

was 'Ptolemy, a skilful man' (ὁ τεχνικός Πτολεμαῖος), who is mentioned in the incipit of the text as well as in the introduction to the list of parallel circles. Material was clearly borrowed from the *Geography* (especially *Geogr.* 1.23 and 7.5.15) and perhaps also from the *Almagest* or the *Handy Tables*, but the *Diagnōsis* also includes information that was not taken from Ptolemy.

The text and the diagrams of the *Diagnōsis* are worth studying in their own right, especially concerning the work's sources and its context of production. Several observations can be made regarding the nature of the text and/or the map(s) of the *Geography* that were used by the author of the *Diagnōsis*. The latter's list of parallel circles includes some geographical references that do not appear in Ptolemy's list (*Geogr.* 1.23), although the additional information can be found in manuscript A and, by a later hand, in manuscript V, as well as in the *Almagest*.<sup>240</sup> There are also slight differences between the latitudes of these parallels and those of the *Geography*: in one instance, the *Diagnōsis* has the same latitude values as manuscripts U and K, but the values differ from manuscripts VRXA;<sup>241</sup> in a second instance, the *Diagnōsis* has the same values as manuscripts UKRA, but these values differ from manuscripts V and X.<sup>242</sup>

Furthermore, the *Diagnōsis* supplies the values for the longitudinal extent of the *oikoumenē* as measured along the parallels through Meroē, Syēnē, Rhodes and Thulē. These distances in stadia were based either on the text of the *Geography* (7.5.15) and/or on Ptolemy's world map. It is important to note that the passage of the *Geography* that gives these distances is extremely corrupt in the Ξ recension.<sup>243</sup> Regarding the longitudinal extent of the *oikoumenē* that was measured along the parallels through Meroē and Syēnē, the *Diagnōsis* contains the same figures as the manuscripts of the Ω recension. The longitudinal extent measured along the parallel through Rhodes in the *Diagnōsis* (72 000 stadia) is the same as in manuscripts U and K, whereas manuscripts V and R give 72 812 stadia.<sup>244</sup> This length of 72 000 stadia is given in another passage of the *Geography* (1.24.6), with which all the manuscripts are in agreement. Finally, the longitudinal extent measured along the parallel through Thulē is 40 854 stadia in the *Diagnōsis*

240 The *Diagnōsis* (15) includes 'through the Hellespont', which was added to the 12th main parallel in the list, as do manuscripts A and V<sup>1</sup> (*Geogr.* 1.23.13) and the *Alm.* 2.6.13. The *Diagnōsis* also includes 'through Byzantium', which was added to the 13th parallel, as does manuscript A (*Geogr.* 1.23.14), and 'through the middle of Pontus', added to the 14th parallel in the list, as do manuscript V<sup>1</sup> (*Geogr.* 1.23.15) and the *Alm.* 2.6.15. Finally, like manuscript V<sup>1</sup> (*Geogr.* 1.23.16) and the *Alm.* 2.6.17, the 15th parallel of the *Diagnōsis* contains 'through the Borysthenes'.

241 *Diagnōsis* 14:  $\overline{\kappa\zeta}$  L' (like UU<sup>1</sup>KK<sup>1</sup>); manuscripts VRXA have  $\overline{\kappa\zeta}$  Lζ' (*Geogr.* 1.23.8).

242 *Diagnōsis* 15:  $\overline{\nu\alpha}$  (like UU<sup>1</sup>KK<sup>1</sup>RR<sup>1</sup>A); manuscripts V and X have  $\overline{\nu\alpha}$  L' (*Geogr.* 1.23.17).

243 The scribe of *Geogr.* 7.5.15 in manuscript X obviously had trouble reading his exemplar, since his hand was clearly hesitant when writing the figures (but not the text). Moreover, two different and later hands corrected this passage, following one or several Ω copies. See manuscript X, f. 165v, col. 2.

244 The original reading in manuscript X (f. 165v, col. 2, l. 13) was also 72 812 stadia, but the figure was later corrected to 72 000 stadia.

and in manuscripts UKR, whereas V and A give 40 000 stadia.<sup>245</sup> It is also worth noting that the *Diagnōsis* uses Συήνη for the spelling of the city of Syēnē, which is the version employed throughout the Ω recension.<sup>246</sup>

To sum up, the *Diagnōsis* is clearly closer to the Ω recension of the *Geography* than to the Ξ recension.<sup>247</sup> It should be remembered that manuscripts U and K are part of the so-called Δ group of the *Geography*'s manuscripts. Since the *Diagnōsis* has the same readings as U and K in several cases, P. Schnabel concluded that this treatise was based on a version of the *Geography* that belonged to the Δ group.<sup>248</sup> More recently, this hypothesis has been defended by F. Mittenhuber, who believes that the author of the *Diagnōsis* did consult some of Ptolemy's maps.<sup>249</sup>

The date of the *Diagnōsis* is still open to debate. P. Schnabel conjectured that it was written during Late Antiquity (in the fifth or sixth centuries),<sup>250</sup> whereas A. Diller opted for a later date – not before the ninth century and possibly as late as the thirteenth century – and thought it likely that its redaction was carried out in Planudes' circle (thus the end of the thirteenth century): the work's language and form of didactic exposition are not incompatible with the style of Planudes.<sup>251</sup> There are some codicological and palaeographical features which could indicate that the redaction of the *Diagnōsis* was, in fact, carried out only shortly before the Athous Vatopedinus 655 was compiled. As previously mentioned, the *Diagnōsis* was not part of the Palatinus Heidelbergensis gr. 398 (the main witness of the Heidelberg corpus) but was originally contained within the Vatopedinus, where it was placed *before* its table of contents. The *Diagnōsis*' folio does

245 The original number in manuscript X (f. 165v, col. 2, l. 8) is not clearly legible. The main scribe wrote μυριάδων Δ ('forty thousands') but the letters that follow are open to interpretation. I read:  $\overline{\omega\kappa}\ \mu(\acute{o}\iota\rho\alpha\varsigma)\ \overline{\pi\delta}\ \gamma\omicron$ , although this does not really make any sense. Beneath the last figures of this extract is a row of dots, which might have been inserted by the main scribe, indicating that he was unsure about the figure. The reading '40 854' was completed later by a second hand.

246 See p. 65.

247 On a philological level, there are some nuances to this hypothesis. The *Diagnōsis*' length along the Thulé parallel also appears in manuscript R and the *Diagnōsis*' rounded value of 72 000 stadia might have stemmed from a misreading or from another passage of the *Geography*. Moreover, information on the *klimata* can be found in the *Handy Tables* and in the *Almagest* as well as on Ptolemy's maps.

248 Schnabel 1938, 53–54. See also Diller 1941.

249 Mittenhuber 2009, 336 and 356; Mittenhuber 2011a. The main argument is that, in the list of

parallels, the author of the *Diagnōsis* refers to the *klimata*, which only appear on the world maps of the *Geography* in manuscripts U and K (Mittenhuber 2009, 336).

250 Schnabel 1938, 53–54. This hypothesis was also put forward by Fischer 1932, 436–442, and Wolska-Conus 1973, 259–273. The latter saw in the *Diagnōsis* a direct answer to the cosmological theories of the sixth-century Cosmas Indicopleustes, and believed that it was possibly produced by someone in the circle of John Philoponus.

251 Diller 1943, 48: 'In the case of the *Diagnosis* the language seems to me to indicate the mediaeval period, in the ninth century or later. In particular, the salutation 'my dearest friend' ( $\acute{\omega}\ \phi\iota\lambda\omega\nu\ \acute{\alpha}\rho\iota\sigma\tau\epsilon$ ) can also be found in a letter written by Planudes. See Treu 1896, 55. Gautier Dalché 2009b, 72, also thinks that a redaction carried out in Planudes' circle is plausible, whereas F. Mittenhuber 2011a believes that the work could have been carried out in the circle of Photius in the ninth century.

not exhibit any scholion, contrary to the other texts (written by the same hand as the *Diagnōsis*) that show abundant marginal commentaries in the manuscript. Thus, it is plausible that the *Diagnōsis* was added to the Heidelberg corpus at a later date.

Moreover, the *Diagnōsis* and the  $\Delta$  group of Ptolemy's *Geography* are closely related to Planudes' circle. The Vatopedinus codex contains manuscript L of the *Geography* (an apograph of manuscript U) as well as a manuscript of Strabo's *Geography*, whose direct exemplar was also the exemplar of the late thirteenth-century Parisinus gr. 1393. A. Diller demonstrated that Planudes owned the Parisinus gr. 1393.<sup>252</sup> Furthermore, the same hand was involved in copying the Parisinus gr. 1393 and manuscript K of Ptolemy's *Geography*. D. Marcotte has thus concluded that the scribes of the Vatopedinus codex must have had access to manuscripts of Strabo's and Ptolemy's works (related to the  $\Delta$  group) and that these manuscripts came from the same library, possibly the library of Planudes and his students.<sup>253</sup>

The author of the *Diagnōsis*, who used the works of both Ptolemy and Strabo, could, therefore, have found his sources in the same collection of manuscripts that was available to the scribes working on other parts of the Vatopedinus codex. This would explain the links between the *Diagnōsis* and the  $\Delta$  group of Ptolemy's *Geography*. Thus, I would be inclined to date the redaction of the *Diagnōsis*, which I deduce was carried out in Planudes' circle, to the late thirteenth century.

#### *The Chrestomathies from Strabo*

The *Chrestomathies* (*Chrest.*) is the name given to a collection of 839 excerpts from Strabo's *Geography* that was transmitted in the Heidelberg corpus.<sup>254</sup> A. Diller suggested that the *Chrestomathies* was produced by the circle of Photius (c. 810 – c. 893), that is, not much earlier than the copy of the Palatinus Heidelbergensis gr. 398 itself (executed in the second half or the last quarter of the ninth century).<sup>255</sup> D. Marcotte has also noted that each of Strabo's excerpts begins with ὅτι and is numbered, which follows the style of Photius' *Bibliotheca*.<sup>256</sup>

The compiler of the *Chrestomathies* added several external references and details to Strabo's text, and mentions Ptolemy in three paragraphs. In *Chrest.* 17.50, for example, a reference is made to Ptolemy because his drawing of Libyē (the African continent)

252 Diller 1937, 297–298. See also Aujac and Lasserre 2003, LXXII.

253 Marcotte 2002, CIV.

254 The text (under the title Χρησθημάθειαι ἐκ τῶν Στράβωνος γεωγραφικῶν) is to be found in the Palatinus Heidelbergensis gr. 398, in the Athous Vatopedinus 655 and in the Parisinus graecus 1630, which was

produced by the circle of Planudes: Marcotte 2007a, 168. A shorter, rearranged version of the *Chrest.* can be found in the thirteenth-century Parisinus graecus 571. See also Marcotte 2002, XLIII–XLV, Marcotte 2015 and Radt 2010, 241–242.

255 Diller 1954, 49–50.

256 Marcotte 2002, XLIV.

differs so much from that of Strabo, who compares the continent to a triangle with a right angle. The other two mentions of Ptolemy are more detailed:

- *Chrest.* 2.26: ‘According to Strabo, the western side of Mauretania (which lies on the ocean-side) begins at the Pillars and inclines toward the east and the south, ends at the meridian through Carthage and [at] the parallel through the Cinnamōmophore; this [meridian] lies, according to Ptolemy, 34°15’ in longitude from the western end [of the *oikoumenē*].’<sup>257</sup>
- *Chrest.* 7.50: ‘Ptolemy says that the northern side of Macedonia is a line running through the Bertiskos and Skardos and Orbēlos mountains, on the east through the middle of Propontis, on the west until the mouth of the Drilōn River, which flows from the Bertiskos Mountains; to the north of these mountains and of this line would lie Illyricum and Thrace.’<sup>258</sup>

In the first passage the redactor uses Ptolemy’s value for the longitude of Carthage, which is, according to the *Chrestomathies*, 34°15’.<sup>259</sup> However, the catalogue of the *Geography* gives a value of 34°50’ in all the manuscripts, as does the ‘Table of Noteworthy Cities.’<sup>260</sup> In Book 8 of the *Geography*, the Ξ recension states that Carthage lies 1  $\frac{3}{4}$  hours to the west of Alexandria, which should correspond to a value of 34°15’ from the meridian through the Fortunate Isles.<sup>261</sup> The manuscripts of the Ω recension give a different figure (1  $\frac{2}{3}$  hours, hence 35° from the Fortunate Isles). Given the format of the longitude in the *Chrest.* (which is in degrees, not in hours), one would deduce that the author of the *Chrest.* referred to the catalogue of the *Geography* or to the ‘Table of Noteworthy Cities’, and not to Book 8, although the value in degrees does match Book 8 of the *Geography* in the Ξ recension.

The *Geography* and the *Chrest.* have the same readings for the Bertiskos and the Skardon mountains, which are mentioned in the second passage.<sup>262</sup> Different kinds of iotacism for the proper nouns Mount Orbēlos and the Drilōn River appear in the

257 *Chrest.* 2.26: Ὅτι κατὰ Στράβωνα ἡ δυτικὴ πλευρὰ τῆς Μαυριτανίας ἢ παρωκεανίτις, ἀρξαμένη ἀπὸ Σητλῶν καὶ πρὸς ἀνατολὰς καὶ νότον κλίουσα, καταλήγει εἰς τὸν διὰ Καρχηδόνας μεσημβρινὸν τῆς Κιναμομοφόρου παράλληλου· ὅστις κατὰ Πτολεμαίου ἀπέχει τοῦ δυτικοῦ πέρατος μόρια λδ δ’ κατὰ μῆκος.

258 *Chrest.* 7.50: Ὅτι Πτολεμαῖος μὲν τὸ τῆς Μακεδονίας βόρειον πέρασ εἶναι λέγει τὴν γραμμὴν τὴν διὰ Βερτίσκου ὄρους καὶ Σκάρδου καὶ Οὐβήλου ἐκβαλλομένην, πρὸς ἀνατολὰς μὲν ἕως μέσης τῆς Προποντιδος, πρὸς δυσμὰς δὲ ἕως τῶν ἐκβολῶν Δρίλωνος ποταμοῦ τοῦ ἐκ τοῦ Βερτίσκου ὄρους ἀνίσχοντος, ἵνα τὰ βορειότερα

τῶν ὀρέων τούτων καὶ τῆς γραμμῆς ταύτης ἢ τὰ μὲν Ἰλλυρικὰ, τὰ δὲ Θράκεια·

259 The pronoun ὅστις used in the text refers very probably to τὸν διὰ Καρχηδόνας μεσημβρινὸν, although the passage is somewhat ambiguous. Despite its ambiguity, one should certainly regard this longitude value (κατὰ μῆκος) as having been counted from the meridian of the Fortunate Isles.

260 *Geogr.* 4.3.7; ‘Table of Noteworthy Cities’, 12.1.

261 *Geogr.* 8.14.5. See Stückelberger and Mittenhuber 2009, 177.

262 *Geogr.* 2.16.1, 2.16.6, 3.9.1 and 3.13.18–19.

*Chrest.* and in the *Geography*.<sup>263</sup> On two occasions, manuscript X has the same reading as the *Chrest.* for the Drilōn River, of which one diverges from the Ω recension, but one cannot associate the *Chrest.* unreservedly to either one or other of the recensions on the basis of these iotacisms alone. In addition, the borders of Macedonia, which are described in *Chrest.* 7.50, do not correspond to the boundary marks provided by the catalogue.<sup>264</sup> The description of Macedonia's northern border in the *Chrest.* only makes sense if one considers Ptolemy's ninth map of Europe: an imaginary line on his map that would run from the mouth of the Drilōn River in the west and would then go through the Bertiskos, Skardos and Orbēlos mountains until the middle of Propontis in the east can, in fact, be considered to be the boundary between Macedonia (in the south) and Illyricum and Thrace (in the north).<sup>265</sup>

In summary, the geographical material that the compiler of the *Chrestomathies* borrowed from Ptolemy seems not to have come directly from the catalogue of localities, at least as we know it. The use of some of Ptolemy's maps explains both the description of Macedonia's borders (which differs from the catalogue's description) and the reference to the general shape of the African continent.<sup>266</sup> However, the *Chrestomathies* from Strabo cannot be unreservedly linked with one of the recensions of the catalogue of localities, although the collection does seem slightly closer to the Ξ than to the Ω recension.

### 2.3.4 Ancient scholia on manuscripts of Strabo and Plato

A few ancient scholia refer explicitly to Ptolemy and the *Geography*: one is to be found in a manuscript of Strabo,<sup>267</sup> two among the *scholia vetera* to Plato – a scholion to the

263 *Chrest.* 2.26: [τοῦ] Ὀρβήλου; *Geogr.* 3.11.1: [τοῦ] Ὀρβήλου UKRA, Ὀρβήλου V, Ὀρβύλου X. The other mention (*Geogr.* 3.9.1) has the same reading – ἐπὶ τὸ Ὀρβήλον ὄρος – in all the manuscripts. *Chrest.* 2.26: [τοῦ] Δρίλωνος; *Geogr.* 2.16.5: [τοῦ] Δρύλωνος UK, Δρίλωνος codd. cett. *Geogr.* 2.16.6: ὁ Δρίλων X, Δρείλων Ω.

264 According to Ptolemy, Macedonia was bordered on the west by the coastal city of Dyrrhachion (or Epidamnos) to the mouth of the Keldynos River, on the south by the Keldynos River to the Maliac Gulf via the Pindus and Mount Oitē, on the east by the Maliac Gulf to the mouth of the Nessus River (*Geogr.* 3.13.2) and on the north by a point on the Adriatic coast that is south of Lissus and that runs to the mouth of the Nessus River via the Skardon, the Orbēlos and the Pangaion mountain ranges (*Geogr.* 2.16.1, 3.9.1 and 3.11.1).

265 Note that the mouth of the Drilōn River is one of the last points on the Adriatic coast of Illyricum before Macedonia and that the Bertiskos mountain range lies to the north of Macedonia, not far from Mount Orbēlos. On the map of manuscript K, the northern mountains of Macedonia have been drawn so that they appear connected.

266 This is also the opinion of P. Gautier Dalché 2009b, 78–79, who quotes other passages of the *Chrest.* where the influence of Ptolemy's *Geography* is apparent.

267 The scholion to Strabo's *Geography* (1.2.2) is found in the Parisinus gr. 1397 (second half of the tenth century), f. 8r: ὅτι τοῦ μεγάλου Πολέμου [sic cod. Πτολεμαίου conj. Kramer] προγενέστερός ἐστὶν ὁ συγγραφεὺς, ἀλλ(ᾶ καὶ) Μαρίνου τοῦ Τυρίου· οὐ γὰρ μέμνηται αὐτῶν. ('This author [i.e. Polemon] is older than the great Polemon but [also older] than Marinus of Tyre. [Strabo] does not mention him [here:]');

*Republic*<sup>268</sup> and to the *Ion* – and one in the *Periplous of the Euxine Sea (Eux.)*.<sup>269</sup> In addition, Proclus' fifth-century *Commentary on the Timaeus* contains a reference to Ptolemy, which was later recorded in a scholion to Plato's *Timaeus*.<sup>270</sup>

The scholion to Plato's *Ion* (533d) quotes the catalogue very precisely and thus allows a comparison to be made with the recensions of the *Geography*. It is found in two of the main manuscripts of Plato's works: the Venetus Marcianus gr. IV.1 (coll. 542) from the middle of the tenth century (manuscript T) and the Vindobonensis suppl. gr. 7 from the late eleventh century (manuscript W).<sup>271</sup> The scholion comments on 'the stone which Euripides named "magnetic" and that most people call Heracleian stone.' The scholiast stated:

Πτολεμαῖος ὁ μέγας ἐν ζ' τῶν γεωγραφικῶν ὑψηλῶν φησι κατὰ τὴν ἐκτὸς Γάγρου ποταμοῦ Ἰνδικὴν [[ὄτι]] μετὰ καὶ ἄλλας τινας νήσους Σατύρων εἶναι τρεῖς, ὧν τοὺς ἐνοικοῦντας οὐράς ἔχειν ὁποῖας διαγράφουσι τῶν Σατύρων. φέρονται δὲ συνεχεῖς καὶ ἄλλαι δέκα νῆσοι καλούμεναι Μανιόλαι, ἐν αἷς φασι τὰ σιδηροῦς ἔχοντα ἥλους πλοῖα κατέχεσθαι, μήποτε τῆς Ἡρακλείας λίθου περὶ αὐτὰς γεννωμένης, καὶ διὰ τοῦτο ἐπιούροις ναυπηγεῖσθαι· κατέχειν τε αὐτὰς ἀνθρωποφάγους.<sup>272</sup>

Greek text in Aujac 2003a, 87; see also Diller 1954, 34. It seems that the scholiast wanted to insert a detail on Polemon of Athens (c. 220–160 BCE), who is mentioned by Strabo in this passage, specifying that Polemon and Ptolemy are different authors and that Strabo 'did not mention him [that is, Ptolemy]'. He very probably confused the names of the two geographers, calling Ptolemy 'the great Polemon'.

268 The scholion to Plato's *Resp.* 519c is found in the Parisinus gr. 1807 (the so-called Paris Plato, third quarter of the ninth century), f. 75r: ὡς Πτολεμαῖος ὁ μέγας ἐν δ' Γεωγραφουμένων φησὶ τὰς μακάρων νήσους ἔξ τῶν ἀριθμῶν ἐν τῇ ἐντος Λιβύῃ κατὰ τὸ Ἀτ(λ)αντικὸν πέλαγος (text in Greene 1988, 247). The scholion comments on *Geogr.* 4.6.34, although Ptolemy never used the name Ἀτλαντικὸν πέλαγος ('Atlantic Sea'). This proper noun is, however, used in Plato's *Timaeus* and in Proclus' *Commentary on the Timaeus*.

269 The scholion to *Eux.* 17 is found in the Lond. Add. 19391, f. 8v (one of the manuscripts of the Heidelberg corpus) and is related to the settlement of Κυτόρος: κατὰ Πτολεμαίων ἐνταῦθα τὰ Βιθυνίας καὶ Γαλατίας ὄρια. It corresponds to *Geogr.* 5.1.7–11. In contrast to Gautier Dalché 2009b, 78, I believe that the boundary near Κυτόρος can be deduced from the text of the catalogue, that is,

not necessarily from Ptolemy's map. See also Diller 1952, 114, and Marcotte 2002, xx, lxxxviii–cvi.

270 Proclus, in *Tim.* 25a: Πτολεμαῖος δὲ τὰ Σεληναῖα ὄρη τὸ ὕψος ἀπλετον ἔχειν φησὶ ('Ptolemy too says that the Mountains of the Moon have an enormous height!') This comment of Proclus is recorded in the Parisinus gr. 1807 f. 117r (text in Greene 1988, 286). There is no explicit mention of this information in the *Geography* (cf. *Geogr.* 4.8.3 and 6), although it could be inferred from Ptolemy's text, which describes the top of this mountain as being covered in snow. Furthermore, Ptolemy always used the singular ὄρος for this mountain, whereas Proclus used the plural ὄρη. See also Diehl 1903, 181, and Gautier Dalché 2009b, 77.

271 The dates of manuscripts W and T have been much debated. The dates cited above were taken from Cufalo 2007, cxxvi–cxxx. W.C. Greene 1988, xv–xvii, dates the main hand of manuscript T to the twelfth century and the main hand of manuscript W to the tenth century. In both manuscripts, the scholion was written by the hand that copied the main text. The scholion is also to be found in manuscripts that derive from manuscripts T and W (such as, e.g., the Parisinus gr. 1808).

272 ὄτι] sic codd. sed del. Greene, Cufalo || τινας νήσους] W νήσους τινας T, Greene || τὰ σιδηροῦς] τὰς σιδηροῦς W || Ἡρακλείας] T Ἡρακλείου W || ἐπιούροις T] πιούροις W || κατέχειν τε] T κατέχειν δὲ W

(Ptolemy the Great, in Book 7 of his *Geography*, says that in India beyond the Ganges, after other islands, there are three islands of the Satyrs, whose inhabitants are described as having tails like satyrs. There are ten other islands called Maniolai, in which it is said that ships with iron nails are stopped [from going any further], maybe because one finds there Heracleian stone; and for this reason ships are built with wooden pegs.<sup>273</sup> Cannibals occupy these [islands].)

The passage, which quotes the actual title of Ptolemy's work (Γεωγραφικὴ ὑφήγησις), can be found almost word for word in Book 7 of the *Geography* (7.2.30–31). The scholion and manuscript X contain δὲ συνεχεῖς καὶ ἄλλαι δέκα νῆσοι as opposed to δὲ καὶ ἄλλαι συνεχεῖς δέκα νῆσοι, which is present in the manuscripts of the Ω recension; together with A, the former also use γεννωμένης, unlike the Ω manuscripts.<sup>274</sup> However, manuscript X has a corrupt reading (Μανίοναι) that is not present in the scholion and Ω manuscripts, which use the correct spelling (Μανίολαι), although X does later use the correct version immediately before the coordinates in the catalogue. Finally, the scholion and the Ω recension use περὶ αὐτάς, whereas X has παρὰ αὐτάς. This last variant can be attributed to a simple misinterpretation of an abbreviation, such as  $\overset{\epsilon}{\pi}$ , which was sometimes used for περὶ or παρὰ.<sup>275</sup> Contrary to the hypothesis of P. Gautier Dalché,<sup>276</sup> this scholion is, therefore, closer to manuscript X than to the manuscripts of the Ω recension: the spelling of Μανίοναι must date back to the scribe of X himself (he gives the correct spelling further on in the text), while the variant παρὰ can be attributed to a commonly made reading error. The two readings where the scholion diverges from the Ω recension concern more complex variants.

As to the origins of the *scholia vetera* to Plato, two hypotheses coexist: some scholars believe that this corpus of scholia was produced quite late, that is, in the ninth century, and possibly by a member of Photius' circle. This has long been the *communis opinio*. In a recent study on the origins of these scholia, D. Cufalo revived this hypothesis, stating that the corpus is 'a Byzantine product, written down from the ninth century onwards, and is the result of the sedimentation of at least three phases, the last of which can

|| αὐτάς] T αὐτοῦς W, Greene. Text in Cufalo 2007, 267–268; see also Greene 1988, 181.

273 The text in Stückelberger and Graßhoff 2006, 730, reads καὶ διὰ τοῦτο ἐπ' οὐροῖς ναυπηγεῖσθαι, 'that is why they build ships on ramps' ('Deshalb baue man die Schiffe auf Landrampen'), unlike the manuscripts, which use ἐπιούρος ('wooden peg'). I have used the latter in the quotation as it is well-attested in antique texts and makes complete sense in this context.

274 *Geogr.* 7.2.31: γεννωμένη U, γενομένης K, γινωμένης VR.

275 In fact,  $\overset{\epsilon}{\pi}$  is used in manuscript R of the *Geography* (f. 97v).

276 Gautier Dalché 2009b, 78: '[...] regarding the islands of the Satyrs and Maniolai in the *Ion*, it concerns a quotation, virtually word for word, that is linked with the passage above in the *Geography* [...] and which seems closer to recension Ω than to recension X [sic]: ('[...] dans le cas des îles Satyres et Maniolai de *Ion*, il s'agit d'une citation quasi littérale, reliée au passage précédent de la *Géographie* [...] et qui semble plus proche de la recension Ω que de la recension X [sic:]

be dated to the first part of the tenth century.<sup>277</sup> The other hypothesis considers that the *scholia vetera* to Plato were produced in at least two main stages: a first collection of scholia dates back to the Neoplatonic milieu and to scholars such as Proclus (c. 410–485), that is, to the fifth or sixth century; then, from the late ninth century, Byzantine scholars – possibly Arethas (born c. 850) or Photius – enhanced the collection of scholia on the basis of their own readings of other works.<sup>278</sup>

Within this context, it is difficult to establish the authorship of the scholia (to *Eux.* 17, Str. 1.2.2, Plato's *Ion* 533d and *Resp.* 519c) that refer to Ptolemy's *Geography*. A. Diller believed that they were all produced by members of Photius' circle, like the *Chrestomathies* from Strabo, that is, in the second half of the ninth century.<sup>279</sup> However, since no traces of any works by Strabo and Ptolemy have ever been found in Photius' *Bibliotheca*, as A. Diller himself observed, this hypothesis has been contested. H. Hunger, for instance, has suggested that Arethas may be the author of both the *Chrest.* and the scholia to Strabo.<sup>280</sup> By contrast, P. Gautier Dalché seems to suggest that all the scholia referring to the *Geography* go back to Proclus. This hypothesis is indeed plausible – Proclus had access to several of Ptolemy's works – but Gautier Dalché's argument is not convincing.<sup>281</sup> In his study of the complex links between the Heidelberg corpus (which contains the *Chrest.* and *Eux.*) and the manuscripts of the family of the Parisinus gr. 1807 (the so-called Paris Plato), D. Marcotte has been more reserved: he has acknowledged the possibility that both groups of philosophical and geographical texts might have been produced during the sixth century in the Neoplatonic centres of Athens or Alexandria.<sup>282</sup> However, he seems to adhere to the belief that the scholia related to Ptolemy (and the references to the *Geography* in the *Chrest.* and the *Eux.*) originated in Photius' circle, his argument being that the latter's *Bibliotheca* is mostly an early work

277 Cufalo 2007, cvi: '[...] un prodotto bizantino, redatto a partire dal IX secolo e frutto della sedimentazione di almeno tre fasi, l'ultima delle quali databile alla prima metà del X secolo.'

278 See Greene 1988, xxxi. For a thorough *status quaestionis*, see Cufalo 2007, xv–xxviii.

279 Diller 1954, 34 and 43–50, whose hypothesis was accepted by Lasserre 1959, 61, 70–73.

280 Hunger 1978, 508.

281 Gautier Dalché 2009b, 78: 'If one considers that all these glosses come from the same milieu (that of Photius or Arethas), then there must have been, during the ninth century, a complete copy of the *Geography*. However, as we have seen, the gloss in the *Timaean* comes from Proclus' commentary; hence the adjective 'great', which is also ascribed to the geographer in the scholion to the *Ion*, could be at-

tributable to the Neoplatonic philosopher [i.e. Proclus] and not to Photius or Arethas. To attribute to them a knowledge of Ptolemy's works thus seems somewhat rash.' ('Si l'on considère que toutes ces gloses proviennent d'un même milieu – celui de Photios ou d'Aréthas –, alors il devait s'y trouver, au IX<sup>e</sup> siècle, un exemplaire complet de la *Géographie*. Mais, comme on l'a vu, la glose au Timée provient du commentaire de Proclus, auquel cas le qualificatif de "grand" attaché aussi dans la scholie à *Ion* au nom du géographe serait dû au néoplatonicien et non à Photios ou Aréthas. Leur prêter une connaissance de l'œuvre de Ptolémée semble donc hasardeux.') P. Gautier Dalché's hypothesis is problematic, since the adjective μέγας is *not* used in the text of Proclus. See footnote 270, p. 107.

282 Marcotte 2007b.

and that Photius might have got to know Ptolemy's *Geography* as well as Strabo's work a little later in his life.<sup>283</sup>

### 2.3.5 The *Geography* in Syriac geographical texts

Some geographical elements taken from Ptolemy can be found in the so-called *Chronicle of Pseudo-Zachariah*, which was written in Syriac before 569 CE in Amida (Armenia) and is a compilation of numerous sources, the main one of which is the *Ecclesiastical History* of Zachariah of Mytilene (written in c. 510 CE).<sup>284</sup> Book 12 of the *Chronicle* is essentially made up of historical texts, although the author also inserted a description of the world, which was presented as a *sqariphos d-tebel*, a Syriac expression taken from the Greek σκάριφος τῆς οἰκουμένης, that is, an 'outline of the world'.<sup>285</sup> It lists the lands of the world, together with the number of cities of each land, and sometimes including ethnological, zoological and meteorological comments.

Although the author of the *Chronicle* confuses Ptolemy with one of the Hellenistic rulers,<sup>286</sup> the main source of the geographical description in Book 12 is clearly an epitome of Ptolemy's *Geography*.<sup>287</sup> In the description of the Iberian peninsula, the *Chronicle* does not refer to the names of the provinces, although the description and the number of cities do show that the three provinces were listed in the same order as in the *Geography*'s catalogue (Baetica, Lusitania and Tarraconensis).<sup>288</sup> However, a clear link cannot be made between the material taken from Ptolemy and the Ω or Ξ recensions.<sup>289</sup>

Syriac scholars had access to Ptolemy's *Geography* in the seventh century. In his *Treatise on the Constellations*, written in c. 660 CE, Severus Sebokht addresses astronomical and mathematical geographical topics, and frequently refers not only to Ptolemy's

283 Marcotte 2002, CXXXVI-CXXXVIII.

284 Greatrex et al. 2011, 1–74; Gautier Dalché 2009b, 49–54.

285 Ducène 2015, 22.

286 Ps.-Zach., *Chron.* 12.7-j. The confusion can probably be attributed to the compiler of the *Chronicle* rather than to Zachariah of Mytilene himself, a Greek rhetor, who studied in Alexandria.

287 This contrasts with the opinion of Bagrow 1947, 72, who believed that the geographical information in the *Chronicle* must have come from other sources. Note that G. Greatrex et al. 2011, 431, seem to have misinterpreted Bagrow's viewpoint.

288 Ps.-Zach., *Chron.* 12.7-c: 'Outer Hispania: 80 cities; Inner Hispania II: 44 cities; Hispania Tertia, which is on the ocean: 240 cities and many islands in the ocean that are called white'. Translation Greatrex et al. 2011, 433. The authors suggest that the 'white'

islands refer to Albion (cf. *albus*, 'white'), i.e. the British Isles. P. Gautier Dalché 2009b, 52, believes that the Ps.-Zachariah's list begins with the Iberian peninsula rather than the British Isles. Conversely, I think that the British Isles are described immediately before Iberia in the Ps.-Zachariah, although the islands are not referred to by name: 'North-western Europe: 77 cities; it is not easy for us to write their names'. The so-called 'white islands' off the western coast of Iberia may refer to Ptolemy's 'Trileukoi Skopeloi' (cf. λευκός, 'white'), a group of islands in the ocean to the north of Tarraconensis (*Geogr.* 2.6.75).

289 Note that the Ps.-Zach. uses *Balgiqa* for Belgica, whereas all the manuscripts of the *Geography* as well as Marcian's work erroneously refer to the province as Βελτικῆ.

*Geography* but also to the *Handy Tables* and the *Almagest*. In his treatise, Severus provides a concise description of the *oikoumenē*:

In order to make it easier to understand these countries and cities and towns, the geographers–philosophers, in summary, gave names to the three great parts of the inhabited world: Europe, Libyē and Great Asia. They counted that in Europe there were 10 tables (*pinaqes*), 22 countries, 118 great cities; in Libyē, 4 tables, 17 countries, 42 cities; in Great Asia, 12 tables, 44 countries and 190 cities. Taken as a whole, 26 tables, 83 countries and 350 cities.<sup>290</sup>

One finds an extremely similar list of localities – including the Syriac translation (*pinaqes*) of the Greek word πίνακες – in the table of contents of Book 8 of the *Geography*, where the numbers of regional maps and their contents, together with a total, are presented. The textual transmission of this specific table of contents is extremely complicated and would be worth studying in its own right. Indeed, A. Diller’s article on ‘Lists of Provinces in Ptolemy’s *Geography*’ shows how hard it is to establish a clear schema of transmission. A renewed investigation of Book 8’s table of contents in the manuscripts of the *Geography*, taking into account indirect traditions, such as the writings of Severus Sebokht, would greatly help our understanding of the *Geography*’s textual tradition(s).<sup>291</sup>

Among all the Syriac authors who used Ptolemy and his *Geography*, Jacob of Edessa (633–708 CE) is the one whose work most closely approximates Ptolemy’s catalogue of localities. Although Jacob of Edessa never explicitly mentions Ptolemy, he notes down places with their geographical coordinates as they appear in the *Geography* and provides, in his *Hexaemeron*, lists of toponyms that were clearly taken from the catalogue of localities.<sup>292</sup> The geographical notes of Jacob of Edessa form a kind of re-arranged digest of the *Geography*. Furthermore, the oldest extant manuscript of the *Hexaemeron*<sup>293</sup> has been dated to 837 CE, that is, only 130 years after Jacob’s death and the interruption of the *Hexaemeron*’s redaction, making it a particularly invaluable testimony.

The lack of a critical edition of this Syriac text prevents us from carrying out a detailed study. É. Villey kindly transliterated a selection of toponyms related to Books 4 and 7 of Ptolemy’s catalogue,<sup>294</sup> which constitute only a small part of the toponyms contained in the *Hexaemeron*. When one compares these toponyms with the readings in the different Greek manuscripts, the results are contrasting but show a clear tendency. In most cases, the Syriac readings clearly resemble the Ξ recension. For example, QAPRARYA and PYNṬWARYA match manuscript X (Καπαρία and Πυτωαρία) but depart from the Ω

290 Severus Sebokht, *Treatise on the Constellations*, 2.7.

291 See Diller 1939 and Defaux 2014, 108–114.

292 See: Hjelt 1892; Darmesteter 1890; Schmidt 1999, 57–66; Gautier Dalché 2009b, 56–61.

293 Lyon BM syr. 002. The manuscript is particularly well preserved and has been digitalised.

294 I was unable to find any relevant Iberian toponyms.

recension (Κασπερία and Κεντουρία).<sup>295</sup> There are also a few cases where the readings in the Syriac manuscript differ from both the Ξ and the Ω recensions, and other cases where the readings resemble those in manuscript A.<sup>296</sup> Despite the small set of toponyms examined,<sup>297</sup> it is clear that a systematic comparative study of this text would be of great value, while one can state that the Ptolemaic material which Jacob of Edessa had at his disposal was more closely related to the Greek Ξ recension of the *Geography* than to the Ω recension. This corresponds, to some extent, to the results obtained by M. G. Schmidt on Book 6 of the *Geography*.<sup>298</sup>

### 2.3.6 Ptolemy's *Geography* in late antique Latin texts

In his *Res Gestae*, written at the end of the fourth century CE, Ammianus Marcellinus inserted no fewer than ten geographical digressions.<sup>299</sup> His excursuses about 'the remote parts of Thrace and the topography of the Pontic Gulf' (22.8)<sup>300</sup> as well as Persia (23.6) have aroused much interest among specialists in antique geography. The digressions contain many toponymic sequences that reveal a marked similarity to Ptolemy's catalogue, a fact that has often been stressed in modern publications.<sup>301</sup> However, a thorough comparative study on the toponymic readings of these excursuses in the manuscripts of Ammianus and Ptolemy has yet to be carried out.

In his digression on Persia, Ammianus gives a geographical overview of the area (23.6.10–13), then lists the names of the provinces ruled by the Persian kings (23.6.14), finally noting down his observations relating to the noteworthy geographical and ethnographic features of all the provinces (23.6.15–74). This excursus has been more thoroughly studied than the Pontic excursus, although discussions have sometimes been biased as editors have tended to emend readings of Ammianus on the basis of the *Geography*.<sup>302</sup> The most interesting comparisons can be made between the list of provinces and two of the lists that appear in the *Geography*: the table of contents of Book 6 and the

295 Jacob of Edessa, *Hexaemeron*, Book 3: Lyon BM syr. 002, f. 127v, col. B, l. 15 and 16 (Chabot 1928, 104); *Geogr.* 4.6.34.

296 Jacob of Edessa, *Hexaemeron*, Book 3: Lyon BM syr. 002, f. 122r, col. B, l. 4 (Chabot 1928, 115): compare ΔΑΒΑΣΩ with Δάμασσα Ω, Δόβασσα Α, Δάμασσα Χ (*Geogr.* 7.2.8).

297 See Defaux 2014, 129–131, for other examples.

298 Schmidt 1999, 66.

299 Sundwall 1996, 623; Drijvers 1998, 270.

300 The Pontic excursus is structured as follows: it begins with a description of the journey from the Aegean to Pontus Euxinus (22.8.1–8), then gives a general geography of Pontus Euxinus (22.8.9–13), followed by descriptions of the south-

ern coast (22.8.14–19), the coast from the Thermodon River to the Tanais River (22.8.20–29), Lake Maeotis (22.8.30–36) and the western coast (22.8.37–45), with, finally, a discussion on the climate (22.8.46–49). See Drijvers 1998, 272. Ammianus' sources for this excursus seem to have been diverse: he refers to 'Eratosthenes, Hecataeus, Ptolemy and others' (Amm. *Res Gestae*, 22.8.10). Ptolemy is also referred to in a slightly earlier chapter in this work (20.3.4).

301 Boeft, Hengst, and Jonge 1995, xx; Gautier Dalché 2009b, 36; Stückelberger and Mittenhuber 2009, 86 and 322; Mittenhuber 2009, 334.

302 Gautier Dalché 2009b, 37.

epitome of the catalogue. This epitome is a paratext of the *Geography* that recapitulates the countries described in the catalogue but it was not necessarily written by Ptolemy himself.<sup>303</sup> The table of contents of Book 6 is virtually identical in both recensions but it diverges slightly from the actual structure of Book 6: the table of contents states that the regions of Susiana and Media are to be dealt with in Chapters 6.2 and 6.3 respectively, although their positions are reversed in the actual catalogue. The names of the regions are also given in the genitive form in this table, which is also a characteristic of the epitome of the  $\Xi$  recension, where genitive forms are often maintained. By contrast, the epitome in the  $\Omega$  recension follows the actual order of the catalogue and gives the names in their nominative forms.

Although Ammianus' list is closer to the table of contents of Book 6 and the  $\Xi$  epitome (as Susiana and Media are in the 'wrong' order), the place names of the list are in their nominative forms, as in the  $\Omega$  epitome. However, the reading *paro panis adcon* in the Ammianus manuscripts for the province of 'Paropanisadae' (Παροπανισάδεις) resembles the genitive form of Παροπανισάδων.<sup>304</sup> The archetype of the *Geography* was undoubtedly the source of the 'wrong' order of Susiana and Media in the tables of contents and the epitome, since both recensions and Ammianus' manuscripts repeat the same mistake. By contrast, the redactor of the  $\Omega$  epitome must have checked the place names on his list against the 'correct' order in the catalogue. The many Persian toponyms supplied by Ammianus have been studied by M. G. Schmidt, who has been able to demonstrate the clear proximity of Ammianus' *Res Gestae* to the toponymic readings of the  $\Xi$  recension as well as to manuscript A (which has a mixed text).<sup>305</sup> In summary, an investigation of the toponyms used by Ammianus Marcellinus shows that the Ptolemaic material (whether it be in the direct or indirect tradition, and included maps or only the text) that he had at his disposal at the end of the fourth century more closely approximates the  $\Xi$  recension than the  $\Omega$  recension.<sup>306</sup>

Jordanes is the sixth-century author of *De origine actibusque Getarum* (*Getica*), a history of the Goths that looks at their origin, migrations as well as their relations with the Roman Empire until 551 CE.<sup>307</sup> His text is presented as a shorter version of the *Historia Gothorum* of Cassiodorus (c. 485 – c. 580 CE), to which Jordanes added extra elements

303 Stückelberger and Graßhoff 2006 place this epitome in *Geogr.* 8.29, but it is positioned at the end of Chapter 7 in manuscript X.

304 Thus, the fact that Ammianus mostly used the nominative is not a strong enough argument for claiming that he relied on the  $\Omega$  recension; Ammianus or his source could easily have modified the endings from a list with genitive forms. In this case, the rare

and complicated word Παροπανισάδων might simply have been misunderstood.

305 Schmidt 1999, 40.

306 One cannot, though, use Ammianus as a *terminus ante quem* for the bifurcation of the tradition, as Mitzenhuber 2009, 334–335, has done.

307 This work was probably written between 550 and 551 CE. See Gautier Dalché 2009a, 277.

from other sources when he saw fit.<sup>308</sup> The Goths originated, according to Jordanes, on the island of 'Scandza', an idea that he justifies in the *Getica* by referring directly to Ptolemy's *Geography*:

Let us go back to the location of Island Scandza, which we left earlier. Claudius Ptolemy, a prominent geographer, remembered in the second book of his work: in the waters of the Arctic Ocean is located a great island named Scandza, which has the form of a leaf of a citron tree, ending in downward-turned sides and of an important length [...]. It is situated opposite the Vistula River, which flows from the Sarmatian Mountains to the Northern Ocean in three mouths and which separates Germania from Scythia. [...] Although many and various nations live on the Island Scandza, which we discuss, Ptolemy records the name of only seven of them.<sup>309</sup>

Among the peoples that occupied the island of Scandza – or 'Scandia' in Ptolemy's catalogue<sup>310</sup> – were the Goutai (Γούται), who were associated with the Goths, the subject of Jordanes' text. The textual relationships between Cassiodorus' *Historia* and Jordanes' *Getica* are complex,<sup>311</sup> but P. Gautier Dalché has convincingly demonstrated that the reference to Ptolemy must go back to Cassiodorus himself.<sup>312</sup> The *Getica* suggests that 'seven peoples' lived on the island, which corresponds to the list given in the Ξ recension (Chaideinoi, Fauonai, Firaisoi, Finnoi, Goutai, Daukiōnes and Leuōnoi<sup>313</sup>) but not to the Ω recension (text, maps and manuscript O included), from which the Finnoi people were omitted.<sup>314</sup> Thus, the error in the Ω recension shows that the version of the

308 Jordanes, *Getica*, 1.3: *ad quos et ex nonnullis historiis Grecis ac Latinis addedi conuenientia, initium finemque et plura in medio mea dictione permiscens.* ('I have added to my [writings] some quotations from Greek and Latin histories with respect [to the matter] and I mixed at the beginning, at the end but mainly in the middle [of this work] some of my personal words:')

309 Jordanes, *Getica*, 3.16–19: *Ad Scandzae [Scandziae codd.] insulae situm, quod superius reliquimus, redeamus. de hac etenim in secundo sui operis libro, Claudius Ptolomeus, orbis terrae discriptor egregius, meminit dicens: est in Oceani arctoi salo posita insula magna, nomine Scandza, in modum folii cetri [cetri alii codd.], lateribus pandis, per longum ducta concludens se [...]. Haec a fronte posita est Vistulae fluminis, qui Sarmaticis montibus ortus in conspectu Scandzae septentrionali Oceano trisculus inlabitur, Germaniam Scythiamque disternans. [...] in Scandza uero insula, unde nobis sermo est,*

*licet multae et diuersae maneant nationes, septem tamen eorum nomina meminit Ptolemaeus.* I am of the opinion that the reading *cetri* (sometimes *citri* in manuscripts) refers to the word *citrus* (that is, the citron tree) rather than to *cedrus*, that is, the cedar or the juniper; cf. with Lozovsky 2000, 81.

310 *Geogr.* 2.11.35.

311 Gautier Dalché 2009b, 61.

312 Gautier Dalché 2009a.

313 *Geogr.* 2.11.35: Χαϊθεινοί, Φαυόναι, Φιραΐσοι, Φίννοι (om. Ω), Γούται (sic Ω, Ούται X), Δαυκιώνες and Λευόνοι.

314 Marcian of Heraclea, *Per. mar. ext.* 2.36, also mentions Scandia but without referring to the populations living there. His figure for the different peoples living in Germania Magna (68) corresponds both to the Ξ and the Ω recensions, since he does not include the peoples of Scandia.

*Geography* that Cassiodorus used when he wrote his *Historia Gothorum* in c. 520–530 CE in Italy is related to the  $\Xi$  recension of the *Geography*.<sup>315</sup>

Some elements of Cassiodorus' description might well have been taken from the catalogue of localities itself – such as the mention of the 'second Book,' the proximity of the island to the Vistula River,<sup>316</sup> or the number of peoples living on the island. However, all the descriptive features, including those that differ slightly from the catalogue, are details that could have been taken from a map. The *Getica* states that the Vistula River originates from the Sarmatian Mountains, whereas Ptolemy located its source in the Asciburgium Mountains, which are situated to the north of the former. A characteristic of the oldest manuscript maps of the *Geography* is that mountain ranges are graphically connected, even though the catalogue states that they are physically separate from one another – for example, both the Sarmatian and Asciburgium mountains are linked in the fourth map of Europe in manuscript R. The description of the shape of the island of Scandza – the leaf metaphor, for instance – is not in the catalogue but might have been inferred from reading a map. Therefore, although we still lack proof, it is possible that Cassiodorus consulted a text and/or a regional map, which had been drawn according to a version of the catalogue close to the  $\Xi$  recension, for his description of the island of Scandza in his *Getica*.

## 2.4 Formal and textual specificity of the catalogue

The *Geography*'s catalogue of localities is unique, not only from the perspective of the history of geography in Antiquity but also from a philological point of view, which forces us to adapt our philological approach.

### 2.4.1 The catalogue: a living text

In the *Geography*, Ptolemy criticises the format of Marinus of Tyre's geographical work for being inconvenient,<sup>317</sup> since it made life unnecessarily difficult for cartographers trying to make maps from the information:

315 Gautier Dalché 2009a, 283–287. Cassiodorus very probably used a Greek version of the *Geography*.

316 *Geogr.* 2.11.34: 'But the greater and easternmost [island, that is, Scandia] is situated near the mouth of the Vistula River.' P. Gautier Dalché 2009b, 69, is thus mistaken when, in order to emphasise the differences between Ptolemy's *Geography* and the

*Getica*, he writes that the Vistula River was not positioned in relation to the island.

317 As Ptolemy frequently writes in the *Geography*, the *Almagest* (1.10, 2.9, etc.) and, of course, in the *Handy Tables*, 'ease of use' (ἡ χρησις, τὸ εὐχρηστον) was an extremely important aspect of his work. See Marcotte 2007b, 170.

And, in fact, this is what happens to most people [who try to draw] a map based on Marinus, since they do not possess a model based on his final compilation; instead they draw on his writings and err in most respects from the consensus of opinion, because his guide is so poorly arranged (διὰ τὸ δύσχρηστον καὶ διεσπαρμένον τῆς ὑψηγῆσεως), as anyone who tries it can see.<sup>318</sup>

Therefore, in order to make consulting his own work and map-making as easy as possible, Ptolemy not only introduces the innovation of associating each toponym with two coordinates but also devises a convenient format for compiling his data. First of all, he notes that only the geographical positions of the well-known localities can be regarded as trustworthy:

[But the coordinates of the places] that have not been so traveled, because of the sparseness and uncertainty of the research, have been estimated according to their proximity to the more trustworthily determined positions or relative configurations, so that none of [the places] that are to be included to make the *oikoumenē* complete will lack a defined position.<sup>319</sup>

Ptolemy conceives the idea of a continuously perfectible catalogue by developing a format in which improvements, particularly to the geographical coordinates, can easily be made:

We have therefore put the degrees in front of each place at the outer edge of the columns (τοῖς ἐκτὸς μέρεσι τῶν σελιδίων) in the manner of a table (κανονίων τρόπον), setting the [degrees] of longitude before those of latitude, so that if anyone should come across corrections (διορθώσεις) from fuller research, it will be possible to put them alongside in the remaining spaces of the columns (ἐν τοῖς ἐχομένοις διαλείμμασι τῶν σελιδίων).<sup>320</sup>

Since the time of Eratosthenes, the typical working process in Hellenistic geography had involved emending or revising a text; this practice was known as a διορθωσις, a term that had been borrowed from Alexandrian philology.<sup>321</sup> This is exactly what Ptolemy intended to do to Marinus' work and is also what he anticipated being done to his own text. Therefore, it was vital that the format of the catalogue facilitated this procedure.

Ptolemy thus originally organises his catalogue in the form of a table (κανόνιον), in which the columns are separated by blank spaces (διαλείμματα), which are reserved for later corrections. He positions the two sets of coordinates in two columns (παραθέσεις) next to the columns of toponyms.<sup>322</sup> In the *Almagest* and, of course, in the *Handy Tables*

318 *Geogr.* 1.18.3.

319 *Geogr.* 2.1.2.

320 *Geogr.* 2.1.3.

321 See p. 177.

322 Marcotte 2007b, 166–167.

(πρόχειροι κανόνες), Ptolemy uses a similar format, which he calls a κανών or a κανόνιον (literally ‘bar’ or ‘ruler’ and, metaphorically, ‘table’).<sup>323</sup> This particular kind of table constitutes a very specific form of text that Ptolemy employs in both his astronomical and his geographical works. Ptolemy uses the term τὰ κατασσόμενα when referring to the entries in his catalogue. The word comes from the verb κατατάσσω, which means to ‘draw up in order,’ ‘arrange’ or ‘set down in order.’ In the introduction to the catalogue, he also uses τὰ κατατεταγμένα to refer to toponyms that have already been ‘registered’ or ‘arranged’ in his catalogue as opposed to localities that still needed to be written down.<sup>324</sup> As D. Marcotte has judiciously noted, in the *Geography* κατατάσσω refers both to Ptolemy’s format of the catalogue (to which entries were progressively added) and, more generally, to the way he organised his geographical information.<sup>325</sup>

From this well-thought-out format, Ptolemy is able to produce a living text, that is, a text that is meant to be continually revised and updated. In the chapter of the catalogue devoted to the area near Byzantium (modern-day Istanbul), for instance, two small pieces of information were added to the recensions after Ptolemy. In the Ξ recension, the city’s name Βυζάντιον (Byzantium) is followed by the word βασιλείον (‘imperial seat’): this mention cannot predate 330 CE, the year that Constantine the Great consecrated the empire’s new capital city.<sup>326</sup> In the Ω recension, after the name Perinthus (Marmara Ereğlisi, c. 80 km west of Istanbul), one finds the detail ἦτοι Ἡράκλεια (‘also known as Heraclea’): the first attestations of this second name go back to the reign of Diocletian (284–305 CE).<sup>327</sup> These additions, which were certainly carried out by Byzantine scribes, concern both recensions (though differently) and reveal that some scribes had no reservations about updating their copy.

Furthermore, the format of the catalogue has the advantage (or arguably the disadvantage) of being able to conceal the emendations by integrating them perfectly into the text, particularly if the corrections occurred at an early stage of the transmission process.<sup>328</sup> At the same time, the format also highlights the problem of toponyms that

323 Ptolemy uses the geometrical meaning of this word (‘ruler’) several times. See *Geogr.* 1.22.6, 1.24.2, 8, 9 and 28.

324 *Geogr.* 2.1.4.

325 Marcotte 2007b, 167–168: ‘La façon qu’a ainsi Ptolémée d’analyser dans sa dynamique le travail de la transcription revient à comparer la mise des mots en colonnes d’écriture à un travail de construction et de mise en forme (tel est le sens de κατατάσσω) de la matière géographique.’

326 *Geogr.* 3.11.5. The Ω manuscripts do not contain this detail.

327 *Geogr.* 3.11.6. Manuscripts X and K have no mention of this detail; manuscript U’s reading ἦτοι Ἡράκλεια has the same meaning. See A. H. M. Jones 1999, 25.

328 See also Isaksen 2011, 255: ‘Leo Bagrow argued that [the *Geography*] was inauthentic on the basis that some place names demonstrably post-dated Ptolemy’s lifetime, but how representative are those he identified? The catalogue’s innovative format of coordinate tables – explicitly intended to encourage insertion and correction – hides the stylistic hints we might turn to in more traditional material!’

appear in only one of the recensions: did a scribe of one of the recensions use the opportunity to improve the text and add new entries to the catalogue? Or, on the contrary, did the scribe of the other recension omit or forget a line in his copy? The common philological principle *lectio difficilior potior* – that the more difficult reading is the stronger version and is, therefore, more likely to be the original – thus doesn't always seem to apply. F. Mittenhuber has drawn up a list of thirty-one missing or added toponyms in manuscripts UKRXO and their respective maps (where applicable).<sup>329</sup> In many cases, manuscript X and the  $\Omega$  maps are at odds with the  $\Omega$  catalogue, and it is extremely difficult to distinguish between the original text and later reworkings of the content.

#### 2.4.2 Dual nature of the catalogue

The catalogue of localities essentially comprises text (toponyms and some short descriptions in prose) and numbers (the coordinates). Thus, it is neither a continuous prose text (such as Strabo's *Geography*), nor a pure set of numerical tables (like some parts of the *Almagest* or the *Handy Tables*), which is significant in an analysis of the copying process, in the evaluation of the two recensions and, consequently, in establishing the original text. In a section of continuous text, the better or best reading of all the manuscript variants can often be determined by examining the context. This is more difficult with Ptolemy's catalogue, as it is composed of lists in which the localities are placed in rows. Many of the localities are grouped into categories, organised by peoples and/or regions,<sup>330</sup> although they are not ordered alphabetically and are not organised hierarchically in accordance with the importance or the nature of the settlement within each list.

The manuscript transmission of other antique texts is sometimes better understood when something is known about the scholars who edited the copies: certain readings, emendations or conjectures in philosophical or scientific antique works can be traced back to Byzantine scholars, such as Photius and Arethas, and later Maximus Planudes and Demetrius Triclinius (c. 1280 – c. 1340) or their respective scholarly circles. It is often possible to determine, at least in part, some of their editing practices or elements about the context of their activities. It is also sometimes possible to determine in which intellectual centres certain antique works were copied, studied and commented on from late Antiquity until the Renaissance.<sup>331</sup>

329 Mittenhuber 2009, 384–385.

330 The integration of peoples in the catalogue of Iberian localities is complete, that is, every toponym is linked to a people and every group of people includes a certain number of localities. However, this is not the case in every part of the catalogue. In the description of Germania Magna, e.g., the list of peo-

ples and their general locations are arranged separately (*Geogr.* 2.11.8–26) and positioned between the list of coastal localities and the list of inland localities with coordinates (*Geogr.* 2.11.1–7 and 27–35).

331 See N. Wilson 1996, 79–135, and Pontani 2015, 331–375 and 403–434.

By contrast, very little is known about the transmission history of Ptolemy's *Geography* – from the original work to the manuscripts of the time of Planudes. Nevertheless, certain assumptions related to the copying process can be made. Many of the catalogue's numerous toponyms (and ethnonyms) are quite obscure – they were located in exotic areas or were simply *hapax legomena* in the geographical literature – and were thus probably unknown to the majority of the scribes.<sup>332</sup> Furthermore, besides the unintentional misreadings and scribal errors (sometimes exacerbated by codicological and palaeographical issues) that occurred, it is entirely plausible that erudite scribes with geographical knowledge modified the names of certain localities; their changes could have ranged from making superficial (sometimes erroneous) modifications intended to clarify the text (*paradiorthoses*) to more serious emendations or corrections made on the basis of other works (*e libro*) or simply guesswork (*ex ingenio*). Many of Ptolemy's toponyms remain unknown to modern scholars, even those in well-known areas such as the Iberian peninsula. There are dozens of Iberian toponyms that are attested only in the *Geography*, hence for which one has no point of comparison and no clue as to a modern location: the cities or towns of Chrētina (Χρητίνα) and Arabriga (Αράβριγα), which Ptolemy locates to the north of the Tagus River,<sup>333</sup> or of Moroica (Μοροίκα) and Brauon (Βραῶον) in the upper Ebro valley<sup>334</sup> are examples of toponyms of which we know nothing, despite the fact that the Iberian peninsula of Antiquity has been studied for decades.

In addition, it is plausible that Ptolemy was not always aware of the nature of the localities that he inserted in the catalogue, particularly if he used itineraries, which tended to list every station along a given route, regardless of the locality's importance. The 'city' of Biniana (Βινιάνα), which lies, according to Ptolemy, not far from Corduba in Baetica<sup>335</sup> or the 'city' of Aemiliana (Αἰμιλιάννα) in Tarraconensis<sup>336</sup> were very likely rural localities, possibly small towns or even large *villae* or domains (*praedia*), if not simply road stations or *tabernae*.<sup>337</sup> The documentation on these kinds of localities is extremely thin, which is not that surprising, since geographers such as Pliny or Strabo selected their topographical information according to its geographical, demographical and historical importance, and did not generally mention places they regarded as insignificant.

When confronted with divergent readings for toponyms unknown outside the *Geography*, how does one decide which manuscript has the correct spelling of a toponym or which place name is more likely to be the original toponym? Moreover, one should not

332 In Late Antiquity and during the Byzantine empire, the two geographical texts used in schools were Dionysius' *Periegesis* and Strabo's *Geography*, which do not contain all of Ptolemy's toponyms.

334 *Geogr.* 2.6.51 and 52.

335 *Geogr.* 2.4.10.

336 *Geogr.* 2.6.58.

337 See p. 18; Arnaud 1998b.

333 *Geogr.* 2.5.7.

exclude the fact that some of Ptolemy's sources might have been inaccurate or inconsistent with other antique sources. Nevertheless, in many cases, even when the toponym is not well documented, common writing errors – such as names divided incorrectly or duplicated, instances of metathesis or the omission of letters and syllables as well as the misreading of majuscule letters or groups of majuscules – can be detected, so that often a reconstruction of the place names that closely resembles the archetype of the tradition (and perhaps the original) is feasible.<sup>338</sup>

A last (and perhaps less crucial) point that needs to be raised is the use of abbreviations for common topographical terms: for instance, the words ποταμός (river) and πόλις (city) were regularly abbreviated to  $\pi\overset{\lambda}{\omicron}$  and  $\pi\overset{\tau}{\omicron}$  respectively and sometimes to a  $\overset{\circ}{\pi}$  or a small omicron inside a pi. Extremely similar abbreviations could easily have led to misunderstandings, although the word ποταμός rarely appears on its own in the catalogue – Ptolemy generally writes of the 'mouths of a river' (ποταμοῦ ἐκβολαί) – and so it was perhaps less likely to be mistaken for πόλις ('city'). Common abbreviations for the less frequent term κολωνία or κολώνεια (colony) were κολῶ, κολω or κο. Manuscript X gives the more accurate reading for Σκαλαβις κολωνία (Scalabis Colonia)<sup>339</sup>, since Scallabis (or Scalabis) is attested as a Roman colony in Pliny's work as well as in epigraphical sources.<sup>340</sup> The name Σκαλαβισκός (Scalabiscos) is used in the Ω manuscripts and should clearly be regarded as an abbreviation for Σκαλαβις κο(λωνία) that was misread and then wrongly copied, at least in the hyparchetype of the Ω recension.<sup>341</sup>

Similar problems affect the writing and transmission of the numerical coordinates, although they also have issues that are specific to them. In an astronomical table based on mathematical procedures, it is possible to check whether a particular figure was expected or is illogical; Ptolemy comments on this himself, for example, when he introduces his table of chords.<sup>342</sup> As far as the geographical coordinates are concerned, Ptolemy created a new system that linked latitude with longitude. His set of coordinates, however, only makes sense *per se* if they are used by an astronomer to calculate a celestial phenomenon or by a cartographer to make a map. Degrees and fractions of degrees cannot be regarded as standard textual components and it is unlikely that the average scribe would have easily understood what Ptolemy had written. Handling a large number of figures in the form of (sometimes extremely long) lists would have made the copying of the catalogue an arduous task and, arguably, more susceptible to corruption than pages of continuous text.

338 Note that it is virtually impossible to distinguish between authorial and archetypal errors.

339 *Geogr.* 2.5.7.

340 Pl. 4.117; *CIL* II, 35.

341 The name Ἀσκαλαβίσκοσ is used on the map of Iberia in manuscript K (f. 78v).

342 *Alm.* 1.10: 'It is easy to see that, if we suspect some scribal corruption in one of the values for the chord in the table, the same theorems which we have already set out will enable us to test and correct it easily.'

Numbers in antique and medieval Greek texts were generally written in the so-called Ionian notation (also known as ‘alphabetic notation’). The manuscripts of Ptolemy’s *Geography* as well as the antique papyri of his *Handy Tables* show that Ptolemy conformed to this practice. The geographical coordinates of the catalogue are ‘hybrid’ in the sense that, although they represent figures, that is, mathematical data, they are expressed using letters of the Greek alphabet, and so, in essence, do not visually differ very much from a ‘normal’ text. This implies that the coordinates were subject to the same graphical confusions and reading difficulties that arise from texts written in Greek (particularly mistakes concerning majuscule or minuscule letters) and to the misunderstandings that commonly arise when dealing with numbers and mathematical data (such as the confusion between integers and the parts of fractions).

The symbols that Ptolemy used to express the coordinates (Table 1) are a mixture of common Greek letters ( $A/\alpha$ ,  $B/\beta$ ,  $\Gamma/\gamma$ , and so on), sometimes combined in specific ways to express fractions, as well as more unusual Greek letters – such as the digamma or stigma ( $\zeta$ ) for  $6^{343}$  and koppa ( $\rho$ ) for  $90$  – and special signs (such as  $L$  for a  $\frac{1}{2}$ ).<sup>344</sup> Two diacritical marks were also used: overlines ( $\bar{\phantom{x}}$ ) for whole numbers and the prime symbol ( $'$ ) for fractions of degrees. The Byzantine notation was relatively close to the antique practice, although from the ninth century onwards there are frequent occurrences of mixtures of majuscule and minuscule variants. The use of the  $^{\circ}$  symbol for degrees did not come into use until the modern era.<sup>345</sup>

Table 1 should not, however, be taken as an exact transcription of the coordinates in the manuscripts of the *Geography*. The systematic use of the overline and the prime symbol depended on the diligence of each scribe, and they were often left out in some of the manuscripts (cf. Fig. 7c with Fig. 7a). The *codices primarii* show some expected graphical variants for common Greek letters (see the letter beta, for instance, in Fig. 7c) but also a mixture of minuscules and majuscules in several of the manuscripts. The special sign used for a half degree also shows a great deal of graphical variability (cf. Fig. 7a with Fig. 7b; see also Appendix B). The fraction two-thirds is sometimes expressed as  $L\zeta$ , that is,  $L$  ( $\frac{1}{2}$ ) and  $\zeta$  ( $\frac{1}{6}$ ) were added together instead of the usual  $\gamma\omicron$ . The latter was also often written with the majuscule form of gamma ( $\Gamma$ ,  $\Gamma\omicron$ , and so on). There are other rare readings, but they may be the result of scribal errors rather than intentional variants: for

343 The use of the digamma ( $\Phi$ ) for the number six was progressively replaced, from the Roman period onwards, by a cursive variant resembling a ‘flattened’  $c$  with a long upper shoulder. From Late Antiquity onwards, the number six was generally written with a digamma variant resembling a stigma ( $\zeta$ ). Cf., e.g., P. Fouad Inv. 267 A, P. Oxy. 4152, 4174 and 4191 from the second and third centuries CE (in which the ‘flattened’  $c$  is used) with P. Oxy. 4167, 4173

and 4190 from the third and fourth centuries CE, in which a sign identical to a stigma is used; see A. Jones 1999, plates III and V–VII, and Fournet and Tihon 2014, 20–21 and 184.

344 According to Mittenhuber 2009, 166, this sign might originally have corresponded to half a square. See also A. Jones 2009, 340.

345 Cajori 1929, 511–512.

$\alpha = 1$	$\eta = 8$	$\xi = 60$	$\iota\beta' = \frac{1}{12} = 5'$	$\gamma\iota\beta' = \frac{1}{3} + \frac{1}{12} = 25'$
$\beta = 2$	$\theta = 9$	$\omicron = 70$	$\zeta' = \frac{1}{6} = 10'$	$L\iota\beta' = \frac{1}{2} + \frac{1}{12} = 35'$
$\gamma = 3$	$\iota = 10$	$\pi = 80$	$\delta' = \frac{1}{4} = 15'$	$\gamma\omicron' = \frac{2}{3} = 40'$
$\delta = 4$	$\kappa = 20$	$\rho = 90$	$\gamma' = \frac{1}{3} = 20'$	$L\delta' = \frac{1}{2} + \frac{1}{4} = 45'$
$\epsilon = 5$	$\lambda = 30$	$\sigma = 100$	$L' = \frac{1}{2} = 30'$	$L\gamma' = \frac{1}{2} + \frac{1}{3} = 50'$
$\zeta = 6$	$\mu = 40$	$\tau = 200$		$L\gamma\iota\beta' = \frac{1}{2} + \frac{1}{3} + \frac{1}{12} = 55'$
$\zeta = 7$	$\nu = 50$	$\tau = 300$		

Tab. 1 Letters of the Greek alphabet were used to express degrees and fractions of degrees in Ptolemy's catalogue of localities. See Mittenhuber 2009, 166, and Stückelberger and Graßhoff 2006, 45.

instance,  $\eta'$  in manuscript X (*Geogr.* 2.6.46) could be read as the fraction one-eighth, although this reading does not fit Ptolemy's grid system (see Table 1). The occasional (but not systematic) use of the Arabic zero by the main scribe of manuscript X – which has created numerous rather strange, hybrid readings of some of the coordinates – is also at odds with Ptolemy's original numeral system.<sup>346</sup>

The Rylands Library Papyrus No. 522 (Fig. 8) contains a list of toponyms with geographical coordinates. As it can be dated to just a few decades after the composition of Ptolemy's *Geography* and was very probably written in Egypt,<sup>347</sup> it can be taken to be a reliable example of what Ptolemy's catalogue looked like at the time of its original redaction. The papyrus is in majuscule script and was written 'in a rounded hand, handsome and easy'.<sup>348</sup> The degrees of whole numbers do not have overlines, while the fractions of degrees are followed by a prime symbol or a kind of apostrophe after the fraction  $\Gamma$  (see Fig. 8 and Fig. 9, Robert's edition, lines 3, 11 and 30). The fractions include a cursive variant of the beta (Roberts, l. 14), a sign close to the modern 'd' of the Latin alphabet with a prime symbol, rather than  $\Delta'$ , for the fraction one-quarter (l. 15), and a sign for a half degree that resembles a capital Latin L (l. 12, 18 and 31). Moreover, the scribe did not use  $L\delta$  to express the fraction three-quarters but a special symbol similar to a minuscule epsilon, followed by a vertical line:  $\epsilon|$  (l. 33).

This papyrus fragment from a scientific text shows a number of graphical variants for the fractions of degrees, which are also attested in antique documentary papyri.<sup>349</sup> More generally, one observes a certain degree of flexibility in expressing numbers, espe-

346 See p. 78, and, e.g., manuscript X, ff. 153 and 154.

347 The papyrus includes a fragment of the 'Table of Noteworthy Cities'. See p. 86.

348 Roberts 1938, 144.

349 The sign  $\epsilon|$  (with a variant similar to an upside-down minuscule beta:  $\text{g}$ ) for the fraction three-quarters as well as the  $d'$  for one-quarter appear frequently in documentary papyri. See Gonis 2009, 176. A. Blanchard 1974, 31, dates the appearance of this sign to the Roman period.



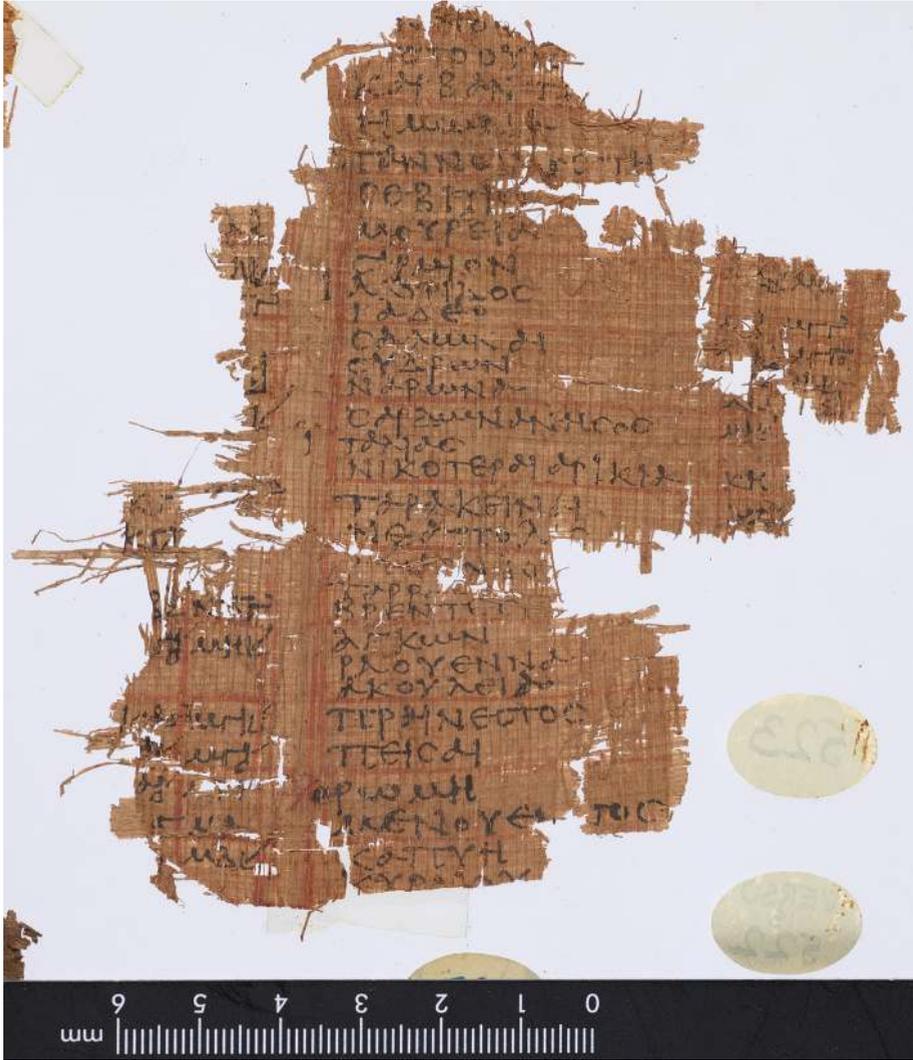


Fig. 8 The Rylands Library Papyrus No. 522, Egypt (possibly Fayûm), early third century CE, 11.3 × 11.7 cm, Ptolemy, 'Table of Noteworthy Cities'. Copyright of The University of Manchester.

the combination  $\Gamma\omicron$  (often used in preference to  $\gamma\omicron$ ), which is used in Ptolemy's manuscripts to represent two-thirds, can cause confusion for two reasons: on the one hand, this particular abbreviation had a number of different meanings and, on the other hand, the common fraction two-thirds could be represented by several different abbreviations. In the passage of the *Etymologiae* that is devoted to the use of abbreviations, Isidore of

Col. i.			Col. ii.		
			20	.....	]
				Π	α]ννονι[ς της ανω
					Πισοουσι[ν]
					Καρβαντι[α
					Ημωνα [
			25	Π	αννον[ι]ας τη[ς κατω
					Σεβιτιον [
					Μουρ'σ'εια [
				I	Σιρμιον μδL' με
					λλυριδος μβ μγγ'
			30		Ιαδερ μβ μγγο
					Σαλωναι μγL' μγγο
					Συρδων μγδ' μδL'
					Ναρωνα μδγ' [μβ]ελ
				I	Σαρδωνα Νησος μαL' [
			35		ταλιας κη μ[
					Νικότεραι Αρικια λζL' [
					Ταρακειναι [
					Νεαπολις [
					Ρηγιον Ιου[λιου
			40		Ταρρας [
					Βρεντεσι[ον
					Αγκων [
					Ραουεννα [
					Ακουλεια [
			45		Πραινεστος [
					Πεισοι [
				*	*Ρωμη [
					Μενουεντος [
					Καπη [
			50		Κυρνου [νησος

	.....		
	[Κλουνια	ια	]μβ
	[Καισαρεια Αυγουστα	ιδL'	]αL'
	[?Ταρρακων	ιςγ'	]γγ'
	[Ακουιτανιας		]μ
5	[Μεδιολανιον	ιζγο'	μς]ελ
	[Βουρδιγαλα	ιη	με]L'
	[Λουγδουνησιας		]μ
	[Αυγουστοδουνον]	κγ[γ']	μςς'
	[Λουγδουνον]	κγδ'	[μεγ']
10	[Βελγικης		]μ
	[Γησοριακον	κ]βL'	νγγ'
	[Δουροκοττορον	κ]γδ'	μηL'
	[Ναρβωνησιας		]μ
	[Μασσαλια	]κας'	μγιβ'
15	[Ναρβων	κ]αL'	μγδ'
	[Αρελατον	κ]αδ'	μγγ'
	[Ουιεννα	κ]	μδ
	[Νεμαυσος	κ]β	μδL'
	[Γερμανιας		]μ

Fig. 9 Reconstruction of the Rylands Library Papyrus No. 522, edited by Roberts 1938, 145.

Seville (c. 560–636 CE) observes that Γο means (or can potentially mean) *uncia*.<sup>352</sup> The Latin word *uncia* and its Greek equivalent οὐγγία (also οὐγκία) means ‘a twelfth’, which was a commonly used fraction. The use of Γο for one-twelfth appears frequently in papyri related to monetary systems, weights and measures as well as in administrative and legal documents related to taxes, sales, loans and heritages.<sup>353</sup> However, the same ab-

352 Isidore of Seville, *Etym.* 16.27.  
 353 See, e.g., P. Lond. III, 966 (p. 59; Egypt, third or fourth century); P. Lond. I, 113.1 (p. 202; Fayûm, sixth century); P. Lond. I, 77 (p. 234; Thebes, eighth century). See the collection of metrological texts

edited by Hultsch 1846, especially 220, 226–227, where some of the manuscripts examined contain definitions of the abbreviation Γο that resemble Isidore of Seville’s definition.

abbreviation  $\Gamma\omicron$  could also be used to represent one-third;<sup>354</sup> Ptolemy, though, uses other symbols to represent one-third as well as one-twelfth:  $\gamma$  and  $\iota\beta$  respectively. In addition, several different abbreviations for the fraction two-thirds are attested in antique and medieval manuscripts:  $\Gamma\omicron$  and  $\gamma\omicron$  (as in the *Geography*) but also  $\Gamma^{\beta}$  or  $\beta/$ .<sup>355</sup> The same fraction is also expressed in many different written forms in the main manuscripts of the *Almagest*.<sup>356</sup> So, even though Ptolemy's numeral system can be summarised in a table, the widely varying use of fractions in antique and medieval manuscripts means that the connections between the symbols and their multiple significations are more complex than often thought.

Given the coherence of the notation principles in each of the *Geography's codices primarii*, one can conclude that the archetype of the tradition used the same numeral system. However, these primary manuscripts were passed down after several centuries of transmission and after successive copies had been made. In the case of an imperfect exemplar, it would have been impossible for a scribe to be sure of the original reading of, for example, a fraction of a degree. Even if only a small number of copies had been made between the time of Ptolemy's original, the archetype of the tradition and the *codices primarii*, the graphical variability in the notation system, the freedom that each scribe could exercise in carrying out his work and the coexistence from Antiquity until the Renaissance of several notations for the same fraction would undoubtedly have increased the probability of misreadings and misunderstandings occurring.

354 See, e.g., P. Lond. 1718 (Inv. No. 1785), a metrological table of the late sixth century.

355 See, e.g., P. Lond. II, 175a (p. 120; Egypt, first century); P. Lond. II, 290 (p. 89; nome of Arsinoë, 85 CE): both are related to taxes and use  $\beta/$  to represent the fraction two-thirds. See Harrauer 2010, 68.

356 *Alm.* 2.6, Heiberg 1898, 106, 109, 111 and *passim*. Regarding the *Almagest's* manuscripts, Heiberg 1907, CXXXIX, noticed: *pro  $\frac{2}{3}$  sine dubio in archetypo semper fuit  $\Gamma^{\beta}$ , quo raro seruatum est, saepius scribitur  $\mathbb{B}$ , plerumque tamen  $\Gamma\omicron$ , nisi grauis etiam deformatur uel corrumpitur, uelut in  $\hat{\Gamma}$ ,  $\iota\beta$ ,  $\zeta$ ?*

### 3 The catalogue of the Iberian peninsula and the recensions of the *Geography*

One may well have reservations about the capacity of solely traditional philological methods to explain the production and transmission of the catalogue as well as the role of each recension in establishing the original text of the *Geography*.<sup>1</sup> The aim of this chapter is to determine the limitations of classical textual criticism and to develop new philological tools to study Ptolemy's catalogue of the Iberian peninsula.

#### 3.1 Structure of the Iberian peninsula's catalogue

##### 3.1.1 Overall organisation of Ptolemy's catalogue of localities

Ptolemy's catalogue of localities is divided into geographical units, each of which corresponds to a περιορισμός or περιγραφή, that is, 'a description or definition of the boundaries'.<sup>2</sup> Each περιορισμός is allotted one chapter in the modern critical editions. In the catalogue there are three περιορισμοί of the Iberian peninsula – Baetica (*Geogr.* 2.4), Lusitania (*Geogr.* 2.5) and Tarraconensis (*Geogr.* 2.6) – which correspond to the three provinces (ἐπαρχία) of Iberia as defined by the Roman administration from the time of Augustus.<sup>3</sup> D. Marcotte has observed that each περιορισμός begins with a definition

1 See p. 64.

2 Marcotte 2007b, 165. Ptolemy uses the term περιορισμός only once, in the introduction to the *Geography*, (1.16.1), but the verbal form περιορίζεται appears frequently in the catalogue, e.g. *Geogr.* 2.4.4.: ἡ δὲ πρὸς μεσημβρίαν πλευρὰ τῆς Βαιτικῆς περιορίζεται τῷ μὲν Ὠκεανῷ ('the southern side of Baetica is delimited by the Ocean').

3 Ptolemy sometimes uses ἐπαρχία for the regions ruled by Rome (these regions do not always tally with the Roman provinces) and usually the term σατραπεΐα for areas outside the empire. See Diller 1939 and Marcotte 2007b, 165–166. Thus, the term 'geographical unit' (or even 'περιορισμός') most adequately describes the catalogue's divisions.

of its boundaries, much as the ὄροι ('boundary marks') were generally defined in land registers.<sup>4</sup>

The Iberian toponyms have been methodically arranged in the catalogue, with each locality integrated into the description of the peoples of each province. Moreover, it seems clear that the topographical nature of the localities played a role in the catalogue's structure, which follows a well-determined schema (Table 2). Each περιορισμός is composed of four sections: the coasts (or 'sides,' πλευρά) of the province, the inland features, the mountains and, where applicable, the islands. Each section consists of one or more lists in which the toponyms are sorted by peoples. The sections as well as the lists are generally preceded by a short introductory sentence.

The description of all the provinces mentioned in the *Geography* has a similar structure. However, the role of peoples in each περιορισμός varies. The toponyms are sorted by the groups of Iberian peoples, which are fully integrated into the descriptions. In other words, each locality is attributed to a people and each group of peoples of the peninsula can be located with respect to its cities. Boundary points, river sources, mountains as well as islands are, however, generally not explicitly assigned to a people. This integration of peoples into the catalogue can be found in several other chapters of the *Geography*.<sup>5</sup> In other cases, however, groups of peoples have been removed from the lists of toponyms and placed in a separate section.<sup>6</sup>

### 3.1.2 Introductory sentences and paratext

When one compares the introductory sentences, one detects minor variations between the Ξ and Ω recensions (Table 3), although these differences do not fundamentally change the meaning of the texts. In almost every case, the Ξ recension includes one or more extra words that do not occur in the Ω recension. For instance, at the end of the description of Lusitania, one finds Ὅρη ἢ Λουσιτανία οὐκ ἔχει ('There is no mountain in Lusitania') in X, while this fact goes unremarked in Ω.<sup>7</sup> Furthermore, Ω omits two

4 Marcotte 2007b, 166. See also Marcotte 2005. Land-surveyors' methods and terminology might have had some influence on the Hellenistic and Roman geography.

5 For instance, the four περιορισμοί of Gallia (*Geogr.* 2.7–10) as well as Achaia (*Geogr.* 3.15) and Cilicia (*Geogr.* 5.8). Sometimes, however, the lists are sorted by regions (such as 'Magna Graecia,' 'Megaris,' 'Caria') rather than by ethnonyms.

6 In the περιορισμοί of Corsica, Sardinia and Sicily, the groups of peoples have been set up in a specific paragraph, between the descriptions of the coasts

and the inland areas (*Geogr.* 3.2–4). The instances where the toponym lists are not sorted by peoples concern mostly the Asian and African chapters. In several cases, the structure is more complex, as when some of the peoples have been only partially integrated into the lists (e.g., in the description of the region of Sarmatia: *Geogr.* 5.9) or when the lists have been sorted by other elements – by *klimata* in the case of Germania (*Geogr.* 2.11) and by rivers and/or mountains in the cases of Lycia (*Geogr.* 5.3) and Mesopotamia (*Geogr.* 5.18), etc.

7 *Geogr.* 2.5.10; cf. 2.3.33.

Disposition [θέσις] of <i>(name of the province)</i>
<p>– Description of the first side and its boundary marks.                      The description of the coast is as follows:                      - People A:                          Locality 1   longitude   latitude                          Locality 2   longitude   latitude                          Locality 3   longitude   latitude, etc.                      - People B:                          Locality 10   longitude   latitude                          Locality 11   longitude   latitude, etc.</p>
<p>– Description of the second side and its boundary marks.                      The description of the coast is as follows:                      - People B:                          Locality 14   longitude   latitude                      - People C:                          Locality 15   longitude   latitude                          Locality 16   longitude   latitude, etc.</p>
<p>– Description of the <i>n</i> side and its boundary marks, etc.</p>
<p>– Description of the inland area:                      - People D:                          Locality 28   longitude   latitude                          Locality 29   longitude   latitude, etc.                      - People E:                          Locality 35   longitude   latitude                          Locality 36   longitude   latitude, etc.</p>
<p>– The mountains in the province are:                          Midpoint of Mountain <i>M</i>   longitude   latitude                          Midpoint of Mountain <i>N</i>   longitude   latitude                          Northern end of Mountain <i>P</i>   longitude   latitude                          Southern end of Mountain <i>P</i>   longitude   latitude, etc.</p>
<p>– The following islands face the province:                          Island <i>W</i>   longitude   latitude                          Island <i>X</i>   longitude   latitude                      On Island <i>Y</i>, there are the following cities:                          Locality 57   longitude   latitude                          Locality 58   longitude   latitude, etc.</p>

Tab. 2 Schematic structure of the Iberian chapters (περιορισμοί) in Ptolemy's catalogue of localities.

- 2.4.2 ἥς πλευρὰς ἡ περιγραφή ἔχει οὕτως· (Τουρθητανῶν· add. X)
- 2.4.3 παρὰ τὴν Ταρρακωνησίαν (Ἰσπανίαν add. X)
- 2.4.4 καὶ τὸν Ἡράκλειον πορθμόν Ω, καὶ τῷ καθ' ἑξῆς Ἡρακλείῳ πορθμῷ X
- 2.4.8 ἀπὸ τοῦ εἰρημένου (Χαριδήμου add. X) ἀκρωτηρίου
- 2.4.16 Καὶ παράκειται (τῇ Βαιτικῇ add. X) νῆσος
- 2.5.1 Τῆς δὲ Λουσιτανίας (Ἰσπανίας add. X) ἡ μὲν νοτιωτέρα (sic Ω, νοτία X) πλευρὰ
- 2.5.1 Ἡ δὲ ἀπὸ ἄρκτων πλευρὰ (τῆς Λουσιτανίας add. X) συνήπται  
τῇ Ταρρακωνησίᾳ (Ἰσπανίας add. X)
- 2.5.5 περὶ τὸ Ἰερὸν ἀκρωτήριον (οἱ εἰρημένοι add. X) Τουρθητάνοι
- 2.5.10 Ὅρη ἡ Λουσιτανία οὐκ ἔχει X, om. Ω
- 2.6.2 Ἀρτάβρων X, om. Ω
- 2.6.3 περιγραφὴν ἔχει οὕτως X, παραγράφεται οὕτως Ω
- 2.6.25 Λεμάων X, om. Ω
- 2.6.56 ἐν οἷς πόλεις (μεσόγειοι add. Ω)
- 2.6.62 ἐπὶ θαλάσση οἰκοῦντες Ω, ἐπὶ θαλάσση οἰκοῦνται X
- 2.6.65 οὗς μέσους ὁ ποταμὸς διαρρεῖ Ω, οὗς μέσος ὁ ποταμὸς διαρρεῖ X
- 2.6.66 τούτων δὲ (ἔτι add. X) ἀνατολικώτεροι Οὐάρδουλοι
- 2.6.70 Αὐθητανοὶ καὶ (ἐν οἷς εἰσι add. X) πόλεις
- 2.6.71 ἐν οἷς εἰσι πόλεις X, ὧν πόλεις μεσόγειοι Ω
- 2.6.75 (Τ)αρρακωνησίας νῆσοι· παράκεινται δὲ καὶ τῇ Ταρρακωνησίᾳ νῆσοι X,  
Νῆσοι δὲ παράκεινται τῇ Ταρρακωνησίᾳ Ω
- 2.6.75 αἱ καλούμεναι Τρίλευκοὶ Σκόπελοι (νῆσοι add. X) τρεῖς
- 2.6.76 καὶ αἱ τῶν Θεῶν νῆσοι δύο (τὸν ἀριθμὸν add. Ω)
- 2.6.77 αἱ τε Πιτυοῦσαι νῆσοι (δύο add. X)
- 2.6.78 ὧν ἐν μὲν τῇ μεῖζονι πόλεις δύο (εἰσι add. X)
- 2.6.78 ἐν δὲ τῇ ἐλάττωνι πόλεις αἶδε (εἰσι add. X)

Tab. 3 Differences between the Ξ and Ω recensions in the introductory sentences of the Iberian catalogue.

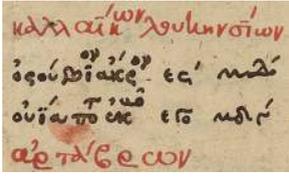
ethnonyms: the Artabri (for the coastal localities) and the Lemaii.<sup>8</sup> There are also only four cases where the Ω recension has the *lectio difficilior*.<sup>9</sup>

In addition, the layout of the groups of peoples in the text reveals some palaeographical particularities, which may reveal the personal choices of the scribes of X, the latter's direct exemplar or even the Ξ hyparchetype. In manuscript X, the first three peoples mentioned in the list of Tarraconensis province – the Callaeci Bracari, Callaeci

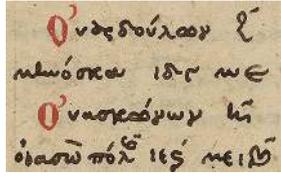
<sup>8</sup> *Geogr.* 2.6.2 and 2.6.25.

<sup>9</sup> In two of these four instances of *lectiones difficiliores*, the Ω recension adds the adjective μεσόγειοι and

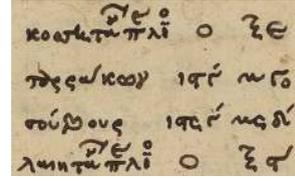
on one occasion it includes the additional expression τὸν ἀριθμὸν; Ω also reads νοτιωτέρα rather than νοτία. See Table 3.



a f. 140v, col.1, l.23–26.



b f. 140v, col.2, l.14–16.



c f. 140v, col.3, l.18–21.

Fig. 10 Extracts of the Vat. gr. 191 (Manuscript X of the *Geography*). © 2017 Biblioteca Apostolica Vaticana

Lucenses and the Artabri (f. 140v, col.1, see Fig. 10a) – were written in red ink by hand D, who worked on the first folios of the catalogue as rubricator.<sup>10</sup> These peoples belonged to the western coast of Tarraconensis. The following row names the peoples who lived along the northern coast (f. 140v, col.2, l.4–16, see Fig. 10b) and was written in black ink by hand E (the main hand of the catalogue), with the red initials written by hand D.<sup>11</sup> These northern peoples were numbered with a Greek letter and sometimes a prime sign (in black, hand E; see Fig. 10b): Paesici (δ), Cantabri (ε'), Autrigones (number omitted), Carietes (ς), Varduli (ζ') and Vascones (η'). The Greek letters undoubtedly correspond to the numbers four (δ) to eight (η'). Logically, we would have expected numbers one (α) to three (γ) to have been added to the first three peoples mentioned in the list (Callaeci Bracari, Callaeci Lucenses and Artabri). The absence of these three numbers suggests that it was not the scribe of X who numbered these ethnonyms; the numbers were already present in the exemplar of X and possibly date back to an earlier stage in the transmission process.

The peoples of the Mediterranean coast of Tarraconensis were written in black by hand E, followed by a strange numbering system, all done by hand E (f. 140v, col.2, l.40 to col.3, l.28). A circle, which resembles the Arabic zero, has taken the usual place of the longitude coordinates (see Fig. 10c), while instead of a latitude, a ξ followed by a Greek letter or number has been inserted, from ξ α (Bastitani) to ξ ζ (Indigetes).<sup>12</sup> Given the order of the list and its position in the catalogue, it is not likely that ξ α would have meant ξα, that is, '61', since the Bastitani are the sixty-sixth, not the sixty-first, group of peoples mentioned in the catalogue. The letters α to ζ were probably meant to represent numbers one to seven, that is, a count of the number of different Iberian peoples living

10 Burri 2013, 499. The same hand D also wrote folios 135r–139r.

11 Hand E wrote folios 139r–157r.

12 The first two 'numbers' (ξ α and ξ β) were later erased from the manuscript; see f. 140v, col.2, ll.40 and 42. The beta, delta and zeta are followed by

a prime sign. A similar numbering system can be found in the manuscripts of the σ family (i.e. manuscripts BSP, see p. 65 and footnote 69, p. 68), with the number of Autrigones omitted as well. The 'numbers' erased from X were also left out of manuscript P.

along the Mediterranean coast, following on from the previous numbering of peoples living on the oceanic coast. The exact meaning of the sign ξ, remains, however, perplexing.<sup>13</sup> Moreover, the sign resembling the Arabic zero was possibly introduced by the scribe of X, perhaps because he had misunderstood an abbreviation.<sup>14</sup>

The first two peoples of the interior of Tarraconensis (the Artabri and the Callaeci Lucenses) are not highlighted in the list of inland localities (neither with red ink nor a larger initial letter), maybe because they were mentioned in the previous list of coastal localities. They are followed by the Capori, written in black by hand E, with an initial letter that was completed at a later date (but neither by hand D nor by hand E). The following four peoples – the Cileni, Lemaui, <B>aedui<sup>15</sup> and Seurri – have red initial letters executed by hand D, as in Fig. 10b, but no number. Finally, the initial letters for the rest of the interior peoples of Tarraconensis were left incomplete.<sup>16</sup>

The fact that not all the peoples of Tarraconensis are numbered in manuscript X suggests that at least some of the numbers were written in at earlier stages of the transmission process. Traces of numbering that are still visible in manuscript X from the Paesici to the Vascones concur with this antique and late antique practice of using the counts of peoples in lists, synopses and epitomes, which could potentially be circulated independently of the main work. Marcian of Heraclea, for example, provides numbers of peoples, which he took from the *Geography*, in his work: Marcian writes that there are five peoples in Baetica, four in Lusitania and fifty-five in Tarraconensis.<sup>17</sup> Groups of peoples are also numbered in manuscripts VRA of the *Geography*: the scribe – or more certainly, the scribes of the exemplar(s) of these manuscripts – wrote down the numbers of the peoples and cities in each province of Gallia and then added the count to the end

13 The ξ is vaguely reminiscent of the abbreviation for ἑξήκοστόν (sixtieth) in some of the *Handy Tables*; see Tihon 2011, 97, e.g., and Mercier 2011, 79–80.

It does not, however, cast any light on this particular problem. Note that the Iberian catalogues of the mixed manuscripts A and O have small symbols before or after the names of peoples, which is associated with a particular cartographical convention; see Mittenhuber 2009, 198–199 and 390. The symbols, though, never take the form of a ξ with numbers.

14 This scribe of manuscript X used the Arabic zero together with the Greek numeral system for several of the catalogue's coordinates. See p. 78.

15 The name of the Baedui was probably already misspelled in the exemplar of X, since the letter B has been lost and the red 'initial' in manuscript X is, in fact, the second letter, 'A'. The practice of highlighting the initial letter of a word with a special colour or in a different style would have led to several other

losses of initial letters. The main scribe would not, in the first copying stage, have drawn the initial letter but would have left it to be completed later – either by himself or another scribe. The initial letters could easily be overlooked, which would lead to missing initials in later copies. Cf. the practice of the scribe of the Rylands Library Papyrus No. 522, who placed the initial letters of the provinces in the margins of the columns; see, e.g., fig. 8 and line 35 for 'Italy' in fig. 9.

16 A few other names are complete, although they lack highlighted initials (such as the Amaci). This palaeographical feature of X went unnoticed in the critical apparatus of Stückelberger and Graßhoff 2006; the editors completed the missing initial letters systematically, except, inexplicably, the initial letters for (A)γκίαται and (T)βούρων.

17 Marcian of Heraclea, *Per. mar. ext.* 2.10, 14 and 17.

of each περιορισμός, as in the following example: Ἑθνη ιζ̄ ὁμοῦ · πόλεις ιθ̄ ('seventeen peoples in total, nineteen cities').<sup>18</sup>

The verbosity of Ξ in its description of Iberia<sup>19</sup> – or the concision of the Ω manuscripts – are open to different interpretations. Since the extra information provided in manuscript X does not help us to understand the text any better (they neither offer any further explanations nor clarify obscure passages), the most plausible explanation is that the scribes of the Ω recension purposefully omitted some non-essential data. The copying processes of the recensions hence differed quite substantially: the manuscripts of the Ω recension tend to be more concise, whereas Ξ, despite the particular graphical practices of its scribe(s), reflects a state of the text that was possibly closer to Ptolemy's original work.

### 3.1.3 Definition of Asturia

The description of Asturia (*Geogr.* 2.6.28–38) is a complex case. The passage suffers from numerous copying issues (see Appendix G): the addition and/or omission of coordinates, the loss of initial letters,<sup>20</sup> typical majuscule variants,<sup>21</sup> misdivisions,<sup>22</sup> different spellings for the sound /e/<sup>23</sup> as well as examples of metathesis.<sup>24</sup> The divergences concern mostly the Ω against the Ξ recension but also occasionally the two Ω subgroups – that is, manuscripts VRA against manuscripts UK – in particular, regarding the coordinates. Given that there are so many majuscule variants and misdivisions concerning the toponyms and the coordinates between the Ω and Ξ recensions in this quite short passage of the catalogue, it would seem that corruptions or changes occurred at an early stage in the transmission process of the text. In the catalogue, Asturia (ἡ Ἀστούρια) is not used as the name of a people but as the name of a region that includes several groups of peoples. Although this is the only instance where Ptolemy refers to a region in Iberia, this type of description, in which the name of the region and the ethnonyms are placed together, does appear in other parts of the *Geography*.<sup>25</sup> The boundaries of what Ptolemy calls 'Asturia' are unclear in the text and the region is treated differently in the two recensions.

18 *Geogr.* 2.7.23. See also 2.8.18, 2.9.22 and 2.10.20. The counts are included in the last lines of each chapter but do not close the chapters, which suggests that they were added later from marginal scholia and were not part of the *Geography*'s original text.

19 This contradicts the viewpoint of A. Diller, who stated that 'X is very defective' and 'in large parts of the work [...] omits titles, synopses, subscriptions' (Diller 1939, 229). He was probably influenced by

the work of manuscript X's rubricator, who often failed to complete his work.

20 *Geogr.* 2.6.29: Ἀλίακα X, Μαλίακα Ω.

21 *Geogr.* 2.6.29: Γίπα X, Γίγια Ω; *Geogr.* 2.6.38: ⟨Γ⟩ιγουρρών X, Ἡγουρρών Ω; *Geogr.* 2.6.28: ιᾱ X, ιδ̄ KV, ι δ' UR.

22 *Geogr.* 2.6.28: Λοῦκος Ἀστούρων Ω, Λουκοαστουρίων X.

23 *Geogr.* 2.6.30: Β⟨ρ⟩ιγέκιον X, Βριγαίκιον Ω.

24 *Geogr.* 2.6.29: Βέρδιγον VRA, Βέργιδον codd. cett.

25 Cf. with the description of Italy or India.

In the Ω recension, nine cities, with coordinates, are listed as being part of Asturia. They are: Lucus Asturum, Laberris, Interamnium, Argenteola, Lankiatoi (possibly 'Lancia'), Maliaca, Gigia, Bergidum Flavium and Interamnium Flavium as well as the Legio VII Gemina, for which no coordinates have been given (*Geogr.* 2.6.28–29). All these localities are followed by a list of nine peoples, each with their own single city (*Geogr.* 2.6.30–38): the Brigaeci (Brigaecium), the Baedunenses (Baedunia), the Orniaci (Intercatia), the Lungones (Paelontium), the Saeleni (Nardinium), the Superati (Petavonium), then the Amaci with the main city of Asturica Augusta and finally the Tiburri (Nemetobriga) and the Gigurri (Forum Gigurrorum). The text of the catalogue does not specify whether these nine peoples were considered to be part of Asturia. The presence of Asturica Augusta, the capital city of Asturia, quite far down in the list may indicate that 'Asturia' comprised all these localities, at least until Asturica Augusta and most probably up to and including Forum Gigurrorum. Then, the localities of the Bracari Callaeci (*Geogr.* 2.6.39) are introduced, using a new geographical indication ('at the sea, between the Durius and the Minius Rivers'), which suggests that this people did not belong to Asturia, since such indications are usually found at the beginning of a new list. In the Ξ recension, four cities are listed as being part of Asturia: Lucus Asturum, Labernis, Interamnium and Argenteola. Then comes '⟨L⟩ankiatai' (possibly 'Lancia'), which does not have any geographical coordinates and is displayed in the text column of manuscript X as an ethnonym that is attached to the following localities: Maliaca, Gipa, Bergidum Flavium, Interamnium Flavium (without coordinates) and the Legio VII Gemina (with coordinates). After these place names, the Ξ recension's list of peoples and localities is the same as in the Ω recension, until one reaches the people of Bracari Callaeci.

Lancia was a well-known city that had been conquered by Publius Carisius in 25 BCE;<sup>26</sup> several authors refer to it as an important Asturian city.<sup>27</sup> Only Pliny the Elder uses the ethnonym *Lancienses* (as one of the *populi Asturum*) rather than the name of the city in his writing.<sup>28</sup> The nominative plural form Λαγκιάτοι or ⟨Λ⟩αγκιάται in the

26 Le Roux 2010, 45.

27 Cassius Dio 53.25: 'Publius [Titus codd.] Carisius took over Lancia, the greatest city of the Astures' (καὶ Τίτος μετὰ ταῦτα Καρίσιος τὴν τε Λαγκίαν τὸ μέγιστον τῶν Ἀστούρων πόλιν ἐκλείφθην εἶλε); Florus, *Epit.* 4.12: 'the rest of the army fled and took refuge in Lancia, a very powerful city' (*reliquias fusi exercitus ualidissima ciuitas Lancia exceptit*); also Orosius, *Hist.* 6.21, and *It. prov.* 395.3.

28 Pl. 3.28: 'After them [i.e. the Cantabri] come the twenty-two peoples of the Astures, divided between Augustani and Transmontani, with Asturica, a

splendid city. Among them there are the Gigurri, the Paesici, the Lancienses, the Zoelae' (*lunguntur iis [sc. Cantabris] Asturum xxii populi diuisi in Augustanos et Transmontanos, Asturica urbe magnifica. In his sunt Gigurri, Paesici, Lancienses, Zoelae*). According to Pliny, the city of Asturica was (logically) part of Asturia. Ptolemy places the Gigurri with the peoples after the Asturian cities *sensu stricto*, whereas the Paesici – whose city was on the coast according to the *Geography* – feature before Asturia in Ptolemy's catalogue. The Zoelae are not mentioned in the *Geography*.

*Geography* – which clearly goes back to the archetype – is not usually employed for the names of cities or for ethnonyms (the latter are generally written in the genitive case in Ptolemy's Iberian catalogue). The correct spelling would have been Λαγκία for the city's name and perhaps \*Λαγκηνοσίοι (in the genitive case, \*Λαγκηνοσίων) for the ethnonym.<sup>29</sup> The absence of coordinates for several of the localities (in Ξ as well as in Ω), the imprecise definition of Asturia and the uncertain status of Λαγκίατου/⟨Λ⟩αγκίαται have all affected the structure of this passage. The many divergent readings of the toponyms and the coordinates as well as the structural difference all point to a defective stage in the process of transmission, which was probably already reflected in the archetype. The scenarios of a revision of the manuscripts in one of the recensions or of two different copying strategies (to overcome defects in the exemplars) are plausible but cannot be satisfactorily demonstrated.

## 3.2 Toponyms and ethnonyms of Iberia

### 3.2.1 Additions and omissions of toponyms

#### *Missing lines in the Ω recension*

There are ten instances in which an entry in the catalogue in one of the recensions is absent from the other recension (Table 4). In three of these instances, which occur in the list of the Asturian localities (*Geogr.* 2.6.29), only the coordinates are missing from one of the recensions.<sup>30</sup> Among these localities, no obvious anachronism can be demonstrated: most of the cities were either mentioned in sources before the time of Ptolemy (such as Nertobriga,<sup>31</sup> the Legio VII Gemina,<sup>32</sup> Lacobriga<sup>33</sup> and Touia<sup>34</sup>) or they cannot be found in any other sources besides the *Geography* (such as Velladis, Capasa,<sup>35</sup> Araducca, Autraca and Ambisna<sup>36</sup>). Sala is possibly Salpensa, which Pliny mentions.<sup>37</sup> Interamnium Flavium is more problematic as the locality appears only in later itineraries,<sup>38</sup> even though

29 The ethnonym is not attested in the Greek sources. The name's spelling in the *Geography* may be the result of a misdivision that was introduced by Ptolemy's source (Λαγκίαται from Λαγκία καὶ? and Λαγκίατοι from Λαγκία τῶν Αστούρων?; see Cassius Dio 53.25) or a misreading of the end of the ethnonym in the archetype; footnote 99, p. 146.

30 See Appendix G.

31 Pl. 3.14. In his *Hist.* 35.2, Polybius uses the spelling Νερκόβρικα (Nercobrica).

32 The Legio VII Gemina (Γερμανική codd., Γερμηή corr. Müller) was founded under Galba in 68 CE. See Cassius Dio 55.24; Tacitus, *Hist.* 2.11 and 3.22;

also Palao Vicente 2006; García Marcos and Morillo Cerdán 2015.

33 Pl. 3.26.

34 Pl. 3.9. Pliny refers to 'the mountains near Tugia' (*saltus tugiensis*), which is the same city as Ptolemy's Touia.

35 According to Stückelberger and Graßhoff 2006, footnote 79, 171, Capasa (*Geogr.* 2.5.8) may be a duplication of Capara (*Geogr.* 2.5.9).

36 Possibly Ambinon, mentioned in *Rav.* 318.14.

37 Pl. 3.14.

38 *Rav.* 320.19, *It. prov.* 429.3 and 431.2.

the name suggests that the city had already been founded under the Flavian dynasty. Only the nameless cape in Baetica (ἔξοχή) is very probably a later addition.<sup>39</sup>

The list of localities in the province of Tarraconensis that is found in the Ξ recension but is absent from Ω is particularly interesting as it involves omissions of catalogue entries that occur at regular intervals. Assuming that there is one line of manuscript for each entry (ethnonym or toponym with coordinates) and one or two lines for the introductory sentences,<sup>40</sup> I have calculated that: from the missing coordinates of the Legio VII Gemina to Araducca there are approximately twenty-eight lines; from Araducca to the two omissions concerning Autraca and Lacobriga, there are about twenty-seven to twenty-eight lines; from there to Ambisna, again approximately twenty-eight lines; from there to the corrupt coordinates of Numantia in Ω,<sup>41</sup> about twenty-seven lines; from there to Touia, about fifty-six lines (that is, twenty-eight lines multiplied by two);<sup>42</sup> and from the extremely divergent coordinates of Pintia to the Legio VII Gemina, there are approximately twenty-eight lines. Two instances of missing lines in the Ω recension that are separated by twenty-eight lines can also be found in other books of the catalogue.<sup>43</sup> Although one should not over-interpret the fact that these omissions occur at regular intervals, it does point to a series of omissions (in actual fact, a series of lacunae) in Ω rather than to later additions in Ξ. The lacunae were probably the result of a single defective exemplar, which was possibly one of the copies between the archetype (common to Ω and Ξ) and the Ω hyparchetype. This faulty copy must have had columns of text of around twenty-eight lines. Damage to the lower edge of a papyrus roll – the upper edges are generally less susceptible to fray – or even the loss of a horizontal papyrus strip, for instance, could explain the regularity at which the defective lines occur. Physical damage to a codex could also explain the series of lacunae.<sup>44</sup>

A synopsis of Book 2 that can only be found in the main Ω manuscripts – it is absent from manuscripts X and O as well as from the manuscripts of P. Schnabel's σ family (SBP) – lists the countries (περιορισμοί), together with numbered columns (σελίδες) for each of them (Appendix F). A comparison can thus be made between the synopsis and the string of Ω omissions discussed above. The numbering of the columns must go back to the organisation of the catalogue at an earlier stage in the transmission process, probably to Late Antiquity, as the practice was unusual in medieval codices,<sup>45</sup> and it

39 See p. 138.

40 Compare with the disposition of the lines in the Rylands Library Papyrus No. 522, fig. 8.

41 In U<sup>r</sup> and K<sup>r</sup> the position of Numantia agrees with the Ξ coordinates.

42 Note that Velladis, Araducca, Ambisna and Touia are also absent from O and O<sup>r</sup>. See Mittenhuber 2009, 384.

43 There are twenty-eight lines between the mentions of Paionia (om. Ω, *Geogr.* 3.13.28) and Berta (om. Ω, *Geogr.* 3.13.35) as well as between Tenephis (om. Ω, *Geogr.* 4.3.39) and the island of Anemoussa (om. Ω, *Geogr.* 4.3.44).

44 See Irigoien 1986; Johnson 2009, 263.

45 Diller 1939, 238.

	Ξ recension		Ω recension	
2.4.07.09		lineam om.	ἔξοχή	τ̄ Lγ'    λ̄ζ̄ ιβ'
2.4.12.11	Sala	ε̄ γο'    λ̄ζ̄ L'		lineam om.
2.4.13.09		lineam om.	Nertobriga	ζ̄    λ̄η Lγ'
2.5.07.08	Velladis	ε̄ γο'    μ̄α ιβ'		lineam om.
2.5.08.15		lineam om.	Capasa	η̄ γο'    λ̄θ ζ'
2.6.29.01	Lancia	numeros om.	Lancia	θ̄ γ'    μ̄γ L'
2.6.29.05	Interamnium Flavium	numeros om.	Interamnium Flavium	θ̄    μ̄δ
2.6.29.06	Legio vii Gemina	θ̄    μ̄δ L'	Legio vii Gemina	numeros om.
2.6.39.09	Araducca	ε̄    μ̄α Lγ ιβ'		lineam om.
2.6.50.06	Autraca	τ̄    μ̄γ δ'		lineam om.
2.6.50.07	Lacobriga	τ̄ γο'    μ̄γ γ'		lineam om.
2.6.52.05	Ambisna	τ̄α ζ'    μ̄γ ιβ'		lineam om.
2.6.59.16	Touia	τ̄ γ'    λ̄η L'		lineam om.

Tab. 4 Omissions or additions of lines and coordinates in the Iberian chapters of the two recensions.

conforms perfectly to a catalogue written on papyrus rolls.<sup>46</sup> The copy, to which the synopsis refers, used seventy-five columns of text for Book 1 and the foreword (πρόλογος) to Book 2, and fifty-five columns for the περιορισμοί of Hibernia to Illyricum (most of Book 2).<sup>47</sup> On the basis of the columns numbers, one can estimate the number of manuscript lines that is being referred to. Using different methods, A. Diller and D. Marcotte arrived at a similar result of thirty-five or thirty-six lines for each column,<sup>48</sup> whereas K. Müller found only thirty lines.<sup>49</sup> The fifty-five columns for Book 2 also correspond to fifty-six pages in the 2006 critical edition; there are thirty-four lines per page on average in this edition, hence the fifty-five columns must have consisted of about

46 Schnabel 1938, 67.

47 There is uncertainty about the last figure in the synopsis: although the list is logical (but incomplete), it is not entirely consistent with the structure of the catalogue. See the note in Appendix F.

48 A. Diller 1939, 238, used the layout of manuscript U and came to an estimate of about thirty-five lines, while D. Marcotte 2007b, 168, calculated, using the

Nobbe edition, that there are about thirty-six lines. Concerning the *Almagest*, G. J. Toomer 1984, 56, has observed that '45 lines is the standard height of tables throughout the *Almagest*. It is presumably chosen to conform to some standard height of papyrus roll.'

49 Müller 1867, 287.

thirty-five lines each. Such estimations are in any case approximate, although the synopsis of Book 2 and the  $\Omega$  string of omissions do seem to refer to copies with different textual layouts, namely columns with between thirty-five/thirty-six lines and with about twenty-eight lines, respectively. That there were two different layouts is, however, not incompatible: the  $\Omega$  omissions occurred after the archetype common to  $\Omega$  and  $\Xi$ , since the lines missing in the  $\Omega$  manuscripts are still to be found in manuscript X. The faulty copy was not necessarily the  $\Omega$  hyparchetype but could have been any copy between the archetype and the  $\Omega$  hyparchetype. By contrast, the synopsis may go back to a copy that predates the bifurcation of the tradition, since the numbers could have been supplied by the archetype but omitted by the scribe of the  $\Xi$  hyparchetype or simply omitted by the scribe of X.<sup>50</sup>

*The έξοχή point along the Baetican coast*

A nameless cape, called simply έξοχή, between Selambina and Abdara along the coast of Baetica is mentioned in the  $\Omega$  recension but not in  $\Xi$  and it does not appear on the maps. In its literal sense the word means 'prominence'. It was commonly used in a figurative sense – as in κατ' έξοχήν ('par excellence'<sup>51</sup>) – but the use of έξοχή in a concrete topographical sense was extremely rare in the geography of Antiquity. Strabo (3.5.6) uses the word once to describe the top of a mountain, and Marcian, who read Ptolemy's works, uses it in the sense of 'promontory'.<sup>52</sup> The word appears, in a geographical sense, in Byzantine works: in scholia to Lycophron<sup>53</sup> and to Dionysius Periegetes<sup>54</sup>, where έξοχή most

50 Furthermore, the synopsis of Book 2 and the epitome of the  $\Xi$  recension both treat Dalmatia as a province, whereas  $\Omega$  includes it in the description of Illyricum (see Appendix F). It is also worth calling to mind the omissions of the western mouths of the Anas and Baetis Rivers, which are common to  $\Omega$  and  $\Xi$ , and, therefore, must have already been missing in the archetype (see p. 96). The absence of a line in the catalogue for the city of Rhodes is also surprising; the city should have been placed in the περιγραφή of the island (*Geogr.* 5.2.34). The 'Table of Noteworthy Cities' (15.2) mentions the island of Rhodes together with its coordinates, although this may refer to the city rather than to the island. See Stückelberger and Graßhoff 2006, 499.

51 E.g., Str. 1.2.10; St. Byz., *Ethn. s.v.* Ἀλεξάνδρεια. See also Cic., *Att.* 4.15.7.

52 *Per. mar. ext.* 1.2: μήτε κοιλότητα μήτε έξοχάς ἔχουσα (κοιλότης in this context means a coastal indentation; see *Stadiasmus* 156). Marcian uses έξοχή in his description of the Cimbrian peninsula (*Per. mar. ext.* 2.33), as does Ptolemy.

53 The word έξοχή appears in a scholion to Lycophron (*Alex.* 447) in the eleventh-century Venetus Marc. gr. Z. 476 (coll. 703), in an explanation of the word Κεραστία. The latter was an alternative name for the island of Cyprus (edition in Scheer 1908, 165, and Billerbeck 2014, 80). The scholiast refers to Περὶ νήσων (*On the Islands*), written by Xenagoras (=FGrH 240 fr. 2), and explains that the alternative name of Κεραστία comes from κέρασ, because Cyprus has 'numerous prominences (πολλὰς έξοχάς) which they call horns (κέρατα)'. M. Billerbeck 2014, 81, translates this as 'weil sie zahlreiche <gebirgige> Vorsprünge hat' and C. Higbie 2007 as 'because it had many peaks'. Stephanus of Byzantium (*Ethn. s.v.* Κύπρος) clearly knew this explanation, since the similarity between his text and the scholion is striking, although he writes 'because it has numerous promontories (πολλὰς ἄκρας)'. Hence, in the scholion έξοχή may simply mean 'cape' or 'promontory'.

54 Scholion to Dion. Per. 89: Κριοῦ μέτωπον ἢ έξοχή αὐτῆς διὰ τὸ ὡπερ ἐπὶ κεφαλῆς κεῖσθαι. The Cre-

probably means promontory, and in the ninth-century *Etymologicum Genuinum*, where the meaning is unclear.<sup>55</sup>

The words commonly used in Ptolemy's catalogue for 'cape' or 'promontory' are ἄκρα, τὸ ἄκρον and τὸ ἀκρωτήριον. A mountain or a mountain range is always referred to as a τὸ ὄρος or in its plural form τὰ ὄρη. Ptolemy uses mostly τὸ ἐφεξῆς ἄκρον, τὸ ἐχόμενον ἄκρον or τὸ μετ' αὐτὴν ἀκρωτήριον (that is, 'the following cape') in his descriptions of nameless capes.<sup>56</sup>

The term ἐξοχή is used six times in Ptolemy's *Geography* and all of them are equivocal. In four instances, the word is used to describe the coastline of the Cimbrian peninsula.<sup>57</sup> In all the manuscripts, the text of this passage has been rearranged and the coordinates are hard to decipher.<sup>58</sup> In addition, the confusing language of these lines is incongruous with the usual simplicity of the catalogue. The phrase ἡ μετὰ τὴν ἐξοχὴν πρώτη ἐξοχή ('first cape after the cape') is surprisingly repetitive. The ἐξοχή points have not been noted down on the Iberian maps of manuscripts UKO, although they do feature on the map of R. That the passage was corrupted (and/or reconstructed) after Ptolemy is not implausible, while a correction carried out on the basis of a defective manuscript, perhaps between Ptolemy's original and the archetype, would explain the uninspiring phrase and the confusion in both the recensions.

The two remaining occurrences are similar and are probably linked. They concern two nameless capes, one on Baetica's coast, the other on the western coast of Albion (modern-day Great Britain).<sup>59</sup> Both occur in exactly the same manuscripts (UKVRR<sup>t</sup>) and are absent from manuscripts U<sup>k</sup>K<sup>t</sup>XOO<sup>t</sup>. In other words, only the text of Ω has these two occurrences, and they do not appear in the Ξ recension or on most of the maps. According to the list made by F. Mittenhuber, no other locality in Book 2 of the *Geography* shows this characteristic.<sup>60</sup> Moreover, the latitude of the ἐξοχή in Albion is

tan cape known as Κριτοῦ Μέτωπον (i.e. 'the Ram's Forehead') is defined as an ἐξοχή, which simply means 'promontory' here. The scholia to Dionysius Periegetes possibly date to the fourth or fifth century (*RE* V, s.v. Dionysios, col. 922). See also the scholion to Dion. Per. 120.

55 On the date of the work, see Baldi 2013, xxiv–xxxii, and Billerbeck 2006, 31\*–33\*. The word ἐξοχή appears in a note describing the shape of the island of Gades (s.v. Γάδειρα): ἀπὸ τοῦ γῆ καὶ τοῦ δειρά, οἰοῦναι γῆς δειρά· τὰ γὰρ Γάδειρα, τῆς γῆς ἐξοχὴ ἐστίν (text in Baldi 2013). The form of the island is compared to 'a neck' and to 'a prominence' of the Earth, although the exact meaning is unsure. The same passage is given in the *Etym. Symeonis* (of the first half of the twelfth century, s.v. Γάδειρα),

the meaning of which is also unclear. Stephanus of Byzantium (s.v. Γάδειρα) uses the same kind of metaphor but does not use the word ἐξοχή: στενὴ καὶ περμήκης, ὡς οὔσα ταυνία, τῆς γῆς δειρά (reused in Eust. *Dion. Per.* 64). The island is described as being 'long and narrow' and as having the form of a 'tongue of land' or of 'a neck'. The expression τῆς γῆς ἐξοχὴ thus seems to refer to a similar image of a narrow piece of land, although there is no other evidence to corroborate this use.

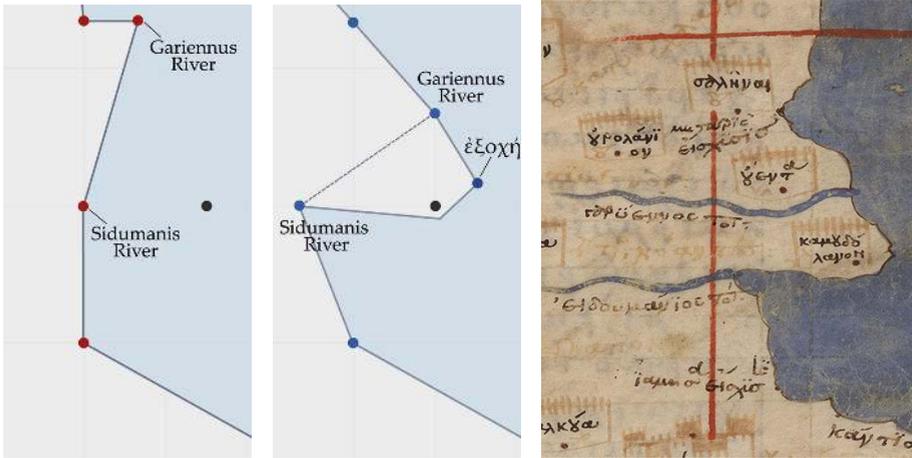
56 *Geogr.* 2.6.3, 3.12.3, 7.2.3–5.

57 *Geogr.* 2.11.3–4.

58 Stückelberger and Graßhoff 2006, 223.

59 *Geogr.* 2.3.6.

60 Mittenhuber 2009, 384. Both localities are also supplied in A.



a Ξ recension.

b Ω recension.

c Vat. Urb. gr. 82 (U) f. 63v. © 2017 Biblioteca Apostolica Vaticana.

Fig. 11 The coastal area near the inland city of Camulodunum (black dot) in the two recensions as well as in manuscript U of the *Geography*.

55°05' ( $\overline{\nu\epsilon} \iota\beta'$ ): it is the only locality in the chapters on the British Isles (179 toponyms in total) with this number of minutes and such a precise latitude.

The two ἐξοχή points in Albion and Baetica are, therefore, more likely to have been added to the catalogue at a later date rather than omitted from the Ξ recension and the maps. These two localities are evidence that the text of Ptolemy's catalogue (but only in the Ω recension) was reworked. They concern two coastal points, for which the geographical coordinates had been determined, that were entered into the catalogue at a precise point by a later editor or scribe.

Although no satisfying explanation has been found for the nameless Baetican cape,<sup>61</sup> the addition of an ἐξοχή point along the coast of Albion, between the mouths of the Gariennus and the Sidumanis rivers, could be cartographical in origin. Even though they have different coordinates in the Ξ and Ω recensions, the mouths of the two rivers create, in both recensions, an illogical coastline. If one links the two points with a more or less straight line, the city of Camulodunum (near modern-day Colchester), which was

61 It is possible that the coastline was modified in order to depict one of the several promontories between modern-day Adra and Almería or perhaps the large bulge in the coastline between these cities; there are shallows and a strong eastward flow

around Punta Sabinar that need to be carefully navigated to reach Almería. The coastal descriptions in *Rav.* 305.4 and 343.11 and in *Guido.* 515.17 refer to a station called C(a)esarea, after Abdera, which has not been identified.

included by Ptolemy in the descriptions of the inland localities,<sup>62</sup> would lie too far to the east – in fact it would be located in the sea (see Fig. 11A). Nonetheless, the cartographers of the UKO maps<sup>63</sup> drew the coast in the form of a large promontory, so that Camulodunum remained inland (see Fig. 11C). The drawings of all three UKO maps are very similar, which suggests that the map-maker of the exemplar, from which they derive, realised that the coastline, as defined in the catalogue, was at odds with the coordinates of Camulodunum. It is possible that this cartographer, noticing the problem, added a point between the mouths of the Sidumani and Gariennus rivers to the catalogue – preserved in the catalogues of  $\Omega$  – in order to help later map-makers (Fig. 11B). The additional point does not represent any actual locality, which explains its neutral denomination:  $\epsilon\tilde{\xi}\omicron\chi\acute{\eta}$ .<sup>64</sup>

### 3.2.2 Toponymic and ethnonymic variants

Most of the toponyms and ethnonyms listed in the Iberian catalogue are not of Greek origin but have Celtic and Latin roots.<sup>65</sup> Statements on the linguistic peculiarity of the peninsula's toponymy were a topos in Greek and Latin geography and can be traced back to Posidonius.<sup>66</sup> Mela, for example, writes that there are 'several peoples and rivers among the Cantabri, but their names cannot be couched in our language'<sup>67</sup>, while Strabo bluntly states:

I shrink from giving too many of the names, shunning the unpleasant task ( $\tau\omicron$   $\acute{\alpha}\eta\delta\epsilon\epsilon\varsigma$ ) of writing them down – unless it comports with the pleasure of someone to hear 'Pleutaures', 'Bardyetes', 'Allotriges', and other names still less pleasing and of less significance than these.<sup>68</sup>

<sup>62</sup> *Geogr.* 2.6.22.

<sup>63</sup> The  $\epsilon\tilde{\xi}\omicron\chi\acute{\eta}$  point is missing from the catalogue of manuscript O, although present in manuscripts U and K.

<sup>64</sup> The coordinates in  $\Xi$  and  $\Omega$  of Camulodunum seem to be corrupted, since Ptolemy states that the city lies 'near ( $\pi\alpha\rho\acute{\alpha}$ ) the estuary of the Tamēsa' (*Geogr.* 2.3.22), which is not the case as far as the transmitted coordinates are concerned. This suggests that the latter differ from the original coordinates of Camulodunum, which at first might have been coherent with the coastline of the catalogue. A mistake in the transmission process that occurred before the common archetype of the tradition might have af-

ected the coordinates of Camulodunum, which led to the map being modified.

<sup>65</sup> See the linguistic studies of Untermann 1992; García Alonso 2001; García Alonso 2003; García Alonso 2005; Moret 2006, among others.

<sup>66</sup> Lasserre 2012, 195.

<sup>67</sup> Mela 3.15. See also Mela 3.13 ('the two [river] mouths are little known even among the locals') and 3.30. A similar judgement can be found in Pliny 3.7, 3.28 ('The twenty-four cities of the Bracari contain 285 000 people, of whom, besides the Bracari themselves, may be mentioned, without boring the reader, the Biballi, Coelerni, Callaeci, Equaesii, Limici and Querquerni') and 4.118.

<sup>68</sup> Str. 3.3.7, also 3.3.3. See Radt 2006, 356.

This forthright statement should not hide the real difficulties that Ptolemy and the antique and medieval scribes faced. Unfamiliar toponymy and ethnonymy were certainly the source of some of the confusions and misreadings that occurred during the transmission history of the *Geography* – from Ptolemy's sources to the extant Greek manuscripts.<sup>69</sup>

*Types of differences between Ω and Ξ*

The variations in the readings between the Ω and Ξ recensions demonstrate the complexity of the textual transmission of the toponyms and ethnonyms. Common writing errors and divergences include:

- misdivisions, such as Λούκος Αστουρών (Ω) and Λουκοσαστουρίων (X).<sup>70</sup> In manuscript X two-word toponyms tend to be written as one word (often with extra vowels placed between the two words), whereas the manuscripts of the Ω recension have more accurate readings in these cases;<sup>71</sup>
- mistakes or differences that are related to capital letters. Thirty-one toponyms and ethnonyms in the Iberian chapters have such errors, the most frequent occurrences being confusions between Λ, Δ and Α (Ούαμα Ω, Ούλαμα X, for instance),<sup>72</sup> between C and Ε (Κέλσα Ω, Κελέα X),<sup>73</sup> between ΓΙ, ΤΙ, Π and Η (Γίγια Ω, Γίπα X)<sup>74</sup> as well as between Τ and Γ (Σετίσαμα Ω, Σεγίσαμα X). In six of these cases, Γ has been mistaken for Τ in the manuscripts of the Ω recension;<sup>75</sup>
- confusions between minuscule letters are much less frequent: they are essentially between β, κ and η.<sup>76</sup> The over-representation of typical majuscule variants between manuscript X and all the Ω manuscripts suggests that an archetype was written in capital letters;<sup>77</sup>
- misreadings of an abbreviation or a symbol;<sup>78</sup>

69 See, e.g., footnote 99, p. 146.

70 *Geogr.* 2.6.28.

71 *Geogr.* 2.6.4: Λαπατία Κώρου Ω, Λαπατιακώρουμ X;  
*Geogr.* 2.6.6: Νοίγα Ούκεσία Ω, Νοιγαουικεσία X; *Geogr.* 2.6.26: Φλαουία Λαμβρίς Ω, Φλαουισαλαμβρίς X;  
*Geogr.* 2.6.53: Ούξαμα Βάρκα Ω, Ουαξαμαβάρκα X.

72 *Geogr.* 2.4.15, also 2.4.13, 2.6.15, 50, 56 57 and 61.

73 *Geogr.* 2.6.68, also 2.6.57.

74 *Geogr.* 2.6.29, also 2.4.6, 2.5.9, 2.6.21, 29, 35, 38 and 50.

75 *Geogr.* 2.6.50, also 2.4.12, 2.6.24, 50, 52, 56 and 68.

76 *Geogr.* 2.4.6, 2.6.68 (possibly 2.6.67 as well).

77 This confirms the assessments of Cuntz 1923, 15, and of Stückelberger and Mittenhuber 2009, 23 and 114–116. The differences in the use of majuscules do not necessarily go back to divergent readings of the archetype itself but could have occurred in any copy between the archetype and the respective hyparchetypes of both recensions, possibly even later in the Ξ recension.

78 *Geogr.* 2.5.7: Scalabis Colonia; see p. 120; *Geogr.* 2.6.3: ἐφ' οὐ Σησιτίου βωμοί Ω, ἐφ' οὐ Σησιτίου ἡλίου βωμοί X. The word ἡλίου is written, in manuscript X, with the symbol of the sun and a breve. Was the symbol misread and omitted from Ω?

- iotacisms (fifteen occurrences)<sup>79</sup> and different transcriptions of the sound /e/ (fourteen occurrences): in eleven of the latter, the manuscripts of the Ω recension use αι, whereas manuscript X uses ε<sup>80</sup> – the inverse occurs only three times.<sup>81</sup> There are also many differences in the use of other vowels: ο/ου, ο/ω, α/ε, and so on.
- betacisms and different transcriptions of the sound /w/. When words were transcribed from Latin to Greek, different strategies might have been adopted to render the sound /w/, which in Latin was written with the letter ‘u’, as in *Oruium* or *Nauia*, for example. This Latin letter was, however, already being pronounced as /β/ (similar to the modern-day Spanish pronunciation of the letter ‘b’) or /v/ in Antiquity; moreover, the pronunciation of the Greek letter β changed from /b/ in the Attic dialect to /β/ in Koine and to /v/ in medieval Greek. Where the two recensions diverge, in four cases the manuscripts of the Ω recension use the two vowels ου to transcribe the Latin /w/, whereas X keeps the beta, or adds and replaces the /w/ with a beta, as in: Ὀρούιον Ω and Ὀρούβιον X; Ναουιλλοουίωνος Ω and Ναβιαλλοουίωνος X.<sup>82</sup> There is only one case in which Ω uses β and X uses υ.<sup>83</sup>
- haplographies, dittographies or simply the insertion or omission of one letter, sometimes the initial letter of a word, of which there are about twenty-five occurrences;
- the metathesis of vowels<sup>84</sup> or consonants.<sup>85</sup>

#### *The estuary near Asta*

The toponymy and vocabulary used to describe the coastal section to the west of the Strait of Hercules – the Port of Menestheus, the estuary near Asta and the double mouths of the Baetis River (*Geogr.* 2.4.5) – have close parallels to Strabo’s description in his *Geography*:

Next in order comes what is called the Port of Menestheus (ὁ Μενεσθέως καλούμενος λιμῆν), and then the estuary near Asta (ἡ κατὰ Ἄσταν ἀνάχυσις) and Nabrisa. The name of estuaries (ἀναχόσεις) is given to hollows that are covered by the sea at the high tides, and, like rivers, afford waterways into the interior and to the cities on their shores. Then immediately comes the outlet of the Baetis, which has a twofold division.<sup>86</sup>

79 *Geogr.* 2.4.9, 2.5.7 and 8, 2.6.13, 51, 53, 58, 61, 63, 69 and 76.

80 *Geogr.* 2.4.5: Βαίλων Ω, Βέλων X; also 2.4.12 and 14, 2.5.6, 2.6.5, 14, 30 (twice), 62, 70 and 74.

81 *Geogr.* 2.6.31, 36 and 58.

82 *Geogr.* 2.6.2 and 2.6.4. See also 2.6.27 and 2.6.53, and similar cases in 2.8.5, 2.14.4, 3.1.8, 4.1.10, 4.2.34..

83 *Geogr.* 2.6.63: Βέρναβα Ω, Βέρναα X.

84 *Geogr.* 2.6.59: Ὠρητου Ω, Ἡρωτων X; also 2.5.6, 2.6.56.

85 *Geogr.* 2.6.72: Τηλοβίς Ω, Τηβολίς X; also 2.5.7, 2.6.14, 40, 54, 58 and 67.

86 Str. 3.1.9.

The expressions ἡ κατὰ Ἄσταν ἀνάχυσις (the estuary near Asta) and [ὁ] Μενεσθέως [καλούμενος] λιμὴν (the Port of Menestheus) can be found word-for-word in Ptolemy's *Geography*, albeit only in the Ξ recension. Manuscript X uses ἡ κατὰ ἀστακαναχύσις, that is, ἡ κατὰ Ἄσταν ἀνάχυσις, the last word of which is a unicum in the *Geography*; the Ω recension uses ἡ κατὰ Ἄσταν εἰσχυσις instead, though with the same meaning. Unlike ἀνάχυσις, the term εἰσχυσις is used frequently in both recensions of the *Geography* for the estuaries of Hibernia and Albion,<sup>87</sup> which suggests that the Ω hyparchetype might have been contaminated by the chapters on Ireland and the British Isles.

Strabo's *Geography*, the Ξ recension of the catalogue and Marcian's *Periplus* are the only other texts to refer to the Port of Menestheus and the estuary near Asta using the same vocabulary.<sup>88</sup> The term ἀνάχυσις is, in fact, not that frequent in geographical texts<sup>89</sup> and was used to describe a landform that is typical of oceanic coasts, namely a deep inlet, where the tide dictates the height of the water (the mouth of a coastal river can potentially flow into the inlet).<sup>90</sup> Strabo's long definition indicates that the term was not self-evident and, furthermore, betrays his source, which provides an accurate description of the oceanic regions. According to F. Lasserre, the information can be traced back to Artemidorus via Posidonius.<sup>91</sup> The *P. Artemid.* may shed new light on the problem if,

87 There are eleven occurrences of εἰσχυσις in the *Geography* (2.3.1–6).

88 *P. Artemid.* V 27 also mentions the Port of Menestheus, although ἀνάχυσις (if the reconstruction is correct) seems to refer to the Anas River, not to Asta. See footnote 92, p. 145.

89 Strabo's *Geography* contains most of these occurrences. One instance is explicitly linked with Crates of Mallus (Str. 1.1.7), although it describes a large oceanic stream, which does not correspond to the kind of ἀναχύσεις described along the Iberian coastline. The expression ἐξ ἀναχύσεως τοῦ ὤκεανου in a fragment of Priscus (p. 341, ed. Dindorf) undoubtedly means the same thing. Strabo also uses the term to describe a lake between Cumae and Cape Misenum (τῆς θαλάττης ἀνάχυσις τις τεναγώδης, 'some kind of shallows covered by the sea', Str. 5.4.5), which was reused by Eustathius in his commentary on the *Odyssey* (Eust. *Odys.* X. 514, p. 392, l. 29, ed. Stallbaum). Dionysius of Byzantium uses the term twice to describe the coasts of the Bosphorus, in one of these instances using similar terms to the Strabo passage quoted above: μετέωρος καὶ τεναγώδης ἀνάχυσις, 'an estuary covered by shallows' (Dion. Byz. 23, ed. Güngerich). The word appears once in the *Chrest.* (3.11). Maximus of Tyre mentions (in *Diss.* 38.3) καὶ ἀναχύσεις θαλάττης καὶ ποταμῶν ἐκβολαί 'and the estuaries of the

sea and the mouths of rivers; which shows that he made a distinction between these landforms. He explicitly names his source as Aristaeas (fl. c. 600 BCE); see Dowden 2009. Marcian (*Per. mar. ext.* 2.9) writes ἀστακαναχύσις with a misdivision similar to that found in manuscript X; see Appendix E. The exact meaning of a last occurrence of this term – in a fragment dubiously attributed to Ocellus Lucanus (*On the Nature of the Universe*, 3.4) – is unclear.

90 Radt 2006, 314: 'Estuary [*Ästuar* in German]: this is surely the best translation for the Greek word ἀνάχυσις [...]; however, the word does not imply, contrary to 'estuary', the mouth of a river. I find the French word *étier* ('tidal inlet', 'canal' or 'inlet filled during high tide'), used by F. Lasserre 2012 to be a more accurate translation of the Greek word than *estuaire* (which generally denotes the lower course of a river). See Compatangelo-Soussignan 2014.

91 Lasserre 2012, 29. C. M. Lucarini 2009, 159, following an old historiographical tradition, attributes the main source of Strabo's excursus on the ἀναχύσεις to Posidonius. The technical discussion, which reveals an interest in oceanic phenomena and a wish to understand as well as define them, does indeed point to scholars such as Artemidorus and Posidonius (and the latter's work *Περὶ Ὠκεανῶν*), who were authorities on the topic.



case of ἔξοχή points to an intentional modification of the catalogue. The exact date of the addition of this point is still open to debate, but its introduction is unquestionably connected to the realisation of a regional map.

In addition, there are a dozen toponyms and ethnonyms that can be linked with a mistake in the archetype that is common to Ω and Ξ. They may be evidence of an inaccuracy on the part of Ptolemy himself. There are indeed very few clues to help us determine whether the introduction of inaccuracies comes from Ptolemy's original or from later scribes at a very early stage of the transmission process, such as before the bifurcation of the tradition into two recensions.<sup>97</sup> They include majuscule mistakes<sup>98</sup> and misdivisions,<sup>99</sup> as well as the additions of one letter to a word<sup>100</sup> and the omissions of syllables.<sup>101</sup>

### 3.3 Coordinates and numerical readings

Several striking characteristics become apparent when one compares the coordinates in both recensions (Fig. 12). The first remarkable feature, as far as the Iberian peninsula is concerned, is the large number of differences. Out of a combined total (from both recensions) of 513 localities with coordinates, 245 have coordinates that differ in the Ω and Ξ recensions, which makes up almost half of all the place names in the Iberian catalogue. These different readings are spread equally over the peninsula and concern

97 O. Cuntz 1923, 15, provided a list of incorrect readings, which he maintained *could not* have come from Ptolemy himself. Such opinions are always open to debate.

98 *Geogr.* 2.4.5.: Αιστουρία codd. pro Αιστουαρία (cf. Pl. 3.7 and Marcian, *Per. mar. ext.* 2.9); *Geogr.* 2.6.64: Λέρτωσα codd. pro Δέρτωσα (cf. Str. 3.4.6 and 9, Pl. 3.23 and Mela 2.90, among many literary testimonies, as well as *CIL* II 4057, 4062 and XI 3281); *Geogr.* 2.6.72: Λήσα codd. pro \*Αἴσω conj. Müller (majuscule mistake plus iotacism, cf. Pl. 3.23; *aesonenses*, id. *CIL* II 4462, 4465, 4473 and *AE* 1972, 314). Furthermore, Ἐτελέστα in Ω and Στελέστα in manuscripts XA (*Geogr.* 2.6.57) could both come from a mistake – Ἐτελέστα – that was present in the archetype, which would explain the reading Στελέστα in manuscripts X and A. The correct toponym is undoubtedly Ἐγγελέστα (cf. Pl. 3.25 and 31.8, and *CIL* II 5091) or Ἐγγελάστα (Str. 3.4.9). The two variants could also come from two erroneous readings of a correct archetype, since C and E, and Γ and T were often confused.

99 *Geogr.* 2.6.4: Ναουιλλουίνωρος ποταμοῦ ἐκβολαί Ω, Ναβαλλουίνωρος ποταμοῦ ἐκβολαί X. The toponym 'Naviallouiōn River' is undocumented outside the *Geography* and could go back to a misreading of a Latin source. Indeed, Pliny's text (Pl. 4.111) provides an interesting parallel: *et deinde conuentus Lucensis a flumine Nauia Albiones, Cibarci, Egiuarii* ('and then, belonging to the *conuentus* of Lucus, from the Navia River, the Albiones, the Cibarci, the Egiuarii'). It is possible that a *flumine Nauia Albiones* was incorrectly divided to form a *flumine Nauialbiones*, which could be the origin of the *Geography*'s Naviallouiōn River. See Müller 1901, 146, and Stückelberger and Graßhoff 2006, 174–175.

100 *Geogr.* 2.4.13: Ασινδον codd. pro \*Ασίδων conj. Müller (cf. Pl. 3.11, *Rav.* 317.9 and *CIL* II 2249); *Geogr.* 2.6.21: Οδύνδιον codd. pro Ούίνδιον (corrected by hand E in manuscript X, cf. Florus, *Epit.* 4.12.49 and Orosius, *Hist.* 6.21).

101 *Geogr.* 2.6.40: Ὑδατα Λαία codd. pro Ὑδατα Φλαουία conj. Hübner (cf. *CIL* II 2477, 2478); *Geogr.* 2.6.58: Βίλβις codd. pro Βιλβιλίς (cf. Str. 3.4.13, Pl. 3.24, among many others).

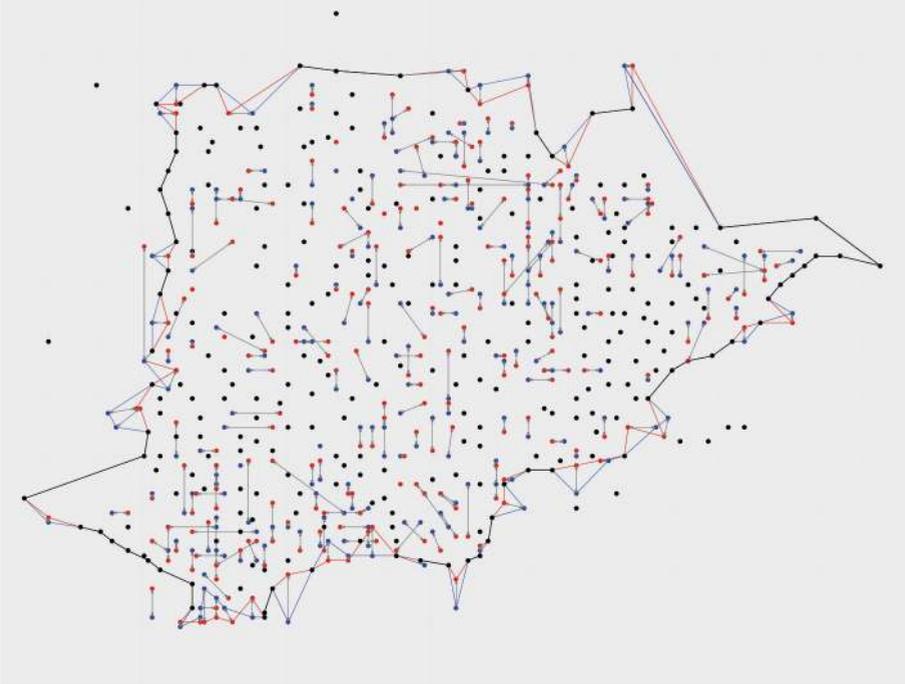


Fig. 12 Differences in the coordinates for the Iberian peninsula between the two recensions of the *Geography*. The  $\Xi$  coordinates are in red and the  $\Omega$  are in blue. The black points and lines represent matching coordinates in the recensions.

the coastal place names as well as those of the interior. Numerical variations are generally small, although in many cases they exceed a half degree, which means that the maps that can be constructed on the basis of the recensions differ quite markedly from each other.

### 3.3.1 Statistical overview

The geographical coordinates in the catalogue are essentially made up of four elements – a whole number of degrees and a fraction of degrees, both for the longitude and the latitude – which correspond approximately to the modern system of degrees and minutes. In other words, the coordinates of a locality include: (1) the degrees of longitude, (2) the minutes of longitude, (3) the degrees of latitude, (4) and the minutes of latitude. Ptolemy devised a format for his catalogue in which the longitude and latitude were set up in separate columns and in which diacritical marks were used to make a distinction between the integers and the fractions.<sup>102</sup> Variant readings between the recensions can

102 See p. 120.

involve one, two, three or all four elements of the coordinates. Most of the time – in 158 out of 245 instances among the Iberian localities – a locality's coordinates in the  $\Xi$  and  $\Omega$  recensions has only one differing element.<sup>103</sup>

Moreover, the four elements of the coordinates do not share the same susceptibility to variation. Most of the time, the differences between  $\Xi$  and  $\Omega$  involve the fractions: the variant readings concern predominantly the fractional parts of the latitudes (in 55% of the cases), followed by the fractional portions of the longitudes (32%). The integers of the latitudes and the longitudes differ much less, at only 7% and 6% respectively. Note that the fractional components of the latitudes, which are often different in the manuscripts, are generally the last numbers of each line in the catalogue. This would make these values more susceptible to omissions and may explain the high number of variant readings.

### 3.3.2 Divergent readings and the writing process

Divergent readings concerning the whole numbers of degrees can often be explained by the writing and copying processes. In several instances, scribes clearly mixed up certain majuscule letters, in particular circular<sup>104</sup> or triangular letters<sup>105</sup>. In nine cases, the graphical proximity between the letters  $\zeta$  in one recension and  $\xi$  in the other was clearly the cause of the divergent readings.

The range of integers for the latitudes and longitudes is rather restricted for the Iberian peninsula: the longitudes of most of the Iberian localities fall within a range of 5° and 17°, while the latitudes fall within a range of 37° and 45°. In many cases, the differences between  $\Xi$  and  $\Omega$  correspond to one unit:  $\overline{\lambda\zeta/\lambda\eta}$ , that is, 37°/38°, for example. Although these kinds of differences may be the result of corrections made to the catalogue, they were probably more often caused by unintentional contamination from adjacent coordinates in the list: a scribe could be influenced by the words, phrases or figures that he had just copied or was just about to write down. The scribe of the exemplar of VRA, for example, repeated the latitude of Novium on the following line (for the latitude of Bouron).<sup>106</sup> Likewise, the latitudes of the first Asturian cities alternate between 43° ( $\overline{\mu\gamma}$ ) and 44° ( $\overline{\mu\delta}$ ), which suggests that the differences between  $\Xi$  and  $\Omega$  might easily have been mistakes induced by the context, more precisely, contamination from the row(s) above (and possibly below) the list. Paradoxically, the restricted range

103 Fifty-six localities have two differing elements, fifteen localities have three differing elements and three localities have four differing elements. Omissions and/or additions of a line in the catalogue explain the thirteen remaining cases.

104 E.g., the longitudes of Illipula ( $\overline{\theta}$  in  $\Xi$ ,  $\zeta$  in  $\Omega$ ) and Setida ( $\overline{\epsilon}$  L' in  $\Xi$ ,  $\zeta$  L' in  $\Omega$ ): *Geogr.* 2.4.12.

105 The longitude of Interamnium (*Geogr.* 2.6.29) is  $\tau \delta'$  in  $\Omega$  and  $\tau \alpha$  in  $\Xi$ , which can be explained by the confusion between IA and IΔ, plus a misdivision (note that manuscript K provides the reading  $\tau \delta$ ).

106 *Geogr.* 2.6.22–23.

of whole numbers used made it easy for the scribes to detect and correct mistakes in the figures, which possibly explains the relatively low number of differences relating to the integers of the coordinates.

The divergent readings concerning the fractional components of the coordinates are more complex and involve most of the differences between  $\Xi$  and  $\Omega$ . As Ptolemy divided each degree into twelve parts, the fractional parts of degrees differ by five-minute intervals:  $5'$ ,  $10'$ ,  $15'$  and so on until  $55'$  (Table 1, Chapter 2). Of course, a coordinate can also be made up of only an integer. Unlike the integers, which very often differ by one unit more or one unit less ( $37^\circ/38^\circ$ , for instance), the fractional components do not frequently involve a difference of just five minutes more or five minutes less ( $6^\circ 10'/6^\circ 15'$ , for instance). The different minute values are not equally subject to variation, as some kinds of differences are more frequent than others. For example, when there is no fraction in the coordinates of one recension, the other recension is concordant in more than 80% of the cases. By contrast, when a recension gives  $\iota\beta$  ( $5'$ ), the other recension has the same reading in less than 30% of cases. Scribal error explains most of the frequent occurrences:  $L/\zeta$  (thirty-seven occurrences) are graphically very similar;<sup>107</sup>  $L\gamma/\gamma$  (sixteen occurrences),  $\gamma\theta/\gamma$  (thirteen),  $L\delta/\delta$  (eight),  $L\gamma/L$  (eight) and  $L\gamma\iota\beta/\gamma\iota\beta$  (six) concern the omission or the addition of a single letter;  $L/\gamma$  (eleven) and  $\gamma/\zeta$  (six) come down to a mutation of one letter. It is, of course, possible that all these differences are the result of corrections, although this cannot be systematically proven.

Moreover, the divergences in the fractional parts are often asymmetrical between  $\Omega$  and  $\Xi$ , a fact that possibly exposes specific features of the copying process of the recensions' respective hyparchetypes. For example, on fifteen occasions the  $\Omega$  recension has the letter  $\gamma$  and  $\Xi$  has  $L\gamma$ , while the inverse scenario occurs only once ( $\Omega^{L\gamma}-\Xi^\gamma$ ). Likewise, the cases of  $\Omega^\delta-\Xi^{L\delta}$  (seven occurrences)/ $\Omega^{L\delta}-\Xi^\delta$  (one) and  $\Omega^L-\Xi^{L\gamma}$  (seven)/ $\Omega^{L\gamma}-\Xi^L$  (one) as well as  $\Omega^L-\Xi^\zeta$  (twenty-three)/ $\Omega^\zeta-\Xi^L$  (fourteen) all point to an asymmetry in the recensions' divergences. A counterexample is  $\Omega^{\gamma\theta}-\Xi^\gamma$  (six)/ $\Omega^{\gamma\theta}-\Xi^{\gamma\theta}$  (seven).<sup>108</sup> As a whole, readings in the  $\Omega$  recension tend to have one sign less than those in  $\Xi$ , which can be interpreted either as omissions in  $\Omega$  or as additions in  $\Xi$ .

### 3.3.3 Anomalies in the coordinates

The only cases of uncommon fractions are to be found in manuscript X:

- Longitude of Merua:  $\bar{\zeta} \eta'$  ( $7 \frac{1}{8}^\circ$ )<sup>109</sup>
- Latitude of Gades:  $\bar{\lambda} \zeta L \zeta'$  ( $36^\circ 40'$ )<sup>110</sup>

107 See p. 121.

109 *Geogr.* 2.6.46:  $\bar{\zeta} L' \Omega$ .

108 The other cases appear less frequently and are thus less relevant.

110 *Geogr.* 2.4.16:  $\bar{\lambda} \zeta \zeta' \Omega$ .

- Longitude of the mouth of the Tagus River:  $\bar{\epsilon} L\zeta'$  ( $5^{\circ}40'$ )<sup>111</sup>
- Latitude of Glandomiron:  $\bar{\mu}\bar{\gamma} L\zeta'$  ( $43^{\circ}40'$ )<sup>112</sup>

The use of  $L\zeta'$  rather than  $\gamma o'$  to represent the fraction two-thirds is employed in other geographical manuscripts<sup>113</sup> but it does not feature in the Iberian section of the  $\Omega$  recension. Similarly, the only instances where the catalogue has exactly the same geographical coordinates for two different localities are in manuscript X:

- Mouth of the Tagus and the city of Arabriga:<sup>114</sup>  $5^{\circ}40'; 40^{\circ}30'$
- Carthago Vetus and Tarraco:<sup>115</sup>  $16^{\circ}20'; 40^{\circ}40'$
- Aquae Calidae and Sebellunum:<sup>116</sup>  $16^{\circ}40'; 42^{\circ}10'$

As far as the Iberian chapters are concerned, the  $\Omega$  recension (with the exception of isolated readings in one of the main  $\Omega$  manuscripts) does not appear to have fractions that diverge from Ptolemy's system, while no instances of two localities with the same coordinates have been found.

A frequently occurring case that may be the result of a misunderstanding rather than a misreading is worth highlighting. There are thirteen instances where the  $\Xi$  recension uses  $\iota\beta$  ( $5'$ ) and the  $\Omega$  recension has  $\gamma o$  ( $40'$ ). The inverse pattern never occurs. There are other similar, frequently occurring cases, including the following instance:  $\Omega^{\gamma o} - \Xi^{\gamma\iota\beta}$  (seven)/ $\Omega^{\gamma\iota\beta} - \Xi^{\gamma o}$  (zero) and  $\Omega^{\gamma o} - \Xi^{L\gamma\iota\beta}$  (five)/ $\Omega^{L\gamma\iota\beta} - \Xi^{\gamma o}$  (two). The confusion between  $\iota\beta$  and  $\gamma o$  is hard to interpret. According to F. Mittenhuber and L. Koch, who have found a similar anomaly in a manuscript (V\*) of the 'Table of Noteworthy Cities',<sup>117</sup> the explanation is palaeographical, since IB and  $\Gamma o$  in majuscule letters are graphically similar.<sup>118</sup> Their explanation is admittedly plausible but not totally convincing. Although the form of the letter  $\beta$  changed over time,  $\gamma o$  (or  $\Gamma o$ ) remained virtually unaltered. Both letter combinations ( $\iota\beta$  and  $\gamma o$ ) appear differently in antique papyri, such as the Rylands Library Papyrus No. 522, as well as in the medieval codices of the *Handy Tables* and in the late medieval codices of the *Geography*.<sup>119</sup> An intentional correction of

111 *Geogr.* 2.5.4:  $\bar{\epsilon} L'$   $\Omega$ .

112 *Geogr.* 2.6.23:  $\bar{\mu}\bar{\gamma} L'$   $\Omega$ .

113 The manuscripts of *Eux.* systematically use  $L\zeta'$  for two-thirds of a mile (see the forty-six occurrences in the Palatinus Heidelb. gr. 398).

114 *Geogr.* 2.5.4: Tagus ( $5^{\circ}30'; 40^{\circ}10'$ )  $\Omega$ ; *Geogr.* 2.5.7: Arabriga ( $5^{\circ}40'; 40^{\circ}30'$ )  $\Omega$ .

115 *Geogr.* 2.6.64: Carthago Vetus ( $16^{\circ}40'; 41^{\circ}20'$ )  $\Omega$ ; *Geogr.* 2.6.17: Tarraco ( $16^{\circ}20'; 40^{\circ}40'$ )  $\Omega$ .

116 *Geogr.* 2.6.70: Aquae Calidae ( $16^{\circ}40'; 42^{\circ}10'$ )  $\Omega$ ; *Geogr.* 2.6.71: Sebendunum (sic) ( $17^{\circ}55'; 42^{\circ}15'$ )  $\Omega$ .

117 Mittenhuber and Koch 2009, footnote 56, p. 49.

The cases are, however, slightly different, since the fraction readings in V\* are often illogical or downright absurd, such as  $\gamma\gamma o'$  (i.e.  $\frac{1}{3} + \frac{2}{3}$ ) for Myndos, Symrna and Ephesos instead of  $\gamma\iota\beta'$  ('Table of Noteworthy Cities' 15.2) or  $L\gamma o'$  (i.e.  $\frac{1}{2} + \frac{2}{3}$ ) for Trapezus instead of  $\iota\beta'$  ('Table of Noteworthy Cities' 15.4). It would make sense, though, if  $\gamma o$  was meant to express one-twelfth.

118 Mittenhuber and Koch 2009, 49.

119 See fig. 8, Appendix B and p. 123.

exactly 35' that was made to the coordinates does not make any sense either.<sup>120</sup> The first occurrence of the fraction  $\iota\beta$  in the catalogue of the *Geography* is in the latitude of the Temple of Hera, which is given at the beginning of the description of Iberia.<sup>121</sup> The first four instances of this fraction can be found in the  $\Xi$  recension, whereas  $\Omega$  has divergent readings. One explanation is that there was confusion about the meaning of the two fractions, particularly as  $\gamma\omicron$  can also mean – in other texts than the *Geography* – one-twelfth.<sup>122</sup> The scribe of the  $\Omega$  hyparchetype might have had trouble understanding  $\iota\beta$  and, in its place, used an equivalent and more familiar fraction ( $\gamma\omicron$ ). In these specific cases,  $\iota\beta$  (one-twelfth) is very possibly the archetypal reading.

In addition, there are a number of cases of divergent readings that cannot be explained by a simple error or the context, such as:

		$\Omega$ recension	$\Xi$ recension
<i>Geogr.</i> 2.4.11	Longitude of Ulia	$\bar{\theta} L'$	$\bar{\eta} L\delta'$
<i>Geogr.</i> 2.6.39	Longitude of Pinetum	$\bar{\zeta} L\gamma'$	$\bar{\zeta} \gamma\omicron'$
	Latitude of Pinetum	$\bar{\mu}\gamma L'$	$\bar{\mu}\gamma \iota\beta'$
<i>Geogr.</i> 2.6.42	Latitude of Coeliobriga	$\bar{\mu}\gamma \gamma'$	$\bar{\mu}\beta L'$
<i>Geogr.</i> 2.6.56	Longitude of Numantia	$\bar{\iota}\gamma \gamma\iota\beta'$	$\bar{\iota}\beta L'$
	Latitude of Numantia	$\bar{\mu}\beta L\delta'$	$\bar{\mu}\alpha L\gamma'$
<i>Geogr.</i> 2.6.62	Latitude of Iaspis	$\bar{\lambda}\eta L\gamma\iota\beta'$	$\bar{\lambda}\eta \delta'$
<i>Geogr.</i> 2.6.73	Longitude of Deciana	$\bar{\iota}\eta \gamma\omicron'$	$\bar{\iota}\zeta L\gamma' (XKK^tF^t)$

These differences in the coordinates could be the result of: a row of coordinates that were incorrectly copied in one or both recensions, and which occurred during the writing of several successive copies; a defective part of the archetype, which was incorrectly interpreted; or an intentional emendation of the text. There are also two other particularly intriguing cases:

		$\Omega$ recension	$\Xi$ recension
<i>Geogr.</i> 2.5.7	Latitude of Scalabis Colonia	$\bar{\mu}\alpha (41^\circ)$	$\bar{\mu} L\gamma\iota\beta' (40^\circ 55')$
<i>Geogr.</i> 2.6.50	Latitude of Sentica	$\bar{\mu}\beta (42^\circ)$	$\bar{\mu}\alpha L\gamma\iota\beta' (41^\circ 55')$

Again, a simple copying error is unlikely and the respective contexts also do not explain the divergent readings. The version of the  $\Xi$  recension is clearly the *lectio difficilior*. Both

120 If  $1^\circ = 500$  stades (along the meridian),  $35' = 291 \frac{2}{3}$  stades. If  $1^\circ = 400$  stades (along the parallel through Rhodes),  $35' = 233 \frac{1}{3}$  stades. If  $1^\circ = 375$  stades (along the middle parallel of the Iberian map),  $35' = 218 \frac{3}{4}$  stades.

121 The  $\epsilon\zeta\omicron\gamma\eta$  point (the latitude of which contains the  $\iota\beta$  fraction) occurs slightly earlier in the catalogue, in a description of Albion (*Geogr.* 2.3.6), and is cer-

tainly a later addition. See p. 138. The missing longitudes of the western mouths of the Anas ( $\bar{\delta} \iota\beta'$ ) and Baetis Rivers ( $\bar{\epsilon} \iota\beta'$ ), which were clearly lost at an early stage in the transmission process, have been added to the catalogue by A. Stückelberger and G. Graßhoff. See p. 96.

122 See p. 123.

these examples are open to different interpretations. The coordinates might have appeared in the archetype as they appear in  $\Omega$  ( $41^\circ$ ;  $42^\circ$ ) and a reviser of  $\Xi$  might have introduced a precision of  $5'$  in order to correct and refine the values ( $40^\circ 55'$ ;  $41^\circ 55'$ ). Alternatively, it is possible that the coordinates were simply rounded up in the  $\Omega$  hyparchetype.<sup>123</sup> The latter is the more plausible option, if one postulates the principle *lectio difficilior potior*. Both scenarios, however, suggest that an intentional emendation was carried out, and by someone with a thorough knowledge of Ptolemy's system of coordinates.

### 3.3.4 Conclusion

The 513 Iberian localities of the two recensions constitute a good sample of coordinates from which to draw some conclusions. First of all, many of the differences in the readings in the  $\Xi$  and  $\Omega$  recensions can be attributed to unintentional misreadings and copying errors, such as: misdivisions, reasonable confusions between majuscule or minuscule letters or similar signs, the omissions or additions of a single sign, as well as plausible misunderstandings ( $\iota\beta/\gamma\omicron$ ). For these cases, it is often difficult to reconstruct the archetypal or original reading using only paleographical and philological assessments and to prove that one of the recensions unquestionably shows the marks of intentional emendations that occurred after Ptolemy's redaction. Only in those cases where there is a significant numerical difference between  $\Xi$  and  $\Omega$  can one detect whether a latitude or a longitude diverges radically from the other localities in the list. Therefore, to be able to demonstrate which recension has the better reading, particularly in cases where the differences are small, it is clear that additional criteria will be needed.

## 3.4 Textual organisation and spatial ordering of the catalogue

### 3.4.1 Using maps to edit the *Geography*

If philologists or editors of the *Geography* base their investigations of divergent coordinate readings on the catalogue alone, they will, in most cases, find nothing to help them select the correct values (or even to suggest a conjecture). Philologists, though, never examine a manuscript reading in isolation. They will always take into account a set of elements related to its context: the meaning of the sentence and the paragraph in which the word is found as well as the usual vocabulary and the style of the author. The catalogue and its lists of localities, however, consist of abstract figures, which is a far from

123  $\Omega$  often provides the *lectio brevior* in the catalogue's paratext. See p. 133.

ideal context for justifying the selection of one reading against another. Even though a difference between  $\Xi$  and  $\Omega$  can, for example, clearly stem from a majuscule that might have been misread and misinterpreted, such a philological explanation of the divergence between the recensions can still not be enough to help assess which of the manuscripts provides the better reading.

The philological methods used by the successive editors of the *Geography* (K. Müller and, more recently, A. Stückelberger and G. Graßhoff) depend, albeit with some variations, on a ‘reconstructive’ or ‘genealogical’ approach, which is sometimes also called ‘Lachmannian’ or ‘Neo-Lachmannian’: in other words, a plausible archetype of the surviving manuscripts is reconstructed and this archetype is then used ‘to try to come as close as possible to the lost original, detecting and correcting, as far as possible, but always as rationally and transparently as possible, the errors shared by surviving copies.’<sup>124</sup> From this point of view, Ptolemy’s catalogue of localities could appear to be a kind of philological aporia, since even the reconstruction of an archetype is problematic.

A philological practice that is still used today to edit medieval texts, is to rely simply on a ‘good manuscript’ or on the authority of the *codex optimus*, that is, the ‘best manuscript’ among all the extant manuscripts of a work, in order to determine the best readings. This procedure, revived since P. Bédier’s famous article on the manuscript tradition of the *Lai de l’Ombre*,<sup>125</sup> has been criticised, mainly because selecting a ‘good manuscript’ or the *codex optimus* can be highly subjective as well as at variance with the history of the textual transmission.<sup>126</sup> Although L. D. Reynolds and N. G. Wilson also have reservations about this practice, they admit that the authority of the ‘best manuscript’ can be useful in specific cases:

In textual traditions where the term [that is, *codex optimus*] may reasonably be employed, its use is confined to passages where there is a variety of readings among the manuscripts and there are no grounds for preferring one of these readings to another. Since the best manuscript is that which gives the greatest number of correct readings in passages where there are rational grounds for decision, it is more likely than the others to give the correct reading in passages where no such grounds exist. It is this argument from probability which justifies the appeal to the best manuscript in the circumstances indicated.<sup>127</sup>

One may be tempted to rely on the ‘best manuscript’ in the numerous cases in the *Geography* where it is difficult to assess the coordinate readings. Many aspects concerning

124 Trovato 2014, 15.

125 Bédier 1970 (first edition 1928).

126 See, e.g., Bieler 1946, 12–13, Dembowski 1993 and Leonardi 2011.

127 See Reynolds and N. Wilson 1991, 216–217.

the spelling of the Iberian toponyms and ethnonyms, as well as the paratext of the catalogue, would appear to suggest to scholars that manuscript X should be used as the *codex optimus*. However, the previous section's analysis of the variant readings of the coordinates revealed that the situation is not that clear-cut: manuscript X contains several obvious mistakes as well as inconsistent elements in the coordinates (for example, the same coordinates used for two different localities, figures at variance with Ptolemy's numeral system), while the manuscripts of the  $\Omega$  recension do not have these flaws. Thus, deciding which manuscript of the *Geography* should be used as the *codex optimus* is not as straightforward as one might think.

The aporia mentioned above can, nevertheless, be overcome if one bears in mind that Ptolemy's catalogue of localities is not literary prose but a scientific work with its own logic and specificities.<sup>128</sup> I am convinced that a 'reconstructive' philological approach is still valid as long as the subject to be studied has been properly defined.<sup>129</sup> Ptolemy's catalogue of localities does indeed offer promising possibilities that have up to now rarely been fully developed. As the lists were intended to be used to make maps, the role of the catalogue can only be said to have been fulfilled when the localities have been situated and drawn on to a map. The map itself can be regarded as a contextual element. The discussion on the  $\epsilon\zeta\omicron\chi\eta$  point in the previous section demonstrated that some of the catalogue's features may possibly be of 'cartographical' origin: the point was only added to the catalogue after a map had been drawn, that is, once the cartographer had realised that, without this point, the coastline made no sense. If no map had been drawn, it would have been impossible to detect that the coordinates in this passage of the catalogue had been corrupted. The aim of the next sections is, therefore, to show how Ptolemy's map of the Iberian peninsula can be used to explain the role of both recensions in establishing the original text and coordinates of the *Geography*.

### 3.4.2 Coastline and lists of coastal localities

As far as the coastal localities are concerned, the order of the toponyms in the lists does not *follow* the order of the coastal line; rather, it *defines* it.<sup>130</sup> The only exceptions, which are clearly indicated in the catalogue, are the sources of rivers and the intermediate points along the river courses; although these points are related to the inland area, they

128 The antique and medieval works that are taken as examples in the debate on classical textual criticism and that are used in the elaboration of its theories and methods – the New Testament, Lucretius' *De rerum natura*, Roman elegiac poetry, Dante's *Divine Comedy*, the *Lai de l'Ombre*, *The Canterbury Tales*, etc. – cannot always be suitable points of comparison when dealing with the *Geography*.

129 The elements pertaining to the appropriate philological approach of Ptolemy's *Geography* that I suggest here and, more generally, in Chapter 3 of this book, cannot be taken as a fully established method: such a method has yet to be problematised, structured and developed.

130 Cf. with *Geogr.* 1.18.6.

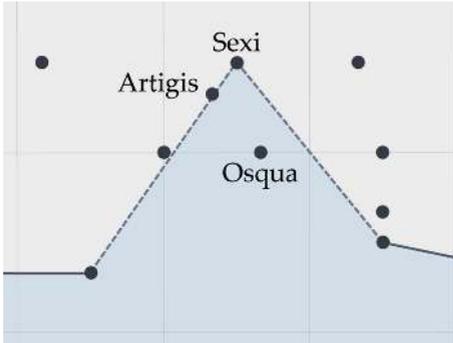


Fig. 13 Configuration of the coast near Sexi in the Ξ recension.

are listed below their respective mouths. The order of the coastal localities obviously concurs with the map that Ptolemy designed. If the catalogue had been organised alphabetically, numerically (with increasing or decreasing latitudes, for example) or even randomly, the reader of the *Geography* would not have been able to draw the coast of the peninsula accurately, which indicates that Ptolemy constructed the catalogue *after* the maps. With the exception of some isolated cases, the coastal descriptions in the catalogue leads to a logical coastline, despite centuries of textual transmission.

Except when the coast cartographically contradicts the inland localities – such as when a city of the interior mistakenly ends up lying in the sea – there are very few criteria that can be used to help detect an erroneous reading. At best, readings are either consistent or inconsistent with the expected coastal shape:

- The latitude of Mount Selēnē (along the Lusitanian coast) is obviously erroneous in the Ξ recension as it would lead to an inconsistent coastline: the latter would run too far northwards and then go back southwards, cutting into itself. The erroneous addition of one letter (the beta) may explain the error:  $\overline{\mu\beta} \gamma\omicron'$  in X,  $\overline{\mu} \gamma\omicron'$  in  $\Omega$ .<sup>131</sup> This copying error was not in Marcian of Heraclea's exemplar.<sup>132</sup>
- The Ξ coordinates of Sexi (in the south-east of Baetica) should be regarded as a minor copying error.<sup>133</sup> Compared with the configuration in  $\Omega$ , Sexi has been shifted slightly northwards, leaving the city of Osqua in the sea and the inland town of Artigis on the coast, thus clearly not corresponding with the text of the *Geography* (Fig. 13).

<sup>131</sup> *Geogr.* 2.5.4.

<sup>132</sup> Marcian (*Per. mar. ext.* 2.13) writes that there are 120 to 150 stadia between the Tagus River and Mount Selēnē, as well as the same range from the latter to

the Munda River, which is incompatible with the latitude given in X.

<sup>133</sup> *Geogr.* 2.4.6. The difference in the Greek numbers between the recensions corresponds to the addition of the symbol L in X ( $\overline{\lambda\zeta} L\delta'$  in X,  $\overline{\lambda\zeta} \delta'$  in  $\Omega$ ).

These two cases of demonstrable copying errors in the coastline only concern the  $\Xi$  recension as the  $\Omega$  recension is unaffected by this kind of inconsistency. E. Rinner has observed the same circumstances for the coast of Asia Minor.<sup>134</sup>

### 3.4.3 Syntax of the catalogue and spatial ordering

The structure of the catalogue, in particular the integration of peoples into the toponym lists, offers a coherent frame from which inconsistent readings in the coordinates can be detected. In the introduction to the *Geography*, Ptolemy reveals some of the reasons behind the structure of the catalogue:

We have chosen an order [of presentation] (τάξις) giving thought to ease of use in the drawing of the map in every respect, namely progressing toward the right, with the hand proceeding from the things that have already been inscribed to those that have not yet [been inscribed]: this would be achieved by having the more northern [localities] drawn before the more southerly ones, and the more western before the more eastern, because our convention is that 'up' with respect to the map-makers' or spectators' view means 'north' and 'right' means 'east' in the *oikoumenē*, both on a globe and on a map.<sup>135</sup>

Ptolemy then explains that, as a result, he recorded first ('πρωτάξομεν') the localities in Europe, followed by those in Libyē and finally those in Asia. He concludes:

We will keep to the same principles (προθέσεως) also in each continent with respect to its parts as [we do] for the whole world and the entire *oikoumenē* with respect to [the continents], that is, we will again begin by recording the more northern and western countries and the adjacent seas and islands and the more noteworthy things of each kind.<sup>136</sup>

For reasons of convenience – at least for right-handed cartographers – the principles of organisation (τάξις) that guide the catalogue are clearly spatial and adapted to the drawing of the maps. The north–south/west–east structure is visible in the positioning of each continent's description within the catalogue as well as in the positioning of the individual περιορισμοί (countries) within each continent. As far as the Iberian peninsula is concerned, each province is generally described using the same logic, that is, from the peoples in the north and the west until the peoples in the south and the east. In Tarraconensis province, for instance, the Artabri and the Callaeci Lucenses peoples, near

A scribe in the  $\Xi$  recension (possibly the scribe of X himself) might have been influenced by the longitude figure that he had just copied ( $\bar{\theta}$  Lδ').

<sup>134</sup> Rinner 2013, 159–160.

<sup>135</sup> *Geogr.* 2.1.4–5.

<sup>136</sup> *Geogr.* 2.1.7.

Cape Nerion at the northwestern point of the peninsula, occupy the top of the list of inland localities, whereas the Indigetes and the Laetani peoples, to the east, are found at the end of the description.

Nowhere in the *Geography* does Ptolemy explicitly give an explanation of the order of the inland localities inside each ‘sub-list’ (that is, the section of a province’s list that is related to one group of people). Contrary to many of the enumerations in Pliny’s work,<sup>137</sup> the sub-lists are not ordered alphabetically. For each group of peoples, that is, in each sub-list, one can link the localities on the map with the order of the localities in the sub-list, much like a ‘connect-the-dots’ picture. Since the order of the entries in the catalogue is the same in both recensions,<sup>138</sup> only the differences in the coordinates between  $\Xi$  and  $\Omega$  will modify the form of the lines that connect the localities on the map. Therefore, the ‘connect-the-dots’ tool allows us to visualise how each sub-list was made and organised by Ptolemy, that is, we can envisage the spatial ordering of the catalogue.<sup>139</sup> In the  $\Xi$  recension, a recurrent pattern clearly emerges (Fig. 14). Within each sub-list, the localities are generally arranged in the catalogue in order of decreasing latitude (that is, from north to south) and increasing longitude (that is, from west to east). This zigzag feature suggests that the catalogue was methodically structured.

A pattern appears for those peoples associated with four or more localities; shorter sub-lists are less relevant because of the small number of elements. On the Iberian map, thirty-two peoples are shown to have at least four localities and, among them, ten include more than fifteen localities. Thirty peoples are connected to three or fewer localities. In the  $\Xi$  recension, the spatial ordering resembles, to a greater or lesser degree, a theoretical zigzag pattern for the Turdetani (forty-one inland localities), the Vaccae (twenty), the Carpetani (eighteen), the Vascones (fifteen), the Sedetani (twelve), the Vettones (eleven), the Arevaci (ten), the Ilergetes (ten), the Laccetani (ten), the Celtici (nine), the Cantabri (eight), the Autrigones (seven), the Varduli (seven), the Turmogi (five) and the Celtici Baeticae (five) peoples. The localities of the Arevaci have not been ordered in a strictly north–south/west–east sense but they nonetheless display the same kind of zigzagging pattern. By contrast, the spatial ordering of the localities belonging to the Lusitani is rather muddled.

137 Pliny writes that he followed a *digestio in litteras* attributed to Augustus for the description of Italy (Pl. 3.46). K. G. Sallmann 1971, 201–202, has demonstrated that Pliny used some alphabetical lists for Hispania and Narbonensis. See also Zehnacker 2004, xvi.

138 There are only two instances where entries have been inverted in the Iberian catalogue, both found in manuscript K as against manuscripts

UVRXO: Maenoba/Malaca (*Geogr.* 2.4.7) and Sal-laeccus/Ammaia (*Geogr.* 2.5.8).

139 The spatial ordering of the catalogue has been studied by Hamdoune 1993, Laporte 2003, 183–187, Isaksen 2011, 260–266, and Rinner 2013, 41–44. However, none of these authors has used spatial ordering to compare the two recensions and they have also not explicitly linked the spatial organisation of the catalogue with the origins of the coordinates.

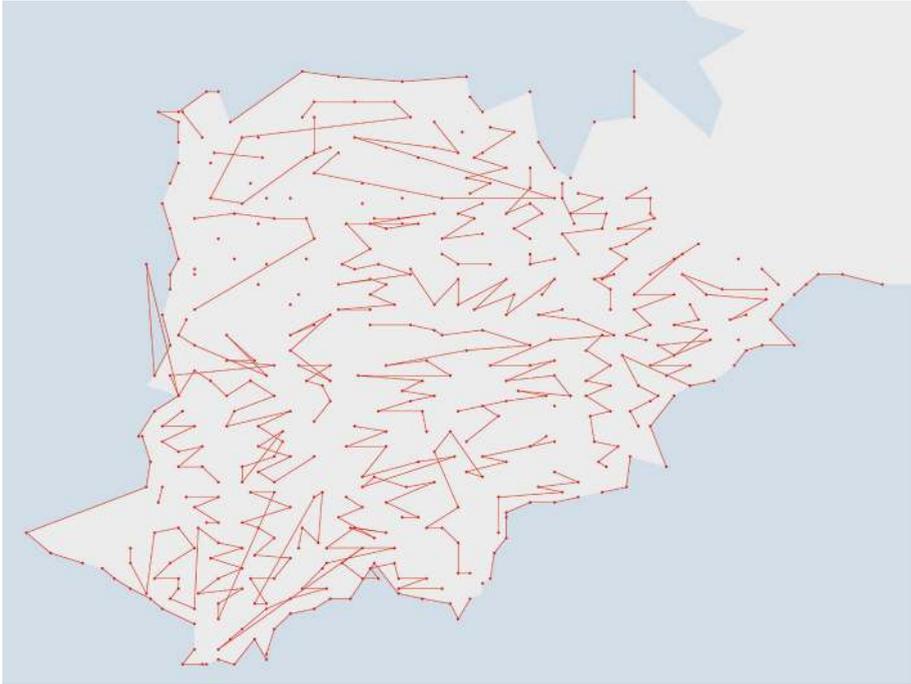


Fig. 14 Spatial ordering of the localities within each sub-list of the catalogue for the Iberian peninsula in the Ξ recension.

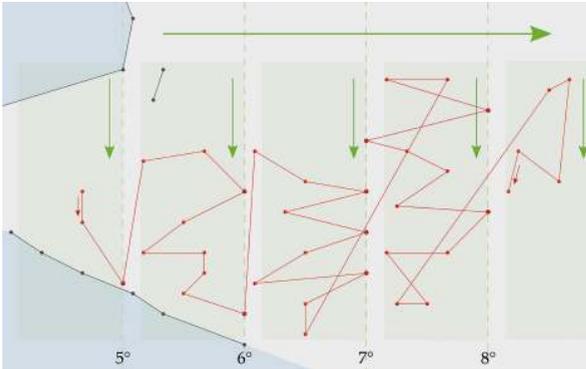


Fig. 15 Spatial ordering of the localities of the Turdetani people in the Ξ recension.

The Turdetani and their forty-one localities is an exemplary case (Fig. 15). The cities, located from west to east, fall into five columns: column 1 contains the cities with longitudes between 4° and 5° included; column 2, the cities with longitudes between 5° and 6° included; column 3, between 6° and 7° included; column 4, between 7° and 8°

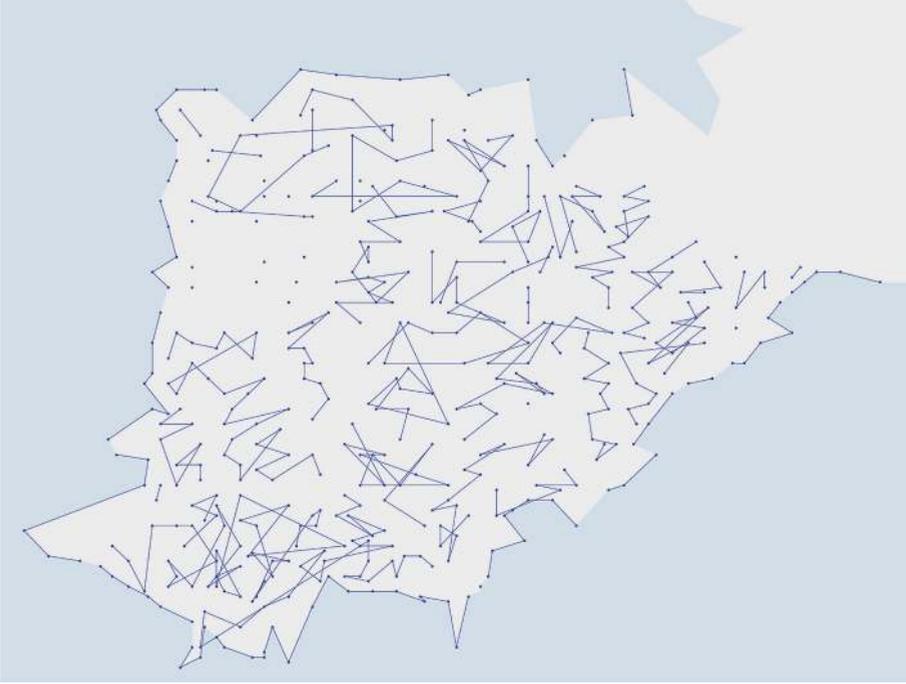


Fig. 16 Spatial ordering of the localities within each sub-list of the catalogue for the Iberian peninsula in the  $\Omega$  recension.

included; and column 5, between  $8^{\circ}$  and  $9^{\circ}$ . The places in each column have been ordered according to decreasing latitude, that is, from north to south. The utilisation of the main meridians ( $5^{\circ}$ ,  $6^{\circ}$ ,  $7^{\circ}$  and  $8^{\circ}$ ) and the repetition of a spatial ordering process are particularly striking.

The spatial ordering of the inland localities in the  $\Xi$  recension thus predominantly follows the same principles of organisation that Ptolemy set out in his introduction for the continents and the *περιορισμοί*. As mentioned earlier, Ptolemy uses the word *τάξις* to designate the ‘ordering’ or the ‘arrangement’ of his catalogue. The word *τάξις* comes from the verb *τάσσω* (‘to draw up in order of battle,’ ‘to assign to,’ ‘to order’); this *τάξις* is in fact the ‘syntax’ of the catalogue, that is, the way that the entries are arranged so that the whole catalogue makes sense. The zigzag patterns are thus the visualisation of the catalogue’s *τάξις*, and show that the coordinates in the  $\Xi$  recension are generally consistent with Ptolemy’s ‘syntax’.

The spatial ordering of the catalogue in the  $\Omega$  recension is clearly less methodically organised (Fig. 16). In many cases, the ordering does not seem not to follow a specific schema, with the zigzag patterns often barely recognisable (cf. Fig. 17 with Fig. 15).

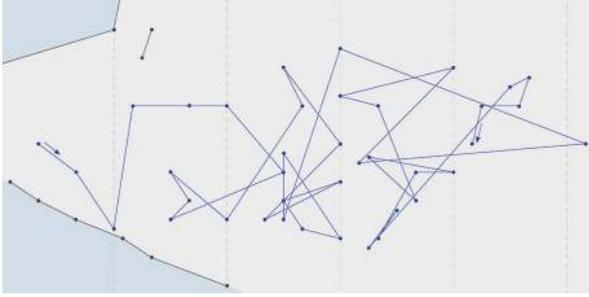


Fig. 17 Spatial ordering of the localities of the Turdetani people in the  $\Omega$  recension.

Once again, the entries in the catalogue follow the same order in both recensions. Thus, when one compares the situation in both recensions, only the differences in the coordinates between  $\Xi$  and  $\Omega$  are responsible for the variations in the zigzag patterns. Some of the localities that were methodically ordered in the  $\Xi$  recension appear to have been randomly arranged in  $\Omega$ . The only exception concerns the Lusitani people, for which the sub-list in  $\Omega$  appears more satisfactorily structured than the sub-list in the  $\Xi$  recension. A person drawing the Iberian map using the  $\Omega$  recension would not find the convenient order that Ptolemy promises in his introduction. In other words, the spatial ordering of the inland localities is not consistent with Ptolemy's method. The  $\Xi$  recension appears notably closer to the catalogue that Ptolemy originally conceived. Although isolated inconsistent readings have been detected only in X, a comparison between the two recensions shows that, on the whole, the  $\Xi$  recension contains 'better' coordinates than the  $\Omega$  recension.

In many cases, a short sentence introduces the sub-lists, in which the ethnonym and an indication of the people's location on the peninsula are supplied. The nature and precision of the indications are varied and often quite vague:

The Turdetani occupy the area further inland, near Lusitania; their cities [include: ...]<sup>140</sup>

To the very east [of Lusitania] there are the Vettones; their cities [include: ...]<sup>141</sup>

In a few cases, the indication refers to previously defined places on the peninsula:

The Artabri occupy the area near Cape Nerion; their cities [include: ...]<sup>142</sup>

The Callaeci Bracari occupy the area between the Minius and the Durius Rivers near the sea; their cities [include: ...]<sup>143</sup>

140 *Geogr.* 2.4.12.

141 *Geogr.* 2.5.9.

142 *Geogr.* 2.6.22.

143 *Geogr.* 2.6.39.

In the interval between the Ebro River and the Pyrenees, to the east of the Autrigones, in the middle of which the Ebro flows, are the Carietes with the following inland cities [...].<sup>144</sup>

In most cases, however, a people is named in relation to the previously mentioned group, with the help of either the cardinal directions – ἀπ' ἀνατολῶν δὲ τούτων,<sup>145</sup> ἔτι τούτων δυσμικώτεροι,<sup>146</sup> μεσημβρινιώτεροι δὲ τούτων<sup>147</sup> – or a simple spatial preposition – ὑπό, μεθά, ὑπέρ – as in:

Below (ὑπό) the Autrigones [there are] the Berones; their cities [include: ...]<sup>148</sup>

The indications of location are identical in the two recensions, including the imprecise nature of the spatial prepositions ('below', 'after', 'above').<sup>149</sup> The Indigetes, the Castellani and the Ausetani peoples, who Ptolemy locates as living in the area between the south-west of the Pyrenees and the Balearic Sea, differ markedly in the recensions; moreover, two of their cities, Aquae Calidae and Sebellunum, have exactly the same coordinates in Ξ. However, apart from this obvious erroneous reading, the introductory sentences in the catalogue are not precise enough for us to detect any inconsistency in the coordinates of one of the recensions; both configurations could be said to correspond to Ptolemy's indications. There is one case that has an inconsistency that is worth highlighting. Ptolemy presents the Arevaci as follows:

Below (ὑπό) the Pelendones and the Berones [there are] the Arevaci; their cities [include:...] <sup>150</sup>

In the Ξ recension the configuration of these three peoples and their respective cities tallies perfectly with the indications given in the introductory sentences (Fig. 18a). By contrast, the configuration of the Ω recension is markedly different: the Berones are clearly to be found to the south-east of the Arevaci, whereas the city of Visontium of the Pelendones lies near the southern cities of the Arevaci (Fig. 18b). Therefore, in this instance the text of the catalogue and the Ω coordinates are strongly discordant.

The analysis of the spatial ordering of the localities in Ptolemy's catalogue has proved extremely instructive, since it has provided us with the means to visualise part of Ptolemy's working method, more precisely the 'syntax' used in his catalogue. Thus, it has become apparent that Ptolemy used his map of the Iberian peninsula, on which the localities had been drawn, to construct and organise the catalogue of localities. Ptolemy's own

144 *Geogr.* 2.6.65.

145 *Geogr.* 2.6.28.

146 *Geogr.* 2.6.72.

147 *Geogr.* 2.6.59.

148 *Geogr.* 2.6.55.

149 See Podossinov 2013, in particular 17–19, on the use of some of the spatial prepositions in the *Geography*.

150 *Geogr.* 2.6.56.

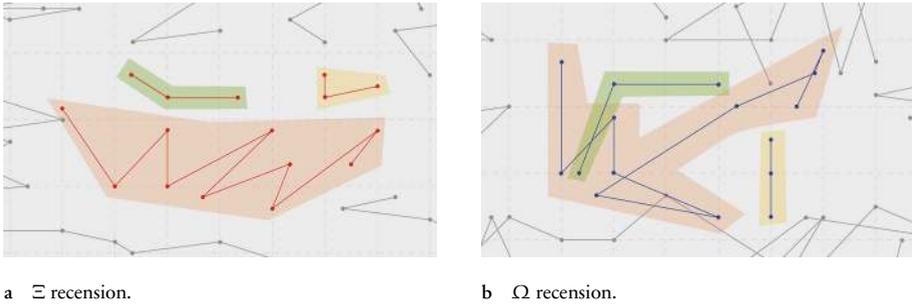


Fig. 18 Configuration of the Arevaci people (in orange), the Pelendones (in green) and the Berones (in yellow).

explanations in the introduction to the *Geography* as well as in the catalogue's paratext testify to this model. Furthermore, it seems clear that the  $\Xi$  recension generally conforms to this model, whereas, in a large number of cases, the  $\Omega$  recension does not follow Ptolemy's principles of organisation.

## 4 Sources and methods in the introduction to the *Geography*

The analysis of the comparatively little studied catalogue of localities in the previous chapter has shed light on a number of aspects of Ptolemy's methods. By contrast, the introduction to the *Geography*, filled as it is with information on Ptolemy's geographical and cartographical viewpoints and procedures, has often been investigated in the belief that it holds the answers to the mystery of the origins of the coordinates. The main purpose of Ptolemy's introduction, however, was not to give a detailed description of the author's working methods but a presentation of his theoretical statements on geography and cartography. The introduction cannot, therefore, be regarded as a complete explanation of the coordinates' origins; as G. Aujac has astutely observed, it is also worth examining what Ptolemy did *not* write in his introduction.<sup>1</sup>

### 4.1 Ptolemy's epistemology of a geographical science

#### 4.1.1 Preliminary definitions

In his introduction, Ptolemy defines geography as an organised science, which allows him to specify the epistemological and technical bases of his project. He explains in detail the distinction between the work of the geographer and the chorographer:

Chorography (ἡ χωρογραφία) deals above all with the qualities rather than the quantities of the things that it sets down; it attends everywhere to likeness (τῆς ὁμοιότητος), and not so much to the commensurateness of the positions (τοῦ συμμετρῶν τῶν θέσεων). Geography (ἡ γεωγραφία), on the other hand, [deals] with the quantities more than the qualities, since it gives consideration to the proportionality of distances (τῆς ἀναλογίας τῶν διαστάσεων) for all things, but

<sup>1</sup> Aujac 2012, 22.

to likeness only as far as the coarser outlines (τῶν μεγαλομερεστέρων περιγραφῶν), and only with respect to mere shape (τὸ σχῆμα μόνον).<sup>2</sup>

There has been much historiographical debate on Ptolemy's epistemological and terminological definitions. As far as the sources and the way they were handled are concerned, one can acknowledge that, for 'geographical' purposes, Ptolemy focused on proportionality and commensurateness, that is, a way of schematising geographical features that took into consideration their general form. He considered the graphical tools of the geographer to be first and foremost 'lines' and 'labels', in the tradition of Eratosthenes' method of likening regions to simple geometrical forms with concise labels, which made it possible to use rounded values for distances, as long as the proportions were respected.

Moreover, unlike geography, chorography should deal with the smallest details, such as 'harbours (λιμένας), towns (κώμας), districts (δήμους), tributaries of main rivers and so on'.<sup>3</sup> Ptolemy adds:

Chorography requires landscape drawing (τοπογραφίας), and no one but a man skilled in drawing (γραφικὸς ἀνὴρ) should do chorography. But geography does not [require this] at all, since it enables one to show the positions (θέσεις) and general shapes (τοῦς καθόλου σχηματισμούς) by means of simple lines (διὰ ψιλῶν τῶν γραμμῶν) and labels (τῶν παρασημειώσεων).<sup>4</sup>

Then, as the title of his work has already suggested, Ptolemy discusses the sources and methods of what he calls 'geography'. Surprisingly, even when dealing with the small details in his catalogue or the regional maps, he never refers to chorography: the catalogue of localities was said to be ἡ κατὰ μέρος ὑφήγησις, which one could translate as 'the detailed instructions' or ἡ κατὰ μέρος ἔκθεσις ('the description part by part').<sup>5</sup> The catalogue provides the coordinates of localities and indicates the lines that were to be drawn. Likewise, in the description of his regional maps, Ptolemy focuses on the boundaries of each map, the appropriate ratio of the central parallel to the meridian and the important cities, which betrays his 'geographical' interest (according to his own definition); he does not refer to any of his regional maps as 'chorographical maps' but describes them as οἱ κατὰ μέρος πίνακες, that is, 'the detailed (or regional) maps'. It is, therefore, reasonable

2 *Geogr.* 1.1.5. I translate the word τὸ σύμμετρον (also ἡ συμμετρία, which Ptolemy uses more frequently) as 'commensurateness' rather than 'symmetry' or 'proportionality'. A. Jones has noted that συμμετρία 'means having the parts of something scaled appropriately to the whole entity, or having the entity scaled appropriately for its setting or application; in

particular, the things that we make ought to have the right size and proportions for human use' (A. Jones 2012, 117; cf. with Vitruvius, 1.2.2–4 and see Hon and Goldstein 2004.)

3 *Geogr.* 1.1.1.

4 *Geogr.* 1.1.6.

5 *Geogr.* 1.18.1, 2.1.2, 2.1.11, 7.4.14.

to interpret the whole prologue of Book 8 as the application of ‘geographical’ principles in the making of regional maps.<sup>6</sup>

Nevertheless, it is clear that in the introduction to the *Geography* as well as in the contents of the catalogue Ptolemy is dealing with elements that he classified as ‘chorographical’. The catalogue gives the coordinates for towns, harbours (λιμένες, not only ἐμπορία), districts and river tributaries – that is, precisely those items that fall within his definition of chorography. Moreover, the catalogue supplies information about local fauna (shells, oysters, elephants, tigers, rhinoceroses, parrots), flora (rice, ginger) and mineral resources (cinnabar, diamonds, onyx, beryl, gold, silver).<sup>7</sup> In the introduction there is a description of the East Libyan coastline from Arōmata to Cape Prason:

[And we learn from the merchants who have crossed from Arabia Felix to Arōmata and Azania and Rhapta] that the sequence (τάξις) of beaches and bluffs (τῶν αἰγιαλῶν καὶ ἀποκόπων) to Cape Prason from the Cape of Arōmata is different from what it is according to Marinus [...]. Immediately following Arōmata is a first bay (κόλπος), and in it, after a day’s travel from Arōmata, is the town (κώμη) of Panō and the trading place of Opōnē, which is six days’ journey from the town. Another bay, which is the beginning of Azania, follows after this trading place, and at its beginning is situated the headland (ἄκραν) of Zingis and the mountain of Phalangis, which has three peaks (κεφαλῶν). [...] Another bay is adjacent to these, in which, after a sail of two days and nights, there is the trading place of Essina. Then comes the anchorage (ῥῆμον) of Sarapiōn after one day’s sail, and then begins the bay leading to Rhapta, with a crossing time of three days and nights. At its beginning is a trading place called Toniki, and by Cape Rhapton is the river called Rhaptos, and a metropolis of the same name, which is a little distance from the sea. The bay from Rhapta to Cape Prasōn is very big and not deep, and barbarous cannibals live about it.<sup>8</sup>

The description reveals an interest not only in large areas and lands but also in secondary localities (towns, the anchorage of a port) and detailed topographical information: Ptolemy writes about ‘the sequence of beaches and bluffs’ and specifies that the

6 See the opposing arguments of Arnaud 1990, 100–409, and Isaksen 2011, 255–258, and Rathmann 2013, 208–211. This may appear paradoxical, since, according to Ptolemy’s definition, chorography focuses precisely on the smaller parts of the *oikoumenē*. The epistemological framework defined by Ptolemy in his introduction is clearly not as strict as it first seems. Both *geography* and *chorography* have their own objectives and methods. However, nothing prevented one from using *geographical* principles (at-

tention to scale, to the proportionality of distances, the commensurateness of the positions, the main localities and physical features) to make a map of one region of the *oikoumenē*. Furthermore, Ptolemy justifies making several regional maps ‘so that all the catalogued [localities] can be inscribed while still being at an appropriate scale (συμμετρίας) for clarity’ (*Geogr.* 8.1.2)

7 See, e.g., *Geogr.* 7.2.16–21.

8 *Geogr.* 1.17.7–12.

Phalangis Mountain has 'three peaks'. In other words, although the catalogue deals with the description of medium- and small-sized areas, Ptolemy also provides information that seems to have little 'geographical' purpose, according to his definition of the word.

For Ptolemy, the word *τοπογραφία* (which he uses only once and which rarely appears in antique texts) had a particular meaning. According to him, 'topography' should serve chorography, as the latter required a certain level of drawing skills. The modern dictionary definition of topography is 'a detailed description or delineation of the features of a locality',<sup>9</sup> especially the position of its rivers, mountains and the appearance of its coastline, which matches Strabo's use of the term perfectly.<sup>10</sup> Thus, the description of the coast from Cape Arōmata to Cape Prason is topographical in its modern sense as well as according to Strabo's understanding of the term. Topographical descriptions were well represented in the periplographic literature as well as in more general works, such as those of Strabo and Mela.

Ptolemy began his introduction by defining the terms 'geography' and 'chorography'; which he wrote required different methods and had different purposes. However, he did not keep to this sharp distinction in his later mentions and uses of certain categories of information.<sup>11</sup> One crucial point is whether Ptolemy used the topographical descriptions of small or larger areas that appear frequently in the literature of Antiquity to determine his geographical coordinates – 'topographical' being understood in this book in the modern sense of the word. Ptolemy's use of topographical descriptions will be examined in Chapter 8.

#### 4.1.2 Primacy and failure of the 'astronomical' method

Ptolemy's map-making method was rooted in the epistemological definition of his subject. In the introduction, he specifies the method and the data needed to create a geographical map:

For these reasons, [chorography] has no need of mathematical method (*μεθόδου μαθηματικῆς*), but here [in geography] this element takes absolute precedence. [...] Since our present objective is to map our *oikoumenē* commensurately (*σύμμετρον*) as far as possible in accordance with the real [proportions], we think it

9 *The Oxford English Dictionary*, second edition, 1989.

10 Str. 8.1.1, 8.1.3, 13.1.5. Quintilian (*Inst.* 9.2.44) and Servius (*Aen.* 1.159) clearly use *topographia* in a similar way, more precisely in contrast to the fictitious description of localities (*topothesia*).

11 More generally, it is impossible to identify any precise and unchanging definition of 'geography', 'chorography' and 'topography' that would have

been valid for every antique scholar, from Eratosthenes to Ptolemy and to the Latin authors, without strongly over-interpreting the sources. However, delving into such an old historiographical debate by manipulating these terms to denote a diverse range of texts and graphical representations from Antiquity could lead to inaccuracies and misinterpretations (see, e.g., Rathmann 2013).

is necessary to begin by mentioning what follows: the first step in such a procedure (τῆς τοιαύτης μεθόδου) is the [exploitation of] the travel reports (ἱστορία περιοδική), which transmit the most extensive knowledge from accounts (ἐκ παραδόσεως) of people with scientific training (μετ' ἐπιστάσεως θεωρητικῆς), who have toured every part of the countries.<sup>12</sup>

Although Ptolemy also uses ἱστορία on its own,<sup>13</sup> the word combined with the adjective περιοδική is a hapax legomenon.<sup>14</sup> The term seems deliberately vague – and was perhaps considered general enough to encompass a wide variety of documents. A synopsis of the travel reports cited or mentioned by Ptolemy reveals the variety of sources that he used.<sup>15</sup> The concept of ἱστορία περιοδική can be understood to include the varied kinds of testimonies of people who had travelled around the *oikoumenē*, as opposed to the works produced by scholars with essentially only book-based knowledge. To describe the known world accurately, it was necessary to carry out land explorations or celestial observations *in* the countries concerned – something that Ptolemy manifestly did not undertake himself – by ‘people with scientific training.’<sup>16</sup> Compared with the (possibly) direct observations that he made in Alexandria, Ptolemy needed to use this particular and indirect transmission of geographical knowledge differently, and this had important consequences as far as his selection of sources and his data handling were concerned. Finally, it should be noted that, although the terminology used in this passage of the *Geography* was quite new, the content reflected standard opinion in antique geographical literature.<sup>17</sup>

In his introduction, Ptolemy reveals the two types of information that could be taken from these ‘reports’ (ἱστορία):

12 *Geogr.* 1.2.2.

13 *Geogr.* 1.5.2, 1.6.1 and 7.7.4.

14 It is also employed in the title of Chapter 4 of Book 1. Stückelberger and Grafshoff 2006 have translated ἱστορία περιοδική as ‘Reiseberichterstattung’ in German, and Berggren and A. Jones 2000 curiously as ‘systematic research’. D. Marcotte understands it to mean ‘l’information fournie par les itinéraires’ (Marcotte 2007b, 164). The adjective περιοδική was perhaps directly coined from the substantive περίοδος [γῆς], sometimes used as title of geographical works.

15 Stückelberger 2009c, 123–124: sea journeys and overland travel by traders, military expeditions, reports of exploratory expeditions, etc.

16 Ptolemy’s use of ἐπίστασις (‘observation’, ‘examination’, hence here ‘scientific training’ or ‘scientific expertise’) is very Polybian; see, e.g., ἀλλὰ μετ’ ἐπιστάσεως θεωρητέον (*Hist.* 2.2.2). Moreover, the concept

of ἱστορία was central to the work of Polybius, a historian and geographer *par excellence*, who relied on personal observations (αὐτόπτης); see *Hist.* 3.48, 59. See also Marcotte 2002, 21.

17 Strabo, e.g., expresses the same idea, albeit much more directly: ‘Yet both I myself and others obtain most of our material by hearsay, and then put together matters of shape, size, and other characteristics, the quality and quantity, just as a thought is put together from mental sensation. [...] Men who have a love of learning are in such a way, for they trust as a sense organ what is seen by those who have happened to wander through places, in one or another portion of the earth, putting together in a single geometrical figure the appearance of the entire inhabited world!’ (Str. 2.5.11) Unlike Ptolemy, though, Strabo is able to contribute information from his own travels.

The enquiry and reporting has a surveying (τὸ γεωμετρικόν) and an astronomical part (τὸ μετεωροσκοπικόν). The surveying component is that which indicates the relative positions of localities solely through measurements of distances (διὰ τῆς ἀναματρήσεως τῶν διαστάσεως); the astronomical component [does the same] through [celestial] observation (διὰ τῶν φαινομένων) by means of astrolabes (τῶν ἀστρολάβων) and shadow-casting instruments (σκιοθήρων ὀργάνων). The latter is a self-sufficient [procedure] and less subject to error, while surveying is cruder and incomplete without [astronomical observation].<sup>18</sup>

Ptolemy then proceeds to give a lengthy discourse on the characteristics of both kinds of enquiries and their respective reliability. Although he finds that land surveys, in which the distances between two inland localities were measured, are less accurate than astronomical observations,<sup>19</sup> he fails to identify clearly the surveying or measuring methods to which he refers: by the second century CE, however, Greek as well as Roman specialists had already developed surveying techniques and instruments for making cadastral maps and taking long-distance measurements.<sup>20</sup> Likewise, Ptolemy also finds that estimating the distances of sea journeys is imprecise. He explains that, in geography, straight distances between localities are needed, and that without observing the sky the distances will always be crude.<sup>21</sup> He does not reject these measurements outright but explains that not only were such distances insufficient (as they do not give the ratio of the distances 'to the whole circumference of the earth or its position with respect to the equator and poles'<sup>22</sup>), they are also irrelevant if they have not been corrected or rectified. The number of adjustments that needed to be made from measurements taken (or believed to have been taken) *in situ* to the final estimation of the direct distance in stadia was the reason behind the impreciseness of this type of information.

Meanwhile, the astronomical method allows one to give the position of a locality with the help of suitable instruments and an arithmetical procedure.<sup>23</sup> Ptolemy examines this method at length and repeatedly comments on its superiority, namely, that it is more convenient and accurate,<sup>24</sup> although he finishes by stating:

18 *Geogr.* 1.2.2.

19 *Geogr.* 1.2.4.

20 See Dilke 1967; Brodersen 1995, 195–224. See chiefly Lewis 2012 for a recent synopsis of surveying methods and instruments.

21 *Geogr.* 1.2.4: '[...] having a measurement of distance in stadia does not guarantee that the [interval] we find is the correct one, because one seldom encounters rectilinear journeys on account of the numerous diversions that are involved in both land and sea travel. For land journeys one has to estimate the surplus [in the reported distance] corresponding to the

kind and magnitude of the diversions and subtract this from the total stadia to find the [number of stadia] of the rectilinear [route]. For sea journeys one also has to account for the variation in speed corresponding to the blowing of the winds, since at least over long periods these do not maintain a constant force.'

22 *Geogr.* 1.2.4.

23 *Geogr.* 1.2.5–1.3.5.

24 *Geogr.* 1.2.5: 'The method using [celestial] observation determines each of these things accurately (ἀκριβοῖ); *Geogr.* 1.3.3: 'We can easily (προχείρως)

These things being so, if the people who visited the individual countries had happened to make use of some such observation, it would be possible to make an absolutely reliable (παντάπασιν ἀδίστακτον) map of the *oikoumenē*.

But Hipparchus alone (μόνος) has transmitted to us elevations of the North Pole for a few cities (ἐπ' ὀλίγων πόλεων), few indeed compared to the multitude (πλήθος) of places to be recorded in a geography, and also localities that are situated under the same parallels. And a few (ἔνιοι) of those who came after him [have transmitted] some of the localities that are 'oppositely situated'.<sup>25</sup>

Ptolemy's long demonstration about the superiority of this method ends in a disappointing observation. The method thereby exposed was, in effect, mainly a description of the reliable information that a geographer *is meant* to gather in order to draw an accurate map. Ptolemy himself was unable to put into practice his ideal method. As A. Jones has written: 'He is not describing what the mapmakers up to his time actually did, but what they *should* do.'<sup>26</sup> Thus, in all likelihood, Ptolemy did not determine the geographical coordinates of every locality from *in situ* observations and calculations; the accounts of people who had undertaken such enquiries would have been too infrequent.

## 4.2 Determining latitude and longitude: theory and application

Although Ptolemy is unforthcoming on the subject of land surveying techniques, he does refer to several procedures that allow one to acquire the position of localities on Earth partly through observing the sky. The objective of this section is to determine the extent to which these procedures enabled Ptolemy to work out the latitude and longitude of a locality as well as to estimate their role in acquiring his coordinates.

### 4.2.1 Ptolemy's 'appropriate' method

Ptolemy writes that one has to know the distance and the orientation of the direct path between two localities in order to determine the position of two localities in relation to each other.<sup>27</sup> As one might expect, Ptolemy realises that measuring the distances between two localities, which were generally land and sea routes that did not correspond

obtain, among many other very useful things (χρησιμωτάτων) etc.; *Geogr.* 1.3.5: 'One can, conversely, easily (προχειρώς) compute the number of stades [of such an interval] from the established circumference of the whole earth.'

25 *Geogr.* 1.4.1–2. Note the strong semantic opposition between *μόνος*, *ὀλίγος* and *ἔνιοι* on the one hand and *πλήθος* on the other.

26 A. Jones 2012, 116. In other words, since it was Ptolemy who devised *the* better method, the investigations of his predecessors were necessarily flawed (see *Geogr.* 1.4.2).

27 *Geogr.* 1.2.3.

to straight lines, is always going to be approximate.<sup>28</sup> Even with an accurate evaluation of the distance and the orientation, two problems remain: one needs to find out the latitudinal position of the concerned localities as well as the ratio of the given distance to the circumference of the Earth.<sup>29</sup> For the given distance and the orientation between two localities, the related longitudinal interval will differ according to the latitude of the localities; the number of stadia in a degree of longitude does, indeed, depend on the latitude, a phenomenon of which Ptolemy was perfectly aware.<sup>30</sup>

In order to calculate the circumference of the Earth, and thus the ratio of a distance to this circumference, Ptolemy develops a method based on observing the sky with the aid of a particular instrument.<sup>31</sup> In contrast to the methods of his predecessors, which Ptolemy summarises,<sup>32</sup> in his procedure the distance does not need to be measured along a meridian: the measurement can take any great circle of the Earth as its basis.<sup>33</sup> The starting point is the distance between two localities, *A* and *B*. Thanks to an astrolabe or a similar instrument (διὰ ὀργάνου μετεωροσκοπικοῦ), it becomes possible to calculate the elevations of the celestial North Pole above the horizon for the two localities, plus the angle between the great circle (on which the route between *A* and *B* has been measured) and the meridian through *A* or *B*, all quantities that can be 'easily taken' from the astrolabe.<sup>34</sup> Ptolemy adds:

Hence by this procedure the total number of stadia of the [Earth's] circumference can be found from just one rectilinear interval measured in the earth. Thereby also [the number of stadia] of the other intervals without measuring the distances can be found, even if they are throughout not rectilinear or along a single meridian or parallel [...]. This is because one can, conversely, easily compute (προχειρώς ἐπιλογίζεσθαι) the number of stadia [of such an interval] from the established circumference of the whole earth using the ratio of the arc subtending the interval to the great circle.<sup>35</sup>

Although an astrolabe (or a similar instrument) could provide the required information almost automatically, Ptolemy does not describe the method in detail. He mentions only an 'easy computation' for obtaining the number of stadia of the route between two localities. In the discussion of his procedure, Ptolemy focuses on the kind of data that needs to be collected and how best to gather the data. His procedure enables him to

28 *Geogr.* 1.2.4. He also seems to have lacked faith in the estimations of the orientation between localities.

29 *Geogr.* 1.2.4.

30 Rinner 2013, 96–98.

31 *Geogr.* 1.2.6–1.3.5. See the detailed explanation of this method in Rinner 2013, 99–100.

32 *Geogr.* 1.3.1–2.

33 *Geogr.* 1.3.3. A 'great circle' is any circle on the terrestrial sphere whose centre coincides with the centre of the Earth (like a meridian or the equator).

34 *Geogr.* 1.3.3–4.

35 *Geogr.* 1.3.4–5.

describe the positions of two localities *A* and *B*, but only by making *in situ* observations. He does not explain how the information – the elevation of the North Pole of *A* and *B*, plus the angle between a meridian and the great circle where *A* and *B* lie – should be used to obtain, ultimately, the latitude and the longitude of localities, be it by methods of computation, geometrical construction or another kind of procedure.

At the end of his theoretical discussion, Ptolemy mentions the use of lunar eclipses to help determine the longitudinal interval between two localities. This method is presented as the pendant to measuring astronomically the elevation of the North Pole for the latitude, that is, as a self-sufficient method for determining longitude:

Most intervals, however, and especially those to the east or west, have been reported in a cruder manner, not because those who undertook the researches were careless, but perhaps because it was not yet understood how useful the more mathematical mode of investigation is, and because no one bothered to record more lunar eclipses that were observed simultaneously at different localities (such as the one that was seen at Arbēla at the fifth hour and at Carthage at the second hour), from which it would have been clear how many equinoctial time units separated the localities to the east or west.<sup>36</sup>

Put simply, during a lunar eclipse all the observers on the moon-facing side of the Earth are able to view simultaneously the shadow of the Earth as it falls on to the Moon. However, observers in localities at different longitudes (one in Carthage, another in Arbēla, for instance) will experience the same eclipse at different local times. These local times can be compared, given that the observers will refer to an event that occurred at the same moment in all the localities (on the moon-facing side of the Earth).<sup>37</sup> In this way, one can obtain longitudinal intervals in hours. In the instance mentioned by Ptolemy, a difference of three hours in local time between Carthage and Arbēla corresponded to a longitudinal interval of 45°.<sup>38</sup> According to Strabo, Hipparchus regarded eclipse observations as the only accurate way of obtaining the longitude of a locality:

One cannot decide accurately [whether localities are] situated more or less towards the east or west, except by comparison of [the times of] eclipses of the sun and moon. That is what [Hipparchus] says about the matter.<sup>39</sup>

Unlike Ptolemy in the *Geography*, however, it seems that Hipparchus believed that *solar* eclipse observations could also be used to determine longitudinal intervals. If Hipparchus and Ptolemy had been referring to the exact same procedure – the simultaneous observation of an eclipse and a comparison of the local times – then one would be able

36 *Geogr.* 1.4.2.

37 Stückelberger 2009b, 235–237; Rinner 2013, 101.

38 Rinner 2013, 102.

39 *Str.* 1.1.12.

to state unequivocally that in this case Hipparchus had made an error. As solar eclipses cannot be viewed simultaneously from different localities on Earth, the method can only be applied to lunar eclipses. The differing characteristics of both phenomena (solar and lunar eclipses) had been described since at least the time of Geminus of Rhodes (first century BCE),<sup>40</sup> of which Ptolemy, who mentions only lunar eclipses in the *Geography*, was certainly aware.<sup>41</sup> It is also possible that Strabo misrepresented Hipparchus' statement or that Strabo's text is corrupt; comparing the passage with other testimonies of Hipparchus does not shed any additional light on the matter.<sup>42</sup>

Ptolemy refers to an eclipse that was reported to have been observed in Arbēla and in Carthage. Thanks to a record of a similar event in Pliny the Elder's work,<sup>43</sup> it is generally acknowledged that Ptolemy was alluding to the lunar eclipse of September 331 BCE, which occurred shortly before the Battle of Gaugamela in which Alexander the Great defeated the army of Darius III. The historical site of Gaugamela lies in the neighbourhood of Arbēla (modern-day Erbil, in Iraq).<sup>44</sup> A precise source for Ptolemy's information on the eclipse has not been found;<sup>45</sup> that Ptolemy invented an *ad hoc* example based on his catalogue should not, however, be dismissed out of hand.<sup>46</sup> In the *Almagest*, Ptolemy describes a series of lunar eclipses, some of which had been observed in Babylon,<sup>47</sup> others in Alexandria,<sup>48</sup> although he does not mention a simultaneously

40 Geminus, *Isag.* 10.1–11.5.

41 A passage from the *Almagest* (2.1), in which Ptolemy explains why the *oikoumenē* covers only a quarter of the Earth, is more ambiguous: 'In the case of longitude (that is, in the east–west direction) the main proof is that observations of the same eclipse (especially a lunar eclipse) by those at the extreme western and extreme eastern regions of our part of the *oikoumenē* (which occur at the same [absolute] time), never are earlier or later by more than twelve equinoctial hours [in local time]; and the quarter [of the Earth] contains a twelve-hour interval in longitude, since it is bounded by one of the two halves of the equator'. Specifying 'especially a lunar eclipse' implies, in principle, that another type of eclipse could also be used. Nevertheless, one can rule out the fact that the simultaneous observation, at both extremities of the known world, of any kind of eclipse had been effectively recorded and was known to Ptolemy; in this particular case, the discussion on the length of the *oikoumenē* and the detailed correction of Marinus of Tyre's text in the *Geography* would have served no purpose. By contrast, one should regard the mention of observed eclipses in the *Almagest* as the only way of *justifying* theoretically the reported longitudinal extent of the

known part of the *oikoumenē*. See Graßhoff, Rinner, et al. 2016.

42 One can also find 'eclipses of the sun and moon' in the *Chrestomathies* from Strabo (1.7).

43 Pl. 2.180: 'On the occasion of the famous victory of Alexander the Great at Arbēla the moon was eclipsed in the second hour [of the night] and in Sicily [it was eclipsed] while rising'. See also Arrian, *Anab.* 3.4.3.

44 Arrian situates the plain of Gaugamela 'six hundred stadia from the city of Arbēla' (*Anab.* 3.4.6).

45 The longitudinal interval that can be deduced from his example (45°) is close to the information in the catalogue (45°10'; *Geogr.* 4.3.7 and 6.1.5). It is a rough estimation as there are c. 33°40' between Carthage and modern-day Erbil. By contrast, Pliny's information allows one to get an accurate longitudinal interval (e.g., 30°, compared with 28°45' between Erbil and Syracuse; Stückelberger 2009b, 237).

46 See his circular reasoning in the *Alm.* 2.1, footnote 41, p. 172.

47 *Alm.* 4.6, 4.9 and 4.11. Ptolemy knew of these observations via Hipparchus.

48 Hipparchus observed three eclipses between 201 and 200 BCE (*Alm.* 4.11). The other eclipse took place in April 125 CE (*Alm.* 4.9) and might have been observed by Ptolemy, although his mention

observed eclipse in those two cities; rather, he postulates that Alexandria was about five-sixths of an equinoctial hour to the west of the meridian through Babylon, and uses this result to make calculations.<sup>49</sup> Although several reports of isolated eclipse observations have been passed down, sometimes with the exact local time provided,<sup>50</sup> one has to agree with Ptolemy that very little information on lunar eclipses was ever transmitted.

#### 4.2.2 Astronomical measurements and mathematical constructions

In the *Almagest*, Ptolemy developed a number of arithmetical and geometrical concepts and procedures for determining and converting a large collection of quantities related to the fields of astronomy, geography and cartography: a table of chords, the determination of the obliquity of the ecliptic, spherical trigonometry, and so on. A place's latitude is one of the geographical properties of a locality and can be expressed in several ways: the length of the longest day, the ratio of a gnomon to its shadow (measured at the solstices or equinoxes), or the elevation of the North Pole above the horizon. Ptolemy was able to develop a series of computations and conversions of different quantities related to latitude.<sup>51</sup> His exposition of the parallels in the *Almagest* (2.13) relied on a mathematical construction in which the geographical reference places associated with each parallel should not be regarded as actual localities of astronomical observations. That such observations did, in fact, take place on the island of Rhodes (on the eleventh parallel) or at Massalia (on the fourteenth parallel) and were later transmitted to Ptolemy, is, admittedly, plausible, although that is not the case for places such as the 'middle of the Pontus' or the 'sources of the Istros River'.<sup>52</sup>

The distinction between information that comes from *in situ* observations and data that results from a geometrical construction or a mathematical conversion is not always clear; indeed, Ptolemy criticises Marinus for not paying enough attention to the matter. In a discussion on the southern limit of the *oikoumenē*, Ptolemy writes that Marinus' arguments were based on astronomical observations:

[Marinus] tries to show that [his] southern limit is plausible both by certain [astronomical] observations (διὰ φαινομένων) as he supposes them to be, and by records (διὰ τῶν ιστορηθεισῶν διανύσεων) of land and sea journeys.<sup>53</sup>

After summarising Marinus' argumentation, Ptolemy notes:

of it is somewhat ambiguous. G.J. Toomer 1984, footnote 54, 206, has conjectured that the latter eclipse was observed by a certain Theon, who transmitted other astronomical observations recorded during the second half of Hadrian's reign (*Alm.* 9.9, 10.1–2).

<sup>49</sup> *Alm.* 4.6.

<sup>50</sup> Xenophon, *Hellenica*, 1.6; Liv. 44.37.9; and Pl. 2.180, quoted in footnote 43.

<sup>51</sup> See Rinner 2013, 26–29.

<sup>52</sup> *Alm.* 2.13.15–16.

<sup>53</sup> *Geogr.* 1.7.3.

Now in these words [Marinus] is describing merely what *ought* to occur (τὰ ὀφείλοντα) in locations on the equator or between the tropics; but he does not tell us whether there has actually been any report about the phenomena on [parallels] south of the equator, for example, that somewhere some stars that are at the south of the equator reach the zenith, etc.<sup>54</sup>

In the above quotation, Ptolemy discusses information on remote areas in the southern hemisphere, which is a very special case. It highlights, however, an epistemological issue – the risk of circular reasoning – when developing a geographical science based on mathematics.

#### 4.2.3 Appropriate method and acceptable procedures

Ptolemy ends his long discussion by ranking his sources. Ptolemy was forced to deal with the lack of information arising from his astronomical method by using an *ad hoc* procedure that was acceptable by default. For instance, when he considers the extent of the *oikoumenē* south towards the Equator, he explains:

[The distance] could have been undisputedly (παντάπασιν ἀκριβῶς) obtained if someone would have observed the [astronomical phenomena] that occur in these regions with a more mathematical method. But since such research has not been made, there is nothing for it but to examine more roughly (ὀλοσχερέστερον), and on the basis of a simpler [procedure], what a reasonable (εὐλογον) amount for the extent [of the *oikoumenē*] beyond the equator would be.<sup>55</sup>

This example comes from Ptolemy's revision of Marinus' work and concerns a specific instance. Nevertheless, at the end of his discussion on the advantages of the astronomical method and the lack of *in situ* observations, he proposes, in similar terms, a solution that is meant to be applied to the entire *Geography*:

It would therefore be reasonable (εὐλογον) for one who intended to undertake a world map following these principles to give priority to the data that have been obtained through the more accurate observations (διὰ τῶν ἀκριβεστέρων τηρήσεων), as foundations (καθάπερ θεμελίους), and to fit [the data] that come from the other [sources] to these, until their positions with respect to each other stand as much as possible in agreement with the most reliable [data] from the sources transmitted [to us].<sup>56</sup>

54 *Geogr.* 1.7.5.

55 *Geogr.* 1.9.8.

56 *Geogr.* 1.4.2.

The text shows a clear change in semantics: the procedure is no longer unquestionable, undisputed, accurate (ἀδίστακος, ἀκριβής) or easy (πρόχειρος) but only εὔλογος, that is, reasonable and consistent. A similar shift occurs between Ptolemy's definition of geography (an *imitation* – μίμησις – of the known world)<sup>57</sup> and the πρόλογος of Book 2, where Ptolemy states that the aim of his map is to give 'the greatest possible *similarity* (μάλιστα ἐνῆν ὁμοίωτητι) in shape' to the real *oikoumenē*.<sup>58</sup>

The most reliable data came, of course, from the astronomical method extolled by Ptolemy. The ranking of the data could then be extended to the remaining information; A. Jones has written of a 'relative prioritisation even among the available distance-measurement reports'.<sup>59</sup> Moreover, this implies that determining the coordinates of each locality did not follow a random order but that it focused firstly on a small number of well-known localities, which were integrated into the 'foundations' (θεμέλιοι) of the map.<sup>60</sup> D. Marcotte has drawn a pertinent parallel in his comparison of Ptolemy's θεμέλιοι with the important dates or epochs (ἐποχαι) used in certain antique chronological tables, such as those developed by Eratosthenes and his successors: they enable any historical event to be dated in relation to these fixed dates.<sup>61</sup> Ptolemy's passage is, however, somewhat ambiguous and it is not clear that the 'foundations' of his map are simply the localities that were determined from the information derived from astronomical observations.<sup>62</sup> On the other hand, Ptolemy suggests that determining coordinates entails a degree of approximation for localities with less qualitative or quantitative information. Ptolemy's critique of his own catalogue is crucial to understanding his method:

The numbers of degrees in longitude and latitude of well-trodden places (τῶν τετριμμένων τόπων) are to be considered as quite close to the truth because generally consistent accounts of them have been passed down without interruption (διὰ τὸ συνεχὲς καὶ ὡς ἐπίπαν ὁμολογούμενον τῶν παραδόσεων); but [the coordinates] of the places that have not been so travelled, because the reports are sparse and unconfirmed (ἔνεκεν τοῦ σπανίου καὶ ἀδιαβεβαιώτου), have been approximately (ὀλοσχερέστερον) estimated according to the more trustworthily determined places or the global configuration, so that none of these places that

57 *Geogr.* 1.1.1.

58 *Geogr.* 2.1.1.

59 A. Jones 2012, 118.

60 Strabo twice uses a similar architectural or urbanistic metaphor to explain how a geographical work has to rely on the study of several fundamental notions (*Str.* 1.1.13 and 2.5.1).

61 Marcotte 2007b, 165. On Eratosthenes' works on chronology, see Geus 2011, 309–332.

62 One cannot infer from this passage that the main cities listed in Book 8 of the *Geography* and/or in the 'Table of Noteworthy Cities' were also used in the θεμέλιοι of Ptolemy's maps. This old hypothesis still appears in modern works – see Stückelberger and Mittenhuber 2009, 144 and 241 – but the strict relationship between these different sets of important localities has never been thoroughly supported.

are to be included to make the *oikoumenē* complete will lack a defined position.<sup>63</sup>

Ptolemy introduces here the idea that determining coordinates cannot always be based on the rigorous and rational procedures of a purely mathematical method. He emphasises the importance of using specific criteria, which he often uses in his revision of Marinus' work, in order to select reliable information. In fact, he suggests two interlocking criteria: a spatial criterion, since he distinguishes between localities or areas that have been well travelled from those that have not; and a 'scientific' criterion, since he respects the consensus of long-held traditions. One important point is the opposition between geographical information that originated from several separate experiences, where a consensus could emerge, and other more dubious forms of data:

Just as one has to reserve judgement concerning great distances and those which have seldom been travelled, or not [travelled] in a way about which there is general agreement, so one should trust those which are not great but have been travelled often and by many people in a way that is agreed upon.<sup>64</sup>

It seems that Ptolemy was highly suspicious of distances that came from isolated reports of one-off journeys, which were subject to chance circumstances,<sup>65</sup> to an element of boasting on the part of the travellers,<sup>66</sup> or simply to the lack of training and knowledge of those people who had travelled to these faraway regions.<sup>67</sup> By contrast, when several independent reports of travellers and/or merchants were concordant, the information was considered to be trustworthy;<sup>68</sup> compared with the geographical tradition, Ptolemy's rehabilitation, in some cases, of merchants' accounts is quite original.<sup>69</sup> The themes of trust, confidence, even of faith underlie the whole revision of Marinus' work.<sup>70</sup>

63 *Geogr.* 2.1.2.

64 *Geogr.* 1.10.2.

65 *Geogr.* 1.8.5–6.

66 *Geogr.* 1.11.8.

67 *Geogr.* 1.9.8. Ptolemy's arguments fall within a long geographical tradition of discussing the relevance and reliance of written accounts. For example, Strabo (15.1.4) makes the very same observation concerning India; Polybius (3.58) also discusses the issues of travel reports from the corners of the known world.

68 Such as the information on the location of Simylla in India (*Geogr.* 1.17.3) or the sea journey to the land of the Sères (*Geogr.* 1.17.5). The disparity between isolated accounts and consensus was common in geographical discussions. See the debate on

the report of Patrocle between Eratosthenes, Hipparchus and Strabo (*Str.* 2.1.4).

69 Admittedly, both Ptolemy and Marinus seem to have regretted that Philemon had trusted the information given by traders on the size of Hibernia: 'These merchants do not concern themselves with finding out the truth, being occupied with their commerce; rather, they often exaggerate the distances out of boastfulness' (*Geogr.* 1.11.8). The distrust of merchants' accounts about distant regions is a topos of ancient geography. See, e.g., Polybius, *Hist.* 4.39. However, Ptolemy seems generally to have accepted the accounts of traders who had travelled along the south-eastern coast of Asia and Libyē (Africa).

70 See, e.g., the location of the occurrences of the verbs *πιστεύειν* (*Geogr.* 1.6.1, 1.9.7, 1.10.2 and 1.12.4) and *ἀπιστεῖν* (1.9.7, 1.11.7) or the adjective *ἄπιστος*

In many cases, Ptolemy does not provide the precise names of the travellers or merchants; the unanimity or the consensus on which Ptolemy relied was often emphatically or categorically proclaimed, with the verb *ὁμολόγειν* ('to agree') and its derivations frequently used.<sup>71</sup> Since the introduction to the *Geography* focuses on a critical review of Marinus' work, one should not underestimate the rhetorical aspect of these references to 'the consensus,' which was a common argumentative practice in the geography of Antiquity. It should, however, be regarded as an effective criterion in the choice of Ptolemy's data as well as a reflection of how he handled his sources. As far as the distances are concerned, corrections and modifications were made depending on the nature of the source and the geographical area under discussion. In evaluating the length of the *oikoumenē*, Ptolemy trusted distances (even long distances) within the Mediterranean area, since the latter was well-known and also because of his respect for the tradition passed down by Marinus.<sup>72</sup>

### 4.3 Origins of the coordinates and the revision of Marinus' work

#### 4.3.1 Technique and practice of the *διόρθωσις*

The second part of Ptolemy's introduction consists mainly of a *διόρθωσις* (from *διορθόω*, literally 'straightening up,' 'making right,' 'revising') – that is, a revision or a correction of a text – of the geographical work of Marinus. This term comes from the specialist vocabulary of the Alexandria-based *γραμματικοί* (the equivalent of today's philologists), who prepared editions of classical, literary texts, chiefly the works of Homer, from as early as the late fourth century BCE. In this context, a *διόρθωσις* comprised correcting the text, generally on the basis of other copies or as a result of personal opinion, while an *ἐπανόρθωσις* involved rectifying a later correction in order to uphold and restore an earlier reading. These modifications were carried out on copies in preparation for a new edition (*ἔκδοσις*) of the text.<sup>73</sup>

(1.8.6) in Ptolemy's revision of Marinus' work. See Gómez Espelosín 2010.

71 *Geogr.* 1.14.10: '[...] since all agree that [the metropolis of the Sinai] is east of Kattigara, etc'; *Geogr.* 1.17.3: 'Absolutely everyone who has sailed through these places agrees'; *Geogr.* 1.17.4: 'There is a consensus among the those who have sailed there'; *Geogr.* 1.17.5: 'They agree reporting that [...]': See also 1.5.1, 1.6.4, 1.10.2, 1.11.2 and 2.1.2.

72 *Geogr.* 1.11.2: 'For in the first place one should follow the numbers of stades, from place to place, set

down by [Marinus] for the distance from the Fortunate Isles to the crossing of the Euphrates at Hierapolis, as if [the journey] were made along the parallel through Rhodes. [This is] both because it is continually being checked (*διὰ τὸ συνεχὲς τῆς πείρας*) and because [Marinus] has manifestly taken into account the amount by which the greater distances ought to be corrected on account of diversions and variations in the itineraries.'

73 See, in particular, F. Montanari 2015.

In disciplines such as astronomy, history or medicine, a διόρθωσις described the particular relationship between a work that had been transmitted and its διορθωτής ('reviser'; 'corrector'). A διόρθωσις was undertaken on an older work, generally an authoritative text: this did not imply that the authority in question had been completely rejected, but rather that the revision represented a validation, for the most part, of the earlier work. Thus, paradoxically, a διόρθωσις signified both preservation and innovation.<sup>74</sup> According to the definition of J. Engels:

The supporters of this method expected progress to be made in a scientific field – from philosophy, rhetoric and grammar to geography – on the basis of constructive criticism and debate with the doctrines of the discipline's best predecessors.<sup>75</sup>

This Alexandrian philological approach had been transferred to geographical and cartographical scholarship as early as the late third century BCE:<sup>76</sup> Eratosthenes had developed διόρθωσις as a working method while engaging in revising the known world's geographical knowledge and, in particular, correcting the 'ancient maps'.<sup>77</sup> Most of the geographical works produced after him were written using the same method. Generally, a geographer either revised the work of a predecessor, whom he regarded as the most recent authority (so Hipparchus revised Eratosthenes' work and Ptolemy revised Marinus' work), or he wrote critiques on more recent theories (Posidonius wrote critiques on Parmenides and Aristotle;<sup>78</sup> Polybius commented on the works of Dicaearchus, Eratosthenes and Pytheas).<sup>79</sup> Strabo and a priori Marinus, however, carried out more thorough revisions of their predecessors' works,<sup>80</sup> while Ptolemy's description of Marinus' work reads as follows:

74 Arnaud 2007, 14.

75 Engels 2013, 88: 'Die Anhänger dieser Methode erwarteten Fortschritte in einer Fachwissenschaft – von der Philosophie, Rhetorik und Grammatik bis hin zur Geographie – von einer konstruktiven Kritik und Auseinandersetzung mit den Lehrmeinungen der jeweils besten Vorgänger der Disziplin.' See, e.g., Strabo's statement (1.2.1) on his personal approach: 'And if I shall, on occasion, be compelled to contradict the very men whom in all other respects I follow most closely, I beg to be pardoned; for it is not my purpose to contradict every individual geographer, but rather to leave the most of them out of consideration – men whose arguments it is unseemly even to follow – and to pass upon the opinion of those men whom we recognise to have been

correct in most cases. Indeed, to engage in philosophical discussion with everybody is unseemly, but it is honourable to do so with Eratosthenes, Hipparchus, Posidonius, Polybius, and others of their type.'

76 Jacob 1998.

77 Str. 1.4.1: 'In his second book, Eratosthenes undertakes a revision (διόρθωσιν) of the principles of geography'; Str. 2.1.2: 'After Eratosthenes has said that, he thinks that there is need of a revision of the ancient geographical map (δεῖν διορθῶσαι τὸν ἀρχαῖον γεωγραφικὸν πῖνακα)': See also Str. 2.1.38.

78 Str. 2.3.1.

79 Str. 2.4.1 and 2.4.4.

80 Marcotte 2012, 16–17.

Marinus of Tyre seems to be the latest in our time to have undertaken this subject, and he has done it with absolute diligence. He has clearly laid his hands on numerous records of research besides those that had come to knowledge still earlier, and treated those of nearly all his predecessors with care, giving appropriate correction (ἐπανορθώσεως) to everything that he found that either they or he himself, at first, had trusted without good reason, as can be seen from the publications (ἐκ τῶν ἐκδόσεων) of his *Revision of the Geographical Map* (τῆς τοῦ γεωγραφικοῦ πίνακος διορθώσεως), which are numerous.

Now if we saw no defect in his final compilation (τῆ τελευταία συντάξει), we would content ourselves with making the map of the *oikoumenē* on the basis of these writings alone, without taking any more trouble about it. Since, however, even he turns out to have given assent to certain things that have not been creditably established, [...] we have justifiably been induced to contribute as much as we think necessary to the man's work to make it more logical and easier to use.<sup>81</sup>

Marinus carried out several revisions of the geographical map, which made him the direct heir, from a methodological point of view, to the traditions of Eratosthenes and Strabo. So, Ptolemy's approach to revising a geographical work was perfectly consistent with the methods of his predecessors: one identified the most recent authority (Marinus), praised his achievements, justified the need to make a revision and then provided a (long) list of shortcomings and errors to be rectified. Finally, the vocabulary Ptolemy uses – διορθωσις, ἐπανόρθωσις, ἔξδοσις – belongs unquestionably to the semantic field of the Alexandrian critical tradition.

Ptolemy directs his critique at different aspects of Marinus' work, which he examines successively: the dimensions that Marinus gave to the *oikoumenē*, isolated cases of incoherence, the inconvenience of using his work and Marinus' cartographical projections. Ptolemy was clearly very familiar with Marinus' geographical work. Moreover, he mentions at least twice that his revision would retain a good part of his predecessor's information:

We shall make this the end of our outline for the things that need some attention in the [current] research itself; lest it should seem to anyone that we are expressing systematic disapproval (ἔνστασις) rather than making a revision (διορθωσις), we will make everything clear in this detailed guide.<sup>82</sup>

81 *Geogr.* 1.6.1–2.

82 *Geogr.* 1.18.1. The use of the future tense ἔσται in 'we will make everything clear' is puzzling, since the passage appears towards the end of Ptolemy's revision

of Marinus' work and nowhere in the rest of the *Geography* does Ptolemy explain how he intends to do this. The entire sentence has been interpreted and translated in a variety of ways. Cf. the very dif-

We have thus taken on a twofold task: first to preserve [Marinus'] opinions [as expressed] through the whole of his compilation, except for those things that need some correction (διορθώσεως); second to see to it that the things that he did not make clear will be inscribed as they should be, so far as is possible, using the research of those who have visited the places, or their positions [as recorded] in the more accurate maps.<sup>83</sup>

Ptolemy's discussion of Marinus' work reveals a paradoxical relationship between Ptolemy and his forerunner,<sup>84</sup> which has caused impassioned historiographical debate, while the absence of an independent transmission of Marinus' work has often led to pure speculation. Nonetheless, the way Ptolemy dealt with the geographical and cartographical tradition that preceded him concurs perfectly with the codes and common practices of Alexandrian geography. My aim now is to ascertain, within this framework, whether an analysis of Ptolemy's διορθώσις of Marinus' work will disclose any aspects of the former's method for determining the coordinates of the catalogue of localities.

#### 4.3.2 Data handling in the revision of Marinus' work

Ptolemy's data handling and the procedures he used in his revision of Marinus' work has been exhaustively studied by E. Rinner.<sup>85</sup> In his corrections of the extent of the *oikoumenē* towards the east and the south, Ptolemy determined, in a series of stages that are discussed below, several sets of latitudinal and longitudinal intervals in degrees, based on the descriptions of sea and land journeys.

##### *Determining the direct distance between two localities*

In order to determine the straight-line or direct distance between two localities, on the basis of distances that had been transmitted in the sources by travel accounts, Ptolemy considers both the sinuosity (ἐκτροπαί)<sup>86</sup> of a route (as opposed to a theoretical, rectilinear journey) and the irregularities (ἀνωμαλίας)<sup>87</sup> of a journey that mostly arise from changing meteorological conditions. To take these features into account, Ptolemy reduces some of Marinus' distances of both land and sea journeys.

When dealing with *maritime* journeys, Ptolemy reduces the distance between localities situated at the extremities of a gulf by a third. For instance, between Cape Kōry

ferent translations of Aujac 2012, 356; Berggren and A. Jones 2000, 80; and Stückelberger and Graßhoff 2006, 105. By 'the detailed guide' (δι' αὐτῆς τῆς κατὰ μέρος ὑφηγήσεως) Ptolemy means the catalogue, since he uses the same expression in the πρόλογος of Book 2 (*Geogr.* 2.1.2).

83 *Geogr.* 1.19.1.

84 See A. Jones 2012, 118.

85 Rinner 2013, 106–127.

86 *Geogr.* 1.8.3, 1.11.2 and 1.12.3.

87 *Geogr.* 1.8.4, 1.9.2, 1.11.2, 1.13.1–2, 1.13.5, 1.13.7–8.

(possibly modern-day Rameswaram in India)<sup>88</sup> and the city of Kouroula to the north-east, Marinus gave a distance of 3 040 stadia, which Ptolemy takes as having been measured by following the gulf; however, a direct sailing between the two points would, according to him, give a distance of 2 030 stadia (that is, a third shorter).<sup>89</sup> Ptolemy's correction corresponds to the difference between two sailing options, otherwise attested in the antique sources – either of closely following the irregularities of the coast (κατακολπίζω) or of sailing directly (εὐθυπλοέω).<sup>90</sup> Ptolemy does not explain his reduction factor but he might have calculated his correction as follows: if one takes the shape of a gulf to be a half circle, a direct sailing between both ends of the gulf would correspond to the diameter of the circle; half the circumference of the circle is the diameter multiplied by  $\frac{2}{\pi}$ . A rough approximation of this ratio is two-thirds; hence the diameter (a direct sailing) is approximately one-third shorter than half the circumference (the sailing along the gulf).<sup>91</sup> A second kind of correction takes into account the irregularities of a maritime journey that arose from changing sailing conditions. For each of the five intermediate journeys between Cape Kōry and the Golden Chersonese (certainly the Malay Peninsula),<sup>92</sup> the correction amounts to a third of the distance, with again no justification given for the reduction factor. From Ptolemy's discussion on the maritime journeys made by Theophilos and Diogenēs along the eastern coast of Libyē, one can work out that the irregularities of the sailing conditions, which were mainly the result of particular winds, would have been considered locally; therefore, an appropriate correction should be adapted to the area under consideration.<sup>93</sup> As for the Mediterranean area, Ptolemy leaves Marinus' distances in stadia between the Fortunate Isles and the Gulf of Issus unchanged, partly because Marinus 'has manifestly taken into account the amount by which the greater distances ought to be corrected on account of diversions and variations (παρὰ τὰς ἐκτροπὰς καὶ τὰς ἀνωμαλίας) in the itineraries.'<sup>94</sup>

Similar characteristics were taken into account when dealing with *land* journeys: the differences in the direction of a road compared with a 'theoretical' route that fol-

88 Rameswaram is situated on a very narrow peninsula on the mainland side of the channel separating India from Sri Lanka. This is the modern location suggested by Stückelberger and Mittenhuber 2009, 691.

89 *Geogr.* 1.13.1–2. Ptolemy makes a similar correction to the distance given for the journey between Paloura and Sada, along the Gulf of the Ganges (*Geogr.* 1.13.7).

90 Arnaud 2005, 89, 109–111; Kowalski 2012, 144–145. See, e.g., *Eux.* 11, 34, 57 (and 26B Diller), *Stadiasmus* 164 or Str. 14.6.2.

91 Meuret 1998, 157–159; Geus 2004b, 46–47; Rinner 2013, 108.

92 *Geogr.* 1.13.3, 1.13.5, 1.13.7–9.

93 *Geogr.* 1.9.1–4 and Rinner 2013, 109–110.

94 *Geogr.* 1.11.2 and Rinner 2013, 111. That Ptolemy includes the route from the so-called Fortunate Isles to the Sacred Cape and then into a well-known sailing area is rather surprising (although Pliny records a set of distances in miles, related to these islands, mostly based on the information collected by Juba; see Pl. 6.202–205). Also intriguing is Ptolemy's silence on these islands and on Marinus' use of them to estimate the longitudinal extent of the *oikoumenē*. Ptolemy never questions Marinus' choice, which may stem from a lack of information in his own sources.

lowed a parallel or a meridian and the irregularities of a journey that arose mainly from meteorological conditions. Significant diversions of a route from a theoretical line could also result from the itinerary itself: in the case of the route from Hekatompylos to Sēra,<sup>95</sup> the itinerary did not follow the parallel through Rhodes very closely but its latitude did vary significantly between the parallels through Smyrna and Byzantium;<sup>96</sup> likewise, there was no reason for Septimius Flaccus' military expedition heading towards the region of Aithiopia to deviate from its strictly southbound route.<sup>97</sup> The corrections that Ptolemy makes thus depend on the particular itinerary, which were treated case by case. Nevertheless, with the exception of the route from the crossing of the Euphrates (near Hierapolis, modern-day Manbij) to the Stone Tower,<sup>98</sup> when it comes to land journeys, Ptolemy halves the distances, taking into account both the changing directions of the itineraries and the irregularities of the trip, so that one cannot determine the weight of each factor.<sup>99</sup>

#### *Determining longitudinal and latitudinal intervals*

On the basis of the direct distance between two localities and a description of their orientation relative to one another, Ptolemy works out the longitudinal interval between the two places. Once again the procedure involves two stages. First, he determines the interval between the respective meridians by reducing the distance in accordance with the orientation data. For instance, the city of Paloura<sup>100</sup> was said to be to the south-east of Kouroula, 'in the direction of the winter sunrise' or 'in the direction of the Euros'.<sup>101</sup> The distance as the crow flies, which had been previously calculated, amounts to 6 300 stadia. Ptolemy reduces the distance by one-sixth (to 5 250 stadia) in order to

95 Talbert 2000, 1351, suggests situating Hekatompylos near Qumis, whereas Stückelberger and Graßhoff 2006, 87, proposes a place near Shahrud – both localities are in northern Iran, near the Caspian Sea. The modern location of Sēra is not known. Stückelberger and Graßhoff 2006, 85, cautiously suggest Lanzhou (a major trading centre along the Silk Road of Antiquity) or the capital city of Xi'an (both in central China).

96 *Geogr.* 1.12.3–9. Departing from Hekatompylos, the route went northwards to the city of Hyrkania, then southwards to Areia, deviating northwards again to reach the city of Antiochia in Margiane (modern-day Merv, Turkmenistan). The route then went quasi eastwards to Bactra (modern-day Balkh, Afghanistan) before going northwards and through the Pamir Mountains. See the schema in A. Jones 2012, 121.

97 *Geogr.* 1.8.5–7.

98 For the route from the crossing of the Euphrates to the Stone Tower (876 *schoinoi*, according to Marinus), Ptolemy simply rounds down the figure (to 800 *schoinoi*) 'because of the diversions of the route' (διὰ τὰς τῶν ὁδῶν ἐκτροπὰς): *Geogr.* 1.12.3. Note that the city of Hierapolis, which Ptolemy uses as a reference point, was, in fact, about 25 km west of the Euphrates.

99 See, e.g., the distance from the Stone Tower to Sēra (*Geogr.* 1.12.1) in Rinner 2013, 111–113. Ptolemy does not correct the distance between Leptis Magna (near modern-day Al Khums in Libya) and Garama (modern-day Germa in the Sahara Desert, south-east Libya), which he clearly believed went in a generally straight, north-to-south direction (*Geogr.* 1.10.2).

100 Paloura was possibly situated near the mouth of the modern-day Nagavali River in eastern India.

101 *Geogr.* 1.13.5. The Euros is, in Ptolemy's *Geography*, a south-easterly wind.

calculate the east–west component of the distance.<sup>102</sup> The distance thus obtained was said to be the longitudinal interval between the meridian through Kouroula and the meridian through Paloura. In the five examples that he discusses, Ptolemy proceeds in the same way, placing the reduction factor in relation to the angle made by the line segment between two localities on the one hand and a parallel circle on the other: one-sixth for a distance towards the south-east, one half for a distance ‘toward the Boreas’ (which in this instance means towards the north-east) and no reduction for a distance going in an easterly direction.<sup>103</sup> Ptolemy does not explain how he works out these reduction factors. However, all the reductions exhibit a trigonometrical relationship between the actual distance and the meridian, which Ptolemy is able to apply thanks to his chord table.<sup>104</sup> This procedure relies firstly on the distances on the Earth’s surface being handled as distances on a plane and then on dividing the horizon into twelve regular sections.<sup>105</sup>

The second stage of this procedure involves converting the longitudinal intervals, which are in stadia, into degrees. The number of stadia in one degree of any great circle is constant (500 stadia, according to Ptolemy). However, this number does vary for the degrees measured along other circles: along parallel circles, for example, the number of stadia in one degree depends on the latitude considered.<sup>106</sup> When it comes to revising the longitudinal extent of the south-eastern coast of Asia, Ptolemy calculates 1° of longitude for 500 stadia, since he believes the concerned areas are close to the Equator.<sup>107</sup> Therefore, the interval of 5 250 stadia between the meridians through Kouroula and Paloura corresponds to a longitudinal interval of 10°30’.<sup>108</sup>

#### *Approximation and analogy*

Ptolemy has to use a different procedure to determine the southern extent of the *oikoumenē*. According to Ptolemy, Marinus’ *oikoumenē* extended too far south. Ptolemy accepted Marinus’ information on the south-east coast of Asia (although this did not

102 One can acquire a more concrete idea of Ptolemy’s procedure by imagining that Ptolemy projected the section of line that runs from Paloura to Kouroula on to a parallel circle, in this case, on to the Equator.

103 *Geogr.* 1.13.3–9; Rinner 2013, 114.

104 See the exact procedure in Rinner 2013, 113–116. The table of chords is given in *Alm.* 1.11 for each half degree. See also Berggren and A. Jones 2000, 16.

105 Rinner 2013, 114–115.

106 In modern terms, if 1° of any great circle equals 500 stadia, as Ptolemy postulated, the number of sta-

dia in a degree along a parallel circle of latitude  $\phi$  corresponds to  $\cos(\phi) \cdot 500$ . For a latitude of 36°, 1° must equal 404.5 stadia, which Ptolemy rounds down to 400 stadia (*Geogr.* 1.12.11). See Rinner 2013, 117–118. Since meridians are by definition great circles of the Earth, 1° of meridian always equals 500 stadia.

107 *Geogr.* 1.13.4.

108 *Geogr.* 1.13.5. Ptolemy uses the same procedure for distances considered to run along the parallel through Rhodes (*Geogr.* 1.12.11) and for north–south distances (*Geogr.* 1.8.2, 1.10.1).

stop him from adjusting the data) but he did not believe Marinus' accounts of individual journeys made to the land of Agisymba in the region of Aithiopia, at least as far as the duration of the journeys were concerned.<sup>109</sup> Interestingly, the accounts contain comments on Agisymba's fauna, such as the fact that rhinoceroses could be found there.<sup>110</sup> It seems that Ptolemy was alluding to the idea that the location of specific fauna is dependent on the climate<sup>111</sup> and from that deduced that the rhinoceroses of the southern hemisphere lived approximately at the same distance from the Equator as their northern relatives. He surmised that, as rhinoceroses and elephants could not be found north of Meroë (16°25' N), the land of Agisymba could not be situated any more south than the corresponding parallel in the southern hemisphere (16°25' S).<sup>112</sup> E. Rinner has rightfully pointed out that Ptolemy's reasoning is a *Notlösung* ('a temporary solution').<sup>113</sup> In his defence, though, it does seem that this admittedly extreme case is the only time that Ptolemy, in the total absence of any other information, resorts to making such a crude estimation of a latitude.

Ptolemy's discussion gives rise to numerous approximations and the rounding up and down of figures in several aspects of his data handling, particularly in the computing procedures. For example, he states:

An arc similar to [one degree of the Equator] on the parallel through Rhodes (that is, the parallel 36° from the equator) contains approximately (ἔγγιστα) 400 stadia. We may ignore, in such a rough determination (ἐν ὀλοσχερεῖ καταλήψει), the slight excess compared with the [exact] ratio of the parallels.<sup>114</sup>

In this particular case, rounding down the figure involves an error of slightly more than 1%, which is considered negligible, when compared with Ptolemy's long distances.<sup>115</sup> When Ptolemy converts stadia into intervals in degrees and vice versa, he often includes the adverb 'ἔγγιστα', that is, 'approximately'.<sup>116</sup>

109 *Geogr.* 1.8.7: 'For these reasons it is likely that these men either told travellers' tales or used the expression *to the south* for *toward the Notos* or *toward the Lips* as the locals tend to talk, using the approximate term in place of the exact.'

110 *Geogr.* 1.8.5.

111 Ptolemy used the old idea of the determinism of fauna and flora depending on the latitude and climatic conditions – a theory already applied to geographical descriptions and popularised by Posidonius (*Str.* 2.3.7). Aristotle had also utilised this kind of argument in a discussion, in which (like Ptolemy) he referred to elephants, about the supposed smallness of the ocean between the Pillars of Hercules

and eastern India 'as further evidence in favour of this they quote the case of elephants, a species occurring in each of these extreme regions, suggesting that the common characteristic of these extremes is explained by their continuity'. (*De cael.* 2.14 [298a])

112 *Geogr.* 1.9.8–1.10.1; Rinner 2013, 120–122.

113 Rinner 2013, 121.

114 *Geogr.* 1.11.2–3.

115 Rinner 2013, 118 and 125. At a latitude of 36°, 1° equals 404.5 stadia.

116 *Geogr.* 1.10.1: '16°25', so approximately (ἔγγιστα) 8,200 stadia; *Geogr.* 1.13.4: 'a distance of 675 stadia or approximately (ἔγγιστα) 1°20'. See also 1.13.2, 1.13.5, 1.13.8, 1.14.7–8 and *passim*.

### Conclusion

In his revision of Marinus' work, Ptolemy mentions and uses several procedures that he might also have employed to determine the coordinates of localities using the basic information supplied by his sources: orientation data, distances in stadia, the descriptions of itineraries or of the coastal topography. However, when one compares the longitudinal intervals in degrees determined by Ptolemy along the south-east coast of Asia with the coordinates of the respective localities in the catalogue, one finds important differences.<sup>117</sup> Although one cannot rule out completely that such procedures were used, it is clear that the computations in the introduction were not transferred to the catalogue. Admittedly, the catalogue of localities in manuscript X does not contain the coordinates of the localities along the south-east coast of Asia, so one cannot ascertain whether the  $\Xi$  recension originally had the same coordinates as the  $\Omega$  recension. Furthermore, Ptolemy neither records whether the methods he uses in his διόρθωσις of Marinus' work could also be employed to determine the geographical coordinates of localities, nor does he admit to using these coordinates in the catalogue. Correcting the *oikoumenē*'s dimensions – specifically the extent of the known world south of Libyē and east of Asia – is what underlies the procedures in Ptolemy's introduction.

### 4.4 Distance, time and orientation

Ptolemy did not produce an extensive and annotated list of the sources and the types of data, which he used to determine the coordinates. The geographical texts and authorities that Ptolemy explicitly mentions are either lost – such as the accounts of Theophilos, Philemon, Julius Maternus and others<sup>118</sup> – or only known to us through indirect citations and rare fragments in other geographical works – such as those of Hipparchus and Timosthenes. Nevertheless, throughout the introduction to the *Geography*, Ptolemy refers to a large amount of different kinds of geographical information, much of which had been used in the works of earlier geographers. It is these earlier preserved texts that possibly form the basis of Ptolemy's work.

One of the most widespread pieces of information used in geographical texts and in Ptolemy's *Geography* are the distances between localities. Ptolemy uses long distances when considering the length and the width of the *oikoumenē*, for instance,<sup>119</sup> but also smaller distances (of several hundred stadia) for the precise examples in the introduction.<sup>120</sup> They are generally expressed in stadia, which was the most commonly used unit of length in Greek geographical texts, although Ptolemy also refers to distances in

117 Rinner 2013, 116, 122–123.

118 Stückelberger 2009c, 123–124.

119 *Geogr.* 1.8.1.

120 *Geogr.* 1.15.4.

*schoinoi*<sup>121</sup> and in miles<sup>122</sup>. According to Ptolemy, one *schoinos* was equal to thirty stadia.<sup>123</sup> Despite the existence in Antiquity of several stadia-to-miles conversion scales, Ptolemy provides no clues in his work as to which conversion system he used. The most common ratio was one mile for eight stadia,<sup>124</sup> but ratios such as 1:7  $\frac{1}{2}$  (in the *Eux.* and in the *Hypotyposis*, for example) and 1:8  $\frac{1}{3}$  (according to Polybius)<sup>125</sup> are attested as well.<sup>126</sup> Ptolemy does, though, clearly define the equivalence between meridians and parallels in degrees and distances in stadia: one degree on a great circle of the terrestrial sphere was equivalent to 500 stadia.<sup>127</sup>

The distances between two localities were sometimes given in units of time, that is, in the duration of maritime or terrestrial journeys. On several occasions Ptolemy refers to the number of days it took to march between two places as well as the duration (also in days) of a sea journey.<sup>128</sup> The relationship between distances and the duration of journeys was frequently made in geographical texts<sup>129</sup> as well as in the everyday lives of travellers or traders in Antiquity. Nowhere in the *Geography* does Ptolemy allude to a systematic conversion of a journey by land, although, for measuring maritime distances, he does explicitly mention that one nychthemeron (that is, a period of twenty-four consecutive hours) may correspond to 1 000 stadia, and that this was used by Theophilus and accepted by Marinus.<sup>130</sup> This equivalence appears to have been very common and was certainly used by Ptolemy, except in the case of sea journeys in certain meteorological areas (such as the Indian Ocean) and of particularly long trips.<sup>131</sup> Other common equivalents are attested in the geographical literature, such as 600 or 700 stadia for a day's sailing and several more sophisticated values based on diurnal subdivisions.<sup>132</sup>

Ptolemy uses two orientation systems that appear recurrently in the literature of Antiquity – the first based on the position of the Sun above the horizon and the second on a systematisation of wind directions. The first system utilises the four cardinal points – δύσις (west), μεσημβρία (south), ἀνατολή (east) and ἄρκτος (north) – plus four additional

121 *Geogr.* 1.11.4, 1.12.3 and 1.12.8. The *schoinos* (σχόινος) was a unit of length used in Egypt. See Hdt. 2.6 and Str. 17.1.24.

122 *Geogr.* 1.15.6 and 1.15.9.

123 *Geogr.* 1.11.4 and 1.12.3. Other ratios of conversion did exist, such as 1:40 (Eratosthenes) and 1:32 (Pl. 12.53). The length of the *schoinos* was variable (see the discussion in Str. 17.1.24).

124 Str. 7.7.4: 'Now if one reckons as most people do (ὡς οἱ πολλοί), eight stadia to the mile [...].'

125 Str. 7.7.4.

126 Arnaud 2005, 84–87. That a ratio 1:10 did exist is frequently mentioned in modern studies, generally on the basis of the article of Lehmann 1929, col. 1934. The latter is, however, not free of imprec-

cision and the evidence he gave for the existence of such a ratio (Pl. 12.53, Str. 5.3.12) is unconvincing (see Dicks 1960, 42–46). The references to Julian of Ascalon and Cassius Dio (Arnaud 2005, 85, 95; Roller 2010, 272) are also open to question (see Diller 1950 and Geiger 1992, 39–43). See also Shcheglov 2016a, 695–696.

127 *Geogr.* 1.7.1 and 1.11.2.

128 *Geogr.* 1.8.5, 1.9.1–4, 1.10.2, 1.11.5–8, 1.14.1–4, etc.

129 The practice is discussed by, e.g., Marcian of Heraclea in *Epit. Men.* 2 and 5.

130 *Geogr.* 1.9.4.

131 *Geogr.* 1.17.7; Arnaud 2005, 79–81; Rinner 2013, 109–110.

132 Arnaud 2005, 61–96.

orientations: summer sunset and winter sunset as variations for the west,<sup>133</sup> summer sunrise and winter sunrise for the east. Although the directions of the rising and setting Sun during the year depends on the latitude, Ptolemy uses them, in his revision of Marinus' work, to express differences of 30° from the east and the west, regardless of the latitude.<sup>134</sup>

Ptolemy does not explicitly describe a specific wind direction system but he does refer to nine winds in his introduction.<sup>135</sup> Despite three omissions (certainly a mere coincidence),<sup>136</sup> these winds surely correspond to a twelve-rhumb wind rose, which closely resembles but is not identical to the systems of Timosthenes, Theophrastus and Aristotle (each wind name usually had several synonyms).<sup>137</sup> An asymmetrical relationship existed between antique navigation, which relied heavily on winds, and antique geography, which used orientations based on winds and wind roses. The complex wind roses of Aristotle, Timosthenes and, later, of Vitruvius<sup>138</sup> were theoretical and geometrical constructions for geographers or architects rather than practical sailing tools.<sup>139</sup> The navigational practices related to winds were rarely as precise or as subtle as the descriptions of winds found in geographical works, the eight-rhumb wind rose being a theoretical optimum that was rarely used at sea.<sup>140</sup>

Unlike the travellers and sailors of Antiquity who used their empirical knowledge of winds for purely practical purposes, Ptolemy uses winds in his revision of Marinus' work to divide up the horizon into regular sections of 30° each.<sup>141</sup> These sections of winds correspond to the orientations based on the position of the Sun; both systems complement each other and appear to have been interchangeable.<sup>142</sup> Directions based on winds and on the position of the Sun were an important source of geographical information as their frequent occurrence in geographical works, such as in the work of Timosthenes, to whom Ptolemy refers in the *Geography*,<sup>143</sup> as well as in a number of periplographical texts testifies. Thus it is hardly surprising that they feature so strongly in Ptolemy's δῶρθωσις of Marinus' work.<sup>144</sup>

133 Neither term appears in the *Geography*.

134 Rinner 2013, 144–145, based on *Geogr.* 1.13.5.

135 See the list in Stückelberger and Mittenhuber 2009, 228.

136 Ptolemy describes the missing Zephyrus in *Tetrabiblos* 1.10.

137 Aristotle, *Meteor.* 2.6 (363a–365a) and *Vent.* (973a–b), see D'Avella 2007; Theophrastus, *Sign.* 35–37, see Sider and Brunschön 2007, fig. 1, 96; Timosthenes in Agathemerus, *Hypotyp.* 7.

138 Vitruvius, *De arch.* 1.6.4–13.

139 Timosthenes uses wind directions to locate peoples at the edges of the *oikoumenē* (Agathemerus, *Hypotyp.* 7; see also Prontera 2014, 17–21). Ptolemy uses winds in a similar way in *Tetrabiblos* 2.3.

140 Arnaud 2005, 53–59; Arnaud 2010.

141 Rinner 2013, 144.

142 Rinner 2013, 145–147.

143 In addition to the authors already cited, Eratosthenes, Posidonius (*Str.* 1.2.21), Pliny (2.119–130) and Strabo (1.2.20–21) all discuss this topic.

144 Several passages of the *Stadiasmos* (117, 137) show a close relationship between wind names and the descriptions of routes. See Arnaud 2014, 51.

## 4.5 Sources on the latitude of localities

### 4.5.1 Elevation of the pole

The values of latitude, expressed in degrees, that correspond to the elevation of the North Pole (ἐξάρματα τοῦ βορείου πόλου) are by far the least frequent type of data to be found in the sources, a state of affairs that Ptolemy bemoans in the *Geography*.<sup>145</sup> In his *Commentary on the Phaenomena of Eudoxus and Aratus*, Hipparchus had recorded the elevation of the pole at Athens (37°), Rhodes (36°) and for the Hellespont (41°).<sup>146</sup> However, given the difficulty of determining the elevation of the pole by direct observation<sup>147</sup> and the context in which Hipparchus mentioned these values, the latter might have been obtained from a calculation based on the length of the day or the ratios of a gnomon to its shadow.

### 4.5.2 Ratio of a gnomon to its shadow

Ptolemy mentions and partially explains how to use shadow-casting instruments in the *Geography* as well as in the *Almagest*. Only a small number of antique sources give the ratio of a gnomon to its shadow and then only for a few places, even though this type of information had been circulating since at least the Hellenistic period. The ratios are rarely explicitly linked with a precise source. In the first century CE, Vitruvius had supplied the ratios of a gnomon to its shadow measured at the equinox ( $g:s_E$ ) for a small number of cities: Rome (9:8), Athens (4:3), Rhodes (7:5), Tarentum (11:9) and Alexandria (5:3).<sup>148</sup> With the exception of Rome, these cities had all been major scientific centres of Classical and Hellenistic Greece; hence it is possible that the measurements date back to these periods and so could have been circulating for some time in the geographical sources. According to Strabo, Hipparchus found the ratio of the gnomon to its midday shadow at the summer solstice ( $g:s_S$ ) at Byzantium (120:41  $\frac{4}{5}$ ), while Pytheas is said to have obtained the same ratio at Massalia.<sup>149</sup> The measurement led to a good approximation for the latitude of Massalia but is erroneous by approximately 2° for Byzantium.<sup>150</sup> Strabo mentions other ratios – Alexandria (5:3) and Carthage (11:7) – which must have come from Eratosthenes or Hipparchus.<sup>151</sup>

145 *Geogr.* 1.4.2.

146 Hipparchus, *Arat.* 1.3.7 and 1.11.7.

147 Hipparchus confirms the absence of a reference star at the North Pole (*Arat.* 1.4.1). See Stückelberger 2009b, 232.

148 Vitruvius, *De arch.* 9.7.

149 Str. 1.4.4. and 2.5.41.

150 It is possible that Hipparchus did not take this measurement himself. The verb used by Strabo (εὑρεῖν,

to find, to discover, to get) is quite vague and does not necessarily mean that Hipparchus had *observed* or *measured* something. He could simply have found the ratio in a source.

151 Str. 2.5.38. According to Stückelberger and Graßhoff 2006, 230, Strabo's data can be traced back to Hipparchus, even though the text is ambiguous on this point.

The ratios provided by Pliny in his *Natural History* are not presented with the same simplicity, for they appear in his list of *circuli* and are associated with a large number of different geographical places (cities but also larger areas). One should not infer from this that the measurements with a gnomon were carried out in all the locations cited by Pliny. He used the ratios to qualify latitudinal zones, which can be compared with *klimata*. Pliny's values ( $g:s_E$ ) differ from those of Strabo and Vitruvius: 7:4 for the first *circulus* (through Alexandria and Carthage, for example); 35:24 (second *circulus*: Antioch, Lilybaion); 100:77 (third *circulus*: Rhodes, Gades); 21:16 (fourth *circulus*: Athens, Carthago Nova); 7:6 (fifth *circulus*: Hellespont, Tarentum), 9:8 (sixth *circulus*: Byzantium, Massalia, Narbo); and 36:35 (seventh *circulus*: Ravenna, Viennae, or 1:1 in Venetia).<sup>152</sup> Because of the complex nature of the list and the large amount of documentation Pliny could have consulted, a precise source cannot be identified.<sup>153</sup> There are a few ratios and a series of shadow observations located elsewhere in Pliny's work; they concern exclusively Egypt (Syēnē, Berenikē, Ptolemais, Meroē) and India (the Hypasis River, Patala), while the mention of Onesicritus and the observations made during Alexander the Great's campaigns point to Hellenistic sources.<sup>154</sup>

#### 4.5.3 Lengths of the longest day

The lengths of the longest day of the year were generally linked with expositions of parallel circles and *klimata*. Thanks to Strabo, it is possible to reconstruct, to a limited extent, the list of parallels described by Eratosthenes and Hipparchus, including the length of the longest day.<sup>155</sup> Strabo writes that a geographer should only deal with the inhabited regions, that is, from the parallel through the Cinnamōmophore to the parallel through Iernē,<sup>156</sup> which is why he provides only a summary of Eratosthenes' and Hipparchus' descriptions, which originally covered the whole hemisphere.<sup>157</sup>

Strabo lists twelve parallel circles with the lengths of their longest day, from the parallel through the Meroē (thirteen hours) up to the parallel through the British Isles

152 Pl. 6.211–220 and 2.182 (Rome 9:8, Ancona 36:35, Venetia 1:1 and Egypt less than  $\frac{1}{2}$ :1). Rinner 2013, 175–176, and E. Rinner, BACP0069.

153 The ratios can hardly have come from Hipparchus, despite the assumptions of Stückelberger 2009b, 230. Pliny very probably did not have first-hand knowledge of the work of Eratosthenes or Hipparchus (see Haushalter 2015, 221–222). J. Desanges 2008, 307, has conjectured that Pliny gathered documentation from two traditions – astronomical and geographical on the one hand, astrological on the other – and that Pliny followed mostly the latter.

154 Pl. 2.183–185.

155 Ptolemy also alludes to Hipparchus' list of localities 'which are situated under the same parallels' (*Geogr.* 1.4.2).

156 Str. 2.5.34. Iernē is Hibernia, i.e. Ireland.

157 Str. 2.5.43: 'Since the regions beyond already lie near territory rendered uninhabitable by the cold, they are without value to the geographer. But if anyone wishes to learn about these regions, and about all the other astronomical matters that are treated by Hipparchus, but omitted by me as being already too clearly treated to be discussed in the present treatise, let him get them from Hipparchus.'

Geographical references	Longest day of the year
Meroë	13 hours
Syēnē	13 $\frac{1}{2}$ hours
Alexandria	14 hours
Sidōn, Tyr	14 $\frac{1}{4}$ hours
Rhodes	14 $\frac{1}{2}$ hours
Hellespont	15 hours
Byzantium	15 $\frac{1}{4}$ hours
Middle of the Pontus	15 $\frac{1}{2}$ hours
Borysthenes	16 hours

Tab. 5 Summary of the list of Hipparchus' parallel circles given in Strabo's *Geography* (2.5.34–43), with geographical references and lengths of the longest day of the year.

(nineteen hours), separated by intervals of a quarter, a half or one hour (Table 5).<sup>158</sup> Strabo's long description is complex and includes a large amount of various data types – latitudinal intervals in stadia, day lengths, the ratio of a gnomon to its shadow, positions of stars, together with many cities and regions – and he does not always specify whether the information comes from Eratosthenes, Hipparchus or his own calculations and conversions.<sup>159</sup> Nevertheless, one can recognise a specific schema of parallels that covered the whole northern hemisphere with minimal intervals of fifteen minutes: these lengths are the backbone of Strabo's description and thus may be related to Hipparchus, his main source.<sup>160</sup> Each parallel circle with its corresponding day length is associated with cities and larger regions. Strabo's list deals with about twenty cities, most of them in Libyē and western Asia,<sup>161</sup> that lay along the parallel circles or to the north or south of them.

Pliny alludes to a classification of parallels with intervals of thirty minutes from the Equator to the parallel through Thulē but he does not link this tradition with a precise source, referring only to 'the most careful among subsequent [scholars]'; where 'subsequent' means 'after the Ancients'.<sup>162</sup> Pliny's list of parallels contains different lengths of

158 Str. 2.1.18 and 2.5.34–43.

159 Shcheglov 2007, 191: 'Strabo's testimony on Hipparchus' table is too heavily abridged and confused to provide a reliable basis for a neat reconstruction of its original content and scope. [...] The analysis of Strabo's testimony reveals a number of mistakes and omissions, which fortunately can be repaired by taking the parallel sources into account.'

160 Hipparchus strayed from this system at least once: he gives 14  $\frac{3}{5}$  hours as the longest day at Athens in *Arat.* 1.3.12.

161 The list also mentions several localities in western Europe: Syracuse, Rome, Naples, Nikaia (modern-day Nice) and Massalia.

162 Pl. 6.219.

<i>Circulus</i>	Geographical references	Longest day of the year
1	Alexandria, Carthage ...	14 hours
2	Sidōn, Tyr ...	14 $\frac{2}{5}$ hours
3	Rhodes ...	14 $\frac{1}{2}$ $\frac{1}{30}$ hours
4	Athens, Carthago Nova ...	14 $\frac{2}{3}$ hours
5	Hellespont, Tarentum ...	15 hours
6	Byzantium, Massalia ...	15 $\frac{1}{9}$ or 15 $\frac{1}{5}$ hours
7	Borysthenes ...	15 $\frac{3}{5}$ hours

Tab. 6 Pliny's list of seven *circuli* (6.211–220) with some of the geographical references and lengths of the longest day of the year.

the longest day and his geographical range is wider (Table 6).<sup>163</sup> Pliny refers neither to Eratosthenes nor to Hipparchus but presents the description of parallels as a 'Greek invention'; he alludes, though, to Latin authors, who 'called the sections *circulus*' (whereas 'the Greek used the term *parallelos*').<sup>164</sup> He mentions a certain Nigidus for one of the length values, as the latter gave a longest day of 15  $\frac{1}{5}$  hours for the sixth *circulus*.<sup>165</sup> The latter is generally identified as P. Nigidus Figulus, who was praised by his friend Cicero for his erudition,<sup>166</sup> although his work remains unknown. On the basis of a comparison between the list of *circuli* and the discussion on gnomons (Pl. 2.182), E. Honigmann concluded that Nigidius' main Greek source might have been Serapion of Alexandria.<sup>167</sup> The sources of Pliny's list are, however, more complex<sup>168</sup> and also partially contradict his own geographical description: all this points to a list that was already complex in Pliny's source and which had not been totally harmonised with his other sources.<sup>169</sup> Nevertheless, Pliny's list contains up to 130 cities and as many regions and provinces, which indicates, together with Strabo's testimony, that lists of parallel circles related to geographical localities had been in circulation before the time of Marinus and Ptolemy.

163 Pliny succinctly summarises these lengths in his discussion on gnomonics: in Meroë, twelve equinoctial hours and eight parts of an hour; Alexandria fourteen hours; Italy fifteen hours; and Britain seventeen hours (Pl. 2.186).

164 Pl. 2.211. The list of *auctoritates* of Book 6 of the *Natural History* mentions several well-known geographers (Eratosthenes, Hipparchus, Posidonius and Timosthenes, among others) who discussed this topic. Pliny also cites a series of authorities, whose works are unknown.

165 Pl. 6.217.

166 Cic. *Fam.* 4.13. Aulus Gellius (*Noct. Atticae* 3.12) calls him *doctissimus uir*.

167 Honigmann 1929, 34–50.

168 J. Desanges 2008, 266–267, has pointed out several geographical elements that cannot be older than the first century CE. O. Neugebauer 1975, footnote 15, 729, was sceptical about E. Honigmann's hypothesis. He also found similarities in the lengths of the longest day between Pliny's list and the seven *klimata* of Vettius Valens (*Anth.* 1.6, ed. Kroll, p. 24), Neugebauer 1975, 728.

169 See the difficulties that P. Schneider 2012 has encountered in realising some maps and diagrams taken from Pliny's *circuli* description.

#### 4.5.4 Marinus' list of parallels and *klimata*

Marinus provided, as far as one can reconstruct through Ptolemy's revision, something resembling a list of localities arranged by parallel circles:

One finds in [Marinus'] works (ἐν ταῖς συντάξεσι) separately, in one place maybe just the latitudes, say in the exposition of the parallels (ἐπὶ τῆς τῶν παραλλήλων ἐκθέσεως), and in some other place just the longitude, say in the description of the meridians. Moreover, the same localities are not found in each section: the parallels are drawn through some places and the meridians through others [...].<sup>170</sup>

Ptolemy alludes several times to parallel circles (παράλληλοι)<sup>171</sup> but also to Marinus' list of *klimata*. Ptolemy corrects some of its contents, referring generally to 'the division (διαίρεσις) of the *klimata*'<sup>172</sup> or simply to 'the *klimata*'<sup>173</sup>. In Marinus' work, *klimata* are not circles with a specific latitude but numbered latitudinal zones, which one can assume were delimited by two parallels.<sup>174</sup> Ptolemy does not specify which value – degrees or length of the day – Marinus gave to each parallel, with the exception of the parallel through Thulē (63°)<sup>175</sup> and Rhodes (36°).<sup>176</sup> Marinus had read the astronomical work of Hipparchus<sup>177</sup> and he used at least two of Hipparchus' main parallels (through the Hellespont and through Byzantium).<sup>178</sup> He probably placed a large number of cities along and between his parallels and *klimata* – Ptolemy alludes to 'all the inland cities of Thrace,' which Marinus located to the north of the parallel through Byzantium<sup>179</sup> – and employed a wide range of geographical localities.<sup>180</sup>

#### 4.5.5 Reading the stars

One possible way of determining a locality's latitude is by observing the stars. Some constellations are only visible in the northern hemisphere for example, while the culmination of some stars differs according to the location of the observer. Strabo recorded

170 *Geogr.* 1.18.4.

171 *Geogr.* 1.15.7–9.

172 *Geogr.* 1.15.5.

173 *Geogr.* 1.15.6.

174 *Geogr.* 1.15.7–8. See Rinner 2013, 134.

175 *Geogr.* 1.7.1.

176 *Geogr.* 1.7.1. Marinus also gave Okêlis a latitude of 11°24' (*Geogr.* 1.7.4).

177 *Geogr.* 1.7.4. Ptolemy does not provide strong evidence that Marinus was familiar with Hipparchus' geographical writings.

178 *Geogr.* 1.15.7–9. It would seem likely that, if the values in degrees or in lengths of the longest days for Hipparchus' and Marinus' parallels had been very different (as Pliny's and Hipparchus' values were), then Ptolemy would most probably have mentioned this fact. Thus, it is possible that Marinus' and Hipparchus' latitude data, at least for the main parallels, were similar or at least consistent.

179 *Geogr.* 1.15.8.

180 Noviomagus (Chichester, West Sussex, England) and Londinium (London) are included in Marinus' list of *klimata* (*Geogr.* 1.15.6).

examples of these descriptions, which he probably found in Hipparchus' work, and then linked them with several parallels.<sup>181</sup> Marinus also used celestial observations in his argumentation on the southern extent of the *oikoumenē*, always referring back to Hipparchus.<sup>182</sup> Ptolemy was perfectly aware of the difference between theoretical descriptions of the sky, which could be used to establish a precise geographical latitude, and precise reports on the appearance of the sky that had been observed in a specific city.<sup>183</sup> That Ptolemy used such celestial observations is, therefore, theoretically possible, although it cannot be verified.<sup>184</sup>

## 4.6 Sources on the longitude of localities

### 4.6.1 Localities lying along the same meridian, τόποι ἀντικείμενοι

Ptolemy writes that, in some sources more recent than Hipparchus, he found descriptions of localities that are 'oppositely situated' (ἀντικείμενοι):

A few of those who came after [Hipparchus] have transmitted some of the localities that are oppositely situated (τῶν ἀντικειμένων τόπων) not meaning that they are equidistant from the equator, but simply because they are on a single meridian, based on the fact that one sails from one to another of them by north or south winds.<sup>185</sup>

Although Ptolemy does not refer to a precise source, he does indirectly acknowledge that Marinus provided some of these localities by stating that the latter's data often needed to be revised:

We have also concluded that the positions of the individual cities call for correction in many places [...], for example in the places that are believed to be oppositely situated (τῶν ἀντικεῖσθαι πεπιστευμένων).<sup>186</sup>

This is followed by a series of four instances where Ptolemy either refutes Marinus' examples of τόποι ἀντικείμενοι with the help of Timosthenes or he points out a contradiction in the information provided by Marinus.<sup>187</sup> This information alone does not give an

181 Str. 2.5.35–36 and 2.5.41–43.

182 *Geogr.* 1.7.4–9.

183 *Geogr.* 1.7.5. See p. 173.

184 Rinner 2013, 135–136.

185 *Geogr.* 1.4.2.

186 *Geogr.* 1.15.1.

187 *Geogr.* 1.15.2–4. See Berggren and A. Jones 2000, 157–159. Ptolemy refers to Timosthenes twice, on

one occasion to make the following correction: 'Again, [Marinus says that] Pachynos [is opposite] Leptis Magna, and Himera [opposite] Theainai, yet the distance from Pachynos to Himera amounts to about 400 stadia, while that from Leptis Magna to Theainai amounts to over 1 500 stadia, according to what Timosthenes records! In fact, Marinus'

absolute geographical longitude and so needs to be combined with other data. The instances Ptolemy quotes from Marinus' work concern localities throughout the whole Mediterranean area and involve long distances: Tarraco and Iōl Caesarea, Pachynos and Leptis Magna, Himera and Theainai, Tergeste and Ravenna, the Chelidoniai Rocks and Kanōbos,<sup>188</sup> Cape Akamas and Paphos, Paphos and Sebennytos.<sup>189</sup>

As Ptolemy himself states, the description of localities that lie on the same meridian was a mathematical adaptation of empirical knowledge based on sailing praxis.<sup>190</sup> The description of two localities that are 'opposite' each other did not mean, from the nautical point of view, that they necessarily lay on the same meridian. Rather, it concerned localities that were daymarks (that is, navigational aids that served as reference points for sailors) along a commonly used maritime route.<sup>191</sup> Essentially, the statement that locality *A* is 'opposite' (κατά) or 'directly opposite' (ἀντικρύ) locality *B* could reflect a wide range of configurations.<sup>192</sup> Then, for a small number of localities for which it had been established that the route followed a north–south direction, geographers determined approximately the relative longitudes between the localities. Eratosthenes and Timosthenes, in particular, seem to have collected and systematised this kind of information in order to identify localities that could be placed on a common meridian.<sup>193</sup> Eratosthenes' construction of a meridian running through Meroë, Syēnē, Alexandria, Rhodes, Byzantium and the Borysthenes must certainly have arisen from such a practice.<sup>194</sup>

The existence of a substantial set of localities that were said to lie on the same meridian was hence well attested and was an important component in the creation of Hellenistic geography. Ptolemy seems, however, to have treated this information cautiously<sup>195</sup>

two pieces of information are consistent. Thus, it is possible that Ptolemy assumed that Himera and Pachynos on the one hand and Leptis Magna and Theainai on the other lay more or less on the same parallel.

188 Strabo (14.3.8) records exactly the same configuration.

189 Agathemerus, *Hypotyp.* 26, claims a distance of 3,800 stadia between Paphos and Alexandria, following the Boreas (a north wind).

190 Arnaud 2005, 66.

191 Kowalski 2012, 99.

192 Str. 10.5.17, 14.3.8, 17.3.6; *Isid. Etym.* 14.6.24–25 for the route Rhodes–Karpáthos–Egypt. See the examples of Kowalski 2012, 97–100.

193 For example, Strabo (2.1.40) reproaches Eratosthenes for believing that Rome and Carthage lay on the same meridian. To reach Carthage starting from Rome (or Ostia), one well-attested option was to sail southwards until Maritima (modern-day Maret-

timo) and from there to head south-westwards for Cape Hermaion (Ras Addar) on the north-eastern tip of the Bay of Carthage. The idea that Rome and Carthage lay approximately on the same meridian originated from this route. See Arnaud 2005, 162–163. Likewise, Strabo records that Timosthenes erroneously believed that Cape Metagonion was situated opposite (κατά) Massalia, whereas this cape in fact lay opposite Carthago Nova (Str. 17.3.6).

194 Str. 2.5.7: 'All agree that the route by sea from Alexandria to Rhodes is in a straight line with the course of the Nile, as also the route from there along Caria and Ionia to the Troad, Byzantium, and the Borysthenes. Taking, therefore, the known distances that have been sailed, [scholars] inquire as to the regions beyond the Borysthenes that lie in a straight course with this line [...]. See Arnaud 2005, 214–215 and 228.

195 See Ptolemy's rather sceptical presentation in *Geogr.* 1.15.1.

and nowhere does he state whether he used this type of data to determine his geographical coordinates.

#### 4.6.2 Longitudinal extent of the *oikoumenē*

An important part of Ptolemy's revision of Marinus' work concerns the discussion on the longitudinal extent of the *oikoumenē*. Ptolemy focuses his revision on the eastern part of the world, that is, the area from the Euphrates River eastwards. Ptolemy clearly trusted Marinus' estimation of the longitudinal extent of the Mediterranean area:

For in the first place one should follow the numbers of stadia, from place to place, set down by [Marinus] for the distance from the Fortunate Isles to the crossing of the Euphrates at Hierapolis, as if [the journey] were made along the parallel through Rhodes. [This is] both because it is continually being checked and because [Marinus] has manifestly taken into account the amount by which the greater distances ought to be corrected on account of diversions and variations in the itineraries.<sup>196</sup>

According to Marinus, on the basis of the individual numbers of stadia that he assumes, and reckoning on the parallel [through Rhodes], the distance from the meridian through the Fortunate Isles to the Sacred Cape of Iberia amounts to 2°30' [...].<sup>197</sup>

Marinus provided at least one list that contained several localities in the Mediterranean area with precise longitudinal intervals, given in stadia: the Sacred Cape, the mouth of the Baetis River, Calpē, Caralis, Lilybaion, Pachynos, Cape Tainaron, Rhodes, Issus and the crossing of the Euphrates. This theoretical line has its origins in mathematical geography. Agathemerus attributed to Dicaearchus the creation of a straight line that ran from the Pillars of Hercules through Sardinia, Sicily, the Peloponnese, Caria, Lycia, Pamphylia, Cilicia and the Taurus Mountains until the Imaon Mountains.<sup>198</sup> While Dicaearchus provided the distances measured between the localities that lay on his main parallel,<sup>199</sup> Eratosthenes, paradoxically, did not link the parallel through Rhodes to his

196 *Geogr.* 1.11.2.

197 *Geogr.* 1.12.11.

198 Agathemerus, *Hypotyp.* 5. This imaginary line corresponds to the so-called *diaphragma*, a term that is frequently used in modern scholarly publications – e.g., in Geus 2011, 256, 276; Irby 2012, 99, 102; Salway 2012, 197; Gómez Fraile and Albaladejo Vivero 2012, 364 – although its usage as a *terminus technicus* for Dicaearchus' line should probably be avoided.

There is absolutely no evidence that Dicaearchus used this term himself and the word is not used in the sources with this specific meaning. Agathemerus writes of a simple 'right section' (τομή εὐθεῖα), while Strabo, describing the work of Eratosthenes, uses only 'line'.

199 For instance, 3 000 stadia from the Peloponnese to Sicily and 7 000 stadia to the Pillars of Hercules (Str. 2.4.2).

own distances.<sup>200</sup> Artemidorus described a line running from the east to the west of the *oikoumenē*. Although it matched the Hellenistic parallel of Rhodes, Artemidorus' line was not explicitly presented by Pliny as a parallel circle.<sup>201</sup> The line that Ptolemy took from Marinus fell within this geographical tradition and enabled him to obtain longitudinal intervals for a limited number of localities.

#### 4.6.3 Lists of meridians and hour intervals

Marinus seems to have compiled a list, perhaps in the form of a table, that described meridians, probably on the model of his description of parallels and *klimata*.<sup>202</sup> Ptolemy writes about Marinus' *exposition* (ἔκθεσις) of the parallels but refers to the ἀναγραφή of the meridians, which could be translated as 'record', 'description' or 'composition'. However, it is difficult to distinguish between the two terms, while a clear definition of Marinus' list has not been found.<sup>203</sup> The latter might have been a list of localities lying on the same meridian, perhaps similar to Eratosthenes' description of the meridian through Alexandria.<sup>204</sup> In his revision of Marinus' work, Ptolemy hints at dividing the *oikoumenē* into hour-intervals:

Marinus makes the longitudinal dimension [of the *oikoumenē*] bounded within two meridians that cut off fifteen hour-intervals (ὥραῖα διαστήματα).<sup>205</sup>

[Marinus] says that Pisae is 700 stades from Ravenna † in the direction of the Libonotos †, but in his division of the *klimata* and the hour-intervals (διὰ τῆς τῶν ὥραίων διαίρεσεως), he puts Pisae in the third hour-interval and Ravenna in the fourth.<sup>206</sup>

200 Eratosthenes' parallel of Rhodes went through the Pillars of Hercules, the Strait of Sicily, south of the Peloponnese, through Rhodes of course, the Gulf of Issus and the Taurus Mountains (Str. 2.1.1). However, Eratosthenes did not use this parallel to record distance data; rather, he provides some of the intermediate distances between the Indus River and the Caspian Gates, from there to the Euphrates River, the Nile, the Canopic mouth of the Nile, Carthage and from there to the Pillars of Hercules (Str. 1.4.5). This succession of localities was not explicitly presented as a parallel circle – and this was certainly not Eratosthenes' intention. In fact, Strabo reproaches him for using broken lines to measure the inhabited world and thereby introduce significant inaccuracies (Str. 2.1.37).

201 Pl. 2.242–243. The line went through the Ganges River, the Gulf of Issus, Cyprus, Rhodes, Astypalaia, Lilybaion, Caralis, Gades and the Sacred Cape.

202 *Geogr.* 1.18.4. See p. 192.

203 Note that at no point does Ptolemy refer to any 'tables' (κανόνες) compiled by Marinus.

204 The meridian through Alexandria was used primarily by Eratosthenes to evaluate the width of the *oikoumenē*, not to give the longitude of the localities.

205 *Geogr.* 1.11.1. See also *Geogr.* 1.14.9 and 1.17.2.

206 *Geogr.* 1.15.5. This passage has caused intense debate on account of its apparent inconsistency: if Pisa is south-west of Ravenna, then the two cities could have been in different hour-intervals, which would make Ptolemy's criticism illogical. Modern scholars generally consider that the numbering of the hour-intervals is corrupt here (Berggren and A. Jones 2000, 78, 159–160 and 164; Stückelberger and Graßhoff 2006, 98–99). In fact, the *codices primarii* of the *Geography* contain the same numbers of hour-intervals, although manuscript X does not include

In Marinus' work, 'hour-intervals' were longitudinal zones of one equinoctial hour each, which corresponded to  $15^\circ$  of longitude.<sup>207</sup> As such they acted as a pendant to the *klimata*, and were, like the latter, numbered as well. Arranging localities according to hour-intervals was, however, too imprecise to determine longitude, even in relation to a prime interval. Ptolemy used hour-intervals to draw the grid of the world map; he explains that one had to divide each interval into three sections and then draw the meridians, each with intervals of  $5^\circ$ .<sup>208</sup> Ptolemy's purpose here was purely graphical: drawing meridians at every whole degree would have been impracticable, pointless or not aesthetically pleasing, but drawing meridians at  $5^\circ$  intervals was an appropriate compromise. However, Ptolemy's use of hour-intervals was never explicitly linked with determining the coordinates.

## 4.7 Maps and pictorial representations

### 4.7.1 Ptolemy's use of maps as sources

Maps as concrete geographical objects were a central part of Ptolemy's approach to geography. He alludes several times to the cartographical creations of his predecessors, for he intended to use 'the reports of those who have visited the places, or their positions as recorded in the more accurate maps (ἐν τοῖς ἀκριβεστέροις πίναξι).'<sup>209</sup> Ptolemy uses the word *πίναξ*, which was commonly used in geographical literature, to describe his own cartographical constructions.<sup>210</sup> Eratosthenes, for example, intended to correct the 'ancient map', which here clearly means both the cartographical object and a textual description.<sup>211</sup> Ptolemy's use of maps as a geographical source is ambiguous. On the one hand, he states that he effectively had access to or even used some *ἀκριβέστεροι πίνακες*, that is, very detailed or precise maps (the adjective may refer to the scale of the map, to

'in the direction of the Libonotos' – this phrase was inserted later by a reviser in the left margin (f. 134r). Hence, only the  $\Omega$  recension contains this direction. The archetype could have been defective at this point and later (wrongly) completed in the  $\Omega$  hyparchetype, perhaps on the basis of Ptolemy's own configuration; in the *Geography*, Pisae lies, in fact, in the direction of the Libonotos, that is, southwest of Ravenna. The reviser of X would have taken this correction from an  $\Omega$  manuscript. The

original text might have contained a different orientation, e.g., simply 'in the direction of the Notos' (south of Ravenna), which would explain Ptolemy's criticism of Marinus.

207 Rinner 2013, 138.

208 *Geogr.* 1.23.1.

209 *Geogr.* 1.19.1.

210 *Geogr.* 1.24.1.

211 *Str.* 2.1.2.

its quality and/or to the amount of information it contained),<sup>212</sup> on the other hand, he warns:

After all, continually transferring [a map] from earlier exemplars (παραδειγμάτων) to subsequent ones tends to bring about grave distortions in the transcriptions through gradual changes. If this method based on a text did not suffice to show how to set [the map] out, then it would be impossible for people without access to the picture (εἰκόνας) to accomplish their objective properly. And in fact this is what happens to most people [who try to draw] a map (πίνακος) based on Marinus, since there is no model (παραδείγματος) based on his final compilation.<sup>213</sup>

In this passage, Ptolemy implies that Marinus' works did not contain any map that was worth using. He criticises the way of copying maps that was prevalent at the time and, when he describes the appearance of his predecessors' maps, he focuses on their shortcomings:

For in the case of an undivided map (ἐπὶ τῆς ὑφέν καταγραφῆς), because of the need to preserve the ratios of the parts of the *oikoumenē* to each other, some parts inevitably become crowded together because the things to be included are near each other, and others go to waste because of a lack of things to be inscribed. In trying to avoid this, most [map-makers] have frequently been constrained by [the frame] of their maps themselves to distort in diverse manners (πολλαχῆ διαστρέφειν) both the measures and the shapes of the countries, as if they were not guided by [geographical] reports (ὑπὸ τῆς ἱστορίας).<sup>214</sup>

Ptolemy then gives some examples of the generally distorted shapes of eastern Asia and western Libyē.<sup>215</sup> However, he gives no further clues as to how he used the 'more accurate maps' of his predecessors.

212 Berggren and A. Jones 2000, 81, have translated ἀκριβέστεροι πίνακες as 'the more accurate maps,' whereas Stückelberger and Graßhoff 2006, 107, understand it to mean a 'more detailed map' ('detailliertere Karte'). Stückelberger 2009c, 132, believes that 'one can only say with certainty that it [i.e. ἀκριβέστεροι πίνακες] must have concerned maps that only included limited areas, in contrast to world maps: ('Mit Sicherheit lässt sich nur sagen, dass es sich – im Gegensatz zur Weltkarte – um Einzelkarten handeln muss, die nur begrenzte Regionen umfassten?') Such an assumption is, however, purely speculative, since Ptolemy gives

no indication of the meaning of this expression, which is thus open to different interpretations. The same adjective ἀκριβής is also associated with the term 'observation': διὰ τῶν ἀκριβεστέρων τηρήσεων (*Geogr.* 1.4.1), i.e. 'through the more precise/detailed/accurate observations.' Stückelberger and Graßhoff 2006, 65, have translated the phrase as 'through the more reliable observations' ('durch die sichereren Beobachtungen').

213 *Geogr.* 1.18.2–3.

214 *Geogr.* 8.1.2.

215 *Geogr.* 8.1.2–4.

#### 4.7.2 Maps in the geographical literature of Antiquity

Even though Eratosthenes was generally considered, even in Antiquity, to be one of the founders of Hellenistic cartography, not a single reference is made to him in the *Geography*; Ptolemy mentions him only once, along with Hipparchus, when writing about the obliquity of the ecliptic in the *Almagest*.<sup>216</sup> No manuscript of Eratosthenes' maps has come down to us. Strabo does discuss Eratosthenes' 'map of the *oikoumenē*'<sup>217</sup>, but it seems as if he is referring to a text not to a drawing (it is entirely plausible that Eratosthenes provided a map *and* a textual commentary). Nonetheless, Strabo gives a good (though partial) description of the general appearance of a map by Eratosthenes and he also reveals the latter's cartographical principles.<sup>218</sup>

Eratosthenes' map of the *oikoumenē*, based on Dicaearchus' model, was divided into two by a line running from the Pillars of Hercules to the Taurus Mountains and India. Each part was subdivided into smaller sections, which Eratosthenes called σφραγίδες,<sup>219</sup> πλυθία<sup>220</sup> or simply μέρη and μερίδες ('part', 'portion', 'region').<sup>221</sup> Eratosthenes gives a description of their borders, which fit, in most cases, in his grid of main parallels and meridians but are also linked with topographical features (mountain ranges, rivers). His cartographical construction shows the effort he put into schematising the map, focusing on the general shape (size and form) of each part of the *oikoumenē*.<sup>222</sup>

In the last part of his introduction to his *Geography*, Strabo describes what he believes a map of the *oikoumenē* should represent.<sup>223</sup> Although he often referred to Eratos-

216 *Alm.* 1.12.

217 Str. 2.1.1: 'In the third book of his *Geographika*, [Eratosthenes] establishes the map of the inhabited world (καθιστάμενος τὸν τῆς οἰκουμένης πύρακα).'

218 Str. 1.4.1–9 and 2.1.1–41. See Aujac, Harley, and Woodward 1987b, 155–157; Roller 2010; Geus 2007; Geus 2011, 276–288; Stückelberger and Mittenhuber 2009, 254–256.

219 The primary meaning of σφραγίς is 'seal' or 'gem stone'. However, some scholars believe that, in Eratosthenes' description, the term corresponds to 'parcel', i.e. a portion of land delineated by boundary marks, as used in the land administration of Ptolemaic Egypt. Eratosthenes might thus have borrowed the word from the terminology of land surveyors or γεωμέτρης (see Marcotte 2005, 151–152, and Roller 2010, 26, among others). By contrast, K. Geus 2004a, 20–21, has remarked that 'there is no conclusive evidence that "seal" was used in this sense before the publication of Eratosthenes' *Geographika*' and estimates that 'Eratosthenes was thinking of the impression in wax made by a signet ring; hence 'geographically speaking, a "seal" is

to be regarded as a region marked by distinctive lines and landmarks'. In fact, the oldest attestation of σφραγίς in the context of land surveying is *contemporary* with the redaction of Eratosthenes' geographical work, i.e. the last two decades of the third century BCE.

220 The word πλυθίον means 'rectangle' or 'quadrilateral'. In Ptolemaic Egypt, the term had been used to describe square portions of land (which Hyginus, in the first years of Trajan's reign, compared to *laterculi quadrati uti centuriae*, i.e. 'square parcels [literally, small bricks] like centuries') from at least the middle of the third century BCE. A centuriation (*centuriatio*) was a division of a territory into square areas; each of these square areas was called a century (*centuria*). See Marcotte 2005, 151–152, and Behrends et al. 2000, 36–37 and 80–81.

221 Str. 2.1.35.

222 Geus 2004a, 25: 'Consequently, Eratosthenes' concern was that his map should be readily drawn, copied and memorised.'

223 Str. 2.5.1–43.

thenes, Hipparchus and other authorities in earlier discussions, Strabo now assumes total responsibility for his claims.<sup>224</sup> He specifies that, in order to obtain a reliable picture of the *oikoumenē*, the map needs to be drawn on to a spherical surface (ἐπισφαιρικῆς ἐπιφανείας) and its diameter should be at least ten feet (c. 3.3 m),<sup>225</sup> while the area of the flat surface of a plane map (ἐπίπεδος πίναξ)<sup>226</sup> should be at least seven feet (c. 2.3 m) in length. One should start by drawing a grid of parallels and meridians:

It is clearly helpful to assume two straight lines that intersect each other at right angles, one of which will run throughout the greatest length and the other throughout the greatest breadth [of the *oikoumenē*]: the first line will be one of the parallels, and the second line one of the meridians. Then it will be helpful to conceive lines parallel to these two lines on either side, which divide the land and the sea that we happen to use. [...] and thereby too the *klimata* will be better represented, both in the east and in the west, and likewise in the south and in the north. But since these straight lines must be drawn through known places (διὰ γνωρίμων τόπων), two of them have already been so drawn – I mean the two central lines mentioned above, the one representing the length and the other the breadth – and the other lines will be easily found by the help of these two. For by using these lines as references (στοιχείοις)<sup>227</sup> so to speak, we can correlate the regions that are parallel, and the other positions, both geographical and astronomical, of inhabited places.<sup>228</sup>

One may suppose that the first parallel to be drawn would have been the parallel through Rhodes in the tradition of Dicaearchus and Eratosthenes. Strabo develops a grid using an orthogonal projection but he is silent about the appropriate ratio of the meridian to the parallel. He writes that the outline of the inhabited lands, which he sums up in a kind of epitome of his own books, should be inscribed within the grid, using the

224 See Aujac, Harley, and Woodward 1987a, 174. The attribution of some characteristics of his map to, e.g., Eratosthenes, is sometimes much less reliable than the traditional modern selection of Eratosthenes' fragments would have us imagine. Strabo explains, e.g., that a map of the world should represent parallels and meridians as straight, perpendicular lines (Str. 2.5.16). That Eratosthenes did so (Dilke 1985, 34; Stückelberger and Mittenhuber 2009, 255) is plausible but has not been substantiated; see also Rinner 2013, 78. Eratosthenes and Hipparchus appear mainly in Strabo's discussion on the list of the *klimata* at the end of his exposition.

225 Str. 2.5.10. See Stückelberger and Graßhoff 2006, footnote 128, 113.

226 Str. 2.5.10. Ptolemy uses the same term. See *Geogr.* 1.18.1.

227 The word στοιχείου in fact means 'element', as in the title of Euclid's famous work. Strabo explains here that the two main axes are to be taken as the basis for the other lines. Aristotle used the word in a similar way and his usage can elucidate Strabo's use of the term: 'We give the name of *elements* (στοιχεῖα) to those geometrical propositions, the proofs of which are implied in the proofs of the others, either of all or of most' (Arist. *Metaph.* 3.3 [998a]). In researching reliable reference places, Ptolemy refers to θεμέλιοι (see p. 175), which have a similar meaning as στοιχείου in Strabo's description.

228 Str. 2.5.16.

axes, several main localities that have already been drawn on to the grid as well as the distances.<sup>229</sup> The drawing of the *klimata*, inspired by Hipparchus, comes at the end of the introduction and is certainly the last part of the map to be drawn.

It is inevitable – albeit paradoxical – that Marcus Agrippa and his geographical work should get a mention in a synopsis of antique pictorial representations of the known world. Pliny the Elder is the only reliable source to mention Agrippa, and there is no question about the existence of a geographical *text* written by Agrippa (no matter its nature).<sup>230</sup> By contrast, the existence of a *map* drawn after Agrippa's text has generated a long-standing, passionate debate and a bibliography of monstrous proportions, which, given the paucity of antique testimonies, is hard to comprehend.<sup>231</sup> One short passage has caught the attention of generations of scholars:

*Agrippam quidem in tanta uiri diligentia praeterque in hoc opere cura, cum orbem terrarum orbi [sic codd.] spectandum propositurus esset, errasse quis credat? Et cum eo diuum Augustum? Is namque complexam eum porticum ex destinatione et commentariis M. Agrippae a sorore eius inchoatam peregit.*<sup>232</sup>

(Who could therefore believe that Agrippa made a mistake, as one knows the diligence of this man and how careful [he has been] in this work, when intending to set the world before the eyes of the world? And that the divine Augustus [was mistaken] with him? For it was [Augustus] who completed the porticus containing it [*sc.* the world] that has been begun by his sister, in accordance with the *commentarii* and the *destinatio* of Marcus Agrippa.)

On the basis of this fragment of text and in the absence of any archaeological evidence, almost two centuries of animated historiography has created a kind of 'ghost map', a lost document that is supposedly the keystone of our understanding of the interactions between Pliny, the imperial power and the whole of Roman cartography up until the Middle Ages.<sup>233</sup> Many scholars, however, deny that such a map ever existed. The debate is complex, not only because it concerns the exegesis of Pliny's passage – which has sometimes been emended to favour one thesis or the other<sup>234</sup> – but also because of its association with Roman itineraries, including the Peutinger Map. In attempting to put together a corpus of fragments that dates back to Agrippa's work, one encounters a series of specific epistemological issues, as exemplified by the divergent editions of Partsch 1875, Riese 1964, Detlefsen 1906 and Klotz 1931. If one restricts the number

229 For the length, e.g., of the Mediterranean Sea (Str. 2.5.19).

230 The verbs that Pliny uses to introduce Agrippa's information point clearly to a text. See Arnaud 2008, 97–98.

231 See, e.g., the edifying *status questionis* in Brodersen 1995, 269–270.

232 Pl. 3.17.

233 Arnaud 2008, 74–79.

234 See Traina 2007, 99; Arnaud 2008, 82–84.

of fragments to those explicitly mentioned by Agrippa, and disregards the *Div. orb. terr.*, the *Dem. prov.* as well as the 'Chorograph' mentioned by Strabo and the other fragments where Agrippa's authorship has been or must be challenged, the number of fragments comes down to thirty-one mentions, all of them by Pliny. No complete map, even reduced to the Mediterranean area, can ever be reconstructed on the basis of these passages, for all the fragments seem to refer back to a text. Even if one considers that the text goes back to the so-called *commentarii* mentioned by Pliny in the passage quoted above, and that these *commentarii* were related to a map in one way or another (a commentary – in the modern sense – of the map, the map's preliminary notes, or a collection of scientific material), the general appearance and nature of Agrippa's geographical works do not appear clear at all. The fragments include, among other types of information: *definitiones* of regions with their boundaries regarding the four cardinal points (one may see here some formal similarities with Eratosthenes' σφραγιδες<sup>235</sup>); latitudinal and longitudinal extents in miles; long-distance measurements plus some isolated maritime distances; and perimeters and *periploi*.<sup>236</sup> One can thus make a very general sketch of Agrippa's *imago mundi*, although any attempt to reconstruct the appearance of his map will inevitably contain an element of speculation: the dimensions, the map's orientation, the form of the map itself and of the known world, the entries or labels all have to be imagined, since no clear information has been transmitted on these topics.

#### 4.7.3 Archaeological documentation

The few surviving Greek and Roman antique maps as well as pictorial representations of small- and large-scaled spaces have fuelled an interminable number of discussions on the reality and methods of cartography in Antiquity. Although the excessively extensive bibliography on antique maps is inversely proportional to the tangible archaeological evidence, the smallness of the corpus should lead to more measured conclusions. The paucity of the existing documentation does not allow any categorical statements, whether positive or negative, to be made on the presence of maps in the libraries before Ptolemy's time.<sup>237</sup> We will ignore very small-scale pictorial representations, such as the cadastres of Arausio (modern-day Orange, southern France),<sup>238</sup> the *forma* of Lacimurga<sup>239</sup> or the *Forma Urbis Romae*,<sup>240</sup> which cannot have been of much use

235 Gómez Fraile and Albaladejo Vivero 2012, 416, mention 'las *sphragides* de Agripa' (!).

236 Arnaud 2008, 112–115.

237 Marcotte 2010, 363.

238 Piganiol 1962. The map dates back to the first century CE and its scale has been estimated to be approximately 1:6 000 (Talbert 2012, 164).

239 Last decades of the first century BCE? The identification of the territory that the bronze plaque represents is still open to debate (Lacimurga, Augusta Emerita or Ucibi?). See Sáez Fernández 1990; Clavel-Lévêque 1993.

240 This map of the centre of Rome has been dated to the first decade of the third century CE and has a scale of about 1:240. See Dilke 1987c, 225–230, and

to Ptolemy, given their scale and purpose. Likewise, some early medieval maps – such as the Albi map,<sup>241</sup> the maps in some manuscripts of the work of Isidore of Seville and Cosmas Indicopleustes<sup>242</sup> and the so-called Cotton ‘Anglo-Saxon map’<sup>243</sup> – will also be disregarded, although they predate the Peutinger Map. In spite of its date, the latter is of interest because of its links with the literature of Roman itineraries and the possibility that its model dates back to Antiquity.

*The map in the Artemidorus Papyrus*

The recently discovered and edited Artemidorus Papyrus (*P. Artemid.*)<sup>244</sup> comprises a partial map that has elicited much intense debate in the past decade. Its dimensions are large (99 cm × 32.5 cm), if one includes only the seven preserved sheets (κολληήματα).<sup>245</sup> Although the authenticity of the papyrus, and hence of the map, has been challenged by L. Canfora and others since 2006, no decisive evidence – despite the numerous arguments and counter-arguments – has yet been presented *against* its authenticity.<sup>246</sup> Meanwhile, carbon-14 dating has established that the papyrus was made between 40 BCE and 130 CE, with a certitude of 95%,<sup>247</sup> which is compatible with the palaeographical analysis undertaken.<sup>248</sup> The map consists of mostly horizontal wavy lines, some of which run

Talbert 2012, 172–177. The fragments have been digitalised by the Stanford Digital Forma Urbis Romae Project.

241 Albi, France, bibliothèque municipale, Ms. 29 (115), f. 57v (mid eighth century).

242 E.g., the manuscript Vat. lat. 6018, ff. 64v–65r (ninth century) of Isidore and the Vat. gr. 699, f. 40v (ninth century) of Cosmas Indicopleustes.

243 London, British Library, Cotton MS, Tiberius B.V., f. 56v (eleventh century). This manuscript includes the *Periegesis* of Priscian.

244 Mertens-Pack<sup>3</sup> 168.02 = LDAB 7132. *Editio princeps* in Gallazzi, Kramer, and Settis 2009.

245 Gallazzi, Kramer, and Settis 2009, 275.

246 The expansion of the *P. Artemid.* bibliography (books, articles, reviews of articles, not including all the many symposiums) concerning its supposed inauthenticity has spiralled out of control in the past ten years. The most reasonable position to take is to consider that the burden of proof should fall on the ‘accuser’ (Marcotte 2010, 336–337), i.e. on those supporting the forgery theory. To put it briefly, the latter intend to demonstrate that the *P. Artemid.* is a nineteenth-century forgery that many consider was carried out by the Greek palaeographer Constantine

Simonides (Carlucci 2009, Canfora 2011 and Canfora 2012b). Their arguments are of some interest (when they point to particularities of the text) but they are rarely convincing to me, if not downright contradictory and meaningless (e.g. Small 2010) – hence the absence of a decisive outcome. Supporters of the *P. Artemid.*’s authenticity have not been pressured to present such a sensational hypothesis (with perhaps the exception of Rathmann 2011 and Rathmann 2013), given the state of the sources and the characteristics of the map (Talbert 2009; Marcotte 2010; Gallazzi, Kramer, and Settis 2012; Moret 2013; and Haushalter 2014). As D. Marcotte 2010, 356, has noted, a history of antique cartography is necessarily a study of hapax. ‘Authenticity’ in this context means that the map was sketched at some time in Antiquity, then thrown away and reused during the first century CE; it does not necessarily mean that the map was drawn by Artemidorus himself or that it was realised in accordance with the text of the papyrus (D’Alessio 2009).

247 Gallazzi, Kramer, and Settis 2009, 66–71. The analysis of the inks used has shown that their composition matches antique recipes.

248 Marcotte 2010, 339–344.

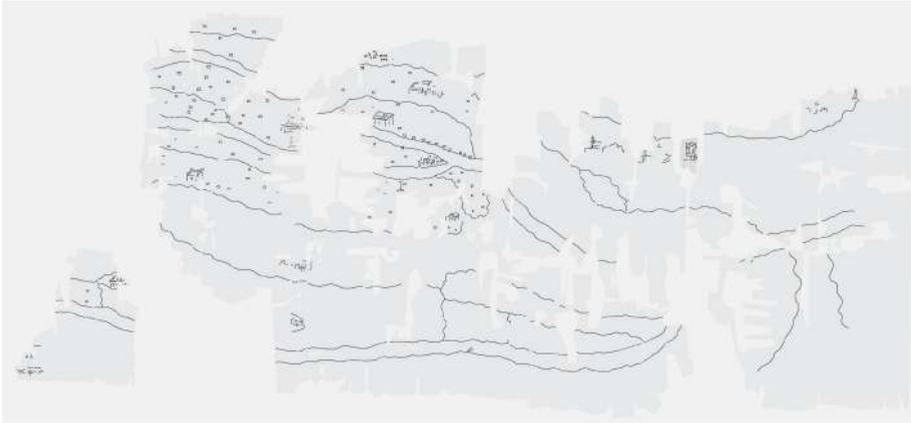


Fig. 19 Reconstructed drawing of the map in the Artemidorus Papyrus.

vertically, and several types of labels, which represent either small squares or more detailed pictures of buildings (Fig. 19) – they possibly indicate several categories of towns and cities.<sup>249</sup> The lines are generally interpreted as representing a fluvial network (more rarely as roads). The picture has no frame and it lacks a title, a caption and any indication of orientation. Moreover, the scale of the map (and thus the dimensions of the depicted territory) cannot be established: the size of the labels and of the (supposed) watercourses are not of any help to scholars, since the cartographical conventions in Antiquity regarding scale are unknown. Several hypotheses have been put forward to identify the geographical area – the Iberian peninsula or a section of it, the Nile Delta, the island of Cyprus and the coastlines of its mainland neighbours, among others – that has been represented.<sup>250</sup> However, since the map does not contain any text, it is impossible to establish its chronological and logical relationship with the rest of the papyrus, especially the description of the Iberian peninsula. Nonetheless, the *P. Artemid.* is of interest in that it reveals how the papyrus might have been used to realise maps or cartographical sketches before Ptolemy's time.

#### *The parchment of Dura-Europos*

A parchment fragment (45 cm × 18 cm) depicting a section of the coastline of the Pontus was discovered in 1923 at the ancient site of Dura-Europos on the lower Euphrates among the remains of Roman shields (Fig 20).<sup>251</sup> The archaeological and historical

249 Gallazzi, Kramer, and Settis 2009, 282–287; Marcotte 2010, 363–364; Moret 2013, 38–39.

250 See, respectively, Gallazzi, Kramer, and Settis 2009, 293–305; and Rathmann 2011; Moret 2013, 40–44; Mattaliano 2008, 189–193.

251 Paris BnF suppl. gr. 13542 V; Cumont 1925, 1–2.



Fig. 20 The parchment of Dura-Europos. Watercolour by J. Lauras based on the original parchment, before its restoration.

context suggests that these artefacts belonged to the *Cohors xx Palmyrenorum*, a Roman cohort that was based in Dura-Europos between, approximately, 230 and 260 CE.<sup>252</sup> Since a small Latin signature, set in the white rectangle to the left of the fragment, has been dated to around 200 CE,<sup>253</sup> the whole fragment can be dated to the first decades of the third century CE.

The parchment depicts a blue sea with four ships on the left side, a slight curve, which is understood to represent a coastline, and a brown area depicting land on the right, in which buildings are used as labels and the names of localities written in Greek (twelve toponyms can be made out, sometimes with the distances given in miles). Two dark lines represent rivers. The drawing seems to be a kind of coastal itinerary or a fragment from a *paraplois*, which can be reconstructed as follows:<sup>254</sup>

- |   |                                    |                                 |
|---|------------------------------------|---------------------------------|
| 1 | [Π]αν[υσός ποτ(αμός) ? μί(λια)...] | Δάνουβις ποτ(αμός) [μί(λια)...] |
|   | Ὀδεσ[σός μί(λια)...]               | Τύρα μί(λια) πδ̄                |
|   | Βυβόν[α μί(λια)...]                | Βορ[υ]σ[θένη]ς [μί(λια)...]     |
|   | Κάλλ[α] ντ(ις) μί(λια)...]         | 10 Χερ[σ]όν[ησος]               |
| 5 | Τομέα μί(λια) λγ̄                  | Τραπε[ζοῦς]                     |
|   | Ἴ[σ]τρος ποτ(άμος) μί(λια) μ̄      | Ἄρτα [μί(λια)...]               |

252 Cumont 1925, 9.

253 Arnaud 1989, 385.

254 According to Arnaud 1989, 378, and accepted by Brodersen 1995, 146–147. The edition of Cumont

1925, 9, was based on the parchment before its restoration and diverges from this reconstruction on several points.

The localities correspond to those found on the coastline of the Pontus, from south of Odessus up to the Cimmerian Bosphorus by way of the mouth of the Danube River. The sequence has parallels in other geographical works, particularly Roman itineraries<sup>255</sup> and the *periploi* of the Pontus.<sup>256</sup> The nature of the document has been debated, with the parchment linked with the so-called *itineraria picta* ('pictorial itineraries') to which Vegetius alludes in his principal surviving work, although the document does not match his description.<sup>257</sup> Given that it was found next to shields, F. Cumont believes that the parchment was a form of decoration for a shield, hence the name Dura-Europos Shield, which is generally given in modern publications. F. Cumont and R. Uhden both suggested that it might originally have been a slightly oval, c. 55 to 65 cm-wide picture.<sup>258</sup> By contrast, P. Arnaud has shown that the original parchment must have been at least 90 to 95 cm wide, which would have been too large for the decoration of a shield.<sup>259</sup> He has put forward the hypothesis that the parchment was, in fact, a real map (πίναξ), which was oriented westwards, was centred on the coasts of the Pontus and was partly based on Roman itineraries.<sup>260</sup> The schematisation of the coastline and the attention given to the illustrations and the colours clearly point to an object that had a decorative purpose: the topography and the distances shown would not have been that helpful – for sailors or travellers. The parchment is thus a composite document: it is based on itinerary sources but cannot be regarded as an *itinerarium*; likewise, although it represents a region, it does not provide the characteristics of a chorographic picture.<sup>261</sup>

#### *The mosaic map of Madaba*

Large fragments (10.5 m × 5 m) of a Byzantine floor mosaic were discovered in a church in Madaba (Jordan) at the end of the nineteenth century.<sup>262</sup> The fragments reveal that the mosaic depicted a map: the pieces show the lands from lower Egypt up to Palestine and Damascus, focusing on Jerusalem and its urbanised area. All the localities are linked with the geography of the Bible. The captions are in Greek, the cities are represented by vignettes in the form of sometimes more or sometimes less elaborate buildings, and the

- 255 *It. prov.* 227.2–228.3; *Rav.* 369.10–371.5; *Tab. Pent.* segments 7A3–4. There are other close parallels in: *Mela* 2.3, 6–8 and 22; *Pl.* 4.82–84; *Str.* 7.6.1; also in Ptolemy's coastline of Moesia Inferior (*Geogr.* 3.10.8) and of Tauric Chersonese (*Geogr.* 3.6.2–3).
- 256 Arrian, *Periplous of the Euxine Sea* 31–36 and *Eux.* 50–79. The latter gives the distances both in stadia and in miles.
- 257 Vegetius, *Epitoma rei militaris* 3.6. This hypothesis of A. Levi and M. Levi 1967, 30–31 (already hinted at by Cumont 1925, 13–15), and accepted by Dilke 1985, 120, and Dilke 1987b, 249, has been refuted

- by Rebuffat 1986, 87–91, and Arnaud 1989, 374. Moreover, *itinerarium pictum* has been used as a *terminus technicus* by modern scholars, which is not at all the impression given by the text of Vegetius (see Rathmann 2013, 205–206).
- 258 Cumont 1925, 2; Uhden 1932, 123.
- 259 Arnaud 1989, 379–382.
- 260 Arnaud 1989, 383–385.
- 261 Arnaud 1989, 387.
- 262 Dilke 1987a, 264; Brodersen 1995, 149–151 and 163. The original size of the mosaic could have been 24 m × 6 m (Dilke 1987a, 265).

map shows some topographical elements (such as rivers, including the Nile Delta, and mountain ranges). The designer(s) paid much attention to colours and decorative images (ships, trees and animals), while numerous explanatory notes, based on the Bible, can be found in several parts of the map. The mosaic can be dated to the middle of the sixth century CE.<sup>263</sup> Although the purpose of the mosaic was chiefly decorative – to represent biblical locations aesthetically – the representation is also interesting from a cartographical perspective: the map has no precise orientation; the lands have been distorted, with localities slightly rotated, while some have been made larger than others (for instance, the city of Jerusalem); and the rivers and coastline are extremely schematic.<sup>264</sup> Given its dimensions, it makes little sense to make a comparison between this particular kind of representation and a work such as the Peutinger Map, which was drawn on a parchment scroll.<sup>265</sup> Several modern scholars see in the mosaic and its subject matter topographical elements that might have come from Eusebius' *Onomastikon*, but this is open to debate.<sup>266</sup>

### *The Peutinger Map*

After having being intensively analysed at the beginning of the twentieth century, then again in the 1970s and 1980s,<sup>267</sup> the Peutinger Map or *Tabula Peutingeriana* (*Tab. Peut.*)<sup>268</sup> has been investigated anew in the wake of the publication of R. Talbert's project<sup>269</sup> and the discovery of the *P. Artemid.*<sup>270</sup> Despite these thorough studies, however, the original and complex Peutinger Map remains largely mysterious.<sup>271</sup> The map is a parchment scroll assembled from eleven folios, each approximately 33 cm long, which together form a 6.75 metre-long representation of the world, running from western Europe and Africa until India and Taprobanē Island in the east. At least one, perhaps several, folios are missing, as the far western parts of the map (the Atlantic coasts of Europe and the whole Iberian peninsula) have not survived.<sup>272</sup> Numerous types of information can be found on the map: toponyms (ranging from small road stops to main cities), the names of provinces and seas, ethnonyms, rivers and deltas, islands, mountain ranges, forests

263 Dilke 1987a, 265.

264 Brodersen 1995, 150–151; Rinner 2013, 85–86.

265 One can compare the distortion of the lands and the attention to architectural vignettes of the Madaba map with a mosaic from the third or fourth century that was found at the site of ancient Ammaedara (Haidra, Tunisia) and which depicts a dozen Mediterranean islands. See Bejaoui 1997.

266 See Stenger 2013, 228.

267 For a synopsis of the historiography, see Talbert 2010, 62–72.

268 Codex Vindobonensis 324. See Dilke 1987b, footnote 25, p. 238, for a note about the denominations of the document.

269 See Talbert 2010 and the online contents (maps and database) at <http://www.cambridge.org/us/talbert/>.

270 See Albu 2005, Salway 2005, Talbert 2007b, Albu 2008, Talbert 2012 and Rathmann 2013.

271 Many of the problems posed by the *Tab. Peut.* cannot be exposed or discussed here.

272 Depending on the modern reconstructions that are consulted, one or three folios might have been lost. See Talbert 2007a, Talbert 2010, 66–67, 87–88 and 189–192; Rathmann 2013, footnote 77, 220–221.

as well as a number of commentaries.<sup>273</sup> The roads are shown by red lines, generally in the form of zigzags, and are interconnected, while the toponyms have mostly been written in above these lines together with distances, mainly in miles.<sup>274</sup> Many of the localities have been represented by different kinds of vignettes – there are more than 550 in total – which indicates that the localities were arranged hierarchically: the most visually prominent places are Rome, Constantinople and Antioch.<sup>275</sup>

The cartographical approach of the Peutinger Map differs greatly from Ptolemy's world map. Admittedly, the objective of both the authors was to encompass the whole *oikoumenē* in a single document, and both maps are oriented towards the north. However, the cartographical scale and the *συμμετρία* that Ptolemy believed were so crucial to representing the lands in proportion to each other as well as to the whole *oikoumenē*<sup>276</sup> were clearly not a concern of the makers of the Peutinger Map: the lands are distorted, so that gulfs and seas appear to be narrow channels, while the size of some countries has been exaggerated and that of others reduced, which was certainly done in order to fit the particular format of the map support.<sup>277</sup> These characteristics correspond to Ptolemy's critical comments on some of the world maps of his time.<sup>278</sup>

Leaving aside the formal description of the Peutinger Map, there is a lack of consensus among scholars as to the date of the model(s), the context of the copying of the map, the sources as well as the actual nature and function of the map. It is generally assumed, on the grounds of palaeographical elements, that the map was made around the beginning of the thirteenth century.<sup>279</sup> Given the map's anachronistic information,<sup>280</sup> it is difficult to establish, with any certainty, a coherent model that explains the sources of the map and the (plausible) successive stages of transmission until the present map. According to E. Albu, the map goes back to a Carolingian exemplar for which antique sources were used,<sup>281</sup> whereas R. Talbert dates the production of the original map to c. 300 CE, for 'the map's design and presentation match best the preoccupations of Diocletian's Tetrarchy.'<sup>282</sup> M. Rathmann, by contrast, assumes that there was a Hellenistic 'prototype map' (from around the third century BCE) and that successive – a priori

273 Talbert 2010, 102–108.

274 Some distances are given in stadia (sections 7B1–7C1 of the map), others in leagues (1B5). Such a mixture of different distance units can also be found in, e.g., the *It. prov.*, in which a few of the distances are provided in stadia (317.6, 333.10, etc.) and in leagues (232.3, 238.2, 252.3–5, etc.) as well as in miles.

275 Talbert 2010, 108–122.

276 See p. 163.

277 Salway 2005, 131; Talbert 2010, 86–99; Talbert 2012, 179; and Rinner 2013, 84.

278 *Geogr.* 8.1.2. See p. 198.

279 Salway 2005, 120; Albu 2005, 135; Talbert 2010, 83–84; Rathmann 2013, 217.

280 The Gulf of Naples, e.g., with the cities of Pompeii, Herculaneum, Oplontis and Stabiae, corresponds to the configuration of the area before the eruption of Mount Vesuvius in 79 CE, while the mention of Constantinople can go back no earlier than the fourth century, when the city was founded.

281 Albu 2005.

282 Talbert 2010, 136. He adds: 'Granted, the connections identified can be no more than subjective, and hence this dating of the original map deserves to be treated with much caution as any other.'

more or less continuous – additions and modifications were made until a ‘late antique ultimate revision.’<sup>283</sup> One of the map’s most debated topics is its relationship with the antique and late antique itinerary literature. Since there are many striking parallels between the map’s road sections and those in the *It. prov.*, *Rav.*, *It. Burd.* and *Guido*,<sup>284</sup> it is entirely possible that itinerary sources were used to help plot the routes. According to B. Salway, ‘the basic itinerary data [of the *Tab. Peut.*] represent a collection formed between c. 50 and 300 CE’<sup>285</sup> Nevertheless, the extent to which itinerary sources played a role in the making of the map is not clear, and no explanatory, concrete model has yet been proposed, although some rare methodological elements have been discussed.<sup>286</sup>

#### 4.8 Administrative documents

The catalogue of localities is arranged in geographical units (περιορισμοί) that sometimes make use of the way the Imperial Roman territories were organised on an administrative level: the Iberian peninsula is, for instance, divided into three provinces (ἐπαρχίαι being the usual Greek translation for *provinciae*), which goes back to the divisions of Augustus. Moreover, several characteristics of the catalogue point to administrative or juridical classifications: the precision of the status of colony (κόλωνία), of which there are seventy-one occurrences in the whole *Geography*; the mention of strategies (στρατηγίαι) in Thrace, Cappadocia and Armenia Minor; the location of twenty-one Roman legions; and the division of Egypt into administrative nomes (νομοί). In this context, some scholars strongly maintain that Ptolemy, while based in Alexandria, might have had access to and used certain provincial Roman administrative documents.<sup>287</sup> A. Stückelberger has postulated that Ptolemy utilised several kinds of administrative sources, such as a *demensuratio provinciarum* or a *liber coloniarum*,<sup>288</sup> a supposition that many scholars regard

283 Rathmann 2013. Although R. Talbert and E. Albu do not agree on every point, their very different hypotheses do explain many features of the map. However, I find M. Rathmann’s model somewhat unconvincing.

284 Talbert 2010, 139–140, in particular the similarities in R. Talbert’s online database.

285 Salway 2005, 131.

286 See Albu 2005, 137–138, who raises some points on this subject.

287 Stückelberger 2004, 38; Stückelberger 2009c, 129–132; Rinner 2013, 21; Kleineberg, Marx, and Lelgemann 2012, 6. J. M. Gómez Fraile has suggested that Ptolemy used ‘administrative data’ or an ‘administrative framework’ to construct his map, but he does not state precisely which source

Ptolemy might have used: Gómez Fraile 1997, 195–7; Gómez Fraile 2005, 57.

288 Stückelberger 2009c, 131–132. A *demensuratio provinciarum*, literally ‘measurement of the province’ – although whether this kind of document ever had an administrative use is open to question – contained summary descriptions of provinces, including their dimensions. By *liber coloniarum*, A. Stückelberger is referring to the *Libri coloniarum* (‘Books of the Colonies’), a collection of notes related to the territories of different Italian cities, which was passed down in the corpus of grammatists (see Brunet et al. 2008, vii–xiv). The extant *Libri coloniarum* were certainly produced from administrative documents (they supply information on the legal status of the

as so probable as to be not worth debating. This hypothesis is, however, by no means self-evident.

Most of the 'administrative information' contained in the *Geography* – with the exception, perhaps, of the locations of the Roman legions – can be found in other geographical sources, such as the works of Pliny, Mela and Strabo, which implies that this kind of information was not confined to confidential documents of the Roman administration. Pliny and Mela, for instance, used a similar nomenclature and geographical configuration to Ptolemy in their presentation of the provinces of the Iberian peninsula.<sup>289</sup> The spatial definition of a *provincia* was the sum of the territories of its cities; the topographical reference marks, which were sometimes used, made it easier to describe the extent of the geographical territory of a province, even though these landmarks were not necessarily juridically or administratively classified. One knows, through Ptolemy's revision of Marinus' work, that the latter provided descriptions of boundaries as well.<sup>290</sup> The administration of Imperial Rome undoubtedly collected a considerable amount of information about its territories, if only for juridical and fiscal purposes. Likewise, the main cities of each province in all likelihood gathered together local geographical data (for instance, when creating a centuriation). As he worked as a procurator and was involved in the administration of several provinces, Pliny would certainly have had access to administrative documentation. Alexandria, as one of the most important cities of the eastern Mediterranean area, as well as a great harbour and trading centre, also probably gave Roman administrators the opportunity to accumulate large amounts of geographical information. Moreover, the Roman administration in Egypt had deep roots in the structures developed from the time of the Ptolemaic rulers.<sup>291</sup>

However, one cannot be certain that either a piece of geographical documentation useful to Ptolemy became available in Alexandria or that he could get his hands on such documentation, even though he supposedly had Roman citizenship. As A. Jones has noted: 'Ptolemy gives not the slightest indication that there exists such an entity as a Roman empire, nor does he tell us which of the "provinces and satrapies" are units of government and which are merely designations of geographical convenience.'<sup>292</sup> Therefore, although it is certainly tempting to do so, one should not overestimate the role of Roman administrative documents as potential sources of Ptolemy's work.

territories, their precise boundaries and history) but they cannot be regarded as coming directly from the Imperial administration. The existence of a *liber coloniarum* for each Roman territory is plausible but not proven. Moreover, even if Ptolemy had had access to such a text, one wonders what kind of data he would have extracted from it, given that the information deals with legal issues or very small terri-

tories, which were of no use for determining coordinates or drawing maps.

289 Pl. 3.6; Mela 2.87. See Silberman 1988, 220–221; Le Roux 2010, 60–61; Gómez Fraile and Albaladejo Vivero 2012, 415.

290 *Geogr.* 1.16.

291 Bowman and Rathbone 1992.

292 A. Jones 2012, 127.

## 5 The Iberian peninsula in antique sources

Ptolemy's introduction to the *Geography* gives few indications as to the origins of the coordinates listed in the catalogue. However, it does provide invaluable information on the type of geographical data that was at Ptolemy's disposal. It has become clear that, in his work, Ptolemy referred to information that could also be found in other antique sources. When collecting information on Greece, Strabo was forced to consult very different kinds of sources:

I will now discuss the rest of the geography of Greece. Homer was the first to examine it, followed by a number of others, who have written specifically [treatises such as] *On Harbours* (Λιμένας), *Periploi*, and *Circuits of the Earth* (Περίόδους γῆς), or such others, in which Greece is included. Still others have shown forth the topography of the continents in separate portions of their general historical works, as Ephorus and Polybius did. And even others have added certain material on this topic in a physical or mathematical work, such as Posidonius or Hipparchus.<sup>1</sup>

As Strabo suggested, it is important to note that in Antiquity 'geography' was not a clearly defined and well-structured scientific field: the sources that we (somehow anachronistically) classify as 'geographical' denote, in fact, very different interests and practices. This chapter provides a summary of the Greek and Roman sources that have come down to us on Iberia, a topic that deserves to be fully reviewed elsewhere. Since each geographical source is unique, typologies which are too strict are not particularly relevant.<sup>2</sup> The structure of this synopsis has been divided into general geographical works, periplo-geographical sources and itineraries, and information in the historical literature – a perhaps somewhat random typology in which the form and nature of the sources rather than their chronology have been given priority.

1 Str. 8.1.1.

2 Arnaud 1998a, 9–11; Marcotte 2002, LV–LXXII; Dan et al. 2016, 574–577.

## 5.1 Ptolemy and the geography of the Iberian peninsula

Ptolemy's second map of Europe, which comprises the entire Iberian peninsula, is undoubtedly one of the most impressive and accomplished of his regional maps. From a modern perspective, it is perhaps one of his most accurate maps, both regarding the general shape of the peninsula and the coordinates of localities. Ptolemy's map of Iberia, which contains sixty-three groups of peoples – fifty-six belonging to the province of Tarraconensis alone – and more than 500 localities, towns and harbours, among which one finds the most prestigious cities of the Roman world, is one of the most populous territories depicted in the *Geography*. Ptolemy also recorded thirty-two rivers and nine mountains or mountain ranges, located nine islands or archipelagos and described five different seas and oceans surrounding the peninsula. With its division into three Roman provinces – Baetica, Lusitania, Tarraconensis – and its legion (Legio VII Gemina) stationed in the region of Asturia, Ptolemy's map appears to offer a complete picture of Roman Hispania.

Iberia lies at the westernmost edge of Europe – *hesperia ultima* ('ultimate lands to the west')<sup>3</sup> – at the end of the Inner Sea. Nevertheless, by the second century CE the peninsula was one of the most integrated territories of the *Imperium Romanum* and one of its provincial centres. Two of the Roman Empire's most prominent emperors – Trajan and Hadrian (contemporaries of Ptolemy) – had their family roots in the Baetican city of Italica (modern-day Santiponce, to the north-west of Seville), while all the cities of the Hispaniae had been granted the Latin right under Vespasian in 74 CE.<sup>4</sup> The peninsula was crossed by a high number of Roman roads, although good anchorages and harbours were quite hard to find along the Iberian littoral. Nonetheless, the major rivers – the Anas, Baetis, Ebro, Durius and Tagus – were navigable relatively far into the hinterland.<sup>5</sup>

The Iberian *peninsula* is a geographical construction of Antiquity. The peninsula was never politically or culturally united, and even under Roman domination it was composed of various groups of peoples, cultures and languages. Phoenician settlements and the most westerly of the Greek *apoikiai* had been established in 'Iberia' (the name given to the area by ancient Greek authors) since the sixth century BCE and had developed various forms of interaction with the Iberian peoples. At the beginning of the First Punic War, Carthaginians controlled the Strait of Hercules, the whole southern part of the peninsula around the Baetis Valley and Carthago Nova as well as the Balearic Islands.

By the time Ptolemy started writing his *Geography*, the Iberian peninsula was a well-defined feature within the geographical literature, clearly situated with respect to the entire *oikoumenē*, in spite of some uncertainties concerning the peninsula's most western

3 Horace, *Odes* 1.36; Servius, *Aen.* 1.530.

5 Campbell 2012, 247–262; Castillo Pascual 2014.

4 Le Roux 2010, 119–132.

and northern parts. It was considered a wealthy territory, particularly the southern area, and, after two centuries of successive wars and Roman conquest, had become relatively peaceful. Ptolemy's map of the Iberian peninsula is primarily a geographical and scholarly construction, realised from a Greek and Roman perspective, and in which Greek and Roman information was used. Anachronisms are an essential feature of antique geography.<sup>6</sup> Geographical works in Antiquity were never just representations of a contemporary reality; they were also made up of a temporal dimension, which could be concealed by the nature of the project or the style of the geographer. Like every other geographical work of Antiquity, Ptolemy's map of the Iberian peninsula is, therefore, a distorted depiction of second-century Iberia.

## 5.2 General descriptions of the *oikoumenē*

### 5.2.1 Strabo's *Geography*

Strabo's Γεωγραφικά,<sup>7</sup> or simply *Geography*, is the most comprehensive Greek treatise on geography that has come down to us from Antiquity as well as one of the longest extant works in Greek literature.<sup>8</sup> One can deduce, from several passages of his *Geography*, that Strabo was born in *c.* 64 BCE in Amaseia, Pontus, and that he died after 23 CE.<sup>9</sup> Strabo recounts that he was a pupil of Aristodemus, when the latter was teaching rhetoric and grammar in Nysa (Asia Minor).<sup>10</sup> While in Rome, he certainly attended some of the courses of Tyrannion – a prominent authority on geography, if one believes Cicero<sup>11</sup> – and he also travelled to many places in the eastern Mediterranean, in particular to Alexandria.<sup>12</sup> Before starting his *Geography*, Strabo wrote a historical treatise, which probably included forty-three or forty-seven books and functioned as a kind of

6 Arnaud 1998a.

7 The title Γεωγραφικά is mentioned as the heading of his work in the ninth-century manuscript of the *Chrestomathies* from Strabo and in Strabo's extant medieval codices (sometimes Γεωγραφική) as well as in the lexicon of Pamphilus (first century CE; see Matthaios 2015, 227–228) according to Athenaeus of Naucratis (*Deipnosophistae* 3.121a). Other late antique testimonies refer to Strabo's Γεωγραφούμενα. See Aujac and Lasserre 2003, XLIX–LI; Roller 2014, 16.

8 Eustathius of Thessalonica (twelfth century) describes Strabo as ὁ γεωγράφος ('the Geographer'), in the same way that Homer was generally known as ὁ ποιητής ('the Poet').

9 Thus he was almost an exact contemporary of Augustus (63 BCE – 14 CE), Juba II of Numidia (*c.* 50 BCE – 23 CE) and the historian Livy (*c.* 60 BCE – *c.* 17 CE). See, among a vast bibliography, Roller 2014, 1–29, for an excellent introduction to Strabo and his *Geography*.

10 Str. 14.1.48.

11 Str. 12.3.16. Tyrannion (born in Pontus, like Strabo) was a close friend of Atticus and Cicero. He is one of the specialists, alongside Eratosthenes and Hipparchus, whom Cicero consulted when writing his own geographical treatise (*Att.* 2.6, see p. 35). See Montana 2015, 165–167.

12 Str. 2.3.5. Aujac and Lasserre 2003, VIII–XX.

supplement to Polybius' *Histories*.<sup>13</sup> Strabo relied on his own travel experiences and the personal testimonies he gleaned<sup>14</sup> as well as on his scholarly knowledge (following the scientific practice of his time). Particularly in the introduction to his *Geography*, Strabo demonstrates a wide knowledge of the history of geography and allots much space to the Hellenistic authorities and Greek-speaking geographers from the Roman period (Eratosthenes and Hipparchus, Polybius, Artemidorus and Posidonius).<sup>15</sup>

Strabo's *Geography* consists of seventeen books. The first two books provide a comprehensive introduction to geography (one generally speaks about Strabo's *prolegomena* to the *Geography*), which is divided into three parts. After a prologue in which Strabo demonstrates that Homer was the true founder of geography (1.1.1–23), Strabo undertakes a διόρθωσις<sup>16</sup> of Eratosthenes and Hipparchus, then of Posidonius and Polybius (1.2.1–2.4.8). Finally, Strabo presents a proper introduction to his own regional descriptions: in this 'second beginning,' as he himself describes it,<sup>17</sup> he reveals his objectives and methods (2.5.1–12), gives a summary description of the whole *oikoumenē* (2.5.13–33) and presents a table of *klimata*, largely inspired by Hipparchus (2.5.33–43). The rest of the work is given over to a detailed description of each part of the *oikoumenē*, starting with Europe (Books 3 to 10), going on to Asia (Books 11 to 16) and concluding with Egypt and Libyē (Book 17).

Books 1 and 2 do not deal specifically with Iberia, although information on the peninsula is occasionally given. In Strabo's outline of the *oikoumenē*, the description of Europe dominates, with the Iberian peninsula opening the account:

If we look at each part of [Europe], the first of all its countries, beginning from the west, is Iberia, which in shape is like an ox-hide, whose parts forming the neck, so to speak, fall over into neighbouring Celtica; and these are the parts that lie towards the east, and within these parts the eastern side of Iberia is cut off by a chain of mountains called Pyrenees, but all the rest is surrounded by the sea; on the south, as far as the Pillars [of Hercules], it is surrounded by our Sea, and on the other side, as far as the northern headlands of the Pyrenees, by the Atlantic. The greatest length of this country is about 6 000 stadia; and breadth 5 000.<sup>18</sup>

13 Str. 11.9.3. His interest in history is clearly visible in his practice of geography. See Aujac and Lasserre 2003, xxiv.

14 Str. 2.5.11. See Roller 2014, 8–9.

15 Strabo mentions the works and opinions of extremely ancient authorities (such as Hecataeus, Anaximander, Eudoxus, Dicaearchus, among others), which does not imply, however, that he con-

sulted their works first-hand. It is probable that many of the Hellenistic authors quoted by Strabo were known to the latter through his reading of Eratosthenes' work.

16 See p. 177.

17 Str. 2.5.1: λαβόντες ἀρχὴν ἑτέραν.

18 Str. 2.5.27.

The origin of the ox-hide metaphor is unknown, but it does provide a striking image of a land that had only been described as a peninsula since the time of Artemidorus (*fl.* c. 104–101 BCE). Iberia is, though, remarkably absent from Strabo's exposition of the *klimata*, which was clearly taken from Eratosthenes and Hipparchus.<sup>19</sup>

Strabo opens his detailed description of the *oikoumenē* with the Iberian peninsula (Book 3). This book was certainly written or finished in 17 or 18 CE.<sup>20</sup> The main source for his description is Posidonius (c. 135 – c. 51 BCE), who was the author of a work *On the Ocean* (Περὶ Ὠκεανοῦ), probably written in c. 86 BCE,<sup>21</sup> which had greatly influenced Roman geography.<sup>22</sup> Strabo mentions Posidonius' name fourteen times and quotes relatively long passages from him on a number of different topics (such as minerals and rivers as well as making ethnographical and zoological observations).<sup>23</sup> It is also probable that Strabo borrowed data on the works of Polybius and Artemidorus – Strabo's most important sources of information on Iberia after Posidonius – from the latter.<sup>24</sup> Aside from the mention of a census 'of our time,' which is hard to date precisely,<sup>25</sup> Strabo's sources of information on Iberia are not later than the first century BCE. His sources that date from the end of the Roman Republic to the beginning of the Principate cannot be identified with certainty. Although he did not personally travel to Iberia, the authors used by Strabo (whether first-hand or not) were often direct witnesses; personal experiences and observations occupied an important place in Strabo's descriptions and scientific debates (for example, on climate, tides, topographical points of interest). Thus, even though Strabo's account is not free of shortcomings and slight inconsistencies, it has the great advantage in that it contains references to sources, such as Posidonius and Artemidorus, that are mainly lost to us. The structure of Book 3, devoted to Iberia, can be summarised as follows:<sup>26</sup>

1.1–3. Introduction, presentation of general geographical characteristics of the peninsula, its form and dimensions

1.4–2.15. Description of Turdetania (which corresponds roughly to the province of Baetica)

1.4–9. Coastal description

2.1–5. Inland description

19 Str. 2.5.33–43. See Rinner 2013, 169–171, and E. Rinner, BACP0068.

20 Lasserre 2012, 3.

21 Gómez Fraile and Albaladejo Vivero 2012, 387.

22 Posidonius was born in Apamea (Syria) and studied in Athens. He was politically involved in Rome and taught in Rhodes. He was close to the Roman elite of his time (Marius, Cicero, Pompey the Great) and travelled the western Mediterranean, in particular Baetica. No complete work of him have survived. See Kidd 1988, 3–47; Vimercati 2004.

23 Str. 3.1.5, 3.2.5, 3.2.9, 3.3.4–5, 3.4.3, 3.4.13, 3.4.15, 3.4.17 and 3.5.1.

24 Alonso Núñez 1979; Gómez Fraile and Albaladejo Vivero 2012, 386–393; Moret 2013; Aujac and Lasserre 2003, xxxviii–xxxix; Lasserre 2012, 4–7.

25 Str. 3.5.3: ἐν μὲν τῶν καθ' ἡμᾶς τιμήσεως.

26 This outline follows approximately the order of topics discussed by Strabo. It is possible, however, to divide the text differently. See also some interesting observations in Counillon 2007.

- 2.6–15. Long excursus on ethnography, fauna and flora, resources and history
- 3. Description of Lusitania (with Callaecia)
  - 3.1–5. Geographical description (essentially the western coastline)
  - 3.6–8. Ethnographical excursus, with a lapidary mention of northern peoples
- 4. Description of the eastern part of the peninsula
  - 4.1–9. Description of the Mediterranean coastline
  - 4.10–14. Inland description
  - 4.15–19. Excursus on ethnography, fauna and flora, and resources
  - 4.20. Short development of the provinces' administrative organisation
- 5. Description of islands around the peninsula
  - 5.1–2. Mediterranean islands
  - 5.3–10. Long description of the Island of Gades
  - 5.11. Cassiterides Islands

Strabo's chapter on Iberia is well structured and follows a traditional pattern of describing the coastal areas, the interior and lastly the islands. His topographical descriptions of the Iberian coast are sometimes very precise and detailed, and reveal a strong periplographical logic – he relies on just a few major landmarks (the promontories of the Pyrenees, the Strait of Hercules and the Sacred Cape). However, the interior and the northern areas of the peninsula generally receive only a brief outline; groups of peoples are roughly situated according to Iberia's main rivers, while the principal cities of the interior are also often only approximately located. Whereas the administrative organisation of the peninsula occupies a secondary role, Strabo devotes a long excursus to the peninsula's ethnography and historical and physical geography.<sup>27</sup>

### 5.2.2 Pomponius Mela's description of the world

In the first century CE, the Hispaniae gave Rome an outstanding generation of scholars, including Seneca, Quintilian, Lucan, Martial, Columella and Pomponius Mela.<sup>28</sup> The latter wrote a description of the known world, which was perhaps entitled *De Chorographia* and was certainly finished in 43 or 44 CE,<sup>29</sup> in which he recorded that he came

27 Cruz Andreotti and Ciprès Torres 2012. See also Moret 2013, 73–76 and 81–82.

28 Parroni 2007, 81.

29 On the discussion about the redaction's date of Mela's work, see Parroni 1984, 15–22. The archetype

of the manuscript tradition uses the heading *De Chorographia* (Vaticanus lat. 4929, ff. 149v–188r, late ninth century) but the name *De situ orbis* – the incipit of Mela's text – is sometimes used as the title.

from Tingentera.<sup>30</sup> Apart from this mention, however, nothing is known about Mela's life or where he even composed his world description. Mela presents his project in a few words at the beginning of his work. This incipit has led, however, to a number of differing interpretations:

A description of the known world (*orbis situm*) is what I set out to give, a difficult task and one hardly suited to eloquence, since it consists chiefly in names of peoples and localities and in their fairly puzzling arrangement. To trace this arrangement completely is a time-consuming, rather than a welcome, subject, but nevertheless a very worthwhile thing to consider and understand. [...]

I should, however, say more elsewhere with greater preciseness (*dicam autem alias plura et exactius*); now let me address the things that are most unambiguous, as they all certainly will be, even in a summary treatment (*nunc ut quaeque erunt clarissima et strictim*).<sup>31</sup>

The exact meaning of the last sentence has been widely debated. Some modern scholars believe that Mela was referring to his own introduction (a summary description) and to the bulk of the work (the part-by-part description). It is, however, plausible that Mela was alluding to a future work and that the whole of the extant text is a kind of compendium.<sup>32</sup> In any case, the text is succinct and relatively pragmatic.

After a short presentation and some general points on the *oikoumenē* (1.1–8), Mela gives an overview of the three land masses of Libyē (Africa), Asia and Europe (1.9–24). The detailed description that follows this introduction is divided into two parts and is clearly modelled on a *periplois*: the first section follows the African coast of the internal sea in a west-to-east direction (1.25–48), moving on to Asia (1.49–117), then Europe, finally returning to his starting point, the Pillars of Hercules (2.1–96), with a note on the Mediterranean's islands (2.97–126); the second section includes a description of the countries bordered by the ocean, starting again from the Pillars and going around Europe (3.1–58), then Asia (3.59–84) and Africa up to the Pillars again, 'which is the terminus both of this work and of the Atlantic coastline' (3.85–107). That Mela borrowed the structure of his description from *periploi* is also reflected in the work's vocabulary, which even includes nautical terms. With respect to the content, he focuses mainly on the littoral description, often giving the inland areas and countries only the barest outline. As in Strabo's *Geography*, the islands are listed in separate sections. Except for one

The model of the Vaticanus, from which all the extant manuscripts derive, dates from the sixth century. See Parroni 1984, 55–81.

30 Mela 2.96. Tingentera was possibly located near modern-day Algeciras in the Bay of Gibraltar.

31 Mela 1.1–2.

32 See Parroni 1984, 23–29; Silberman 1988, 98; Romer 1998, 33.

single instance, however, Mela does not supply any distance data<sup>33</sup> and there are almost no concrete indications of the orientations of the sailing routes, the winds, or the harbour and anchorage amenities. Thus, Mela's two *periploi* – of the Mediterranean and of the ocean – were primarily a structural tool for organising his description as a fictitious journey.

Identifying Mela's sources is particularly complicated. Mela mentions very few authors (Homer and 'the physicians,' Hanno and Cornelius Nepos) and is silent on the rest of his sources.<sup>34</sup> Numerous parallels between Mela's description and Pliny's geographical books have been drawn by many scholars over the years. It has been also observed that Mela belonged to the *auctoritates* ('authorities') listed by Pliny at the beginning of Books 3 to 6 of his *Natural History*. Many scholars have analysed the anonymous sources of Mela within the framework of the so-called *Dreiquellen Theorie* of Pliny's sources. According to this model, which was elaborated by D. Detlefsen and A. Klotz,<sup>35</sup> Pliny availed himself of predominantly three sources: Augustan administrative documentation, Marcus Agrippa's geographical work and a littoral description (dated to the Late Roman Republic period, and perhaps written between 44 and 29 BCE). Supporters of the theory believe that this littoral description is Mela's and Pliny's common source, as this would explain their similarities.<sup>36</sup> There has been much debate concerning the identity of the mystery author, but no consensus has yet been reached: Cornelius Nepos, Varro (both first-century BCE writers) or a 'general geographical tradition' have been proposed.<sup>37</sup> Some strong parallels between Mela, Pliny and Ptolemy can be seen in their descriptions of the Mediterranean littoral of Iberia and I would be inclined to see in Ptolemy's use of a very similar coastal description the source that is common to Mela and Pliny.<sup>38</sup> Even though Mela probably finished his world description during the early years of Claudius's reign, his sources are rarely later than the Augustan period. The most up-to-date information on Iberia that he used are the mentions of Caesaraugusta and Emerita (cities founded in 24–25 BCE), the Altars of Sestius (c. 20 BCE) and the three Augustan provinces of Baetica, Tarraconensis and Lusitania.<sup>39</sup>

33 Mela 1.6, where he gives the width of the Strait of Hercules: c. 10 miles.

34 Mela 1.60, 2.104, 3.45, 3.90 and 3.93. The reference to 'the physicians' (perhaps alluding to the Ionian geographers Hecataeus or Anaximander) is linked with Homer, although Mela might have known them through his reading of Cornelius Nepos (see Mela 3.45). P. Parroni 1984, 44–45, has noted Mela's closeness to the Hellenistic sources (Eratosthenes,

Artemidorus, Diodorus of Sicily), whom he probably knew indirectly.

35 Detlefsen 1877; Detlefsen 1908; Klotz 1906. Despite the criticisms of other scholars – in particular Sallmann 1971 – the theory has not been fundamentally challenged. See Desanges 2003, 11–20, and Zehnacker 2004, XIII–XV.

36 Desanges 2003, 11–16; Silberman 1988, XXXVI–XLII.

37 Sallmann 1971, 130–134. See also Parroni 1984, 43.

38 See p. 348.

39 Silberman 1988, XL.

Despite being a native of Iberia, Mela's description of the peninsula is no more detailed than the accounts of other countries.<sup>40</sup> However, within the structure of his text, the account of the peninsula is positioned right at the centre of Mela's two-part description, that is, at the end of the Mediterranean *periplous* and at the beginning of the oceanic description. Thus, his native Hispania (like Tingentera, his city of origin) is located at the edge of the two principal geographical spaces of the *oikoumenē* – the Internal Sea and the ocean – which was possibly intentional. The general picture of Iberia – a peninsula surrounded by seas and linked to the continent by the Pyrenean mountain range – is similar to Strabo's and matches the schema of Artemidorus that was transmitted by Posidonius.<sup>41</sup> After the accounts of the Strait of Hercules (1.6, 1.25–27), Mela's Iberian description is arranged as follows:

- 2.85–96. Mediterranean littoral, from the Pyrenees to the Strait of Hercules
- 2.124–126. Description of the Mediterranean islands of Iberia
- 3.3–15. Oceanic littoral, from the Strait of Hercules to the Pyrenees
- 3.46–47. Description of the oceanic islands<sup>42</sup>

Like the rest of his work, Mela's description of Iberia is pared to the bone but at the same time precise and relatively complete. There is a strong periplographical pattern, with Mela concentrating much of his attention on describing the littoral. Apart from a general picture of the peninsula's natural resources (2.86) and an extremely short account of the sources of the Baetis River (3.5), inland Iberia is reduced to the following passage:

The most renowned of the inland cities (*urbium mediterraneis*) in Tarraconensis were Palantia and Numantia – nowadays it is Caesaraugusta; in Lusitania, Emerita; and in Baetica, Astigi, Hispalis and Corduba.<sup>43</sup>

By contrast, the coast is described remarkably well. Mela's attention to littoral topography is often very nuanced, at both the level of the peninsula (taken as a whole) and of local landforms. While Strabo's topographical description is sometimes very schematic, Mela offers, in many cases, a concrete and subtle picture of the Iberian littoral, with an enriching use of adverbs to emphasise the different descriptive sequences.<sup>44</sup>

40 Parroni 2007. However, he does focus much attention on the area around the Strait of Hercules.

41 Mela 1.19: 'Iberia stretches to the west and also for a long time to the north with differently situated coastlines (*diuersis frontibus*): The description, section by section, and orientation of Iberia's coastline

are quite similar to the accounts of Pliny, Strabo and Ptolemy.

42 Gades is also mentioned in 2.97.

43 Mela 2.88.

44 See, e.g., p. 327, p. 338 and p. 340.

### 5.2.3 Pliny's *Natural History*

Pliny the Elder (23/24–79 CE) is the author of a *Natural History*, a comprehensive encyclopedic work on the natural world (in the widest sense) comprising thirty-seven books. Unlike Strabo and Mela, Pliny's life is not shrouded in mystery. He was a man of the equestrian class, serving first as an officer, then as a procurator in many Roman provinces (included Tarraconensis in 73 or 74 CE).<sup>45</sup> He was in charge of the Roman fleet at Misenum and an adviser to Vespasian and Titus.<sup>46</sup> Thanks to the writings of his nephew and adopted son, Pliny the Younger (c. 61–112 CE), we are also well informed about Pliny's working practices, his voracious reading and love of books and knowledge, for which he managed to find time, despite his political responsibilities.<sup>47</sup>

Unlike the works of Mela, Strabo and even Ptolemy, Pliny's *Natural History* is, as its title makes clear, not entirely devoted to geography; only Books 3 to 6 contain descriptions of the *oikoumenē*.<sup>48</sup> The structure of Pliny's description is slightly more complex than Mela's, but it nevertheless contains periplographical characteristics. Pliny begins at the coast of Baetica (the westernmost province on the Mediterranean Sea coast), going eastwards along the European coast until the Black Sea (3.5–4.93), from where he 'cuts' through the continent to reach the northern oceanic coast of Europe, which he describes following a south-west path until reaching Gades and the Pillars of Hercules (4.94–4.120). Then, Pliny describes northern Africa until Egypt, including the neighbouring islands and inland Africa (5.1–46). Starting from Egypt again, he describes the Middle East up to Mesopotamia, then Asia Minor until the Hellespont, with an excursus on the remaining Mediterranean islands (5.47–140). The next stage of the description includes the Asiatic coast of the Black Sea (5.141–6.22) and inland Asia from the north-west (Caucasus) to the Far East and the fringes of China (6.23–52). From there Pliny goes southwards to describe India and Parthia (6.53–107), then westwards again to the Persian and Arabian gulfs, including the countries of the interior (6.108–162). Finally, crossing the Red Sea, Pliny describes the southern coast of Africa, its islands, including the Fortunate Isles (6.163–205). The geographical chapters conclude with a summary of the dimensions of the *oikoumenē* (6.206–210) and a presentation of the 'Greek' division of the world into *circuli*, that is, into parallel circles (6.211–220).

45 Syme 1969.

46 Murphy 2004, 2–4.

47 Murphy 2004, 3: 'When not at his official duties, he devoted almost every moment to study. Sleeping little, he read or had a slave read to him continuously, and dictated excerpts of whatever caught his interest to a scribe. By keeping these teams of readers and scribes employed at note-taking continually – he preferred being carried in a litter to walking because

he could not be read to while he walked – whether he was being massaged after a bath, eating, or travelling, he produced an immense quantity of notes, the raw materials of his books.' See Pliny the Younger, *Letters* 3.5.

48 The geographical books of Pliny can be considered to be an introduction to the rest of the *Natural History*. See Traina 2007, 99–100.

The historiographical debates on Pliny's geographical sources have already been outlined above. One can distinguish two types of sources. The main part of Pliny's information came from the literature he read: he knew the main Hellenistic authorities (Eratosthenes, Polybius, Artemidorus, among others), compared them and commented on them. His reading of more recent Roman works – Varro, Cornelius Nepos, Agrippa, Livy or Juba – are very often highlighted.<sup>49</sup> In addition to the geographical literature, Pliny seems to have had access to first-hand information, thanks to his position in the Roman administration and the long periods he spent in different provinces of the empire. Information taken from Roman administrative documents was thus often used in descriptions of the Mediterranean provinces. This will have had two main consequences: contrary to Mela and Strabo, Pliny's picture of the world was more strongly marked by the political and administrative organisation of the Roman Empire;<sup>50</sup> furthermore, it enabled Pliny to update many Hellenistic and Republic descriptions. As far as the Mediterranean countries are concerned, one could say that Pliny borrowed, from his Hellenistic sources, a periplographical order of description (although he did rework it). However, this descriptive form was used as a device to describe a Mediterranean that had become part of the Roman Empire, giving the *periplous* a new political or even cultural dimension.

Pliny's report of the peninsula opens and concludes the description of Europe. After an account of the Strait of Hercules (3.3–4), Pliny's description continues as follows:<sup>51</sup>

3.6. Short exposition of the three provinces of the Iberian peninsula

3.7–17. Description of Baetica

3.7. Administrative presentation, that is, the names of the *conuentus*<sup>52</sup> and the number of cities sorted by administrative categories

3.7–8. Coast of Baetica, described from west to east

3.9. Excursus on the Baetis River

3.10–15. Description of inland Baetica arranged by *conuentus*

3.16–17. Dimensions of the province

3.18–29. Description of Hispania Citerior (that is, Tarraconensis)<sup>53</sup>

49 Although Strabo's geographical work had already been written when Pliny composed his *Natural History*, the latter obviously did not know of its existence. See Diller 1975b, 7, and Traina 2007, 98. And even though Mela is included in Pliny's lists of *au-toritates* that open each geographical book, he is not mentioned in Pliny's descriptions.

50 Prontera 2002, 241.

51 See also Zehnacker 2004, x–xiii; Beltrán Lloris 2007; Moret 2013, 76–78 and 82–84.

52 *Conuentus* was the name given to a district, based on a particular city (e.g. Gades, Corduba, Astigi and Hispalis were the four *conuentus* of Baetica) for juridical purposes. It was Augustus who created the *conuentus* of Hispania. See Le Roux 2010, 62.

53 In this section, Pliny uses the older denomination 'Hispania Citerior' but it was, to him, strictly synonymous with 'Tarraconensis'. See Pl. 3.6 and 3.9.

- 3.18. Administrative presentation (*conuentus* and number of cities by category)
- 3.19–22. Mediterranean coast of Hispania Citerior, from south of the province to the Pyrenees
- 3.23–28. Description of inland Hispania Citerior, arranged by *conuentus*
- 3.29–30. Dimensions of the province and short conclusive note on natural resources and Vespasian's granting the Latin right on the Hispaniae
  
- 3.76–78. Mediterranean islands near Iberia
- 4.110–112. Description of Tarraconensis' oceanic coast, from the Pyrenees to the Durius
- 4.113–118. Description of Lusitania<sup>54</sup>
  - 4.113–116. Description of the coast from the Durius to the Anas rivers
  - 4.117–118. Description of inland Lusitania
  - 4.118. Dimensions of the province
  
- 4.119–120. Description of oceanic islands near Iberia

Pliny's description of the Iberian littoral has a similar schema to those of Mela and Strabo but, unlike the latter, Pliny gives almost no coastal distances, with the exception of a few data, taken from Varro, on the ocean littoral. It has often been observed (and regretted) that Pliny's description largely consists of a list of toponyms (admittedly, often arranged by *conuentus* or by peoples) with very little data provided on the location and topography. The few historical or ethnological excursuses that can be found are rather laconic. In his description of other regions of the *oikoumenē* (for example, India and Taprobanē), Pliny was much more loquacious and willingly provided some picturesque digressions. As for Iberia, the reader is struck by the sheer amount of toponyms that are listed. Like many sources of the Roman period, Pliny claimed that he intended to give, above all, localities whose names could be 'easily expressed in Latin.'<sup>55</sup> In actual fact, he seems to have willingly provided full lists of them, in particular toponyms and ethnonyms from the northern and western areas of the peninsula. Their mention in Pliny's catalogue of localities can be compared with entering these peoples and cities into the *imperium Romanum* and, if one extends this further, was a kind of 'Romanisation' by geographical discourse.<sup>56</sup> Pliny's sources of information on Iberia reflect the sources he used for the rest of the geographical books of the *Natural History*. According to the *Dreiquellen Theorie* mentioned above, Pliny used mainly Augustan administrative documentation, Agrippa's work and a littoral description (common to Mela). This model remains relevant to understanding the data that Pliny used, though with some qualifications: one

54 Pliny's description of Lusitania is not only much shorter than the other Iberian provinces but also much less well structured and indeed often confusing.

55 Pl. 3.7. The reluctance to discuss 'barbarian' toponyms was common in antique geography. See p. 141.

56 See Traina 2007, 99–101.

will search in vain for the identity of the author of the littoral description and for the exact form of Agrippa's geographical work.<sup>57</sup>

#### 5.2.4 Concise descriptions of the *oikoumenē*

The short treatise of Agathemerus, generally referred to as *Hypotyposis* (*Hypotyp.*), has a wide geographical horizon but is otherwise rather concise.<sup>58</sup> It contains a summary description of the *oikoumenē*, the most recent sources of which are Artemidorus, Posidonius and Menippus.<sup>59</sup> The treatise was probably written between the first or second century CE but may be later (third or fourth century).<sup>60</sup> The text is composed of five thematic sections – an introduction to the *oikoumenē* (*Hypotyp.* 1–4), a description of winds (5–7), a description of areas and dimensions of the Mediterranean Sea (8–14), a set of distances related to the *oikoumenē* (15–19) and a description of islands (20–25) – but it does not pretend to be exhaustive. Only a little information on the Iberian peninsula can be gleaned from Agathemerus' text.

Two short texts from Late Antiquity – the *Divisio orbis terrarum* (*Div. orb. terr.*) and the *Demensuratio provinciarum* (*Dem. prov.*)<sup>61</sup> – contain descriptions of the *oikoumenē* in the form of lists of countries and Roman provinces. The lists consist of schematic descriptions of geographical territories that vaguely resemble Ptolemy's introduction to each περιουσιμός of his catalogue: the boundaries of a country or a province are delimited by the surrounding areas (contiguous countries) or topographical features (oceans, rivers, mountains) according to each of the four cardinal points. In most of the cases, the texts give the distances related to the length and width of the concerned areas in miles. The *Dem. prov.* uses *in longitudine* and *in latitudine*, whereas the *Div. orb. terr.* frequently uses simply *longitudo* and *latitudo*. These terms refer, however, to the geometrical length and width of an area rather than to longitude and latitude. Each country or province follows this model. The *Dem. prov.* starts with Asian territories, described roughly from east to west (*Dem. prov.* 1–9), then the European countries from east to west (10–24) and Africa from west to east (25–29). By contrast, the *Div. orb. terr.* begins with the Pillars of Hercules and the countries of Europe from west to east (*Div. orb. terr.* 1–15), then describes Asia (with Egypt) more or less from west to east until India (16–24) and ends with the African provinces (25–26). Although one finds in both texts the same kind of

57 See p. 201.

58 The title given by the Athous Vatopedinus 655, in which the text is preserved, is Ἀγαθημέρου τοῦ Ὀρθωνοῦ γεωγραφίας ὑποτύπωσις or *Agathemerus son of Orthōn's Sketch of Geography*. Critical editions in GGM<sup>2</sup>, 471–487, and in Diller 1975a.

59 Agathemerus, *Hypotyp.* 20. The first two paragraphs mention a list of Classical and Hellenistic geographical authorities, as in Str. I.I.I.

60 Diller 1975a, 59; Marcotte 2002, xxxix.

61 Critical editions in Riese 1964 and Schnabel 1935.

information, they often differ with respect to the names of the countries, the boundaries and the distance data.

Both texts are hard to date, while the context of the works and their purpose are not well known. The place names are corrupt in both works and there are many divergent readings for the values given in miles. One of the manuscripts of the *Div. orb. terr.* (Vaticanus lat. 642) ends with an epigram in which Theodosius (I or II) is said to have ordered the measurements, thereby ensuring the accuracy of the distance data.<sup>62</sup> Many scholars believe that both the *Div. orb. terr.* and the *Dem. prov.* derive from the geographical work of Agrippa.<sup>63</sup> Admittedly, some of the definitions of the provinces do often correspond to those of the Roman Empire at the beginning of the Principate, although Agrippa was not the only source to use such delimitations.<sup>64</sup> The distances are only very partially compatible with Agrippa's data, as transmitted by Pliny. The *Div. orb. terr.* and the *Dem. prov.* also have links with Orosius' text. The fact that Agrippa, Pliny, Orosius, the *Div. orb. terr.* and the *Dem. prov.* have similar types of information but with numerous divergences in the content may indicate that these kinds of sources were relatively widespread during the imperial period.

### 5.3 Iberia in the corpus of periplographical texts

#### 5.3.1 Elements of definition

The denomination 'periplographical literature' groups together those ancient texts whose common structural principle consists of a sequential description of an area's coastline. One cannot speak of a 'genre' in the narrow sense of the word, since this would imply adherence to strict rules of composition and a certain level of normativity. Instead, 'periplographical literature' should be regarded as a relatively flexible category, apart from the common property stated above. The word περίπλους (plural περίπλοι) means literally 'a sailing around' or 'circumnavigation' and describes in concrete terms a maritime journey.<sup>65</sup> The term was also used to refer to texts or written descriptions that provided information on the practice of navigation, such as: the sequence of coastal localities that forms a maritime route and the distances between them (expressed in stadia or, frequently, in days of sailing), directions, harbour and anchorage amenities,

62 In his *De mensura orbis terrae* (possibly written in 825 CE), Dicuil supplies the text of the *Div. orb. terr.*, though in a slightly different version. Dicuil's text also contains the epigram and the reference to Theodosius.

63 See, e.g., Wolska-Conus 1973, 274–279.

64 Arnaud 2008, 94.

65 See, e.g., Hdt. 6.95: 'Setting forth from Samos they sailed by the Icarian Sea through the islands (διὰ νήσων τὸν πλῶον); this, to my thinking, was because they feared above all the voyage around Athos (τὸν περίπλοον τοῦ Ἄθω), seeing that in the previous year they had come to great disaster by holding their course that way.'

resources (water), noteworthy topographical features (promontories, shallows) and a variety of information on local sites (temples, sanctuaries) as well as ethnographical observations.

In his epitome of Menippus' *periplous*, Marcian of Heraclea gives a brief outline of the history of *periploi* and identifies Timosthenes of Rhodes, Eratosthenes and Pytheas (among others) as forerunners of this type of description.<sup>66</sup> The extant periplographical corpus includes texts from the Hellenistic period until Late Antiquity, which certainly seem to have been widespread in antique geography.<sup>67</sup> The exact origin of written *periploi* and the precise relationship between them and the daily practicalities of navigation are not well known. It is now acknowledged that these *periploi*, as they have been passed down to us, did not correspond to portolans (medieval equivalents of modern-day 'nautical instructions')<sup>68</sup> but were rather geographical, scholarly constructions. Herodotus mentions several journeys undertaken by Phoenicians and Carthaginians around the African continent; although these journeys were recorded, little is known about the existence of Phoenician *periploi* or how closely they resembled the Greek versions.<sup>69</sup> Although the generic term *periplous* can be applied to different types of texts within the periplographical corpus, some common typological properties can be observed:<sup>70</sup>

- *periplous* is usually reserved for descriptions that start and end at the same locality, and gives an account of the whole journey. However, this property is not always respected, with the term *periplous* also being applied to coastal descriptions that cover a large geographical area. The term σταδιαμός also had a similar meaning, though it was used less frequently.
- the related term *paraplous* (παράπλους, plural παράπλοι), although used less frequently, seems to correspond to a description of a reasonably long stretch of coastline that is not, though, a circumnavigation in the strict sense of the word. For example, in Ps.-Scylax's description, the whole journey is divided into different *paraploi*, which correspond to specific portions of the littoral; the description of the Iberian coast in the *P. Artemid.* was also explicitly presented as a *paraplous*;<sup>71</sup>

66 Marcian, *Epit. Men.* 3–5.

67 See, e.g., the importance of *periploi* in Marcian's geographical collection. See p. 93 and p. 99; Marcotte 2002, cxvii–cxxvii.

68 Gautier Dalché 2002.

69 Hdt. 4.41–42. Mela (3.90, 3.93–95) and Pliny (2.169, 5.8 and 6.200) mention the written report of a journey made by Hanno. A Greek description of a journey (credited to Hanno), from the Pillars of Hercules to some locality on the Atlantic coast of Africa,

has been passed down in the Heidelberg corpus of Minor Greek Geographers, but the question of its supposed Phoenician model and the redaction date of the so-called Periplous of Hanno are still being debated. See *GGM*<sup>1</sup>, 1–14; Desanges 1978, 38–85 and 392–403; González Ponce 2011.

70 See Janni 1984; González Ponce 2002; Marcotte 2002, 1x; Counillon 2004; Kowalski 2012, 23–40.

71 *P. Artemid.* V 14–15.

- the derivative *anaplous* (ἀνάπλους, plural ἀνάπλοι) originally described an upstream voyage (of a river or a canal)<sup>72</sup> and might have occasionally been used as the literary term for a description of a strait: the *Anaplous of the Bosphorus* by Dionysius of Byzantium, for example, describes an upstream voyage through the Bosphorus.<sup>73</sup>
- the meaning of the term *diaplous* (διάπλους, plural διάπλοι) is more difficult to grasp. It is used in a paragraph annexed to Ps.-Scylax's text that provides a list of distances and where it means 'crossing' or 'sailing across,' and in this sense is close to the Latin *traiectus*.<sup>74</sup> It must certainly be connected to a journey on the high seas between two localities.<sup>75</sup> This term is also used by Marcian in his references to Menippus' work.<sup>76</sup> Nevertheless, *diaplous* probably referred more to a way of sailing than to an actual written description or a specific work.<sup>77</sup>

Such a classification, based on the criterion of the geographical areas covered in the texts, has its limitations and cannot be taken to be a satisfactory description of the full variety of antique 'periplographical texts.' As P. Arnaud has observed:

The outlines [of the periplographical literature], as they have been determined by modern erudition, are very, if not too, broad. They take no or little account of the structural differences between a descriptive *periplous* (often barely distinguishable from the chorographical description in periegetic form), the portolan, the *periplous*-guidebook with instructions in the imperative form, and the travel report in the first person.<sup>78</sup>

Even though each of the extant texts that can be defined as being 'periplographical' shows different characteristics in content and purpose, the details on the technical term *periplous* given above should improve our understanding of the vocabulary used in antique texts.

72 See, e.g., in Ps.-Scylax 107, the upstream voyage from the Mediterranean Sea to Lake Mareotis.

73 See also the scholia on Dionysius, *Per.* 138.

74 The word *traiectus* is sometimes used in the *It. mar.* (e.g. 489.4, 493.12).

75 This is how Ptolemy uses the term. He utilises the vague term πλοῦς for every kind of maritime route, and only employs the term διάπλους when citing the reports of Alexandros (1.14.1) and 'the traders' (1.17.8).

76 Marcian, *Epit. Men.* 3. The mention, though, is unclear.

77 Arnaud 2005, 49–50, 108 and 119.

78 Arnaud 2012, 28: 'Les contours de cette catégorie, tels qu'ils ont été fixés par l'érudition moderne, sont très larges et sans doute trop larges. Ils ne prennent pas, ou peu, en compte la différence de structure entre le périple descriptif (souvent difficile à distinguer de la description chorographique de type périégétique), le portulan, le périple-guide comportant des instructions à l'impératif, et le récit de voyage à la première personne.'

### 5.3.2 Iberia in the *Periplous* of Pseudo-Scylax

The *Periplous* of Pseudo-Scylax is one of the most ancient surviving descriptions of the Iberian coast. The text was transmitted in the so-called Paris corpus of the Minor Greek Geographers, whose late antique editor was certainly Marcian of Heraclea. It deals with a relatively complete *periplous* of the whole of the Mediterranean and Pontic coastlines (despite the defective state of folio 93 in the Parisinus suppl. gr. 443) as well as a stretch of the Atlantic littoral of West Africa.

The description begins at the Pillars of Hercules and takes a clockwise route along the European coast eastwards until the Tanais River (Ps.-Scylax 1–69), then descends and continues along the Asian coast until the Canopic mouth of the Nile (70–106); the defective parts of the text concern sections 104 (after the coast of Syria) to 106 (the Pelusiatic mouth of the Nile). Afterwards, the text includes the North African coast until the Pillars of Hercules (107–111) before finally going westwards beyond the Pillars and following the Atlantic littoral to the island of Kernē (112).<sup>79</sup> The work provides the distances between the coastal localities, mainly in sailing times (of days) but sometimes in stadia (frequently for short distances of less than 100 stadia).<sup>80</sup> It also supplies information on harbours, anchorage amenities, coastal settlements and noteworthy places (manufactures, forts, temples, sanctuaries). Much attention, sometimes of a very precise nature, is also paid to the coastal topography. Occasionally, the author provides information on the inland areas and the peoples living along the coast.

Two paragraphs were annexed to the *periplous*, but it is not known if they were part of the original composition or if they are much later additions. A first paragraph (Ps.-Scylax 113) gives the sea distances between a group of islands that form a route – from Chalcis (in Euboea) to Mycalē (in Asia Minor) – and which the text calls διάφραγμα. This term can be understood to mean ‘a crossing line’, implying a direct sea route through the Aegean Islands, in contrast to the route that follows the coasts around the Aegean Sea. Another διάφραγμα leads from a locality in the Peloponnese (perhaps Cape Malea) towards Rhodes, sailing past the islands of Crete and Karpathos. The second paragraph (Ps.-Scylax 114) provides a list of Mediterranean islands in order of decreasing size.

Despite the heading and the introductory note in the Parisinus (ff. 62v–63r), the *periplous* cannot be attributed to Scylax of Caryanda. The latter was known in Antiquity as a sailor in the service of Darius the Great (ruler of Persia between 522 and 486 BCE), and, if one believes Herodotus, he carried out explorations of the littoral from the Indus River to Egypt.<sup>81</sup> According to the testimonies of Aristotle, Strabo and Philostratus, a written report of this voyage or possibly of other journeys did circulate, although one

79 The location of the island of Kernē is disputed. Some scholars believe that it is to be found off the

coast of Morocco; others suggest the coast of Senegal or Guinea.

80 Counillon 2004, 33–34.

81 Hdt. 4.44.

cannot be sure of its exact form and content.<sup>82</sup> The *Periplus* of Ps.-Scylax was certainly written in the middle of the fourth century BCE, although before the time of Alexander the Great, given the dates of certain pieces of information included in the text.<sup>83</sup> Thus, although Scylax of Caryanda cannot have been the author, the description known today as the *Periplus* of Ps.-Scylax is one of our most ancient geographical sources.

Several hypotheses have been proposed to explain the origins of Ps.-Scylax's text. D. Marcotte has shown that it was Marcian of Heraclea who attributed a *periplus* that he had in his possession to a sailor in the service of Darius; as the editor of the geographical collection known today as the Paris corpus, Marcian had been able to make this deduction from his own knowledge of ancient *periploi*.<sup>84</sup> I. Matijašić, however, believes that 'in the time of Augustus, i.e., in Strabo's time, the Paris *periplus* [*sc.* Ps.-Scylax] had already been assigned to the ancient seafarer Scylax of Caryanda.'<sup>85</sup> The question of the work's sources has been the subject of much debate. The text quotes no explicit sources; the author uses the first person singular to explain to the reader how he organised his description, not to describe personal experiences. Thus, the text cannot be considered to be the written report of a journey that was actually undertaken, even though 'at *some* level, sailors' first-hand experience must underlie the coastal description.'<sup>86</sup> It is much more likely to be a compilation of texts of diverse origins – which may include as yet unidentified literary sources – that undoubtedly underwent several stages of revision or emendation.<sup>87</sup>

Ps.-Scylax's description of the Iberian coastline, although admittedly rather brief, is, nevertheless, of interest, primarily because of its date. In addition, the author places great emphasis on the area around the Pillars of Hercules, to the point of making unnecessary remarks. The sections of the *Periplus* of Ps.-Scylax devoted to Iberia read as follows:<sup>88</sup>

1. And I shall begin from the Pillars of Hercules in Europe [and go] as far as the Pillars of Hercules in Libyē, and as far as the Great Aithiopiāns. And the Pillars of Hercules directly face one another (εἰσι δὲ ἀλλήλων καταντικρῶ), and they are distant from one another [by] a voyage (πλοῦν) of a day. Past the Pillars

82 Aristotle, *Pol.* 7.13 (1332b); Str. 13.1.4, 14.2.20; Philostratus, *Vit. Apoll.* 3.47. There are also later mentions of Scylax's writings, e.g., in Avienus' *Ora maritima* (370), by Stephanus of Byzantium (*s.v.* Καρόανδα) and in the *Souda* (*s.v.* Σκύλαξ). See Shipley 2011, 4–6 and Matijašić 2016.

83 Counillon 2004, 11.

84 Marcotte 2002, LXVI–LXVII and CXVII–CXXIV. The introductory note of the editor of the corpus (that is, Marcian) clearly states: 'A proof that the author is

very ancient is that he knows neither Alexander, King of Macedonia, nor the period shortly before him.' (τῆς δὲ ἀρχαιότητος τοῦ ἀνδρὸς ἐναργὲς γνώρισμα τὸ μῆτε Ἀλεξάνδρον εἰδέναι τῶν Μακεδόνων βασιλέα μῆτε [τὴν ἀδ. Müller] τῶν ὀλίγων ἐμπροσθεν ἐκείνου χρόνου, GGM<sup>1</sup>, xxxiii)

85 Matijašić 2016, 7.

86 Shipley 2011, 11.

87 Counillon 2004, 24–26; Shipley 2011, 11–21.

88 Translation G. Shipley modified.

of Hercules in Europe are many trading towns (ἐμπόρια) of the Carthaginians, and mud and flood tides and shoals.

2. In Europe the first are the Ibères, a people of Iberia, with the Ebro<sup>89</sup> River. And two islands come next here, which have the name Gadeira. One of these two has a city that is a day's voyage (πλοῦν) distant from the Pillars of Hercules. Then a trading town (ἐμπόριον) [and] city, which has the name Emporion, a Hellenic city; and these people are colonists from the [people] of Massalia. Coastal voyage (παράπλους) of Iberia: seven days and seven nights.

3. [...] Coastal voyage (παράπλους) of the Ligyes from Emporion as far as the Rhodanos River: two days and one night. [...]

111. The Pillar of Hercules in Libyē. Cape Abylē<sup>90</sup> [and] a city [at] a river, and opposite (ἀντίον) the Gadeira islands. [...] These islands are beside (πρὸς) Europe; one of these two has a city: and the Pillars of Hercules are by these, the one in Libyē low and the one in Europe high. And these capes directly face one another; and these are apart from one another [by] a voyage of a day.

112. And past Cape Hermaia [in Libyē] there extend great reefs, and from Libyē up to Europe, not projecting above the water: and it washes over them in places. And the reef extends up to the other cape of Europe directly facing it: and this promontory has the name Sacred Cape.

The only Iberian locations mentioned in the *periplous* are the Sacred Cape, Gades (Gadeira), the Pillars of Hercules and Emporion (in the far north-east), with the rest of the coast between these locations ignored. However, the author does supply three long distances: one day's sailing between the northern (the European Pillar is not named) and southern Pillars of Hercules; one day's sailing between both Pillars and Gades; and seven nychthemera for sailing the whole length of Iberia's Mediterranean coastline. The text also provides topographical information on the location of the islands with respect to the continent and on the schematic configuration of the capes. The author departs slightly from the *periplous* schema, however, as he describes, for the area near the Strait of Hercules, something resembling a network of routes linking both sides of the Strait with Gades, rather than solely a sequence of localities.

89 G. Shipley 2011, 91–92, believes that the river referred to here (Ἰβηρ) is the río Tinto (in south-western Spain) and not the Ebro River, although I see no good reason for this supposition.

90 The main manuscript (Parisinus suppl. gr. 443 f. 101) gives ἀπυιλύη ('apilyē': see *GGM*<sup>1</sup>, 90, and

Shipley 2011, 220). The conjectures Αβύλη (Abylē) or Αβίλυκη (Abilykē according to Eratosthenes and as quoted by Str. 3.5.5) seem acceptable. The spelling of this toponym varies greatly in the antique sources.

### 5.3.3 Iberia in the Artemidorus Papyrus

The unfinished map of the so-called Artemidorus Papyrus (*P. Artemid.*) was examined in the previous chapter.<sup>91</sup> The most interesting information contained in the *P. Artemid.* is, however, the geographical text on the Iberian peninsula (columns IV and V). After a brief presentation of the geographical area, which is called Ἰβερία or Hispania (IV 1–5), the author writes of the division of the area into two provinces (IV 5–14). Then, each side (πλευρά) of the peninsula is described,<sup>92</sup> giving the schematic form (τὸ ὅλον σχῆμα) of Iberia, together with its most important coastal landmarks: the Pyrenees, the Pillars of Hercules, Gades and the Sacred Cape (IV 14–V 14). This first section is presented as a περιγραφή, that is, a description of the contour or outline of the peninsula, which corresponds well with what Ptolemy calls περιορισμός, that is, a definition or a delimitation of the boundaries of a geographical area.

The following and last section of the text deals with an ‘abridged *parapλους*’ or a ‘concise description’ (παράπλους ἐν ἐπιτομῇ) of the Iberian coast (V 14–45). The author starts at the Pyrenean Promontory on the Mediterranean Sea and goes clockwise until Gades (V 14–26). The coastal description continues to the Sacred Cape (the sequence of toponyms is unclear in the text), with the mouths of the Baetis and Anas rivers highlighted as main landmarks (V 26–36); then, it goes northwards, via five stages, to the Artabrian Promontory, finally reaching the ‘Great Harbour’<sup>93</sup> (V 36–44). From this point at the north-western corner of the peninsula and until the north-western Pyrenean Promontory, the text gives no descriptions or distances in stadia (V 44–45):

We will now take on a summary description of its coasts (τὸν παράπλου ἀυτῆς ἐν ἐπιτομῇ), in order to acquire some general knowledge of the distances [between] the localities.

From the Promontory of Pyrenean Aphrodite until the city of (Empor)ion, a colony of the Phoceans, (632 stadia); from this locality until the city of Tar-raco, 1 508 [stadia]; from there the Ebro River, less than 92 [stadia]; from the latter until the Su(cro) River, 1 048 [stadia]; from there to (Carthago) Nova, 1 240 [stadia]; from Carthago [Nova] until Mount (Calpē), 2 020 [stadia]; from the latter until Gadeira, 544 [stadia]. As a whole, from the Pyrenees (and) the Aphrodision to Gadeira [there are] 7 048 [stadia]; and beyond Gadeira until the Tower and the Port of Menestheus there are 7 170 [stadia].

91 See p. 203.

92 If one follows the presentation in the papyrus, the Pyrenees do not form one ‘side’ of the peninsula

*sensu stricto* but more the joint between the peninsula and the continent. See Moret 2013, 63.

93 This harbour was certainly located near modern-day A Coruña.

From the latter until the second mouth of Ast⟨...⟩, [there are] 120 [stadia]. Beyond the latter, until the Ba⟨etis⟩ River 84 [stadia]. Beyond the latter, towards Onoba, 280 [stadia]; from there to Maenoba ⟨78⟩ [stadia]; from the latter ⟨to⟩ the city of Ipsa, 24 [stadia]; beyond ⟨the latter⟩ until the estuary of the An⟨as⟩ in a straight line to the point where the city of Kilibē lies, there are ⟨36⟩ stadia. After the ⟨mouth⟩ of the ⟨A⟩nas comes the end of the Sacred Cape, and until its extreme point [there are] 992 stadia.

Going beyond the promontory and until the Tower of the Salacians ⟨there are⟩ 1 200 stadia. And from there until the ⟨mouth⟩ of the Tagus River, 320 [stadia]; from the latter until the ⟨Durius⟩ River, 1 300 [stadia]; thereafter, 180 stadia away, flows the Obleuiōn River, which is called L⟨ēth⟩ēs or ⟨Limaia⟩s. Then, until the B⟨aenis⟩ River, 110 [stadia]; from the latter until the Promontory of the Artabrians, 94⟨.⟩ [stadia]; from there to the Great Harbour ⟨.⟩40 ⟨stadia. The rest of the⟩ coast has not been ascertained.

The *P. Artemid.*'s description of Iberia is thus made up of two very different parts: the outline (περιγραφή) and the *paraplous*. Both these sections, although very schematic, concur with two different antique geographical practices and can be said to be complementary.<sup>94</sup>

### 5.3.4 Hispania in the *Itinerarium maritimum*

The work that is generally referred to as the *Antonine Itinerary* consists of two texts, which need to be treated separately: a compilation of essentially terrestrial itineraries, which is known as *Itinerarium provinciarum Antonini Augusti (It. prov.)* in the manuscripts; and a list of maritime journeys, which is called the *Imperatoris Antonini Augusti Itinerarium maritimum (It. mar.)*.<sup>95</sup> The *It. prov.* is described in section 5.4.1 of this chapter. Both texts are often brought together in manuscripts, even though they seem to have been written independently of each other; not much is known about their exact textual history either.

The origin, the date of redaction and the purpose of the *It. mar.* have been hotly debated. The text can be divided into four parts, differentiated by their content and linguistic features, which is a strong indication that they were not compiled at the same time: first, there is a description of a maritime route (*It. mar.* 487.4–493.11) from the isthmus near Naupactus (to the north of the Peloponnese) to Hadrumetum (modern-day Sousse, Tunisia); second, there is a collection of rather eclectic maritime crossings (*traiectus*) between localities of the western Mediterranean (493.12–497.8); third, there

94 A concise but excellent and comprehensive study of Iberia in the *P. Artemid.* and its place within the

development of the geography of the Iberian peninsula has been carried out by Moret 2013.

95 Arnaud 2004, 3–6; Cuntz 1929, iv–vii, 1 and 76.

is a coastal route from Portus (near Ostia) to Arelate (497.9–508.2); and, finally, the text ends with a collection of maritime distances between the islands of the Mediterranean and the ocean – the references to Greek islands are accompanied by short mythological notes and *mirabilia* (508.3–529.6).<sup>96</sup> The distances in the texts are given in miles or in stadia. Although there are formal disparities between the different sections of the text, one can clearly see the work of a compiler, who (re-)arranged the ensemble, so that its structure roughly follows geographical traditions.<sup>97</sup> Despite the collective name given in the manuscripts, the *It. mar.* does not date from the Antonine Age, since much of the information it contains clearly postdates this period. However, the singularity of the *It. mar.* lies more in its dynamic textual history than in a definite date of composition, as P. Arnaud has proposed. On the basis of internal criteria (such as language and toponymic forms), he has suggested that the text was not created before the fourth century CE, while the itinerary from Portus to Arelate is certainly later (at least after the fourth century).<sup>98</sup>

The coverage of the Iberian peninsula is quite limited. As for the rest of the *It. mar.*, many of the toponyms have either been greatly altered or show late toponymic forms. The information related to Iberia is contained within the collection of *traiectus* and the section on the distances between the islands:

[495.4–6] From Baelo to Tingis in Mauretania, the crossing (*traiectus*) is 220 stadia.

[496.1–2] From Carthago Spartaria [that is, Carthago Nova] to Caesarea of Mauretania, the crossing is 3 000 stadia.

[510.2–512.2] Between Hispania and Tingis in Mauretania:

From the island of Diana Lesbos [sic] Ebusus to Carthago Spartaria, 400 stadia; and from the island just quoted to Baleares, 300 stadia; Columba island, Greater Balearic [island], island of Nura, Smaller Balearic [island]; between the Balearic Islands there are 600 stadia.

[512.3–513.3] Between Carthago Spartaria and Caesarea of Mauretania:

Between the islands of Erroris and Tauria there are 75 stadia; from the islands just quoted to Calama of Mauretania † Amecas<sup>99</sup> †, 75 stadia; Island of Crinis, Stoechades.<sup>100</sup>

96 P. Arnaud 2004, 6–8, has divided the *It. mar.* into three sections, as he has grouped together the first maritime route and the collection of sea crossings.

97 Arnaud 2004, 9–10.

98 Arnaud 2004, 10–15.

99 Possibly an abbreviation for *A M(auretania) Caes(ariense)*, according to the hypothesis of Arnaud 2004, 11.

100 The mention of these two islands or archipelagos is odd. It has proved impossible to link the toponym Crinis with any known locality, while the

I have tried to make this translation as intelligible and meaningful as possible, but the text lacks logic and the description seems, in many places, to be either corrupt or to contain toponymic forms that have proven hard to link with other known localities. This is not a *periplous* or *paraplous* of Iberia in the strict sense but only a set of distances related to journeys between the peninsula and its adjacent islands as well as between Iberia and the African coast opposite. All the distances are given in stadia, but it is highly probable that some of the distance data were omitted (for example, in the mentions of the Balearic Islands); the figures are also rather dubious.<sup>101</sup>

## 5.4 Itinerary sources and the peninsula's antique roads

### 5.4.1 Iberian roads in manuscript sources

Descriptions of itineraries that contain the intermediate distances of a route have been passed down in a number of works. Despite their quite late date – even the Latin word *itinerarium* is attested only from Late Antiquity onwards<sup>102</sup> – they provide invaluable information on the peninsula's Roman road network.

The *Itinerarium provinciarum* (*It. prov.*) was referred to in section 5.3.4 as one of the two parts of the so-called *Antonine Itinerary*. Many scholars agree that it dates from the fourth century CE, making it earlier than the *Itinerarium maritimum*.<sup>103</sup> The long text describes many of the roads that covered the Roman territory. It comprises in fact several individual itineraries, each section of which was given a heading that indicated the starting and ending points of a route (often with a figure for the overall distance). The lists contain the place names along a particular road, including intermediate distances. The latter are generally given in miles but, occasionally, in stadia or in Gallic leagues. More precise information is sometimes given on a settlement's nature, such as whether it was a *colonia*, *oppidum* or *vicus*. The *It. prov.* begins at the Pillars of Hercules and the northern African territories, going from Mauretania to Cyrenaica (eastern Libya), followed by a description of the roads on the islands of Sardinia, Corsica and Sicily. The work continues with the territories of Asia Minor, then goes southwards to Egypt; a number of road stations in Thrace, Moesia and Cappadocia are then listed. The last section covers Europe: first, the northern and Alpine provinces and the territories near the Adriatic Sea; then the road network in Italy, Gallia and the Iberian peninsula; and, finally, the

Stoechades is the antique name given to the Îles d'Hyères in southern France (Pl. 3.79; Mela 2.124; Agathemerus, *Hypotyp.* 20).

101 Arnaud 2004, 7.

102 Schmidt 2011, 82–83.

103 Kubitschek 1916, col. 2337, and Salway 2001 have suggested the first half of the fourth century, whereas Whittaker 2002 and Arnaud 2004 have proposed the second half of the fourth century.

roads in Great Britain. B. Salway has noted that 'despite being made up of individual itineraries or regional sub-collections of varying dates, the collection has clearly been assembled with an aspiration to comprehensiveness, even if the level of coverage is not consistent throughout'.<sup>104</sup> The structure of the compilation is quite complex and 'rather than a tidy circular survey of the routes of the empire, the trajectory of this collection is closer to a figure-of-eight'.<sup>105</sup>

The Iberian peninsula is well-represented in the *It. prov.*, which provides several dozen itineraries connecting the principal localities of the peninsula. As in several other passages of the *It. prov.*, some parts of the itineraries are made up of sea journeys for which the distances along a route *per loca maritima* are given in stadia, for example between Bracara Augusta and Glandomiron in the north of the peninsula.<sup>106</sup> Occasionally, the work provides several alternative routes for joining the same two cities: these itineraries are either presented as an 'alternative road' (*alio itinere*),<sup>107</sup> sometimes including the name of the region that was crossed, or 'as a shortcut' (*per compendium*).<sup>108</sup> Unlike some of the other areas covered by the *It. prov.*, the precise nature of the Iberian localities are almost never specified.<sup>109</sup> The Iberian road network is discussed in more detail in Chapter 9, which is devoted to Ptolemy's coordinates of the inland localities. Many of the toponyms and the distance data have been damaged or badly transmitted, so that there are marked differences between these names and those toponyms passed down by other sources (Pliny, Mela, or epigraphical sources). Despite the corruptions, many of the itineraries and their localities on the Iberian peninsula are identifiable with the toponyms in other sources, even if a large number of these antique localities have not been identified.

Two very late itinerary texts warrant a mention because of their links, albeit ambiguous, with the antique road network and with Ptolemy. The so-called *Ravenna Cosmography* or *Cosmography of the Ravennese* (*Rav.*) describes the whole antique Roman *oikoumenē*, using a blend of literary descriptions and lists of toponyms (without distances). The text, written by an anonymous scholar from Ravenna,<sup>110</sup> consists of three main parts: an introduction that includes an outline of the whole known world; a geographical description of the lands of Asia, Africa and Europe; and, finally, a kind of *periplous* of the Mediterranean Sea, with a description of its islands.<sup>111</sup> The enumerations of the localities have not been presented as itineraries or descriptions of roads but

104 Salway 2007, 182.

105 Salway 2001, 40.

106 *It. prov.* 423.6; cf. with *It. prov.* 95.2–96.4, 97.7–98.1, 126.6–7, 139.1–2, 323.10 and 324.1. It is not perfectly clear, however, whether the routes *per loca maritima* were meant to be strictly maritime (as the distances expressed in stadia suggest) or whether

they were terrestrial routes connecting coastal localities.

107 *It. prov.* 427.4.

108 *It. prov.* 431.4.

109 One exception is the *vicus Cuminarium*, along the road between Augusta Emerita and Caesaraugusta (*It. prov.* 445.6).

110 *Rav.* 258.3–6.

111 See, also, Guckelsberger and Mittenhuber 2013.

they do show, in many cases at least, close parallels to other itinerary sources, in particular the Peutinger Map.<sup>112</sup> The original composition of the work is generally dated to the late seventh or early eighth century.<sup>113</sup> Several well-known late antique authorities – including Basil of Caesarea (fourth century CE), Isidore of Seville (c. 560–636 CE), Orosius (fifth century CE) and Jordanes (sixth century CE)<sup>114</sup> – as well as Ptolemy are mentioned in the introduction to this work.<sup>115</sup> The author seems to have known of Ptolemy’s geographical work, albeit indirectly. A certain ‘Ptolemy, king and scholar’ (*Ptolomeus rex et phylosophus*)<sup>116</sup> is cited in the author’s description of northern Europe, the Vistula River and the island of Scandza, which is reminiscent of the mentions of Ptolemy by Jordanes and Cassiodorus in the very same context.<sup>117</sup> The Iberian peninsula or Spania (*Rav.* 300.17–323.2) is the last European land to be treated. The description provides a substantial set of 275 toponyms.<sup>118</sup> The author mentions several authorities on Spania, although most of them are completely obscure to us, if not utterly fictitious: Castorius (his main source),<sup>119</sup> Lollianus and Arbitio, who are described as ‘Roman scholars,’ and Aithanaridus, Eldevaldus and Marcomirus, who are called ‘Gothic scholars.’<sup>120</sup> There is no tangible evidence that Ptolemy’s *Geography* influenced the Iberian description of the *Rav.*, but it is, nevertheless, a subject still worth investigating. Many of the lists of localities correspond to antique roads that one can also find in other manuscripts and epigraphical texts. Thus, the description is not original and, because of the high incidence of corrupt place names, the work, aside from being part of the secondary tradition of itinerary sources, is not always that useful.

Guido’s *Geography* was probably written in 1119,<sup>121</sup> and is largely based on the *Ravenna Cosmography*.<sup>122</sup> Like his main source, Guido’s text is a mixture of usually long descriptive notes and lists of toponyms. The first and main part of the work is devoted to a description of Italy, while the description of Hispania is reduced to short lists of toponyms, ranging from Iuncaria near the Pyrenees to Baelo in the Strait of Hercules

112 Talbert 2010, 164–165.

113 Schnetz 1940, v; Gautier Dalché 2003, 43; Talbert 2012, 189. L. Dillemann 1997, 26–27, estimates that the latest information contained in the work dates from the ninth century.

114 *Rav.* 13.6–8 and 29.3.

115 On the sources, mentioned or not, of the *Rav.* and the historiographical debates they have given rise to, see Dillemann 1997, 27–58.

116 As the author of the *Ravenna Cosmography* calls every scholar *phylosophus*, one should not over-interpret its use in describing Ptolemy. Confusion between Ptolemy and the Ptolemaic kings was widespread; Isidore of Seville (*Etym.* 3.26), one of the sources of the *Rav.*, made this mistake.

117 *Rav.* 175.4–14. See p. 113. L. Dillemann 1997, 45–48, has studied the (very indirect) influence of Ptolemy on the author of the *Rav.*

118 Guckelsberger and Mittenhuber 2013, 304–310; Dillemann 1997, 108–112.

119 On Castorius, see Gautier Dalché 2003, 43–44.

120 *Rav.* 301.5–302.1. On these names, see Dillemann 1997, 53–54 and 57–58.

121 *Guido.* 452.24. This date, given at the end of a table of contents, has been passed down in only two manuscripts (of the thirteenth and fourteenth centuries). The table and the date seem to be later additions and it is not clear whether the latter relates to the composition of Guido’s work or to the copy. Most modern scholars, however, accept 1119 as the date of Guido’s work.

122 *Guido.* 461.20–22.



Fig. 21 The north-eastern end of the Iberian peninsula and the Pyrenees as depicted on the Peutinger Map.

via Tarraco and Carthago Spartaria.<sup>123</sup> The toponyms are corrupt but agree quite well with the *Rav.*'s list. Guido also mentions the Strait of Hercules and gives a summary of the peninsula.<sup>124</sup>

Although the first folio(s) of the Peutinger Map, which almost certainly depicted the Iberian peninsula, the western part of Africa and probably the British Isles as well, has been lost, the far left-hand side of the extant folio shows the north-eastern end of the Pyrenees and below it a short section of the Mediterranean coast (Fig. 21). The first stopping places on the road between Narbo and Tarraco are easily recognisable: Aquae Voconiae, Gerunda, Cinniana, Iuncaria, Deciana and the passage through the Pyrenees. Gerunda, Iuncaria and Deciana also feature in Ptolemy's catalogue. The distances reported in the Peutinger Map are similar to the information provided in the *It. prov.*<sup>125</sup>

#### 5.4.2 Epigraphical sources

The Vicarello Goblets are four silver goblets or beakers in the shape of milliarums, between 95 and 153 mm in height and *c.* 75 mm in diameter, which were found in 1852, along with votive offerings, in a spring at Vicarello, a spa town near Lake Bracciano in the region of Lazio in Italy.<sup>126</sup> Inscribed on them are the road stations of an itinerary from Gades to Rome, with the intermediate distances given in miles (Fig. 22). The route crosses Iberia from Gades to the eastern end of the Pyrenees passing through forty-five Iberian localities. It goes along the valley of the Baetis River, crosses the *saltus castulonensis* (that is, the mountainous area near modern-day Linares), then follows the coast from Valencia to the Pyrenees before reaching Narbo. The route then goes through the province of Gallia Narbonensis, crosses the Alps, descends to the Padan Plain before finally reaching Rome. The total distance given for this itinerary is 1 840 miles (Goblet IV gives a distance of 1 835 miles). The intermediate distances and readings for the

123 *Guido.* 514.9–516.8.

124 *Guido.* 549.19–550.16 and 555.1–556.6. Guido's very last word is Hispania.

125 *It. prov.* 390.2–4 and 397.8–398.1. The distances are exactly the same, although the number of intermediate road stations varies. Cf. *Rav.* 303.1–5.

126 *CIL* XI 3281–4. See Schmidt 2011, 73 and 76.

	ITINER	capitulum	ARIVM	capitulum	AGADES	capitulum	ROMAM	capitulum
	ADPORTVM XXIII		VALENTIAM XX		AMBRVSSVM XV		EAMBRVM XX	
	HASTAM XVI		SAGYNTVM XVI		NEMAVSVM XV		PLACENTIAM XVI	
	VGIAM XXVII		ADNOVLASXXIII		VGERNVM XV		FLORENTIAM XV	
	ORIPPVM XXIII		ILDVM XXII		ARELATA VIII		FARMAM XXV	
5	HISPALIM VIII		INTIBILIM XXIII		ERNAGINVM VI		LEPIDVMREGIVMXXVIII	
	CARMONEM XXII		DERTOSAM XXVII		CLANVM VIII		MVTINAM XXVII	
	OBVCLAM XX		SVBSALTVM XXXVII		CABELLIONEM XII		BONONIAM XXV	
	ASTIGIM XV		TARRACONEM XXV		APTAMIVLIAM XII		CLATERNVM X	
	ADARAS XII		FALFVRIANAM XVI		CATVVIACIAM XII		FORVMCORNELI XIII	
10	CORDVBAM XXIII		ANTISTIANAM XIII		ALAVNIVM XVI		FAVENTIAM X	
	AD X		ADFINES XVII		SEGVSTERONEMXXIII		FORVMLIVI X	
	EPOSAM XVII		ARRAGONEM XX		ALABONTEM XVI		CESENAM XIII	
	VCISEEM XXVIII		SEMPRONIANA VIII		VAPPINCVM XXVII		ARMINVM XX	
	ADNOVLAS XIII		SETERRAS XXIII		CATVRIGOMAGVMXII		PISAVRVM XXIII	
15	CASTVLONEMXIX		AQVISVOCONTISXV		EBVRDENVVMXVII		FANVMFORTVNAE VIII	
	ADMORVM XXIII		GERVNDAM XII		FAMAM XVII		FORVMSEPRONIXVI	
	II SOLARIA XIX		CILNIANAM XII		BRIGANTIVMXXVIII		ADCALEM XXIII	
	MARIANA XX		IVNCARIA M XV		DRVANTIVM XI		HESIM XIII	
	MENTESAM XX		INPYRAENEVM XVI		SEGVSIONEMXXIII		HELVILLVM X	
20	LIBISOSAMXXIII		RVSCINONEMXXV		OCELVM XXVII		NVCERIAM XV	
	FARIETINIS XXII		COMBVSTA VI		TAVRINIS XX		MEVANIAM XIX	
	SALTIGIM XVI		NARBONEM XXXII		QVADRATA XX		ADMARTIS XVI	
	ADPALEM XXXII		BAETERRAS XVI		RIGOMAGVM XVI		NARNIAM XXVIII	
	ADARAS XXII		CESSERONEMXIII		CVTTIAS XV		OCRIILO XII	
25	SAETABIM XXVIII		FORVMDOMITIVM VIII		LAVMELLVVMXIII		ADXX XXIII	
	SVCONEM XVI		SEXTANTIONEMXV		TICINVM XXI		ROMAM XX	
	SVM	basis	MPX	basis	DCCC	basis	XXXX	basis

Fig. 22 Transcription of the itinerary of Vicarello Goblet I (CIL IX 3281).

toponyms differ slightly on all four goblets; on Goblet IV the Iberian and Gallic road has been divided into four sections, with a total distance given for each section.

The archaeological excavation was poorly documented (which was not unusual in the mid nineteenth century), so that little is known of the context of the find. Goblet IV was only ‘discovered’ ten years after the initial find, as the leading archaeologist of the excavations had kept the artefact for himself,<sup>127</sup> which understandably interfered with the dating of the goblets and the votive offerings and with their historical reconstruction. Many hypotheses have been proposed on their origins and their link with the itinerary literature and the tradition of Roman *milliaria*. The *communis opinio* is that ‘the four silver goblets are miniature replicas of a milestone that had been erected in Gades as the counterpart of the *milliarium aureum* in Rome. The goblets are thus souvenirs brought to Vicarello by a Spaniard or Spaniards, who dedicated the silver vessels as a votive offering to the healing god or out of gratitude for their safe journey from Gades.’<sup>128</sup> This hypothesis is, however, open to debate, particularly since it is based on very little evidence. Several different dates for the realisation of the goblets have been proposed – from the Augustan to the Antonine periods, although there is some evidence to suggest that they were made during the third or fourth century CE.<sup>129</sup> The goblets are clearly the work of different craftsmen and so it is possible that they date from different periods.

127 Schmidt 2011, 75–76.

128 Schmidt 2011, 77. See the historiographical synopsis by the latter, 77–78, and by Benítez de Lugo Enrich et al. 2012, 108. See, also, Salway 2001, 55.

129 Schmidt 2011, 80–83; Benítez de Lugo Enrich et al. 2012, 104.

The Iberian itinerary recorded by the Vicarello Goblets appears to be quite ancient, particularly the section from Castulo to Saetabis through the *saltus castulonensis*: the itinerary described in the *It. prov.*, for example, went southwards from Castulo via Acci and reached the coast at Carthago Nova, before turning northwards to Saetabis, thus avoiding the *saltus castulonensis*.<sup>130</sup> It tallies with the testimonies of Asinius Pollio, who writes in a letter to Cicero that the road through the *saltus castulonensis* was dangerous and that the postal service couriers preferred to go by sea from the Mediterranean to reach the valley of the Baetis River,<sup>131</sup> and of Strabo, who alludes to the common itinerary at his time (which followed the littoral more closely) and to a more ancient itinerary, which cut through the land after Saetabis to reach Castulo.<sup>132</sup> The Gades-to-Rome itinerary recorded in the Vicarello Goblets also finds echoes in a riddle, in the form of a poem in Metrodorus' *Greek Anthology*, in which a short arithmetical exercise is reproduced.<sup>133</sup>

The so-called *Itinerario de Barro* (*It. Barr.*), also known as the Tablas de Astorga, are four clay tablets on which short lists of the stations to be found along the north-western Iberian road network have been engraved. Each tablet is *c.* 14 cm long and 12 cm wide; Tablet II has a trapezoidal-shaped handle with a small hole at its centre, which presumably the other tablets also originally had. The engravers used cursive capital letters, in a rather irregular style of writing; the layout suggests that they were either the work of an inexperienced scribe or a rough draft. At the bottom of each tablet the name of a *duumvir*, a certain Caius Lepidus, son of Marcus, has been engraved.<sup>134</sup> After many years of debate, the tablets have recently been dated to the late third century CE and are regarded as authentic.<sup>135</sup> Each tablet contains one or two short itineraries, introduced by a heading that indicates the starting and finishing localities, as in the manuscript itineraries.

130 *It. prov.* 399.1–402.5

131 Cicero, *Fam.* 10.31.

132 *Str.* 3.4.9.

133 *Greek Anthology* 14.121: 'From Cadiz to the city of the seven hills the sixth of the road is to the banks of Baetis, loud with the lowing of herds, and hence a fifth to the Phocian soil of Pylades – the land is Vaccaean, its name derived from the abundance of cows. Thence to the precipitous Pyrenees is one-eighth and the twelfth part of one-tenth. Between the Pyrenees and the lofty Alps lies one-fourth of the road. Now begins Italy and straight after one-twelfth appears the amber of the Po. O blessed am I who have accomplished two thousand and five hundred stades journeying from thence! For the Palace on the Tarpeian rock is my journey's object' (transl. Paton 1960, 89). See Dirkzwager 2006 and Schmidt 2011, 79–80. The compiler (Metrodorus) of the mathematical epigrams transmitted in the

*Greek Anthology* has not been identified with certainty; he might have been a sixth-century Byzantine mathematician and grammarian.

134 Fernández Ochoa, Morillo Cerdán, and Gil Sendino 2012, 154. In a colony or a *municipium*, a *duumvir* was a magistrate who had a variety of roles. The tablets do not give any details about the exact duties of Caius Lepidus.

135 The tablets' authenticity has been challenged since the first publication of the find's report in 1920, but the recent and thorough study of C. Fernández Ochoa, Morillo Cerdán, and Gil Sendino 2012 dates the tablets to between 227 and 310 CE, and possibly, more precisely, to between 267 and 276 CE, following the results of an investigation using thermoluminescence dating that was led by A. Millán and P. Benítez at the Universidad Autónoma de Madrid (for the full results, see Fernández Ochoa, Morillo Cerdán, and Gil Sendino 2012, 177–179).

Tablet I covers the stretch of road from Legio VII Gemina to Portus Blendium; Tablet II has two itineraries – from Lucus Augusti to Iria and from Lucus Augusti to Dactonium; Tablet III's route runs from Asturica to Augusta Emerita; and Tablet IV's road goes from Asturica to Bracara Augusta.<sup>136</sup> Although many of the stations correspond to localities transmitted by other sources (such as the great cities), several toponyms are hapax and the distances are often unexpected, which indicates (although it has not yet been demonstrated) that the standard value of the mile was not used on these tablets.

An inscription found in Valencia, sometimes called the 'Tegula de Valencia' in publications, also deserves a mention:

AB VALENTIA SAGUNT  
 AB SAGUNTO DERTOS  
 AB DERTOSA TARRACONA  
 AB TARRACONA - - - -  
 AB - - - - -  
 AB - - - - -

This fragmentary inscription has now been lost but was edited by F. Fita before its disappearance at the end of the nineteenth century and recorded in the *Corpus Inscriptionum Latinarum* (CIL).<sup>137</sup> It mentions the stations along the road between Valentia and Taraco, without giving any distances.

## 5.5 Historical works

Treatises devoted specifically to geography were not particularly common in Antiquity, so that one finds the same familiar authors regularly appearing in the works. Another important source of information on antique geography are, however, texts on the subject of history, since both fields of knowledge were, to a certain extent, linked.<sup>138</sup> Posidonius and Strabo wrote historical and geographical treatises, while the incipit of Appian's *Roman History* consists of a geographical sketch of the Roman *imperium*. In general, most historical books of Antiquity include some form of geographical excursus, notes or digressions (see Herodotus, Polybius or Livy; later Orosius and Jordanes).<sup>139</sup> Historical literature thus provides us with a substantial amount of information on antique geography, even if this information is sometimes difficult to handle: historical literature rarely

136 Fernández Ochoa, Morillo Cerdán, and Gil Sendino 2012, 154.

137 Fita Colomé 1883 and CIL II<sup>2</sup> 6239. See also Morote Barbera 1979, 146.

138 See, e.g., Str. 8.1.1.

139 Polybius, *Hist.* 3.58.2–3, observed, e.g., that 'while nearly all historians or at least the greater number have attempted to describe the peculiarities and the situation of the countries at the extremities of the known world, most of them are mistaken on many points.'

deals with geographical texts *per se* but rather uses topographical information in the service of historical narrative, providing information that has already been reworked or rearranged.

The writing of Polybius (c. 208–127 BCE) provides some of the most interesting historical and geographical sources of information on Iberia. In his *Histories*, which originally consisted of forty volumes, Polybius describes Rome's conquest of the Mediterranean, from the Punic Wars, starting in 264 BCE, to the destruction of Carthage and Corinth in 146 BCE; as Polybius witnessed many of the events himself, many of the descriptions are eyewitness accounts. Regrettably, the fragmentary transmission of his *Histories* – only the first five books have survived in their entirety – has denied us a complete synopsis of his geographical knowledge, which was clearly a constituent part of his work:

Pragmatic history (τῆς πραγματικῆς ἱστορίας) consists of three parts, the first being the industrious study of memoirs and other documents and a comparison of their contents; the second the survey (τὴν θέαν) of cities, places, rivers, lakes, and in general all the peculiar features of land and sea and the distances of one place from another; and the third being the review of political events.<sup>140</sup>

Polybius's geographical knowledge was far-ranging and the author possessed political and military experience. He was aware of the strategic importance of topography during wartime and the importance of geography in politics; his description of the geographical location of Byzantium, for example, is almost geopolitical in the modern meaning of the word.<sup>141</sup> He was also widely travelled, having visited Italy, Gallia, Iberia (on two occasions: during the Celtiberian Wars and the Numantine War) and northern Libyë, from Carthage to the Strait of Hercules.<sup>142</sup> He knew of the theoretical debates about climate zones, the oceans, the formation of currents, while from Strabo one learns that Polybius criticised some aspects of the geography of Eratosthenes and Dicaearchus.<sup>143</sup> In Book 3 of his *Histories*, Polybius specifies that he would only add geographical digressions to his narration when he believed they would help improve readers' understanding of the events and that he would devote a part of his work specifically to geography.<sup>144</sup> At the end of his short description of Iberia, Polybius also mentions his intention to present a more detailed report of the peninsula's many groups of peoples at a later date.<sup>145</sup> The

140 Polybius, *Hist.* 12.25 j. There has been heated debate among modern scholars about the meaning of the Polybian expression πραγματικῆ ἱστορία, the standard translation of which is 'pragmatic history'. However, it is possible that Polybius meant something more like 'contemporary' and/or 'political history'.

141 Polybius, *Hist.* 4.38.

142 Polybius was one of Pliny's sources of information on the northern coast of Libyë (see Pl. 5.9) and one of Strabo's sources of information on Iberia.

143 Str. 2.2.3, 2.4.1–8.

144 Polybius, *Hist.* 3.59.4–9. This fact is confirmed by Strabo (8.1.1).

145 Polybius, *Hist.* 3.37.11.

non-extant Book 34 of the *Historiēs* was certainly dedicated to geography; thus the excerpts that Pliny, Strabo and Athenaeus took from Polybius are collated in this book by modern editors.<sup>146</sup>

Part of Polybius' description of Iberia is contained in Book 3 in an excursus to Hannibal's expedition from Iberia to Italy, so 'that [his] narrative may not be altogether obscure to readers owing to their ignorance of the localities.'<sup>147</sup> Most of Book 3 was written in Rome between 167 and 151 BCE; the geographical excursus on Iberia may be slightly later, and was certainly not written before 146 BCE.<sup>148</sup> After a short description of the location of the three continents, Polybius gives a general appraisal of the peninsula:

The Celts inhabit the country near the *Narbōn* [River] and beyond it as far as the chain of the Pyrenees which stretches in an unbroken line from the Mediterranean to the Outer Sea. The remaining part of Europe beyond the Pyrenees reaching to its western end and to the Pillars of Hercules is bounded on the one side by the Mediterranean and on the other by the Outer Sea, that portion of which is washed by the Mediterranean as far as the Pillars of Hercules being called Iberia, while that part which lies along the Outer or Great Sea has no general name, as it has only recently come under notice, but is all densely inhabited by barbarous tribes of whom I shall speak more particularly on a subsequent occasion.<sup>149</sup>

Discussing the territories ruled by the Carthaginians at this time, Polybius writes:

Crossing the Straits at the Pillars of Hercules [the Carthaginians] had similarly subdued all Iberia as far as the point on the coast of Our sea where the Pyrenees Mountains, which separate the Celts from the Iberians, end. This spot is about 8 000 stadia distant from the strait near the Pillars of Hercules. There are indeed 3 000 stadia from the Pillars to Carthago Nova, from which place Hannibal started for Italy, 2 600 stadia from hence to the Ebro river; 1 600 stadia from hence to Emporion, (from hence to the Pyrenees, 600 stadia) and from hence to the passage of the Rhône about 1 600 stadia – this part of the road having now been carefully measured by the Romans and marked with milestones at every eighth stadia.<sup>150</sup>

146 This hypothesis is based on the testimonies of Athenaeus of Naucratis (*Deipnosophistae* 8.330 and 8.332a) and Stephanus of Byzantium (*Ethn. sv. Αιθάλη*). It is, however, not implausible that Polybius' geographical description filled more than one volume.

147 Polybius, *Hist.* 3.36.1.

148 De Foucault, Foulon, and Molin 2004, xv–xvi; Marcotte 2002, 20–21.

149 Polybius, *Hist.* 3.37.9–10.

150 Polybius, *Hist.* 3.39.4–8. On the philological and historical issues raised by this passage, see p. 427 as

The other fragments of Polybius' writings that Strabo and Athenaeus have passed down do not allow us to reconstruct a complete picture of what Polybius knew about Iberia. Iberia was, to Polybius, a kind of unfinished geographical object, which was still in the process of being constructed: only the Mediterranean littoral was well known.<sup>151</sup> One cannot even be sure that he knew that Iberia was a peninsula. The passage cited directly above resembles a *paraplaus* of the Mediterranean coastline of Iberia, the values of which find echoes in later sources. In addition, Polybius' schematic conception of the western Mediterranean Basin as a triangle formed by the Pillars of Hercules, Narbo and the Strait of Sicily formed the basis for the development of the western Mediterranean in the geography of Antiquity.<sup>152</sup>

Among the Greek and Roman historians who supplied much of the information on the geography of the Iberian peninsula, one finds Appian of Alexandria. The latter wrote a *Roman History*, with the aim of recounting and explaining how Rome came to dominate the known world. The text has only survived in fragments; however, thanks to Codex 57 of Photius' *Bibliotheca* and to Appian's preface to his work, the structure and composition of his *Roman History* is relatively well known. The work was not arranged chronologically, as one might have expected from a historical work, but in geographical units. The book on Iberia (Ἰβηρικὴ, generally translated as 'The Wars in Spain', although a more accurate translation would be 'The Iberian Book'), opens with a brief description of the area. Although not particularly up to date, this description presents the area's main geographical features and defines the territory as a peninsula. The book records those events of the Punic Wars that took place on the peninsula as well as the Lusitanian and Celtiberian Wars until Iberia was divided 'into three parts' during the reign of Augustus. Appian's description is an undeniably important toponymic source of information on Iberia.

Diodorus of Sicily's *Bibliotheca historica*, in particular Book 5, provides information on the geography of Iberia, especially the Balearic and Pityusic Islands, in the form of long digressions or isolated descriptions and mentions. Julius Caesar's *Civil War* and Livy's *Ab Urbe Condita* do not exhibit the same degree of attention to Iberian geography, although the place names in these texts do share similarities with Ptolemy's toponymy. The historical works of Cassius Dio, Tacitus and Florus can also be occasionally helpful. At the beginning of the fifth century, Paul Orosius wrote a seven-volume book entitled *Histories against the Pagans*. Born in Callaecia in north-west Iberia, he travelled to Africa and Palestine, became a famous theologian and erudite, and knew both Augustine of

well as De Foucault, Foulon, and Molin 2004, 52, 200–202.

151 Moret 2013, 71.

152 For recent discussions, see also Cruz Andreotti 2006; Moret 2006, 65–67; Gómez Fraile and Albaladejo Vivero 2012, 375–380; Moret 2013, 71–73.

Hippo and Jerome personally.<sup>153</sup> As a historian who was interested in geography, Orosius used quite ancient sources (Julius Caesar, Livy, Tacitus), which makes his writings an interesting geographical source. In particular, Chapter 2 of the first book of his *Histories* contains a description of the whole *oikoumenē* that includes a summary of the Iberian peninsula.<sup>154</sup>

153 Martínez Cavero 2002, 22–48.

154 See Janvier 1982.



## 6 Identifying and explaining the origins of the *Geography*'s coordinates

The number of studies on Ptolemy's coordinates and their origins as well as on the sources and geographical methods used in the *Geography* has increased significantly since the publication of the critical edition of A. Stückelberger and G. Graßhoff in 2006. The latter aroused great interest among specialists in astronomy, mathematics, geodesy and geography but surprisingly less attention from historians and classicists. There is a trend in recent studies of the *Geography* that would have us believe that Ptolemy's coordinates need to be 'corrected' or 'improved upon,' and some publications have even attempted to 'decode' the coordinates or to 'reveal' the true nature of Ptolemy's maps. However, Ptolemy's *Geography* is, in my opinion, neither an encrypted text whose 'truth' needs to be 'revealed,' nor a GIS database from the second century CE. It is a historical source that still deserves to be studied from a historical viewpoint, using, of course, the appropriate methodology.

### 6.1 Origins of Ptolemy's catalogue in modern research works

The questions regarding Ptolemy's sources and methods are rarely selected as the *central* topics of present-day studies. In many cases, hypotheses or suppositions have been put forward but they have not been or cannot be verified. It has been suggested, for example, that Ptolemy used the cities contained in his 'Table of Noteworthy Cities,' which supposedly date back to a collection of coordinates developed since Hipparchus or even earlier, as the starting point for creating his maps;<sup>1</sup> that he simply performed certain

1 Stückelberger 2009b, 241. A. Stückelberger considers the localities of the 'Table of Noteworthy Cities' to be the 'foundations' (θεμελίαι) to which Ptolemy refers in the introduction to the *Geography*;

see p. 175. Moreover, the latitudes of these main places (e.g. of Egypt, Gallia or Iberia) are, according to the author, so accurate that they could only have been determined astronomically.

arithmetical computations;<sup>2</sup> or that he copied (albeit with modifications) maps of 'military origin'<sup>3</sup> – to cite just a few of the proposals that have been made in recent years.

Proposing hypotheses is, of course, an important part of a historian's work, particularly when the historical documents being examined – such as the *Geography* – are poorly understood. Although some of the general assumptions being made are not necessarily erroneous, a few of these unproven hypotheses are often taken to be confirmed, which makes using these hypotheses as the methodological basis for studying Ptolemy's *Geography* problematic. A synopsis of some of the different contemporary research methods being employed will, however, allow us to define the characteristics of an appropriate investigation into the origins of Ptolemy's coordinates. It should be noted that this synopsis is by no means exhaustive.<sup>4</sup>

### 6.1.1 The Earth's circumference and the length of the stadion

In the *Geography*, Ptolemy uses the value of 180 000 stadia for the Earth's circumference, that is, 500 stadia for one degree of a meridian. The problems concerning the size of Ptolemy's Earth and the numerical value that corresponded to one stadion in Antiquity appear frequently in recent publications about Ptolemy's work.<sup>5</sup> The problem of the length of the stadion is one of the most complicated issues in the history of the ancient sciences. However, as I am not convinced that this problem is fundamentally relevant to understanding Ptolemy's working methods and the origins of the Iberian peninsula's coordinates, I will not enter into a debate of this issue.<sup>6</sup>

In a recent series of papers, I. Tupikova and K. Geus have attempted to identify the role of Ptolemy's evaluation of the Earth's circumference in his map-making. Their central point is 'the presupposition that the value for the circumference of the Earth used by Ptolemy is expressed in the same metrical value of the stad[ia] which Eratosthenes used.'<sup>7</sup> Their working hypothesis is as follows:

Instead of speculating about the modern metrical value of a stadium used by ancient scholars, we will try to recalculate the geographical positions given by Ptolemy in his *Geography* in assuming that his definition of the stad[ia] used in the calculation of the geographical positions coincides with the definition of

2 Berggren and A. Jones 2000, 16–17.

3 Strang 1998a, 425.

4 J. Urueña Alonso has written two substantial and rather complex articles dealing with the origins of Ptolemy's map of the Iberian peninsula (Urueña Alonso 2011 and Urueña Alonso 2014). However, I

came across these articles far too late in my research project to be able to include them in this book.

5 See, e.g., Russo 2013, Shcheglov 2016b.

6 See the good synopsis in Shcheglov 2016a.

7 Tupikova and Geus 2013, 20.

the stad[ia] used by Eratosthenes in his estimation of the circumference of the earth.<sup>8</sup>

In other words, the authors maintain that the main difference between the calculations made by Eratosthenes and Ptolemy is the number of stadia they attributed to one degree of a meridian: Ptolemy assigns 500 stadia and Eratosthenes 700 stadia. I. Tupikova and K. Geus have, therefore, recalculated Ptolemy's coordinates, so that they fit a larger sphere, where one degree of a meridian equals 700 stadia. Their recalculation comprises several stages:

The first step [in recalculating] the original positions is to restore Ptolemy's raw data,<sup>9</sup> that is, the distances between [the] different localities which he had at his disposal and – in some cases – the directions of the routes connecting these localities.<sup>10</sup>

By 'original positions' the authors mean the 'positions on an Eratosthenian Earth'. This stage of the procedure was particularly tricky, for five different cases needed to be treated, depending on the information – latitude data, distance data, orientation of a road, and so on – that was supposedly available to Ptolemy. To begin with, a starting locality ('reference point') needed to be defined for a given set of places:

Let us start with the following indisputable statement: Ptolemy put a position on his map only relative to another one, which we call [a] reference point. It is therefore obvious that the first step in reconstructing the Ptolemaic map is the choice of the correct reference point(s) used in his mapping procedure.<sup>11</sup>

The second step in the recalculation process consists of making a comparison between Ptolemy's and the modern coordinates that takes the problem of the prime meridian into account. Ptolemy's coordinates, the authors' 'recalculated' coordinates and the modern coordinates are then transposed on to a map to facilitate the comparison.<sup>12</sup> This procedure is applied to several geographical areas in order to test different 'starting points' as well as different scenarios.<sup>13</sup> The authors conclude with the observation that if Ptolemy had adopted Eratosthenes' value, his map would have been much more precise and he would thus have avoided the excessive distortion that occurs in the east–west direction of his world map.<sup>14</sup>

8 Tupikova and Geus 2013, 2–3.

9 In another article (Geus and Tupikova 2013b, 127), the authors write of a possible reconstruction of Ptolemy's 'original coordinates for every point'.

10 Tupikova and Geus 2013, 4.

11 Tupikova, Schemmel, and Geus 2014, 32.

12 Tupikova and Geus 2013, 9–11.

13 Tupikova and Geus 2013, 11–18.

14 Tupikova and Geus 2013, 20.

The authors draw two conclusions about Ptolemy's sources and cartographical method. First, they maintain that Ptolemy used the 'wrong' value for the circumference of the Earth, which led to significant distortions. Their recalculation enables them to correct these distortions and to obtain what they believe is Ptolemy's raw data, that is, the distances between the localities and the directions of the routes.<sup>15</sup> Second, by testing a number of different hypotheses, they suggest identifications for Ptolemy's starting points, namely, the places for which he first determined the geographical coordinates and which were then used as the basis for the mapping of other localities. This procedure is also used to analyse different sections of Ptolemy's catalogue. As far as the eastern part of the Mediterranean area is concerned, the authors' recalculation suggests that Ptolemy 'measured this part of the Mediterranean not from Alexandria but from Italy', and in this instance, most probably from Rome; they also suggest that Massalia (Marseille) 'served as a starting point for Ptolemy's mapping of Spain'.<sup>16</sup> I. Tupikova and K. Geus have made a number of suggestions about Ptolemy's methods and sources, although they have not fully discussed the latter.<sup>17</sup> They maintain: that Ptolemy might have collated a 'dozen, if not hundreds of sources'; that he had access to Roman military and administrative archives;<sup>18</sup> and, as far as one can understand, that he carried out calculations to determine the geographical coordinates.<sup>19</sup> The authors' explanation for the coordinates of Markanda (Samarkand), for instance, is as follows: Ptolemy derived the latitude from astronomical observations, while the longitude might have been the result of 'highly precise terrestrial measurements, possibly carried out by the bematists of Alexander the Great'.<sup>20</sup>

### 6.1.2 The Eastern Mediterranean

In the introduction to his 1976 article, F.J. Carmody presents the *status questionis* of Ptolemy's methods and sources. He also links the procedures exposed in the introduction to the *Geography* with the catalogue of localities and the geographical documentation of Antiquity. To be precise, he takes the methods Ptolemy mentions in his introduction and tests their validity on specific areas of the catalogue in order to explain some of the map's characteristics. For instance, if one regards Cape Drepanon (in Cyprus) as the reference point, then the 'arcs' of Drepanon–Berytos and Drepanon–Tripolis should

15 Tupikova and Geus 2013, 20.

16 Tupikova and Geus 2013, 13–14.

17 A second article analyses northern Europe (Geus and Tupikova 2013b) and a third paper investigates the Silk Road in Ptolemy's map (Tupikova, Schemmel, and Geus 2014).

18 Geus and Tupikova 2013b, 125, 137.

19 Tupikova and Geus 2013, 2: 'It was not a data base in degrees that Ptolemy had at his disposal but the distances expressed in stad[ia], dayruns and other units in use, which he had to recalculate in angle measure [i.e. convert into degrees] to fit the world map under construction.'

20 Tupikova, Schemmel, and Geus 2014, 13.

both have been rotated  $6^\circ$  on Ptolemy's map.<sup>21</sup> These rotations were the result of Ptolemy's method of map-making, which, according to the author, consisted of the procedure he called 'triangulation':

The term 'triangulation' properly describes the calculation of distances between points as a function of angles. As on the celestial sphere, where the constellations assume graphic forms, the places may be joined by arcs that form polygons or extended arcs, all of which can be treated as right[-angled] triangles to be analyzed by use of sine tables such as those prepared by Ptolemy. Our cartographer chose, according to circumstance, to situate places either by the length of the arc that joins them or by the angular orientation of the arc, or, less often, by both.<sup>22</sup>

Ptolemy supposedly used antique sources to help him find the best candidates for this so-called triangulation method. F. J. Carmody attempts to reconstruct as concretely as possible Ptolemy's mapping procedure, explaining that Ptolemy made *ad hoc* modifications to his own constructions. His description of a plausible working map reads as follows:

Ptolemy could well have effected the plane projection by dividing the surface of the earth into rectangles whose top and bottom coincide with selected parallels of latitude and whose sides overlap to the extent of the difference, at top and bottom, in the length of the small circles of longitude. The latitudes are divided into a series of zones, each of about  $2^\circ$ , but for the divisions in longitude we have no reference, so that in the final analysis we do not know the dimensions of the rectangles actually used in the calculations. It is clear that for Spain Ptolemy compensated for the total difference in lo[n]gitudinal arcs by means of a single operation made near the north coast.<sup>23</sup>

Although F. J. Carmody describes how he investigated Ptolemy's map very precisely,<sup>24</sup> he does not give any concrete examples of the distances that Ptolemy purportedly used. Moreover, even though he discovers some symmetries in the map, he does not develop a model to explain how each locality was situated.<sup>25</sup>

21 Carmody 1976, 607.

22 Carmody 1976, 603.

23 Carmody 1976, 603–604.

24 Carmody 1976, 605–606: 'I have copied Ptolemy's map on transparent paper, placed it on a modern map of the same scale, and have read the difference in length of arc, positive if Ptolemy's arc is longer, as is usually and normally the case. If I have turned

my paper to make the arcs coincide, I say that I have turned it by the "angle of declination" of Ptolemy's arc, positive if it was turned to the right, negative if to the left.'

25 The statement that some of these symmetries 'cannot be fortuitous' (Carmody 1976, 609) was not used to explain how the localities were constructed.

### 6.1.3 Ptolemy's Iberian peninsula

In an article published in 1997, J. M. Gómez Fraile examines the way Ptolemy determined the provincial boundaries and located the peoples and the cities of the Iberian province of *Tarraconensis*.<sup>26</sup> His analysis consists of a detailed commentary of the map and of the text of the *Geography*. In order to explain Ptolemy's mapping process, the author compares Ptolemy's ethnonyms and toponyms with Pliny's text, and then with Mela's and Strabo's works.<sup>27</sup> He establishes that a certain amount of Roman administrative information had been used and suggests a model for the origins of the map: the overall shape and the boundaries of the peninsula were determined first, and then the peoples were located throughout the peninsula and used as framework to situate localities inside each administrative frame. However, he is rather vague about the exact location process and admits that Ptolemy might sometimes have randomly carried out rough estimates.<sup>28</sup>

J. M. Gómez Fraile then investigates the coordinates of the *Geography* and their origins in a second article, summing up his objectives, methods and main results as follows:

The aim of this research lies in checking the origin of Ptolemy's geographical coordinates for the Iberian peninsula. To achieve this goal, the author proposes, as a methodological innovation, to convert the geographical coordinates into distances in stadia between equidistant points, to provide an analytical comparison of the numerical information derived from mathematical Greek geography and the Roman road network. The evidence suggests a mixture of theoretical data, based on astronomy, and practical data, based on Roman roads.

The principal contribution concerns the impossibility of making the road data compatible with Eratosthenes' traditional globe of 252 000 stadia. This state of affairs could explain why Marinus and Ptolemy decided to use Posidonius' figure of 500 stadia for one degree.<sup>29</sup>

One of Gómez Fraile's main hypotheses is that Ptolemy used a wrongly calibrated map and worked with distances that he should have used on a grid where 1° equals 700 stadia, for example, concerning the latitudinal extent of the whole peninsula. This hypothesis does not, though, lead to the identification of a precise source. The shape of the peninsula, especially its latitudinal extent, could have been estimated by using the distance between the parallel through Rhodes and the parallel through Massalia given by Hipparchus.<sup>30</sup> The author clearly hoped to prove that Pliny's list of parallels (in-

26 Gómez Fraile 1997.

27 Gómez Fraile 1997, 239-242.

28 Gómez Fraile 1997, 201-202 and 231-236.

29 Gómez Fraile 2005, 35.

30 Gómez Fraile 2005, 43-44.

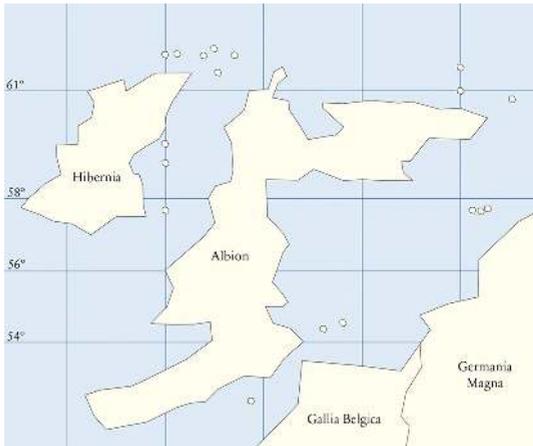


Fig. 23 Outline of Ptolemy's map of the British Isles.



Fig. 24 Outline of the British Isles.

terpreted here as a product of Greek mathematical geography, with Hipparchus as the main source) was compatible with the *Geography*.<sup>31</sup> Nonetheless, even if a rough comparison reveals several common points, one cannot find in Pliny's list a relevant source of information for each of Ptolemy's latitudes.

J. M. Gómez Fraile has also analysed the links between the *Geography* and Roman itineraries, pointing to several coincidences between Ptolemy's map, the *It. prov.* and the Vicarello Goblots.<sup>32</sup> According to him, Ptolemy might have used itinerary sources in different ways: for instance, although the distance between Gades and Castulo provided by the Vicarello Goblots corresponds to the distance as the crow flies between these two cities on Ptolemy's map,<sup>33</sup> the distance between Castulo and Ruscino (in Narboensis) given by the Goblots only tallies with the *Geography* if one adds the intermediate distances between each station along the route on Ptolemy's map.

#### 6.1.4 The British Isles according to Ptolemy

There are fewer antique textual sources of information on the British Isles than on other European areas, which explains why Ptolemy's map of Albion (Great Britain) and Hibernia (Ireland) has aroused the interest of so many historians and archaeologists in the modern era. Most of these studies – some of which date back to the eighteenth and

31 Gómez Fraile 2005, 44–47.

32 Gómez Fraile 2005, 47–55. The author uses the coordinates selected by Müller 1901 and does not take the differences between the recensions of the *Geography* into account.

33 J. M. Gómez Fraile reconstructs the distances between localities mentioned in the *Geography*, first by converting the degrees into stadia, then by using Pythagoras' theorem (Gómez Fraile 2005, 39–40).

early nineteenth centuries – focused on a single aspect of Ptolemy's map: the sharp eastward 'turn of Scotland',<sup>34</sup> which refers to the fact that the northern part of Ptolemy's Albion 'turns' abruptly to the east from approximately 58° latitude – that is, north of Cataractonium<sup>35</sup> – rather than stretching northwards (Fig. 23 and Fig. 24). This characteristic of the *Geography* (sometimes regarded as 'a problem?') has generated a series of studies with the objective of 'rectifying' and 'resolving' this abrupt eastward turn. While corrective-based approaches have professed to amend Ptolemy's coordinates in order to locate unknown places, some publications have sought to explain the origin of Albion's peculiarity in the *Geography* by linking it with Ptolemy's methods of working.

According to J. J. Tierney, the apparent distortion of Albion derives from an incomplete revision of Eratosthenes' map of the British Isles that was carried out either by Marinus of Tyre or by one of his predecessors: improvements were made to the south of Albion, but, because of insufficient information on the northern part of the island, the revisions were left unfinished. Thus, the eastward rotation of northern Albion was not decided on by Ptolemy but can be traced back to Eratosthenes' ancient map.<sup>36</sup> In other words, if one compares Ptolemy with the other antique sources before him, it was the *southern* part of Albion that was 'turned' or, in a certain sense, 'rectified'. Although the progressive elaboration, in Antiquity, of a depiction of the British Isles starting from Eratosthenes is crucial to understanding Ptolemy's map, the importance of J. J. Tierney's article has often been minimised by supporters of the corrective-based approach.<sup>37</sup> Admittedly, Tierney fails to suggest a model to explain Ptolemy's coordinates and his argumentation is also not always convincing. However, he does explicitly link the state of the sources of information on the British Isles at the time of Ptolemy with the introduction to the *Geography*, in particular Ptolemy's statement on the lack of accurate information, particularly on regions at the edges of the *oikoumenē*.<sup>38</sup>

Subsequent to an oft-cited but unpublished dissertation, A. Strang has re-examined this distortion of the British Isles in three articles, published in 1997 and 1998, in which he presents the methodological foundations of his 'empirical approach' to analysing Ptolemy's map of Albion.<sup>39</sup> The aim of his research was to 'resolve' the coordinates' is-

34 The expressions 'Ptolemy's map of Scotland' or even 'Ptolemaic Scotland', which frequently appear in modern publications, should be avoided, as it is imprecise and anachronistic. Ptolemy never referred to the Scottish people (who only appear in sources from the fourth century CE onwards; see Amm. *Res Gestae* 20.1), even less to a 'land of the Scots' or to 'Scotia'. That the territory of modern Scotland tallies approximately with the area that has been 'turned' eastwards on Ptolemy's map is pure coincidence.

35 *Geogr.* 2.3.16, almost certainly modern-day Catterick in North Yorkshire.

36 Tierney 1959, in particular 134, 145–146.

37 E.g., Marx 2014, 231. The tone of A. Strang 1998b, 29, is decidedly sarcastic.

38 Tierney 1959, 143–147.

39 Strang 1997, 2: 'Several approaches were considered but an empirical (as opposed to a statistical etc.) method was chosen because of uncertainty concerning the reliability of the *Geographia* data and the complex variety of distortion evident within the map of Britain derived from this data.' See Strang 1998b and also Strang 1998a.

sue and to locate new toponyms of the *Geography*; the question of Ptolemy's sources and methods thus seems to have been secondary. A. Strang believes that several characteristics of Ptolemy's maps are 'constraints' that were chosen *a priori* by Ptolemy, in particular the latter's adoption of a 'smaller world' and his decision to set the maximum northern extent of the *oikoumenē* at 63° latitude.<sup>40</sup> These features would have forced Ptolemy to distort, shift and rotate a considerably important number of landmasses and cities. A. Strang identifies several points on Ptolemy's map and interprets them as centres of rotation to explain Albion's appearance in the *Geography*. Some of these points are toponyms recorded in Ptolemy's catalogue (the Vedra River, for example), but more often Strang uses modern localities (such as Long Melford in Suffolk or Whithorn in Scotland).<sup>41</sup> Then the author interprets the rotations in relation to Ptolemy's map-making. Although A. Strang's reconstruction of Ptolemy's procedure can be hard to follow in detail, there are a few passages that give a clear idea of how he interprets Ptolemy's working methods:

Once Ptolemy had rearranged these places<sup>42</sup> into the gap created by rotating Scotland relative to England, he was obliged to stretch and reconnect the coastline back to Ituna. This appears to have been done freehand, as the coastal features were not moved in a consistent pattern. From Ituna outwards, a longer coastline has been created with an irregular relationship between the Ptolemy river-mouths. When Novantarum [Promontory] (Mull of Galloway) is reached, it must have been realised that with Monarina [Island] (Isle of Man) now almost directly west of Epidium [Promontory] (Mull of Kintyre), it was more realistic, through rotation, to interpose Novantarum [Peninsula] (Rhinn of Galloway) between them.<sup>43</sup>

A. Strang's reconstruction of Ptolemy's mapping method thus consists of a series of operations arranged more or less chronologically: 'Ptolemy shifted that place', 'Ptolemy rotated this land', or even 'it now becomes obvious that Ptolemy's map incorporates bands of territory that do not exist and that land in East Anglia has actually disappeared between the rotational groups'.<sup>44</sup> In addition, he claims that Ptolemy used a grid with

40 Strang 1998b, 28.

41 Strang 1998b, 36–37.

42 The identity of these places is unclear in A. Strang's text.

43 Strang 1998b, 37. Another example of Ptolemy's working method can be found in Strang 1998a, 431: 'Ptolemy was obliged to omit the following two features. *Tinea flumen* (the Tyne) could not be included beside *Vedra flumen* (the Wear) in the angle between England and Scotland during Ptolemy's

rotation of Scotland, but can now be reinserted. Also, Cape Wrath had to be omitted by Ptolemy to prevent its being interposed between *Orcades insulae* (Orkneys) and *Orcas prom[ontorium]* (Duncansby Head) in his new configuration of Scotland. However, this cape must have been such an important feature in Flavian navigation that it demands a title and reinsertion. In the map it has been labelled as (*Wrath*) *prom[ontorium]*'.

44 Strang 1998b, 36.

two different scales, although he does not explain this very clearly.<sup>45</sup> As result of his analysis, A. Strang puts forward his ideas for Ptolemy's sources of information, which he presents as being almost self-evident:

From inspection of the *Geographia* text, it is evident that Ptolemy place-listing is not directly the result of collecting or acquiring data from itineraries, periploi (sea voyages) etc. but has been copied from a map showing spatial and directional relationships e.g. tribal displacement (east, above etc.) and coastal lists extending beyond tribal or territorial boundaries.<sup>46</sup>

It became clear during this analysis that Ptolemy must have extracted his data from an authoritative map rather than from disparate lists or itineraries and it is likely that this would have been of military origin and from the Flavian occupation period.<sup>47</sup>

As for Ptolemy's sources and methods, A. Strang makes some suppositions but provides no hard evidence. He formulates an account about the origins of Ptolemy's coordinates in which a number of stages (none of which has been proven) are postulated, only so that they would fit the several distortions of Ptolemy's map.

The recent article of C. Marx on the distortion of the British Isles, the aim of which was surely to improve on A. Strang's solution, is also typical of the corrective-based approach that relies, on the one hand, on inadequate knowledge of Ptolemy's text and of the history of antique geography in general,<sup>48</sup> and that, on the other hand, regards a number of suppositions as being historically true. For example:

Ptolemy's *Thule* is to be equated with the Shetland Islands [...]. A reason for this is that according to Tacitus' *Agricola* 10 the Romans named an archipelago *Thule* which came within the range of vision during their circumnavigation of Great Britain, and this archipelago was surely the Shetland Islands. That information was certainly known to and used by Ptolemy.<sup>49</sup>

The crucial point here is that C. Marx postulates (like A. Strang before him) that Ptolemy intentionally rotated the northern part of Albion; he also suggests a method that was based on Ptolemy's knowledge of spherical astronomy:

Supposing an intentional rotation for Ptolemaic Scotland, an accurate way for its accomplishment would have been a 3D rotation of points on the earth's surface performed by means of a rotation around an axis through the point of

45 Strang 1997, 8–10; Strang 1998b, 34–35.

46 Strang 1998b, 43.

47 Strang 1998a, 425. See also 426.

48 See p. 260.

49 Marx 2014, 235.

origin and a given pivot point. [...] Accordingly, it is imaginable that Ptolemy was able to perform a 3D rotation around an axis (pivot point) by means of a decomposition into single rotations around coordinate axes and that he applied the procedure to the places of Scotland or to some selected places. That gave reason to model the turning of Scotland by a 3D rotation. But even if Ptolemy proceeded in another way, e.g. by rotating mapped points computationally or graphically in the plane, a 3D rotation is a good approximation for the unknown original procedure.<sup>50</sup>

To perform a rotation one requires not only an axis or a centre of rotation but also an object that one intends to rotate. C. Marx refers to some 'mapped points' that Ptolemy supposedly found one way or another and alludes to some 'measurement data, information from travel reports, maps'<sup>51</sup> that Ptolemy is supposed to have had at his disposal. Hence the model developed by C. Marx remains extremely speculative.

## 6.2 Methodological requirements

An analysis of the methodological elements that Ptolemy mentions in the introduction to the *Geography* will not, on its own, disclose the origins of the coordinates contained in the catalogue of localities. Neither can the sources that he mentions nor the mapping procedures he uses to estimate the dimensions of the *oikoumenē* elucidate how Ptolemy obtained each of the *Geography*'s approximately 6 000 coordinates. As a result, recent studies have tended to focus either on the possible sources of Ptolemy's world map or on correcting its main distortions using plausible assumptions of Ptolemy's working methods. Rarely have investigations aimed at establishing both his source(s) and method(s) been undertaken.

An efficient way of identifying the origins of the coordinates is by establishing each stage of Ptolemy's working process – from the selection of his sources to the creation of his catalogue of localities. The research method that I have selected to use in this study is based on the work of E. Rinner,<sup>52</sup> who has adapted and applied to Ptolemy's *Geography* a method developed by G. Graßhoff to identify the origins of Ptolemy's star catalogue.<sup>53</sup>

The introduction to the *Geography* includes information not only on the type of data that Ptolemy had at his disposal but also on the way he used these data. Ptolemy reduced distances by simple fractions (by a half, a third or a sixth of a given distance)

50 Marx 2014, 237–238.

51 Marx 2014, 232.

52 Rinner 2013. See also Graßhoff, Mittenhuber, and Rinner in print.

53 Graßhoff 1990.

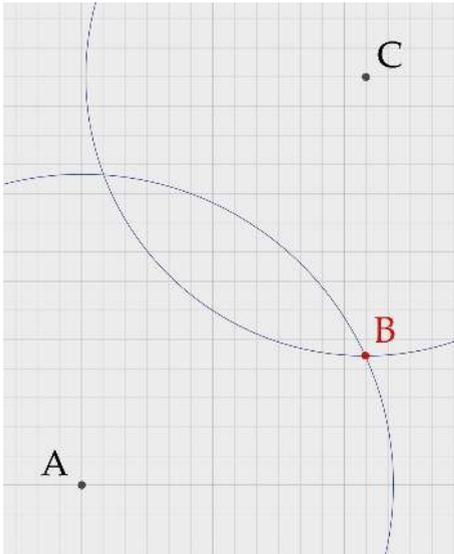


Fig. 25 Basic construction, using a ruler and compass, of place *B* by combining three pieces of information:

- the distance between *A* and *B*,
- the distance between *C* and *B*,
- the fact that *B* lies to the east of *A*.

and also rounded up or down distances or intervals. Only occasionally did Ptolemy leave Marinus' distance data unchanged.<sup>54</sup> We can also assume that Ptolemy performed other kinds of arithmetical transformations, although they are not attested in his text, in particular the rounding up or down of the coordinates he determined in order to obtain multiples of twelfths of a degree, so that each latitude and longitude fitted his grid system. The introduction to the *Geography* also provides examples of complex data transformations, involving successive reductions of distances and the conversions of distances in stadia into intervals in degrees.

Ptolemy claimed that he had access to only a small amount of latitudinal and longitudinal data needed to compile his catalogue, which suggests that he determined most of his coordinates himself after having adapted the information he found in his sources. The coordinates were, therefore, the result of a chain of data transformations that varied in its complexity. Simple procedures that would have enabled Ptolemy to determine the geographical coordinates of a locality could have consisted of a few basic geometrical constructions for which only some elementary information was needed to construct a point on a map. The type of geometrical construction would have depended on the type of available data: two distances could have been combined with another piece of information (Fig. 25) or a distance could have been combined with a latitude (Fig. 26), and so on. The number of possible mapping procedures is substantial and is dependent on the types of available information.

<sup>54</sup> *Geogr.* I.11.2.

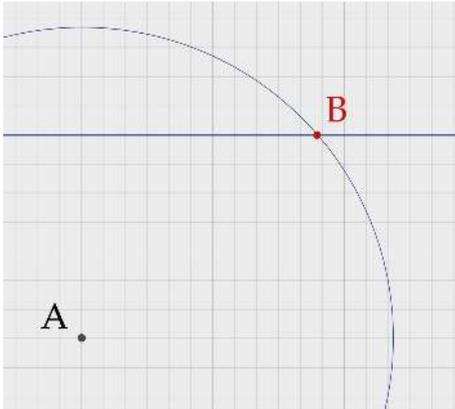


Fig. 26 Basic construction, using a ruler and compass, of place *B* by combining three pieces of information:

- the distance between *A* and *B*,
- the latitude of *B*,
- the fact that *B* lies to the east of *A*.

After a locality had been constructed, the coordinates of the localities would have been read off from the map by following the grid and its graduations. The analysis of the catalogue's structure and the way Ptolemy organised the toponyms in the lists shows that he very probably realised a map and determined the localities' coordinates *before* he put together the catalogue. 'Working maps' were undoubtedly an important part of Ptolemy's geographical method.<sup>55</sup>

A model that will succeed in explaining the origins of the coordinates needs to take into account not only the sources but also the whole sequence of the data transformation process. The selection of one piece of information over another, the rounding up or down of a figure, specifically reducing a distance, using particular drawing tools and working maps are all factors that will affect the development and determination of a locality's coordinates. This means that the coordinates *themselves* contain the memory (or traces) of the whole process of their development.<sup>56</sup> The method used by E. Rinner is based on a comparison between Ptolemy's coordinates of localities and the coordinates of the modern-day locations of the antique sites mentioned by Ptolemy. For example, when one determines a locality's coordinates, the specific distance or latitude used, or the particular reduction applied to the distance, will affect the position of this locality as a specific type of distortion will always occur. A modification made to any one stage of the process will also bring about changes to the coordinates – and will consequently bring about a different kind of distortion.

I prefer to use the term 'distortion' rather than 'error' as the latter implies that Ptolemy was mistaken in his choice of sources or methods and suggests that I am questioning the accuracy of his coordinates. P. Gautier Dalché and R. Burri have rightly

55 See p. 156.

56 Rinner 2013, 11.

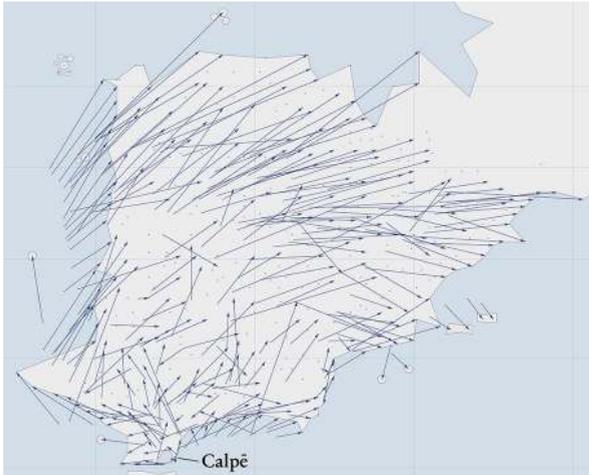


Fig. 27 A comparison between the modern-day coordinates and Ptolemy's coordinates of the  $\Xi$  recension in relation to the longitude of Calpē, using Ptolemy's regional map projection. The arrowheads point to the coordinates of the *Geography*, while their tails correspond to the modern locations. The pale grey spots mark the toponyms of the  $\Xi$  recension that could not be located with any great certainty.

reminded us that lambasting Ptolemy's 'errors' is hardly an appropriate way of conducting a historical study,<sup>57</sup> particularly since, as already mentioned, it makes no sense to 'correct' Ptolemy's supposed errors. Therefore, a comparison with modern coordinates is to be understood solely as a way of divulging the particularities of Ptolemy's maps and as the starting point for analysing Ptolemy's sources and data handling. When I refer to the 'distortions of Ptolemy's coordinates' I mean the differences that are visible when one compares the coordinates of Ptolemy's localities with the coordinates of their modern-day locations. My objective is not to discover why Ptolemy's coordinates were 'inaccurate' but to understand how Ptolemy determined the coordinates of his catalogue. The distortions are simply the means of accessing the origins of the coordinates.

To achieve an optimal visualisation of these distortions, I have used, following E. Rinner's model, so-called *displacement vectors*, that is, simple arrows that link each toponym with its corresponding modern location.<sup>58</sup> A comparison between Ptolemy's coordinates for the places in Iberia and their respective modern locations using displacement vectors highlights the variations in the distortions, which generally affect groups of places, not just one isolated place, with several neighbouring displacement vectors showing a similar pattern (Fig. 27). For example, some of the distortions involve a shift in the same direction (the vectors point in the same direction and are of the same length), while others show more specific patterns, such as rotations and the enlargement of areas.

A set of several localities with the same kind of distortion cannot be explained simply by determining each coordinate independently of each other. For instance, all

57 Gautier Dalché 2009b, 19; Burri 2013, 44.

58 Rinner 2013, 12.

the localities on the oceanic coast of Tarraconensis province (the north of the Iberian peninsula) are affected by a common latitudinal shift of about 2°. If Ptolemy had determined the latitude of these localities independently of each other, that is, using different sources and/or different mapping processes, the probability of obtaining the same distortion for ten or fifteen localities would have been extremely low. By contrast, a distortion that is common to a group of neighbouring localities can be explained by a single ‘inaccurate’ component of the mapping procedure, which then transmitted the distortion to other localities. In other words, a model that explains large groups of similar distortions must take into account the fact that the coordinates were determined in relation to each other. If the location of several places was determined in accordance with the position of one specific locality, which already contained a distortion, then this distortion would have been transferred to every later point, the construction of which was linked to this first locality.<sup>59</sup>

A ‘group of distortions’ can be defined as a set of displacement vectors that depicts significant, similar variations between Ptolemy’s coordinates and their respective modern locations. A single factor is usually the source of these main distortions. A ‘residual distortion’ is the difference that remains at the local level after the main distortions of the group have been explained. The displacement vectors are, therefore, not only a practical way of visualising these differences but are also active tools that enable us to understand the characteristics of Ptolemy’s map and to test, confirm or reject the construction hypothesis.

Therefore, this investigation aims to explain the sources and procedures that were responsible for the distortions that arose from Ptolemy’s coordinates. It consists of the following methodological steps:

- undertaking a comparison of Ptolemy’s coordinates with the modern locations and identifying the main distortions of Ptolemy’s map;
- identifying the sources and procedures that would explain the main distortions;
- explaining the specific residual and local distortions (once a model for the main distortions has been elaborated), again by identifying possible sources and procedures.

The objective of this multistage investigation is to develop a model that explains the procedures that Ptolemy performed, the chronological order of the different stages of his work as well as the type of geographical information he used, if possible linked with the precise data passed down in the other sources of Antiquity.

59 Rinner 2013, 13–14.

### 6.3 Identifying and locating Ptolemy's toponyms

In order to be able to visualise the distortions of Ptolemy's map, it is necessary to determine the geographical coordinates of the modern equivalents of the toponyms given in the *Geography*. To do so, a working database that collates the modern-day coordinates of ancient toponyms is needed, for which a specific method is required. Although some well-known places mentioned by Ptolemy can be accurately located on modern maps – such as the city of Tarraco (modern-day Tarragona) or the Sacred Cape (Cabo de São Vicente) – many toponyms in the *Geography* cannot be identified and located with any great certainty. Various investigations of Ptolemy's Iberian localities have been led and their identification and locations discussed: for instance, the *Barrington Atlas of the Greek and Roman World*, which was based on a large amount of historical and archaeological studies, contains maps of the peninsula with ancient sites and their periods of occupation marked. Despite these studies, several more recent projects have undertaken mathematical analyses of Ptolemy's coordinates, from which new modern equivalents of the *Geography's* toponyms have been proposed; these non-traditional methods need to be examined to ascertain the validity and the reliability of their results.

#### 6.3.1 Statistical and geodesic methods of investigation

The Antiker Atlas des Ptolemaios (Ptolemy's Antique Atlas) project of the Institute of Geodesy and Geoinformation Science at the Technische Universität Berlin (TU Berlin) has recently investigated the coordinates of Ptolemy's *Geography* using 'geodetic-statistical analytical' methods.<sup>60</sup> The project's objectives were certainly ambitious:

With today's information technology (processing power, algorithms and software) computer-based mathematical analyses of historical geographic data are possible [...]. Such analyses can lead to a better understanding of the knowledge and the scientific methods of the past as well as of historical developments in general. Among the innumerable [research] works on the 'Geography' [...] calculational investigations of the Ptolemaic coordinates are rare.<sup>61</sup>

By 'rectifying' the geographical data of Ptolemy's *Geography*, the authors reveal their principal goal: to identify the modern equivalents of Ptolemy's toponyms rather than to conduct an analysis as such of the coordinates.<sup>62</sup> First, the authors propose a model

60 Kleineberg, Marx, and Lelgemann 2012, 11; Marx 2014, 231.

61 Marx 2011, 29.

62 Kleineberg, Marx, and Knobloch 2011, 11; Kleineberg, Marx, and Lelgemann 2012, 11–12.

that describes 'a transformation of the modern into the ancient coordinates of a place.'<sup>63</sup> Their method comprises five stages:<sup>64</sup>

- dividing Ptolemy's localities into 'subsets'. These are groups of localities that show similar kinds of distortions, which are established by visualising the residuals.
- determining so-called 'transformation units' for each subset:

'By modifying Neitzel's [maximum subsampling method], a combinatory search for the best maximally consistent group of places is carried out. The observations  $\Lambda$  and  $\Phi$  of the model [the longitude and latitude of Ptolemy's localities] are meaningfully combined, from which several identifications for each place can be investigated. The consistency of one group of places is tested by means of a one- and two-dimensional individual test to detect the extreme values in the coordinates and the points, as well as by means of an overall test of the model of the hypothesis.'<sup>65</sup>

- investigating the localities that had not been placed in a transformation unit, more precisely searching to combine unplaced localities as appropriately as possible with nearby transformation units.
- grouping the transformation units by using the maximum subsampling method.
- reworking the results, that is, visually investigating the situation and form of the transformation units, and computing the presumed modern coordinates for Ptolemy's toponyms, using the transformation units, to locate unidentified places.

The authors give no concrete examples as to how they apply this multistage procedure, but after correcting Ptolemy's coordinates, they declare that they have found new locations, which will help create an 'antique atlas of the *oikoumenē*'.

63 Marx 2014, 232. The model is as follows:

$$\begin{aligned}\Lambda + v_{\Lambda} &= m_{\lambda} \lambda + \Lambda_0 \\ \Phi + v_{\Phi} &= m_{\phi} \phi + \Phi_0\end{aligned}$$

where  $\Lambda$  and  $\Phi$  are the Ptolemaic longitude and latitude,  $\lambda$  and  $\phi$  are the modern longitude and latitude,  $m_{\lambda}$  and  $m_{\phi}$  are scale parameters,  $v_{\Lambda}$  and  $v_{\Phi}$  are residuals, and  $\Lambda_0$  and  $\Phi_0$  are translations. See also Kleineberg, Marx, and Lelgemann 2012, 16.

64 Kleineberg, Marx, and Lelgemann 2012, 17–18.

65 Kleineberg, Marx, and Lelgemann 2012, 17: 'mittels einer Modifikation der [Methode der maximalen Untergruppe] von Neitzel wird eine kombina-

torische Suche nach besten maximalen konsistenten Ortsgruppen durchgeführt. Dabei werden sinnvolle Kombinationen der Beobachtungen  $\Lambda$  bzw.  $\Phi$  des Modells durchlaufen; je Ort können mehrere Identifizierungen kombinatorisch untersucht werden. Die Konsistenz einer Ortsgruppe wird mittels ein- und zweidimensionaler Einzeltest zur Aufdeckung von Ausreißern in den Koordinaten und Punkten [...] sowie mittels Globaltest der Modellhypothese [...] geprüft.'

The statistical procedure used by the authors is presumably mathematically correct, although it is unlikely that the average historian with a standard mathematical background would be able to understand the method.<sup>66</sup> From the perspective of the historical method, however, a few observations do need to be made. The authors clearly neglected to study Ptolemy's own working methods and sources, making only a series of vague, undiscussed assumptions, many of which are highly questionable.<sup>67</sup> They also failed to mention the implications of Ptolemy's determination of the coordinates in their construction of an adequate investigation; at best, the coordinates are described as being 'inaccurate' and 'unsure,' which caused the group to resort to 'interdisciplinary knowledge' in order to solve problematic identifications.<sup>68</sup>

The three volumes of the so-called 'Atlas der Oikumene'<sup>69</sup> as well as the various articles of the TU Berlin research group<sup>70</sup> show a number of historical inaccuracies as well as some aberrations.<sup>71</sup> The textual basis of their investigation is also problematic. Their database for Book 2 of the *Geography*, for instance, associates each toponym with a longitude and a latitude that are mixtures of the  $\Omega$  and  $\Xi$  recensions, and contains conjectures from Müller's critical edition and from the translations of Nobbe and Stevenson<sup>72</sup> as well as 'alternative propositions on the basis of a supposed copying mistake'<sup>73</sup>

66 Burri 2014 has made a similar comment.

67 Identifying Ptolemy's reference meridian with the meridian that runs through modern-day El Hierro island (part of the Canary Islands) is, e.g., debatable. According to C. Marx 2014, 231: 'If the Ptolemaic positions are not rough, conjectural positions but locality determinations based on accurate data sources (such as military measurements), it can be expected from the Ptolemaic coordinates that they are systematically distorted.' This speculative hypothesis is, however, used as the basis of his analysis. He adds: 'Roman sources were surely available to Ptolemy, which is affirmed by the occurrence of Latin place names [in the *Geography*] and by the high accuracy of the Ptolemaic data [...]' Should one infer from this that 'Greek' sources never described or referred to Latin toponyms? Should Roman sources be regarded *per se* as a guarantee of accuracy? And, more importantly, what is a 'Roman source'?

68 Kleineberg, Marx, and Lelgemann 2012, 11–12.

69 Kleineberg, Marx, and Knobloch 2011; Kleineberg, Marx, and Lelgemann 2012; Marx and Kleineberg 2012. The anachronistic expression *Atlas der Oikumene* is systematically enclosed within inverted commas in all their titles, as if it were the name Ptolemy gave to his maps. G. Papay 2011 has pertinently pointed out that the concept of an atlas in

the modern sense of the word only dates from the sixteenth century.

70 Marx and Neitzel 2007; Marx 2011; Marx 2014, among others.

71 For example: 'In the composition of the catalogue of localities in Book 2, Ptolemy follows the division of the Roman provinces' (Kleineberg, Marx, and Lelgemann 2012, 9); 'Marinus of Tyre was a Phoenician geographer' (Marx and Kleineberg 2012, 1); and 'the specific value of Ptolemy's *Geography* regarding the history of sciences and cultural history is [...] that it contains the totality of antique geographical knowledge' (Kleineberg, Marx, and Lelgemann 2012, 1).

72 By using Stevenson's book, which is not a serious work and was regarded as 'a complete failure' by A. Diller 1935, the authors betray their ignorance of the basic historiography of Ptolemy's *Geography*.

73 Kleineberg, Marx, and Lelgemann 2012, 20. More generally, their list of bibliographical references is amateurish, omitting important works (such as Berggren and A. Jones 2000 and Tierney 1959 for the British Isles, for instance) and quoting other authors whose arguments are outdated. The bibliography related to antique Iberia is particularly poor; the authors also fail to mention the critical editions of the antique sources they used.

As they never explain their choices, one wonders which *Geography* they were, in fact, attempting to 'decipher.' Furthermore, the authors occasionally mix up the locations of antique sites, the names of modern municipalities and the locations of modern urban centres: if one compares their 'modern' coordinates with the actual location of the antique place, one finds, for some well-known archaeological sites, approximations of about 1.5 km (for Lugdunum/Lyon and Forum Segusiavorum/Feurs) or 2 km (for Maritima/Martigues) as the crow flies. Finally, the limitations of the authors' method is clearly illustrated in their location of Acinipo and Arunda, two places in the province of Baetica. These two localities were undoubtedly situated at Ronda la Vieja (Acinipo) and Ronda (Arunda), about 90 km to the south-east of Seville: thanks to the archaeological and epigraphical documentation, and even the toponymic continuity, there has been general agreement on the identification and locations of these places for many years. In the *Geography*, Ptolemy inexplicably places these localities in the north of the province, although he does keep them situated near each other. Understandably, then, when one compares Ptolemy's coordinates of these two places with their modern-day coordinates, there are significant differences. However, Kleineberg, Marx, and Lelgemann 2012 propose that Zafra is the site of Acinipo and Villafranca de los Barros is the site of Arunda, an area that is more than 200 km (as the crow flies) from their actual locations. Although it is at odds with all publications on the topic since the seventeenth century, the authors never justify their results.<sup>74</sup>

An investigation of Ptolemy's coordinates using statistical and geodetic methods could, in principle, form the basis of a relevant, historical approach to studying the *Geography*. However, the disputable epistemological basis and conclusions of the TU Berlin research group show that one cannot undertake a mathematical study of Ptolemy's coordinates without taking into account the fact that the *Geography* is, first and foremost, a historical source. For this reason, the Iberian locations proposed by Kleineberg, Marx, and Lelgemann 2012 have not been included in the process of locating places in the following three chapters.

### 6.3.2 A historical method to identify and locate Ptolemy's Iberian places

The method I have used to identify and locate Ptolemy's toponyms is more traditional, since it is based mainly on historical and archaeological sources, although modern geographical information system applications have also been used. Identifying a toponym involves determining the modern equivalent of the ancient toponym, while locating the toponym refers specifically to obtaining the coordinates of the modern-day locality; in

74 Kleineberg, Marx, and Lelgemann 2012, 72, and the map at the end of the book.

practice, both procedures are interlinked. It is also necessary to classify the toponyms according to the reliability of their modern coordinates.

Scholars have been attempting to identify Ptolemy's toponyms for centuries; some sixteenth-century printed editions of the *Geography* contain modern names of Ptolemy's locations.<sup>75</sup> In his critical edition, K. Müller systematically suggested a modern equivalent and an approximate location for each toponym, otherwise prudently noting *situs incertus* ('uncertain location') or *ignotum oppidum* ('unknown town').<sup>76</sup> Müller's extensive footnotes became the basis of subsequent scholarship throughout the twentieth century. Modern historians of antique Iberia often use Ptolemy's *Geography* to help identify archaeological sites, while specialists of ancient geography concentrate on comparing Ptolemy with other antique literary, archaeological, epigraphical and numismatic sources. This has created a vast historiography from which hypotheses on identification and locations can be debated, with recent publications showing that this question is perpetually evolving.

Despite this long-standing research tradition, the process of precisely identifying the ancient toponyms has been characterised by a certain degree of inertia: it is not uncommon for a once carefully proposed hypothesis to have been supported somewhat neglectfully, accepted by later studies, then quoted from publication to publication, even though the original argumentation was far from indisputable or had even, in the meantime, been falsified. Thus, it is important to focus on the tangible evidence that was presented by those who have suggested identifications, and to reveal, in the case of heated arguments or controversies, the concrete elements of the debate. As choosing one identification over another can sometimes appear to be subjective, it is crucial that the approach is, at the very least, presented openly and transparently.

In order to identify a toponym from the *Geography*, one needs to examine the hypothesis debated in the modern literature by addressing the following questions:

- Are there one or several mentions of this toponym in the antique (geographical as well as historical) literature before and after Ptolemy? How do these sources allow one to identify the toponym?
- How does the archaeological documentation corroborate the existence of the toponym and are there epigraphical and numismatic mentions of the latter?

Checking and making comparisons with the antique sources is, naturally, of primary importance. The following documentation has, therefore, also been investigated:

75 See, e.g., the Latin translation of W. Pirckheimer, edited and printed in Basle, Switzerland, in 1540 by H. Petri. Entitled *Geographia universalis vetus et nova complectens. Claudii Ptolemaei Alexandrini enar-*

*rationis libros VIII*, it gives the names of the modern locations next to Ptolemy's toponyms.

76 Müller 1901.

- the identifications suggested by editors of the *Geography*, in particular Stückelberger and Graßhoff 2006, who used mostly new research, and Müller 1901, who presented a number of lines of argumentation and supplied references on the antique sources.
- the identifications suggested by the *Barrington Atlas of the Greek and Roman World* and the work's bibliographical references. For the most part, the *Atlas* relied on the identifications supplied by the series of the *Tabula Imperii Romani (TIR)* project.<sup>77</sup>
- the specialist publications on the antique geography of the Iberian peninsula, in particular the works of A. Tovar and A. Schulten,<sup>78</sup> but also the articles and monographs of A. Blázquez, A. García y Bellido, H. Galsterer, J. de Alarcão, P. Sillières, P. Moret and D. Martino García, among others.
- the identifications suggested by the editors of antique geographical texts besides the *Geography*, particularly: J. Desanges 2003 and H. Zehnacker 2004 on Pliny; F. Lasserre 2012 and S. Radt 2006 on Strabo; P. Silberman 1988 on Pomponius Mela; K. Müller 1882 and D. Marcotte 2002 on the Minor Greek Geographers.
- the epigraphical and numismatic documentation, which has led to many issues being clarified. A number of publications are now available online: the *Inscriptiones Hispaniae Latinae*, the *Corpus Inscriptionum Latinarum*, the *Corpus Inscriptionum Graecarum* and the *Inscriptiones Graecae* as well as the *Année Épigraphique*.
- the identifications proposed in the *Real-Encyclopädie der classischen Altertumswissenschaft*, which are often of interest, although they are not always up to date.

The modalities used in identifying toponyms will vary according to the type of locality (urban city centre, river, cape, mountain range or administrative limit) and its location (coastal or inland locality). The ideal situation is one in which several types of information can be corroborated: a testimony in antique literature that locates the place with respect to a well-known city or physical feature, together with the presence of a settlement that goes back to the Republican and Imperial periods, plus one or several epigraphical mentions. By contrast, identifying a toponym solely on the basis of, for example, a distance in miles provided by a late itinerary, without any trace of an antique settlement, is clearly disputable. When Ptolemy's writings are the only source, identifying a place can be particularly arduous. Unlike settlements, which can potentially be excavated, identifying physical features requires alternative strategies: topographical descriptions in the texts of Mela and Strabo, for instance, can help one to identify a cape, although the information supplied in the texts of Antiquity is not usually detailed enough to allow one to identify mountains or small, uninhabited islands.

77 TIR Conimbriga 1991; TIR Caesaraugusta 1993; TIR Emerita 1995; TIR Tarraco 1997; TIR Valencia 2002. 78 Tovar 1974; Tovar 1976; Tovar 1989.

In order to obtain the modern-day coordinates of ancient toponyms, it is necessary to locate the places as precisely as possible. Although the maps provided by the *Barrington Atlas of the Greek and Roman World* and the *TIR* are often useful, the scales of the maps (up to 1:1 000 000 in the *TIR*) and their date (they date mainly from the 1990s) do not always allow one to identify locations precisely or to update them.

In many cases, well-documented archaeological sites as well as modern topographical maps are extremely useful for locating modern cities; Spain's Centro de Descargas of the Centro Nacional de Información Geográfica<sup>79</sup> supplies maps up to a scale of 1:25 000 online, while the portal iGEO, which was created by several Portuguese governmental agencies and institutes, provides topographical maps up to a scale of 1:10 000.<sup>80</sup> High-resolution imagery of the whole Iberian peninsula can be viewed from their respective websites. It is also worth scrutinising archaeological documentation: scientific publications as well as the documentation of the Patrimonio histórico de España (each autonomous community being responsible for its own registers) and Portugal's Direção Geral do Património Cultural for classified sites.<sup>81</sup> On the whole, both these organisations give precise details on the locations of archaeological excavations.

Once the modern-day location of the identified toponym has been located on the topographical map, the easiest way of obtaining its geographical coordinates is to use Google Earth's 'placemark' tool, which automatically provides the coordinates of any chosen point on the map. In many cases, ruins or identifiable traces of ancient sites are plainly visible on Google Earth's satellite pictures. Occasionally, when the image resolution is low or when sites cannot be located because of urbanisation, it is worth using the 'overlay' tool: this allows one to overlay the satellite picture with a map of an ancient site that was made by archaeologists, for example, paying attention to the relief and to the scale of the map. This procedure enables one to locate antique sites on the satellite picture more precisely. The geographical coordinates can then be registered in a database.

Locating certain physical features – especially the harbours and mouths of rivers – poses a particular problem. Rivers are usually easy to identify: there are many cases of toponymic continuity<sup>82</sup> and they are – with the exception perhaps of some rivers in the north of the peninsula – well represented in the antique sources. However, because of centuries of changing coastal topography, the locations of the mouths of several rivers have changed, sometimes by an order of magnitude of several dozen kilometres. Three areas in particular have been affected: the estuary of the Guadalquivir with the Doñana

79 Go to <https://www.cnig.es>.

80 See [www.igeo.pt](http://www.igeo.pt).

81 <http://www.patrimoniocultural.pt/en/>

82 For example, the modern Castilian name *río Ebro* is very close to the Greek Ἰβηρ ποταμός or Latin

(*H*)*iberus flumen*, while the Latin toponym *Ana(s) flumen* was extended during the Arabic period to *wādi Ana* (*wādi* is the Arabic word for 'river'), which over time became the Spanish *río Guadiana*.

marshland, the Bay of Cádiz and the delta of the Ebro River. These areas have all been thoroughly studied, and geoarchaeological investigations (with the help of geomorphological and lithostratigraphic analyses) have been able to trace the history of these coastal changes over a long period.

The current, distinctive delta of the Ebro River only started to appear from the Middle Ages onwards; during Antiquity it is possible that the sea reached as far as the vicinity of Dertosa (Fig. 28 and Fig. 29). The estuary of the Baetis River (río Guadalquivir) and the region around the island of Gades (Cádiz) formed a more complex topographical area. It would seem that, during the period of the Roman Republic, the Guadalquivir flowed into a vast gulf (that was partly covered by marshland), which reached quite far inland, possibly almost as far as the city of Hispalis (Seville). The descriptions of Mela and Strabo allude to this particular coastal topography.<sup>83</sup> Over time, this inner lagoon became filled with sediment, changing the morphology of the Guadalquivir, so that today it flows into the Atlantic Ocean about 60 km away from the antique locations of the river mouths (Fig. 30 and Fig. 31). Likewise, in Antiquity deep inlets and estuaries characterised the land opposite Gades; now the locations of certain marshes, drylands and the courses of the coastal rivers have changed. Thus, the sites of some of the antique harbours – such as the local Port of Menestheus, mentioned by Strabo, Ptolemy and referred to in the *P. Artemid.*<sup>84</sup> – do not correspond to the coastline today.<sup>85</sup>

Obtaining the precise locations of certain ancient coastal places and features, such as the mouths of rivers, estuaries and harbours, can often be problematic. Likewise, locating intermediate points along rivers, their sources, the extremities or 'the middle' of mountain ranges and archipelagos – as they appear in the nomenclature of Ptolemy's catalogue – as well as the administrative boundaries cannot, in many cases, be accurately determined.

The scope of reliability of identifying and locating places varies widely. In order to create a user-friendly database, Ptolemy's toponyms have been organised into four categories according to the dependability of the modern location. The criteria and data classification were inspired by the study on the *Stadiasmós of Patara* undertaken by the research group led by G. Graßhoff and F. Mittenhuber at the University of Bern, Switzerland.<sup>86</sup> As different procedures are used to identify and locate places, the identification and location of a place will not necessarily be equally certain. In practice, however, such cases are rare, and an uncertain identification usually implies that the location is

83 Mela 3.5; Str. 3.1.9.

84 Str. 3.1.9; *Geogr.* 2.4.5; *P. Artemid.* V 27.

85 See the geoarchaeological studies of F. Ruiz, Rodríguez-Ramírez, et al. 2004, F. Ruiz, Pozo, et al. 2010, Rodríguez-Vidal et al. 2011 and of Rodríguez-Ramírez and Yáñez-Camacho 2008 for the morpho-

logical evolution of the lower Guadalquivir area; see Peinado Cifuentes and Bermúdez García 2004 and Arteaga and Schultz 2008, in particular the contribution of Bernal Casasola 2008, for a study on the Bay of Cádiz.

86 Graßhoff and Mittenhuber 2009, 89–121.



Fig. 28 Possible morphology of the mouth of the Ebro River in the second century CE.



Fig. 29 Schematic, modern-day topography of the Ebro delta.



Fig. 30 Possible coastal morphology near Gades and the estuary of the Baetis during the Roman Republic.



Fig. 31 Schematic, modern-day topography of the low Guadalquivir area and the Bay of Cádiz.

also uncertain. Therefore, the following categories include both the identification and location evaluations in order to make it clear which of the modern coordinates available in the database are solid and which should be used with caution. The reliability score (from 1 to 4) makes the data easy to find and retrieve.

1. *The identification and location are certain.* The place name is well known, as it appears frequently in textual sources that predate and post-date Ptolemy's *Geography*; the place name's linguistic continuity is onomastically well documented. The epigraphical and archaeological documentation is solid and has contributed to its identification, while publications give enough precise information on the location of the ancient site. Satellite pictures at a high-enough resolution allow the site to be recognised and/or located. In the case of an urban centre, the modern coordinates of the antique forum have, where possible, been chosen.
2. *The identification and location are well supported.* The place name is documented and the identification is well supported, but the epigraphical and archaeological documentation is not decisive. This category thus concerns places for which there is still an element of doubt in spite of a consensual *communis opinio*. It includes physical features that cannot be indubitably located, for instance because of some uncertainty about the antique topography: the mouths of rivers, capes, ancient harbours, and so on. Antique urban sites that lack a precise location are also included in this category.
3. *The identification and location are plausible but uncertain.* This category collates a number of different kinds of cases: identifications based on thin evidence (a similarity between names, for example) but without solid archaeological evidence and a poorly supported location; an unidentified but precisely located archaeological site that could correspond to an ancient toponym for which a decisive identifying element is missing; a well-identified physical feature whose location is doubtful because of important changes that have occurred, over time, in the topography.
4. *The identification and location are undecided.* When the literary, archaeological and epigraphical evidence is almost non-existent or highly questionable, the identification and location of an ancient toponym are generally regarded as speculative and cannot be justified. As a consequence, modern coordinates for these places have not been transferred to the database and so no comparisons have been made.



## 7 The main coastal distortions explained

### 7.1 Iberia's Mediterranean coast

#### 7.1.1 Characteristics of the distortions in the $\Xi$ recension

The Mediterranean coast of the Iberian peninsula, running from the Pillars of Hercules in the south to the Temple of Venus, at the south-eastern end of the Pyrenees in the north, shows a distortion in its longitude in the  $\Xi$  recension (Fig. 32). The coast's shift in longitude is uneven: between Calpē and the vicinity of Carthago Nova (modern-day Cartagena) the locations of places have been shifted slightly eastwards; localities from Carthago Nova to the city of Emporion (Empúries) show an approximately  $2^{\circ}30'$  shift in longitude; and, finally, a smaller group of places from Emporion to the Pyrenees has undergone a progressively increasing longitudinal shift, which amounts to roughly  $4^{\circ}$  at the Temple of Venus and which has caused a clockwise rotation of about  $90^{\circ}$ . These successive distortions in longitude have resulted in the coast being stretched eastwards, thereby increasing both its longitude and its length.

There are also visible differences in latitude between Ptolemy's coordinates and their respective modern locations, although they are much smaller than the differences in longitude. Two sections are particularly distinct: from Calpē to the city of Alōnai one can detect a small, regular shift northwards, while there is almost no distortion in latitude in the section of coast between the mouth of the Ebro River and the Pyrenees. The places in-between, including the Balearic and the Pityusic Islands, have been shifted slightly northwards and southwards. Four groups of places that share a common type of distortion can, therefore, be identified. They are the localities between: Calpē and Alōnai; Alōnai and the mouth of the Ebro River; the mouth of the Ebro River and Emporion; and Emporion and the Pyrenees. The islands form an additional group.

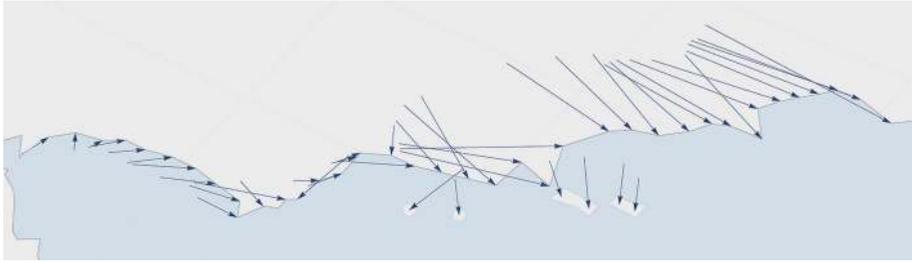


Fig. 32 The Mediterranean coast of Iberia: A comparison between the modern-day coordinates and Ptolemy's coordinates, taken from the Ξ recension and using Ptolemy's second map projection.

Locality	Pliny the Elder				Ptolemy	
	Longest day	(Latitude)	Gnomon : shadow	(Latitude)	Latitude	Longest day
Carteia	14 $\frac{1}{2}$ $\frac{1}{30}$ h	(36°20')	100 : 74	(36°30')	36°10'	
Carthago Nova	14 $\frac{2}{3}$ h	(37°43')	21 : 16	(37°20')	37°55'	14 $\frac{2}{3}$ h
Tarraco	15 $\frac{1}{5}$ h	(41°51')	9 : 8	(41°40')	40°40'	< 15 h
	15 $\frac{1}{9}$ h	(42°36')				
Pyrenaeum	15 $\frac{3}{5}$ h	(45°45')	35 : 36	(45°50')	42°20'	

Tab. 7 Latitudes of Carteia, Carthago Nova, Tarraco and the Pyrenees according Ptolemy and Pliny the Elder (*Hist. nat.* 6.215–217). Ptolemy's latitudes are taken from his catalogue of localities (*Geogr.* 2.6–10), while the lengths of the longest days come from Book 8 of the *Geography* (*Geogr.* 8.4–5).

### 7.1.2 The Mediterranean coast of Iberia in the antique sources

The Mediterranean coast of Iberia is by far the best documented coastal area of the entire peninsula (Fig. 33). In spite of the variety of geographical information that was available, the ancient sources of Antiquity exhibit a recurring pattern in their descriptive approach: the coast was generally divided into the same few sections, which were not defined by topographical characteristics but by the same principal localities along the coast, on which the information in the ancient texts was mostly focused.



Fig. 33 The principal localities along the Mediterranean coast of Iberia in the second century CE, from the eastern entrance to the Strait of Hercules in the south to the Pyrenees in the north.

#### *Longitude and latitude of western Mediterranean localities*

Pliny the Elder's list of *circuli*<sup>1</sup> contains information about the latitudes of Massalia (Marseilles) and Narbo (Narbonne) in Gallia Narbonensis as well as places in Iberia.<sup>2</sup> In particular, Pliny mentions Carthago Nova and Tarraco, which Ptolemy also includes in his list of 'important cities'.<sup>3</sup> However, the latitudes given by Pliny for these locations do not exactly match the latitudes given in the catalogue of Ptolemy's *Geography* (Table 7). Strabo has provided us with invaluable information on Hipparchus' system of parallel circles for the western Mediterranean area. Hipparchus had estimated that Byzantium and Massalia lay on the same parallel circle.<sup>4</sup> According to Strabo, this belief was based on Pytheas' measurement of the ratio of a gnomon to its shadow, taken at Massalia at the summer solstice;<sup>5</sup> Strabo claims that Hipparchus believed that the ratio was, at the

1 See p. 191.

2 Pl. 6.215–217.

3 *Geogr.* 8.4.5.

4 Str. 1.4.4, 2.1.12, 2.4.3 and 2.5.8

5 Str. 1.4.4, cf. Str. 2.1.12 and 2.5.8.

same time of the year, the same as for Byzantium<sup>6</sup> – hence his conclusion that both cities lay on the same parallel. The ratio corresponds to a latitude of *c.* 43°.<sup>7</sup> Moreover, Strabo assumes that the longest day of the year in Byzantium has a duration of 15  $\frac{1}{4}$  hours, which can also be traced back to Hipparchus.<sup>8</sup> In Ptolemy's *Almagest*, Massalia – not Byzantium – is cited as the geographical reference point for the 14th main parallel, and it is given the Hipparchian duration of the longest day (15  $\frac{1}{4}$  h).<sup>9</sup> In Ptolemy's works – in the catalogue of localities<sup>10</sup> as well as in Book 8 of the *Geography*<sup>11</sup> and in the *Handy Tables*<sup>12</sup> – Massalia lies exactly on this parallel. The antique sources contain very little information concerning relative longitude. Ptolemy refutes Marinus of Tyre's statement that Tarraco lies opposite Iōl Caesarea, that is, that they both lie on the same meridian.<sup>13</sup> Likewise, Strabo contradicts Timosthenes, who wrote that Massalia lay directly opposite Metagonion in north-west Libyē.<sup>14</sup> Pliny's information that Malaga faces the city of Siga in Mauretania can also be understood to mean that the two cities have roughly the same longitude.<sup>15</sup>

#### *General configuration of the western Mediterranean area*

Polybius was the first author to give a coherent overall schema of the western Mediterranean coastlines of Europe, correlated with distance data and the parallel through the Pillars of Hercules and the Strait of Sicily (that is, the parallel through Rhodes). According to Strabo, Polybius used a triangle, formed by the points made by the Pillars of Hercules, Narbo and the Strait of Sicily, to schematise the shape of the western Mediterranean Basin:

[Polybius says that] the coast is much like an obtuse angle (ἀμβλεία γωνία), whose sides run respectively to the Strait [of Sicily, i.e. near Messina] and to the Pillars, and with Narbo as vertex (κορυφήν); hence a triangle (τρίγωνον) is formed with a base (βάσις) that runs straight through the open sea and with

6 According to Strabo (2.5.41), who transmits Hipparchus' value, the said ratio was  $41 \frac{4}{5} : 120$ . Hipparchus must have known of Pytheas' report through the work of Eratosthenes.  
7 Strabo does not give a latitude for Byzantium and Massalia in his work. Nonetheless, he reports that the parallel through Byzantium and Massalia lies 4 900 stadia to the north of the parallel through Rhodes (Str. 2.5.8 and 2.5.41 or 2.4.3: 'c. 5 000 stadia'). Hipparchus gives Rhodes a latitude of *c.* 36° (Arat. 1.11.7: περὶ μοίρας λς). Furthermore, in both Eratosthenes' and Hipparchus' works, 1° of latitude equals 700 stadia (Str. 2.5.3), which leads us once again to the value of *c.* 43° for Massalia and Byzantium.

8 Rinner 2013, 202.

9 *Alm.* 2.6.14.

10 *Geogr.* 2.10.8: the latitude of Massalia is 43°5'.

11 *Geogr.* 8.5.7: the longest day in Massalia is 15  $\frac{1}{4}$  h.

12 'Table of Noteworthy Cities' 3.4: the latitude of Massalia is 43°5'.

13 *Geogr.* 1.15.2: '[Marinus] says that Tarraco is opposite (ἀντικείμεθα) Iōl Caesarea, although he draws the meridian through [Iōl Caesarea] also through the Pyrenees, which are more than a little to the east of Tarraco.'

14 Str. 17.3.6.

15 Pl. 5.18: 'The oppidum of Siga [is] opposite (*ex aduerso*) Malaca in Hispania.'

sides (πλευρὰς) that form the said angle, of which sides the one from the Strait [of Sicily] to Narbo measures more than 11 200 stadia, the other a little less than 8 000 stadia.<sup>16</sup>

In his *Geography*, Strabo discusses the relevance of Polybius' distances and how they contradict Hipparchus' system of parallels. Relying more on the accounts of navigators than on Hipparchus' parallels, Strabo obtains a configuration of the western Mediterranean area that does not, however, differ that radically from Polybius' triangle.<sup>17</sup> Strabo's coastline of Iberia is shorter than that of Polybius; thus the angle formed by the parallel through Rhodes and the Iberian side should be greater than in Polybius' configuration, while the coastline should have a south-west–north-east orientation (rather than a west-south-west–east-north-east orientation).<sup>18</sup> The height of the triangle on Ptolemy's map is greater (3 500 stadia) than the estimations of Polybius and Strabo (2 000 and 2 500 stadia, respectively),<sup>19</sup> while the angle formed by the Iberian coast and the parallel through Rhodes is greater than that of his predecessors. Nevertheless, Ptolemy's map does resemble their configurations in two respects: in all three descriptions the eastern coast of the Iberian peninsula is positioned between the parallels through Rhodes and Massalia, and it runs in a south-west–north-east direction.

#### *Paraploi and distance data sets in the antique sources*

Three sets of medium distances, which cover the whole coast from the Strait of Hercules up to the Pyrenees, sometimes even as far as Massalia, have been passed down to us. The distances given by Polybius and Strabo and found in the *P. Artemid.* for the Iberian coast (Table 8 and Appendix H) are not distributed throughout the respective texts but constitute three specific sets of data, which the authors clearly regarded as coherent. Polybius' list appears as a geographical digression<sup>20</sup> in the middle of an account of Hannibal's expedition from Iberia to Italy.<sup>21</sup> The passage aims to give the reader a clear picture of the geographical area covered by Hannibal.<sup>22</sup> Strabo's list lies in the introduction to

16 Str. 2.4.2.

17 In his discussion of Polybius' triangle, Strabo rejects Hipparchus' statement that Byzantium and Massalia have the same latitude (Str. 2.5.8). However, in several other passages, he seems to have agreed with Hipparchus' description (Str. 2.1.12, 2.4.3 and 2.5.40). See Moret 2013, 73–74. Strabo seems not to have noticed this aporia, which has led to much confusion among scholars.

18 Str. 2.5.8.

19 Str. 2.4.2.

20 Polybius, *Hist.* 3.36–39.

21 Polybius, *Hist.* 3.35 and 3.40–56.

22 Polybius, *Hist.* 3. 36: 'That my narrative may not be altogether obscure to readers owing to their ignorance of the topography I must explain whence Hannibal started, what countries he traversed, and into what part of Italy he descended. Nor must I simply give the names of countries, rivers, and cities, as some authors do under the idea that this is amply sufficient for a clear knowledge.'

Route	Polybius	Strabo	<i>P. Artemid.</i>	
Pillars to Carthago Nova	3 000	2 200	2 020	
Carthago Nova to Ebro River	2 600	2 200	[2 288]	Tab. 8 The <i>paraploi</i> from the Pillars of Hercules to the Pyrenees described by Polybius ( <i>Hist.</i> 3.39), Strabo ( <i>Geogr.</i> 3.4.1) and in the <i>P. Artemid.</i> (V 16–25). Distances in stadia. See Appendix H.
Ebro River to Emporion	1 600		[1 600]	
Emporion to Pyrenees	⟨600⟩	1 600	⟨632⟩	
Pillars to Pyrenees	c. 8 000	6 000	[6 540]	

Route	Distances in stadia	Equivalence in miles
Cape of Pyrenean Aphrodite to Emporion	⟨632⟩	79
Emporion to Tarraco	1 508	200
Tarraco to Ebro River	92	
Ebro River to Sucro River	1 048	131
Sucro River to Carthago Nova	1 240	155
Carthago Nova to Calpê	2 020	252.5
Calpê to Gades	544	68
Cape of Pyrenean Aphrodite to Gades	7 084	885.5

Tab. 9 The distance data between the Cape of Pyrenean Aphrodite to Gades, given in the *P. Artemid.* V 16–26. Source for the conversion into miles: Moret 2013, 67.

the chapter dedicated to the Mediterranean side of the peninsula in Book 3, before his description of ‘the seaboard of Our Sea from the Pillars to the Pyrenees Mountains.’<sup>23</sup>

In Polybius’ and Strabo’s texts, the Pillars of Hercules and the Pyrenees are used as the two main reference points in arranging the entire coastline, while the map of the *P. Artemid.* goes westwards as far as Gades (modern Cádiz). The estimations of the total distance range from 6 000 to 8 000 stadia and agree with other ancient sources.<sup>24</sup> Polybius, Strabo and the *P. Artemid.* also use the same reference points, that is, Carthago Nova and the mouth of the Ebro River, for intermediate distances. Strabo refers to Emporion only later in his detailed description but again includes an estimation of the

23 Str. 3.4.1–20.

24 The values of Eratosthenes (Str. 2.4.4: 6 000 stadia), given by Ps.-Scylax (‘*paraplois* of Iberia, 7 days and

7 nights’) as well as in the *Div. orb. terr.* 3 (900 miles, so c. 7 200 stadia) have the same order of magnitude.

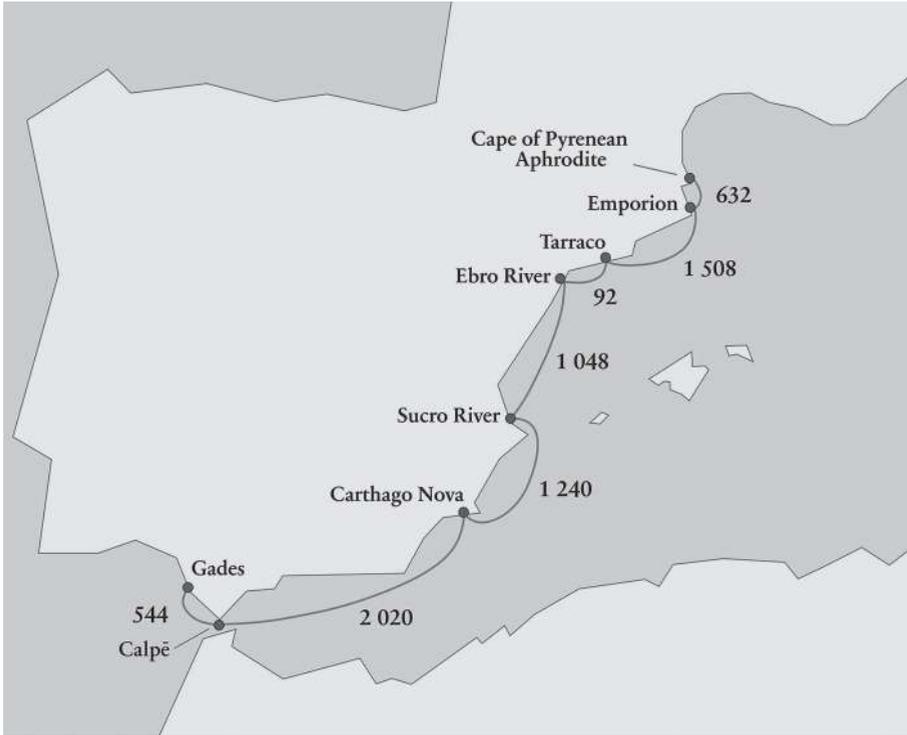


Fig. 34 The different stages – from the Cape of Pyrenean Aphrodite to Gades – of the *paraplous* described in the *P. Artemid.* (distances given in stadia).

distance between the city and the Pyrenees.<sup>25</sup> The *P. Artemid.* has a more detailed list than the works of Polybius and Strabo, for it contains mentions of the Sucro River and the city of Tarraco (Table 9 and Fig. 34). Some of the distances in the three lists are very similar. They are also almost always multiples of eight, which could indicate that the data were converted from Roman miles to stadia.<sup>26</sup> In spite of Strabo's mention of the trophy of Pompey to situate the Pyrenees,<sup>27</sup> P. Arnaud has demonstrated that the distances given by Strabo and Polybius (which are congruent with the testimonies of Eratosthenes and Ps.-Scylax) can be traced back to a coasting trade practice of several days' duration.<sup>28</sup> The distances are, however, different enough for us to assume that

25 Str. 3.4.8. See AppendixH, note *d.*

26 This does not imply, however, that these distances necessarily come from Roman roads or terrestrial itineraries.

27 Str. 3.4.1. The trophy of Pompey was located at the Col de Panissars, near Le Perthus, which is quite far from the shore.

28 Arnaud 2005, 167: 'In spite of their divergences, our sources reveal the existence of a coasting trade practice of several days' duration along the Spanish coast [...]' ('En dépit de leurs divergences, nos sources témoignent bien de l'existence, le long des

they come from different sources and/or that they originate from a common value (for the whole journey from the Pillars to the Pyrenees) that was then divided in different ways. Two different but coherent sets of data exist for the journey between Iberia and Massalia. According to Strabo, Eratosthenes estimated that the distance between the Pyrenees and Massalia was 1 000 stadia,<sup>29</sup> that is, about a nychthemeron (a period of twenty-four hours) by sea. Ps.-Scylax states that a sea journey of two days and one night was needed to travel from Emporion to the Rhône.<sup>30</sup> Thus, there seems to be consensus on the distance of 1 000 stadia, which Strabo also considers acceptable, between the Pyrenees and Massalia.

The emergence of recurring reference points – Carthago Nova, the Ebro River and the city of Tarraco, Emporion and the Pyrenees – can be correlated with the development of maritime routes along this coast. With its roots in Greek and Punic infrastructures, the harbour network along the Mediterranean coast of Iberia remained particularly strong and dynamic throughout the Roman Republic and Principate periods. Maritime trade in the area was organised and concentrated on a small number of major hubs, which were relieved by secondary coastal localities. Ancient textual sources, as well as archaeological evidence, attest to the importance of maritime traffic.<sup>31</sup> Emporion, together with its Hellenistic harbour, was the first anchorage point for the Romans.<sup>32</sup> Tarraco – *Scipionum opus* – connected the littoral with a vast hinterland (the Ebro plain) and became the main city of maritime Tarraconensis in the early Principate period, largely thanks to its wine trade. Carthago Nova, of course, remained the great harbour and *emporion* of the peninsula.<sup>33</sup> Sources not only attest to maritime routes that started from Carthago Nova and went along the Iberian coast but also to routes that travelled directly to Italy by sailing through the Strait of Bonifacio (between Corsica and Sardinia)<sup>34</sup> as well as southwards to the Libyan shore.<sup>35</sup> The importance of Carthago Nova in geographical texts is also related to its particular and very early role as a reference point on the boundary between the two provinces – Hispania Citerior and Hispania Ulterior – of Iberia.<sup>36</sup>

côtes espagnoles, d'une pratique de cabotage pluri-journalier [...].

29 Str. 2.4.4.

30 Ps.-Scylax 3. The value cited in Ps.-Scylax's text (two days and one night) can be broken down as follows: a journey of one day (c. 600 stadia) from Emporion to the Temple of Venus and one nychthemeron (c. 1 000 stadia) from the Temple of Venus to the Rhône. The latter figure is a good approximation of Eratosthenes' evaluation of the journey between the Pyrenees and Massalia (1 000 stadia). P. Arnaud has interpreted this differently, however. He understands Eratosthenes' distance to be a direct route

by sea through the Gulf of Lion (which he convincingly demonstrates) and Ps.-Scylax's larger value to correspond to a coastal shipping journey. This interpretation seems to have overlooked the distance between Emporion and the Pyrenees. See Arnaud 2005, 166.

31 Rico 2009.

32 Le Roux 2010, 184.

33 Ramallo Asensio and E. Ruiz 2008; Rico 2009, 32–34.

34 Boetto 2012.

35 Arnaud 2005, 159–160.

36 Cadiou and Moret 2012, 27; Moret 2013, 51.

*Descriptive geography of the coast*

The sets of distance data that divide the Iberian coast into several sections, punctuated by reference points, are common to all the sources. The structure of Strabo's textual descriptions resembles that of Pomponius Mela. Although Mela's text does not provide any distance data, it features the same principal localities of the Pyrenean promontory, that is, Tarraco and the Ebro River as well as Carthago Nova, the last interesting locality before one reaches the Pillars and the Strait of Hercules:

[2.89] If, however, you coast along the shore [of Hispania], right after Cervaria comes the cliff that thrusts the Pyrenees out into the sea [...];

[2.90] From there until Tarraco (*inde ad Tarraconem*), there are the small towns of Blande, Iluro, [...]. Tarraco is the city of these shores that is the wealthiest in maritime resources. The small Tulcis river runs beside it, and on the farther side, the mighty Ebro runs beside Dertosa.

[2.91] From there (*inde*) the sea winds its way into the land, and as soon as it is let in with a great sweep, it is divided into two bays by the promontory they call Ferraria.

[2.92] The first is called the Bay of Sucro. It is the larger one and admits the sea with quite a large mouth [...]. [2.93] Then, the Bay of Ilici holds Allone, Lucentia and Ilici, whence its name. Here now the land goes farther into the sea and makes Hispania broader than it has been [...].

[2.94] But from (*verum ab*) the places mentioned in this vicinity to the starting point of Baetica, nothing needs to be reported except Carthago, which the Carthaginian general Hasdrubal founded. On Baetica's coast there are obscure towns, of which mention is only relevant for [placing localities in their] proper sequence. [...]

[2.95] Then (*deinde*) the sea becomes very narrow, and mountains constitute the closest shores between Europe and Africa. The Pillars of Hercules, as we said at the beginning, Abila and Calpē, each jut into the sea.<sup>37</sup>

Thus, in Mela's description, the Pyrenees, the Ebro River and Calpē correspond to major inflection points in the coastal topography of the whole peninsula. The importance of noteworthy cities such as Tarraco ('*urbs maritimarum opulentissimam*') and Carthago Nova, as well as Saguntum and Valentia ('*urbes notissimas*'), is contrasted with several sets of insignificant towns ('*parua oppida*', '*ignobilia oppida*'). Likewise, the Ebro River ('*ingens*

37 Mela 2.89–95.

*Hiberus*') is contrasted with numerous secondary watercourses ('*parua flumina*', '*modicus amnis*', '*non magna flumina*').

Strabo's description follows a similar pattern. At first, he individualises the coast as a coherent geographical unit, giving it an appropriate introduction (in which he provides the distance data set mentioned earlier; see Table 8) and conclusion.<sup>38</sup> In his introduction, Strabo defines several coastal sections, which he also uses to organise his detailed description. First, he describes Calpē and the coast eastwards (with some ethnological and historical digressions),<sup>39</sup> and then he turns his focus to Carthago Nova, 'by far the most powerful of all cities in this country.'<sup>40</sup> Subsequently, he splits up the rest of the coast into two sections, each with its own short introduction. The first section covers Carthago Nova to the Ebro River, which is subdivided into two parts by the Sucro River:

[3.4.6] On the coast from Carthago Nova up to the Ebro, about midway between these two points, are the Sucro river and its mouth, and a city with the same name. [...The river] can be waded, runs about parallel to the Ebro, and is slightly less distant from Carthago Nova than from the Ebro. Now between the Sucro river and Carthago, not far from the river, there are three small Masaliote cities. [...] And again, on the other side of the Sucro, going towards the mouth of the Ebro, is Saguntum, founded by Zacynthians; [...] and at the very crossing of the Ebro is the settlement of Dertossa. The course of the Ebro, which rises in Cantabria, is southwards through a great plain and parallel to the Pyrenees Mountains.

Note that Strabo reinforces his organisation of the coastal configuration by using the Pyrenean range and the Ebro River, which he regards as being two parallel lines, in his description of the hinterland. Strabo's next section runs from the Ebro to the Pyrenees. Tarraco and Emporion are the two most important places along this stretch of coast:

[3.4.7–8] Between where the Ebro turns out seaward and the heights of the Pyrenees, on which are situated the Trophies set up by Pompey, the first city is Tarraco. It has no harbour, indeed, but it is situated on a bay and is adequately supplied with all other advantages; and today it is not less populous

38 Str. 3.4.1: 'There remains of Iberia the seaboard of Our Sea from the Pillars to the Pyrenees Mountains'; Str. 3.4.10: 'Such is the character of the whole seaboard from the Pillars up to the common boundary of Iberia and Celtica.'

39 Str. 3.4.2–5.

40 Str. 3.4.6: 'Carthago Nova is by far the most powerful of all the cities in this country, for it is adorned

by secure fortifications, by walls handsomely built, by harbours, by a lake, and by the silver mines of which I have spoken. And here, as well as at the nearby places, the fish-salting industry is large. Furthermore, Carthago Nova is a rather important emporium, not only of the imports from the sea for the inhabitants of the interior, but also of the exports from the interior for all the outside world.'

than Carthago Nova. Indeed, it is naturally suited for the residence of the prefects, and is a metropolis, as it were, not only of the country this side of the Ebro, but also of the greater part of the country beyond the Ebro. [...]

Further, the whole coastline from the Pillars to [Tarraco] has few harbours, but from Tarraco on, all the way to Emporion, the coasts have fine harbours [...]. Emporion is a Massaliote foundation; it is about (...) stadia<sup>41</sup> distant from the Pyrenees and from the common boundary between Iberia and Celtica, and this coast too, all of it, is fertile and has good harbours.

Moreover, this geographical schema is in complete agreement with the historical accounts of one of the most momentous episodes in Roman history, namely the journey of the Carthaginian general, Hannibal, from the Punic-held territories of Iberia to Italy. The link is especially visible in Polybius' text, since Polybius used the description of the expedition as a pretext for making a geographical digression, giving his set of distances for the Iberian part of the expedition (Table 8). The *imitatio Herculis* is an important literary motif in Livy's narrative, where Hannibal and his journey are likened to Hercules' odyssey; each Iberian landmark of Hannibal's journey is symbolic and structures Livy's text.<sup>42</sup> Within this framework, the Pillars of Hercules, the city of Carthago Nova with its evocative name (which is where Hannibal's army spent the winter before starting out on its journey),<sup>43</sup> the mouth of the Ebro River (the crossing of which was the symbolic beginning of the expedition)<sup>44</sup> as well as the Pyrenees (the site of the army's first logistical feat)<sup>45</sup> are the great reference points of this episode in Roman history.

### 7.1.3 The main distortions in the $\Xi$ recension explained

#### *Utilisation of a general frame*

A striking feature of Ptolemy's map is the absence of any significant distortions in latitude for the whole eastern coast of Iberia (Fig. 35b). The main localities in Gallia Narbonensis share the same characteristic. It is possible that Ptolemy used a frame composed of two parallels, which he took from Hipparchus' system, and in which he included the coast of Iberia. Hipparchus believed that Massalia lay on the parallel where the longest day is  $15 \frac{1}{4}$  h, and Ptolemy placed the city on the same parallel. The actual latitude

41 See Appendix H, note *d*.

42 See Fabrizi 2015 and its comprehensive analysis of Livy's narrative; also Briquel 2004, 32.

43 Livy, 21.22.

44 According to Livy (21.22), Hannibal's dream occurred at the mouth of the Ebro (*ad Hiberum maritimam ora*); Polybius depicts the crossing of the Ebro as a declaration of war (Polybius, *Hist.* 3.6.2,

3.15.3; 3.30.2, 3.40.2, etc.; cf. Livy, 21.30; Appian, *lb.* 10.39): the news supposedly spread panic throughout the population of Rome. See also Cadiou and Moret 2012, 22.

45 Hannibal and his army did not sail around the promontory near the Temple of Venus but they did march through a neighbouring Pyrenean pass.

of the old port of Marseille is  $43^{\circ}18'$ , which is remarkably close to the estimation of Antiquity ( $43^{\circ}5'$  in Ptolemy's catalogue). Furthermore, Strabo, who followed a tradition initiated by Dicaearchus and continued by Eratosthenes, believed that the parallel through Rhodes also went through the Strait of Hercules,<sup>46</sup> which is the southernmost tip of the Iberian peninsula's Mediterranean coast. Hipparchus recorded that the parallel corresponded to a latitude of  $36^{\circ}$  or to a longest day of  $14\frac{1}{2}$  h. In fact, the  $36^{\circ}$  parallel runs through the Strait of Gibraltar, immediately below Punta de Tarifa, and matches the measurements of Antiquity perfectly. Moreover, the so-called triangle of Polybius, which Strabo discusses, gives a schematic orientation of Iberia's Mediterranean coast, making it run in a south-west to north-east direction. Ptolemy's map also corresponds to this configuration. The use of only this small number of geographical elements could explain why there are no important differences between Ptolemy's latitudes for the localities concerned and the actual locations. Some of the information can be found in the work of Hipparchus, whose list of parallel circles is one of the few explicit sources quoted by Ptolemy,<sup>47</sup> as well as in the geographical work of Eratosthenes, which Ptolemy might have known of through Hipparchus' work.

*Division of the coast according to the main periplographical landmarks*

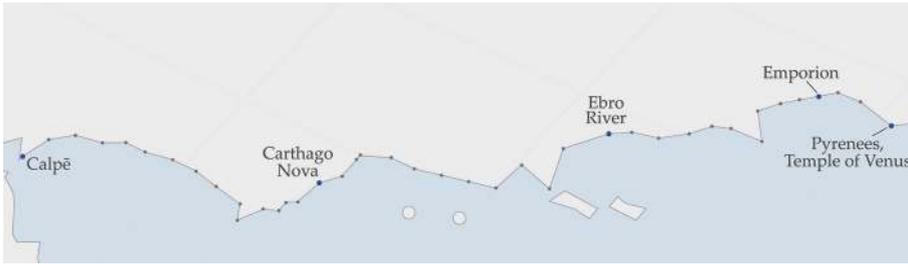
Four groups of distortions can be detected among the localities of Ptolemy's Mediterranean coast of Iberia. The boundaries of these groups are located at: Calpē (the Iberian Pillar of Hercules), Alōnai (near Carthago Nova), the mouth of the Ebro River, Emporion and the Temple of Venus (at the eastern end of the Pyrenees), Fig. 35b. Little has come down to us about the city of Alōnai from the antique sources; it is mentioned only by Mela and in a few later texts.<sup>48</sup> However, on Ptolemy's map, the city of Carthago Nova is located nearby and shows the same kind of distortion. So although Carthago Nova is not situated exactly on the border of the Alōnai group of distortions, it can, nevertheless, be taken as its reference point.

In the distance data as well as in the textual descriptions, the groups of displacement vectors correspond to the recurring structural pattern that characterises the geographical sources. That is to say, Iberia's Mediterranean coast was divided into four sections that focused on a handful of principal localities: Calpē, Carthago Nova, the Ebro River,

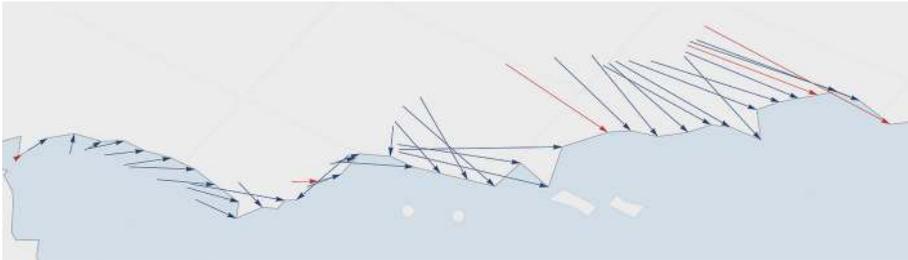
46 Str. 2.1.1.1.

47 *Geogr.* 1.4.2. and 1.7.4. As E. Rinner 2013, 192, points out, Ptolemy's references to Hipparchus in the *Geography* are not explicitly linked with Marinus' work, which may be an indication that it was not only thanks to Marinus that Ptolemy was aware of Hipparchus' work.

48 *Geogr.* 2.6.14; Mela 2.93; *Rav.* 304.16. Stephanus of Byzantium (*Ethn. s.v.*) states: 'Alōnis (Ἀλωνίς), island and city of Massalia, as Artemidorus [wrote]: The toponym mentioned by Stephanus and attributed to Artemidorus may not, however, refer to the place name that Mela and Ptolemy call Alōnai. See: De Wever 1966, 79; Privitera 2007, 49; and the thorough study of P. Moret 2000.



a Main localities.



b Initial distortions.



c Residual distortions.

Fig. 35 The division of the coastline into four sections (carried out on a map using Ptolemy's second projection) may explain the main distortions along Iberia's Mediterranean coast ( $\Xi$  recession).

and Emporion and the Temple of Venus. The specific variations in the distortions could be the result of a mapping process in which the coastline, delimited by these reference points, was subdivided into several sections. When the Iberian coast is positioned so that the modern coordinates of Carthago Nova, the mouth of the Ebro River, Emporion and the Temple of Venus coincide with their respective coordinates in the *Geography*, each group displays similar distortions to those on Ptolemy's map (Fig. 35c). For the localities between Calpē and Carthago Nova, the shift to the north-east is slightly smaller

than in the initial distortion, which was already very small. The shift in longitude between Carthago and the Ebro River is also considerably smaller. The remaining shifts in longitude differ from place to place: some places have been shifted a little eastwards (for example, Portus Illicitanus), others westwards (the mouth of the Saetabis River) and some not at all (the mouth of the Sucro River). The localities of this group also show differing distortions in latitude. As for the rest of the coast up as far as the Pyrenees, the shift in longitude has been eliminated, except for a very local set of places (Tarraco, Subur and Barcino), which has been moved slightly towards the north-east. In addition, there is no longer a clockwise rotation of the coast between Emporion and the Temple of Venus.

*Mapping the coast's principal localities*

Constructing the coastline by referring to the locations of only a small number of reference places, which are frequently mentioned in the antique sources, could account for the main distortions in longitude and latitude that are to be found along the entire coast. As seen earlier, much of the geographical data, such as the distances or latitudes, concerns only a few principal localities. However, the values in latitude transmitted by Pliny for the cities of Carthago Nova and Tarraco and for the Pyrenees (Table 7) do not match Ptolemy's coordinates.

Most of the data concerns the distances between the principal localities. If one compares the sets of distances of Polybius and Strabo and those found in the *P. Artemid* (Table 8) with Ptolemy's distances between the same places, using a map of Ptolemy's second projection, the divergences are distinct enough for us to conjecture that Ptolemy did not use any of these sets as a direct source for the *Geography*, even though his distances have the same order of magnitude as the other data sets. The Pillars of Hercules (that is, Calpē), Carthago Nova and the mouth of the Ebro River are equidistant on Ptolemy's map and in Strabo's work, although not according to the information provided by Polybius and in the *P. Artemid* (Table 8). Ptolemy's figure for the distance between the three localities tallies with Strabo's value (2 200 stadia), multiplied by *c.* 1.07 or increased by  $\frac{1}{14}$  of its length. Moreover, Ptolemy's value for the distance between the Ebro River and Emporion corresponds to the value given by Polybius and found in the *P. Artemid*. (1 600 stadia), also increased by 1.07 of its length.<sup>49</sup> The distance in the *Geography* between Emporion and the Pyrenees corresponds to 600 stadia, again increased by 1.07 of its length. Polybius and the *P. Artemid*. provide values of around 600 stadia for the same journey (cf. Appendix H, notes *e* and *f*).

<sup>49</sup> Strabo also calculates a distance of 1 600 stadia, not between the mouth of the Ebro and Emporion but between the Ebro River and the Pyrenees.



Fig. 36 The locations (red points) of, from left to right, Carthago Nova, the mouth of the Ebro River and Emporion on a map using Ptolemy's second projection ( $\Xi$  recension).

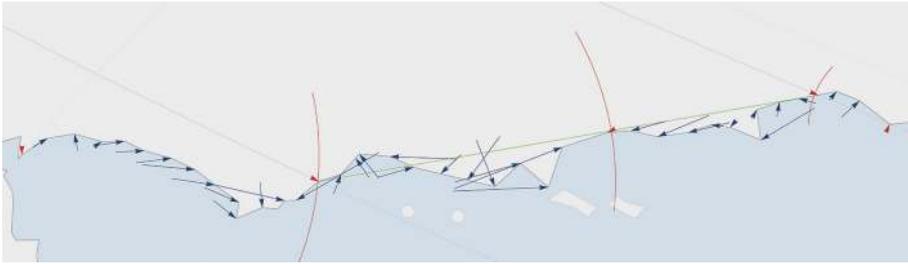


Fig. 37 The principal localities of Iberia's Mediterranean coastline were mapped, with a ruler and compass, using some of the distances that are recorded in the antique sources ( $\Xi$  recension).

One can determine the geographical position of a locality by combining two distances. Ptolemy does not explicitly mention such a procedure, even though it would have consisted of undertaking only a simple geometrical construction. By knowing the position of two localities *A* and *B* as well as their respective distances to a place *C*, one can obtain the position of locality *C* by using a compass to draw the two distances (Fig. 25). However, using solely distances cannot explain how each of the principal localities along the Iberian coast were constructed. Two features of Ptolemy's map suggest that other elements might have been combined with the distances. Carthago Nova, the mouth of the Ebro River and Emporion all lie on a straight line (Fig. 36), and Emporion also lies on the same parallel as the Temple of Venus ( $\phi = 42^\circ 20'$ ). These two elements do not feature anywhere else in the ancient sources, and they do not tally with the actual topography.<sup>50</sup> Descriptions such as 'Emporion lies to the west of the Temple of Venus' or 'from Emporion, following the sun rising, one finds the Temple of Venus' constitute the kind of data that Ptolemy might have used to create his configuration. In the introduction to

<sup>50</sup> In particular, the city of Emporion (modern-day Empúries) and the Temple of Venus (near Cap

Béar) lie almost on the same meridian. The mar-

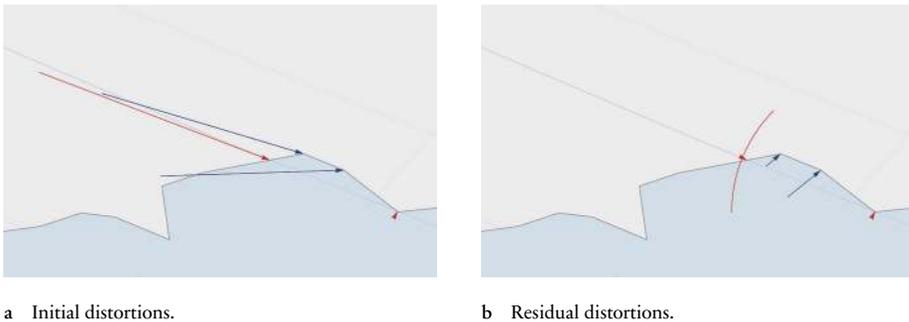


Fig. 38 Emporion was located thanks to a geometrical construction with a ruler and compass, with the Temple of Venus as the starting point of the construction, in which a value of latitude and a distance measurement were combined.

his *Geography*, Ptolemy specifies that the information required to build a geographical map should come partly from the distance data and partly from the data based on astronomical observations.<sup>51</sup> However, he does not describe in any detail a procedure, based on this kind of information, for determining the coordinates of localities. Ptolemy does state, though, that a distance often needs to be corrected in order to take into account the irregularities of a journey. He then discusses reducing the recorded distances in order to obtain the direct distance between two points. Ptolemy does not provide any systematic values for carrying out these reductions in the *Geography*, nor does he give a thorough explanation of the kinds of reduction that were required for each case.

A simple geometrical construction can be undertaken to map a locality using only one value of latitude and one distance measurement: starting from point *A*, place *B* is found on the circle of radius *d*, where *d* represents the direct distance between both places; at the same time, place *B* lies on the parallel that corresponds to its latitude. If one assumes that Emporion and the Temple of Venus lie on an east–west axis, then this combination of data may explain the position of Emporion in relation to the Temple of Venus (Fig. 38a and 38b). Likewise, it is plausible that the geographical position of Carthago Nova was also determined using a value of latitude and a distance measurement. Although Ptolemy's latitude for this city has not been documented, the distance corresponds to the value given by Strabo, increased by 1.07 of its length.

itime route that links the Gallic and the Tarracensis coasts is well attested. Several texts mention the maritime journeys made by Cn. Scipio (Polyb. *Hist.* 3.76 and Livy, 21.60), Scipio the African (Livy, 26.19) and later by Cato the Elder (Livy, 34.8–16 and Appian, *ib.* 40) from the Rhône

to Emporion, bypassing the Pyrenean headlands, with varying amounts of geographical detail, but they do not mention the route that was followed by navigators.

<sup>51</sup> See p. 167.

It is possible that the mouth of the Ebro River was positioned using two distances that can be found in the antique sources. However, the coordinates obtained from the geometrical construction of the mouth of the Ebro River, using only a compass and two distances, do not exactly match the coordinates of this locality in the *Geography*.<sup>52</sup> It is possible that another geometrical construction, which gives a better approximation of Ptolemy's value, was used. As previously mentioned, Carthago Nova, the mouth of the Ebro River and Emporion lie on a straight line (Fig. 36). In the absence of any additional information on latitudes or longitudes, such a straight line might have been used to obtain an approximate orientation of the coast. Combined with the distance measurement supplied either by Strabo (the distance between Carthago Nova and the Ebro) or Polybius and the *P. Artemid.* (the distance between Emporion and the Ebro), the line allows us to obtain a location of the Ebro that is remarkably close to its value in Ptolemy's *Geography* (Fig. 37).

*Ptolemy's mapping and the characteristics of the second map projection*

At first glance, it seems surprising that one needs to apply a factor change of 1.07 in order to use the distances found in the sources in the geometrical constructions required to place the localities on to a map. In the introduction to the *Geography*, Ptolemy reduces certain distances by simple ratios, such as one-half or one-sixth, in order to allow for the irregularities of maritime or terrestrial journeys (as opposed to the actual direct distance between two places).<sup>53</sup> However, it seems that when Ptolemy considered that a measurement already corresponded to the direct distance, he did not reduce it.<sup>54</sup> Therefore, increasing a distance cannot be said to be an essential characteristic of Ptolemy's regular handling of distance data. In addition, the value 1.07, which roughly corresponds to an increase of one-fourteenth of the original distance, can hardly be considered a simple fraction.

The factor change of 1.07 can be explained by the characteristics of Ptolemy's second map projection as well as by my research method. On the graticule (or grid) of Ptolemy's so-called second projection, both the parallels and the meridians appear as curves.<sup>55</sup> Whereas the central meridian of the grid for the world map ( $\lambda = 90^\circ$ ) is a straight line, at the edges of the world map (the Iberian peninsula is situated at the western edge of the world map), the curvature of the other lines of the grid becomes particularly prominent.

52 Starting from Carthago Nova (*K*) and Emporion (*E*), the mouth of the Ebro River (*I*) can be found: (i) on the circle, with *K* at its centre, with a radius equalling the distance *KI*, as transmitted by Strabo; (ii) and on the circle, with *E* at its centre, with a radius equalling the distance between *EI*, as supplied by the *P. Artemid.* and Polybius. The two circles in-

tersect twice. The points constructed in this way do not tally perfectly with the coordinates of the Ebro in the *Geography*.

53 *Geogr.* 1.13–14.

54 *Geogr.* 1.11.2.

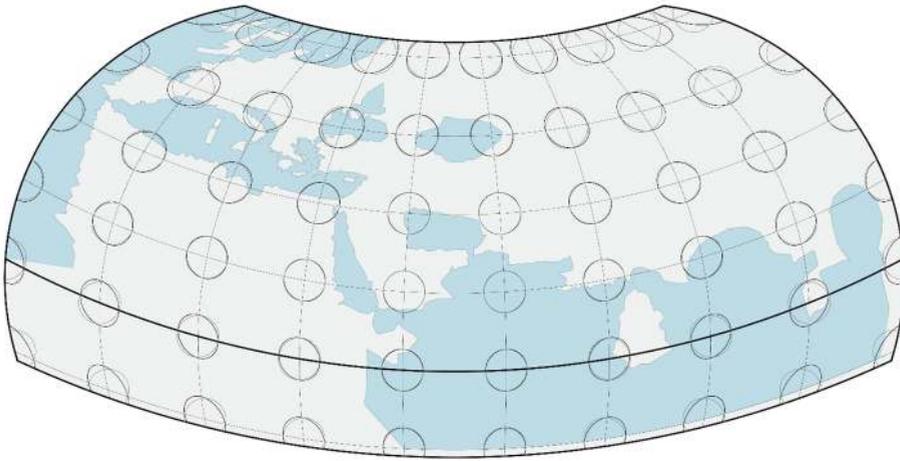
55 See p. 52.

This feature plays an important role in a geometrical construction in which a compass is used to measure and note down distances on to the map. If one considers two points lying at the same latitude on the map, the route along the curved parallel between these points will be slightly longer than the straight line that connects the same two points. The variation between the 'curved journey' and the 'straight, direct journey' depends on the curvature of the grid. Hence, the area of the graticule where the distance is measured influences the geometrical construction that follows (Fig. 39a). For the sake of convenience and to avoid the problem of curvature, the distances in my construction (Fig. 37) as well as in my research method have been measured (with a compass, precisely thanks to a mathematical symbolic computation program) in relation to the central meridian of Ptolemy's world map ( $\lambda = 90^\circ$ ). This is a straight line, where one degree always corresponds to 500 stadia. Let us, for example, measure distance  $d$  (1 500 stadia) along the graduations of the  $90^\circ$  meridian with a compass (Fig. 39b) and trace a circle ( $C_0$ ) with radius  $d$  in the area of the map where the Iberian peninsula is located (Fig. 39c). The centre of circle  $C_0$  can, for instance, be on the central parallel of the Iberian map (that is, on the 12th main parallel of Ptolemy's world map)<sup>56</sup> as well as on the meridian through the Pillars of Hercules. Then, if, in the same area of Iberia, we trace a circle ( $C_1$ ) with a radius of 1 500 stadia, but with distance  $d$  measured along the graduations of the 12th main parallel, we find that, on paper, circle  $C_1$  appears to be exactly 1.07 times larger than circle  $C_0$ . In other words, we can assume that, to construct the map, Ptolemy measured the distance values with a compass and followed the graduations *ad hoc*, that is, in the area of the localities he was about to map, which, as far as the Iberian peninsula is concerned, was along the 12th main parallel, near the meridian through Calpē. In this particular case, he used the exact distance data noted down by Strabo and Polybius and found in the *P. Artemid.* to construct the main points along the Mediterranean coastline (Carthago Nova, the mouth of the Ebro River, Emporion). Ptolemy might have considered that these distance data matched the direct distances between the localities. The factor change of 1.07 is to be understood as an effect of my measuring method, which takes the  $90^\circ$  meridian as a reference point.

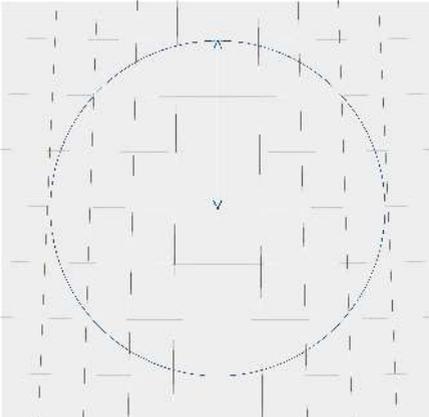
That the distance data noted down in the *P. Artemid.* and transmitted by Polybius and Strabo were used can only be demonstrated if they are measured with a compass and employed used on a map laid out according to Ptolemy's second projection. If the same values are plotted either on a map using an orthogonal projection or using Ptolemy's so-called first projection, then they do not correspond well to the coordinates in the *Geography*.

56 *Geogr.* 8.4.1: 'The second map of Europe contains the whole Hispania with its three provinces with the adjacent islands. The parallel through its middle has the ratio 3:4 to the meridian.' Ptolemy is

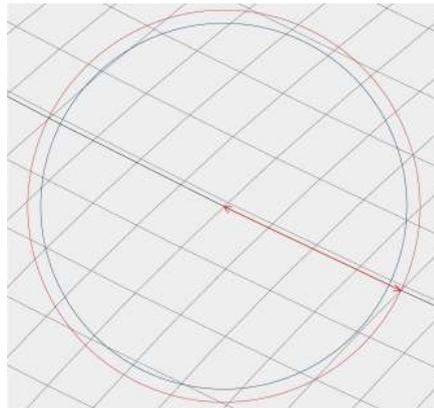
referring here to the 12th main parallel, where the longest day of the year is fifteen hours and the latitude  $40^\circ 55'$ .



a Representation of the *oikoumenē*, constructed from the coordinates in the *Geography*, on the graticule of Ptolemy's second projection. The projection's characteristic distortions can be visualised by comparing the localities that are equidistant on a sphere with circles that have the same radius.



b A circle with a radius of 1 500 stadia, drawn at the centre of the world map, along the 90° meridian, where one degree is 500 stadia ( $500 \times 3^\circ = 1\,500$  stadia).



c The red circle has a radius of 1 500 stadia, drawn in the area on the graticule where Iberia is located. The radius has been measured along the graduations of the 12th main parallel where one degree is 375 stadia ( $375 \times 4^\circ = 1\,500$  stadia).

Fig. 39 The characteristics of Ptolemy's second map projection and its consequences on geometrical constructions, in particular on the drawing of two circles using the same value for their radius – the red circle is exactly 1.07 times larger on the map than the blue circle.

An alternative mapping procedure that explains the main distortions and that uses either an orthogonal projection or Ptolemy's first map projection has not been identified. This would seem to indicate that a working grid, constructed according to Ptolemy's second map projection, was combined with geographical information to map the principal localities on this coast.

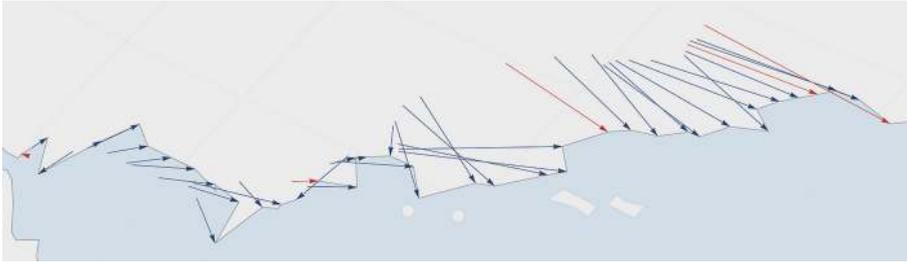
#### 7.1.4 The main distortions in the $\Omega$ recension explained

There are a number of important differences in the geographical coordinates of places along the Mediterranean coast in the two recensions of the *Geography*. Unlike the  $\Xi$  recension, the  $\Omega$  recension's coastline of the Iberian Sea depicts an uneven gulf.

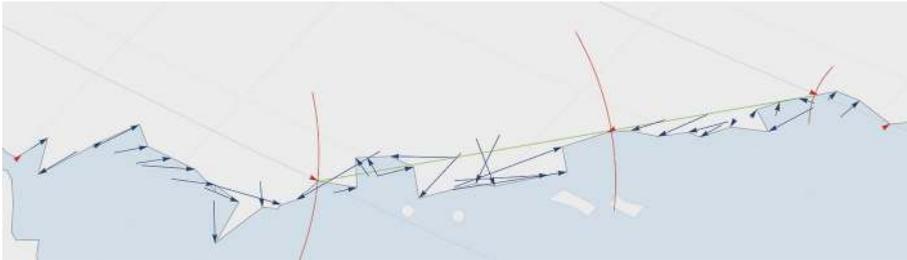
The city of Suel and the Cape of Charidēmos show a significant shift southwards and there is a small, nameless cape between Selambina and Abdara that does not appear in the  $\Xi$  recension. The coast between Carthago Nova and Portus Tenebrius forms a short, deep gulf (ended by Cape Scrombraria and the Sucro River) before running in a straight line in a north-easterly direction; the coast then proceeds northwards, curving briefly before reaching the mouth of the Ebro River. From the Ebro to the Pyrenees, the coast is almost identical in both the recensions.

In spite of the differences in outline, the displacement vectors depict the same groups of distortions in both recensions (Fig. 40a). With the exception of a few minor variations, one observes, between Calpē and the area of Carthago Nova, the same small shift towards the north and the east as in the  $\Xi$  recension. The most striking differences in the coordinates between the recensions are to be found between Carthago and the mouth of the Ebro River, although one can still detect a heterogeneous pattern, similar to that found in the  $\Xi$  recension, which is the result of the coastal localities having been inaccurately disposed. From the Ebro to the Pyrenees, one can see the same two groups with common distortions that are found in the  $\Xi$  recension.

As in the case of the  $\Xi$  recension, the boundaries of the subgroups correspond to the recurring structural pattern that characterises the geographical sources: the coast is contained between two parallel circles and has been divided into four descriptive sections by Calpē, Carthago Nova, the Ebro River, and Emporion and the Temple of Venus. When the coast is positioned so that the actual coordinates of these principal localities tally with their respective coordinates in the *Geography*, similar distortions to those found on Ptolemy's map are generated, which help explain the increase in longitude. Since Ptolemy's coordinates for these places are the same in both recensions, it is possible that the same procedure was used to map these principal localities on the Iberian coast in the  $\Omega$  and  $\Xi$  recensions (Fig. 40b).



a Initial distortions.



b Residual distortions after the coast was constructed according to the locations of the principal localities.

Fig. 40 Subdivision of the coastline into four sections to explain the main distortions of the Mediterranean coast of Iberia ( $\Omega$  recension), using Ptolemy's second map projection.

## 7.2 Southern oceanic coast of Iberia and the Strait of Hercules

### 7.2.1 Characteristics of the distortions in the $\Xi$ recension

The oceanic coast of southern Iberia comprises the localities of the Roman province of Lusitania, from the Sacred Cape to the mouths of the Anas River, and the places from there to Calpē in the province of Baetica. The coast has three distinct topographical forms: from the Sacred Cape to the mouths of the Baetis River, the shore is almost rectilinear and runs in a north-westerly–south-easterly direction; then, a gulf-like, curved section characterises the Baetis to the Cape and Temple of Hera; and, finally, one reaches the Strait of Hercules, with Calpē, one of the Pillars of Hercules, at its eastern entrance. From here the European and Libyan coasts separate to form a wide maritime area, which Ptolemy calls the Iberian Sea.

In Ptolemy's catalogue, the Strait of Hercules is described as a sea (rather than as a narrow maritime passage) that is situated between the Western Ocean and the Iberian Sea, and is framed by the Baetican shore to the north and the coast of Mauretania Tingitana to the south. The Strait is bounded by four points: the Cape of Hera and its

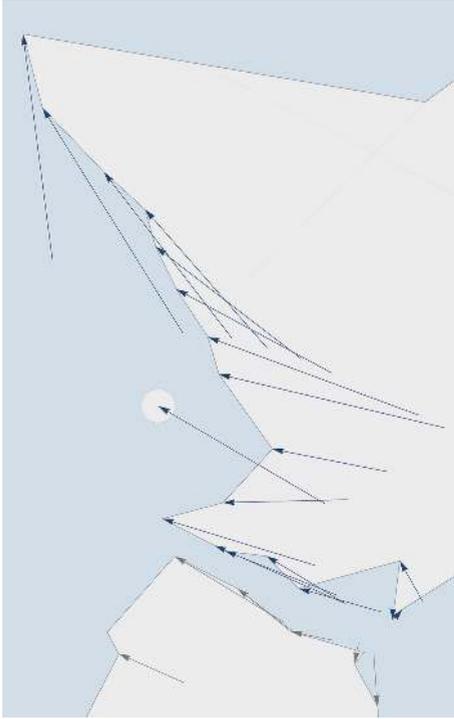


Fig. 41 The southern oceanic coast of Iberia and the Strait of Hercules: A comparison between the modern and Ptolemy's coordinates of the  $\Xi$  recension, using Ptolemy's second map projection.

temple (in the north-west), Calpē (in the north-east), the Heptadelphoi Mountain (in the south-east)<sup>57</sup> and Cape Kōtes (in the south-west).<sup>58</sup> Thus, it appears on Ptolemy's map as a two-dimensional channel. In the  $\Xi$  recension, the Strait is symmetrical, divided evenly into two by the parallel through Rhodes. Only the position of Barbesula, with its sharp indentation of the coastline, breaks up the regularity of the Iberian coast.

The south-west group of localities is the only set of Iberian coastal places that shows a westwards shift when the meridian through Calpē is used as a reference meridian in a comparison of Ptolemy's coordinates with the actual coordinates. Nonetheless, when a comparison is made with the actual topography, three groups can be identified that also match the coastline's main topographical units (Fig. 41).

From Calpē to the Temple of Hera, the localities show a shift westwards and the area appears stretched longitudinally, although there is no latitudinal distortion. The

57 Curiously, Abylē, the African Pillar of Hercules, lies in the Iberian Sea (*Geogr.* 4.1.6) and, unlike its European counterpart (Calpē), it does not form the boundary between the Iberian Sea and the Strait.

Note that Procopius (*Vand.* 3.1.2 and 4.5.1) later associates the African Pillar of Hercules with a fort called Septem, named after seven adjacent hills.

58 *Geogr.* 2.4.5–6 and 4.1.2–6.



Fig. 42 The Strait of Hercules and the Island of Gades in the second century CE.

Libyan localities, from the Heptadelphoi Mountain to Cape Kōtes, show the same distortions. From the Temple of Hera northwards to the mouths of the Baetis River, a similar longitudinal shift westwards can be observed, but paired with a slight latitudinal shift northwards and a counterclockwise rotation. Finally, from the Baetis to the Sacred Cape, a larger longitudinal (about  $1^{\circ}30'$ ) shift westwards is visible, with the localities deviating progressively northwards. Thus, in comparison with the coast's actual shape, Ptolemy's coastline shows a clockwise rotation. In the *Geography*, Ptolemy has clearly oriented the coast in a south-east–north-west direction, whereas in fact it runs in an east–west direction.

### 7.2.2 The Strait of Hercules in the antique sources

The importance of the role played by Gades, the Strait and the Pillars of Hercules (Fig. 42) in the geographical literature of Antiquity cannot be overestimated.<sup>59</sup> This area – *finis terrae* of both Europe and Libyē – generally opened and closed the descriptions of the then known world<sup>60</sup> and, as the spectacular point where the Greek and Roman Mediterranean Sea and the oceanic world met, it was a subject of great fascination. As a topos of ancient geography, the Strait enthralled the ancients, less by its unique topography

<sup>59</sup> Marcotte 2002, 156–158; Dueck 2012, 74.

<sup>60</sup> See, e.g., Mela's opening (1.24): 'Now for me, as I begin to describe its coastlines and regions with greater preciseness, it is most convenient to begin from that point where Our Sea enters into the land mass [...]; and his conclusion (3.107): 'Farther on

is the colony of Zilia, and the Zilia River, and the place we started from, Point Ampelusia, which now turns into Our Strait, which is the terminus both of this work and of the Atlantic coastline? See also Silberman 1988, 118.

than by its mythological significance.<sup>61</sup> Whether or not these pillars ever existed, the geographical places they were meant to refer to and the exact location of Gades all formed part of long-running debates, borne out, for instance, by a long passage in Strabo's *Geography*.<sup>62</sup> Many of the geographers, including Posidonius,<sup>63</sup> Artemidorus<sup>64</sup> and Polybius,<sup>65</sup> who participated in the debates, travelled to this area, while Mela came from Tingentera (near modern-day Algeciras)<sup>66</sup> and Turranius Gracilis (Pliny's source) was born near Mellaria (maybe near Valdevaqueros).<sup>67</sup> In spite (or because) of these numerous experiences, the geographical testimonies about the Strait of Hercules are diverse and sometimes contradictory. Thus, it is necessary to distinguish clearly between accounts that concern the morphology of the Strait – the coastal topography and the distances between places – and reports about the location of the Pillars. Both questions are linked but they are underlain by different issues. And although the exact location of the Pillars would not explain Ptolemy's construction of the Strait, it may help to reveal his sources.

The antique sources generally use the Greek topographical term ὁ πορθμός (strait, narrow passage)<sup>68</sup> and the Latin equivalent *fretum*<sup>69</sup> to describe the area. Less often, one finds τὸ στόμα (entrance, outlet, mouth),<sup>70</sup> ὁ στενωπός (narrow passage, channel),<sup>71</sup> or *fauces* (narrow passage, gorge).<sup>72</sup> Although the terminology is unambiguous and is used to refer to the same type of landform,<sup>73</sup> the terms do not give an accurate description of the morphological variety of a strait or of the diverse pictures that emerge from the descriptions. Thus, any value related to the size of the Strait of Hercules needs to be linked with an explicit topographical configuration or a description of its boundaries in

61 See Romm 1994, 15–20 and Baslez 2004, 17–21, for a comprehensive overview.

62 Str. 3.5.3–6.

63 Posidonius wrote about his own observations, while based at Gades, where he spent thirty days (Str. 3.1.5 and 3.5.9). He is Strabo's primary source for the latter's description of the island (Str. 3.5.7–10). See also Str. 17.3.4., where Posidonius' maritime journey is mentioned.

64 Artemidorus sailed in the area of the Sacred Cape (Str. 3.1.4) and visited Gades (Marcian, *Epit. Men.* 1.3). As P. Moret 2013, 58, has noted, the absence of any mention of the Strait in the *P. Artemid.* is extremely surprising.

65 Polybius (3.59) explains that he was able to correct ancient authors, since he himself had sailed along Libyē, Iberia and Gallia, especially along their oceanic coasts. He also states (3.57) that his knowledge of the Strait 'near the Pillars of Hercules' and on the particularities of the sea in this area would be recorded in a later and more appropriate part of his work; unfortunately these chapters have been lost.

66 Mela 2.96.

67 Pl. 3.3. Turranius is also mentioned in an observation concerning the sighting of a whale on the shore of Gades (9.11) and in a report about culinary habits 'in Baetica and Africa' (18.75).

68 Chantraine 1968, 929. Polybius (16.28.9) uses the related word ὁ πόρος as well, while πορθμός is the term used by Ptolemy in the *Geography's* catalogue.

69 Pl. 3.3, 3.7; Mela 1.6, 1.16 and 2.96.

70 Ps.-Scymnos vv. 139–140, where στόμα refers precisely to the mouth of the ocean. See Str. 3.5.6.

71 Str. 2.5.19.

72 Pl. 3.3–4. Note that the Strait is frequently referred to only by the metaphor 'the Pillars of Hercules' or simply 'the Pillars'. Strabo prefers to refer to it as ὁ κατὰ τὰς στήλας πορθμός, i.e. 'the Strait of [or near] the Pillars' (Str. 2.5.19–26, 3.1.7, etc.).

73 E.g., in the same passage on the Strait of Hercules and the Bosphorus (16.28.6–12), Polybius uses alternately στόμα, πορθμός and πόρος. He also uses the same vocabulary to refer, e.g., to the Strait of Messina, the Hellespont and the Bosphorus. Cf. with Ptolemy's own description, *Geogr.* 7.5.3.

order for it to make sense. The descriptions of the Strait in the antique literature vary somewhat. For example, Pliny and Mela use two very different landforms to describe the same *fretum*. Pliny restricts the Strait to the very precise section where both the European and Libyan shores are at their closest. He describes the Iberian side from west to east as follows:

The Cape of Hera,<sup>74</sup> the Port of Baesippo, the oppidum of Baelo, the *vicus* Mellaria, the strait from the Atlantic sea (*fretum ex Atlantico mari*), Carteia called ‘Tartesos’ by the Greek, the mount Calpe. Then, on the shore of the Internal Sea, the city of Barbesula, etc.<sup>75</sup>

Pliny’s estimation of the length – 15 miles *in longitudinem* – is thus consistent with a narrow but very short passage, which he calls *fretum*.<sup>76</sup> However, he fails to give an estimation for the route from Calpē to the Cape of Hera. Mela, by contrast, portrays the Strait as a long channel that forms a vast area between the ocean and the Mediterranean Sea. Calpē and Abyla – *Columnae Herculis* – mark the spot where the opposite coasts are at their closest,<sup>77</sup> while the maritime area between the facing capes, Ampelusia and Hera to the west, and the Pillars to the east, is a wide zone, which Mela calls *fretum*, that is, the ‘Strait’. Mela notes down the rows of localities on both shores of the Strait. As for the Iberian side, from the Pillars westwards, he records:

There is a bay beyond that point [i.e. Calpē], and on it is Carteia. [...] Then Mellaria, Bello and Baesippo occupy the shore of the Strait (*oram freti occupat*) all the way to the cape of Hera.<sup>78</sup>

Mela’s description emphasises the particular topography of the area: the facing western promontories form a sharp coastal break and the oceanic shores of Europe and Africa go off in opposite directions,<sup>79</sup> in a similar way to the eastern entrance to the Strait:

[The sea], at first narrow and not more than ten miles wide, breaks into the land mass and penetrates it. Then, spreading in length and width, it pushes back the shores, which recede to an impressive degree.<sup>80</sup>

74 Pliny and Mela use the Latin name ‘Cape of Juno’, which corresponds to the Greek ‘Cape of Hera’. In order to avoid confusion between the two names, I have used the Greek name in this text.

75 Pl. 3.7.

76 Pl. 3.3.

77 Mela 2.95: ‘Then the sea becomes very narrow (*angustissimum*), and mountains constitute the closest shores between Europe and Africa.’

78 Mela 2.96. See the full description of both coastlines in Mela 1.26–27 (Africa) and 2.95–96 (Europe).

79 Mela 2.96 and 3.3.

80 Mela 1.6.

On this side of the Strait, the sea already pours in over a rather broad area, and with its great rush it bends back rather far the lands it has cleared from its path.<sup>81</sup>

Although they both mention the same localities, Pliny and Mela describe two quite different kinds of straits. From his fragments and from the *P. Artemid*, it would seem that Artemidorus' picture of the Strait resembles Mela's.<sup>82</sup> Ps.-Scylax insists that both Pillars of Hercules are 'caples directly facing one another.'<sup>83</sup> No clear picture of this area emerges from Strabo's *Geography*, especially as he uses, alternately, 'the Pillars' or 'the Strait of the Pillars,' in generalised and detailed descriptions, without disclosing whether he is distinguishing between the two designations. Like Pliny, Strabo seems to have sketched a short channel, whose waters belong neither to the Mediterranean Sea nor to the ocean.<sup>84</sup> He positions Calpē at the beginning of the Mediterranean Sea<sup>85</sup> but situates Cape Kōtes beyond the western entrance to the Strait.<sup>86</sup> All the documented values for the length of the Strait concern its 'short version' (Pliny, Strabo): 120 stadia or 15 miles (Table 10). Mela does not supply any distance data on its length. The unexpected value given by Avienus and credited to Euctēmōn of Athens (108 miles) should be regarded as the distance from Calpē to Gades.<sup>87</sup> The set of distance data related to the width of the Strait is substantial but conflicting; the often capricious conditions of navigation in the Strait may have made any reliable evaluation difficult.<sup>88</sup> A north–south sailing gives a different result to a south–north one, which may explain the variations in the sources. Estimations for its width generally range from between 40 and 80 stadia (Table 10).

81 Mela 1.27.

82 Moret 2013, 58–59 and 70. P. Moret's idea is tempting but it needs corroboration in the form of a reliable description of Artemidorus' Libyan shore.

83 Ps.-Scylax 111: αὗται δὲ εἰσι τὰ ἄκρα κατασκευῶν ἀλλήλων. See also Ps.-Scylax 1.

84 Str. 3.1.7: 'The Strait at the Pillars, where (καθ' ὅν) the Internal Sea connects (συνάπτει) to the External Sea.'

85 Str. 3.4.1.

86 Str. 17.1.2.

87 The source (Avienus' *Ora maritima*) and the claimed authorship of the distance (Euctēmōn of Athens) have given rise to a number of historical and philological issues. Avienus' sources have been intensively debated, but little is known of the history of this text, the date of which is, anyway, rather late (fourth century CE). Euctēmōn (*fl.* 432 BCE), an Athenian astronomer, is mentioned in several sources. According to Ptolemy (*Phas.* 67.6–7), he made observations in Athens, the Cyclades, Macedo-

nia and Thrace. He is often associated in the antique sources with Metōn, his contemporary – e.g. in the *Alm.* 3.1 and later by Ammianus Marcellinus (*Res Gestae*, 26.1.8). His observations were used and/or commented on by Geminus (*Isag.* 8.50 and *parapēgma*; see Evans and Berggren 2006, 275–277) and by Ptolemy in several astronomical works (*Alm.* 3.1; *Phas.* 14.21). Euctēmōn was, therefore, not unknown to the author of the *Geography*. However, there are no traces of any geographical works by Euctēmōn – let alone relating to western Europe – besides the reference to him in *Ora maritima*. It would be extraordinary if a 'periplus of the Internal Sea' written by Euctēmōn and possibly translated from a Punic text existed (Rehm 1907; opinion defended by Antonelli 2000, 126–128; see also Avienus, *FGrH V*). The only certainty is that it is impossible to prove whether he ever travelled to the Strait.

88 Strabo remarks on the contrast between the clement conditions along the coast of Turdetania and 'a certain difficulty in passing the strait' (Str. 3.2.5).

Source	Length	Width
in Avienus, <i>Or. mar.</i> vv. 350–375:		
– Euctēmōn of Athens	108 miles	3 miles
– Scylax of Caryanda		same width as the Bosphorus
– Damastes of Sigeion		7 stadia between the Pillars
Ps.-Scylax 111		1 day’s sailing between the Pillars
Ps.-Scymnos, vv. 139–140	120 stadia	30 stadia between the Pillars
Polybius, <i>Hist.</i> 16.28.9		60 stadia
Mela 1.6		no more than 10 miles
Turranius Gracilis (Pl. 3.3)	15 miles	5 miles from Mellaria to White Cape
Livy, Cornelius Nepos (Pl. 3.4)		min. 7 miles, max. 10 miles
Strabo, <i>Geogr.</i> 2.5.19	120 stadia	min. 70 stadia
Strabo, <i>Geogr.</i> 17.3.6	120 stadia	min. 60 stadia
Agathemerus, <i>Hypotyp.</i> 20		80 stadia
Philostratus, <i>Vit. Apoll.</i> 5.1		60 stadia
Marcian, <i>Per. mar. ext.</i> 1.3		80 stadia
Procopius, <i>Vand.</i> 3.1.2		84 stadia
Pliny, <i>Hist. nat.</i> 5.2	min. 30 miles from Tingis to Baelo	
<i>It. mar.</i> 495.5–6	220 stadia from Baelo to Tingis	

Tab. 10 The dimensions of the Strait of Hercules according to the geographical sources of Antiquity.

Apart from these, no distances from Calpē or the Pillars to the Cape of Hera, or from Abylē to Cape Kōtes have been recorded, even in other late antique sources.

### 7.2.3 *Ultra columnas Herculis*: general configuration of southwestern Iberia

South-western Iberia was one of the first oceanic areas to be described in the ancient sources.<sup>89</sup> And, as one of its boundary marks, the Sacred Cape was singled out early on as a particularly remarkable place in the *oikoumenē*. Unsurprisingly, then, it was the subject

<sup>89</sup> According to Strabo (3.1.4), the Sacred Cape was described by Ephorus (c. 405–330 BCE).

of a certain amount of special treatment in ancient geographical texts, for example in Strabo's *Geography*:

Let me describe Iberia in detail, beginning with the Sacred Cape. This cape is the most westerly point, not only of Europe, but of the whole inhabited world; for, whereas the inhabited world comes to an end in the west with the two continents [...], the headlands of Iberia project at the aforementioned cape about 1 500 stadia beyond those of Libyē. Moreover, the country adjacent to this cape they call in the Latin language *Cuneus* meaning thereby to indicate its wedge-shape (σφῆρα σημαίνειν).<sup>90</sup>

The etymological explanation, which was also used by Mela,<sup>91</sup> indicates that the sources of these two authors contained a precise picture of this headland's shape. However, the name *ager Cuneus* is thought to be related to the *Cynetes* or *Kouneoi* people,<sup>92</sup> who used to live in the area.<sup>93</sup>

The sources reveal that there were a variety of viewpoints about the appearance and the location of the Sacred Cape. Pliny, relying on Varro, believed that the Sacred Cape was situated approximately at the centre of the peninsula's western coast.<sup>94</sup> According to P. Moret, this viewpoint could have been inspired by Artemidorus, whose geography of Iberia shares many similarities with the geographical texts of Varro and Pliny.<sup>95</sup> In actual fact, the distances and the description in the *P. Artemid.* tend to indicate that the Sacred Cape was located in the southern part of the western coast, rather than at its centre. Unlike Artemidorus,<sup>96</sup> Strabo believed that the Sacred Cape was the most westerly point of the *oikoumenē* and that it lay on the parallel through the Pillars of Hercules and through Rhodes; he describes the Cape and the Pillars as the boundaries of a large gulf.<sup>97</sup> Strabo's configuration is argued at length in his work<sup>98</sup> and may have been partly inspired by Posidonius.<sup>99</sup> One consequence of Strabo's configuration is that a maritime journey, directly joining the Pillars to the Sacred Cape, could have been made by roughly following the parallel through Rhodes.

90 Str. 3.1.4.

91 Mela 3.7.

92 Hdt. 2.33: 'The Celts live beyond the Pillars of Hercules, being neighbours of the Kynēsioi, who are the westernmost of all the peoples inhabiting Europe,' and 4.39; Polyb. 10.7.5; Appian, *Ib.* 57–58, 68; Justinus, *Hist.* 44.4.1.

93 Silberman 1988, 251; Lasserre 2012, 185.

94 Pl. 4.115.

95 See Moret 2013, 77, and Arnaud 2008, 108, for discussions on Varro's role in transmitting Artemidorus' writings to Agrippa and thence to Pliny's works.

96 Pl. 2.242 = fr. 1 Stiehle 1856: '[...] to the Artabrian promontory, which is the most projecting part of Hispania (*ad promontorium Artabrum, quo longissime frons procurrat Hispaniae*): This measurement of the longitudinal extent of the *oikoumenē* provided by Pliny and credited to Artemidorus covers the distance from the Sacred Cape to the Cape of the Artabri, which suggests that this latter cape was the westernmost point of the peninsula. See Moret 2013, 70 and 79.

97 Str. 2.4.8, 2.5.14 and 3.5.6.

98 Str. 2.5.14.

99 Moret 2013, 75–76.



Fig. 43 The oceanic coast of southern Iberia in the second century CE: The outline of the Baetis River and the locations of its double mouth are imprecise. See p. 268.

Ptolemy's map differs from these descriptions and is decidedly innovative. His Sacred Cape forms the most westerly point of Iberia and Europe, as does Strabo's, although Ptolemy's Cape lies more than  $2^\circ$  to the north of the parallel through Rhodes ( $\phi = 38^\circ 15'$ ). Unlike Pliny's Cape, though, it does not form part of the centre of the western coast. Despite the specific distortions it shows in comparison with the actual coast, Ptolemy's innovative configuration of the Sacred Cape is quite close to its actual shape, and thus it notably improves the accuracy of the physical characteristics of this area.

#### 7.2.4 Oceanic coast from the Strait to the Sacred Cape

The works of Mela and Pliny provide descriptions of the topography of the first stretch of the oceanic coast of Iberia, just after the western end of the Strait of Hercules up to the Sacred Cape (Fig. 43). Their texts draw interesting parallels with Ptolemy's map. Mela introduces the section related to this stretch of coast with a short, bird's-eye view description, before going into more detail:

The Atlantic and the line of Baetica's oceanfront (*ora Baeticae frontis*) receive those who travel this way and follow the right-hand coast. This coastline is virtually straight (*paene recta*) as far as the Anas river, except where it draws back (*abducitur*) gradually once or twice. [...] In the nearest bay (*in proximo sinu*) is a harbour they call the Port of Gades and a sacred grove they call Oleastrum; then a fort, Eborā, on the coast; and far from the coast the colony of Hasta. On the coast again there is an altar and a temple of Hera,<sup>100</sup> and on the sea itself, the Monument of Caepio [...].<sup>101</sup>

Mela's description continues with the Baetis River, from its source to its double mouth, and the large Lusitanian headland formed by the Sacred Cape.<sup>102</sup> According to him, the stretch of coast from the Pillars to the Anas River lies in the province of Baetica, while the coast from the Anas River to the Sacred Cape is in the province of Lusitania. As Pliny organised his text according to the Roman provinces, he discusses the coasts in two different sections (in Books 3 and 4) of his work. As for Baetica's stretch of coast, the picture Pliny creates closely resembles Mela's text (with the description reversed):

The things that more especially deserve notice, or are more easily explained in the Latin tongue, are the following, beginning at the river Anas, along the line of the seashore: the oppidum of Ossonoba, nicknamed Aestuarīa, at the confluence of the rivers Luxia and Urium; the Hareni mountains; the Baetis river; the coast of Cure<sup>103</sup> and its curved bay (*litus curensē inflexo sinu*), opposite to which is Gades, to be described among the islands; the cape of Hera<sup>104</sup> [...].<sup>105</sup>

Pliny does not give any details about the topography of the coast between the Anas River and the Sacred Cape,<sup>106</sup> while Strabo's description is less clear than those of the

100 This Temple of Hera, situated north of Gades, should not be confused with the temple described by Ptolemy on the homonymous cape, situated south of Gades, at the western entrance to the Strait (*Geogr.* 2.4.5). Mela (2.96) also refers to this Cape of Hera.

101 Mela 3.3–4.

102 Mela 3.5–6.

103 '*Litus curensē*' is a *hapax legomenon*, so its meaning is, by definition, difficult to decipher. There are no records of a place or a people named 'Curum' or 'Curenses' in this area. The onomastic comparisons that are generally proposed and debated seem rather audacious and are rarely cogent (see Chenoll Alfaro 1982). Although all the manuscripts of Pliny's work include the name, one does won-

der whether a mistake might have been made in the archetype. *Curensē* is indeed morphologically close to the words derived from *curuare* (to form in the shape of a curve) and *curuus* (curved, winding, bent). Compare Pliny's phrase '*litus curensē inflexo sinu*' with other passages in the *Hist. nat.*, such as '*magnoque litorum flexu retro curuatus in cornua*' (4.76) and '*curuatur ora*' (6.18), as well as the words used in Mela's text: '*curui litoris*' (1.110) and '*curuansque se subinde longo supercilio inflexum est*' (3.32).

104 This Cape of Hera and Ptolemy's Cape and Temple of Hera must be one and the same. See footnote 100, p. 300.

105 Pl. 3.7.

106 Pl. 4.117–118.

two Latin authors. He writes that the coast between the Pillars of Hercules and the Sacred Cape is made up of a large gulf:

[The promontory that juts down to the Pillars is] encompassed by simple gulfs (ἀπλοῖς κόλποις): by the gulf that lies between Calpē and the Sacred Cape – the gulf on which Gades is situated – and also by that portion of the sea that lies between the Pillars and Sicily.<sup>107</sup>

In addition, Strabo describes the parallel through Rhodes as running through the Pillars of Hercules, Gades (and the nearby coast) and the Sacred Cape. Given the proximity of the island on which Gades was situated to the continent (one stadion) and its central position in the gulf,<sup>108</sup> the curvature of the gulf's coastline must be almost 'flat'. In his detailed description, Strabo focuses on a few specific topographical elements (such as small islands, estuaries and river mouths), documenting that the coast is 'full of bays' but without giving any precise locations.<sup>109</sup> Thus, according to Pliny and Mela, the oceanic coast west of the Strait is composed of two distinct sections: first, a gulf that includes the island of Gades; and second an approximately straight coastline that runs from the mouths of the rivers Baetis and the Anas to the Sacred Cape. Strabo also writes that Gades lies at the centre of a gulf, although his configuration differs from that of the Latin authors.

The antique sources contain a number of estimations for the length of the coastline that stretches from the Pillars of Hercules to the Sacred Cape. The distances provided are generally linked with the maritime route that connected the Strait of Hercules with the Sacred Cape via Gades (Fig. 43), which explains why some of the data do not always correspond to the direct route between the Pillars and the Sacred Cape. Although the estimations of the length of the entire coastline as well as of intermediate distances generally have a similar order of magnitude, there is, nevertheless, little agreement on the figures, while some of the deductions are clearly contradictory (Table 11). The debates of Antiquity concerning the location of the Pillars of Hercules – at Gades or at Calpē and Abylē, according to the main theses – occasionally make interpreting the sources problematic. The *P. Artemid.* provides precise distances, although a full reconstruction is impossible because of the papyrus' poor state of preservation. The Sacred Cape is also used in general descriptions to estimate the size of the whole peninsula.<sup>110</sup>

107 Str. 2.4.8. The description is clearly derived from Eratosthenes.

108 Str. 3.1.8 and 3.5.3–6.

109 Str. 3.5.6: 'Gades is not situated in such a geographical position as to denote an end; rather it lies at about the centre of a long coastline that is full of bays (ἐν μέσῃ πως κεῖται μεγάλη παραλία κολπώδεις).'

110 See, e.g., Pl. 4.115.

Source	Route	Distance
Strabo, <i>Geogr.</i> 2.4.3	Pillars of Hercules to Sacred Cape	c. 3 000 stadia <sup>111</sup>
Eratosthenes (Str. 1.4.5)	Pillars of Hercules to Sacred Cape	not less than 3 000 stadia
Ps.-Scylax 1	Pillars of Hercules to Gades	1 day's sailing
Strabo, <i>Geogr.</i> 3.1.8, 3.5.3	Calpē to Gades	750 or 800 stadia
Strabo, <i>Geogr.</i> 17.6.3	Strait of Hercules to Gades	800 stadia
Pliny, <i>Hist. nat.</i> 4.119	Gades <i>ab ostio freti</i>	75 miles <sup>112</sup> (c. 600 stadia)
Philostratus, <i>Vit. Apoll.</i> 5.1	Calpē to Gades	600 stadia
<i>P. Artemid.</i> V 24–25	Calpē to Gades	544 stadia
Eratosthenes (Str. 3.2.11)	Gades to Sacred Cape	5 days' sailing <sup>113</sup>
Artemidorus (Str. 3.2.11)	Gades to Sacred Cape	less than 1 700 stadia
Strabo, <i>Geogr.</i> 3.1.9	Gades to Sacred Cape	less than 2 000 stadia
Varro (Pl. 4.115)	Gades to Anas River to Sacred Cape	228 miles (c. 1 824 stadia) <sup>114</sup>

111 Str. 2.4.3: ὁμολογοῦσι γὰρ οἱ πλεῖστοι ('most people agree that...'). The anonymous *Hypotypōsis*, which is difficult to date, although some of its data derive from Strabo and Ptolemy (Marcotte 2002, XL–XLII), also gives a distance of 3 000 stadia between the Pillars of Hercules and the Sacred Cape (*Hypotyp.* 1 and 47).

112 Some manuscripts give 75 miles, others 25 miles. See Detlefsen 1904, 82.

113 If one day's sea voyage covers 600 stadia, then one could take 3 000 stadia to be the distance of the whole five-day journey.

114 Pl. 4.115: 'Varro reports that [from the Sacred Cape] to the Anas river, by which we have mentioned Lusitania as being separated from Baetica, [there is a distance of] 126 miles, it being 102 miles more to Gades.'

Tab. 11 The documented distances between the Pillars of Hercules and the Sacred Cape via Gades.

## 7.2.5 The main distortions in the Ξ recension explained

### *Division of the coastline into topographical units*

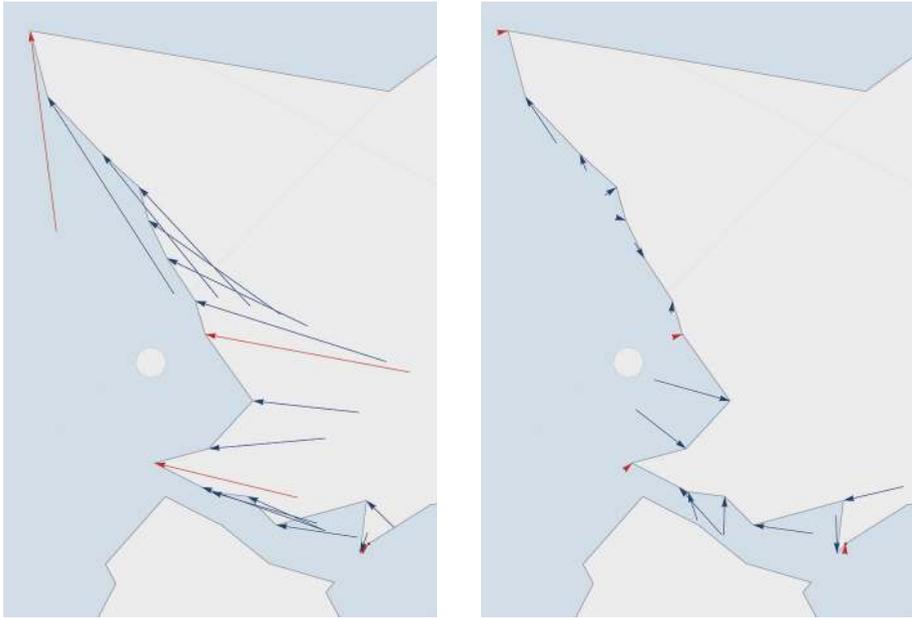
There is a high degree of consistency between the main topographical units of the coastline – that is, the Strait of Hercules, a gulf near Gades up to the Baetis River and a straight section that runs to the Sacred Cape – in Ptolemy's *Geography* and the three groups of displacement vectors (delimited by the Sacred Cape, the double mouth of the Baetis River, and the Temple of Hera and Calpē, Fig. 44a). Moreover, the three coastal sections match other sources, in particular Pliny and Mela, who describe similar topographical

units and accentuate the same principal localities that border the groups of distortions on Ptolemy's map. Mela's text corresponds particularly well to Ptolemy's Strait of Hercules, as they both describe a channel-like strait. By contrast, the latitudinal data on Gades and the Sacred Cape given by Strabo and Pliny do not correspond to Ptolemy's coordinates in the  $\Xi$  recension. It is, therefore, highly plausible that the main distortions in the  $\Xi$  recension are a direct result of the coastline having been divided into three topographical units. When the coast is positioned so that the modern coordinates of Calpē and the Temple of Hera (the boundaries of the Iberian side of the Strait), as well as of the eastern mouth of the Baetis River and the Sacred Cape, coincide with their respective coordinates in the *Geography*, each group generates the main distortions that are found on Ptolemy's map (Fig. 44b). The displacement vectors that showed a shift westwards and a clockwise rotation of the localities between the Sacred Cape and the double mouth of the Baetis River have almost disappeared. The few places that form the gulf between the Baetis River and the Temple of Hera still show a small longitudinal shift eastwards. Likewise, the localities along the coastline of the Strait of Hercules have been shifted slightly westwards, although the area no longer appears to have been stretched longitudinally.

#### *Construction of the Strait of Hercules*

In the  $\Xi$  recension of the *Geography*, the Strait of Hercules corresponds to the type of channel-like strait that Ptolemy himself describes as 'a peninsula, making the Strait, as it were, an isthmus of the sea.'<sup>115</sup> The two shores of the Strait are bordered by the meridian of longitude  $7^{\circ}30'$  to the east and by the meridian of longitude  $6^{\circ}$  to the west, with the small cape of the Temple of Hera, which has a longitude of  $5^{\circ}45'$ , lying outside the Strait. The European and the Libyan shores also find themselves on either side of the parallel through Rhodes, and both are affected by similar distortions. Moreover, the variation in the distortions matches the topographical divisions within and outside the Strait. It is possible that the specific distortions of the Strait itself were caused by a mapping process in which topographical descriptions were used to determine the dimensions of the opposite coasts and the distance between them, and that the four boundaries of the Strait and the coasts were positioned in relation to these points. Ptolemy's Strait of Hercules in the  $\Xi$  recension of the *Geography* is, in comparison with the other antique sources, extremely innovative. Only Mela's description resembles Ptolemy's configuration. Both authors describe a channel whose western and eastern entrances are formed by two facing promontories. The minimal width of Ptolemy's Strait corresponds to  $10'$  of a meridian, that is, 83 stadia or *c.* 80 stadia when rounded down, a value that tallies

115 *Geogr.* 7.5.3: χερσονήσου δίκην ἰσθμὸν ὡσπερ εἰ ποιοῦσα τοῦ πελάγους τὸν πορθμόν.



a Initial distortions.

b Residual distortions.

Fig. 44 The division of the coastline into three main topographical units explains the main distortions of the coast between the Pillars of Hercules and the Sacred Cape in the  $\Xi$  recension.

with Mela's text. Moreover, many sources report that the Rhodes parallel goes through the Strait of Hercules, thereby separating the Libyan and European continents.

In order to determine the positions of the four boundaries of the Strait of Hercules, a mapping process that combines some of the information contained in the sources might have been used. For example:

- the shape of the Strait was influenced by the four capes facing the Strait's two entrances: therefore, the four boundary localities form the vertices of a quadrilateral;
- both coasts were placed on either side of the parallel through Rhodes;
- 80 stadia was the minimal width of the Strait.

The descriptive elements of the four boundaries can be used to determine the position of the Strait in relation to the meridian through Calpē: they provide enough information for us to create a structural frame on to which the strait can be placed (Fig. 45).<sup>116</sup>

116 In Greek astronomical and geographical texts, when a parallel is combined with a geographical place,

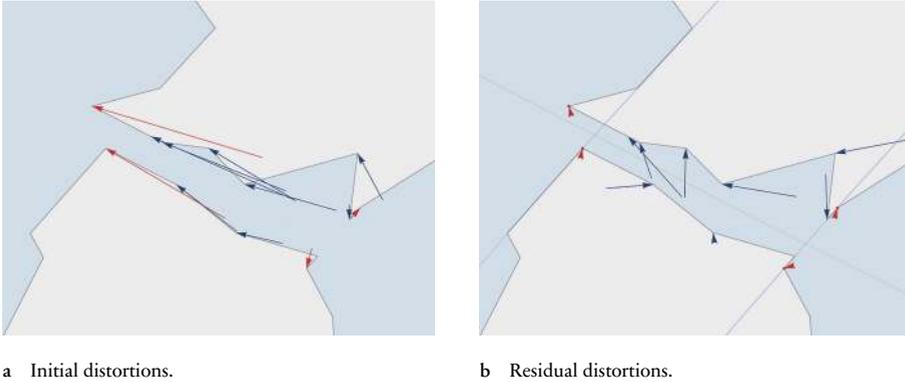


Fig. 45 A geometrical construction of the Strait of Hercules using Mela's topographical description and distance data on the dimensions of the Strait to explain the main distortions in the  $\Xi$  recension.

However, additional elements need to be added as these components alone cannot determine the position of each boundary of the Strait. First of all, some data on the length of the Strait are required. Mela is one of the few authors not to have left any estimations for the length of the Strait. The generally accepted value is 120 stadia, although this figure does not fit the configuration of the Strait in the *Geography*, where it is five times longer (at *c.* 600 stadia). It is possible that Ptolemy used the figure given by Avienus and credited to Euctēmōn of Athens: 108 miles, that is, *c.* 864 stadia. Euctēmōn's datum is, however, questionable.<sup>117</sup> The length of Ptolemy's Strait does, in fact, tally with the transmitted distances for the journey between Calpē and Gades, which all have an order of magnitude of one day's sailing, which corresponds to between 600 and 800 stadia. This does not, however, correspond to estimations of the length of the Strait, which is quite a distance away from Gades. Thus, the length that Ptolemy used for the Strait cannot be traced back to one of our sources.

Moreover, although the western European and Libyan coasts that face the ocean follow the 6° meridian accurately, the Cape of Hera breaks this regularity. It forms a small promontory, which juts out of the Strait westwards, in the direction of the ocean. Once again, Ptolemy's map agrees with Mela's description:

the parallel circle almost always goes *through* (διὰ) the concerned cities and countries. See p. 45. One cannot exclude the possibility that this terminology influenced Ptolemy's mapping process: he places

both continents on either side of the parallel, so that the line runs right through the centre of the Strait.

117 See footnote 87, p. 296.

At this stage that promontory [the Cape of Hera] runs to the west and to the Ocean with a side-wise ridge (*in occidentem et oceanum obliquo iugo excurrens*), and it faces that promontory in Africa that we had said was called Ampelusia.<sup>118</sup>

In order to draw this cape, Ptolemy might have used a description similar to Mela's text (a 'side-wise' headland running westward). The configuration of the eastern entrance to the Strait has, however, no equivalent in any of the other antique sources. The most surprising feature is that the two so-called Pillars of Hercules, which were situated, according to ancient descriptions, at the eastern entrance of the Strait, do not, on Ptolemy's map, form the entrance promontories but are the first localities to be positioned beyond the Strait: Exilissa in Tingitana and Carteia in Baetica form the inflection points of their respective coasts.

*Construction of the Sacred Cape and the double mouth of the Baetis River*

The antique sources contain three kinds of geographical information on the Sacred Cape: distances, latitudinal data and the geographical position of the Cape in relation to the whole Iberian peninsula. Considering the peninsula as a whole, descriptions of the cape's location can be divided into two distinct categories, although neither of them fits Ptolemy's configuration.<sup>119</sup> Thus, the latitudinal data given by Strabo – the Sacred Cape is said to lie approximately on the parallel through Rhodes – cannot be a source for the latitude of the Sacred Cape in Ptolemy's *Geography*. The Sacred Cape was an important reference point for measuring all types of distances, from short to long. A long distance is, for example, the 1 300 miles that Varro estimates for the distance from the central Pyrenees to the Sacred Cape.<sup>120</sup> All the medium distances refer to the journey from the Pillars of Hercules to the Sacred Cape through Gades, and range from c. 2 200 to more than 3 000 stadia. Moreover, the distance between the Pillars and the Cape, although largely disseminated in the sources, can only help us determine the position of the Sacred Cape when it is combined with other information. Finally, the data for many of the long distances are often inconsistent, unreliable and too fragmentary to enable us to reconstruct a complete journey between the principal localities.

It is possible to explain the positioning of the Sacred Cape by making a geometrical construction with a ruler and compass, using the distance between Calpē (*C*) and the Sacred Cape (*S*) as a medium distance and a long distance from another main point, such as the Temple of Venus at the south-eastern end of the Pyrenees (*P*). The Sacred Cape is then situated:

118 Mela 2.96.

119 See p. 297.

120 The value might have been corrupted. See Moret 2013, 84.

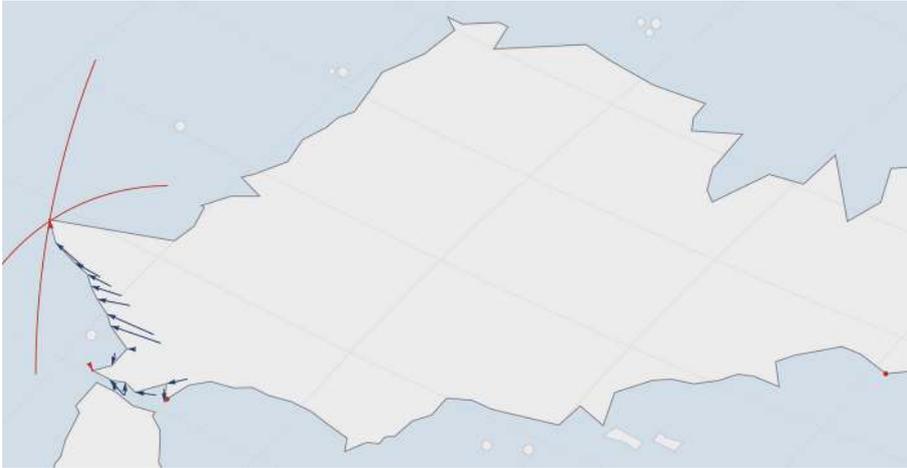


Fig. 46 Ruler-and-compass construction of the Sacred Cape, using distance data recorded by Pliny ( $\Xi$  recension).

- on the circle, with  $C$  at the centre and a radius equalling  $r \cdot d_{CS}$ , where  $d_{CS}$  is the distance between  $C$  and  $S$ , transmitted by Pliny, and  $r$  corresponds to a reduction of one-fifth;
- and on the circle, with  $P$  at the centre and a radius equalling  $d_{PS}$ , where  $d_{PS}$  is the distance between  $P$  and  $S$  (Fig. 46).

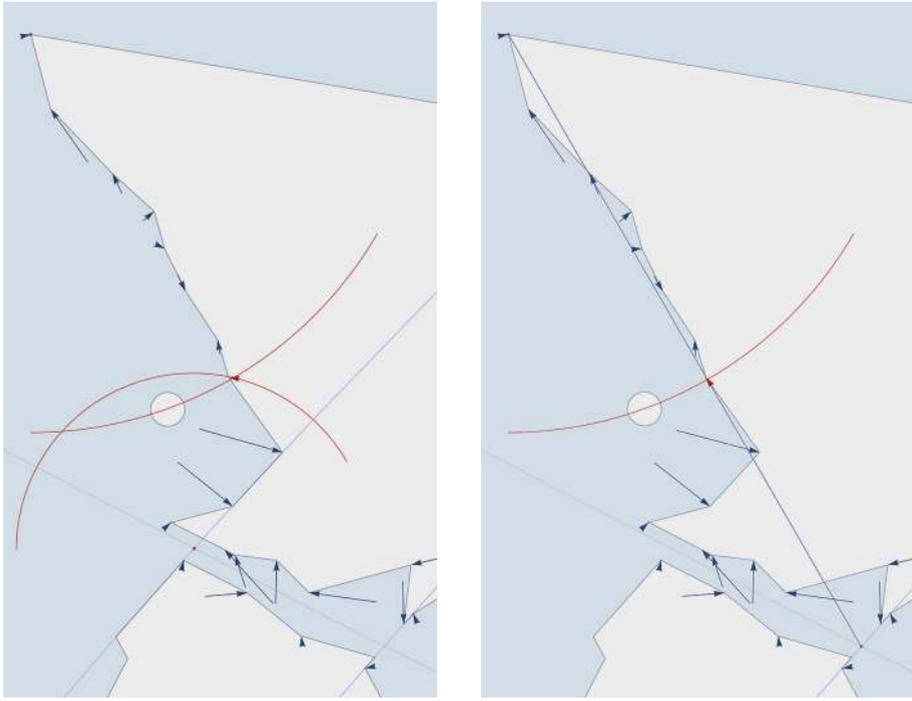
Pliny's distance  $d_{CS}$  (303 miles, so *c.* 2 424 stadia)<sup>121</sup> is also close to other estimations recorded by Strabo (1 700 + 750 stadia, for instance). The distance to be used with the compass was measured on the map along the parallel through Rhodes. Distance  $d_{PS}$  corresponds to the rounded value of 7 600 stadia or 950 miles, which is not documented but matches the order of magnitude of Roman evaluations of the entire length of the peninsula, if reduced by a value similar to  $r$ .<sup>122</sup>

A mapping procedure that could explain the construction of the eastern mouth of the Baetis River thanks to information passed down in the antique sources has yet to be found. However, it is possible that two distances were combined (Fig. 47a). It should also be noted that this mouth of the Baetis River lies on a straight line that connects

121 This value is a combination of the journey from the Pillars, at the eastern entrance to the Strait, to Gades (75 miles) and from there to the Sacred Cape (228 miles). See Table 11.

122 Varro reckons that there are 1 250 miles between the Pyrenees and Cape Magnum (Pl. 4.114), which corresponds to the maximum length of the peninsula given by Appian (10 000 stadia). See p. 317.

When one combines the extents of the provinces of Tarraconensis and Lusitania provided by the Roman sources, one obtains 1 147 miles, according to Pliny (3.29 and 4.118; here Pliny relies on Agrippa for data), 1 115 miles according to the *Dem. prov.* 22–23, while the *Div. orb. terr.* 5–6 gives a distance of 980 miles. These values are close to the distance that Ptolemy might have used.



a Ruler-and-compass construction, using two distances.

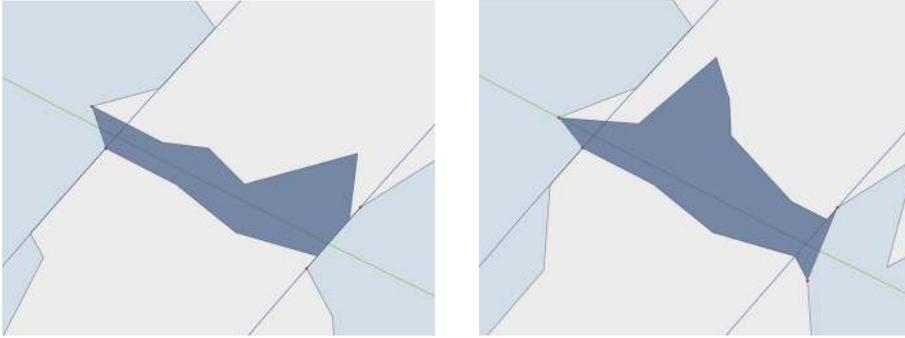
b Ruler-and-compass construction, using one distance measurement and an auxiliary line.

Fig. 47 Two geometrical constructions of the eastern mouth of the Baetis River ( $\Xi$  recension).

the eastern entrance to the Strait to the Sacred Cape. This line gives an extremely good approximation of the coast, and it might have been used as a guide when positioning the Baetis River (Fig. 47b).

### 7.2.6 The main distortions in the $\Omega$ recension explained

In the  $\Omega$  and  $\Xi$  recensions, the coast's three distinct landforms (Fig. 49a) match the three groups of distortions. Between the Sacred Cape and the Temple of Hera the distortions are similar in both recensions. The coastline forms (1) a rectilinear, north-west–south-east oriented section from the Sacred Cape to the double mouth of the Baetis River, where the localities have been shifted westwards and have been affected by a clockwise rotation; (2) a curved section from the Baetis River to the Temple of Hera, where the localities have been shifted significantly westwards, with a small latitudinal shift northwards and a small counterclockwise rotation.



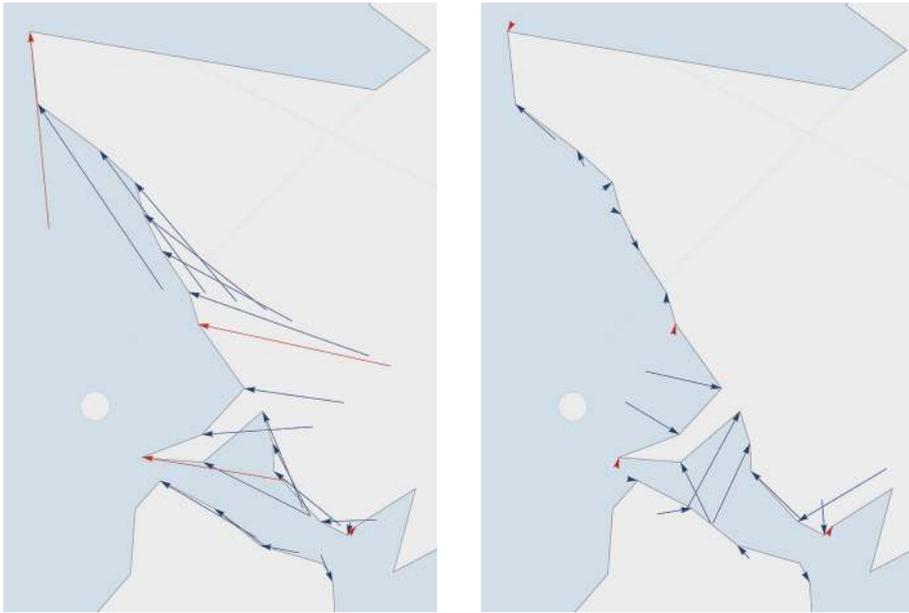
a Ξ recension.

b Ω recension.

Fig. 48 Outline of the Strait of Hercules (dark blue area) in Ptolemy's *Geography*, 2.4.5–6 and 4.1.2–6.

The third group of distortions – along the Strait of Hercules – differs from the first two groups as the discrepancies in the coordinates of the recensions are quite distinct in this area. In contrast to the Ξ recension, the two shores of the Strait in the Ω recension are asymmetrical (cf. Fig. 48a with Fig. 48b), and a sharply indented gulf around the city of Baelo has created a dramatic latitudinal northwards shift for a small group of localities. All the locations along the Strait are characterised by a significant longitudinal shift westwards. In both recensions, the main topographical units of Ptolemy's coastline coincide with the three different groups of distortions as well as with the descriptions of the area found in the other antique sources, particularly in Pliny's and Mela's works. As in the Ξ recension, the main distortions of Ptolemy's coast in the Ω recension are, therefore, a result of the coast having been divided into three topographical units, delimited by the same principal points: Calpē, the Temple of Hera and the eastern mouth of the Baetis River with the Sacred Cape.

When the coast is positioned so that the modern coordinates of these localities coincide with their respective coordinates in the Ω recension, each group displays the same main distortions as Ptolemy's map (Fig. 49b): the main distortions of the localities between the Sacred Cape and the double mouth of the Baetis River have disappeared, while between the Baetis and the Temple of Hera, there is a same small longitudinal shift eastwards that can also be seen in the Ξ recension. We can contrast this with the residual distortions along the Strait: the longitudinal shift westwards has been greatly reduced (which also affects the Libyan localities along the Strait), while the small group of localities around the Gulf of Baelo, that is, the city and the river, as well as Mellaria, have been significantly shifted northwards.



a Initial distortions.

b Residual distortions.

Fig. 49 The division of the coast into three main topographical units explains the main distortions along the coastline between the Pillars of Hercules and the Sacred Cape ( $\Omega$  recension).

The city of Barbesula, which Ptolemy locates incorrectly in the Strait, still shows a shift southwards. Although one could propose the same hypothesis regarding the construction of the Sacred Cape and the double mouth of the Baetis River for both recensions, one can still not explain the differences in the placing of the principal localities along the Strait of Hercules in the  $\Omega$  recension. In particular, there are two features in the  $\Omega$  recension that are at variance: the Temple of Hera lies exactly on the parallel through Rhodes and the two points on the eastern boundary of the Strait do not lie on the same meridian. None of the other ancient sources states that the Cape and Temple of Hera lie on the parallel through Rhodes. Thus, the use of a structural frame composed of two meridians divided by the parallel through Rhodes does not provide us with a satisfying explanation for the differences in the  $\Omega$  recension. Although these two features do not bring about any decisive differences in the main distortions between the two recensions, they may, nonetheless, be evidence of different cartographical construction methods.

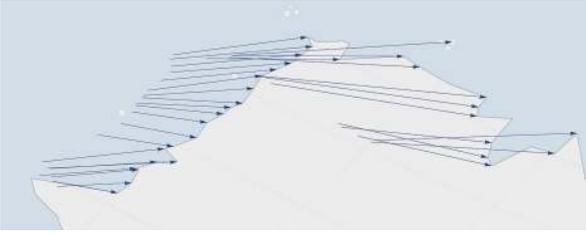


Fig. 50 Northern and western oceanic coasts of Iberia: Comparison between the modern and Ptolemy's coordinates of the  $\Xi$  recession, using Ptolemy's second map projection.

### 7.3 Western and northern coasts of Iberia

#### 7.3.1 Characteristics of the distortions in the $\Xi$ recession

The western coast of the Iberian peninsula includes the localities of the province of Lusitania, between the Sacred Cape and the mouth of the Durius River, and the locations, on the western coast of the province of Tarraconensis, from the Durius to Cape Nerion. The places on the northern coast run from Cape Nerion to Cape Oiarsō, at the north-western end of the Pyrenees. All the localities show an important longitudinal and latitudinal shift north-eastwards (Fig. 50), compared with the actual coastlines (Fig. 51 and Fig. 52). Two distinct groups can be identified: the localities on the western coast, that is, from the mouth of the Callipous River to Cape Nerion, are affected by a shift north-eastwards, which increases slightly the further north one goes. Together, this makes the coast in the *Geography* expand and rotate slightly in a clockwise direction. The places on the northern coastline also show a north-eastward shift, with a much larger distortion than the western coast.

An analysis of the northern coastal group raises a number of specific issues. Compared with the peninsula's other coastlines, only a few localities are marked on Ptolemy's map: eighteen places for a large area, with an extremely high average distance between them. The locations of many of these places are also uncertain; hence, the group of displacement vectors is quite small. Twelve out of the eighteen places can be identified, of which only nine have a well-supported location.

#### 7.3.2 Western and northern oceanic coasts of Iberia in the antique sources

*...inlustrantque terras ante ignobiles* (Mela 3.13)

The antique sources undoubtedly handled the western coastline of the Iberian peninsula quite differently from the northern coastline. The western seaboard of Iberia, comprising the provinces of Lusitania and Callaecia, was relatively well represented in the geographical sources at the time of Ptolemy. Although this coast was not as urbanised as the Mediterranean shores, both Strabo and Pliny praised its numerous harbours and



Fig. 51 Principal localities along the western coastline of the Iberian peninsula in the second century CE.

ivers, many of which were navigable for long distances;<sup>123</sup> on Ptolemy's map of Iberia half the places on the peninsula's western coast are river mouths. By contrast, the geographical works of the early Principate period regarded the northern Iberian coastline

123 Pl. 4.113–116; Strabo (3.3.4) describes the area as a 'fortunate country' (χώρα εὐδαίμων) because of its fluvial network; cf. Appian, *lb.* 301. Five of the

seven toponyms given in the *P. Artemid.*, along the coastline from the Sacred Cape to the Cape of the Artabri, are rivers.



Fig. 52 Principal localities along the northern coastline of the Iberian peninsula in the second century CE.

– its inhabitants, its cities and harbours – as uninteresting and almost unworthy of serious consideration.<sup>124</sup> Moreover, the local climate and the area's proximity to the ocean placed the region outside the 'civilised' *oikoumenē*:

Now of Iberia the larger part affords but poor means of livelihood; for most of the inhabited country consists of mountains, forests, and plains whose soil is thin – and even that not uniformly well-watered. And northern Iberia, in addition to its ruggedness, not only is extremely cold, but lies next to the ocean, and thus has acquired its characteristic of inhospitality and aversion to intercourse with other countries; consequently, it is an exceedingly disagreeable place to live in.<sup>125</sup>

One needs to distinguish between what can be classified, from a Graeco-Roman-centered point of view, as a literary topos and what could be considered a genuine lack of information in the sources. In the *P. Artemid.* (V 45), the *paraplous* stops at the Great Harbour (near modern-day A Coruña),<sup>126</sup> with Artemidorus claiming that there were no measurements for the rest of the northern coastline up to the Pyrenees. At the time of Artemidorus, the western and northern parts of Iberia were certainly regarded as being at the very fringes of the Roman world. The idea of marginal and extreme regions persisted in the historical and geographical literature long after the Roman conquest, with Appian, a contemporary and fellow countryman of Ptolemy, asserting that the oceanic coasts of Iberia remained *litora incognita*.<sup>127</sup> After many decades of military campaigns,

124 See p. 141.

125 Str. 3.1.2. The contrast between a civilised Iberia and the barbaric peoples who lived at the fringes of the Roman Empire can also be detected in the works of Polybius (3.37.11) and Livy (21.60.4).

126 On Ptolemy's map, the 'Great Harbour' corresponds to the area near Flaviū Brigantium, which matches with the same area in the *P. Artemid.*

127 Appian, *Ib.* 2–3: 'In coasting [sailors] follow the Tyrrhenian Sea as far as the Pillars of Hercules. They do not traverse the Western and Northern ocean, except in crossing over to Britain, and this they ac-

the early Augustan *arae Sestianae* were erected in *c.* 20 BCE in the vicinity of Cape Nerion (modern-day Cabo Touriñán or possibly Cabo Fisterra) in order to symbolise that the whole Iberian peninsula had been politically integrated into the territories of Rome.<sup>128</sup> However, despite being mentioned by Mela, Pliny and Ptolemy, the erection of the altars cannot be regarded as strong enough evidence that the area had become fully incorporated into the Romans' geographical *imago mundi*. According to P. Moret:

Even after the Roman conquest, the mythical picture of the westernmost point [of the Roman Empire] prevails over the empirical knowledge of a territory, even as it became better explored, delimited and marked out.<sup>129</sup>

For this reason – and although Appian's statement on the absence of Romans in the area should not necessarily be taken literally<sup>130</sup> – the geographical works of the early Principate period remained strongly influenced by Greek geographers, who continued to ignore, for the most part, the oceanic fringes of Iberia, particularly the area beyond the Sacred Cape. The large amount of new information that was brought back to Rome by its legions and administrators would only gradually be incorporated into the geographical literature.<sup>131</sup> It is this that may explain, to a certain extent at least, why, on Ptolemy's map, the northern coast is less accurate than the western seaboard.

#### *General configuration of the peninsula*

The identification and definition of the western and northern oceanic coastlines of Iberia were a relatively recent development in the geographical texts of Antiquity. Artemidorus was the first author to realise that Iberia was a peninsula.<sup>132</sup> He completed Eratos-

comply by availing themselves of the tide, as it is only half a day's journey. For the rest, neither the Romans nor any of the subject peoples navigate that ocean'

128 Le Roux 2010, 44–45 and 49.

129 Moret 2006, 38: 'Encore après la conquête romaine, la vision mythique de l'Extrême Occident l'emporte sur la connaissance empirique d'une province pourtant de mieux en mieux explorée, délimitée et balisée.'

130 P. Goukowsky 2003, 98, seems to have trusted Appian's report, although the recent synthesis of Fernández Ochoa and Morillo 2013 highlights the successful integration of Iberia's oceanic maritime areas into the Roman Empire during the early Principate period.

131 Moret 2006, 42: 'The third phase – that is, that of the Roman conquest – is the most complex. While an archaistic tendency develops in one part of ge-

ography's output, the varied information that the Roman armies bring back with them are firstly passed on to historians, often in a chaotic and contradictory way – hence, for example, the impossibility of making a coherent geographical picture of Hispania from Livy – and only later to geographers.' ('La troisième phase, celle de la conquête romaine, est la plus complexe. Alors qu'une tendance archaïsante se développe dans une partie de la production géographique, les informations de toutes sortes que les armées romaines ramènent avec elles se répercutent d'abord chez les historiens, de façon souvent chaotique et contradictoire – d'où par exemple l'impossibilité de composer un tableau géographique cohérent de l'Hispanie à partir de Tite-Live –, puis avec retard chez les géographes.')

132 Artemidorus played a vital role in spreading geographical knowledge about the peninsula. See

thenes' and Polybius' schema of Iberia<sup>133</sup> with his descriptions of the peninsula's western and northern sides (πλευρά): the western coast from Gades to the Cape of the Artabri (including the Sacred Cape) and the northern coast from the Artabri to the Pyrenees, with the Artabrian promontory being the point where the two coasts meet.<sup>134</sup>

It is possible that Artemidorus had already conceived the idea of a peninsula that could be compared to a quadrilateral, which more or less resembles a rectangle and which could be transferred to a grid of parallels and meridians; in the *P. Artemid.*, the Mediterranean coast is, for instance, described as being 'parallel to the southern *klima*'.<sup>135</sup> The terminology of this passage in the papyrus – κλίμα, περιγραφή, σχῆμα – may indicate that, in spite of its location on the fringes of the *oikoumenē*, the peninsula had by the time of Artemidorus been incorporated into Hellenistic mathematical geography.<sup>136</sup> The order of the peninsula's sides presented in the papyrus – first the Pyrenees, which connects Iberia to the mainland, then the south side, the north side and finally the west side – shows a schematisation that seems to have been modelled on Eratosthenes' σφραγίδες, rather than periplographically.<sup>137</sup> Artemidorus' schematic picture of a peninsula that is surrounded by the Mediterranean Sea, the ocean and the Pyrenees and has differently oriented sides goes unchallenged and provides a descriptive frame that is used by all the sources until Late Antiquity.<sup>138</sup> Geographical sources after Artemidorus describe the western side of the peninsula, starting from Gades (Mela, Pliny)<sup>139</sup> or from the Sacred Cape (Strabo)<sup>140</sup> and running until the northernmost tip of the peninsula. According to Strabo, this coastline not only faces west (and the ocean) but it also has an approximately north–south and rectilinear configuration: he describes the western

Moret 2013, 79: 'By completing the drawing of the coast until Galicia, by integrating the provincial divisions into his overall schema, by using terrestrial itineraries to refine the distances in his *periplous*, Artemidorus appears to be an innovator rather than an heir.' ('En complétant jusqu'à la Galice le dessin du littoral, en intégrant les divisions provinciales dans son schéma d'ensemble, en se servant d'itinéraires terrestres pour affiner les mesures de son périple, Artémidore apparaît comme un innovateur plus que comme un héritier.')

- 133 Polybius' complete picture of Iberia is unknown. According to P. Moret, the topics debated in Polybius' third book of the *Histories* explain the lack of geographical information on the Atlantic areas, especially north of the Tagus River. It is also possible that his non-extant Book 34 might have contained additional elements on the subject (Moret 2013, 80–81).
- 134 *P. Artemid.* IV 14–V 14, Pl. 2.242 = fr. 1 Stiehle 1856.

135 *P. Artemid.* IV 37–V 1: τοῖς μεσημβρίαν κλίμασιν κειμένη παράλληλος. See Moret 2013, 69–70. A similar expression can be found in Polybius (5.44).

136 Marcotte 1998, 264–266; Marcotte 2010, 353.

137 Moret 2013, 63: 'The order of this *perigraphē* betrays a viewpoint that differs radically from the traditional Greek periplography. In a deliberately schematic and simplified form, it deals with geometric modelling [...]' ('L'ordre de cette *perigraphē* trahit un point de vue qui n'est en aucune façon celui de la périprographie grecque traditionnelle. Sous une forme volontairement schématique et simplifiée, il s'agit bel et bien d'une modélisation géométrique [...].')

138 Str. 2.5.27 or, in historical sources, e.g., Appian, *Ib.* 1.1, and Justinus, *Hist.* 44.1.8–9.

139 Mela 3.11–12; Pl. 4.110–118.

140 Str. 3.1.3: 'The third is the western side, which is approximately parallel to the Pyrenees and extends from the Sacred Cape to that cape of the Artabri, which is called Nerion.'

side of the peninsula as 'in a certain way parallel to the Pyrenees (παράλληλον πὼς τῇ Πυρρήνῃ):'<sup>141</sup> As for the coast running from the Cape of the Artabri (also called Cape Nerion)<sup>142</sup> to the northern headland of the Pyrenees, descriptions are quite schematic; Mela, Pliny and Strabo note simply that the coast faces north,<sup>143</sup> while Mela adds that the shore is mainly rectilinear.<sup>144</sup>

Most of the antique sources use three particular capes, which are presented as major coastal landmarks, as a structural device: first, the western side of the peninsula beginning at the Sacred Cape;<sup>145</sup> then Cape Nerion, the point at which the western and northern sides of the Iberian oceanic coasts meet:

The Neri, the last people in that stretch, inhabit the remainder. This is as far as its western shore reaches. From there the coast shifts northward with its entire flank (*deinde ad septentriones toto latere terra conuenitur*).<sup>146</sup>

As one sails in the opposite direction from the Sacred Cape as far as those called the Artabri, the voyage is northward, and one has Lusitania on the right. Then all the rest of the voyage is eastward, thus making an obtuse angle (ἀμβλεῖαν γωνίαν ποῖων) as far as the headlands of the Pyrenees that end at the ocean.<sup>147</sup>

Last of all come the Artabri, who live in the neighbourhood of the cape called Nerion, which is the end of both the western and the northern sides of Iberia (ἡ καὶ τῆς ἑσπερίου πλευρᾶς καὶ τῆς βορείου πέρας ἐστί).<sup>148</sup>

Finally, one reaches the Pyrenees (in fact its north-western end, which Ptolemy calls Cape Oiarsō, that is, modern-day Cabo Higuer) – the unchanging boundary between Gallia and Iberia.<sup>149</sup>

141 Str. 3.1.3. In the same passage, the Pyrenees are said to be 'an unbroken chain of mountains, stretching from north to south' that form 'the boundary line between Celtica and Iberia.'

142 Str. 3.1.3.

143 Mela 3.12; Pl. 4.114; Str. 3.1.3.

144 Mela 3.12.

145 After examining the hinterland of Baetica, Strabo starts his description of the western shore of the peninsula at the Sacred Cape: 'Let us begin again at the Sacred cape, following the littoral in the other direction, namely, toward the Tagus River.' (Str. 3.3.1)

146 Mela 3.11–12.

147 Str. 2.5.15.

148 Str. 3.3.5, cf. *Chrest.* 3.16. Pliny, too, emphasises the role of Cape Nerion: 'Then there runs out into the sea a promontory shaped like a vast horn, called by some people Artabrum [...]; this headland sharply divides the land, the sea, the heavens (*terras maria caelum discriminans*). This cape ends the side (*latus*) of Hispania, and after rounding it the front (*frons*) of Hispania begins. On one side of it is the north and the Gallic Ocean, and on the other the west and the Atlantic' (Pl. 4.113). Pliny's description is, however, puzzling, as he states that Cape Nerion lies to the south of the Durus River, near Olisipo (modern-day Lisbon; see Fig. 51), which is an astonishing mistake to have made.

149 Pl. 4.110; Str. 3.3.7; Mela 3.15; Appian, *Ib.* 1.1; Diodorus, *Bibl.* 5.35.

*Distance and latitudinal data*

The sources contain very little distance information on Iberia's oceanic coastline. Pliny, whose main source for this coastline was Varro, provides several distances concerning the western coast but only up until the Minius River.<sup>150</sup> The *P. Artemid.* (V 36–45) contains a *paraplous* comprising seven stages, from the Sacred Cape to the Great Harbour, which is situated immediately after the Cape of the Artabri (that is, Cape Nerion). The values given in the papyrus constitute the greater part of the remaining distance corpus. However, although some of the figures in Pliny's work and in the *P. Artemid.* are concordant, both sources are considered incomplete, for textual and philological reasons.

Other sources contain schematic evaluations of the size of the whole peninsula. Strabo, for example, estimates the maximum breadth (πλάτος) of the whole peninsula to be 5 000 stadia and its length (μῆκος) 6 000 stadia.<sup>151</sup> Strabo's estimation of the breadth must be related to the distance between the Sacred Cape and Cape Nerion. These types of evaluations sometimes refer, however, to imprecise reference places, and the numerical range can be quite vast. Appian estimates the peninsula to be 10 000 stadia in length as well as in breadth,<sup>152</sup> while Varro estimates that there are 1 300 miles between the Sacred Cape and the middle of the Pyrenees.<sup>153</sup> Artemidorus reckons that there are 991.5 miles 'from Gades round the Sacred Cape to the Artabrian promontory, which is the longest coast of Iberia.'<sup>154</sup>

Although the extant sources contain no estimations of the entire length of the northern coast, they do include several rough evaluations of the extent of the Pyrenees, described as the 'side' where the peninsula is connected to the mainland. According to Strabo, the mountain range is 'less than 3 000 but more than 2 000 stadia' long<sup>155</sup> or 'much less than 3 000 stadia.'<sup>156</sup> This value can be traced back to Posidonius<sup>157</sup> and is also mentioned by Diodorus.<sup>158</sup>

Pliny classifies the Pyrenees in his seventh *circulus* as one of the places where the longest day is  $15 \frac{3}{5}$  hours and where a 35 ft gnomon casts a 36 ft shadow on the equinox.<sup>159</sup> The duration of the longest day corresponds to a latitude of  $45^{\circ}45'$ , if it is calculated using Ptolemy's ratio for the obliquity of the ecliptic ( $\epsilon = 23^{\circ}51'$ ).<sup>160</sup> A ratio of a gnomon to

150 Pl. 4.115–116.

151 Str. 2.4.4, 2.5.27 and 3.1.3.

152 Appian, *Ib.* 1.4.

153 Pl. 4.115. See Moret 2013, 84.

154 Pl. 2.242 = fr. 1 Stiehle 1856.

155 Str. 2.5.28.

156 Str. 3.1.2.

157 Str. 4.1.14.

158 Diodorus, *Bibl.* 5.35. The *Div. orb. terr.* (3) gives 300 miles, that is, c. 2 400 stadia, for the breadth of the peninsula *proxima a Pyrenaeis montibus*, which

tallies with the distance of a journey from Taraco to Ouarsō that was passed on by Pliny (3.29: 307 miles) and the distance of a similar journey recorded by Strabo (3.4.10: 2 400 stadia). This minimal breadth is said to be slightly smaller than the length of the Pyrenees (Str. 2.5.28 and 3.1.3; Pl. 3.29, cf. Mela 6.86).

159 Pl. 6.218.

160 Ptolemy explains how to convert a duration of the longest day into a latitude in degrees in the *Almagest* (2.2). See Rinner 2013, 27.

its shadow of 35:36 tallies with a latitude of  $45^{\circ}48'$  (or rounded up to  $45^{\circ}50'$ ).<sup>161</sup> Pliny's text mentions only *Pyrenaeum*, which is an extremely imprecise location for a mountain range that stretches, according to him, from the north to the south. Ptolemy's latitude value for Cape Oiarsō, the northern extremity of the Pyrenees, is  $45^{\circ}50'$ ,<sup>162</sup> which matches Pliny's gnomonic value perfectly.

### 7.3.3 The main distortions in the $\Xi$ recension explained

When one compares Ptolemy's coordinates of the  $\Xi$  recension with the actual coordinates, one can observe two groups that are delimited by three main points: the Sacred Cape, Cape Nerion and Cape Oiarsō (Fig. 50). One can explain how Cape Oiarsō was positioned in  $\Xi$  recension by using the latitude passed down by Pliny and a distance datum. Pliny's gnomonic data are not part of the system of parallels that Ptolemy took from Hipparchus, which used durations with one-hour, half-hour and quarter-hour gaps.<sup>163</sup> There is also no consensus on a precise value for the extent of the Pyrenees. I have picked 2 500 stadia as a value that corresponds to the 'less than 3 000 but more than 2 000 stadia' claimed by Strabo. Cape Oiarsō (*O*) can then be positioned on the map thanks to a geometrical ruler-and-compass construction (Fig. 53). It is situated:

- on the circle, with the Temple of Venus (*T*) at the centre and with radius  $r \cdot d_{TO}$ , where  $d_{TO}$  represents a distance of 2 500 stadia between *T* and *O*, and  $r$  represents a reduction of one-fifth;
- and on the parallel of latitude  $45^{\circ}50'$ , which tallies with Pliny's gnomonic value.

Despite the fragmentary condition of the sources and leaving aside Pliny's list of latitudes, distances are the only kind of geographical information that is supplied by the antique sources.

The position of Cape Nerion can be determined by combining two distance data. Strabo writes that the distance between the Sacred Cape and Cape Nerion comes to 5 000 stadia, which he regards as the maximum breadth of Iberia. Using a ruler-and-compass construction, one can thus position Cape Nerion (*N*) as follows:

- on the circle, with the Sacred Cape (*S*) at the centre and where the radius equals  $r \cdot d_{SN}$ , where  $d_{SN}$  is the distance between *S* and *N* passed down by Strabo, and  $r$  corresponds to a reduction of one-fifth;

161 A method to convert the ratio of a gnomon to its shadow into a latitude in degrees is given in the *Almagest* (2.5). See Rinner 2013, 29.

162 *Geogr.* 2.6.10.

163 See p. 189.

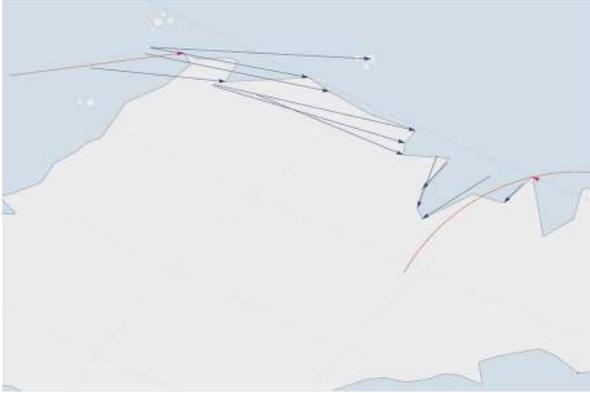
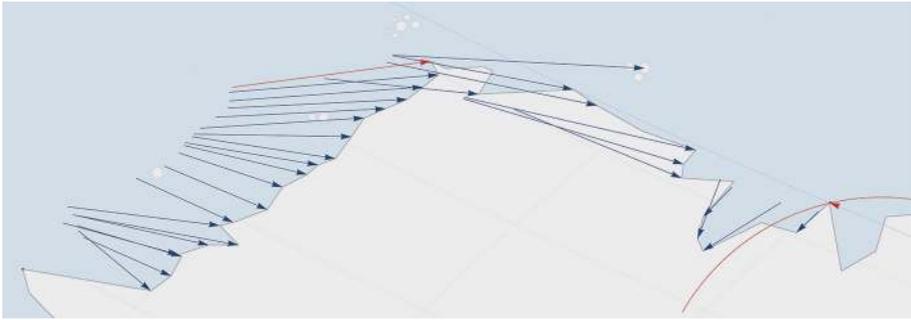


Fig. 53 Ruler-and-compass construction to locate Cape Ouarsō, using Ptolemy's second map projection ( $\Xi$  recension).

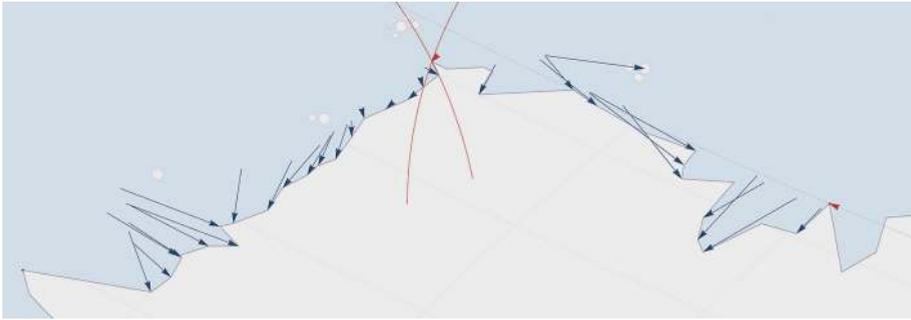
- and on the circle, with Cape Ouarsō ( $O$ ) at the centre and where the radius equals  $r \cdot d_{ON}$ , where  $d_{ON}$  is the distance between  $O$  and  $N$ , and  $r$  corresponds to a reduction of one-fifth (Fig. 54).

As none of the sources refer to any distances for the entire journey between Cape Ouarsō and Cape Nerion, the distance required to map Cape Nerion must be conjectured. A reasonable value for  $d_{ON}$  would seem to be 4 600 stadia or 575 miles, which also needs to be reduced to four-fifths of the initial length. A distance of 4 600 stadia could also correspond to a maritime journey of four nychthemera ( $4 \times 1\ 000$ ) and one day (600). To draw the circles used in locating Cape Nerion (Fig. 54b), the distances were measured with a compass along the graduations of Ptolemy's 12th main parallel.<sup>164</sup> The coordinates of this landmark, taken from the geometrical construction, even though only some of the data derive from the extant sources, closely approximate Ptolemy's coordinates of the same locality in the *Geography*. This mapping procedure – in which Iberia's western and northern coasts were plotted in relation to the three main capes – accounts for the main distortions on Ptolemy's map. The construction depended not only on the numerical information (distances and latitudinal data) that could be found in the ancient sources but also on the antique conceptualisation of this part of the Iberian peninsula, which was initiated by Artemidorus and is attested in a number of geographical sources. On the northern coast, the mapping procedure has generated a shift towards the north and the east, which corresponds to the main distortions on Ptolemy's map of this area. A small group of places between Cape Trileukon and the Naelo River still shows a longitudinal shift as well as a latitudinal shift southwards, but only for the localities that make up the Gulf of Flaviobriga. These residual distortions hence concern small groups of

164 See pp. 287–290.



a Initial distortions after Cape Oiarsō's location was constructed.



b Residual distortions after the three main capes on Iberia's oceanic coastlines were positioned.

Fig. 54 Ruler-and-compass construction to locate Cape Nerion ( $\Xi$  recension).

places. Along the western coastline, the construction has also resulted in a shift north-eastwards. The area between the mouth of the Munda River and Cape Nerion still shows a small increase in latitude, and the shift eastwards (though smaller than before the construction) of a group of places between the mouth of the Callipous River and Mount Selēnē also remains.

#### 7.3.4 The main distortions in the $\Omega$ recension explained

The western and northern coasts of Iberia exhibit the same main distortions in both the  $\Xi$  and the  $\Omega$  recensions. The differences between the recensions are clearly discernible, although they concern local groups of places, such as the few places that form the Barbarion promontory or the shapes of the gulfs of the northern coastline. The same groups of distortions can be identified in both recensions. The  $\Omega$  longitude of Cape Oiarsō ( $5^\circ$ ) differs slightly to the value in the  $\Xi$  recension ( $5^\circ 10'$ ). The mapping

process that can explain the position of Cape Oiarsō in the  $\Xi$  recension can also account for the construction of the cape in the  $\Omega$  recension. However, the location of the point that was constructed is closer to the location of Cape Oiarsō in the  $\Xi$  recension than to its location in the  $\Omega$  recension. As the variation does not exceed ten minutes of a degree in longitude, it can be regarded as tolerable. A construction that would explain the  $\Omega$  coordinates more accurately has yet to be identified.



## 8 The localised coastal distortions explained

In the previous chapter the main groups of coastal distortions were explained by mapping, in the first instance, just a small number of reference places. However, after having positioned the Iberian coastline in accordance with the main constructed points, the existence of many smaller distortions became apparent (see Chapter 7). Although these residual distortions concern only small areas, there are particularly significant variations between the two recensions. A detailed examination is, therefore, in order.

### 8.1 Distortions related to the coastline in the $\Xi$ recension

#### 8.1.1 South-western coast of Iberia

The localities on the south-western coast of Iberia (Fig. 55), between the Pillars of Hercules and the Sacred Cape, show a small number of residual distortions when the coast is positioned in relation to the group's main localities – Calpē, the Temple of Hera, the eastern mouth of the Baetis River and the Sacred Cape (Fig. 56). The displacement vectors between the Sacred Cape and the Baetis are extremely small: only the city of Ossonoba has been shifted westwards (by *c.* 20'), while the rest of Ptolemy's coast matches the modified modern coordinates perfectly. The localities between the western mouth of the Baetis River and the Temple of Hera have been shifted eastwards; the modified coordinates of the actual coast depict a slightly convex curve, whereas Ptolemy's map shows a large, distinct gulf. Within the Strait of Hercules, the city and the river of Baelo as well as Mellaria have been shifted slightly to the north-east; by contrast, the cities of Iulia Traducta and Barbesula have been shifted south-westwards and Carteia south-eastwards. Thus, a few groups of localities show residual distortions as they deviate slightly from the modern coastline. Ptolemy divided the coastline into a number of main topographical units: he focused on just a few distinct points from which the rest of the localities along the coast were then positioned.



Fig. 55 The south-western coast of Iberia and the Strait of Hercules in Ptolemy's *Geography* ( $\Xi$  recension).

Latin sources, such as the works of Pliny the Elder and Pomponius Mela, supply not only the names of localities where the topography clearly changes but also provide invaluable information about the coastal topography itself, that is, the shape of the coastline between the main localities.<sup>1</sup> Mela writes that the shore from the Sacred Cape to the Baetis is almost rectilinear and that the Strait of Hercules resembles a long, narrow channel. Pliny describes the littoral between the Cape of Hera and the Baetis as a curved bay. The descriptions in these sources, the shape of Ptolemy's coastline and the groups of displacement vectors share many similarities.

A way of explaining the residual distortions would be to transfer the descriptive elements found in the sources directly on to a map. A coastal section that is described as rectilinear or quasi-rectilinear can be drawn as a straight line. As far as the south-western coast of Iberia is concerned, the coastline between the Sacred Cape and the mouths of the Baetis River can be drawn as a straight line according to the topographical information passed down by Mela. Pliny describes a gulf between the Baetis River and the Temple of Hera, although he does not specify its exact shape, its depth or the appearance of the shore. In the absence of more precise information, such a gulf can be schematised as a simple, regular, curved line between the two boundaries.

<sup>1</sup> See p. 293.



Fig. 56 An outline of the actual coastline overlaid on Ptolemy's map reveals the residual distortions along the south-western coast of Iberia (Ξ recension).

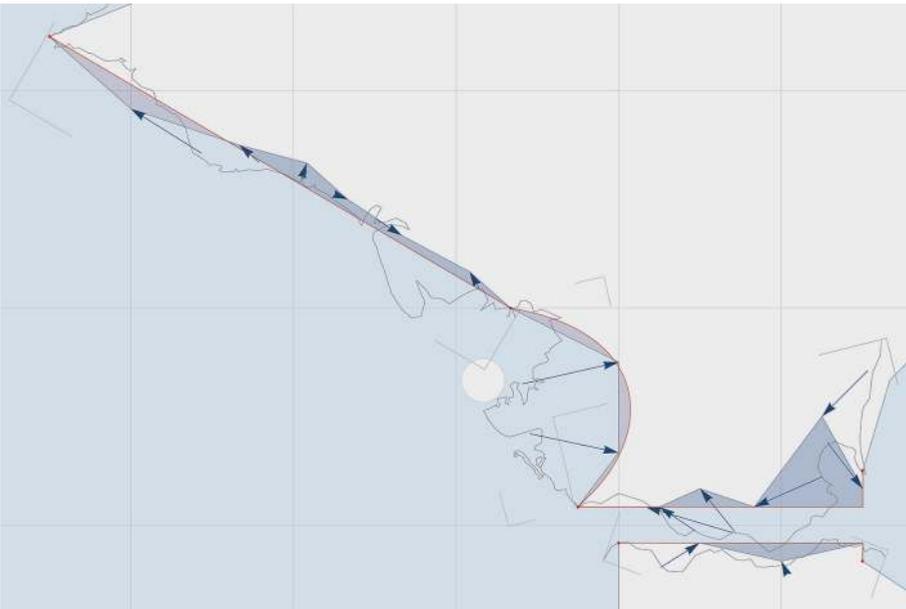


Fig. 57 A model to explain the residual distortions: topographical information was transferred to the map with the help of simple geometrical forms (Ξ recension).

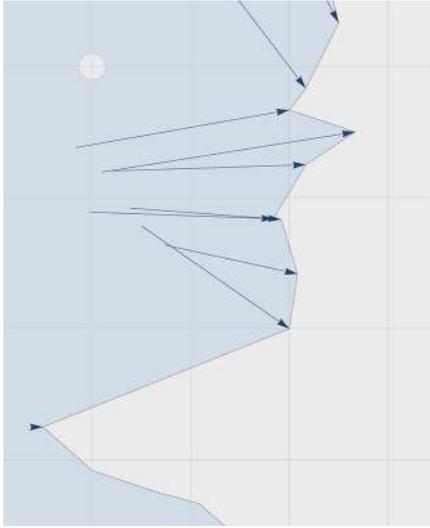


Fig. 58 Residual distortions along the coast of Lusitania, on a map using Ptolemy's regional projection ( $\Xi$  recension).



Fig. 59 The coast of Lusitania in Ptolemy's *Geography* ( $\Xi$  recension).

The shape of the Strait of Hercules, which is said to be a narrow channel, like an 'isthmus of the sea' according to Ptolemy,<sup>2</sup> can be drawn as two parallel segments, with the parallel through Rhodes running through the centre of the Strait (Fig. 57). The differences between the coastline of the  $\Xi$  recension and the coastline that was drawn schematically following the topographical descriptions passed down by the sources (notably Pliny and Mela) are very small (Fig. 57). The only important variation concerns the city of Barbesula, within the Strait of Hercules. Ptolemy's Barbesula lies too far north ( $\phi = 36^{\circ}30'$ ) in comparison with the schematised coastline. However, it is possible that the latitude given for this city in the  $\Xi$  recension was the result of a simple copying error and that it was originally  $36^{\circ}10'$  (as in the  $\Omega$  recension).<sup>3</sup>

### 8.1.2 Coast of Lusitania

The coastal localities of Lusitania, from the Sacred Cape to Mount Selēnē (Fig. 59), show significant residual distortions when the western coast is positioned in relation to the Sacred Cape and Cape Nerion (Fig. 58). The localities can be divided into two groups: compared with the modified modern coordinates, the localities from the Sacred Cape to Cape Barbarion show a longitudinal distortion eastwards and a small shift southwards;

2 See p. 303.

3 See p. 97.

the localities between Cape Barbarion and Mount Selēnē display the same longitudinal distortion but with a slight shift northwards. The coastal localities to the north of this group have been affected by an important shift south-westwards. Both stretches of coastline also show an increase in length.

Several sources describe the coast of Lusitania to the north of the Sacred Cape. There are few important cities in this area – besides Olisipo (modern-day Lisbon) – and geographical texts generally focus on the topography of the coastline. Mela gives a very detailed description. According to him, the coast follows a roughly north–south direction and includes a succession of bays and promontories. Starting from the south-west of the peninsula, the coast forms a massive headland that is made up of three capes and two bays:

By contrast, on the other side of the Anas, where it faces the Atlantic sea, Lusitania at first goes on with a mighty thrust into the sea; then it stops and recedes farther than Baetica does. Where it juts out, the coast spreads into three promontories, with the sea being received in two folds. The promontory besides the Anas is called Wedge Field (*ager Cuneus*), because it runs out from a wide base and gradually hones itself into a point; they call the second one Sacred Cape (*Sacrum promonturium*) and the one beyond Great Cape (*Magnum promunturium*). On Wedge Field are Myrtili, Balsa and Osso-noba; on Sacred Cape, Laccobriga and Port Hannibal; on Great Cape, Eborā. Bays lie between the promontories. Salacia is on the first one; on the second are Olisipo and the mouth of the Tagus, a river that generates jewels and gold.<sup>4</sup>

Mela's description of the *ager Cuneus* is echoed in Pliny's text<sup>5</sup> as well as in Strabo's *Geography*. Strabo, however, supplies a different toponymy and clearly postulates (unlike Mela and Pliny) a synonymy between the Latin *ager Cuneus* and the Sacred Cape.<sup>6</sup> In his description, which is less detailed than Mela's, the western coast of Lusitania has a succession of capes and bays, where the Sacred Cape as well as Cape Barbarion are the most noteworthy points:

Now, beginning again at the Sacred Cape, following the coast in the other direction, namely, towards the Tagus River, there is first a gulf. Cape Barbarion lies afterwards, and near it the mouth of the Tagus, and the distance by sailing straight is (...) stadia. [There is a tower on the cape] and the distance from it to the coast is 10 stadia. Here, too, there are estuaries. One of them extends inland from the previously mentioned tower for more than 400 stadia, and along this

4 Mela 3.6–8.

5 Pliny (4.116) uses similar vocabulary in his description: *promunturium Sacrum et alterum Cuneus, oppida Osso-noba, Balsa, Myrtilis*.

6 Str. 3.1.4.

estuary the country is watered as far as Salacia. Now the Tagus not only has a width of about 20 stadia at its mouth, but its depth is so great that merchant-ships of 10 000 measures' burden can ascend it.<sup>7</sup>

The sources provide little information on the precise shape and size of the numerous capes and inlets in the area. That the Sacred Cape is large is well documented, but the sources contain no clear measurements. Pliny gives an interesting but bewildering description of a cape 'called by some people Artabrum, by others Great Cape, and by many Cape of Olisipo': it is said to be 'running out into the sea shaped like a vast horn (*vasto cornu*)' and 'the distance to which this promontory projects has been given as 60 miles, and by others as 90 miles.'<sup>8</sup> The disorder in the toponymy makes it impossible to identify positively which cape Pliny is describing in this passage.<sup>9</sup>

*Topographical division into gulfs and capes to explain the distortions*

There are, therefore, clear similarities between the sources' division of the coast into several capes, with gulfs lying between them, the groups of residual distortions and the form of Ptolemy's coastline. The names and the number of headlands in the *Geography* do not, however, match any one source exactly. Ptolemy's toponymy is close to Strabo's text, although the topography (three capes, two gulfs) matches Mela's description more closely. In addition, unlike Cape Barbarion, which is attested in Strabo's text,<sup>10</sup> Mount Selēnē can only be found in Ptolemy's *Geography*: the catalogue reads 'Mount Selēnē, a cape.'<sup>11</sup> Several references to promontories between the Tagus and Durius rivers are, nonetheless, attested in the sources, although the toponymy does vary. Ptolemy's Mount Selēnē and Mela's *Magnum promunturium* may be the same cape (modern-day Cabo da Roca, near the Sierra de Sintra). The way the coast between the Sacred Cape and Mount Selēnē was subdivided into capes and bays may explain the residual distortions (Fig. 60a). When the coastal sections are constructed in relation to the positions of the three capes of Ptolemy's catalogue (the Sacred Cape, Cape Barbarion and Mount Selēnē), the result is a longitudinal shift as well as an increase in the length of the coastline (Fig. 60b). These distortions are the main differences between the *Geography* and the modified modern coordinates. The remaining displacement vectors reveal very small differences. The positions of Cape Barbarion and Mount Selēnē were regarded as already known in the above mapping process (see Fig. 60). These two promontories as well as Cape Nerion are oriented in a north–south direction in the *Geography*, which corresponds to Strabo's description in which the western side of the peninsula stretches from south to north.

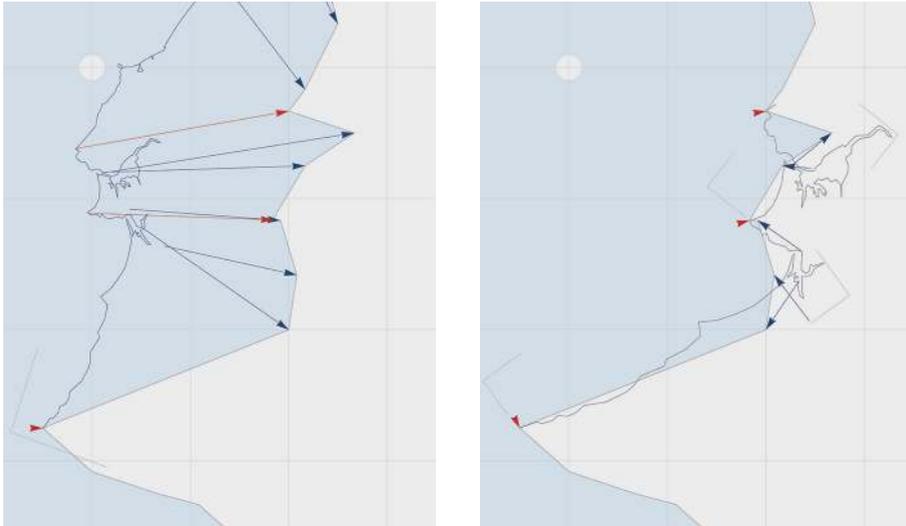
7 Str. 3.3.1. The first part of the passage in the manuscripts is incomplete. See Lasserre 2012, 51 and 193.

8 Pl. 4.113–114.

9 See note 148, p. 316.

10 Str. 3.3.1.

11 *Geogr.* 2.5.4: Σελήνης ὄρος, ἄκρον.



a Initial distortions.

b Residual distortions.

Fig. 60 Residual distortions that occur between the Sacred Cape, Cape Barbarion and Mount Selēnē after the coast was positioned in accordance with the location of the main capes (Ξ recession).

Ptolemy's positioning of the two promontories in comparison with the Sacred Cape is mirrored in the sources: according to Strabo, the Sacred Cape is the most westerly point of the coast, while Mela reports that the littoral to the north of this cape recedes dramatically to the east.<sup>12</sup> Despite the fact that the sources agree on the location of these promontories, it has proved impossible to develop a model that explains how the coordinates of Cape Barbarion and Mount Selēnē were determined.

#### *Drawing of the coastline*

Small residual distortions are visible when the coastal sections are positioned in accordance with the capes (Fig. 61a). The differences concern the appearance of the coastline between the three capes. Unfortunately, precise information about the shape of the coastline in this area is rare. Pliny's description is vague, which prevents us from making a thorough comparison with Ptolemy's map. Mela writes tersely that 'bays lie in-between (*sinus intersunt*)', which exactly matches Strabo's description of the coast between the Sacred Cape and Cape Barbarion: 'there is a gulf (κόλπος ἔστιν)'.<sup>13</sup> The distance data given by Strabo on the width of the Tagus at its mouth are irrelevant to its

<sup>12</sup> See p. 315 and p. 327.

<sup>13</sup> Mela 3.8 and Str. 3.3.1. See p. 327.

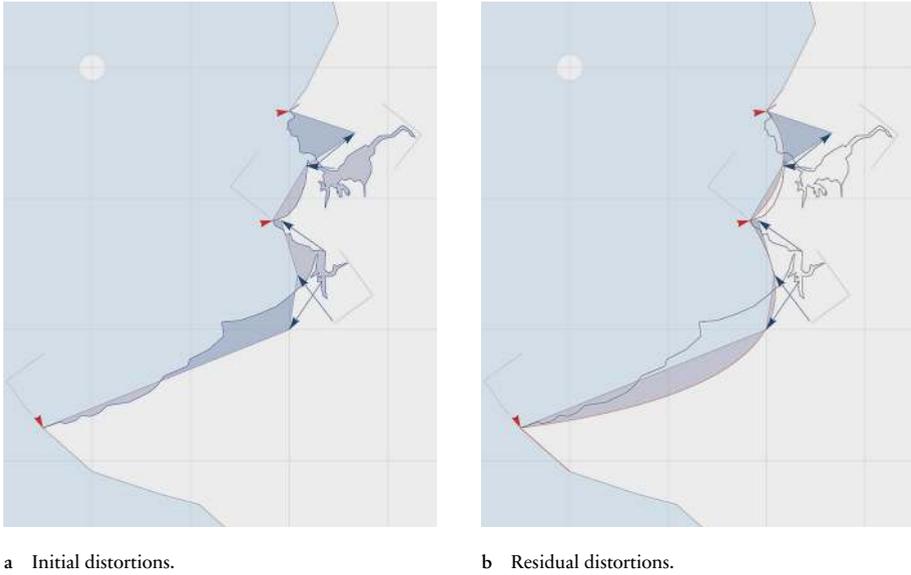


Fig. 61 A model to explain the residual distortions: topographical information (transmitted by Strabo and Mela) was transferred to the map with the help of simple geometrical forms. (Ξ recension).

configuration in the *Geography*. In general, the sources do not give details about the size and the appearance of the capes.

However, toponyms, such as ‘Cape Barbarion’, are themselves descriptive. The terms ἄκρα, ἄκρον, ἀκρωτήριον or *promunturium* can be applied to all kinds of headlands but they supply no details *per se* about a headland’s shape, size or orientation.<sup>14</sup> Likewise, the terms κόλπος or *sinus* are used to describe both a small coastal inlet and, at the other end of the scale, a large gulf.<sup>15</sup> On Ptolemy’s map, the three promontories resemble acute angles, while the gulfs have the form of a gentle curve: the bay of Salacia is vast and mostly open, while the gulf of Olisipo, where the mouth of the Tagus lies, resembles an acute-angled inlet. The topographical information found in the sources – even very concise terms such as *sinus/promunturium* and κόλπος/ἀκρωτήριον – can be used to explain the distortions of the coastline: the capes can be drawn as acute angles and the gulfs as gently rounded forms. The mouth of the Tagus, which is described as an estuary with a large entrance, can be drawn in the form of an acute angle inside the bay between Cape Barbarion and Mount Selēnē (Fig. 61b).

14 Kowalski 2012, 178–180.

15 Kowalski 2012, 188–189.



Fig. 62 The coast of the Iberian Sea in Ptolemy's *Geography* ( $\Xi$  recension).



Fig. 63 Iberia's Mediterranean coastline from the Ebro River to the Pyrenees in Ptolemy's *Geography* ( $\Xi$  recension).

### 8.1.3 The Mediterranean coast

Ptolemy's coastline from Calpē to the Cape of Charidēmos shows a large, regularly shaped gulf, which corresponds to the description of the shore of the Iberian Sea in the catalogue (Fig. 62).<sup>16</sup> With the exception of the gulf-shaped Iberian Sea coastline, the rest of the Mediterranean coast in the *Geography* does not have any individualised topographical units (Fig. 63 and Fig. 64). Some promontories, such as Cape Tenebrius and Cape Lounarion, are clearly visible, but Cape Scrombraria is hard to distinguish. The coastal sections between these capes are neither rounded gulfs nor strictly rectilinear in shape. Rather, the coast between the Cape of Charidēmos and the Pyrenees forms a slightly undulating littoral from where several capes jut out. After the Cape of Charidēmos, Carthago Nova and its neighbouring localities form a roughly straight south-west/north-east-oriented section; the coast continues in an approximately east-west direction until Cape Tenebrius. The shore then goes northwards, curving slightly before reaching the

<sup>16</sup> *Geogr.* 2.4.7. The  $\Xi$  coordinates of the city of Sexi, which lies on the Iberian Sea coast, have been cor-

rected using the values in the  $\Omega$  recension; see p. 155.

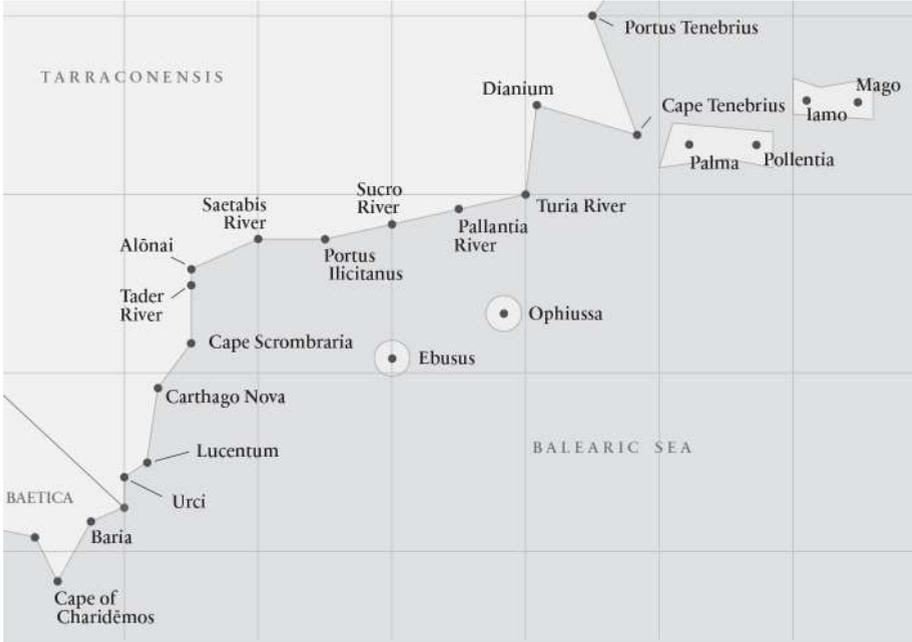


Fig. 64 Iberia's coastline from the Cape of Charidēmos to Portus Tenebrius in the *Geography* (Ξ recension).

mouth of the Ebro River. The coast is gently indented until Emporion, interrupted only by Cape Lounarion, before turning eastwards and reaching the Temple of Venus.

*Characteristics of the distortions*

Once the entire Mediterranean coast had been positioned in accordance with the main localities (Calpē, Carthago Nova, the Ebro River, Emporion and the Pyrenean Temple of Venus), it became clear that the differences between the coastline in the *Geography* and the modified modern coordinates were quite small (Fig. 65). Apart from the coastal section between Calpē and the Cape of Charidēmos, where the displacement vectors reveal that the whole gulf has been affected by the same distortion (a slight expansion paired with a clockwise rotation), the distortions of the rest of the localities up to the Pyrenees are irregular, either affecting very local groups of localities or varying from locality to locality. In addition, it became apparent that a significant number of localities (such as Lucentum) had been inaccurately situated, while the positions of some short sections – especially between Carthago Nova and the mouth of the Ebro River – had been erroneously determined.

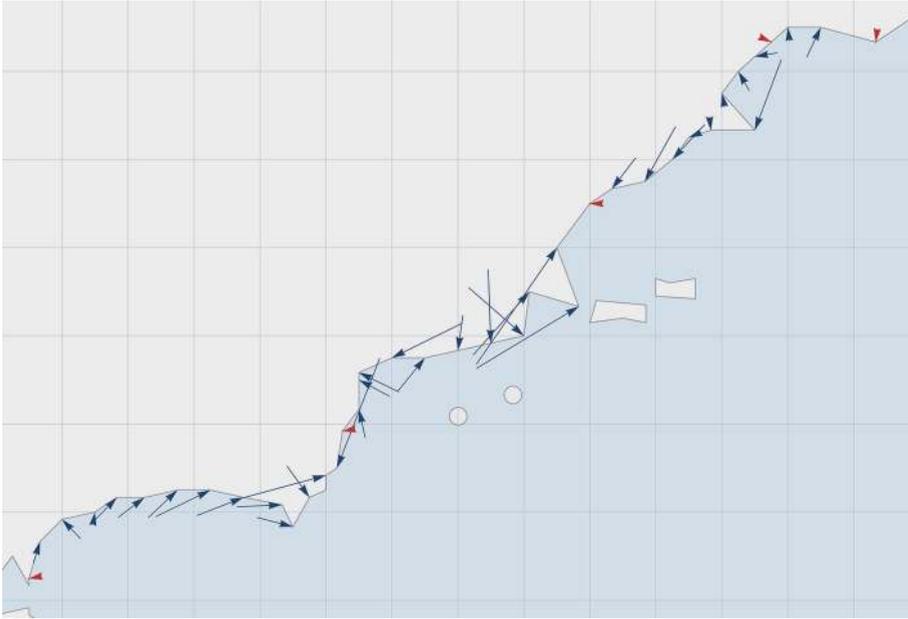


Fig. 65 Residual distortions along the Mediterranean coast of Iberia, on a map using Ptolemy's regional projection ( $\Xi$  recession).

#### *Topographical descriptions of Iberia's Mediterranean coast*

The descriptions of the topography of this coast found in the antique sources tend to be either very detailed or extremely concise. Mela, for example, gives a detailed description, thereby providing a clear topographical coastal structure. He describes a coherent succession of capes and gulfs, provides information about the size and shape of the bays, and locates the important topographical breaks.<sup>17</sup> By contrast, the descriptions of Pliny, Strabo, Ps.-Scylax and Ps.-Scymnos, as well as the historical texts of Polybius, Livy and Appian, for instance, are decidedly concise. Mostly, they only give the names of the localities along the coast, sometimes with details about the nature of the locality (harbour, small town or important city). However, they rarely supply any information on the appearance of the coastline, which is particularly surprising, given that the coast had for long been integrated into the Greek and Roman world. Strabo describes only two topographical features in detail, namely a cape near Carthago Nova and a small bay close to Tarraco,<sup>18</sup> while Pliny mentions only the promontory near Carthago Nova.<sup>19</sup>

17 Mela 2.89–96. See p. 279. His description closely resembles the actual coastline.

18 Str. 3.4.6.–7.

19 Pl. 3.19.

*Drawing of the coastline*

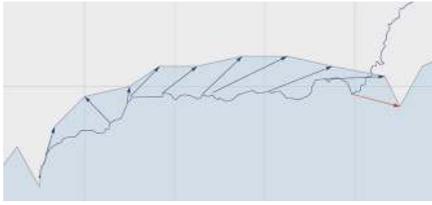
The description of the Mediterranean coast in the *Geography* does not agree at all with Mela's account, which means that we cannot base an explanation of the residual distortions of Ptolemy's coast on the former's topographical information. The appearance of the coast in the *Geography* can, nevertheless, be compared with the distortions: where Ptolemy's coast has a regular, rounded gulf (the section along the Iberian Sea, that is, between Calpē and the Cape of Charidēmos), the differences follow a coherent pattern; where the coastline does not follow a specific schema, the displacement vectors show distortions that vary from locality to locality.

The similarities between the Iberian Sea coastline and its related distortions are striking (Fig. 66a). As no ancient source mentions this large gulf, the relative accuracy of Ptolemy's map is surprising. It is possible – although it cannot be proven – that a description of the gulf-shaped coastline between the Pillars of Hercules and the Cape of Charidēmos was used and that this could explain the distortions. When the coast is positioned so that the coordinates of Calpē and the Cape of Charidēmos in the *Geography* coincide with the respective modified modern coordinates, a counterclockwise rotation and a small shift eastwards are generated, which corresponds to Ptolemy's initial distortions (Fig. 66b). Given that, with the exception of Ptolemy's catalogue, there is a total absence of information on the Cape of Charidēmos, it is impossible to explain how the cape was positioned on the map. The residual distortions affect the shape of the gulf between the two capes, which is slightly deeper than the modified modern coastline. A way of explaining the distortions using the same topographical information (a gulf-shaped coastline, without any additional details) would be to draw the coastline in the form of a regular curve (Fig. 66c).

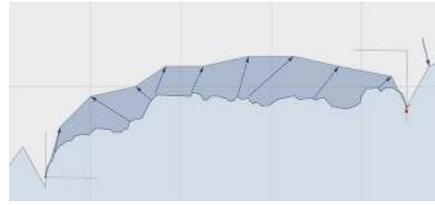
The larger differences between the Cape of Charidēmos and the Temple of Venus concern localities that were wrongly positioned along the coast (Fig. 67). Besides these cases, the differences between the coastline in the *Geography* and the outline of the modified modern coast are quite small and vary from locality to locality. Although Mela's description is very precise, it does not match Ptolemy's map. None of the other sources – including Strabo and Pliny – give any indication of the shape of the coastline, with the exception of brief mentions of certain promontories. If one follows the other sources, the topography of this coastal section can thus be taken to be 'unspecified', that is, the coast is not strictly straight, it has no major gulfs or headlands and there are no breaks of any note in the coastline.

On Ptolemy's map, four toponyms are named as promontories: the Cape of Charidēmos and Capes Scrombraria, Tenebrius and Lounarion. With the exception of Cape Scrombraria,<sup>20</sup> the promontories are all similar in shape: they resemble acute angles,

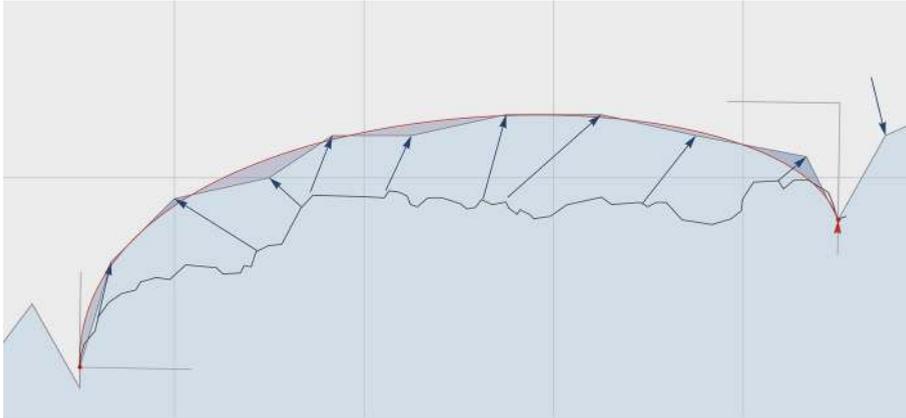
20 In the  $\Xi$  recension, Cape Scrombraria, to the north of Carthago Nova, has the form of a slightly con-



a Initial distortions.



b Residual distortions after the coastline was positioned in accordance with the two extreme points of the gulf.



c The coastline was drawn in the form of a large, regular curve.

Fig. 66 A possible explanation of the distortions along the Iberian Sea coastline based on simple topographical information, carried out on a map using Ptolemy's regional projection ( $\Xi$  recension).

formed by three points, that is, they are made up of two localities positioned at the far end of the two arms of the vertex angle, so that the vertex points roughly in the opposite direction of the general orientation of the nearby coastline (Fig. 68). The coastal sections between these capes form an undulating littoral. In the absence of any other information, it is possible that the distortions of Ptolemy's coast are the result of the graphical transcription of topographical information: an 'unspecified' topography or a coastal topography lacking clear definition could have led to the drawing – on the map – of an undulating line (rather than a straight line, which would have represented a rectilinear coast, or a concave curve, which would have been acceptable for a gulf or bay) to connect the main localities of the constructed coast. In addition, the few toponyms

vex curve, unlike the coastline's other capes. In

the  $\Omega$  recension, however, it has the same shape as Ptolemy's other capes.

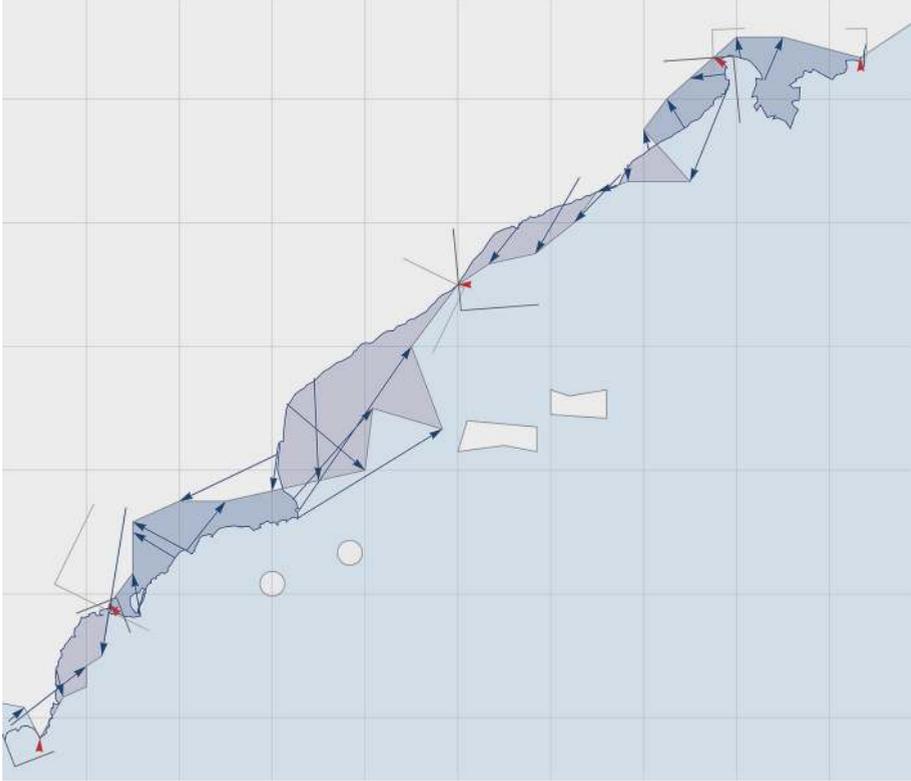


Fig. 67 An outline of the actual coastline overlaid on Ptolemy's map reveals the residual distortions along the Mediterranean coast of Iberia ( $\Xi$  recession).

that describe a cape – again there is no information on their size or shape – could have been drawn as acute angles.

#### 8.1.4 Northern and north-western coasts

The positioning of the northern and north-western coasts in accordance with the coordinates of the Sacred Cape and Capes Nerion and Ouarsō reveal important residual distortions as well as several smaller groups of distortions (Fig. 69). On the north-western coast, three groups can be defined: from Cape Nerion to the mouth of the Minus River, the displacement vectors show almost no distortions; between the mouths of the Minus and the Durus rivers, a progressive latitudinal distortion southwards and a slight counterclockwise rotation are visible; and from the Durus to the Munda rivers there is a shift in a south-easterly direction.

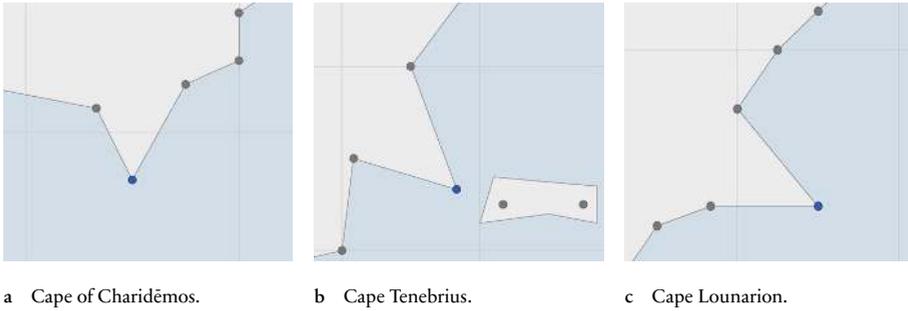


Fig. 68 The capes of Iberia's Mediterranean coast ( $\Xi$  recension).



Fig. 69 Residual distortions along the northern coastline of Iberia, carried out on a map using Ptolemy's regional projection ( $\Xi$  recension).

Many toponyms of the northern and north-western littoral (Fig. 70 and Fig. 71) – the Altars of Sestius, the mouth of the Vir River<sup>21</sup> and its neighbouring nameless cape, the mouth of the Nabius River as well as the cities of Noega Oukesia and Menosca – have not been satisfactorily identified and/or located, and so several displacement vectors are missing. Two groups of common distortions can be distinguished: the localities between Cape Trileukon and the mouth of the Naelo River have been shifted massively eastwards, while the localities in the Gulf of Flaviobriga show an important latitudinal shift southwards.

21 This river may have a connection with the city of Iria Flavia.



Fig. 70 The northern coast of Iberia in Ptolemy's *Geography* (Ξ recension).

*Topographical description of Iberia's northern and north-western coasts*

Pliny's description provides little information on the appearance of the northern coast,<sup>22</sup> while Mela is the only source to give detailed topographical information on the peninsula's northern oceanic area, in particular the section between Cape Nerion and Cape Ouarsos. Mela draws attention to the winding coastline and the numerous river mouths between the Tagus River and Cape Nerion:

[3.8] From these promontories [*sc.* Wedge Field, the Sacred Cape and Great Cape] to the part that has receded, a huge bend opens up (*ingens flexus aperitur*), and on it are the old Turduli and the towns of the Turduli as well as the Munda River, which flows broadly more or less halfway up the coast of the last promontory, and the Durius River, which washes the foot of the same promontory. [3.9] The oceanfront there has a straight shoreline (*rectam ripam*) for a considerable distance and then protrudes a little bit (*paulum eminent*) where it takes a moderate bend (*modico flexu accepto*). At that time, drawn back again and again and lying in a straight line (*recto margine iacens*), the coast extends to the promontory we call Celtic [that is, Nerion]. [3.10] Celtic people – except for the Grovi from the Durius to the bend – cultivate the whole coast here, and the rivers Avo, Celadus, Nebis, Minius and Limia (also known as the Oblivion) flow through their territory. The bend itself includes the city of Lambriaca and receives the Laeros and the Ulla rivers. [3.11] The Praetamarici inhabit the section that juts out, and through their territory run the Tamaris and Sars rivers,

22 The Paesici are said to occupy a peninsula to the east of the oppidum of Noega (Pl. 4.111).



Fig. 71 The north-western coast of Iberia in Ptolemy's *Geography* (Ξ recension).

which arise not far away – the Tamaris next to the harbour of Eborā, the Sars beside the Tower of Augustus, which has the famous inscription. The Super-tamarici and the Neri, the last people on that stretch, inhabit the remainder. This is as far as the western shore reaches.

According to Mela, the coast between Cape Nerion and the Pyrenees is made up of two sections, the first from Cape Nerion to the Cantabri and the Salia River, where the coast is roughly straight, and the second from there to the Pyrenees, where the coast forms a vast gulf:

[3.12] The shoreline, uninterrupted except for moderate recesses and small promontories (*modici recessus ac parua promunturia*), is almost straight (*paene recta*) until it reaches the Cantabri. [3.13] On that shore, first of all, are the Artabri – actually a people of Celtic ancestry, then the Astyres. In the territory of the Artabri a bay admits the sea through a narrow mouth but encloses it with its not-so-narrow grasp; it rings the city of Adrobrica and the mouths of four rivers. Two mouths are little known, even among locals; through the other two the Mearus and the Iubia rivers make their outlets. On the coast that belongs to the Astyres is the town of Noega, and on the peninsula sit the three so-called Altars of Sestius [...]. [3.14] From what they call Salia River, though, the coast begins to recede gradually (*paulatim recedere*), and the breadth of still-wide Hispania begins to contract more and more (*magis magisque spatia contrahere*). The land narrows so much that where it abuts Gallia, its breadth is less by half than where it extends its western shore.

Pliny and Strabo also describe how the peninsula narrows at the Pyrenees,<sup>23</sup> while the *P. Artemid.* contains a description of a 'quite great gulf' (κόλπος εὐμεγέθης) along the northern coast, where it abuts the Pyrenees.<sup>24</sup> None of the sources provides a precise evaluation of the size of this vast coastal recess or of its exact geographical location. Such a narrowing can be found later in Orosius, who amplifies this characteristic, so that the peninsula is, according to him, like a triangle, surrounded by the Internal Sea and the Ocean, attached to the continent by one of its vertices, which is the Pyrenean Mountain.<sup>25</sup>

Mela emphasises the importance of the rivers in the geography of the area, mentioning sixteen river mouths between the Tagus and the Pyrenees. Even though the other sources do not supply any topographical details, the succession of rivers does structure the descriptions. Pliny also draws attention to the role of the rivers in his text, for they are clearly used as reference points for medium distances:

Mistakes have also been made in regard to the important rivers. From the Minius, which we spoke of above, the distance to the Aeminius River according to Varro is 200 miles, though others place the latter elsewhere and call it the Limaea; in earlier times it was called the Oblivion River and a great many stories were told about it. Two hundred miles from the Durius is the Tagus, the Munda coming between them.<sup>26</sup>

23 Pl. 3.29 and 4.110; Str. 3.1.3, also *Chrest.* 3.2.

24 *P. Artemid.* V 8–12.

25 Orosius, *Hist.* 1.2.25–26.

26 Pl. 4.115.

Pliny also states that the Durius River acts as the administrative boundary of Lusitania.<sup>27</sup> He adds that it is ‘one of the largest [rivers] in Hispania’ and states that the Minius River has a mouth that is four miles wide.<sup>28</sup> Strabo also highlights the rivers of northern Iberia and focuses on the same main rivers:

Best known of the rivers immediately after the Tagus are the Munda, which can be sailed upstream short distances, and likewise the Vacua. After these two is the Durius, which, coming from afar, flows by Numantia and many other settlements of the Celtiberians and Vaccaeans, and is navigable for large boats for a distance of about 800 stadia inland. Then come other rivers. And after these the river of Lēthē, which by some persons is called Limaia, but by others Beliōn; and this river, too, rises in the country of the Celtiberians and the Vaccaeans, as does also the river that comes after it, namely the Baenis (others say Minius), which is by far the greatest of the rivers in Lusitania itself, also being navigable inland for 800 stadia. Posidonius, however, says that the Baenis rises in Cantabria. Off its mouth lies an island, and two breakwaters which afford anchorage for vessels. The nature of these rivers deserves praise, because the banks which they have are high, and adequate to receive within their channels the sea at high tide without overflowing or spreading over the plains. Now this river marked the boundary of Brutus’ campaign, though farther on there are several other rivers, parallel to those mentioned.<sup>29</sup>

Strabo states that the Durius and the Baenis (that is, Minius) rivers play a decisive role in maritime commerce as they connect the Atlantic coast with a vast hinterland; he writes that they are the longest rivers in the area. The *parapλους* in the *P. Artemid.* is organised around the same main rivers – the Tagus, the Durius, the Oblivion and the Baenis.<sup>30</sup>

*Subdivision of the coast into its main rivers to explain the distortions*

As in all the other antique sources, the western coast of Tarraconensis is structured in the *Geography* by its rivers – nine out of thirteen toponyms, from the mouth of the Munda River to Cape Nerion, are river mouths. Two of them, the Durius and the Minius rivers, were clearly of particular importance, for they are the only oceanic watercourses whose mouths and sources are recorded in the catalogue<sup>31</sup> – a privilege accorded only to the major rivers of the peninsula (the Ebro, the Baetis, the Anas and the Tagus rivers). The Durius River was also used as a boundary between the provinces of Tarraconensis and Lusitania.

27 Pl. 4.113.

28 Pl. 4.112.

29 Str. 3.3.4.

30 *P. Artemid.* V 38–43.

31 *Geogr.* 2.5.1 and 2.6.1.

The Durius, the Minius and the Munda rivers delimit the groups of distortions on the western coast of Tarraconensis in the *Geography* (Fig. 72a). Although the Munda River is of less importance than the two other rivers, it is, nevertheless, systematically mentioned by the sources. Strabo writes that it is one of the area's best-known rivers. There is, therefore, a similarity between the different groups of distortions and the important role of these rivers in the ancient sources as well as in the *Geography*.

It is possible that the distortions came about by using the mouths of the three rivers listed above to subdivide the coast. When the coastal sections are set up in accordance with the positions of the three rivers in the *Geography*, the localities between the Munda and the Durius rivers show a south-easterly shift as well as a latitudinal expansion southwards between the Durius and the Minius Rivers (Fig. 72b). There is little change to the localities between the Minius River and Cape Nerion – the initial distortions were already very minor. The displacement vectors for all three sections show almost no signs of any distortions after the rivers were positioned.

It has proved impossible to develop a mapping procedure to explain the positions of the three river mouths using only the information provided in the antique sources; the distance data supplied by the sources (Pliny, the *P. Artemid.*) do not provide a satisfying explanation. The mouths of the Durius and the Minius rivers are situated on the same meridian (Fig. 72c), which may be an indication that a mapping process that used the position of one river to locate the second on a north–south direction was employed. A source for this specific orientation could simply have been a general account of the western coast, describing it as stretching from north to south.<sup>32</sup>

#### *Divergences between the topography and the toponymy*

The appearance of the northern and north-western coastlines in the *Geography* partially matches Mela's description. Ptolemy's winding western coast, with its short promontories and open, curved bays, roughly corresponds to the succession of straight shorelines and moderate bends described by Mela. Both Ptolemy and Mela also refer to an almost straight section along the northern coast that is followed by a major coastal recess; this gulf is mentioned in other geographical sources too.

There is one particularly striking feature of this area's coastal topography in the  $\Xi$  recension of the *Geography*. Whereas the capes along the southern coastline of Iberia all resemble short, acute angles, the promontories of oceanic Tarraconensis, by contrast, vary considerably (cf. Fig. 73 with Fig. 68): Cape Avaron is nearly invisible; Cape Orvium lies in a bay; Cape Nerion is shown as a small acute angle; the nameless cape and Cape Trileukon on either side of Flavium Brigantium have the shape of obtuse angles; and Cape Oiarō forms a long, narrow, peak-shaped peninsula. In addition, some

<sup>32</sup> See p. 315.

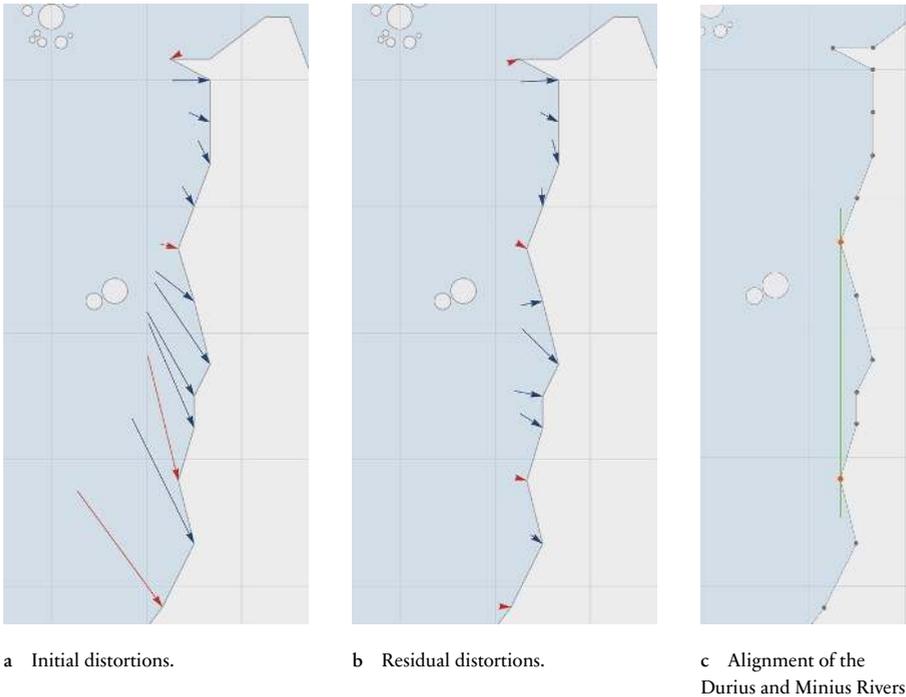


Fig. 72 Residual distortions between the mouth of the Munda River and Cape Nerion when the coast is positioned in accordance with the location of the main rivers (a, b). The fact that the mouths of the Durius and Minius Rivers are aligned (c) may simply be an element of the construction process ( $\Xi$  recession).

cities (Menosca, Noega Oukesia) and river mouths (Navia[*llouiōn*], Minius and, to a lesser extent, the Durius River) appear to have been placed at the heads of promontories. There are small gulfs between the mouths of the main rivers but not between the capes of the catalogue (with the exception of Cape Nerion). The relationship between the topography and the toponymy in the  $\Xi$  recession is, therefore, paradoxical. Thus, the drawing of gulf-shaped lines between the capes of Ptolemy's catalogue cannot be used to explain the residual distortions that occur when one compares the coordinates in the *Geography* with the modified modern coastline.

The overestimation of the size of Ptolemy's gulfs is another notable characteristic of the northern and north-western coasts (Fig. 74). The so-called Great Harbour, in which Flavium Brigantium lies, corresponds to the area of modern-day A Coruña. The actual coastline is extremely irregular and indented as four rias<sup>33</sup> have formed a series

33 A ria is a long, narrow, coastal inlet formed by the partial submergence of a river valley, a frequent

landform along the northern and north-western coastlines of Spain.



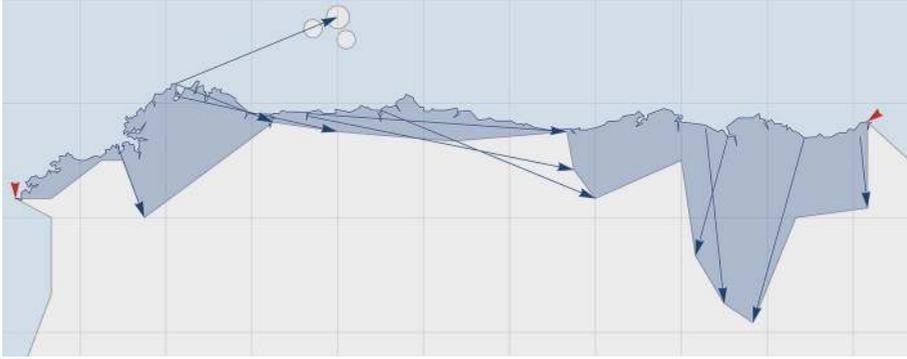


Fig. 74 An outline of the actual coastline overlaid on Ptolemy's map reveals the residual distortions along the northern coast of Iberia ( $\Xi$  recension).



Fig. 75 Schematic topography of the harbour of A Coruña and its surrounding area.

Pliny's text may provide a clue as to the location of Noega Oukesia in the *Geography*: this city lies on a vast headland, whereas the two coastal localities of the Paesici (Flavionavia and the Naelo River) are situated in a gulf to the east. Pliny refers to *Noega oppidum in paeninsula Paesici*,<sup>35</sup> which is generally understood to mean 'the oppidum of Noega, [then] the Paesici on a peninsula',<sup>36</sup> but one could also take it to mean 'the oppidum of Noega on a peninsula, [then] the Paesici'. The latter version may explain Ptolemy's coastline around Noega Oukesia.

35 Pl. 4.111.

36 Detlefsen 1904, 80; Rackham 1942, 204; Mayhoff 1906, 180.

## 8.2 How the coastal localities were positioned

A likely and satisfactory explanation for many of the local distortions that appear on the map of the Iberian peninsula is that the coastlines were drawn by transforming topographical information into simple geometrical shapes. There remain small residual differences, which concern the distances between localities. How each locality was precisely positioned, and thus how the coordinates themselves were determined, still needs to be explained. The sources provide different kinds of information that can be used to determine the detailed location of a locality. The most common types of information are the distance data between localities and the descriptions of the succession of localities along the coastal sections.

### 8.2.1 Utilisation of distance data

Short distances between coastal localities are spread over general geographical treatises, such as in the works of Pliny and Strabo; Mela provides no distances, besides a very few exceptions. This form of data is better represented and systematically organised in the periplographical sources. As far as the Iberian coasts are concerned, the *P. Artemid.* often gives distance data accurate to the nearest stadion, from the Temple of Venus in the Pyrenees to the Great Harbour in the north-west of the peninsula.<sup>37</sup> The *It. prov.* gives distances in miles for the African coast in the area of the Strait of Hercules,<sup>38</sup> while some sections correspond to terrestrial itineraries between certain Iberian coastal localities, for instance between Malaca and Gades via the strait.<sup>39</sup>

A model that would explain how the localities were positioned, and hence how the coordinates were determined for each toponym, could be one in which the localities were plotted on a coastline that has already been drawn, using the distances between the localities. Such a model would depend on one particular parameter, namely the precision allowed by the graticule of the working map. As Ptolemy divides each degree into twelve parts, his coordinates can differ by only five-minute intervals: 5', 10', 15' and so on until 55'. For example, a locality in Ptolemy's catalogue can be situated at a latitude of 36°30' or 36°35' but never at 36°31' or 36°32'. If the distance is measured by following the graduation of a meridian, 5 minutes corresponds to *c.* 40 stadia or 5 miles. The distance that corresponds to the minimum interval varies in relation to the latitude, if the distance is measured along a parallel circle: on the middle parallel of Ptolemy's map of Iberia, where the longest day is 15 hours, 5 minutes corresponds to *c.* 30 stadia.

37 *P. Artemid.* V 17–45; see p. 230.

38 *It. prov.* 8.3–9.4.

39 *It. prov.* 405.7–408.4.

The distances given in the sources can either be very small and/or very precise: according to the *P. Artemid.*,<sup>40</sup> for example, there are 24 stadia between Maenoba and Ipsa, and 632 stadia between the Emporion and the Temple of Venus; in the *It. prov.*<sup>41</sup> there are 6 miles between Mellaria and Baelo, and 21 miles between Malaca and Suel. Such highly precise distances cannot be mirrored by precise enough coordinates on Ptolemy's map of the Iberian peninsula: either they are too small and would thus fall inside the minimum possible interval of five minutes of a degree or their precision would be hidden by the lower resolution of the graticule. Adopting a regressive approach in order to 'read' a distance between two points on a map is not always particularly efficient as it leads to rough estimates that cannot be compared with the precise values in the sources. For example, Marcian of Heraclea, who probably read the distances between the localities on a map that had been drawn using the data from the catalogue of the *Geography*, often gives the lower and upper limits of values:

From Carteia to Barbes[u]la, 100 stadia. From Barbes[u]la to Transducta, no more than 200 stadia, no less than 145 stadia in a straight line. From Transducta to Mellaria, no more than 1[5]5 stadia, no less than 123 stadia. From Mellaria to the city of Baelo, no more than 140 stadia, no less than 100 stadia.<sup>42</sup>

Three kinds of procedures can be carried out using one distance and an already drawn coastline:

- Starting from a given point, one can determine the position of the next locality on the coastline with a compass; the position of the next locality is then determined starting from the previous point, and so on. Then, the coordinates of the localities are rounded up or down, so that they fit the grid that has been divided into increments of 5°.
- A similar process with a compass can be used, but the coordinates of the starting locality can be rounded up or down before being used as the starting point, and so on for the next locality.
- If the coastline closely follows a meridian or a parallel circle, the distance can be calculated by carrying out a conversion from stadia to degrees. Precise distance data were possibly rounded up or down before being used.

Each of these procedures will result in a specific kind of distortion depending on which sources were used. If it becomes problematic to identify accurately a precise source, a

<sup>40</sup> *P. Artemid.* V 18–19 and V 32.

<sup>41</sup> *It. prov.* 407.2–3 and 405.7–8.

<sup>42</sup> Marcian, *Per. mar. ext.* 2.9.

comparison between the distances between the localities in the *Geography* and the distances in the periplographical works should, however, indicate if the sources fall within the same order of magnitude as Ptolemy's distances. Although some sections in the *It. prov.* and the *P. Artemid.* are toponymically close to the *Geography*, it has not been possible to ascertain whether Ptolemy used the distance data contained in these texts.

One can draw an interesting parallel between a value (concerning the distance between Calpē and Carteia) given by Strabo in his *Geography* and a value on Ptolemy's map. Even though the passage in question is the subject of much philological debate, it states that there is a distance of 40 stadia between Mount Calpē and the neighbouring city of Carteia.<sup>43</sup> Strabo's source for this value must be Timosthenes, to whom he refers further down in the passage<sup>44</sup> and who is one of the few Hellenistic geographers explicitly mentioned by Ptolemy.<sup>45</sup> In the *Geography*, the two localities lie at a distance of 5' of a meridian from each other, that is, *c.* 40 stadia. Therefore, it is possible that Ptolemy used the value given by Strabo, together with a drawing of the coastline, to work out the distance between Calpē and Carteia on his map.

### 8.2.2 The use of toponym lists

In the works of Mela, Pliny and Strabo as well as in less detailed sources, the descriptions of the coastlines generally take the form of a list of the localities that lie along or close to the shore, often with no intermediate distances between the places. The texts are usually arranged in a particular order, following a schema inspired by the periplographical texts:

After locality *A* there are on the coast locality *B*, locality *C*, then locality *D* with locality *E* nearby, locality *F* and so on.

Ptolemy's catalogue of localities, from Tarraco to the Pyrenees, for instance, is very close to the actual order of the localities along the coastline. The texts of Mela and Pliny and Ptolemy's toponyms also closely resemble one another. A comparison between

43 Str. 3.1.7: ἐκπλεύουσιν οὖν ἐκ τῆς ἡμετέρας θαλάττης εἰς τὴν ἕξω δεξιὸν ἐστὶ τοῦτο, καὶ πρὸς αὐτῷ [sc. τῷ Κάλπη ὄρει] Κάλπη πόλις ἐν τετταράκοντα σταδίοις. ('When one sails from our sea into the external sea, one has this mountain on the right and near it [sc. Mount Calpē], within a distance of 40 stadia, is the city of Calpē.') Although all the manuscripts give Κάλπη πόλις (which is not attested elsewhere), many scholars believe that Strabo is, in this instance, referring to the city of Carteia. The conjecture goes back to I. Casaubon. F. Lasserre 2012, 187, and S. Radt 2006, 312, regard it as correct as did A. Schulten (*RE* X, 1760). D. Meyer 2013 adds: 'The

numerous variations and confusion surrounding these names that occurred even in Antiquity make a copying error plausible' ('Zahlreiche Varianten und Verwechslungen der Namen schon in der Antike machen den Schreibfehler plausibel!') The manuscripts of the *Geography* themselves contain a variety of spellings: Καρτηρία X, Καρτηρία Ω; Κάλπη VXO, Κάρπη UKRA. If we follow this entirely plausible conjecture, we have a distance of 40 stadia between Calpē and Carteia.

44 See Meyer 2013, F 16.

45 *Geogr.* 1.15.2–4.

the *Geography* and the works of Mela and Pliny reveals certain features of the possible source of Ptolemy's map of Iberia. The three texts give the main traditional landmarks (the Pyrenees, Emporion, Tarraco and the Ebro River) and provide very similar toponym lists, with tiny variations (Table 12). Some of the rivers appear at different places in the texts, and the order of Barcino and the Rubricatus River differs in all three texts.

It is worth investigating the characteristics of this common source within the framework of the long debate about the sources of Mela and Pliny.<sup>46</sup> According to the so-called *Dreiquellen-Theorie*, Pliny used three main sources, one of which – a littoral description – was also one of Mela's sources. Historiography has tended to focus on the link between Pliny, Mela and their common source, but surprisingly, as far as is known, the obvious similarities between their works and Ptolemy's have not yet been analysed. The works of Mela, Pliny and Ptolemy are the only literary sources of Antiquity to contain the names of Blanda, Iluro, Baetulo, Subur and the Rubricatus River. Ptolemy's mention of the Clodianus River can also be found in Mela's work, although there is no other attestation, and Ptolemy's *Geography* is – as far as we know – the earliest Greek text to contain a record of the city of Barcino.<sup>47</sup> Finally, although the other Greek sources used the Greek spelling of Emporion (Ἐμπόριον),<sup>48</sup> Ptolemy preferred the Latin spelling *Emporiae* (Ἐμπόριαι).<sup>49</sup> All these factors point to the use – however divergent or indirect – of a common source, of which, for instance, Strabo was unaware or simply ignored. This source probably goes back to the Late Republic or early Principate period and contained a description of the coast, which was unquestionably written in Latin.

In many cases, a wrong order of localities along the coast has given rise to local distortions in the *Geography*. An incorrect order can be the result of a misreading of an accurate source or of the use of an inaccurate source. However, as far as the Iberian coast is concerned, none of the wrong orders of localities that appear in the *Geography* has been identified in any other extant source. In the southern part of the peninsula, the city of Barbesula (near modern-day Torreguadiaro) lies, according to Ptolemy, inside the Strait of Hercules, between Carteia and Iulia Traducta. However, ancient sources locate this city on the coast to the east of the Strait, where, according to Ptolemy, the mouth of the Barbesula River lies.<sup>50</sup> The sequence of toponyms along the Mediterranean coast, between the Cape of Charidēmos and the mouth of the Ebro River, is somewhat muddled: Ptolemy erroneously situates Lucentum (modern-day Alicante) south of Carthago

46 See p. 218.

47 Mela and Pliny were the first Latin authors to refer to Barcino (modern-day Barcelona), a small colony that is rarely mentioned in the antique geographical literature. Barcino grew in importance foremost during Late Antiquity, becoming one of the capitals of the Visigothic Kingdom in the sixth century.

48 Ps.-Scylax 2; Ps.-Scymnos v. 204; Str. 3.4.8; Polybius, 3.39.7 and 3.76.1; Appian, *lb.* 6 and 40; St. Byz. *s.v.*

49 This has been noted by H. Zehnacker 2004, 115. Cf. Mela 2.89; Pl. 3.22; Livy 21.60–61, 28.42, 34.16, etc.

50 Mela 2.94; Pl. 3.8; *It. prov.* 406.2; *Rav.* 305.8 and 344.2. Ptolemy's mistake can also be found in Marcian's work (*Per. mar. ext.* 2.9).

Ptolemy	Mela	Pliny
Pyrenees, Temple of Venus	Pyrenees	Pyrenees, [Temple of] Venus
Rhodē	Rhoda	
	Ticis River	Ticer River
Clodianus River	Clodianus River	
Emporiae	Emporiae	Emporiae
Sambroca River	Jupiter mons, Baetulo River	Alba River
Blanda	Blande	Blandae
		Arnum River
Iluro	Iluro	Iluro
Cape Lounarion		
Baetulo	Baetulo	Baetulo
Rubricatus River		Barcino
	Barcino, Rubricatum River	Rubricatum River
Barcino		
Subur	Subur	Subur
	Maius River	
	Tolobi	
Tarraco	Tarraco	Tarraco
	Tulcis River	Subi River
Ebro River	Ebro River	Ebro River

Tab. 12 The toponymy of the Iberian coast between the mouth of the Ebro River and the Pyrenees: A comparison between the descriptions of Ptolemy (*Geogr.* 2.6.16–20), Mela (2.89–90) and Pliny (3.21–22).

Nova (although this section is correctly described by Pliny and Mela);<sup>51</sup> and the city of Urci, although its exact location is still under debate, is certainly to be found around modern-day Almería, that is, to the west of the Cape of Charidēmos (Cabo de Gata). Even though several toponyms of the *Geography* in this area have been less certainly identified and located,<sup>52</sup> Ptolemy or his sources clearly mixed up the order of the lo-

<sup>51</sup> Pl. 3.19; Mela 2.93.

<sup>52</sup> The locations of the ancient sites of Alōnai, Portus Ilicitanus, Portus Tenebrius and the Saetabis River are not precisely known. Alōnai and the port of Ilici

could be the same place (see Moret 2000, 242–253). The Saetabis River is generally connected with the modern city of Xàtiva and the small river nearby (río Albaida), even though this river flows into the Sucro

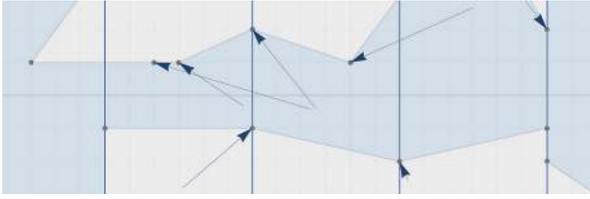


Fig. 76 Residual distortions along the African coast of the Strait of Hercules in the  $\Xi$  recension in which a grid of one-twelfth of a degree was used.

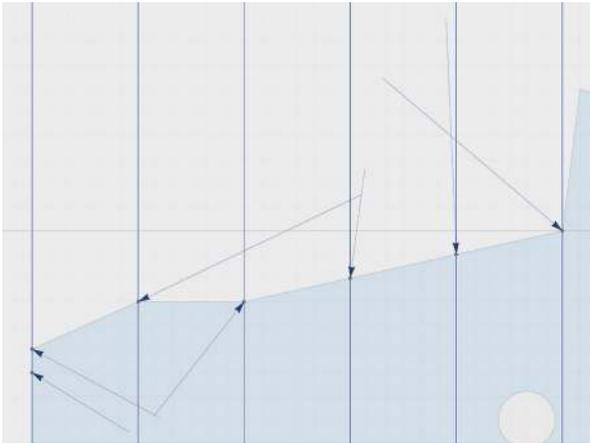


Fig. 77 Residual distortions along the coast of Tarraconensis between Carthago Nova and the Turia River in the  $\Xi$  recension, using a grid of one-twelfth of a degree.

calities along the coast: the section between Dianium and Portus Tenebrius has, in the *Geography*, been wrongly shifted to the north of the section between the Sucro and the Turia rivers. Ptolemy's order of localities is especially surprising, since the sequence of the groups of peoples along the Mediterranean coast in his catalogue follows that of the list used by Pliny, whose description of the Mediterranean coast is accurate. There are other incongruities, which bring about local distortions, in the same area. Ptolemy places several famous coastal cities inland: Valencia, Saguntum (Sagunt) and Dertosa (Tortosa).<sup>53</sup> These cities are generally described as being on, or very close to, the coast.<sup>54</sup>

In the absence of distance data, localities might have been plotted at regular intervals along a coastline, which would account for distortions between the localities, in particular on almost straight sections of the coast: the localities that lie along the African side of the Strait of Hercules as well as those on the Mediterranean coast between Alōnai and the mouth of the Turia River were positioned at half-degree longitude intervals along the coastline (Fig. 76 and Fig. 77); along the Iberian sea coast, that is, in the gulf from the Pillars of Hercules to the Cape of Charidēmos, most of the localities were placed at half-degree or one-third of a degree longitude intervals (Fig. 78).

(río Júcar) to the north of the city (and not directly into the Mediterranean Sea).

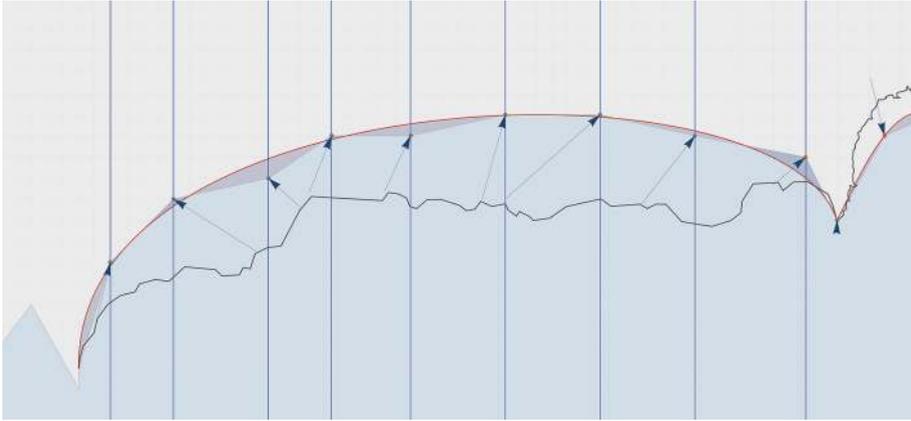


Fig. 78 The localities between the Pillars of Hercules and the Cape of Charidēmos were placed at half-degree or one-third of a degree longitude intervals along the coastline ( $\Xi$  recension).

Almost all the Iberian capes of the southern coast have the shape of acute angles.<sup>55</sup> A procedure that would explain how the nearby localities were positioned involves placing the localities so that they reproduce the shape of a cape, which in this case has a symmetrical form. The same method can also be used to explain how the mouth of the Baelo River and the Port of Menestheus, situated on either side of the Temple of Hera, were positioned. The estuary near Asta, which is the remaining locality in the gulf between the Temple of Hera and the mouths of the Baetis River, is situated on the gulf's coastline. It is possible that a distance was used to place it; alternatively, the estuary might have been placed approximately in the middle of the section, between the Port of Menestheus and the Baetis. The same method might also provide an explanation for how the localities between the Minius River and the Altars of Sestius were positioned. The Altars and the harbour of the Artabri were placed at the far end of the two arms of the angle formed by Cape Nerion to help reproduce the form of a small acute-angled cape. The localities from the cape to the Minius River were situated at similar distances from each other, which corresponds to a latitude of one-third of a degree (Fig. 79). Surprisingly, Cape Orvium, which is explicitly mentioned as a promontory in the catalogue, does not appear as a cape on the map but lies in the gulf between Cape Nerion and the Minius River.<sup>56</sup> In all these cases, the difference between the coast in the  $\Xi$  recension of the

53 *Geogr.* 2.6.62–64.

54 Strabo (2.4.6 and 3.5.1) locates Saguntum and Dertosa on the coast. Pliny (3.20) situates the colony of Valentia and the city of Saguntum three miles away from the shore. Mela (2.90–92) locates all three cities on the coast.

55 See p. 337.

56 This mistake appears in both recensions of the *Geography*. That a scribe miscopied the coordinates or unintentionally switched two lines of the catalogue seems an unlikely explanation for this error.

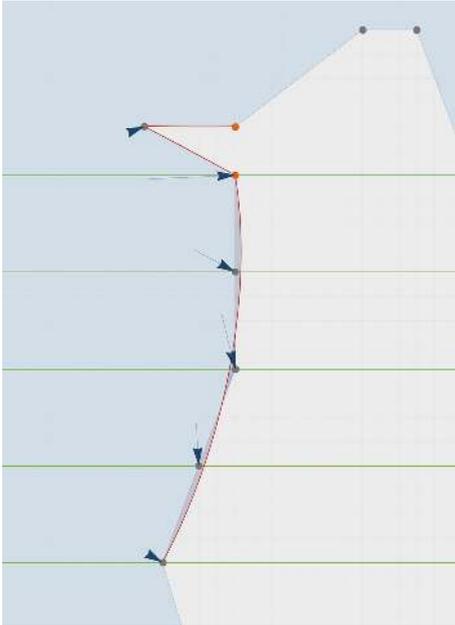


Fig. 79 The localities between the Altars of Sestius and the mouth of the Minius River were placed at one-third of a degree latitude intervals along the coastline ( $\Xi$  recension).

*Geography* and a coast drawn with simple geometrical shapes (a regular curve, straight segment, acute angle, and so on) is generally smaller than one-twelfth of a degree, which is the minimum possible interval on Ptolemy's grid.

### 8.2.3 Boundaries between the provinces

The catalogue of the Iberian localities of the *Geography* is structured around the Roman provinces, each of which is delineated twice: the extent of a province depends on how its localities are distributed over the map as well as on the boundary marks mentioned in the catalogue.<sup>57</sup> The heated historiographical debate about the concepts of boundaries, frontiers and provinces in the Roman world lies beyond the scope of this book. The most important point to remember, though, is that the way the boundaries between two Roman provinces were situated was, above all, the result of a partitioning of cities under one or another administrative authority.<sup>58</sup> The spatial definition of a province was, therefore, the sum of the territories of its cities. Pliny's testimony shows that the

<sup>57</sup> Boundary marks with coordinates could be precisely situated on to the map. By contrast, when the boundary between two provinces – e.g. between Lusitania and Tarraconensis – was delineated by a river, whose course (between the source and the

mouth) had not been specified by Ptolemy, then the positions of the localities belonging to either province helped to situate (approximately) their common boundary.

<sup>58</sup> Cadiou and Moret 2012, 28.

*formulae provinciarum*, which were the official documents that defined the different Roman provinces, were lists of the cities (classified by juridical status and alphabetical order) that were set under the authority of a magistrate. They were not descriptions of physical boundaries.<sup>59</sup> A *formula provinciae* thus allowed provinces a degree of spatial discontinuity, so that, for example, cities could be defined as 'enclaves' in the modern sense of the term. Topographical landmarks were used to denote the extent of the geographical territory of a province, particularly in the geographical sources, although these markers were not necessarily juridically classified. As far as the coastline is concerned, two kinds of boundaries were used to mark the Iberian provinces in the *Geography*:

- topographical features: the mouth of the Durius River (between Lusitania and Tarraconensis);<sup>60</sup> the western mouth of the Anas River (between Lusitania and Baetica);<sup>61</sup> and the Pyrenees (between Tarraconensis and the Gallic provinces);<sup>62</sup>
- a boundary point: between Baetica and Tarraconensis. This point was defined only by its role in marking the boundaries of an area and did not refer to a topographical feature.<sup>63</sup>

Topographical features were commonly used in the geographical sources to mark provincial boundaries in Iberia. That the Pyrenees marked the border between Hispania and Gallia, and later the boundary between the respective provinces, was a topos in the antique sources.<sup>64</sup> The boundary between Baetica and Lusitania at the Anas River is also well-documented:<sup>65</sup> the river was used as a landmark by Pompey the Great<sup>66</sup> as well as by Augustus and Agrippa, who made the river a landmark when the province of Hispania Ulterior was divided into 'Lusitania' and 'Baetica' during the reorganisation of the Hispaniae.<sup>67</sup> It probably remained as such until the end of Roman dominance in the region.<sup>68</sup> The Lusitania–Tarraconensis boundary seems to have been more flexible. Pompey used the Durius River during the civil wars between 56 and 48 BCE,<sup>69</sup> but the boundary between Hispania Citerior and Ulterior remained unclear until the reign of Augustus. Pliny situates the boundary between Lusitania and Tarraconensis at

59 Christol 1994; Arnaud 1993, 46; Arnaud 2001, 52–53.

60 *Geogr.* 2.5.1

61 *Geogr.* 2.4.2–3 and 2.5.2–3.

62 *Geogr.* 2.7.2 and 2.10.2.

63 *Geogr.* 2.4.3 and 2.6.12.

64 Polybius, 3.39.4; *P. Artemid.* IV 5–14, quoted by St. Byz. s.v. Ἰβηρία and Const. Porphy., *De adm. imp.*; Mela 3.15; Pl. 3.6; Str. 3.1.3; Diodorus, *Bibl.* 5.35; Eustathius, *Dion. Per.* 288 and 338. See Rico 2006.

65 Pl. 3.6: *amne Ana discreta* and 4.115; Mela 2.87: *illas fluuius Anas separat*.

66 After the Lucca Conference of 56 BCE, Pompey gained authority of the Iberian regions that were under Roman control and used the river to dispatch his legates throughout the territory. See Caesar, *Bell. Civ.* 1.38.1 and Le Roux 2010, 36–37.

67 Le Roux 2010, 60–61.

68 Today, the río Guadiana forms part of the border between Portugal and Spain.

69 Le Roux 2010, 36–37.

the mouth of the Durius River,<sup>70</sup> as does Strabo, although he states that this provincial boundary was relatively recent.<sup>71</sup> Augustus' territorial reorganisation of Iberia might indeed have consisted of two stages, with the area of Callaecia possibly having first been attached to Lusitania,<sup>72</sup> before being incorporated into Hispania Citerior (that is, Tarraconensis), feasibly between 7 and 2 BCE.<sup>73</sup> At around this time, the Durius River was undoubtedly used as the boundary between the provinces of Lusitania and Tarraconensis.

It is possible that descriptions of the Roman provinces, as they appear in the texts of Pliny and Mela, were used to determine the coordinates of these coastal boundaries in the *Geography*. Indeed, the coordinates of these boundary points match the coordinates of the mouths of the respective rivers and of the Pyrenean headlands exactly, and so do not require additional coordinates. By contrast, the coastal boundary between the provinces of Baetica and Tarraconensis in the *Geography* is a boundary point – Ptolemy uses the word τὸ πέραρ, meaning the 'end', 'limit' or 'boundary' – that has its own coordinates.<sup>74</sup> The antique sources are not consistent on this boundary, so it is difficult to reconstruct it exactly. Carthago Nova had long been Hispania Citerior's southernmost coastal city.<sup>75</sup> At the time of Augustus, the boundary between Ulterior and Citerior had been shifted south-westwards, to near the city of Murgi.<sup>76</sup> More precisely, according to Pliny, the city of Murgi was the last Baetican city before one entered the province of Tarraconensis; then, along the coast of Tarraconensis, there were the cities of Urci and Baria. Pliny specifies, however, that Baria was registered as a Baetican city.<sup>77</sup> By contrast, Mela states that Urci was the first coastal city of Baetica after Tarraconensis, and he does not even mention Baria.<sup>78</sup>

In the *Geography*, the boundary point between Baetica and Tarraconensis is situated between Baria in Baetica and Urci in Tarraconensis (Fig. 80). Ptolemy cannot, there-

70 Pl. 4.113.

71 Str. 3.4.20. Strabo writes that the Durius River marked the territorial jurisdiction of the *legatus iuridicus* in charge of the Lusitanians.

72 There are references to the reorganisation of the Hispaniae in Strabo (3.3.3), in Pliny's text when he quotes Agrippa (4.118) and in other late Latin texts: *Dem. prov.* 23: *Asturia Galicia et Lusitania*; *Div. orb. terr.* 5: *Hispania Lusitania cum Asturia et Callaecia*; and in Orosius, *Hist.* 1.2.35.

73 The chronology of the two-stage reorganisation of Iberia carried out under Augustus was first presented in the work of Albertini 1923. However, the discovery of a fragment of a bronze tablet containing an inscription of an edict of Augustus, which has been dated to 15 BCE, has further complicated the reconstruction of the exact chronology of the Augustan reorganisation of the Iberian provinces

during the final two decades of the first century BCE. The text (sometimes called the 'Bierzo Edict') mentions an unknown province, the *provincia transduriana*, which has given rise to much discussion, including debate on the authenticity of the text. See Grau Lobo and Hoyas 2001.

74 *Geogr.* 2.4.3 (and 2.6.12 in the  $\Omega$  recension):  $\lambda = 12^\circ$ ;  $\phi = 37^\circ 15'$ .

75 *P. Artemid.* V 5–14; Pl. 3.16; Livy 40.41.10; Cadiou and Moret 2012, footnote 28, p. 27. Orosius, *Hist.* 1.2.34, also records this fact.

76 Pl. 3.8: *Murgi Baeticae finis*; also 3.16–17.

77 Pl. 3.19: *Oppida orae proxima Vrci adscriptumque Baeticae Baria* ('The oppida nearest the coast [i.e. of Tarraconensis] are Urci and Baria, which belong to Baetica.') In modern terms, Baria would be regarded as a Baetican enclave in the territory of Tarraconensis.

78 Mela 2.94.

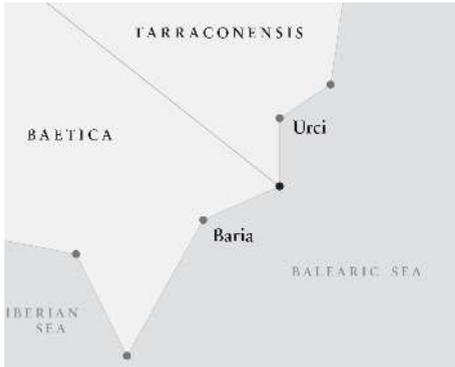


Fig. 8o Coastal boundary between Baetica and Tarraconensis in the Ξ recension of the *Geography*.

fore, have used the same source as Mela and Pliny. Given the variability of the location of this boundary, it is possible that a source later than Mela and Pliny was used, and that it registered Urçi as being in Tarraconensis and Baria in Baetica, with the boundary located between them.<sup>79</sup> It is also possible that a source, such as Pliny's or Mela's texts, was misunderstood or even simplified: if Baria belonged to Baetica and Urçi to Tarraconensis, then it might have seemed logical for a cartographer such as Ptolemy, who was not interested in or aware of the subtleties of the Roman administration, to locate the provincial boundary between these two places.

### 8.3 Coordinates of the islands

There are several islands and archipelagos around the Iberian peninsula in the *Geography*. Whereas Gades (modern-day Cádiz) and the Mediterranean islands – Mallorca and Minorca, Ebusus (Ibiza) and Ophiussa (Formentera), the four largest Balearic Islands – were well known, the islands in the Atlantic were either poorly documented in the ancient sources (such as the Cassiterides and the Islands of the Gods) or were mentioned only in the *Geography* (the Trileuci Islets and Londobris Island).

#### 8.3.1 The islands around the Iberian peninsula in the antique sources

##### *Distance and latitude data*

In view of the importance of islands in navigation – with regard to maritime conditions as well as the development of the maritime network – and given the specific place of navi-

<sup>79</sup> For other areas, Ptolemy's documentation is more recent than that of the Augustan administration. See p. 36.

gational information in the development of geography in Antiquity, it is not surprising that the ancient sources contain many distances relating to the islands. The distance data include information on the circumference and length of the islands, the distances between the islands and the Iberian mainland, and the distances between islands.

Gades has a singular place in the geographical and historical sources, and in the Phoenician, Greek and Roman worlds in general. The island was a trading and maritime hub in Antiquity<sup>80</sup> – Strabo writes that the city was ‘where live the men who fit out the most and largest merchant fleet (ναυκλήρια), both for Our Sea and the External Sea’<sup>81</sup> – which explains the varied and copious amount of distance data that link the island to far-away places, via the Strait of Hercules and the oceanic coasts of Europe and Africa.<sup>82</sup> The sources also give estimations of extremely long distances from Gades, which indicates that the island played an important role in the Greek and Roman construction of the geography of the world.<sup>83</sup> Pliny records that the third *circulus* (that is, the third parallel circle) runs through Gades; thus, according to his description, the duration of the longest day at Gades is 14 hours 32 minutes<sup>84</sup> and the ratio of a gnomon to its shadow is 100 : 74 at the equinox.<sup>85</sup> Strabo situates Gades on the parallel through Rhodes and the Pillars of Hercules.<sup>86</sup>

As for the Balearic (also Gymnesiae) and Pityusic Islands, Agathemerus, Pliny and Strabo, among others, have provided scholars with an important series of numerical data related to the length, breadth, circumference and distances between the islands.<sup>87</sup>

80 Arnaud 2005, 167–168.

81 Str. 3.5.3.

82 From the Strait of Hercules (or the Pillars) to Gades, the sources generally give distance data that correspond approximately to one day’s sailing (Table 11, p. 302). Strabo records a distance of 70 miles from Gades to the Baetis (Str. 3.1.9), ‘no more than 100 stadia’ to Asta (Str. 3.2.2) and 800 stadia to Lixus in Tingitana (Str. 17.3.2). The *Chrest.* (3.24) states that there are 750 stadia between Calpē and Gades, and the mouths of the Baetis River, while Varro gives a figure of 102 miles for the distance between Gades and the Anas River (Pl. 4.115). Pliny (3.17) writes that there are 250 miles between Castulo in Baetica and Gades.

83 Artemidorus’ estimate for the longitudinal extent of the *oikoumenē*, measured between the mouths of the Ganges and Gades, is 8 568 or 8 945 miles (depending on the route) and he calculates that there is 991.5 miles between Gades and the Cape of the Artabri via the Sacred Cape; Isidorus’ estimate for the *oikoumenē* is 9 818 miles (Pl. 2.242). Both authors give an estimate of 8 214 miles for the length

of Europe between the Tanais River and Gades (Pl. 4.121). Artemidorus reports that the distance between Caralis in Sardinia and Gades is 1 250 miles (Pl. 2.243 and 3.84) and Pliny (19.4) mentions a sailing of seven days from Ostia to Gades.

84 Pl. 6.214: 14  $\frac{1}{2}$   $\frac{1}{30}$  hours.

85 Pl. 6.214. Many manuscripts give 100 : 77, which must be erroneous, since this ratio would have situated the third circle to the north of the fourth circle and thereby contradicted Pliny’s own statement. Confusing LXXIII with LXXVII would have been an easy mistake to make. See Desanges 2008, 281.

86 Str. 2.5.14; see p. 297.

87 Agathemerus, *Hypotyp.* 20; Str. 3.5.1; Pl. 3.77; Livy 28.37; *It. mar.* 510–512; *Isid. Etym.* 14.6.43. Agathemerus, *Hypotyp.* 16 lists a series of distances that go back to Artemidorus, and states that the 10 000 stadia between Caralis and Gades are to be understood ‘by sailing off the Gymnesiai’ (ὑπερπλεύσαντι Γυμνησίας νήσους), which suggests that there was another route through the Balearic Islands to the Iberian peninsula (Arnaud 2005, 67 and 158–159).

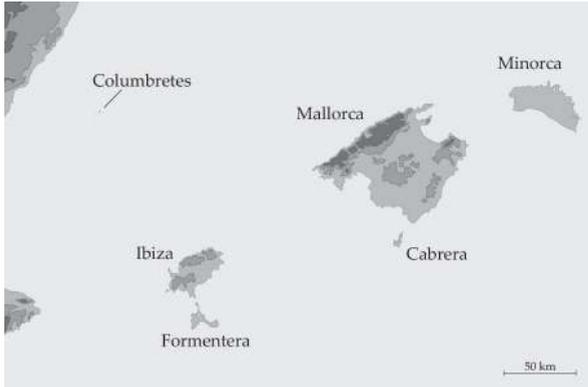


Fig. 81 The Balearic and Columbretes Islands.

The distances between these islands and the mainland have been less frequently passed down, although Diodorus gives some precise information in his text:

[Then] comes first an island called Pityuse (Πιτυοῦσσα), the name being due to the multitude of pine-trees (πίτνες) which grow throughout it. It lies out in the open sea and is distant from the Pillars of Hercules a voyage of three days and as many nights, from Libyē a day and a night, and from Iberia one day.<sup>88</sup>

Pliny situates the archipelago in relation to the Iberian mainland with a string of distance data:

[The Pityuses] are 46 miles large, and they are 700 stadia away from Dianium, which is also the distance by land from Dianium to Carthago Nova; at the same distance from the Pityuses out to sea are the two Balears, and opposite the Sucro [River] lies Colubraria. The Balearic Islands, formidable in warfare with the sling, have been designated by the Greeks the Gymnesiae. The larger island is 100 miles in length, 475 in circumference [...]. The smaller island is 30 miles away from the larger; its length is 40 miles and its circumference 150. It contains the cities of Iamo, Sanisera and Mago. Twelve miles out to sea from the larger island is Capraria, treacherous for shipwrecks, and right of Palma lie the Menariae with Tiquadra and the small island of Hannibal.<sup>89</sup>

While there is a copious amount of documentation on the distances relating to the Balearic and Pityusic Islands, the distances concerning the oceanic islands and the archipelago that are mentioned in the *Geography* appear far less often in the sources. Strabo, for example, estimates that the Cassiterides lie ‘approximately at the *klima* of Britain.’<sup>90</sup>

88 Diodorus, *Bibl.* 5.16. Mallorca is also said to be one day’s sailing from Iberia (*Bibl.* 5.17). Livy (28.37)

reports that *Pityussa* island – he means here Ebusus

*Locations in relation to the mainland and relative longitude*

Sources that describe the geographical location of islands without any distance data are especially informative, since they situate the islands in relation to major landmarks on the mainland. Although the spatial vocabulary, with its liberal use of adverbs, can be rather imprecise – for example, Strabo situates Gades ‘near (πλησίον) the mouths of the Baetis,<sup>91</sup> while the Balearic Islands, according to Diodorus, face Iberia (κατ’ ἀντικρὺ τῆς Ἰβηρίας)<sup>92</sup> – some of these descriptions contain much more explicit information. According to Mela, the Balearic Islands are ‘located across (*contra*) the coast of Tarraco,<sup>93</sup> while Strabo states that they lie, more precisely, ‘off the stretch of coast that is between Tarraco and Sucro, on which Saguntum is situated.’<sup>94</sup> The *Chrestomathies* from Strabo situates them ‘near (κατὰ) the mouth of the Ebro River southward (πρὸς νότον κεῖνται).’<sup>95</sup> The text of Orosius locates the islands even more precisely:

There are two Balearic Islands, the larger and the smaller one. On each of these are two towns. The larger island, toward the north, faces (*septentrionem uersus contra*) the city of Tarraco in Hispania; the smaller, the city of Barcelona.<sup>96</sup>

Strabo describes the Cassiterides archipelago as being clearly situated to the north of the harbour of the Artabri,<sup>97</sup> a description that can be equivalent to a relative longitude. Likewise, the works of Diodorus and Strabo contain information on the location of the Balearic and Pityusic Islands on an east–west axis, on their positions relative to each other<sup>98</sup> and on the location of the islands’ cities.<sup>99</sup>

*Variability in the toponymy*

There are several inconsistencies in the sources concerning the ancient toponymy of the modern Balearic Islands and the nearby islets (Fig. 81), which raises issues about inter-

only – is 100 miles from the continent, which certainly corresponds to a day’s sailing. See Arnaud 2005, 81–83.

89 Pl. 3.76–78.

90 Str. 2.5.15: κατὰ τὸ Πρεττανικόν πῶς κλίμα ἰδρυμένα.

91 Str. 3.5.3.

92 Diodorus, *Bibl.* 5.17.

93 Mela 2.124

94 Str. 3.5.1.

95 *Chrest.* 3.20.

96 Orosius, *Hist.* 1.2.55.

97 Str. 2.5.15: ‘And in like manner the islands called Cassiterides, situated in the open sea approximately in the latitude of Britain, lie opposite to, and north of, the Artabri (τοῖς Ἀρτάβροισι ἀντίκεινται πρὸς ἄρ-

κτου)’ Str. 3.5.11: ‘The Cassiterides are ten in number, and they lie near each other in the high sea to the north of the port of the Artabri (πρὸς ἄρκτον ἀπὸ τοῦ τῶν Ἀρτάβρων λιμένος)’ Pliny (4.119) and Diodorus (5.38.4) simply state that the Cassiterides face Iberia.

98 Str. 3.5.1: ‘The Pityuses lie more out in the open sea and more to the west (πρὸς ἐσπέραν κεκλιμένα) than the Gymnesiae.’

99 Str. 3.5.1: ‘Of the Gymnesiae, the larger has two cities, Palma and Polentia, one of which, Polentia, is situated in the eastern part of the island, and the other in the western.’ According to Diodorus (*Bibl.* 5.17), the smaller of the Balearic Islands lies to the east of the larger island.

preting the descriptions of these islands' locations. Some of these divergences, however, may help explain how the islands were positioned in the *Geography*.

First of all, while the plural form *Pityussae* (Πιτυοῦσσαι) was generally used to refer to the two islands of the Pityusic group (modern-day Ibiza and Formentera), the singular form *Pityussa* (Πιτυοῦσσα) could also be used to refer to Ibiza only.<sup>100</sup> Ebusus, the Latin equivalent, was also used to denote the Pityusic Islands and sometimes just Ibiza. Pliny clearly refers to the two Pityusic Islands as Ebusus<sup>101</sup> but in a later passage identifies Ibiza as Ebusus and Formentera as 'Colubraria' (in Latin) or 'Ophiussa' (in Greek).<sup>102</sup> This contradicts a previous statement of his in which he seems to give the name of Colubraria to another island, quite distinct from the Pityusic Islands, which is situated near the Sucro River.<sup>103</sup> Colubraria was, in fact, the name for the Columbretes Islands. Mela makes a similar mistake in his work, as, like Pliny, he identifies Formentera as Colubraria, which he writes is located near Ebusus.<sup>104</sup> According to Pliny, the position of Colubraria (regardless of the toponymic inconsistencies) and the position of Ebusus in Mela's description are linked with the Sucro River and its bay:

At the same distance from the Pityuses out to sea, are the two Baleares, and, opposite the Sucro [River]<sup>105</sup> lies Colubraria (*et Sucronem uersus Colubraria*) (Pl. 3.76)

Near the promontory they call Ferrara, in the bay of Sucro (*in Sucronensi sinu*), the island Ebusus has a city by the same name. (Mela 2.125)

One final element from Pliny's work has a parallel in the *Geography*, although the toponymy is problematic:

Facing the promontory of the Artabri are the six Islands of the Gods, which some people have designated the Fortunate Isles.<sup>106</sup>

100 See, e.g., Diodorus, *Bibl.* 5.16, or Plutarch, *Sert.* 7.

101 Pl. 3.76: 'The first islands that we meet in these seas are the two to which the Greeks have given the name of Pityuses, from the pine-tree, which they produce. Both islands now bear the name of Ebusus, and form a federate city. They are separated by a narrow strait.'

102 Pl. 3.78: 'The earth of Ebusus has the effect of driving serpents away, while that of Colubraria produces them; hence the latter spot is dangerous to all persons who have not brought with them some of the earth of Ebusus. The Greeks have given it the name of Ophiussa' (ὄφις is the Greek word for 'serpent').

103 Pl. 3.76: 'At the same distance from the Pityuses out to sea, are the two Baleares, and, opposite the Sucro [River] lies Colubraria.' See Zehnacker 2004, 178–179.

104 Isidore of Seville also uses the name of Colubraria for Formentera in his work (*Etym.* 14.6.43).

105 Pliny's text does not refer explicitly to the 'Sucro River', although almost every modern translation interprets this reference to mean the river. This is entirely plausible, given that, earlier in the text, Pliny (3.20) does indeed mention 'the Sucro River and in former days an oppidum of the same name'. By contrast, Strabo (3.4.6) refers to the eponymous city but does not mention its river.

106 Pl. 4.119.

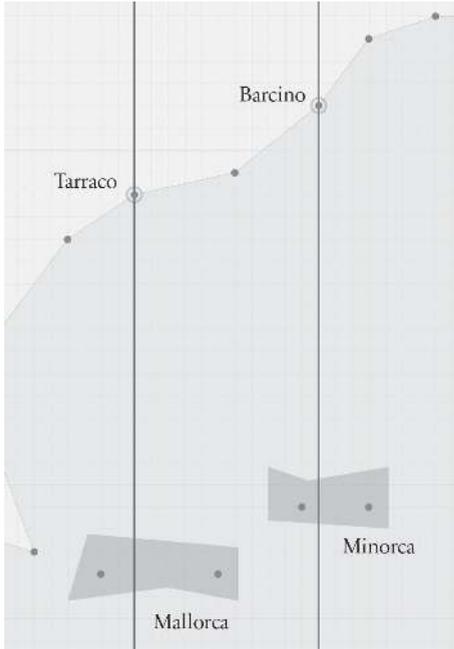


Fig. 82 Location of the Balearic Islands in the *Geography*, facing the cities of Tarraco and Barcino, as in Orosius' description.

Confusion can easily arise when one compares Pliny's Islands of the Gods or the Fortunate Isles with Ptolemy's *Geography*. Both Ptolemy and Pliny refer to an archipelago named the 'Islands of the Gods' (*Insulae Deorum*/αἱ τῶν Θεῶν νῆσοι), situated off the north-west coast of the peninsula.<sup>107</sup> However, the number of islands in the group varies (Ptolemy writes that there are two, Pliny six). Pliny states that these six islands are also called the 'Fortunate Isles' (*Fortunatae Insulae*), which finds some echo in Ptolemy's mention of the six 'Fortunate Isles' (αἱ τῶν Μακάρων νῆσοι).<sup>108</sup> The latter are, however, situated at the western edge of the *oikoumenē*, facing the Libyan (African) continent, and not, as Pliny states, near the Iberian peninsula.

### 8.3.2 Construction of the Iberian islands

#### *Mallorca and Minorca*

The locations of Mallorca and Minorca in the Ptolemy's *Geography* correspond to Mela's and Strabo's descriptions as they lie off the Tarraconensis littoral, between the Sucro River and Tarraco. However, it is the description of Orosius that resembles Ptolemy's map the closest. In the *Geography*, the meridians through Tarraco and Barcino run

through Mallorca and Minorca, respectively, which agrees with Orosius' description (*septentrionem uersus*), Fig. 82.

A mapping procedure that would explain how the larger Balearic island was positioned, for instance, involves carrying out a construction with a ruler and compass that combines: (1) the relative longitude, namely that the island lies on the same meridian as Tarraco, as passed down by Orosius; (2) the distance between Tarraco and the island, which is 700 stadia. This procedure, however, enables one to determine only the latitude of Mallorca. A similar procedure explains how the smaller island of Minorca was positioned: one uses a distance of 750 stadia between Barcino and the island, which one combines with the longitude information ('Minorca faces, toward the north, Barcino'). Instead of using a compass to work out the distance, a simple calculation can be made, since the distance is related to a meridian, where  $1^\circ$  always equals 500 stadia: thus a distance of 750 stadia corresponds directly to a latitudinal interval of  $1\frac{1}{2}^\circ$ . Orosius' *Histories against the Pagans* (fifth century CE) is much later than Ptolemy's *Geography*, and Orosius himself relates that he visited Alexandria.<sup>109</sup> This does not necessarily imply, however, that he had access to the *Geography* and that he took his description of the Balearic Islands from Ptolemy's work (which he never mentions). The influence of the *Geography* on Orosius' geographical description is hard to identify precisely.<sup>110</sup>

Although several distances between Mallorca and the littoral of Tarraconensis can be found in the antique sources, they were not explicitly linked with Tarraco. The distance between Tarraco and Mallorca is *c.* 700 stadia, when measured on Ptolemy's map. Pliny records several sets of 700 stadia, between the Pityusic Islands and the Balearic Islands, as well as between the Pityusic Islands, the city of Dianium and the island of Colubraria. The value of 700 stadia can correspond to a day's sailing<sup>111</sup> and agrees with Diodorus' statement that the largest of the Balearic Islands is one day's sailing from Iberia.<sup>112</sup> In the *Geography*, the Balearic cities of Mallorca (Palma and Pollentia) on one hand, and Minorca (Iamo and Mago) on the other hand lie on the same latitude. Although many of the sources give estimates of the size of both islands, both of them are much smaller in the *Geography* than in Pliny's and Strabo's descriptions. As for Mallorca, Strabo clearly states that Pollentia lies to the east and Palma to the west of the island.

107 *Geogr.* 2.6.76.

108 *Geogr.* 4.6.34.

109 Orosius, *Hist.* 6.15.32.

110 Y. Janvier 1982, 165–169, believes that Orosius might have used some of Ptolemy's maps as sources for his geographical excursus. Despite some convergences, however, I found no conclusive evidence for this hypothesis. Orosius' description of the penin-

sula like a triangle, with the Pyrenees, Flavius Brigantium and Gades as vertices (*Hist.* 1.2.25–26) can barely be inferred from Ptolemy's *Geography*. Their works' few points in common are more likely to be an indication that they used the same sources.

111 Arnaud 2005, 74–78. See Marcian, *Epit. Men.* 5.

112 Diodorus, *Bibl.* 5.17.

*Ebusus*

There are interesting similarities between the location of Ebusus in the *Geography* and the descriptions of Mela and Pliny, since, according to Ptolemy, Ebusus lies on the same meridian as the mouth of the Sucro River. The Latin authors do not, however, explicitly describe this precise location. Admittedly, Mela refers to *the bay* of Sucro, in front of which lies Ebusus, but in his description he mentions the eponymous river as well.<sup>113</sup> Pliny positions *Colubraria* opposite the Sucro, but his localities have been inaccurately placed.<sup>114</sup> The term ‘opposite’ (*uersus* in Pliny’s text) can, of course, refer to several spatial configurations and is not as precise as the ‘*septentrionem uersus*’ that Orosius uses in his text. The term *uersus* can, nonetheless, be compared with the Greek adjective ἀντικείμενος, which means simply ‘to be opposite to,’ and which Ptolemy uses in the introduction to the *Geography* to describe localities that lie on the same meridian.<sup>115</sup> A description on the schema: ‘A *uersus* B’ might, therefore, be interpreted within the framework of Ptolemy’s *Geography* as ‘A and B lie along the same meridian.’

To explain how Ebusus was positioned in the *Geography*, two pieces of information need to be combined to carry out the ruler-and-compass construction: (1) Ebusus lies opposite the mouth of the Sucro River (i.e., on the same meridian); (2) the distance between the Pillars of Hercules and Ebusus is a sailing of three days and three nights, that is *c.* 3 000 stadia, as passed down by Diodorus.

As was the case in constructing the main localities of the Mediterranean coast of Iberia, where long distances were involved, a map using Ptolemy’s second projection would seem to be adequate to position Ebusus. Centring the compass at Calpē (the Iberian Pillar of Hercules) and using a distance of 3 000 stadia,<sup>116</sup> the circle cuts the meridian of the Sucro River approximately at the location of Ebusus, as given in the *Geography*. However, centring the compass at point *P* ( $\lambda = 7^{\circ}30'$ ;  $\phi = 36^{\circ}$ ) instead of at Calpē generates a much better result (Fig. 83a). Point *P* lies at the intersection of the meridian through Calpē (the boundary line of the eastern opening of the Strait) and the parallel through Rhodes, which runs through the centre of the Strait. Since the two promontories known as the Pillars of Hercules were frequently used to refer to the opening of the Strait, it makes sense to use this landmark as the construction’s starting point.

*Islands of the Gods*

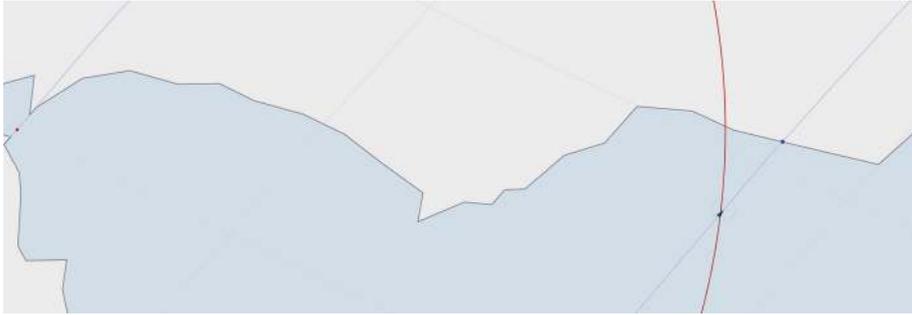
A mapping procedure that uses long distances and a map of Ptolemy’s second projection could also explain how the Islands of the Gods were positioned, although there is no

113 Mela 2.92.

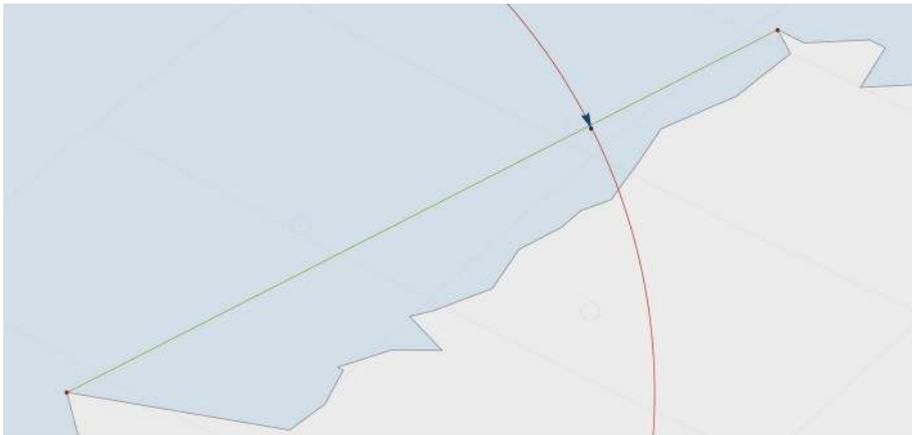
114 See p. 360.

115 *Geogr.* 1.4.2; see p. 193.

116 The distance of 3 000 stadia was first measured by following the graduation of the parallel through Rhodes.



a Island of Ebusus.



b Islands of the Gods.

Fig. 83 Ruler-and-compass construction to position islands using a map of Ptolemy's second projection.

mention of any details in the sources. On a map using Ptolemy's second projection, the archipelago is located on the straight line that connects the Sacred Cape to Cape Nerion, at a distance of 3 000 stadia from the Sacred Cape (Fig. 83b). These two pieces of information correspond to the kind of data passed down in the sources to describe maritime routes.

### *Gades*

Information and especially distance data related to Gades are varied, numerous and widespread in the geographical texts of Antiquity. Combining two distances with a ruler and compass makes it possible to determine how the island was positioned and

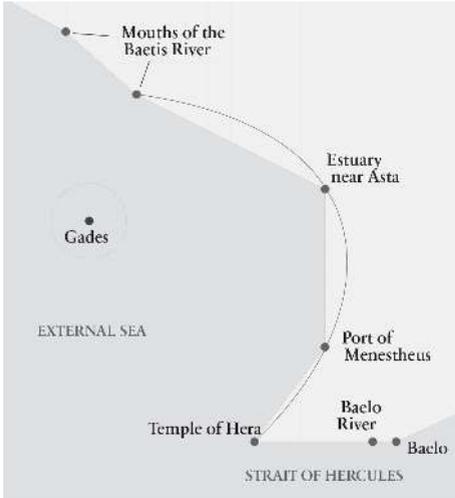


Fig. 84 The island of Gades ( $\Xi$  recension) faces the gulf between the Temple of Hera and the Baetis River (as in Pliny’s description) and, as Strabo states, is situated virtually opposite the mouths of the Baetis River.

seems to be a plausible construction method, given the state of our sources. Surprisingly, however, no such combination has been identified yet. For example, although many sources report that the island is roughly one day’s sailing from the Pillars of Hercules, which corresponds to between 600 and 800 stadia (Table 11), Gades, according to the *Geography*, lies more than 900 stadia away from the Pillars. This discordance concerns almost all the numerical data related to Gades, since Ptolemy and the other sources generally fall within very different orders of magnitude. The information about the latitude of the island, passed down by Strabo and Pliny, does not tally with the  $\Xi$  recension of the *Geography* either; its latitude in manuscript X is, however, graphically unexpected, which might indicate that a copying error or a later modification was made in the  $\Xi$  recension.<sup>117</sup> Several elements in the topographical descriptions passed down by Pliny and Strabo provide information that could explain how Gades was positioned. According to Pliny, the island faces the gulf between the mouths of the Baetis and the Cape of Hera,<sup>118</sup> while Strabo reports that the island lies near the mouths of the Baetis.<sup>119</sup> Both these pieces of information correspond to the configuration in the  $\Xi$  recension of the *Geography* (Fig. 84).

117 The latitude of Gades is  $36^{\circ}10'$  in  $\Omega$  and  $36^{\circ}40'$  in  $\Xi$  (*Geogr.* 2.4.1). Both readings are very close ( $\overline{\lambda\zeta\varsigma}'$   $\Omega$ ,  $\overline{\lambda\zeta\zeta}'$   $\Xi$ ). The form generally used for  $40'$  in the *Geography* is  $\gamma 0'$  and not  $L\zeta'$  (see p. 150). There is also a variation in the manuscripts of the

*Handy Tables*:  $\overline{\lambda\zeta\varsigma}' L^*M^*f^*P^*$ ,  $\overline{\lambda\zeta\zeta}' L' V^*$  ('Table of Noteworthy Cities' 2.3; see Koch, Mittenhuber, and Stückelberger 2009, 154).

118 Pl. 3.7

119 Str. 3.5.3.

*The other islands and archipelagos*

A satisfying model that would explain the locations of the Cassiterides archipelago, Londobris Island as well as the Trileuci Islets has yet to be developed. The fact that their coordinates are generally made up of whole degrees may indicate that the islands were positioned approximately on a map of the entire peninsula.<sup>120</sup>

**8.4 Distortions in the  $\Omega$  recension**

When one compares – after the main points have been positioned – the coordinates in the  $\Omega$  recension of the *Geography* with the modified modern coordinates, and the coordinates in the  $\Xi$  recension with the modern coordinates, one finds different kinds of local distortions. There are significant differences between the recensions in several areas of the Iberian map, particularly around the Strait of Hercules and the neighbouring part of the Mediterranean coast up to the Ebro River as well as around Cape Barbarion and Cape Nerion.

**8.4.1 Local coastal distortions***The Strait of Hercules*

In the  $\Omega$  recension, the Strait of Hercules is much more complex in shape than the Strait in the  $\Xi$  recension for it is not depicted as a typical channel with two roughly parallel banks on either side of the parallel through Rhodes. The use of just one of the sources cannot explain the locations of the four boundaries of the Strait in  $\Omega$ .<sup>121</sup> There are residual distortions around the small group of localities that forms the gulf around Baelo, which has been shifted northwards (Fig. 85). The city of Baelo (near modern-day Bolonia, in the province of Cádiz) lies, in actual fact, in a smooth recess of the coast, but the latter differs markedly from the great gulf depicted on Ptolemy's map. Although the toponyms and the sequence of localities in the Strait described by Mela, Pliny and Strabo are similar to those in Ptolemy's catalogue, none of the antique sources shows such a distinct topography around Baelo. They describe a coast that has no major bay or headland, besides the Cape of Hera, while the narrow peninsula, with the Temple of Hera at its extremity, appears excessively large in comparison with the rest of the southern Iberian coast; this striking topographical form of Ptolemy's map is not described in the sources and does not feature in Marcian's description. The Strait

120 *Geogr.* 2.5.10: Londobris ( $\lambda = 3^\circ$ ,  $\phi = 41^\circ$ ). *Geogr.* 2.6.75: Trileuci Islets ( $\lambda = 9^\circ$ ,  $\phi = 46 \frac{3}{4}^\circ$ ). *Geogr.* 2.6.76: centre of the Cassiterides archipelago

( $\lambda = 4^\circ$ ,  $\phi = 45 \frac{1}{2}^\circ$ ). Strabo (3.5.11) and Ptolemy write that the Cassiterides is made up of ten islands.  
121 See p. 308.

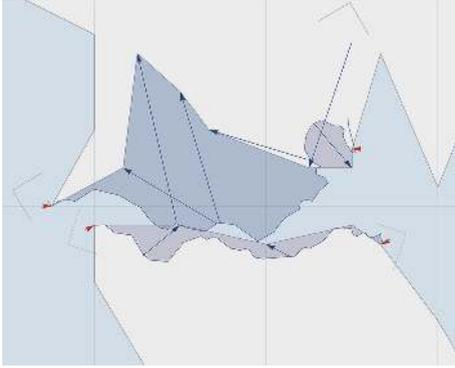


Fig. 85 Residual distortions along the Strait of Hercules ( $\Omega$  recension).

of Hercules in the  $\Omega$  recension does not resemble a regular channel – or isthmus of the sea, as Ptolemy describes it – but a small sea marked, on either side, by two facing headlands. This topography is reminiscent of Ptolemy’s drawing of the Propontis (Sea of Marmara), which he depicts as a small sea, situated between the Pontus (Black Sea) and the Aegean Sea and bounded by two straits: the Hellespont (the Dardanelles) to the south-west and the Thracian Bosphorus to the north-east.

#### *The Mediterranean coast*

The arrangement of the displacement vectors along the coastal section between Carthago Nova and the Sucro River in the  $\Omega$  recension is extremely chaotic: the localities along the coastline were imprecisely positioned, which has led to irregular distortions (Fig. 86). The pattern of distortions matches the topography only partially. The  $\Omega$  coastline forms a well-marked gulf, framed by two distinct promontories – Cape Scrombraria and the mouth of the Sucro River. Then, from the Sucro to Cape Tenebrius the coastline is almost rectilinear in shape. Some of these topographical features do, however, bear comparison with Mela’s description:

From [the Ebro River] the sea winds its way into the land, and as soon as it is let in with a great sweep, it is divided into two bays by the promontory they call Ferraria. The first is called the Bay of Sucro. It is the larger one and admits the sea with quite a large mouth, but the farther one enters it, the narrower it gets. This bay takes in the unimportant Sorobis, Turia and Sucro Rivers. It includes some cities too, in fact, but the best-known are Valentia and that famous city, Saguntum, which is renowned for its loyalty as well as its troubles. Then, the

Bay of Ilici holds Allone, Lucentia and Ilici, whence its name. Here now the land goes farther into the sea and makes Hispania broader than it has been.<sup>122</sup>

In Strabo's work, the mouth of the Sucro River is the important boundary mark of the coastal section between Carthago Nova and the Ebro, although Strabo does not describe the coastal topography in this area very precisely.<sup>123</sup> In the  $\Omega$  recension, the coast has two sections with different landforms, with the Sucro River forming the boundary between them. In addition, the gulf between Cape Scrombraria and the Sucro River includes the city of Alōnai, Portus Ilicitanus and the nearby, inland city of Ilici, which partially matches Mela's toponymy of the *Ilicitanus sinus*. Cape Scrombraria has the stereotypical form of many of the *Geography's* capes, but none of the sources describes the mouth of the Sucro River as a promontory. In spite of the small number of similarities between Ptolemy's map and the descriptions of Strabo and Mela, it has not proved possible to explain the localised distortions between Carthago Nova and the Ebro River.

As for the Iberian Sea coast, between the Pillars of Hercules and the Cape of Charidēmos, the gulf has an uneven shape in the  $\Omega$  recension (Fig. 87). The regularity of the curved shore is broken by two large headlands, formed by Suel and the Cape of Charidēmos, which both jut out southwards into the sea. Finally, the city of Malaca lies in a coastal recess and the nameless cape to the east of Selambina creates a small indentation. This very specific topography shows significant local distortions. Although the sharp coastal recess near Malaca is not documented in the antique sources, the city's modern equivalent, Málaga, does lie in a slightly curved bay. The small nameless cape (ἐξοχή) is certainly a later addition.<sup>124</sup> In the  $\Xi$  recension, the coastline was very possibly drawn in the form of a regular curve;<sup>125</sup> however, a similar mapping procedure does not explain the topographical particularities of the area in the  $\Omega$  recension.

It is possible that the coastal localities between the Pillars of Hercules and the Cape of Charidēmos as well as those between Alōnai and the mouth of the Turia River were positioned, in the  $\Xi$  recension, after an outline of the coastline had been drawn, with the localities then placed at more or less regular intervals. However, this process does not explain the coordinates of the  $\Omega$  recension as accurately as it does those of the  $\Xi$  recension.

#### *Northern and western oceanic coasts*

The notable residual distortions between the Sacred Cape and Mount Selēnē involve a clockwise rotation, which can be separated into two groups, using a similar model to that employed in the  $\Xi$  recension: the localities from the Sacred Cape to Cape Barbarion

122 Mela 2.91–94.

123 Str. 3.4.6.

124 See p. 138.

125 See p. 334.

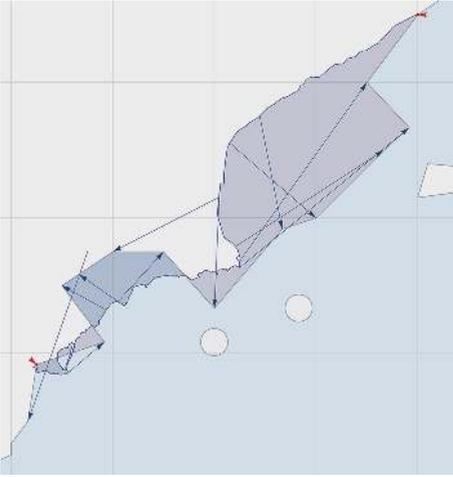


Fig. 86 Residual distortions along the Mediterranean coast between Carthago Nova and the Ebro River ( $\Omega$  recension).

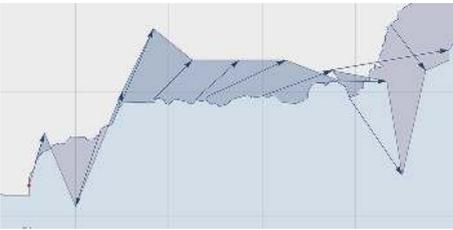
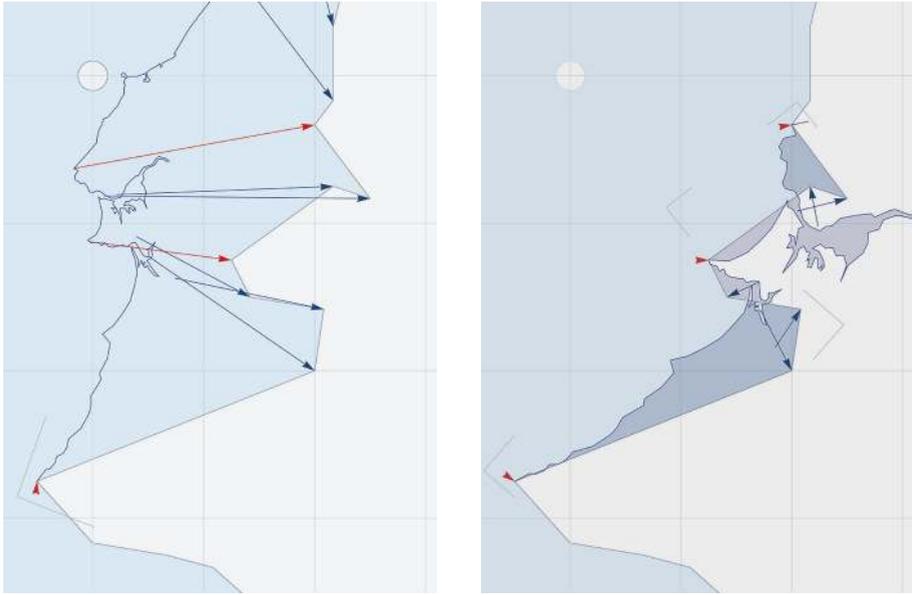


Fig. 87 Residual distortions along the Iberian Sea coast ( $\Omega$  recension).

show a longitudinal distortion eastwards with a small shift southwards; between Cape Barbarion and Mount Selēnē, the localities show a larger longitudinal distortion but no latitudinal shift (Fig. 88a). The subdivision of the coast into topographical units made of capes and bays could explain the residual distortions in both recensions (Fig. 88b).

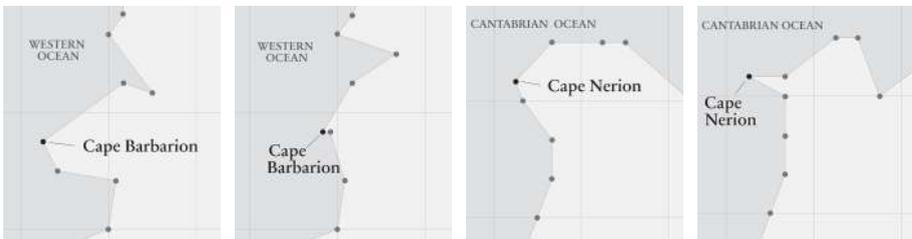
Once the coastline in the  $\Omega$  recension had been positioned in accordance with the main capes, clear residual distortions are visible. The coast between the capes is described as a series of gulfs in the sources, but the schematic drawing of the coast in the form of a regular curve in the  $\Omega$  recension does not explain the residual distortions as accurately as the representation in the  $\Xi$  recension. The topography of the regions near Cape Barbarion and Cape Nerion is strikingly similar in each of the two recensions: the two capes in the  $\Omega$  recension form large headlands that resemble rounded peninsulas (Fig. 89a and 89c); in the  $\Xi$  recension they are shown as tiny, acute-angled capes (Fig. 89b and 89d). The landforms in  $\Omega$  resemble the modern topography closely (Fig. 90), but no descriptive elements that could explain these landforms in the  $\Omega$  recension have been identified in the antique sources.



a Initial distortions.

b Residual distortions.

Fig. 88 Topographical subdivision of the coast into capes and bays to explain the residual distortions between the Sacred Cape and Mount Selēnē in the  $\Omega$  recension.



a  $\Omega$  recension.

b  $\Xi$  recension.

c  $\Omega$  recension.

d  $\Xi$  recension.

Fig. 89 Shape of the coast near Cape Barbarion and Cape Nerion in the two recensions of the *Geography*.

The significant distortions that appear between the Navia (Ilouiōn) River and Cape Oiarsō can be divided into two categories, which correspond to the subdivision of the coast into topographical units. Note that the modern locations of several toponyms along this coastline have not been satisfactorily identified, which prevents us from making an accurate comparison. Although the description of this area in the antique sources is



a Cabo Espichel.

b Cabo Fisterra and Cabo Touriñán.

Fig. 90 Schematic, modern-day coastal topography near Cabo Espichel (that is, Cape Barbarion) and Cabo Touriñán (Cape Nerion).

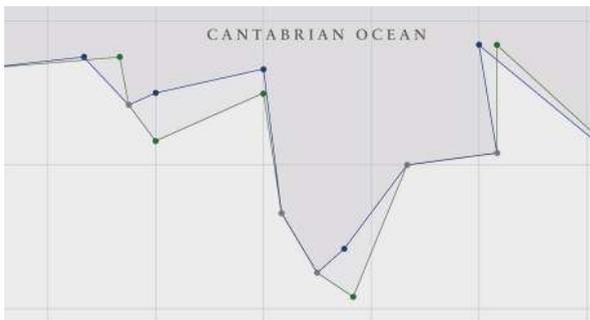


Fig. 91 Outline of the coast between the Navia (Ilouíōn) River and Cape Oíarsō in the Ξ (green) and Ω (blue) recensions.

rather brief, the differences can be convincingly explained: the coast was drawn in the form of a group of three large gulfs, as was done in the  $\Omega$  and  $\Xi$  recensions.<sup>126</sup> The outlines of the coast are quite similar in both recensions, although the localities were positioned slightly differently: the Naelo and Deva Rivers in  $\Xi$  can be found at the tip of their respective gulfs, whereas these positions are occupied by the cities of Flavionavia and Flaviobriga in the  $\Omega$  recension (Fig. 91). It has not proved possible to establish the cause of this discrepancy between the  $\Xi$  and  $\Omega$  recensions.

126 See p. 344.

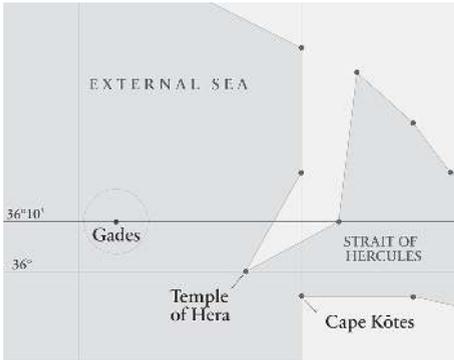


Fig. 92 Location of Gades in the  $\Omega$  recension on the parallel of latitude  $36^{\circ}10'$  at the western entrance to the Strait of Hercules.

### 8.4.2 Coordinates of Gades

In the  $\Omega$  recension, the island of Gades lies to the west of the Cape and Temple of Hera, and further south than in the  $\Xi$  recension. This configuration matches Mela's description of the island, which is to be found as one leaves the Strait and sails towards the ocean: *Gades insula quae egressis fretum obuia est*.<sup>127</sup> On Ptolemy's map, Gades is the first locality that a (fictitious) sailor would find in his path ('*ob-via*') on the oceanic coast of Baetica (Fig. 92). There is another piece of information from Pliny's work that might explain how Ptolemy worked out the latitude of Gades. According to Pliny, the longest day of the year in Gades is 14 hours 32 minutes.<sup>128</sup> Locations at slightly different latitudes will also have this duration of the longest day, which depends on the value of the obliquity of the ecliptic ( $\epsilon$ ) that one uses to carry out the conversion.<sup>129</sup> When one uses the ratio  $\frac{11}{83}$  given by Ptolemy in the *Almagest*<sup>130</sup> for the obliquity of the ecliptic (that is,  $\epsilon = 23^{\circ}51'$ ), one obtains a latitude of  $36^{\circ}21'41''$ , which does not exactly match the value given by the  $\Omega$  recension of the *Geography* ( $36^{\circ}10'$ ). However, by using the rounded value  $\epsilon = 24^{\circ}$ , which Eratosthenes and Hipparchus as well as Geminus of Rhodes all mention,<sup>131</sup> the longest day of 14 hours 32 minutes corresponds to a latitude of  $36^{\circ}10'31''$ , which is similar to the value in the  $\Omega$  recension of the catalogue. Ptolemy regarded this rounded value of  $\epsilon$  as being very close to his own evaluation;<sup>132</sup> Indeed, O. Neugebauer

127 Mela 2.97.

128 Pl. 6.214.

129 A conversion method is given in Rinner 2013, 27.

130 *Alm.* 1.12. Ptolemy seems to state that he empirically measured this value of  $\epsilon$  himself: 'From observations (ἐκ τῶν παρατηρήσεων) of that kind, and especially from comparing observations near the actual solstices (τῶν περὶ τὰς τροπὰς αὐτὰς ἡμῶν ἄ-

νακρινομένων), [...] we found that [...]': The same value was used to determine the latitude of the summer tropic, that is, the parallel through Syēnē. See: *Alm.* 2.6.7, 2.8 and 2.13; *Geogr.* 1.23.7 and 4.5.73.

131 *Str.* 2.5.7; *Hipp., Arat.* 1.10.2 and 5; *Geminus, Isag.* 5.41–45. See Evans and Berggren 2006, 156.

132 *Alm.* 1.12.

has demonstrated that Ptolemy, without admitting it explicitly, used  $\epsilon = 24^\circ$  for some of the values given in the *Almagest* on several occasions.<sup>133</sup>

Pliny's list is the only geographical source that explicitly links Gades with a parallel circle, where the longest day lasts 14 hours and 32 minutes.<sup>134</sup> Gades was one of the most important localities in the western Mediterranean area in the development of geography. Strabo, for instance, writes that Posidonius made observations at Gades for a total of thirty days, including during the summer solstice.<sup>135</sup> The use of the length of the longest day, as passed down by Pliny, may explain the latitude of Gades in the  $\Omega$  recension of the *Geography*. Then, in order to determine the coordinates of the island all one had to do was combine this latitude with a distance datum as well as a descriptive element, perhaps taken from Mela.

### Conclusion

The localised residual distortions that remain when the construction of the main points of the map has been explained help us to understand how Ptolemy might have determined the coordinates of each coastal locality in his catalogue. Most of the time, the process involved visualising topographical descriptions on to a working map. The main landforms could be positioned thanks to the localities that had already been constructed and drawn using simple geometrical shapes (curves, straight lines, and so on). Then, the rest of the localities were situated along the coastline, following a number of different strategies: in a few cases, it is possible that some distances were transferred on to the map; in many instances, though, the simplest procedure that would explain the specific distortions was that the localities were positioned at regular intervals along a coastline on the basis of a list of toponyms. Two strategies might have been combined to position the islands: the use of distance data with a compass and the visualisation of topographical descriptions.

Furthermore, there are clear differences between the  $\Xi$  and the  $\Omega$  recensions. In the  $\Xi$  recension, the geographical information that Ptolemy might have used to determine the coordinates can also often be found in other antique sources. The  $\Omega$  recension, however, is often incompatible with the information available in our extant sources.

- 133 Neugebauer 1975, 236–250, especially his summing-up: ‘Hence the conclusion seems to me inevitable that the angles  $\nu$  for the planetary phases were not only based on the round[ed] value  $\epsilon = 24^\circ$  but also computed with methods more primitive than the tables [*Alm.* 2.8 and 2.13]. See also A. Jones 2002.
- 134 According to O. Neugebauer's reconstruction, the list of the seven climates used by Vettius Valens (*Anth.* 1.6, ed. Kroll 24) has several points in com-

- mon with Pliny's values of the longest day. See Neugebauer 1975, 728; cf. with Pl. 6.211–219. Both Vettius Valens and Pliny link the third climate or *circulus* with a longest day of 14 hours and 32 minutes. Vettius Valens was active in the second century CE and was at one time based in Alexandria (see Komorowska 2004).
- 135 Str. 3.1.5 and 3.5.9.

Curiously, the coastline drawn according to the  $\Omega$  recension sometimes depicts landforms that resemble the actual topography quite closely, or at least more closely than the  $\Xi$  recension (such as the headlands near Cape Nerion and Cape Barbarion). Given the consistency of these landforms, simple scribal error does not always seem to be the most satisfying explanation for these discrepancies. An alternative explanation could be that some of the coordinates in the  $\Omega$  recension were modified intentionally. It is possible that a revision was carried out employing sources which Ptolemy had not used, which would explain why the 'revised' Iberian coast differs from the coast in the  $\Xi$  recension but is, nevertheless, logical. The precise context and the most probable sources of this revision cannot, however, be verified.

## 9 The Iberian interior's distortions

Ptolemy's Iberian interior comprises a large number of toponyms – 402 localities in the  $\Xi$  recension, 398 in the  $\Omega$  recension – that are distributed over the peninsula's three Roman provinces.<sup>1</sup> As we have seen, all the coastal localities were connected by a line, which, although virtual in the catalogue, must have been drawn on to the map by the cartographer, with the result that the coastline shows identifiable, topographical landforms. It has also become clear that one of Ptolemy's mapping procedures was to draw the coast according to the available literary descriptions of the area. The inland localities, by contrast, are not graphically connected with each other on the map, neither by roads nor by rivers. They were essentially organised by groups of peoples – each people generally being assembled in the same area of the map.

The antique sources contain far less geographical information on inland Iberia than on the peninsula's coastline. Strabo focuses on ethnographical, economical, zoological and historical elements and (apart from a few exceptions) situates the localities that he describes only approximately. However, he does provide some details on Iberia's main rivers. Pomponius Mela mentions just a couple of important inland cities, while Pliny the Elder lists a large number of localities, conscientiously arranged by *conuentus* and in alphabetical order,<sup>2</sup> although he gives very few details about their locations. While the characterisation of a locality as a cape or bay in the toponym itself offers invaluable topographical information, the administrative categories such as '*colonia*', '*municipium* of Roman citizens', 'city with Latin rights', 'free city', 'federate city', 'stipendiary city' and so on, provide, by contrast, no geographical or topographical information *per se*.<sup>3</sup> Besides

1 When distinguishing between 'the coast' (ἡ παραλία) and 'the interior', Ptolemy uses alternately τὰ ἐνδοτέρω and ἡ μεσόγαια or simply refers to 'the inland cities' (αἱ πόλεις μεσόγειοι).

2 See p. 221.

3 The catalogue refers to only two Iberian localities as *coloniae*: Clunia Colonia (*Geogr.* 2.6.56) and Scalabis Colonia (*Geogr.* 2.5.7; see p. 120). The first (and as

far as we know the only) attestation of Clunia as a *colonia* can be found on an inscription dedicated to Hadrian (*CIL* II 2780). Pliny does not include the city among the twelve *coloniae* of Hispania Citerior. This may simply be an indication that Ptolemy's documentation was relatively up to date. Scalabis was already a *colonia* at the time of Pliny (4.117). No

these authors' works, the sources that contain the most information on inland Iberia are the itineraries, in the form of manuscript texts (the *Itinerarium provinciarum*, the *Ravenna Cosmography*), maps (the *Tabula Peutingeriana*) and epigraphical sources (the Vicarello Goblets and the *Itinerario de Barro*),<sup>4</sup> all of which provide lists of stations along a given road, often with distances but without any cardinal directions.

There is a noticeable quantitative as well as qualitative discrepancy between the data contained in the catalogue of the *Geography* and the sources that preceded Ptolemy. The most commonly used information concerns the peninsula's main rivers and their structural role in the geography of the area.<sup>5</sup> However, the courses of the Baetis, Anas, Ebro, Tagus, Durius and the Minius, from their sources to their river mouths, cannot be reproduced with any great certainty from the information provided on them in the *Geography*. Furthermore, roads, which form the basis of the Roman itinerary literature, neither feature on Ptolemy's map of Iberia, nor do they even get a mention in the *Geography*.

A comparison between Ptolemy's coordinates and those of today shows a small number of groups of displacement vectors with similar distortions. The differences between the recensions of the *Geography* do not affect the definitions of the main groups but they do show numerous local variations. It proved impossible to determine the boundaries of the main groups of distortions as precisely as those of the coast, mostly because of the difficulties of locating Ptolemy's toponyms. Several principal groups of common differences can be identified, although the boundaries between them are not clear (Fig. 93). Whereas the localities in the north and east of the peninsula – that is, generally the localities in the province of Tarraconensis – show a massive shift to the north and the east (in a similar pattern to the nearby coastlines), the localities of the province of Baetica, together with several localities in the area of Carthago Nova and southern Lusitania, have been affected by a small northwards distortion, plus a slight shift to the east or the west.

### 9.1 Castulo and the group of distortions around Baetica

The southern group of distortions includes the localities of Baetica, several localities of Lusitania, in particular near Augusta Emerita, and some places in the province of Tarraconensis, near Carthago Nova. There is a clear distinction between, on the one hand, Alōnai, Ilici, Asso, Saltiga and Libisoka, which have been shifted to the north-east and are part of the Baetican group, and, on the other hand, Saetabis, Valentia, Saguntum and other neighbouring localities, which have been affected by a massive distortion

other administrative category is mentioned in the catalogue.

<sup>4</sup> See Chapter 5.

<sup>5</sup> See, more generally, Campbell 2012, 45–82.

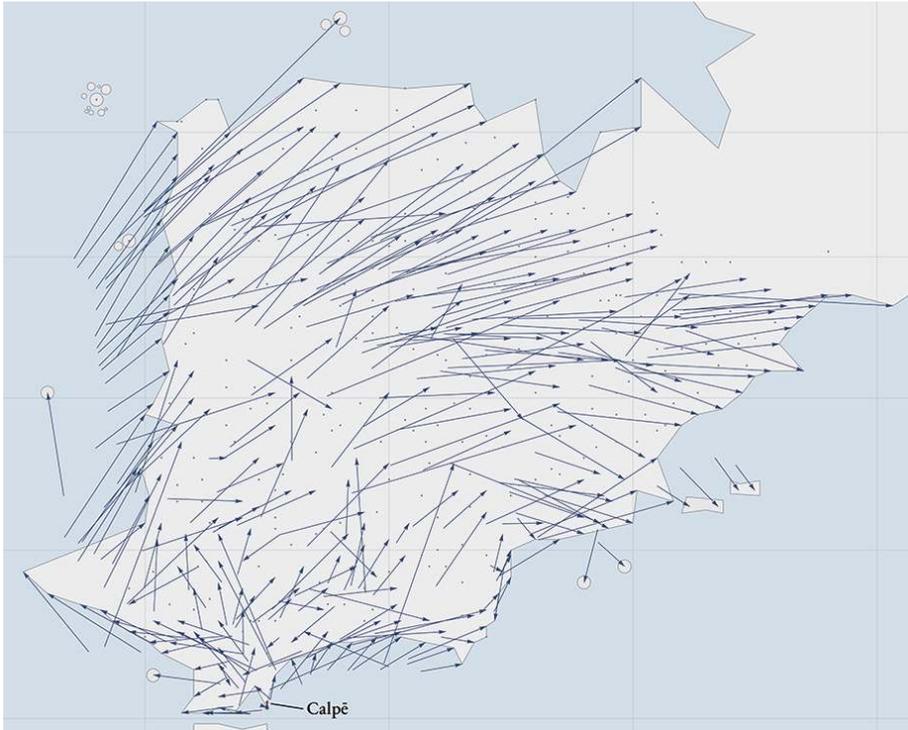


Fig. 93 A comparison between the modern-day coordinates and Ptolemy's coordinates of the  $\Xi$  recension in relation to the longitude of Calpē (red dot), using Ptolemy's regional map projection. The grey spots indicate the positions of the toponyms of the  $\Xi$  recension that could not be located with any great certainty.

eastwards and a small shift southwards. This last set belongs to the group of remaining Tarraconensis localities. The other boundaries are less clear. The Baetis River crosses this group, from its source in the southern part of the Orospeđa Mountains until its two mouths, which face the island of Gades, flowing near the main cities of Hispalis and Corduba.

### 9.1.1 Southern Iberia in the ancient sources

Several types of geographical information on southern Iberia can be found in the ancient sources: descriptions of rivers and their spatial relationships with some cities; distance data from roads or fluvial connections; and descriptions of the dimensions of provinces. There is very little information, however, on the spatial relationships (through the use of the cardinal directions) between the localities.

*The fluvial network in geographical descriptions*

Pliny and Strabo describe the appearance of the courses of the Anas and Baetis rivers, after having first located their sources. Pliny notes that both the Anas and Baetis flow westwards from Tarraconensis until reaching the ocean,<sup>6</sup> although Strabo writes:

Like the Anas, [the Baetis] at first flows towards the west, and then turns south, and empties on the same coast as the Anas.<sup>7</sup>

Pliny divides his description into two sections: first, the cities between the coast and the Baetis River (3.10–12); then the localities between the Baetis and the Anas rivers (3.13–15). He also situates cities on the right bank of the Baetis (Corduba, Orippo, Caura, and so on) and on its left bank (Hispalis),<sup>8</sup> although he does not systematically describe the sequence of the localities along this river. In a similar way, Strabo uses the Baetis to locate, to differing degrees of precision, some of the cities that are mentioned in his work: Hispalis, Corduba, Italica and Ilipa on the banks of the river (ἐπὶ τῷ Βαίτι); Astigis, Carmo and Obulca a little further away (ἀπωτέρω).<sup>9</sup> Some of the data related to fluvial distances have been passed down: there are 500 stadia from the mouths of the Baetis to Hispalis, 700 stadia from the river's mouths to Ilipa and 1 200 stadia up to Corduba.<sup>10</sup>

*Itinerary sources*

The network of Roman roads is particularly dense in the area between the Anas River and the southern littoral of Iberia. There are many itinerary sources that supply the stations and cities along these roads, including, most of the time, the distances between them. It should be remembered that, although late antique itineraries (such as the *It. prov.*, the *Rav.* or even Guido's *Geography*) point to the existence of a vast descriptive corpus of Roman roads, the textual history of these sources is not well known; these texts may have been supplemented by successive additions and corrections right up until the Early Medieval period, and so they do not represent a snapshot of the road system of the Roman Empire, even less of the Antonine period. The *It. prov.* provides the description of the following roads in the area of the Anas and Baetis rivers:

- a road that runs from Arelate (in Gallia Narbonensis) to Castulo via Carthago Nova (396.1–402.5); the Iberian section of the road (that is, from the Pyrenees) is the Via Augusta;
- two roads that run from Corduba to Castulo via Vircao and Iliturgi (402.6–403.3) and via Epora and Ucia (403.4–404.1);

6 Pl. 3.6 and 3.9.

7 Str. 3.1.6.

8 Pl. 3.10–11.

9 Str. 3.2.1–3.

10 Str. 3.2.3 and 3.5.9.

- a road that leads from Castulo to Malaca and that follows the coast after Urçi (404.2–405.6);
- a road that runs from Gades to Corduba via Hispalis (409.1–412.6);<sup>11</sup>
- a second road between Hispalis and Corduba via Astigi (413.1–5), plus the distance between Hispalis and Italica (413.6);
- a road that runs from Hispalis to [Augusta] Emerita (414.4–415.2);
- a road that leads from Corduba to [Augusta] Emerita (415.3–416.3);
- three roads that run from Olisipo to [Augusta] Emerita via Eborā (416.4–418.5), Budua (418.7–419.6) and Scallabis (419.7–420.7);
- two roads that lead from Esuris to Pax Iulia, the stages of which have been inaccurately ordered (425.6–427.3 and 431.4–7);
- a road that runs from the mouths of the Anas to [Augusta] Emerita via Italica and Contributa (431.4–432.8).

Epigraphical sources complete and generally confirm the description of the road network in southern Iberia. The Vicarello Goblets give the road stations along an itinerary from Gades to Rome via Hispalis, Corduba and Castulo.<sup>12</sup> This road meets the Mediterranean littoral only from Valentia. The goblets as well as the lists of the *It. prov.* systematically supply the distances in Roman miles between each station. The numerous *milliaria* (milestones) that have been found along the route should also be examined, since they could provide evidence of documentation that might have been known to Ptolemy but are no longer extant. The information on distances provided in other geographical works (such as Strabo) or in historical texts is extremely sparse, and it occasionally differs in its content.<sup>13</sup> The dense network of roads in the Baetican area was organised around the well-documented Via Augusta, which followed the floodplain of the Baetis. More generally, the main roads were organised around a small number of major centres: Castulo (near modern-day Linares), whose importance was highlighted by Strabo,<sup>14</sup> Corduba (Cordoba) and Hispalis (Seville) in the floodplain of the Baetis, as well as Augusta Emerita (Mérida) and Pax Iulia (Beja, Portugal) along the Anas River.

#### *Description of the provinces*

The descriptions of the dimensions and boundaries of the Roman provinces form another type of information source. They are built on the same model: a schematic presentation of the boundary marks of each of the provinces or more generally a list of the geographical areas that surround them, usually with measurements of their length and

11 Before this road, the *It. prov.* lists the localities along the road between Malaca and Gades, even though it runs along the coast.

12 See p. 236.

13 (Ps.-)Caes., *Bell. Hisp.* 32.6, mentions that there are 170 miles between Carteia and Corduba. Strabo writes that there are 300 stadia between Corduba and Obulca (3.4.9) and 1 400 stadia between Carteia and Munda (3.2.2).

14 Str. 3.4.9.

width. As far as the Iberian provinces are concerned, the first description of this kind goes back to the geographical work of Artemidorus, and was passed down by Constantine VII Porphyrogenetos and in the *P. Artemid.* These two witnesses supply the same passage from Artemidorus, albeit with small textual variants:<sup>15</sup>

From the Pyrenees inland to the land near Gadeira, the territory is called Iberia as well as Hispania. It has been divided by the Romans into two provinces. [To the first province] belongs the whole land from the Pyrenees until Carthago Nova and the sources of the Baetis; to the second belongs the land until Gadeira and Lusitania.<sup>16</sup>

From the Pyrenees to the land near Gadeira and to the inland regions, the whole territory is called Iberia as well as Hispania. It has been divided by the Romans into two provinces. To the first one belongs the whole land from the Pyrenees until Carthago Nova, Castulo and the sources of the Baetis; to the second province belongs the land until Gadeira and the whole of Lusitania.<sup>17</sup>

Artemidorus' passage does not provide any distances but he is the first author to locate landmarks in the interior to define the two provinces. These landmarks are later reused, albeit differently, by Pliny, who adds two pieces of information concerning the size and boundaries of Baetica:

The total length of Baetica according to Marcus Agrippa is 475 miles, and its breadth 258 miles, but this was when its bounds extended as far as Carthago Nova: such extensions comparatively often give rise to great errors in the measurements of distances, as they sometimes cause alterations in the boundary of provinces and sometimes an increase or reduction in the mileage of roads. During so long a period of time the seas have been encroaching on land or the shores have been moving forward, and rivers have formed curves or have straightened out their windings. Moreover different persons take different starting points for their measurements and follow different lines; and the consequence is that no two authorities agree. At present (*nunc*) the length of Baetica from the frontier of the town of Castulo to Gades is 250 miles, and from the

15 All the variants are bones of contention between supporters and detractors of the papyrus. See Marcotte 2010, 348–353, and the references given by Moret 2013, 48. I believe that both fragments should be understood to be paraphrases of Artemidorus' text; textual variants are thus inevitable.

16 Const. Porphy., *De admin. imp.* 23 = fr. 21 Stiehle 1856. See the edition of Billerbeck and Zubler 2011, 263–267. Constantine might have known of this description via Stephanus of Byzantium. See Marcotte 2010, 350.

17 *P. Artemid.* IV 1–15.

sea-front of Murgi 25 miles more; its breadth from Carteia along the coast to the Anas is 234 miles.<sup>18</sup>

This passage from Pliny is of great interest as it shows not only the Roman administration's interest in evaluating the geographical extent of some of its provinces but also makes explicit that a number of successive or different estimation methods existed, which were possibly the result of different administrative definitions. Pliny's note cards are, therefore, evidence of this plurality of measures. The association of topographical boundaries with size evaluation in miles can be found in several late antique and medieval sources; despite their age, these sources refer to a period in the Roman Empire that had already passed when the texts were compiled:

– *Demensuratio provinciarum* (*Dem. prov.*) 24: 'Hispania Ulterior [is bordered] to the east by Oretania, to the west by the Ocean, to the north by the Anas River, to the south by the Iberian Sea. Its territory is 480 miles long (*in longitudine*) and 283 miles wide (*in latitudine*):'

– *Divisio orbis terrarum* (*Div. orb. terr.*) 4: 'Baetica Cordubensis, the first province [of Hispania], is delimited to the east by the mountains (*saltu*) near Carthago and Oretania [*Mauretania* codd.], to the north by the Anas River, to the west by the Ocean, to the south by the Celtiberian Sea.'

– Orosius, *Hist.* 1.2.35: 'Hispania Ulterior has the Vaccaeii, the Celtiberians and the Oretani to the east, the Ocean to the north, the Ocean to the west, the oceanic Strait of Gades to the south, from where comes our Sea, which is called Tyrrhenian.'

These texts describe the province of Hispania Ulterior – that is, Baetica – in the same way as the above model, although there are some dissimilarities in their content. The extant manuscripts of the *Div. orb. terr.* do not contain the numerical data on Iberia that were certainly originally included in the text. The links between the *Div. orb. terr.* and the *Dem. prov.* and the geographical work of Agrippa have been intensively discussed, although it has not been possible to prove that these two texts were based on Agrippa – indeed, this supposition is implausible.<sup>19</sup> In light of the passage of Pliny quoted above, it is possible that these kinds of descriptive texts, with or without distances, were circulating as early as the first century BCE, even without identifiable authors, but it has proved impossible to determine their exact origin. Strabo's description of Turdetania, although not a Roman province, uses a similar model:

18 Pl. 3.16–17.

19 Arnaud 2008, 94–95.

It is above the coast this side [i.e. below] of the Anas that Turdetania lies, and through it flows the Baetis River. It is delimited on the west and north by the Anas River, on the east by a part of Carpetania and by Oretania, and on the south by those of the Bastetani, who occupy a narrow stretch of coast between Calpē and Gades and by the sea next to that stretch as far as the Anas. But these Bastetani of whom I have just spoken also belong to Turdetania, and so do those Bastetani beyond the Anas, and most of its immediate neighbours. The extent of this country is not more than 2 000 stadia, that is, in length or breadth (ἐπὶ μῆκος καὶ πλάτος).<sup>20</sup>

In this passage, the measurement of 2 000 stadia given by Strabo is similar to the length of Baetica passed down by Pliny (250 miles). However, this type of source is difficult to interpret as the terms *latitudo/longitudo* as well as μῆκος/πλάτος do not systematically refer to the latitudinal and longitudinal extent of an area but can often refer to an area's length and breadth, that is, the longest and the smallest dimensions of a territory. Ptolemy uses exactly the same model in the introduction to each περιορισμός, although he is more precise in his references to landmarks, and each time he defines the sides of the province he is about to describe. The vocabulary that Ptolemy and Strabo use is similar (ἀφορίζειν, περιορίζειν, πλευρά) and resembles the technical terms used by Eratosthenes when he defined his σφραγιδες.<sup>21</sup>

### 9.1.2 The boundaries of Baetica in Ptolemy's *Geography*

Although the Roman roads are not shown on Ptolemy's maps, the organisation of the roads in the south of the peninsula, dominated by the Baetis floodplain and its connections with Carthago Nova and the southern parts of Lusitania, corresponds to the geographical area covered by our group of displacement vectors. Strabo's description of Turdetania, which includes some peoples, in particular the Bastitani beyond the Anas, also matches this group.

It has not been possible to locate any of Ptolemy's inland boundaries of the provinces. It is, therefore, hard to estimate the role of the boundaries – in this particular case the Anas River and the 'line' to the coast<sup>22</sup> – in Ptolemy's mapping process. A method to explain how the boundaries were determined can, nevertheless, be proposed, on the basis of the antique sources that describe the size and extent of Baetica. On Ptolemy's map, the maximum latitudinal extent of Baetica runs from the Strait of Hercules to the

20 Str. 3.2.1.

21 Marcotte 2007b; see p. 199.

22 Such a line was not necessarily thought of as straight. Indeed, when Ptolemy clearly means a 'straight line', he systematically writes εὐθεία γραμ-

μή (*Geogr.* 1.21.1) or otherwise simply uses the substantive form ἡ εὐθεία (*Geogr.* 1.24.1, 7 and 13).

The word γραμμὴ ('line') on its own never means a 'straight' line.

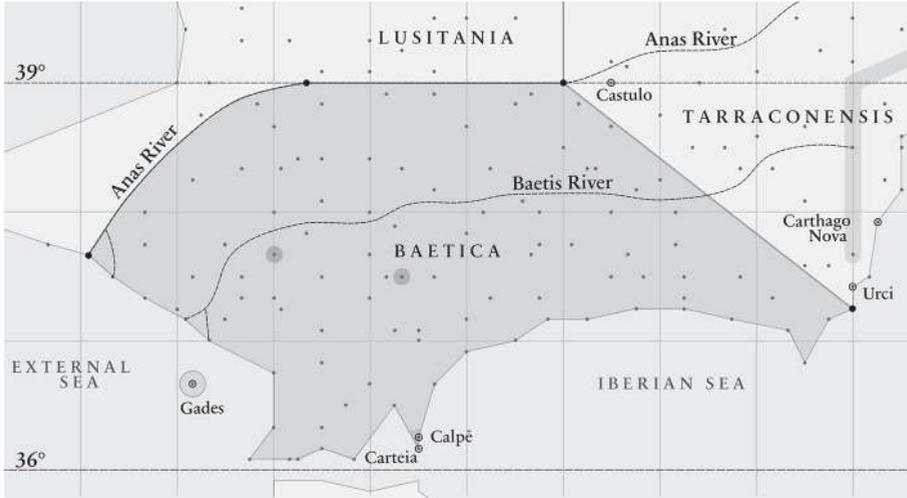


Fig. 94 The province of Baetica in Ptolemy's *Geography* ( $\Xi$  recension).

parallel of latitude  $39^\circ$ , in which a section of the Anas River flowed. Ptolemy uses two intermediate points to define the course of the river, in addition to its mouths and sources: one point corresponds to the common boundary of the three provinces, the second to the inflection point of the course, which curves south-westwards towards the ocean (see Fig. 94). The latitudinal extent of Baetica is, therefore, *c.*  $3^\circ$  of latitude, more precisely a little less than 1 500 stadia. The position of the Anas River as a provincial boundary but also as the northern boundary mark of Baetica is well attested in the ancient sources.

The north–south extent of Baetica in the *Geography* can be explained by the fact that Ptolemy used Pliny's 'updated data' for the distance between Carteia and the Anas River (234 miles), which he then reduced by one-fifth: a distance of 234 miles corresponds to *c.* 1 872 stadia, so  $1\ 872 \times \frac{4}{5} = 1\ 497.6$  stadia, which tallies with Ptolemy's map (where the distance is just under 1 500 stadia). It is possible that a simple conversion from stadia into degrees was done to obtain the latitudinal extent, especially since the value in stadia of a degree of a meridian is constant. Ptolemy regularly reduced distances by a simple fraction (such as one-fifth).

The use of Pliny's value could hence explain the latitude of the boundary between Baetica and Lusitania. However, using Pliny's topographical information concerning this distance evaluation is problematic: on the one hand, Pliny refers not to the Strait of Hercules but to Carteia, which is slightly north of the parallel through the Strait in the *Geography*; on the other hand, Pliny makes clear that the distance of 234 miles between Carteia and the Anas River was measured along the coast: *latitudo a Carteia Anam ora*



Fig. 95 Localities of Tarraconensis near the province's boundary with Baetica, constructed on a map using Ptolemy's second projection ( $\Xi$  recension).

CCXXXIII.<sup>23</sup> Strabo's value for the width of Turdetania (2 000 stadia) as well as the breadth presented under the authority of Agrippa (258 miles or *c.* 2 064 stadia) could also explain the latitude of the boundary between Baetica and Lusitania, if reduced to three-quarters of the original data. None of these procedures is, however, fully convincing, although, given the types of transmitted sources, this kind of calculation process could well have been employed.

### 9.1.3 The road from Urci to Castulo

The road network in Baetica and the Anas area was organised around the main cities of Hispalis, Corduba, Castulo, Augusta Emerita, all of which are mentioned in Ptolemy's catalogue and – except for Castulo – are cited in Book 8 of the *Geography* as well as in the *Handy Tables*.<sup>24</sup> A mapping process that would explain how Ptolemy calculated the coordinates of Hispalis, Corduba and Emerita has not been identified, despite the vast array of distance data preserved in the *It. prov.*, on the Vicarello Goblets and elsewhere.

23 Pl. 3.17.

24 *Geogr.* 8.4.3–4; 'Table of Noteworthy Cities' 2.1–2.

Moreover, in many cases the distances on Ptolemy's map of Iberia are clearly greater than those passed down in the other ancient sources, which does not correspond to the way Ptolemy regularly treated his distance data: he generally reduced, not increased, distances.

In the  $\Xi$  recension, a small group of displacement vectors, which corresponds to the localities of Urçi, Acci, Tugia<sup>25</sup>, Biatia (Vivatia or Viatia in other antique sources) and Castulo, is visible immediately to the northeast of the boundary between Baetica and Tarraconensis (Fig. 95). This group shows an expansion as well as a rotation towards the northeast. Castulo was a major station in the road network and was frequently used as a boundary mark in descriptions – it is one of the few landmarks, in fact, of the Iberian interior. The city of Castulo and the nearby mountains (*saltus castulonensis*) were associated with the boundary area between Hispania Ulterior and Citerior, probably from as early as the time of Artemidorus, if one believes the *P. Artemid.*, and certainly since Pompey the Great.<sup>26</sup>

On Ptolemy's map (as in Pliny's description), Castulo is situated in Tarraconensis, near the common boundary point between the three Iberian provinces, on the same latitude as the east–west section of the Anas River (see Fig. 95b). Its location in the *Geography* can be explained by using two of the distances given in the sources. Thanks to a simple geometrical construction carried out with a ruler and compass, Castulo (*K*) can be positioned:

- on a circle with Urçi (*U*) at the centre and radius  $r \cdot d_{UK}$ , where  $d_{UK}$  is a distance of 1 304 stadia between *U* and *K*, and *r* is a reduction of one-fifth;
- and on a circle with Corduba (*C*) at the centre and radius  $r \cdot d_{CK}$ , where  $d_{CK}$  is a distance of 624 stadia between *C* and *K*, and *r* is a reduction of one-fifth (Fig. 96a).

The circles were drawn on a map of Ptolemy's second projection and the distances were measured by following the graduation of the 12th main parallel of Ptolemy's world

25 The toponym's spelling in the *Geography* (2.6.59) is Τουία. The locality was omitted in the  $\Omega$  recension.

26 Caesar, *Bell. Civ.* 1.38; Str. 3.4.20: 'The limit [of Baetica], on the east, has been set near Castulo (πλησί-

ον Κασταλώνας): Cf. with Pliny's description cited above. See the excellent and comprehensive presentation by Moret 2013, 51–54.



a Construction using two distances.

b Construction using a distance and a parallel circle.

Fig. 96 Two possible constructions of Castulo, carried out using a ruler and compass on a map of Ptolemy's second projection ( $\Xi$  recession).

map.<sup>27</sup> The positions of Corduba and Urçi were taken as already known.<sup>28</sup> The distance of 1 304 stadia between Urçi and Castulo corresponds to the 163 miles given in the *It. prov.* (404.2–8), while the distance of 624 stadia between Corduba and Castulo corresponds to the 78 miles given by the same source for the shortest route between these two cities (*It. prov.* 403.4).<sup>29</sup> It is remarkable that both pieces of information appear sequentially in the itinerary's manuscripts. In this construction, both these distances were reduced by one-fifth, which is in agreement with the other procedures already described and which can be explained by the need to take the bends in the road into account.

A variation of this mapping process would be to use the same distance between Urçi and Castulo (163 miles, that is 1 304 stadia) but combine it with the parallel of

27 See p. 287. The coordinates of Corduba used in this construction were taken from the  $\Omega$  recession, where the latitude of this city ( $38^{\circ}05'$ ) differs from the latitude ( $38^{\circ}20'$ ) in the  $\Xi$  recession. The value in  $\Omega$  is, I believe, more likely to be the correct figure, since  $38^{\circ}05'$  is also the latitude found in the 'Table of Noteworthy Cities' (2.2). In their edition of the latter, Koch, Mittenhuber, and Stückelberger 2009, 154, however, opted for the latitude of  $38^{\circ}20'$ ; even though most of the manuscripts (V<sup>\*</sup>M<sup>8</sup>F<sup>9</sup>; see p. 85) give  $38^{\circ}05'$ , while only manuscript L<sup>\*</sup> supplies  $38^{\circ}20'$ . In addition, the length of the longest day given in Book 8 of the *Geography* – in both recen-

sions – is much closer to the latitude of  $38^{\circ}05'$  than to  $38^{\circ}20'$ .

28 As Urçi lies on the coast, it is possible that it was positioned at an earlier stage of the construction process.

29 The other road between Corduba and Castulo is 99 miles long, according to the *It. prov.* (402.6). If Ptolemy had had access to both values (78 and 99 miles) for the same route, it would have made more sense for him to pick the shortest route, which would have helped him come closest to the direct distance between the two points.

CASTULO		
TUGIA	35 miles	Tab. 13 First section of the road from Castulo to Malaca via Urci, according to the <i>It. prov.</i> (404.1–405.6). The toponyms in small capitals belong to the same group of distortions that appears in the $\Xi$ recension of the <i>Geography</i> .
Fraxinum	16 miles	
Bactara	24 miles	
ACCI	32 miles	
URCI	24 miles	

latitude 39° rather than with a second distance value (Fig. 96b). This alternative leads to almost the same result as Ptolemy's coordinates and requires only the already known location of Urci. Positioning Castulo at the same latitude as the boundary point finds a parallel in descriptions of the situation of the city near the boundary between the three provinces, although one cannot simply transpose this piece of information to suppose that Castulo lay on the same parallel as the northern boundary of Baetica.

The road from Castulo to Urci corresponds to the inland section of the road between Castulo and Malaca as passed down in the *It. prov.* (Table 13). The city of Biatia is not recorded in this text, which could indicate that it was close to, but not actually on, this road. The exact route of the road between Castulo and Tugia is, in any case, not entirely certain (Fig. 97). The  $\Xi$  recension of the *Geography* does not include all the stations recorded in the *It. prov.*, although the sequence of the localities of Castulo, Tugia, Acci and Urci tallies with the itinerary's list. In spite of the discrepancies between the data (in miles) in the *It. prov.* concerning the intermediate distances and the positions of Castulo, Tugia, Acci and Urci on Ptolemy's map, the alignment of these localities (as well as Biatia) can still be explained: a straight line was possibly used to depict the road connecting Castulo and Urci (Fig. 98). This explanation can also be applied to Ptolemy's second projection or his regional map projection, but only in the case of the  $\Xi$  recension. The  $\Omega$  manuscripts omit the locality of Tugia and its coordinates,<sup>30</sup> and also give a very different latitude for Acci.<sup>31</sup>

## 9.2 Tarraconensis and Lusitania

The northern and eastern areas of the Iberian peninsula mostly belong to the province of Tarraconensis. The northernmost localities show distortions that run in a north-easterly direction, while the distortions of the localities east of the Ebro River run only in an

30 *Geogr.* 2.6.59.

31 *Geogr.* 5.6.61: 38°30'  $\Omega$ , 37°55'  $\Xi$ .



Fig. 97 Schematic configuration of the road between Castulo and Urci.



Fig. 98 Biatia, Tugia and Acci were positioned along a straight line between Castulo and Urci (Ξ recension). These localities were probably located using the same auxiliary line on a map of Ptolemy's second projection.

easterly direction (Fig. 93). Nevertheless, there is no sharp division between the two patterns of distortions. Few of the localities of northern Lusitania and few of the localities that Ptolemy situates in the vicinity of the Minius River have been identified and located with any great certainty.

### 9.2.1 Northern and eastern Iberia in the ancient sources

As for Baetica, the antique sources on northern and eastern Iberia can be classified into four categories: a focus on the major river floodplains (the Tagus, Durius and Minus rivers, but above all the Ebro River); the important documentation on the Roman road network; a small amount of precise information on the location of localities; and a few schematic presentations of the provinces. One particular passage from Strabo's *Geography* supplies a combination of distance data and directions in order to situate one city in relation to three other localities:

Ilerda is distant from the Ebro 160 stadia, to a man travelling approximately towards the west; from Tarraco, on the south, about 460 stadia; from Osca, on the north, 540 stadia.<sup>32</sup>

As the distances given by Strabo do not match the data given in the *It. prov.*, both works must go back to different sources.<sup>33</sup> The cardinal directions given in the above quotation need to be understood within the context of a general configuration of the peninsula, where the Pyrenees and the Ebro River run in a north–south direction. Descriptions that use cardinal directions are, however, extremely rare, and there is little other distance data. There are certainly more schematic descriptions, which offer the same stereotypical framework: the province of Tarraconensis, from which the territory of Callaecia is generally excluded, is bordered to the east by the Pyrenees, to the west by Oretania, to the south by the Iberian Sea and Baetica, and to the north by the ocean – a schema that is sometimes completed by an estimation of the province's length and width.<sup>34</sup>

#### *Rivers and mountains*

Pliny and Strabo refer to several main rivers in their descriptions of the northern and eastern areas of the Iberian peninsula. The Ebro, Tagus and Durius rivers are the major

32 Str. 4.3.10.

33 *It. prov.* 391–392 and 451–452.

34 *Dem. prov.* 22: 535 miles in length, 183 miles in width; *Div. orb. terr.* 6: 500 miles in length, 200 miles in width; Orosius, *Hist.* 1.2.34, as well as the *Cosmographia* 34 (Riese 1964, 98) do not contain

any distances. Pliny (3.18) reminds his readers that the old map (*vetus forma*) of Hispania Citerior had been modified and states (3.29) that its length, from the Pyrenees to the region of Castulo, is 607 miles, whereas its width at its narrowest, between Tarraco and the littoral near Oiarsô, is 307 miles.

landmarks and are used at two levels. At a local level, the rivers are used to help situate localities along their respective courses or in their vicinity: Caesar Augusta, Celsa or Vareia on the Ebro;<sup>35</sup> Acontia and Numantia near the Durus River.<sup>36</sup> Pliny also situates Iuliobriga near the source of the Ebro.<sup>37</sup> At the level of the whole peninsula, the rivers are often placed in relation to the peoples of Iberia, offering a framework by which to distribute them throughout the peninsula. Sometimes, the outline of a river's course is schematised (the Ebro: from north to south;<sup>38</sup> the Tagus and Durus: from east to west<sup>39</sup>), but generally Pliny and Strabo use groups of peoples to situate the rivers, and so both elements are described together:

The Durus River is one of the largest in Hispania, which rises in the region of the Pelendones and passing by Numantia then flows through the Arevaci and Vaccaei, separating the Vettones from Asturia and the Callaeci from Lusitania, and at this point also separating the Turduli from the Bracari.<sup>40</sup>

Now about thirty different tribes occupy the country between the Tagus and the Artabri.<sup>41</sup>

The descriptions are generally less detailed as they often associate a people with a river that flows through its localities<sup>42</sup> or has its source nearby.<sup>43</sup> When Ptolemy locates the Bracari Callaeci 'between the Minius and Durus rivers, near the sea,' he uses the very same descriptive tradition.<sup>44</sup> Finally, although there is very little distance data on the rivers, Pliny does state that the course of the Ebro River is 450 miles long and is navigable up to Vareia, that is, 260 miles from the mouth of the Ebro.<sup>45</sup> The descriptions of mountain ranges have the same characteristics as the rivers. Strabo and Ptolemy are the only authors to mention the Idubeda and the Orospeida mountain ranges. Strabo describes their outlines and situates them in relation to the coast and the groups of peoples living nearby.<sup>46</sup> This kind of description is quite rare, although Strabo's passage fortunately offers invaluable parallels to Ptolemy's map.

35 Pl. 3.20 and 24; Str. 3.4.9.

36 Pl. 4.112; Str. 3.3.2, 3.3.4 and 3.4.12.

37 Pl. 3.20.

38 Str. 3.4.6.

39 Str. 3.3.1 and 3.3.4.

40 Pl. 4.112.

41 Str. 3.3.5. Some manuscripts of Strabo's *Geography* (among them the Parisinus gr. 1393) state that there are 'fifty' tribes.

42 Str. 3.3.4: 'The Durus, which, coming from afar, flows by Numantia and many other settlements of the Celtiberi and Vaccaei.'

43 According to Strabo, the source of the Tagus River is found in the area of the Celtiberi, near the Arevaci, while the Ebro rises in the land of the Cantabri and the Minius rises in the land of the Vaccaei (Str. 3.3.1, 3.3.4. and 3.4.6). Pliny (3.20) also writes that the Ebro rises in the area of the Cantabri.

44 *Geogr.* 2.6.39.

45 Pl. 3.20.

46 Str. 3.4.10.

*Road network and itinerary sources*

As is the case for southern Iberia, the antique road network of northern and eastern Tarraconensis is known mostly thanks to the *It. prov.*, which provides descriptions of several routes, with the distances given in miles:

- a road that runs from the Pyrenees to the Legio VII Gemina via Caesaraugusta (390.2–395.4);
- a road that leads from Arelate to Castulo via Tarraco and Carthago Nova (396.1–402.5);
- a road that stretches from Oliosipo to Bracara Augusta (420.8–422.1);
- three roads that run from Bracara to Asturica Augusta, via Aquae Flaviae (422.2–423.5), via Nemetobriga (427.4–429.4) and via Lucus Augusti (429.5–431.3), plus one road between Bracara and Asturica *per loca maritima*, in particular through Brigantium (423.6–425.5);
- three roads that lead from [Augusta] Emerita to Caesaraugusta, via Salmantica (433.1–438.1), Toletum (438.2–439.4) and finally *per Lusitaniam* (444.3–446.3);
- two roads that extend from Asturica Augusta to Caesaraugusta, one of them being a continuation of the previous road from Titulcia to Caesaraugusta (439.5–439.14), the other running *per Cantabriam* (439.15–443.2);
- an alternative road to the main road between Turiasso and Caesaraugusta (443.3–444.2);
- a road that runs from Laminium to Toletum (446.4–7) and to Caesaraugusta (446.8–448.1);
- a road between Asturica and Tarraco (448.2–452.5);
- a road that runs from Caesaraugusta to Bearnum in Gallia via the Pyrenees (452.6–453.3);
- a road that leads from Asturica to Burdigala (453.4–456.5).

The information contained in the *It. prov.* can be compared with several of the epigraphical sources. The Vicarello Goblets give the stations along the road between Castulo and the Pyrenees, although the route runs partly along the coast (between Valentia and Tarraco). With the exception of the *Geography*,<sup>47</sup> the clay tablets of the *It. Barr.* include the only mentions of Octaviolca, Aquae Quintiae and Dactonium. Iuliobriga, which is also mentioned in the *It. Barr.*, rarely appears in the geographical texts but is quoted by Pliny and Ptolemy<sup>48</sup> and is found much later in the *Notitia dignitatum*.<sup>49</sup> Several of the toponyms inscribed on the tablets of the *It. Barr.* can only be found in Ptolemy and in the manuscript itineraries (*It. prov.* and *Rav*).<sup>50</sup>

47 *Geogr.* 2.6.27: Ὑδατα Κορινθία Ω, Ὑδατα Κορινθία να Ξ; *Geogr.* 2.6.25: Δακτόνιον; *Geogr.* 2.6.51: Ὀττασοιόλκα. See Grande Rodríguez 2004, 178–179.

48 Pl. 3.21 and 3.27: Pliny also mentions 'the harbour of Victory of the Iuliobricense' (Pl. 4.111); *Geogr.* 2.6.51.

49 *Not. dign. partibus occidentis* 42.30: *Tribunus cohortis Celtiberiae, Brigantiae, nunc Iuliobriga*. Several epi-

graphical sources confirm the existence of this locality. The *agrum Iuliobrigensium* is mentioned on four *termini* (boundary stones) found near Retortillo in northern Spain (*CIL* II 2916 a–d) and on several dedications (*CIL* II 4192, 4240) and tombstones (*CIL* II 2480 and VIII 3245).

50 Fernández Ochoa, Morillo Cerdán, and Gil Sendino 2012, 164–171.

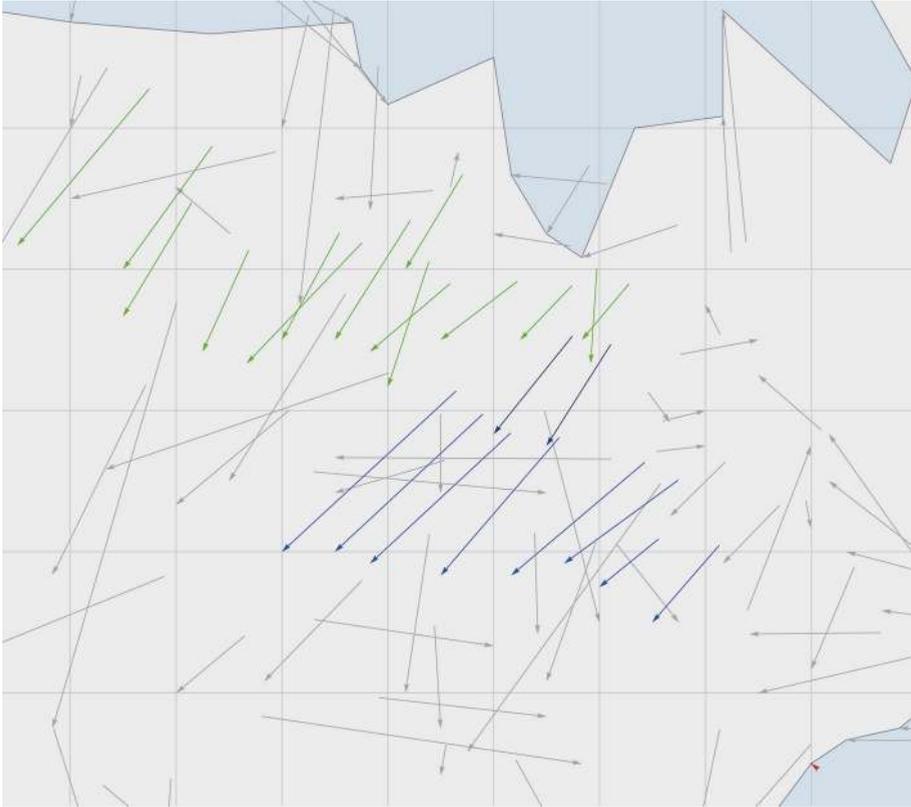


Fig. 99 Residual distortions after the localities were positioned in accordance with the coordinates of Carthago Nova and the mouth of the Ebro River ( $\Xi$  recension). The green arrows show the Asturica Augusta group, the two arrows in dark blue represent Tritium Magallum and Vareia, and the light blue arrows correspond to the group around Caesar Augusta.

### 9.2.2 Upper valleys of the Ebro and Durius rivers

#### *Groups of distortions in the $\Xi$ recension*

The inland localities in north-east Iberia – to the west of the Ebro River and north of the Durius River – show the same main distortions as the nearby coastal localities of the Mediterranean Sea, that is, a massive shift eastwards, sometimes with a slight latitudinal shift northwards (Fig. 93). When the interior is positioned so that the modern coordinates of Carthago Nova and the mouth of the Ebro River coincide with their respective coordinates in the *Geography*, the main eastward longitudinal shift of the coast and the nearby inland localities disappears, although several subgroups of common distortions remain (Fig. 99).

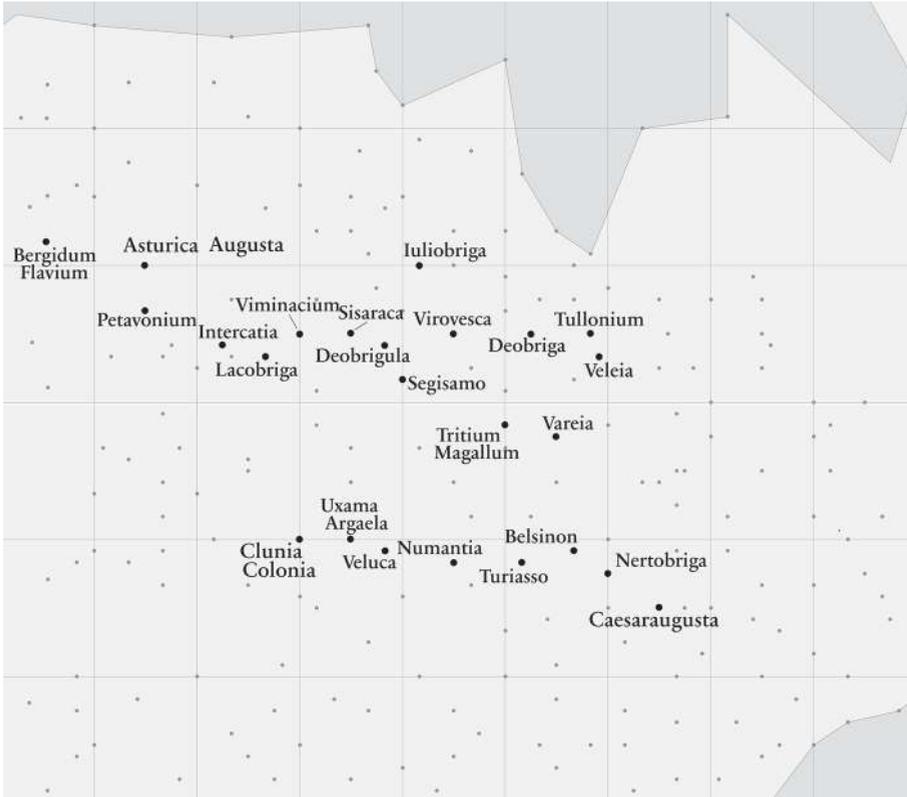


Fig. 100 Localities in the province of Tarraconensis on Ptolemy's map ( $\Xi$  recension).

A first group of localities, which Ptolemy positions between latitudes  $43^{\circ}$  and  $44^{\circ}$  (except Bergidum Flavium), shows a similar moderate shift south-westwards. It includes, from west to east: Bergidum Flavium, Asturica Augusta, Petavonium, Intercatia (of the Vaccae), Lacobriga, Viminacium, Sisaraca, Deobrigula, Segisamo, Virovesca, Deobriga, Tullonium and Veleia (Fig. 100). This group corresponds to localities that lay along or near the ancient road that ran between Asturica Augusta and Caesaraugusta in Iberia and then north to Burdigala (modern-day Bordeaux) in Gallia Aquitania (Fig. 101). Most of the localities can be found in the description of the stations listed in the *It. prov.* (Table 14). Bergidum Flavium lies to the west of Asturica, on the road that continues to Flavium Brigantium.<sup>51</sup> The city of Sisaraca quoted by Ptolemy is certainly Pisoraca, which has been located – thanks to the toponymic proximity but above all to several *milliaria* near

51 *It. prov.* 425.4. See Table 16.

<b>ASTURICA</b>		
Vallata	16 miles	
Interamnium	13 miles	
Palantia	14 miles	
<b>VIMINACIUM</b>		
LACOBRIGA	15 miles	<p>Tab. 14 First section of the road from Asturica Augusta to Burdigala according to the <i>It. prov.</i> 453.4–455.1. The toponyms in small capitals belong to the same group of common distortions that appears in the <math>\Xi</math> recension of the <i>Geography</i>. Note that every toponym of this section (apart from Vallata) can be found on Ptolemy's map, although they either show a very different kind of distortion or their modern locations are unknown. Most of these localities are recorded in other itineraries.</p>
[S]EGISAMO	15 miles	
[D]EOBRIGULA	15 miles	
Tritium	21 miles	
VIROVESCA	11 miles	
Vindeleia	12 miles	
DEOBRIGA	14 miles	
[V]ELEIA	15 miles	
Suessatium	7 miles	
TULLONIUM	7 miles	

Herrera de Pisuerga<sup>52</sup> – approximately 25 km to the north of this road. Sisaraca can be grouped with the city of Iuliobriga, which shows the same distortion and is recorded in the *It. Barr.* as being along the same road that leads to Portus Blendium:

[Via legio]n(e) VII Gemina ad portum Ble(n)dium / Rhama VII milias / Amaia XVIII / Villegia v / Legio I[III] v / O[c]ta[v]iolca v / Iuliobriga x / Aracillum v / P[or]tus Blen[dium]<sup>53</sup>

It is not known for certain whether the road between Portus Blendium and Pisoraca was connected to the main road between Asturica and Virovesca.<sup>54</sup> Finally, two other localities of this group can be linked with stations along the roads starting from Asturica: the *It. prov.* writes that Petavonium lies along one of the roads between Bracara and Asturica, only 39 miles away from the latter;<sup>55</sup> and that Intercatia is a station along the road that runs from Asturica to Caesaraugusta *per Cantabriam*.<sup>56</sup> Thus, all the localities of this first group belong either to the Asturica to Burdigala road via Virovesca or they correspond to stations of the road network very close to Asturica.

52 *CIL* II 4883–4, 4888 and *ERCan* 37–39. See *RE* XX 1806 and Stückelberger and Graßhoff 2006, footnote 115, p. 185.

53 This is recorded on the first tablet (*AE* 1921.6), following the edition of Fernández Ochoa, Morillo Cerdán, and Gil Sendino 2012, 154, in which the

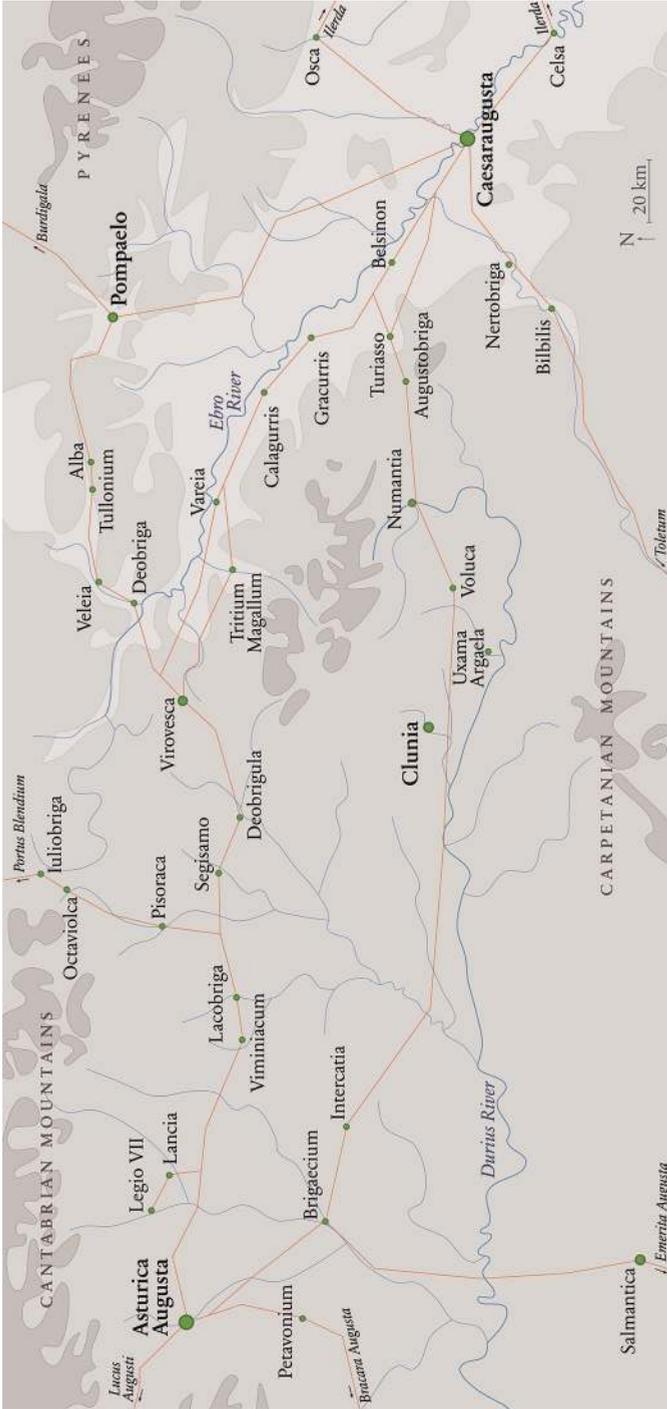


Fig. 101 Schematic configuration of the road network between Asturica Augusta and Caesaraugusta in Antiquity. One of the main roads runs through the Ebro valley via Virovesca, while the other road follows a more southerly route, passing close to Clunia. Cf. with Galve, Magallón, and Navarro 2005, 170.

<b>CLUNIA</b>			
V[X]JAMA	24 miles		
VOLUCA	25 miles		
NUMANTIA	25 miles		
Augustobriga	23 miles		
TURIASSO	17 miles	<b>TURIASSO</b>	
Caravi	18 miles	<b>BALSIO</b>	20 miles
		<b>Allobo</b>	20 miles
<b>CAESARAUGUSTA</b>	37 miles	<b>CAESARAUGUSTA</b>	11 miles

Tab. 15 Last section of the road from Asturica Augusta to Caesaraugusta *per Cantabriam* (*It. prov.* 441.1–443.2) and the alternative road between Turiasso and Caesaraugusta (*It. prov.* 443.3–444.2). The toponyms in small capitals belong to the same group of common distortions that appears in the  $\Xi$  recension of the *Geography*.

A second group of distortions includes localities that have been affected by a larger south-westward shift: Clunia Colonia, Uxama Argaela, Veluca (or Voluca in the *It. prov.*), Numantia, Turiasso, Belsinon (Balsio in the *It. prov.*), Nertobriga and Caesaraugusta.<sup>57</sup> This set of toponyms also corresponds to the ancient road network. Most of the localities match the description of the section between Clunia and Caesaraugusta of the Asturica to Caesaraugusta road *per Cantabriam* in the *It. prov.*, although Belsinon should have been situated on another road that connects Turiasso to Caesaraugusta (Table 15 and Fig. 101). According to the same source, Nertobriga is 30 miles away from Caesaraugusta, along the road towards Toletum.<sup>58</sup> Every locality of this group belongs to the Clunia to Caesaraugusta road or corresponds to stations of the road network very close to Caesaraugusta.

The distortion pattern of Vareia and Tritium Magallum falls between the two other groups as they have been shifted south-westwards; this shift is greater than that of the localities of the group around Asturica and smaller than the shift of the localities of the group around Caesaraugusta. The modern locations of Vareia and Tritium Magallum have not, however, been established with any great certainty. Both are recorded in the *It. prov.* as being located along the road running from Caesaraugusta to Virovesca.<sup>59</sup>

station 'legio iv' is inexplicably omitted. Cf. with García y Bellido 1975, 554–556, and Rodríguez Morales 2012, 53.

54 Talbert 2000, map 24, G2.

55 *It. prov.* 423.3. Petavonium is also listed on one of the *It. Barr.* tablets (see Tablet 4 in the edition of Fernández Ochoa, Morillo Cerdán, and Gil Sendino 2012).

56 *It. prov.* 440.2. Brigaecium, a locality that lies between Asturica and Intercatia, along this road, de-

picts a very different pattern of distortion. Note that the exact locations of Brigaecium and Intercatia are uncertain (see Martino García 2004, 241–246 and 279–282). Brigaecium is also listed on one of the *It. Barr.* tablets as being on the road between Asturica and Emerita (see Fernández Ochoa, Morillo Cerdán, and Gil Sendino 2012, 165).

57 The locations of Belsinon and Veluca are, however, open to question.

58 *It. prov.* 439.2.

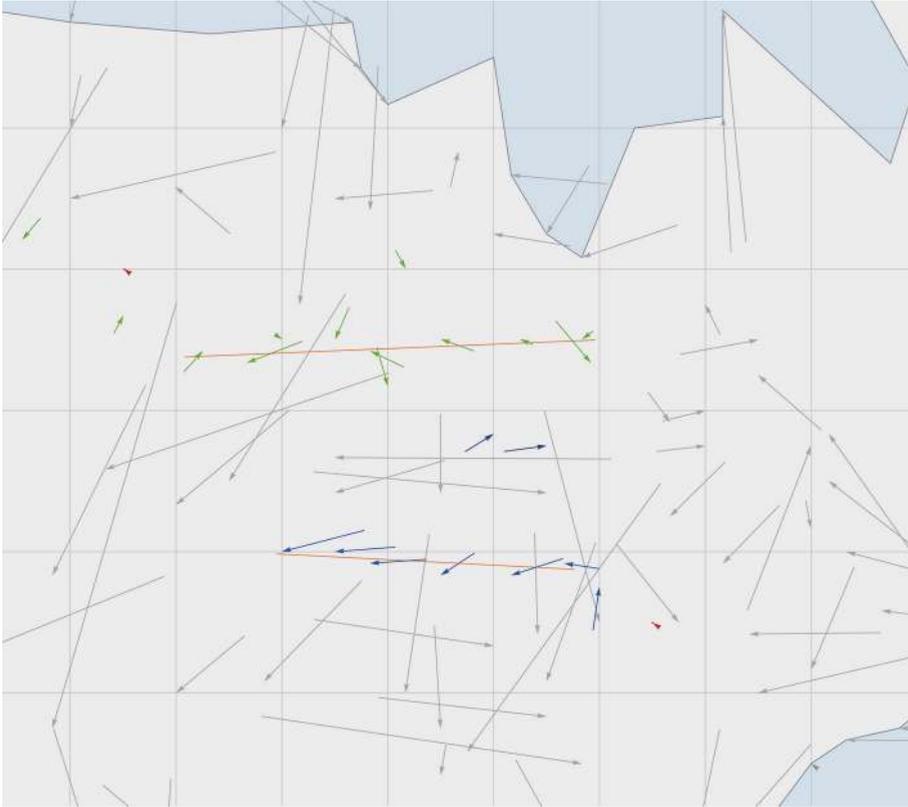


Fig. 102 Residual distortions after each of the three groups was positioned in accordance with the coordinates of their main city, that is, Asturica Augusta or Caesaraugusta; the grey arrows correspond to other localities ( $\Xi$  recension).

#### *The use of the itinerary sources to explain the distortions*

The three groups of common distortions are, therefore, related to different sections of ancient roads that are documented in the sources and organised around the two main cities of Asturica and Caesaraugusta. When the first group is positioned so that the modern coordinates of Asturica coincide with its coordinates in the  $\Xi$  recension of the *Geography*, the distortions almost disappear (Fig. 102). A similar effect can be observed with the second group, as well as with Vareia and Tritium Magallum, when the localities are positioned in accordance with the coordinates of Caesaraugusta: the south-west shift is massively reduced. This suggests that the mapping procedure used the position of important cities as the starting point for the secondary localities. By contrast, the use of

descriptions of localities along the two main rivers (the Durius and the Ebro) does not explain the existence of these groups of distortions.

A procedure that would explain the position of the main points – Asturica and Caesaraugusta, but also Clunia and Emerita in Lusitania – on the basis of extant sources has not been identified. These four cities cover the centre of the peninsula and are recorded as being among the important cities of the interior in Book 8 of the *Geography* as well as in the *Handy Tables*.<sup>60</sup> Moreover, their longitudes and latitudes are all rounded degrees or half-degrees.<sup>61</sup> Thus, using a graticule that is accurate to a half-degree would be sufficient to map these cities. Despite the lack of an identified mapping procedure for the main cities, the position of the intermediate localities can be explained by using a straight line as a graphical transcription of the road – for the localities from Viminacium to Tullonium<sup>62</sup> and between Clunia and Belsinon. The localities are not set exactly on the lines but are situated slightly below or above the lines, which could correspond to a transcription of the small irregularities of a ‘real’ road. The distances on Ptolemy’s map generally fall within the same order of magnitude as the distances passed down in the *It. prov.* Nonetheless, a model that would explain the positions of the concerned localities on the basis of the distances in miles provided in the *It. prov.* has not been identified.

#### *Configuration in the $\Omega$ recension*

The same groups of common distortions can also be said to characterise, in the majority of cases, the coordinates of the  $\Omega$  recension. However, they show distortions that are not as homogeneous as those in the  $\Xi$  recension. As far as the Asturica group is concerned, there are no coordinates for the city of Lacobriga in the  $\Omega$  recension,<sup>63</sup> while the  $\Omega$  coordinates of Virovesca, Tullonium and Alba<sup>64</sup> diverge quite markedly from the  $\Xi$  recension. Thus, the use of a straight line as a guide to plot the localities is much less credible in the  $\Omega$  recension. The coordinates of Veluca and Turiasso, which are part

59 *It. prov.* 393.2–394.1. Note that the toponym Oliba, which appears in the *Geography*, may either be the city of the Libienses, mentioned by Pliny (3.24), or the station of Lybia, which the *It. prov.* (394.2) situates immediately after Tritium on the same road. Its identification remains uncertain.

60 *Geogr.* 8.4.3–5, ‘Table of Noteworthy Cities’ 2.1–3.

61 *Geogr.* 2.5.8: Augusta Emerita (8°, 39°30’); *Geogr.* 2.6.36: Asturica Augusta (9°30’, 44°); *Geogr.* 2.6.56: Clunia Colonia (11°, 42°); *Geogr.* 2.6.63: Caesaraugusta (14°30’, 41°30’). The only exception is the longitude of Caesaraugusta in the  $\Omega$  recension (14° 15’).

62 Intercatia is situated very close to this line, although it belongs to another section of road. Moreover, the toponym Alba, which lies on the same straight line in the  $\Xi$  recension of the *Geography*, appears, in the *It. prov.* (455.2), as the station after Tullonium. Even though Alba has not been located with any great certainty (Talbert 2000, 390, has suggested that it was situated near modern-day San Román de San Millán, a supposition that is probably based on the distances in miles provided in the *It. prov.*), one can explain its coordinates in the *Geography* using the same mapping process.

63 *Geogr.* 2.6.50.

64 *Geogr.* 2.6.53 and 2.6.66.

of the Caesaraugusta group, are very different in the  $\Omega$  recension.<sup>65</sup> In addition, it is widely accepted that the  $\Omega$  coordinates of Numantia are erroneous.<sup>66</sup> It seems that several errors occurred in the manuscript transmission of the  $\Omega$  recension relating to the localities connected with the Arevaci (ten localities, among them Clunia and Numantia) and the Berones (Tritium Magallum, Oliba and Vareia) peoples. In the catalogue, when introducing each group of peoples, Ptolemy reports that the Arevaci live south of the Berones, who themselves live south of the Autrigones.<sup>67</sup> This configuration is strictly adhered to in the  $\Xi$  recension but it does not match the  $\Omega$  coordinates: the three cities of the Berones are clearly situated to the south-east of the Arevaci in the  $\Omega$  recension. An alternative model that would explain the distortions in the  $\Omega$  recension has not been identified.

### 9.2.3 Localities in Callaecia

#### *Distortions in the $\Xi$ recension*

On the north-west edge of the peninsula, which corresponds to the area of ancient Callaecia, the inland localities show the same distortions as the nearby coastal localities. When the inland region is positioned so that the modern coordinates of Cape Nerion and the mouth of the Minius River coincide with their respective coordinates in the *Geography*, the north-eastward shift is dramatically reduced (Fig. 103) and two small subgroups of residual distortions can be determined: Caronium, Lucus Augusti and Dactonium all show a small latitudinal shift southwards, while Iria Flavia and Aquae Calidae have been shifted to the south-east. Flavius Brigantium, which is on the coast, has been shifted towards the south-east. The other localities below the northern coast – few of the toponyms in the area have been located with any certainty – are either part of the Asturica group of distortions (Bergidum Flavius, for instance) or they have been shifted massively eastwards.

All the localities of this group (Fig. 104) are linked to the road system between Bracara Augusta and Flavius Brigantium, and each subgroup is connected to a specific road (Fig. 105). Brigantium, Caronium (spelled Caranicum in the *It. prov.*) and Lucus Augusti correspond to a section of the road, described in the *It. prov.*, between Bracara Augusta and Asturica Augusta *per loca maritima* (Table 16). According to the *It. prov.* (Table 17) and the *Rav.* (32.1.7–8), Aquae Calidae and Iria Flavia are to be found successively along the road from Bracara to Asturica via Lucus Augusti. The tablet of the *It. Barr.* transcribed below records a similar road – from Lucus Augusti until Iria. Note

65 *Geogr.* 2.6.56 and 2.6.58.

66 *Geogr.* 2.6.56: 13°25', 42°45'  $\Omega$ ; 12°30', 41°50'  $\Xi$ . See Müller 1901, 174; Stückelberger and Graßhoff 2006, 186.

67 *Geogr.* 2.6.55–56. See p. 162

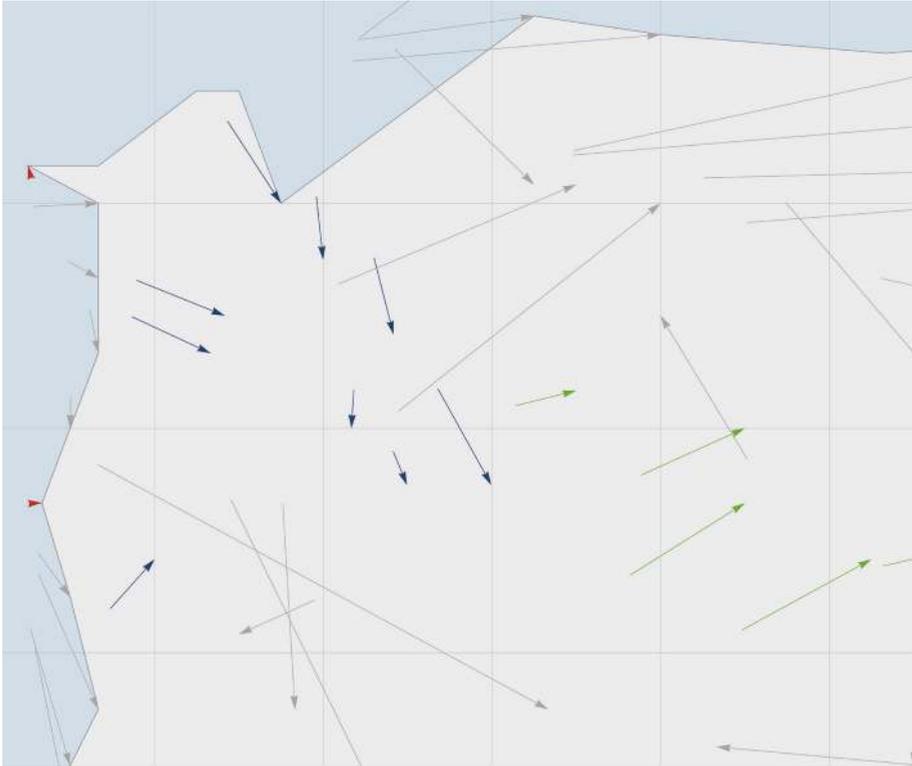


Fig. 103 Residual distortions after the localities were positioned in accordance with the coordinates of Cape Nerion and the mouth of the Minius River ( $\Xi$  recession). The blue arrows correspond to localities in the Flaviium Brigantium group, while the green arrows represent places in the Asturica Augusta group.

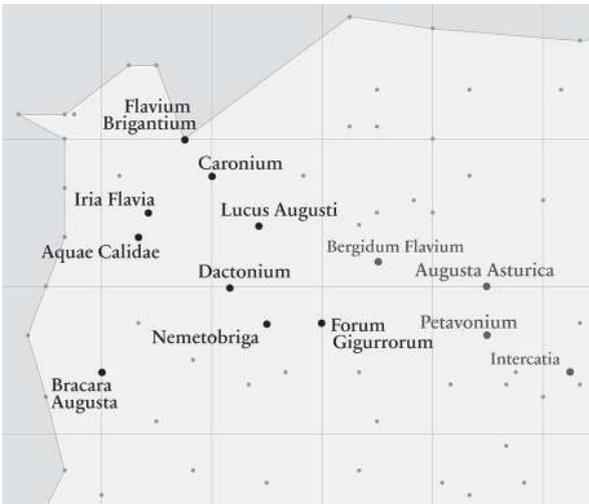


Fig. 104 Localities in north-western Tarraconensis on Ptolemy's map.

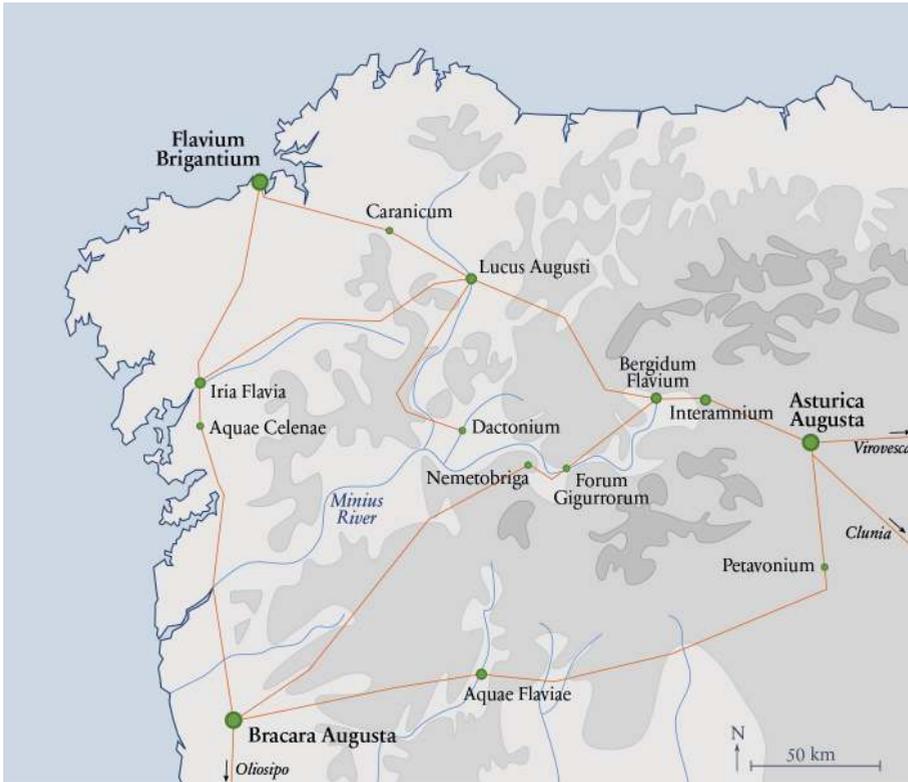


Fig. 105 Schematic configuration of the antique road network around Bracara, Asturica and Flavium Brigantium.

that the catalogue of the *Geography* states that *Aquae Calidae* (Ἰδατα Θερμά) is the city of the Cileni; thus, one can certainly identify *Aquae Celenae* or *Aquae Cilenae* (as recorded in the manuscripts of the *It. prov.*) with Ptolemy's *Aquae Calidae*. *Nemetobriga* and *Forum Gigurrorum* are two stations along another road between *Bracara* and *Asturica* that are described in the *It. prov.* (Table 18) as well as in the *Rav.* (320.1–12). *Dactonium*, whose location at or near Monforte de Lemos is plausible but not certain, is a more problematic case.<sup>68</sup> The toponym is not on the list in the *It. prov.*, which probably persuaded the

68 Monforte de Lemos is traditionally held to be the location of *Dactonium* (*RE* IV 1977; Müller 1901, 158; Talbert 2000, 374; Stückelberger and Graßhoff 2006, 181), partly because of its toponymic proximity to *Dactonium*, *civitas Lemavorum*, but also because of some medieval documentation that refers to *Castrum Actonium* or *Luctonium*, the site today of the monastery of San Vicente do Pino. How-

ever, Fernández Ochoa, Morillo Cerdán, and Gil Sendino 2012, 164, claim that the absence of Roman remains at Monforte makes such an identification problematic. See also the words of caution of Grande Rodríguez 2004, 178–179. The Roman site of Castellós, 9 km from Monforte de Lemos, is another possibility for the location of *Dactonium*.

*Barrington Atlas* to set the locality outside the road network that runs between Bracara, Asturica and Flavium Brigantium. Nevertheless, one of the tablets of the *It. Barr.* gives localities along a stretch of road that includes Dactonium, which suggests that the locality was certainly, in fact, part of the area's road network and that it was connected to Lucus Augusti.<sup>69</sup>

*The use of itinerary sources to explain the residual distortions*

There is a striking similarity between the residual distortions and the configuration of the road network, which one can reconstruct with the help of the itinerary and archaeological sources. When the group of localities is positioned in accordance with the coordinates of Flavium Brigantium and Bracara Augusta, that is, the two main cities of the road network that connects the localities of the group, the distortions are almost eliminated (Fig. 106). A procedure that would explain the positions of Bracara Augusta and Flavium Brigantium has not been identified. A geometrical construction using a ruler and compass (in which distances taken from the *It. prov.* are used) enables us to obtain a rough estimate of the position of Bracara Augusta: this approximate position is not, however, close enough to Ptolemy's coordinates to be considered a fully satisfying explanation.<sup>70</sup> The distance data given in the *It. prov.* between the localities of this group – especially those between Iria and Aquae Celenae, and between Brigantium, Caronium, Lucus Augusti and Bergidum Flavium – fall within the same order of magnitude as Ptolemy's map in the  $\Xi$  recension, although it has not been possible to identify a mapping process that uses them. The use of auxiliary lines could partly explain the position of Caronium in relation to Lucus Augusti and Brigantium, the positions of Iria Flavia and Aquae Calidae in relation to Bracara and Brigantium as well as the position of Bergidum Flavium in relation to Lucus Augusti and Asturica (Fig. 106).

*Distortions in the  $\Omega$  recension*

Although some of the divergences between the recensions affect the coordinates of Flavium Brigantium, Bracara and Dactonium (there are visible differences),<sup>71</sup> the same

The consequences of these different hypotheses on the displacement vector linking Dactonium with its modern location are, however, limited.

- 69 Tablet 2 (*AE* 1921,7) according to the edition of Fernández Ochoa, Morillo Cerdán, and Gil Sendino 2012, 154. Cf. with García y Bellido 1975, 561–563, and Rodríguez Morales 2012, 53.
- 70 The distances used are 1 720 stadia between Asturica and Bracara (i.e. the shortest itinerary) and 1 106 stadia between Flavium Brigantium and Bracara.

Both values are reduced by one-fifth and a map of Ptolemy's second projection is employed. Even though the construction is not fully satisfying, it does show that the distances between these main points in the *Geography* and in the *It. prov.* generally fall within the same order of magnitude.

- 71 Flavium Brigantium (*Geogr.* 2.6.4):  $\lambda = 6^{\circ}45' \Xi$ ,  $\lambda = 7^{\circ}15' \Omega$ ; Dactonium (*Geogr.* 2.6.25):  $\lambda = 7^{\circ}10' \Xi$ ,  $\lambda = 7^{\circ}30' \Omega$ ; Bracara Augusta (*Geogr.* 2.6.39):  $\phi = 43^{\circ}25' \Xi$ ,  $\phi = 43^{\circ}40' \Omega$ .

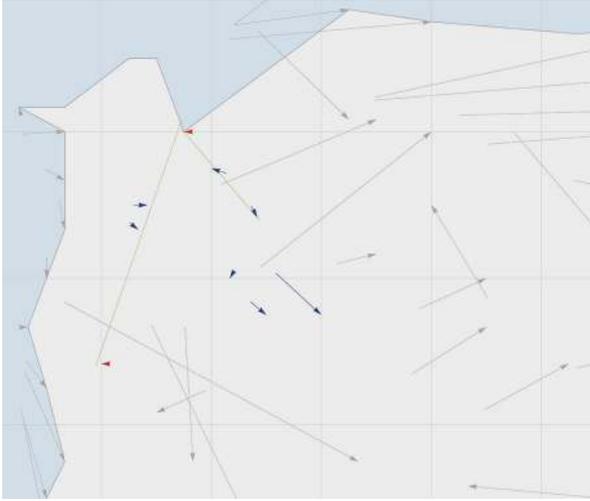


Fig. 106 Residual distortions after the group was positioned in accordance with the coordinates of Flavium Brigantium and Bracara Augusta ( $\Xi$  recension).

Bracara	
Aquae Celenae	165 stadia <sup>(1)</sup>
Vicus Spacorum	195 stadia
Ad Duos Pontes	150 stadia
Glandimirum	180 stadia
Atricondum	22 miles
<b>BRIGANTIUM</b>	30 miles
<b>CARANICUM</b>	18 miles
<b>LUCUS AUGUSTI</b>	17 miles
Timalinum	22 miles
Pons Neviae	12 miles
Uttaris	20 miles
Bergidum	16 miles
Asturica	50 miles

Tab. 16 The road from Bracara to Asturica *per loca maritima*, according to the *It. prov.* (423.6.4–425.5). Only this section of the itinerary gives several of the distances in stadia. The toponyms in small capitals belong to the same group of common distortions that occurs in the  $\Xi$  recension of the *Geography*.  
<sup>(1)</sup> stadia] *m.p.* Parisinus lat. 7230 A et legit Cuntz 1929, *stadia mp* Flor. Laurent. 89.67, *stadia codd. cett. et legunt* Wesseling 1735, Parthey and Pinder 1848.

group of localities can be determined. When one applies the same mapping process to the  $\Omega$  recension, the distortions are also reduced, although not as significantly as in the  $\Xi$  recension. A better model to explain the distortions in  $\Omega$  has not been identified.

---

Bracara	
Limia	19 miles
Tude	24 miles
Burbida	16 miles
Turoqua	16 miles
AQUAE CELENAE	24 miles
[I]RIA	12 miles
Assegonia	13 miles
Brevis	22 miles
Marcia	22 miles
LUCUS AUGUSTI	17 miles

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Tab. 17 A section of the road from Bracara to Asturica via Lucus Augusti, according to the *It. prov.* (429.5–431.3). After Lucus Augusti, the itinerary is the same as in the *It. prov.* 423.6.4–425.5 (see Table 16). The toponyms in small capitals belong to the same group of common distortions that occurs in the  $\Xi$  recension of the *Geography*.

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Bracara	
Salaniana	21 miles
Aquae Oreginae	28 miles
Aquae Querquenae	14 miles
Geminae	16 miles
Salientes	18 miles
Praesidium	18 miles
NEMETOBRI[G]A	13 miles
FORUM [GIGURRORUM] <sup>(1)</sup>	19 miles
Gemestrarium	18 miles
BER[G]IDUM	13 miles
Intera[mnium] Flavium <sup>(2)</sup>	20 miles
Asturica	30 miles

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Tab. 18 A section of the road from Bracara to Asturica via Nemetobriga, according to the *It. prov.* (427.4–429.4). The toponyms in small capitals belong to the same group of common distortions that occurs in the  $\Xi$  recension of the *Geography*.

<sup>(1)</sup> 'Gigurrorum' does not appear in the manuscript but is clearly part of the city's name, as confirmed by the *Rav.* (320.8), which gives 'Forum Gigurnion' at the same place in its list of toponyms on the Bracara to Asturica road. See also Pl. 3.28.

<sup>(2)</sup> The coordinates of this locality appear only in the manuscripts of the  $\Omega$  recension (*Geogr.* 2.6.29).

### 9.2.4 The mountains of Tarraconensis

Ptolemy's catalogue<sup>72</sup> records several mountain ranges in the Iberian peninsula: Mount Vindium in Asturia,<sup>73</sup> Mount Edulium to the west of the Pyrenees; and a larger orographic unit formed by the Orospeđa and Idubeda mountains. Most of these mountains are not well-documented in the ancient sources. There is a single mention of Mount Vindium in Florus (and later in Orosius, who reuses Florus' text),<sup>74</sup> who situates the mountain in Cantabria, without providing any more precise information. Mount Edulium is unknown outside the *Geography*. Although it would be tempting to identify the latter with Mount Medullius, which is mentioned in the same passages of Florus and Orosius and is situated near the Minius River, on the basis of their toponymic proximity, in the *Geography* Mount Edulium is situated quite a distance from the Minius River. Strabo, the only other source for the Orospeđa and Idubeda mountains, gives a detailed description of the ranges:

Of these mountains [of Iberia], one is parallel to the Pyrenees, beginning in Cantabria and ending at Our Sea: they call this mountain Idubeda; whereas the other, beginning at the center of the first one, stretches towards the west, though it inclines towards the south and the coastline that runs from the Pillars. This latter mountain is at first a mere hill and bare of trees, and passes through the so-called Spartarian Plain; then it joins the forest that lies beyond both Carthago Nova and the regions round about Malaca; it is called Orospeđa. It is between the Pyrenees and Idubeda, then, that the Ebro River flows, which is parallel with both mountains and is filled by the rivers and the other waters that pour down from them.<sup>75</sup>

Ptolemy's *Geography* and Strabo's text have several striking points in common (Fig. 107). Ptolemy connects both mountain ranges, as Strabo does, with the Orospeđa coming from the Idubeda and running first westwards, then southwards. Both ranges reach the Mediterranean littoral, with the Orospeđa reaching the coast near Carthago Nova. The Ebro River flows between the Pyrenees and the Idubeda–Orospeđa ranges. However,

72 The regional maps of Iberia in manuscripts UKF show original drawings of the mountains of Tarraconensis: the designer tended to connect the mountain ranges and also added an anonymous and vast mountain range, from where the Durius and Tagus rivers flow, which does not appear in the catalogue. There are significant divergences between the manuscript maps and the text. See Mittenhuber 2009, 185–187.

73 Ptolemy uses either Οὐίνδιον or Οὐνίνδιον (*Geogr.* 2.6.21).

74 Florus, *Epit.* 4.12.49: 'The first battle against the Cantabrians was fought under the walls of Bergida. From here they fled to the lofty peak of Mount Vindium [*Vindium* or *Vinnium montem codd.*], to which they had thought the Roman army was less likely to ascend than the waters of the Ocean'. A similar description can be found in Orosius, *Hist.* 6.21.

75 Str. 3.4.10.

the texts do diverge on some points: Ptolemy's Idubeda does not start in Cantabria but in the area inhabited by the Celtiberians; the Orospeda does not begin exactly at the centre of the Idubeda but in its southern part and it does not reach 'the regions about Malaca'; moreover, Ptolemy's Idubeda runs in a north–south direction, so that it is not parallel to Ptolemy's Pyrenees. A north–south orientation does, however, correspond to Strabo's conception of the Pyrenees.

It is possible that the descriptive elements were transferred directly from a source – similar to Strabo's work – on to the map to draw the Idubeda and Orospeda mountain ranges. This process would have dealt with the problem of a lack of distance data or any latitudinal values. The coordinates of the extremities of the two mountain ranges could then have been recorded in the catalogue. As the differences between the recensions do not affect these mountain ranges but only the nearby Mediterranean coast, this same procedure could explain the configuration in the  $\Omega$  recension. More generally, the toponymic forms in the  $\Xi$  recension resemble the other ancient sources more closely than the toponyms in the  $\Omega$  recension. Given their similarities and differences, the link between Ptolemy's *Geography* and Strabo's text can be understood in one of two ways: either both authors relied on a common source that had gone through different intermediaries or they simply interpreted the same source differently, with Ptolemy very possibly rejecting some elements that might have been incompatible with other features of his map.

### *Conclusion*

Ptolemy seems to have adapted his mapping process for the interior of Iberia according to the sources at his disposal. Some of the localities for which there was plenty of information could have been determined using the available distances and geometrical constructions. However, it is also plausible that some important inland cities were only roughly located on to the map and that they were then taken as the basis for locating the remaining localities. Itinerary sources may have been used, not for their distance data but for the list of toponyms situated along the roads connecting the peninsula's main cities. Straight lines were certainly used to schematise the road network, even though roads are not recorded as a geographical feature in the catalogue.

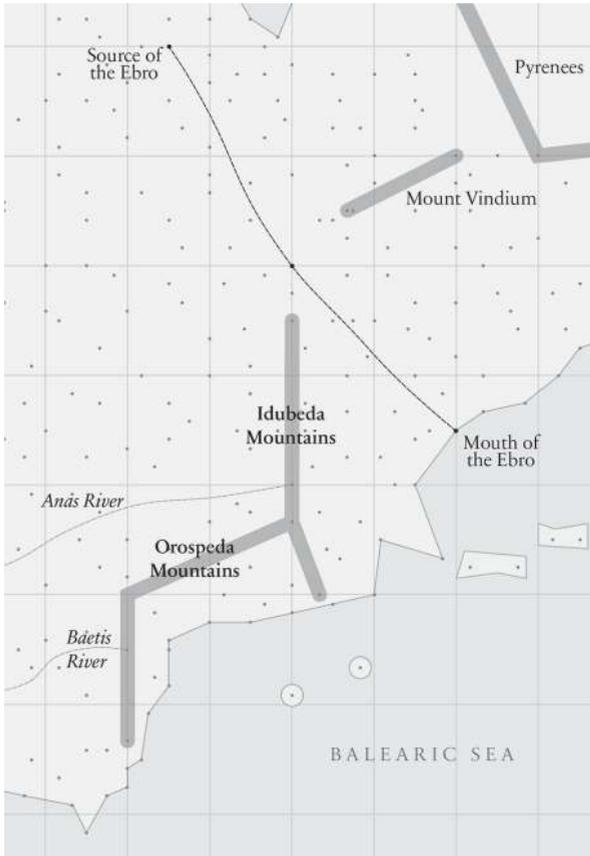


Fig. 107 The linked Orospeda and Idubeda mountain ranges separated from the Pyrenees by the Ebro River ( $\Xi$  recension). The curve in the Orospeda mountains is not explicitly mentioned in the *Geography* but is necessary, since a straight line connecting the range's extremities, which are recorded in the catalogue, would fall within the sea.



## Conclusion

Ptolemy's catalogue of localities has often been used as a geographical source in studies of the antique *oikoumenē* but, unlike the introduction, it has rarely been studied in its own right as a source for researching the history of the *Geography*. Ptolemy's introduction, however, does not provide enough relevant methodological elements to enable us to put together the set of procedures that gave rise to the coordinates. By contrast, when a comparison was made between Ptolemy's coordinates and the modern-day locations clearly discernible distortions emerged. As these distortions characterise the origins of Ptolemy's coordinates, an analysis of the catalogue has enabled us to establish some of Ptolemy's sources as well as certain aspects of his working method.

This study has shown that Ptolemy used a progressive, multistage procedure to determine the coordinates for the Iberian peninsula. The first stage possibly involved positioning a small number of coastal localities on the basis of the following types of information: schematic descriptions of the whole peninsula; distance data; and some fairly scarce and rare information on the latitudes of the localities. In many cases, it was possible to document the information: the distances used by Ptolemy often closely resemble or are identical to other antique sources, while the main localities, whose locations were established first, are precisely those places for which the antique sources have the most geographical data. Several similarities were discovered between Ptolemy's data and some of the information provided by Strabo and Pliny the Elder as well as information that can be traced back to Artemidorus and Polybius, which are a strong indication that Ptolemy availed himself of similar sources.

The coordinates for these main coastal localities were undoubtedly determined using simple geometrical constructions in which basic tools such as a ruler and a compass as well as a grid drawn following Ptolemy's second map-making method were used. Localities were thus constructed and marked down as points on a map. In other words, the procedure of acquiring the coordinates was intrinsically linked with the map-making process. Some of the distances correspond exactly to the figures that can be found in other antique texts; others were reduced by a simple fraction, a method to which

Ptolemy refers in the *Geography's* introduction. During the map-making process, the distances were measured with a compass by following the graduations of the map's grid, which was unquestionably an essential construction tool. It also became apparent that the coastal localities that were used as the main construction points of the map of Iberia were not necessarily those places that were classified as 'important cities' in Book 8 of the *Geography* or in the 'Table of Noteworthy Cities'.

The whole Iberian coastline was, in a second stage, constructed on the basis of a small number of main coastal localities, which were sometimes important cities but were more often than not major topographical features. Ptolemy's main sources of information were, without question, topographical descriptions, such as those passed down by Mela, Strabo and Pliny. Generally, the latter structured their descriptions according to several important landforms (such as large gulfs and important promontories or rectilinear littorals). In order to construct the coastline, Ptolemy must have made a schematic graphical representation (of curves and straight lines) from the topographical descriptions, perhaps using a grid with his second map-making method or a simple orthogonal graticule to carry out this second stage of the construction process.

The coastline formed the basis for locating the coastal localities and for recording the coordinates. There are only a small number of cases where it is possible to show that a particular distance from another source was used to position a locality on the coast with respect to another place. Rather, intermediate coastal localities were generally positioned according to descriptions of the order of localities along a coast in the sources, with the localities placed at more or less regular intervals along the map's coastline. In most cases, the islands that surround the Iberian peninsula were positioned using a combination of a distance datum and a piece of information on the approximate spatial location of the island with respect to the mainland – two types of data that can be found in the antique sources. A geometrical construction with a ruler and a compass was also undoubtedly used, together with a grid of Ptolemy's second map-making method.

It has proved more difficult to establish how the coordinates of the peninsula's inland cities were determined, although several elements of Ptolemy's method can still be proposed. The first stage probably involved determining the main cities of Iberia's interior. Since some of the coordinates appear to have been systematically rounded up or down to full or half degrees, it is possible that some of the cities were located relatively imprecisely on the map, following general descriptions of the peninsula. Other localities were positioned with the help of road descriptions, similar to the itineraries that have been passed down to us (such as the *Itinerarium provinciarum*). Groups of localities that were situated along the same road or on the same local road network often belong to the same groups of distortions. In several cases, they correspond to localities situated along or close to a straight line on Ptolemy's map. It is possible that Ptolemy used

straight lines, which do not appear graphically in the *Geography*, to schematise roads and to help him position the localities. In a number of cases, these lines might have been linked to some of the coastal cities. However, it is difficult to give a satisfactory explanation of their orientation, while the role of the grouping of peoples in the origins of the coordinates has yet to be identified.

The coordinates thus arose from Ptolemy combining some graphical processes and simple geometrical constructions on a working map with a certain amount of geographical information that he could easily have obtained from the literature of Antiquity. We could, therefore, regard Ptolemy's map of the Iberian peninsula principally as a cartographical transcription of descriptions that could be found in the more traditional geographical literature. In Ptolemy's *Geography*, the map reigned supreme. As indicated in the work's introduction, Ptolemy dealt first with the maps before moving on to the coordinates and ending with the catalogue of localities. There was, therefore, a dialectical relationship with a mirror effect between the catalogue and the map: the latter was the condition of possibility of the catalogue, while every map, that is, its contents (the coordinates) and its structure (the order of coastal localities, the division into regional maps), depended on the catalogue. In Ptolemy's working process, the coordinates of the localities could be read directly from the map, which is a much more efficient and simpler method than having to carry out arithmetical procedures (excluding Ptolemy's method of determination involving on-site celestial observations and measurements).

A multistage construction process that focused first on determining a limited number of localities, which were then used as the basis for constructing additional localities, corresponds well to Ptolemy's suggestion, which he formulated in the *Geography's* introduction, that data and procedures be hierarchised: the first localities constructed do indeed form the 'foundations' of the map. Given the importance of Ptolemy's so-called second map projection in determining coordinates, the exact role of Marinus of Tyre's work – the revision of which structures Ptolemy's entire introduction and determines many features of his conception of cartography – can be specified: it is not likely that Ptolemy borrowed much information on the latitudes and longitudes of localities from Marinus, even though the latter was undoubtedly an important source of other kinds of information (such as distances and lists of places).

It is impossible to undertake a successful investigation into the origins of Ptolemy's coordinates without studying the history of the *Geography's* text. In contrast to many other geographical sources of Antiquity, major uncertainties still surround its original text: because of the existence of two different versions of the *Geography* (known as the  $\Xi$  and the  $\Omega$  recensions), a clear strategy was, therefore, needed to analyse the catalogue of localities. In the present study, both recensions were analysed separately before being compared with each other.

Ptolemy's personal working method and the *Geography's* textual transmission history are inseparable research themes. Much information on the history of Ptolemy's text and coordinates can be gleaned from philological and codicological studies. Focusing on the catalogue of Iberian localities, it became apparent that there are important differences between the  $\Xi$  and the  $\Omega$  recensions as well as signs of two quite different *usus scribendi* in their respective hyparchetypes. In the  $\Omega$  recension, the catalogue's paratext was shortened and there are later additions as well as gaps that occur at regular intervals in the list of localities, which all indicate a more turbulent transmission history. By contrast, the paratext and many toponym forms in the  $\Xi$  recension seem to be a closer approximation of Ptolemy's original work, despite the blatant scribal errors and the incomplete state of its main manuscript. There is some evidence to suggest that certain textual corruptions occurred between Ptolemy's original work and the archetype common to both recensions.

It is difficult to detect deliberate changes to the coordinates using a traditional philological approach. However, understanding Ptolemy's working method can help us shed light on the transmission history of Ptolemy's coordinates as well as find the answers to certain questions that would otherwise remain unsolved. The drawing of the Iberian coastline and the positions of the littoral localities in the  $\Xi$  recension can, for the most part, be satisfactorily explained by the methodological elements stated above. In many cases in the  $\Xi$  recension, we can trace the sources that Ptolemy might have used. In the  $\Omega$  recension, however, it is often impossible to detect Ptolemy's sources or procedures. Considering the consistency of the  $\Omega$  coordinates, which depict a perfectly logical coastline and interior, we can hardly attribute all the modifications made to the coordinates solely to unintentional scribal errors. Thus, we cannot exclude the possibility that some of the coordinates were modified at a later date. Furthermore, the order of the inland localities in the catalogue, which was based on a strict spatial principle explained in his introduction, indicates that the coordinates in the  $\Omega$  recension underwent important modifications, intentional or otherwise. Therefore, it seems more likely that the set of coordinates supplied by the  $\Xi$  recension is closer, in the majority of cases, to Ptolemy's original work than the coordinates provided by the  $\Omega$  recension.

Widening the scope of the philological investigation so that it covered the links between the catalogue and the maps enabled us to define the *Geography's* context of production. In spite of its radically innovative form, Ptolemy's *Geography* and its catalogue of localities were not created *ex nihilo* but were rooted, to a large extent, in the established geographical knowledge of the time. It is mostly Ptolemy's use of these sources and the originality of his project that render his work so different. A better understanding of the origins of the coordinates, a detailed study of the manuscripts and a re-evaluation of the indirect tradition of the *Geography*, which is often underestimated, compelled us to

reconsider the transmission history of the text, from its composition to the time of the oldest extant Greek manuscripts.

The focus of this study was the Iberian peninsula, which makes up only a small part of the *Geography*. A model of transmission that takes all the elements gathered in this analysis into account cannot be applied to the *Geography* in its entirety without it first being tested on the other territories of Ptolemy's *oikoumenē*. Nonetheless, new elements that reconstruct the transmission history of the manuscripts can be advanced. As mentioned above, the text and numerical data pertaining to Iberia in the catalogue of localities that are found in the  $\Xi$  recension, mainly represented today by manuscript X of the *Geography* (the Vaticanus graecus 191), approximate Ptolemy's original work the most closely. The indirect tradition of the *Geography*, exemplified by the works of Marcian of Heraclea, several medieval geographical treatises and some ancient scholia, as well as by several Latin and Syriac sources from late Antiquity and the Middle Ages, seems to indicate that the version of Ptolemy's *Geography* that circulated from its composition to the time of Maximus Planudes was closely related to the  $\Xi$  recension. By contrast, there is no tangible evidence to date the  $\Omega$  recension to a period earlier than the Greek primary manuscripts of the *Geography*.

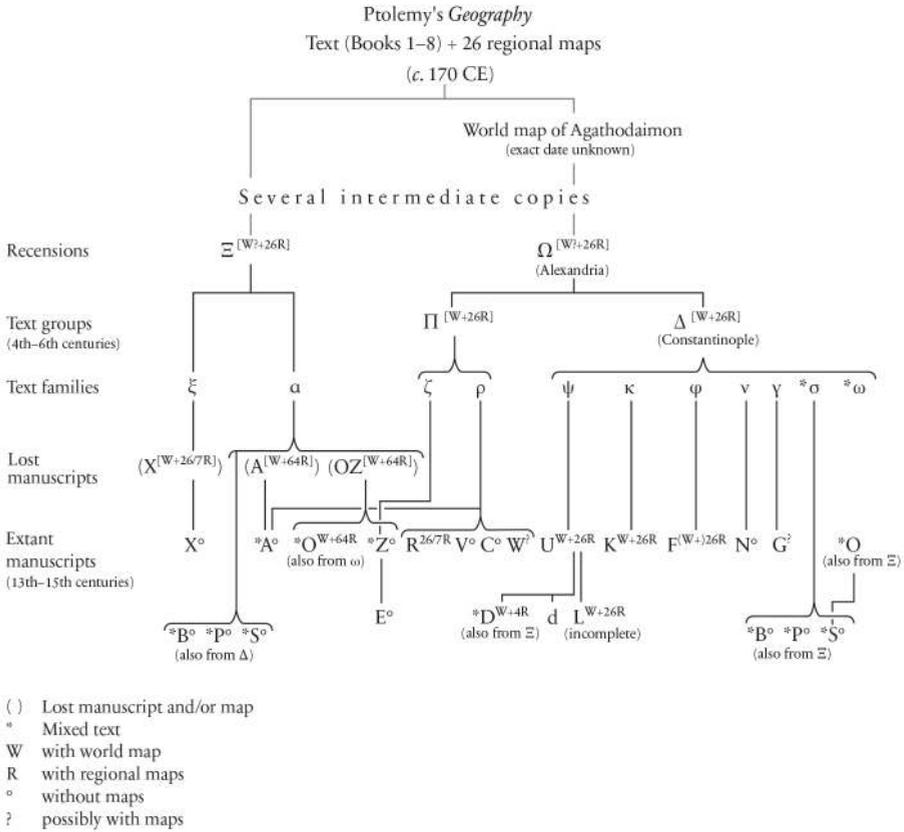
In many recent publications, the early witnesses of the  $\Xi$  recension have been taken as evidence that two different versions of the *Geography* already existed shortly after Ptolemy's redaction. From a logical point of view, this is acceptable only if the  $\Omega$  recension is regarded as Ptolemy's *original* version. In light of the characteristics of the Iberian catalogue, however, it is clear that the text and coordinates of the  $\Omega$  recension were certainly either significantly emended or corrupted. Focusing on this fact as well as on the indirect tradition, which is either always identical or close to the  $\Xi$  recension, I propose the following hypothesis: manuscript X is the sole and ultimate witness of the 'main' manuscript tradition of Ptolemy's *Geography*; it most closely approximates the original and it was the most widely disseminated of the manuscripts in Antiquity and the Middle Ages. It is true that manuscript X exhibits some scribal corruptions and other imperfections, but this is to be expected after a period of more than eleven centuries. As far as the Iberian chapters of the *Geography* are concerned, the version given by manuscript X, together with Marcian's *Periplus of the Outer Sea*, should enable improvements to be made in establishing Ptolemy's original text. Thus I would suggest that the existence of two versions of the *Geography* should not be regarded as the bifurcation of the tradition into two recensions but as the separation of the  $\Omega$  recension from the main tradition. If the manuscript that Planudes discovered was related to the  $\Omega$  recension, then we should probably conclude that the Byzantine scholar came across a version of Ptolemy's *Geography* that stemmed from another branch of the tradition and in which significant changes had been made to its catalogue.

Two important questions remain: When did the separation of the  $\Omega$  recension occur and what was its precise nature? These questions can only be satisfactorily answered when every part of Ptolemy's catalogue of localities has been investigated. Nevertheless, several hypotheses can be advanced. Most of the differences between the  $\Xi$  and  $\Omega$  recensions are related to majuscule variants, which indicates that the last copy common to  $\Xi$  and  $\Omega$  was undoubtedly written in majuscule. The exemplar of the *Geography* that was common to all the  $\Omega$  manuscripts can be attributed to a copy that contained approximately twenty-eight lines of text in each column; it also included additions that imply that Ptolemy's *maps* were consulted and it displayed a number of features concerning the stylistic preferences of its scribe. This gives us a wide chronological range from which to date the bifurcation. The absence of obvious revisions to update the text – such as Christian or Arabic toponyms, political or administrative changes – in the  $\Omega$  version of the Iberian peninsula allows us to reject some hypotheses; a deliberate reworking of the coordinates shortly after Ptolemy's time, in a similar scholarly context, could perhaps explain this absence. However, if such emendations took place much later, for example, from the third or fourth century CE onwards, or during Planudes' own work on the *Geography*, the intention was possibly to restore or preserve Ptolemy's cartographical representation of the *oikoumenē*; in this case we could opt for a scientific context in which the production of an *antique* map was of interest. A partial reworking of the *Geography* at one particular moment is, however, only one of the possible explanations for the differences of the  $\Omega$  recension; it is also conceivable that emendations were carried out at several different stages. To conclude, there are, with respect to the Iberian peninsula at least, still as many objective arguments in favour of a revision of the *Geography* carried out by Planudes as there are by Ptolemy himself.

## Appendices

- A *Stemma codicum* of the main Greek manuscripts of the *Geography* and their maps, according to P. Schnabel
- B Comparison between the different numeral forms used in seven of the Greek manuscripts of the *Geography*, according to O. Cuntz
- C The important cities of the second map of Europe
- D The Iberian cities in the ‘Table of Noteworthy Cities’
- E Comparison between a selection of Iberian toponyms supplied in Marcian of Heraclea’s *Periplous of the Outer Sea* and those in the recensions of Ptolemy’s *Geography*
- F Synopsis of Book 2 of the *Geography* in the  $\Omega$  recension
- G Ptolemy’s Asturia
- H The *paraploi* from the Pillars of Hercules to the Pyrenees described by Polybius, Strabo and in the Artemidorus Papyrus

A *Stemma codicum* of the main Greek manuscripts of the *Geography* and their maps, according to P. Schnabel



Note: The *stemma* was drawn by A. Hermann on the basis of P. Schnabel's work on the Greek manuscripts of Ptolemy's *Geography*, in Schnabel 1938, 120. I drew this diagram again and translated the indications into English.

B Comparison between the different numeral forms used in seven of the Greek manuscripts of the *Geography*, according to O. Cuntz 1923, 43

	1	2	3	4	5	6	7	8	9	10	20	30	40	50	60
Ur	α, ρ	β, γ	Γ	δ	ε	ϕ, ϑ	ζ	η	θ	ι	κ	λ	μ	ν	ξ
X	α	β, β	Γ	δ, δ	ε	ϕ, ϑ	ζ	η, η	θ, θ	ι	κ	λ	μ	ν	ξ
R	α	υ	Γ	δ, δ	ε	ϕ	ζ, ζ	η, η	θ, θ	ι	κ	λ	μ	ν	ξ
W	α	β	Γ	δ	ε	ϕ	ζ	η	θ	ι	κ	λ	μ	ν	ξ
Ω	α	β, β	Γ	δ	ε	ϕ	ζ	η, η	θ	ι	κ	λ	μ	ν	ξ
Σ	α	β	Γ	δ	ε	ϕ, ϑ	ξ	η	θ, θ	ι	κ	λ	μ	ν	ξ
Z	α	β	Γ	δ	ε	ϕ	ζ	η	θ, θ	ι	κ	λ	μ	ν	ξ

$\frac{1}{12} = 5'$     $\frac{1}{6} = 10'$     $\frac{1}{4} = 15'$     $\frac{1}{3} = 20'$     $\frac{1}{2} = 30'$     $\frac{1}{12} = 25'$     $\frac{1}{2} = 30'$     $\frac{1}{12} = 35'$     $\frac{1}{3} = 40'$     $\frac{1}{4} = 45'$     $\frac{1}{5} = 50'$     $\frac{1}{5} = 55'$

Ur	ιβ	ϕ, ϑ	δ	Γ	Γιβ	Ϸ, Ϸ	Ϸιβ	Γο	Ϸδ	ϷΓ	ϷΓιβ
X	ιβ, ιβ	ϕ, ϑ	δ, δ	Γ	Γιβ	Ϸ, Ϸ	Ϸιβ	Γο(ο)	Ϸδ	ϷΓ	ϷΓιβ
R	ιυ(ιβ)	ϕ	δ	Γ	Γιυ	Ϸ(Ϸ)	Ϸιυ	Γο	Ϸδ	ϷΓ	ϷΓιυ
W	ιω	ϕ	δ	ϑ	ϑιω	Ϸ	Ϸιω	ω	Ϸδ	Ϸϑ	Ϸϑιω
Ω	ιβ(ιυ)	ϕ(ϑ)	δ(δ)	Γ	Γιβ	Ϸ	Ϸιβ	Γο	Ϸδ	ϷΓ	ϷΓιβ
Σ	ιβ	ϕ, ϑ	δ	Γ	Γιβ	Ϸ	Ϸιβ	Γο(ο)	Ϸδ	ϷΓ	ϷΓιβ
Z	ιβ	ϕ	δ	Γ	Γιβ	Ϸ	Ϸιβ	Γο	Ϸδ	ϷΓ	ϷΓιβ

Note: 'Ur' (for 'Urbinas') in the nomenclature of Cuntz corresponds to manuscript U, 'Ω' to manuscript O and 'Σ' to manuscript S.

C The important cities of the second map of Europe, *Geogr.* 8.4.1–5

The list of the ‘important cities’ of Ptolemy’s second map of Europe is recorded in Book 8 of the *Geography*. The following critical edition of this list is based on the Stückelberger and Graßhoff 2006 edition, pp. 778–779; the texts in the *codices primarii* were also verified and the critical apparatus was completed. In contrast to the layout of the manuscripts, the length of the longest day of the year and the hour intervals between the Iberian cities and Alexandria were organised in the form of a table in which the numerical data from the two recensions were placed next to each other in order to improve legibility and make comparisons of the data sets easier. An English translation follows the critical edition.

1 Εὐρώπης πίναξ β'

Ὁ δεύτερος πίναξ τῆς Εὐρώπης περιέχει τὴν Ἰσπανίαν πᾶσαν ἐν ταῖς τρισὶν ἐπαρχίαις σὺν ταῖς παρακειμέναις νήσοις. Ὁ δὲ διὰ μέσου αὐτοῦ παράλληλος λόγον ἔχει πρὸς τὸν μεσημβρινόν, ὃν τὰ γ' πρὸς τὰ δ' ἔγγιστα.

5 Περιορίζεται δὲ ὁ πίναξ ἀπὸ μὲν ἀνατολῶν τοῖς Πυρηναίοις ὄρεσιν, ἀπὸ δὲ μεσημβρίας τῶ τε Βαλλιαρικῶ πελάγει καὶ τῶ Ἰβηρικῶ καὶ τῶ Ἡρακλείῳ πορθμῶ καὶ μέρει τῆς ἔξω θαλάσσης, ἀπὸ δὲ δύσεως τῶ Δυτικῶ Ὠκεανῶ, ἀπὸ δὲ ἄρκτων τῶ Κανταβρίῳ Ὠκεανῶ.

	[Ω]	[Ξ]	[Ω]	[Ξ]
τῆς μὲν οὖν Λουσιτανίας ἐπαρχίας				
Νῶρβα Καισάρεια	$\overline{\text{ιδ}} \text{ Lγβ}' \text{ ἔγγιστα}$	$\overline{\text{ιδ}} \text{ Lγβ}'$	$\overline{\gamma} \text{ L}'$	$\overline{\gamma} \text{ L}'$
10    Αὐγούστα Ἡμερίτα	$\overline{\text{ιδ}} \text{ Lγ}'$	$\overline{\text{ιδ}} \text{ Lγ}'$	$\overline{\gamma} \text{ L}'$	$\overline{\gamma} \text{ L}'$
τῆς δὲ Βαιτικῆς Ἰσπανίας				
Ἴσπαλις	$\overline{\text{ιδ}} \text{ γο}'$	$\overline{\text{ιδ}} \text{ γο}'$	$\overline{\gamma} \text{ L}'$	$\overline{\gamma} \text{ Lκ}'$
Κορδύβη	$\overline{\text{ιδ}} \text{ γο}'$	$\overline{\text{ιδ}} \text{ γο}'$	$\overline{\gamma} \text{ γιε}'$	$\overline{\gamma} \text{ γιβ}'$
τῆς δὲ Ταρρακωνησίας Ἰσπανίας				
15    Ἀστούρικα Αὐγούστα	$\overline{\text{τε}} \text{ γιβ}' \text{ ἔγγιστα}$	$\overline{\text{τε}}$	$\overline{\gamma} \text{ γιε}'$	$\overline{\gamma} \text{ γιε}'$
Νέα Καρχηδόν	$\overline{\text{ιδ}} \text{ γο}'$	$\overline{\text{ιδ}} \text{ γο}'$	$\overline{\gamma} \text{ ζ}'$	$\overline{\gamma} \text{ ε}'$
Ταρράκων	$\overline{\text{τε}} \text{ ἔγγιστα}$	$\overline{\text{τε}} \text{ ἔγγιστα}$	$\overline{\beta} \text{ Lγβ}'$	$\overline{\gamma}$
Κλουνία	$\overline{\text{τε}} \text{ η}'$	$\overline{\text{τε}} \text{ γο}'$	$\overline{\gamma} \text{ δ}'$	$\overline{\gamma} \text{ γ}'$
Καισαραυγούστα	$\overline{\text{τε}} \text{ ιβ}'$	$\overline{\text{τε}} \text{ ιβ}'$	$\overline{\gamma} \text{ ιε}'$	$\overline{\gamma} \text{ γο}'$
20    Γάδειρα ἢ νήσος	$\overline{\text{ιδ}} \text{ L}'$	$\overline{\text{ιδ}} \text{ L}'$	$\overline{\gamma} \text{ γο}'$	$\overline{\gamma} \text{ γο}'$

2 περιέχει: περιέχειν X || ταῖς om. UK || 3 σὺν: καὶ X || τὸν om. X || 5 ἀνατολῶν: ἀνατολῶς X || Πυρηναίοις: Πυρηναίοις U || 6 Βαλλιαρικῶ: Βαλιαρικῶ X || τῶ Ἰβηρικῶ καὶ: καὶ om. UK || καὶ μέρει: μέχρι X || ἔξω: ἐκτός Ω || 7 ἄρκτων τῶ: τῶ om. X || 11 Ἰσπανίας om. X || 13 lineam om. V || 14 Ἰσπανίας om. X || 15 Αὐγούστα om. UVR sed exhibit K, Ἀστουρικαυγούστα X ||  $\overline{\text{τε}} \text{ γιβ}'$  ἔγγιστα:  $\overline{\text{τε}} \text{ γιβ}'$  VA, numeros falso exhibit X || 17 Ταρράκων: Ταρρακῶν sic X || 18 Κλουνία |  $\overline{\text{τε}} \text{ γο}'$  |  $\overline{\gamma} \text{ η}'$  K || 19 Καισαραυγούστα sic UK Καισάρεια Αὐγούστα VRXA.

## Second map of Europe

1. The second map of Europe contains the whole Iberia, [comprising] three provinces and its adjacent islands. The parallel circle [running] through its middle has a ratio of around 3 : 4 to the meridian.
2. The map is bounded to the east by the Pyrenees; to the south by the Balearic and Iberian seas as well as by the Strait of Hercules and a part of the Outer Sea; to the west by the Western Ocean; and to the north by the Cantabrian Ocean.

	[has a longest day of ...]		[is ...west of Alexandria]	
	[Ω]	[Ξ]	[Ω]	[Ξ]
3. [Important cities] of Lusitania:				
Nōrba Caesarina	< 14 $\frac{11}{12}$ h	14 $\frac{11}{12}$ h	3 $\frac{1}{2}$ h	3 $\frac{1}{2}$ h
Augusta Emerita	14 $\frac{5}{6}$ h	14 $\frac{5}{6}$ h	3 $\frac{1}{2}$ h	3 $\frac{1}{2}$ h
4. [Important cities] of Baetica:				
Hispalis	14 $\frac{2}{3}$ h	14 $\frac{2}{3}$ h	3 $\frac{1}{2}$ h	3 $\frac{11}{20}$ h
Corduba	14 $\frac{2}{3}$ h	14 $\frac{2}{3}$ h	3 $\frac{2}{5}$ h	3 $\frac{5}{12}$ h
5. [Important cities] of Tarraconensis:				
Asturica Augusta	< 15 $\frac{5}{12}$ h	15 h	3 $\frac{2}{5}$ h	3 $\frac{2}{5}$ h
Carthago Nova	14 $\frac{2}{3}$ h	14 $\frac{2}{3}$ h	3 $\frac{1}{6}$ h	3 $\frac{1}{5}$ h
Tarraco	< 15 h	< 15 h	2 $\frac{11}{12}$ h	3 h
Clunia	15 $\frac{1}{8}$ h	15 $\frac{2}{3}$ h	3 $\frac{1}{4}$ h	3 $\frac{1}{3}$ h
Caesaraugusta	15 $\frac{1}{12}$ h	15 $\frac{1}{12}$ h	3 $\frac{1}{15}$ h	3 $\frac{2}{3}$ h
Island of Gades	14 $\frac{1}{2}$ h	14 $\frac{1}{2}$ h	3 $\frac{2}{3}$ h	3 $\frac{2}{3}$ h

## D The Iberian cities in the 'Table of Noteworthy Cities'

The following text is a critical edition of the 'Table of Noteworthy Cities' for Iberia and is based on the four primary codices identified by Koch, Mittenhuber, and Stückelberger 2009. I undertook a new collation of the manuscripts, added an English translation and also produced a comprehensive critical apparatus in order to show the manuscripts' many textual corruptions.

		[μήκος]	[πλάτος]
1	Λουσιτανίας Ἰσπανίας		
	Αὐγούστα Ἡμερίτα	ῆ	ᾠ L'
	Νῶρβα Καισάρεια	ζ Λγ'	ᾠ Λγιβ'
	Βαιτικῆς Ἰσπανίας		
5	Ἰσπαλις	ζ δ'	ᾠ Λγ'
	Κορδύβη	θ γ'	ᾠ ιβ'
	[L* Μαλάχη	ῆ Λγ'	ᾠ L']
	[L* Π(ι)τύο(υ)σα νῆσος	ῆ L'	<i>vacat</i> ]
	Ταρρακωνησίας Ἰσπανίας		
10	Ἀστούρικα Αὐγούστα	θ L'	μ δ'
	Καρχηδῶν Νέα	ιβ δ'	ᾠ Λγιβ'
	Ταρράκων	ιζ γ'	μ γο'
	Κλονία	ια	μβ
	Καισάρεια Αὐγούστα	ιδ L'	μα L'
15	Γάδεια νῆσος	ε L'	λς ζ'

1 λουσιτανίας σπανίας L\* Ἰσπανίας Λουσιτανίας M\* λουσιτανίας ισπαν V\* || ᾠ L' ad lat. falso add. L\* ι α ῶ μ ῶ numeros alia manus add. falso V\* || 2 αουστα ημεριτα L\* || Γάδεια νῆσος | L | ᾠς γ δ' lineam hic add. f\* || 3 Νῶρβα Καισαρία L\* Νῶρβα Καισαρος V\* M\* || ζ Λγ': ζ Λγ' f\* ζ Λε' V\* || ᾠ Λγιβ', ᾠ Λιβ' V\* || 4 Ἰσπανιας Βαιτικῆς L\* Ἰσπανίας Βαιτικῆς M\* Βαιτικῆς ισπαν V\* || ζ δ' | ᾠ Λγ' numeros falso add. L\* || 5 lineam infra inseruit L\* || Ισπαλις V\* || ζ δ': ζ λ δ' V\* ζ L' f\* M\* || ᾠ λ γ': ᾠ λ γ' V\* || 6 lineam infra inseruit L\* || Κορδύβη f\* || 7 Βουρδούβη [corrupt. pro Κορδύβη] Βουρλούβη legit Mittenhuber | θ γ' | ᾠ L' super lineam add. sed Κορδύβη cum numeros infra habet L\* || 8 Βαιτικῆς, Ἰσπαλις | ζ δ' | ᾠ λ γ' et Κορδύβη | θ γ' | ᾠ γ' lines post Π(ι)τύο(υ)σα νῆσος habet L\* || 9 ταρρακωνίας L\* Ἰσπανίας Ταρρακωνησίας M\* Ταρρακωνησίας ισπα V\* || 10 Ἀστούρικα Αὐγούστα L\* αστουρικα αυγουστα M\* || μ δ': μα f\* non legi potest M\* || 11 Νέα om. M\* f\* || ᾠ Λγιβ': ᾠ λ γ' f\* ᾠ λ δ' M\* ᾠ λ γ' V\* || 12 Καταρρακῶν L\* || μ Λγ' M\* μ γ' V\* || 14 καισαρια αυγουστου L\* καισαρια αυγουστα V\* || 15 Γάδεια νῆσος L\* Γάδεια νῆσος V\* M\* || ᾠς ζ': ᾠς L' V\*.

## Conspectus Siglorum

L*	Leidensis graecus 78 (c. 820)
V*	Vaticanus graecus 1291 (c. 820)
M*	Marcianus graecus Z.331 (coll. 0552) (saec. IX)
f*	Florentinus Laurentianus 28.26 (saec. XIV)
[L* <i>urbs</i> ]	sic urbes in cod. L* quibusdam posterius additae indicantur

		[longitude]	[latitude]
1	In Hispania Lusitania:		
	Augusta Emerita	8°	39°30'
	Nōrba Caesarina	7°50'	39°55'
	In Hispania Baetica:		
5	Hispalis	7°15'	37°50'
	Corduba	9°20'	38°05'
	[L* Malaca	8°50'	37°30']
	[L* Pityoussa Island	18°30'	— ]
	In Hispania Tarraconensis:		
10	Asturica Augusta	9°30'	44°
	Carthago Nova	12°15'	37°55'
	Tarraco	16°20'	40°40'
	Clunia	11°	42°
	Caesaraugusta	14°30'	41°30'
15	Island of Gades	5°30'	36°10'

E Comparison between a selection of Iberian place names supplied in Marcian of Heraclea's *Periplus of the Outer Sea* (2.9–18) and those in the recensions of Ptolemy's *Geography* (2.4.5–6, 2.5.3–4, 2.6.2, 2.6.13)

Marcian of Heraclea	<i>Geogr.</i> , Ξ recension	<i>Geogr.</i> , Ω recension
ἀπὸ Κάλπηϛ	Κάλπη V <sup>1</sup> XO	Κάρπη UKRA
εἰς Καρτηῖαν, ἀπὸ Καρτηῖας	Καρτηία	Καρτιία
τὸ ἔθνος (τῶν) Βλαστουρῶν		Βαστούλων ΧΩ
τῶν Ποινῶν	τῶν Ἰτύνων	τῶν Ποινῶν
εἰς Βαρβήσολα, ἀπὸ Βαρβισόλων	Βαρβήσολα πόλις	Βαρβήσολα
εἰς Τραλιδούκτα, ἀπὸ Τραλισδοουκτῶν	Τρανζδούκτα	Τρανσοδούκτα UKV, Τρανοδούκτα R
εἰς Μενλαρίαν, ἀπὸ Μενραλίας		Μενραλία ΧΩ (loc. mutil. K)
εἰς Βελῶνα πόλι, ἀπὸ Βελῶνος πόλεως	Βέλων πόλις	Βαίλων πόλις (loc. mutil. K)
εἰς Βελῶνος ποταμοῦ ἐκβολὰς		Βαίλωνος ποταμοῦ ἐκβολαί ΧΩ (loc. mutil. K)
(τὸ) τῶν Τουρδούλων ἔθνος	Τουρδούλων	Τουρδούλων ζ̄ λ̄ζ Lγ'
εἰς τὴν κατὰ Ἀσταναναχύσι, ἀπὸ τῆς κατὰ ἄστανά ἀναχύσεις	ἡ κατὰ Ἀστακαναχύσις	ἡ κατὰ Ἄσταν εἰσχυσις
ἐπὶ τὸ τοῦ Βαίτιος ποταμοῦ ἀνατολικώτερον στόμα	Βαίτιος ποταμοῦ ἀνατολικὸν στόμα	Βαίτιου ποταμοῦ ἀνατολικὸν στόμα
ἐπὶ Ουοβαναιστουρίαν		Ὀνοβα Λιστουρία ΞΩ
τοῦ Δορίου ποταμοῦ	τοῦ Δορίου ποταμοῦ ΧΥ <sup>1</sup> Κ <sup>1</sup>	τοῦ Δωρίου ποταμοῦ
ἐπὶ Ἰβάλας, ἀπὸ δὲ Ἰβάλσων		Βάλας ΧΩ
εἰς σόνοβα, ἀπὸ σόννοβα		Ὀσσόνοβα UX, Ὀσσόναβα KV, Ἡσσόναβα R
εἰς Καλσίποδος ποταμοῦ ἐκβολὰς	Καλόποδος ποταμοῦ ἐκβολαί	Καλλίποδος VR, Καλείποδος UK
εἰς Σάλακρα, ἀπὸ Σαλάκρων		Σαλακία ΧΩ
Καστοβριζ		Καιτόβριξ ΧΩ
εἰς Ὀλιοσίπωνα, ἀπὸ Ὀλιοσίπωνος	Ὀλιος ἰπῶν VRA, Ὀλιοσίπων vel Ὀλιοσεῖπων codd. cett. om. K	
ἐπὶ τὰς τοῦ Τάγου ποταμοῦ ἐκβολὰς	Τάγου ποταμοῦ ἐκβολαί	Οὐτάγου ποταμοῦ ἐκβολαί
Λάνοβρις		Λουνοβρίς ΧΩ
ἀπὸ τοῦ Κορίου ἀκρωτηρίου	Ὀνέριον ἀκρωτήριον	Νέριον ἀκρωτήριον
εἰς Οὐρκῆν	Οὐρκει	Οὐρκη

## F Synopsis of Book 2 of the *Geography* in the $\Omega$ recension

The *codices primarii* of the  $\Omega$  recension – U (f. 11v), K (f. 10v–11r), V (f. 30v–31r), R (f. 19v) – and several other *codices secundarii* related to this recension – A (f. 26v), N (f. 38r) and Z (f. 23r), among others – all contain a synopsis of Book 2 of the *Geography*, which is entitled ἔκθεσις, literally ‘exposition’ or perhaps ‘disposition’ in the manuscripts. The synopsis was imperfectly transmitted, and some inaccuracies were already present in the exemplar of the  $\Omega$  hyparchetype: omissions of column numbers, incoherent counts, chapters (περιορισμοί) and their respective maps wrongly linked owing to gaps of one or two lines.

In the following edition of the  $\Omega$  synopsis of Book 2, I kept the original numbers, aside from two conjectures taken from K. Müller and P. Schnabel. The total number of provinces (l. 19) and the points where the word ‘map’ (πίναξ) is mentioned have also been preserved (manuscript U omits them), although they do not correspond to the catalogue’s structure. The spelling of the provinces was, however, rectified.<sup>1</sup>

Manuscripts X (f. 138r), O (f. 10v), P (f. 21v), S (f. 20v) and B (f. 27v) have a different, shorter synopsis, the columns of which have not been numbered (it is not reproduced here). A. Diller believed that one of the scribes might have intentionally abridged the synopsis:

The synopsis is written by the later restorer of X at the end of fol. 138r, his last leaf. Since the longer form would have run over onto the verso, which is crowded as it is, it seems to me that this synopsis is abridged in X because the scribe was pressed for space.<sup>2</sup>

This argument is, however, debatable. Since the scribe left at least six free lines at the bottom of f. 138r and took the liberty of adding some text in the upper margin of f. 139r, he would not have had any trouble finding additional space.

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1 See Müller 1867, 287; Müller 1901, 70–71; Cuntz 1923, 6–8; Schnabel 1938, 62 and 67; Stückelberger and Graßhoff 2006, 136.

2 Diller 1940, 335.

- 1 Ἐκθεσις τοῦ δυσμικωτέρου (μέρους) τῆς Εὐρώπης  
κατὰ τὰς ὑποκειμένας ἐπαρχίας ἢ σατραπείας:
- |    |                             |          |                                 |
|----|-----------------------------|----------|---------------------------------|
|    | Ἰουερνίας νήσου Βρεττανικῆς | πίναξ α' | σελις $\overline{\sigma\zeta}$  |
|    | Αλουίωνος νήσου Βρεττανικῆς |          |                                 |
| 5  | Ἰσπανίας Βαιτικῆς           |          | $\overline{\pi\delta}$          |
|    | Ἰσπανίας Λουσιτανίας        | πίναξ β' | $\overline{\pi\eta}$            |
|    | Ἰσπανίας Ταρρακωνησίας      |          | $\overline{\vartheta\alpha}$    |
|    | Κελτογαλατίας Ἀκουιτανίας   |          | $\overline{\rho\delta}$         |
|    | Κελτογαλατίας Λουγδουνησίας | πίναξ γ' |                                 |
| 10 | Κελτογαλατίας Βελγικῆς      |          | $\overline{\rho(\theta)}$       |
|    | Κελτογαλατίας Ναρβωνησίας   |          | $\overline{\rho\tau\gamma}$     |
|    | Γερμανίας Μεγάλης           | πίναξ δ' | $\overline{\rho\iota\zeta}$     |
|    | Ῥαιτίας καὶ Οὐινδελικίας    |          | $\overline{\rho\kappa\epsilon}$ |
|    | Νωρικοῦ                     |          |                                 |
| 15 | Παννονίας τῆς ἄνω           | πίναξ ε' | $\overline{\rho\kappa\zeta}$    |
|    | Παννονίας τῆς κάτω          |          |                                 |
|    | Ἰλλυρίδος Λιβουρνιας        |          | $\overline{\rho\lambda\alpha}$  |
|    | Δαλματίας                   |          |                                 |
- ἐπαρχίαι  $\overline{\tau\zeta}$  · πίνακες  $\overline{\epsilon}$
- 20 περιορισμός · ἀκρωτήρια · νῆσοι · ποταμῶν παραθέσεις ·  
παραλίου περιγραφὴ · πελαγῶν ὀνόματα · ὄρη · ποταμοί ·  
λίμνη · ἐπαρχιῶν ὀνόματα · χῶροι ἢ ἔθνη · ἐπιγραφαί ·  
ἐπιγράμματα · ἐπίσημοι πόλεις · δευτέρα πόλεις · τρίται πόλεις

1 μέρους add. sec. X: om. codd. || 3 πίναξ α': om. U πίναξ πρῶτος A πίναξ πρῶτος α'  $\overline{\sigma\epsilon}$   $\overline{\sigma\zeta}$  VR || σελις  $\overline{\sigma\zeta}$ : om. U || 5 Ἰσπανίας sic et infra UKRA || 6 Ἰσπανίας Λουσιτανίας: Ἰσπανίαν τὴν Λουσιτανίαν UVRA || πίναξ β': om. U πίναξ  $\overline{\beta}$  hic et similiter infra VRA || 9 πίναξ γ': om. U || 10 Βελγικῆς conj. Müller: Βελτικῆς codd. ||  $\overline{\rho(\theta)}$  conj. Müller:  $\overline{\rho}$  codd. || 12 πίναξ δ': om. U || 13 Ῥαιτίας: Βαιτίας VR || Οὐινδελικίας corr. Müller: Βινδελικίας codd. || 14 Νωρικοῦ: πίναξ ε'  $\overline{\rho\kappa\gamma}$   $\overline{\zeta}$  hic inseruit K || 15 πίναξ ε': om. U ||  $\overline{\rho\kappa\zeta}$  conj. Schnabel:  $\overline{\rho\kappa\gamma}$   $\overline{\zeta}$  U  $\overline{\rho\kappa\gamma}$   $\overline{\zeta}$  V  $\overline{\rho\kappa\gamma}$   $\overline{\zeta}$  R  $\overline{\rho\kappa\gamma}$   $\overline{\zeta}$  A numeros anteposit K  $\overline{\rho\kappa\zeta}$  L' conj. Müller || 17  $\overline{\rho\lambda\alpha}$  sic K: om. VR  $\overline{\tau\epsilon}$  A || 18 Δαλμαστίας A || 19 om. VR sed inseruit V<sup>1</sup> ὁμοῦ ἐπαρχίαι K || 20 ποταμῶν: πόλεων conj. Cuntz || 22 ἐπιγραφαί· ἐπιγράμματα: ἐπιγραφαί ἢ ἐπιγράμματα conj. Müller

- 1 Disposition of the more western part of Europe with the following provinces and satrapies:

	Hibernia, a British island	1st map	column 76
	Albion, a British island		
5	Hispania Baetica		84
	Hispania Lusitania	2nd map	88
	Hispania Tarraconensis		91
	Gallia Aquitania		104
	Gallia Lugdunensis	3rd map	
10	Gallia Belgica		109
	Gallia Narbonensis		113
	Germania Magna	4th map	117
	Raetia and Vindelicia <sup>3</sup>		125
	Noricum		
15	Pannonia Superior	5th map	127
	Pannonia Inferior		
	Illyricum Liburnia		131
	Dalmatia <sup>4</sup>		

Provinces: 16, maps: 5

- 20 Definitions, promontories, islands, positions of rivers<sup>5</sup>, outline of the coasts, names of seas, mountains, rivers, lakes, names of provinces, regions or peoples, captions, headings<sup>6</sup>, important cities, second-rate cities, third-rate cities.

3 The manuscripts give the same betacism and the same omission of an iota (Βυθελκία rather than Ουθελκίας) in another section listing the provinces in V (ff. 32v–33r), R (f. 28rv) and A (f. 20r). See Stückelberger and Graßhoff 2006, 142. This specific spelling of Vindelicia – a region between the Danube River and the Alps – cannot be found anywhere else in the *Geography*; thus both lists were very probably compiled by the same author.

4 The synopsis lists Ἰλλυρίς Λιβουρνία (Illyricum Liburnia) and Δαλματία (Dalmatia) as if they were two distinct provinces, which explains the total given at the end of the list (16 ‘provinces’). In the catalogue, however, Ptolemy treated Liburnia and Dalmatia as two regions situated in the province of Illyricum, so that the catalogue includes only 15 ‘provinces’. The synopsis thus differs slightly in structure from

the catalogue. Dalmatia is also treated as a separate province in the epitomes of manuscripts X and O (*Geogr.* 8.29).

5 The word παραθέσεις is hard to interpret. O. Cuntz suggests to correct ποταμῶν in πόλεωσ, i.e. ‘positions of the cities’: in this case, an abbreviation such as π would have been misunderstood. This conjecture is very tempting. See p. 116.

6 The words ἐπιγραφαί and ἐπιγράμματα are extremely rare in Ptolemy’s vocabulary and their respective meanings are unsure. See Cuntz 1923, 8. The word ἐπιγραφαί might actually refer to the ὑπογραφαί, that is, the captions or the text to be written on or around the maps, see p. 39, whereas ἐπιγράμματα designate perhaps the headings of each map.

G Ptolemy's Asturia, *Geogr.* 2.6.28–38

A critical edition of the passage of Ptolemy's catalogue of localities that includes the localities of Asturia (*Geogr.* 2.6.28–39) is reproduced below. It is based on the Stückelberger and Graßhoff 2006 edition, pp. 180–183; I also consulted the text of the primary codices of the *Geography* and completed the critical apparatus. The texts from the two recensions were placed next to each other in order to improve legibility and to make comparisons of the data sets easier.

1 Ἀπ' ἀνατολῶν δὲ τούτων παράκειται ἡ Ἀστούρια καὶ πόλεις ἐν αὐτῇ.

	[Ω recension]		[Ξ recension]
	Λοῦκος Ἀστούρων	τᾶ μῆ	Λοῦκοσανστουρίων τᾶ μῆ
	Λαβερρίς	τᾶ μῆ Δ'	Λαβερρίς τᾶ Λ'
	Ἰντεράμνιον	τ δ' μῆ γ'	Ἰντεράμνιον τᾶ μῆ Λιβ'
5	Ἀργεντέολα	θ γ' μῆ Δδ'	Ἀργεντέολα θ γ' μῆ Δδ'
	Λαγκίατοι	θ γ' μῆ Λ'	⟨Λ⟩αγκίαται
	Μαλίακα	τ γ' μῆ	⟨Μ⟩αλίακα τῆ Λ' μῆ Δδ'
	Γίγια	τᾶ Λ' μῆ Δδ'	Γίγια τᾶ ζ' μῆ Δδ'
	Βέργιδον Φλαοῦτον	ἦ Λ' μῆ Δδ'	Βέργιδον Φλαοῦτον ἦ Λ' μῆ ζ'
10	Ἰντεράμνιον Φλαοῦτον	θ μῆ	Ἰντεράμνιον Φλαοῦτον Λεγίων ζ'
	Λεγίων ζ' Γεμινή		Γεμινή θ μῆ Λ'
	Βριγαικινῶν·		⟨Β⟩ριγεκινῶν·
	Βριγαίκιον	τ μῆ Λγ'	Β(ρ)ιγέκιον τ μῆ Λιβ'
	Βεδουνησίων·		⟨Β⟩αιδουνησίων·
15	Βεδουνία	τ Λγ' μῆ Λγιβ'	Βαιδουνία τ γο' μῆ γιβ'
	Ὀρνιακῶν·		⟨Ο⟩ρνιακῶν·
	Ἰντερκατία	τᾶ ζ' μῆ δ'	Ἰντερκατία τᾶ ζ' μῆ δ'
	Λουγγόνων·		⟨Λ⟩ουγγόνων·
	Παιλόντιον	τᾶ γο' μῆ Λγ'	Παιλόντιον τᾶ Λιβ' μῆ Λγ'
20	Σαιλινῶν·		⟨Σ⟩αιλινῶν·
	Ναρδίσιον	τῆ μῆ Δδ'	Ναρδίσιον τῆ μῆ Δδ'
	Σουπερατίων·		⟨Σ⟩ουπερατίων·
	Πεταούσιον	θ Λ' μῆ γο'	Πεπαούσιον θ Λ' μῆ γο'
	Ἀμακῶν·		Ἀμακῶν·
25	Ἀστούρικα Αὐγούστα	θ Λ' μῆ	Ἀστούρικα Αὐγούστα θ Λ' μῆ
	Τειβούρων·		⟨Τ⟩ιβούρων·
	Νεμετόβριγα	ζ Λ' μῆ Δδ'	Νεμετόβριγα ζ Λ' μῆ Δδ'
	Ἰγουρρῶν·		⟨Γ⟩ιγουρρῶν·
	Φόρος Ἰγουρρῶν	ἦ μῆ Δδ'	Φόρος Γιγουρρῶν ἦ μῆ Δδ'

1 Ἀστούρια: Ἀστούρικα X falso legit Stückelberger || 4 τ δ': τδ KV || μῆ γ': μῆ Λ' VRA || 7 τ γ': τῆ VRA || 9 Βέργιδον: Βέργιδον VRA || μῆ Δδ': μῆ Δδ' V || 11 Γεμινή: corr. Müller, Γερμανική codd. || 12 Βριγαικινῶν: Βρισαικινῶν ΩΑ || 14 ⟨Β⟩αιδουνησίων: Βαιδουνησίων legit Müller || 15 Βεδουνία: Βεδούνη VR, Βεδούνη UKA, Βαιδούνη O, Βεδούνη U<sup>1</sup> || τ Λγ': τῆ ζ' K || μῆ Λγιβ': μῆ γο' K || 19 Παιλόντιον: Πηλόντιον VRA || μῆ Λγ': sic UKX μῆ Δδ' VRA || 20 τῆ: τ γ' X legit Stückelberger || 28 Ἰγουρρῶν: Ἰγουρῶν hic et infer VR.

H The *paraploi* from the Pillars of Hercules to the Pyrenees described by Polybius (*Hist.* 3.39), Strabo (*Geogr.* 3.4.1) and in the Artemidorus Papyrus (V 16–25)

Route	Polybius	Strabo	<i>P. Artemid.</i> <sup>(a)</sup>
Pillars of Hercules to Carthago Nova	3 000 <sup>(b)</sup>	2 200	2 020 <sup>(c)</sup>
Carthago Nova to Ebro River	2 600	2 200	[2 288]
Ebro River to Emporion	1 600	1 600 <sup>(d)</sup>	[1 600]
Emporion to Pyrenees	<600> <sup>(e)</sup>		<632> <sup>(f)</sup>
Pillars of Hercules to Pyrenees	c. 8 000	6 000 <sup>(g)</sup>	[6 540]

- (a) The values in square brackets are the totals of two intermediate distances supplied in the papyrus; the value without brackets is the actual distance of the route recorded in the papyrus.
- (b) This value matches that of Diodorus of Sicily, who writes that it took three days and three nights to sail from the Pillars of Hercules to the Balearic Islands (*Bibl. hist.* 5.16.1). P. Arnaud is, however, reluctant to attribute this information to a common source (Arnaud 2005, 166).
- (c) This value corresponds to the distance between Calpê and Carthago Nova.
- (d) Strabo does not refer to Emporion in his list but gives an estimation for the distance between Emporion and the Pyrenees further on in the text (3.4.8). The value given by the manuscripts is 4 000 stadia, which is clearly erroneous (See Radt 2006, 368, and Lasserre 2012, 67).
- (e) The whole paragraph (3.39) of Polybius' text has been vigorously debated for philological and historical reasons (see Walbank 1957, 371–372). The text (see the recently revised edition of De Foucault, Foulon, and Molin 2004, 51–52), reads as follows:

Crossing the Straits at the Pillars of Hercules they [the Carthaginians] had similarly subdued all Iberia as far as the point on the coast of Our sea where the Pyrenees Mountains, which separate the Celts from the Iberians, end. This spot is about 8 000 stadia distant from the strait near the Pillars of Hercules. There are indeed 3 000 stadia from the Pillars to Carthago Nova, from which place Hannibal started for Italy, 2 600 stadia from hence to the Ebro river; 1 600 stadia from hence to Emporion, and from hence to the passage of the Rhône about 1 600 stadia [...]. From the passage of the Rhône, following the bank of the river in the direction of

its source as far as the foot of the pass across the Alps to Italy, the distance is 1 400 and the length of the remaining pass through the Alps, about 1 200. After that, Hannibal should come down into the Padan plain. So that to arrive there he had, starting from Carthago Nova, to march about 9 000 stadia.

The total distance from the Pillars to Emporion comes, therefore, to 7 200 stadia (3 000 + 2 600 + 1 600), which does not match the 'c. 8 000 stadia,' even when rounded up. Moreover, when one adds all the intermediate distances between Carthago Nova and the Padan Plain given by Polybius, one gets 8 400 stadia, that is, 600 stadia less than the 'c. 9 000 stadia' claimed by Polybius to be the distance of the whole journey. Hence, many editors from J.F. Gronov onwards have looked for mistakes in the text, one being that Polybius forgot to include an intermediate distance (see Walbank 1957, 371, and De Foucault, Foulon, and Molin 2004, 52 and 201–202). However, without wishing to suggest that Polybius' text is flawed, the 9 000 stadia for Hannibal's journey does add up if one accepts that Polybius did not give a separate value for the part of the journey between the Alps and the Padan Plain and that this section of the journey was simply included in the total.

Nevertheless, the 'c. 8 000 stadia' for the Iberian coast remains problematic. When one examines the whole passage, it looks as if Polybius combined at least two sources: a report on Hannibal's march to Italy and another source for the length of the Iberian coast. The 3 000 stadia between the Pillars and Carthago Nova and the overall evaluation (8 000 stadia) must have been taken from the latter, which also helped Polybius build his 'triangle' (Str. 2.4.2). In order to make the distances for the coast logical, and without filling in any gaps in the text, I would postulate that Polybius calculated that the distance between Emporion and 'the point on the coast where the Pyrenees Mountains end' came to several hundred stadia. The logical value would be 800 stadia between these points to get the rounded figure of 8 000 stadia. P. Arnaud cautiously admits that a distance of 600 stadia between Emporion and the Pyrenees is plausible, making a total of 7 800 stadia (Arnaud 2005, 165–167). This not only fits the 'c. 8 000 stadia' but also matches Strabo's report, in which Polybius is credited with an estimation of 'a little less than 8 000 stadia' (Str. 2.4.2 and 2.4.4). Surprisingly, Polybius' data then approximates quite closely the data found in the *P. Artemid.*

- (f) The number of stadia for this distance is illegible at this point. However, it has been possible to make a reliable estimation by taking into account the total given in *P. Artemid.* V 26.
- (g) According to Strabo (2.4.4), Eratosthenes used this value.

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