



Review of
[Duane W. Roller, *Eratosthenes' Geography*, Princeton University Press, 2010](http://press.princeton.edu/titles/9182.html)
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Roller's Eratosthenes: a Strabonian slant

Duane Roller is an interesting author, who has previously tackled topics that are somewhat out-of-the-way by the standards of the traditional classical curriculum, such as the life and work of Juba, whose kingdom lay in northern Africa, and the role of Juba's wife, Cleopatra Selene, daughter of the infamous Cleopatra from her liaison with Marc Antony.¹ One does not have to be a trained classicist to appreciate Roller's scholarship. Indeed, the subjects he tackles are increasingly ones that resonate with the educated public as much as with specialists. Roller's new book follows this trend and will surely win new fans for its subject. Through Roller's Eratosthenes, we get a glimpse of the incredible intellectual breadth and stamina of the third century BCE, when the world had been newly opened up by Alexander the Great. Modern readers across the board will surely identify with Eratosthenes' efforts to impose some sort of order and meaning on the recently globalised world.

The subtitle of Roller's book reads 'Fragments collected and translated, with commentary and additional material, by Duane W. Roller.' The additional material

¹ [The World of Juba II and Kleopatra Selene: Roman Scholarship on Rome's African Frontier](http://www.routledge.com/books/details/9780415305969). N.Y., London: Routledge, 2003 (www.routledge.com/books/details/9780415305969), reviewed in *BMCR* 2004.07.31 (<http://bmc.brynmawr.edu/2004/2004-07-31.html>).

consists most notably of the well-researched and highly readable introduction, which provides a comprehensive account of Eratosthenes' life and work, specifically his *Geography*. The inclusion of the geographical fragments, with their accompanying commentary, raises Roller's introductory account above entries on Eratosthenes found in reference works on ancient scientific writers, in that the fragments provide a firm basis for Roller's statements. Of course, their presence also provides readers with a basis on which to disagree with Roller, so we can expect that Roller's book will stimulate further discussion concerning Eratosthenes' contribution to the intellectual milieu of the ancient world. That is surely all to the good.

Roller's inclusion of the fragments underlines an important and basic fact, albeit one given insufficient prominence in general accounts of Eratosthenes, namely that his work is 'lost.' That is to say, the various rolls (and perhaps codices, if by chance his work ever got transferred to the new medium) which contained Eratosthenes' words were at various times cut up, re-used, thrown away, eaten by mice or burnt -- or perhaps the material on which they were written simply disintegrated. All that has survived to the present day are a few scraps ('fragments' in the common sense of the word) of papyrus roll retrieved from an ancient rubbish heap, containing some lines of Eratosthenes' poetry. Other than this we are reduced, for our understanding and appreciation of Eratosthenes, to comments on his work by later ancient writers ('fragments' of Eratosthenes, as the word is conventionally used by classicists), a situation which is far from ideal and clearly fraught with difficulty but is, alas, the only option.

Herein lies the rub, for some ninety percent of the material collected by Roller as fragments of Eratosthenes' *Geography* is derived from Strabo.² An unwitting layman might understandably consider that in reality they are 'fragments' of Strabo, in that they are passages taken from his work. These passages are removed from their Strabonian sequence and rearranged to represent the possible order in which Eratosthenes expressed his ideas in the work(s) to which Strabo refers. That is, of course, what any collection of fragments does, and there are many advantages to the process, both generally and in the particular case of Eratosthenes. Before looking at those advantages, however, it is worth looking at some of what gets lost when Strabo's references to Eratosthenes are excised from their surrounding narrative.

Strabo's geographical work was an enormous undertaking, the sheer length of which defeats many would-be translators and commentators. At first sight it is an unwieldy production but on closer inspection a tight narrative structure is revealed, and this needs to be borne in mind when lifting individual passages out of their Strabonian context. For example, in his description of Asia, Strabo divides it into north and south, announcing that he will deal with northern Asia first.³ Strabo continues with a preview of

² In other words, Strabo cites Eratosthenes very frequently, far more frequently than all other ancient authors combined. Numerically, Strabo provides 105 of 155 fragments (p. 15), but the length of Strabo's citations means that they represent a greater percentage of the overall data than the numbers suggest.

³ 11.1.5; 491 C, 13-15. In this review I incorporate, alongside the traditional referencing system (11.1.5), the line referencing system (491 C, 13-15) from S.L. Radt, [Strabons Geographika. Göttingen: Vandenhoeck and Ruprecht, 2002-](#) (www.v-r.de/de/reihen/777). See also [Editions of Strabo's Geography](#) (www.strabo.ca/editions.html#Radt2002).

the first section of northern Asia⁴ and then, after a digression, with previews of the second, third and fourth sections of northern Asia.⁵ Following these previews, Strabo launches into his long and detailed description of the first section.⁶ Several thousand words later,⁷ Strabo draws his description of the first section to a close and starts on the 'second section,' in a passage which is included by Roller as part of a fragment of Eratosthenes (F110). In commenting on this fragment, Roller (p. 206) wrongly states that Strabo's reference to the 'second section' is a reference to one of the two sections into which, Roller claims, Strabo divides the northern part of the whole world; and that, in making this reference, Strabo follows Eratosthenes. This is a misrepresentation of Strabo,⁸ whose division of northern Asia into four sections is his own (or, at least, not derived from Eratosthenes), and perhaps a misrepresentation of Eratosthenes, too.

One of Strabo's many quirks is the use of the definite article without an accompanying noun, creating expressions which translate as 'the [?].' This is of course unacceptable in English, so the noun has to be supplied by the translator, who then faces the risk of supplying the wrong one. Some of Roller's choices are controversial. For example, in reporting on attempts to establish the relative position of locations in what

⁴ 11.1.5; 491 C, 15-25. Strabo admittedly confuses matters by slipping from singular to plural and by omitting nouns, two of his many idiosyncrasies.

⁵ 11.1.7; 492 C, 10-19.

⁶ 11.2.1; 492 C, 20, onwards.

⁷ 11.6.1; 506 C, 33-34.

⁸ Strabo specifically differentiates himself from Eratosthenes in his definition of the four sections of northern Asia at 11.12.5 (522 C, 19-27).

we now call the Middle East, Strabo differentiates between the meridian running due south through the Caspian gates (a mountain pass located in the north-west of current day Iran) and the line running in a south-easterly direction from the Caspian gates to the boundary of Carmania and Persis (in southern Iran). I translate the relevant passage as follows: ‘with respect to the meridian line running through the Caspian gates, the [?] through the Caspian gates and the boundary of Carmania and Persis makes virtually half a right-angle’ (2.1.34; 87 C, 2-5). The noun to be supplied at ‘[?]’ is simply ‘line.’ Roller, who incorporates this passage as part of F64 (p. 78), supplies ‘meridian,’ and in doing so makes an already extremely complicated discussion (in which Strabo undermines another’s attempt to criticise Eratosthenes) incomprehensible.

A similar problem occurs in Strabo’s report of Eratosthenes’ famous and homely comparison of the inhabitable part of the northern hemisphere to a spindle whorl. It is doubtful that many modern readers will know what the heck a spindle whorl is, but it will have been familiar to an ancient audience for whom spinning and weaving were part of the domestic routine. The same Greek word (*spondylos*) was used by various writers to describe the shape of a vertebra, the cow-parsnip flower and an artichoke.⁹ Fortunately, we do not have to be able to envisage a spindle whorl in order to understand Eratosthenes’ meaning, for Strabo makes it clear what shape Eratosthenes had in mind.

⁹ It is possible that Eratosthenes likened the inhabitable portion of the northern hemisphere to a vertebra, cow-parsnip flower or artichoke! On balance, however, it is more likely that the latter were named for their resemblance to a spindle whorl. Roller discusses the issue (pp. 23, 146-47) and opts, surely correctly, for translating *spondylos* as ‘spindle whorl.’

The notion of the spindle whorl is arrived at by making an imaginary cut through the spherical earth at the equator; and by taking the northern hemisphere and slicing off its top at the Arctic Circle. The shape that is left is what Eratosthenes likened to a spindle whorl. The spherical earth can also be cut into two hemispheres longitudinally by means of the great circle that passes through the poles, thus creating a western and an eastern hemisphere. When Strabo talks of both the spindle whorl and the northern hemisphere as being cut into two halves by the 'polar [?]' (2.5.6; 113 C, 11), the word to be supplied is 'circle,' i.e., the great circle passing through the poles. Roller's insertion of 'parallel' (F30, p. 60) leaves the reader flummoxed.

The problem is that Strabo is both a bane and a boon to those interested in Eratosthenes: a boon in that his frequent citation and use of Eratosthenes provides a great quantity of material; a bane in that his style is complex and often idiosyncratic, so that his references to Eratosthenes can be difficult fully to understand even in context, let alone when excised as 'fragments.' Roller cannot be expected to have undertaken a thorough study of Strabo as a prerequisite to his study of Eratosthenes.¹⁰ Had he done so, he would never realistically have found time to get around to providing what is a very valuable contribution to our understanding of Eratosthenes. Fragment collectors are forced to make compromises, and readers who want to understand Strabo's references to Eratosthenes in context can go to one of the several translations of Strabo currently available, in English or other languages, online and in print.¹¹

¹⁰ Roller discusses problems in translating Strabo on pp. 35, 37.

¹¹ See [Translations of Strabo's Geography](http://www.strabo.ca/translations.html) (www.strabo.ca/translations.html).

So much for the perils and pitfalls inherent in fragment collection. On the positive side, removing passages from their native context allows us to focus on the lost author without distraction. In Roller's collection, the benefits of so doing are enormous. Eratosthenes emerges as a figure in his own right, a full-bodied intellectual with a gift for expressing complex ideas in simple language reminiscent of great scientists in later ages. As we have seen in the case of *spondylos*, such simple language can paradoxically be complicated to translate. Another case presents itself with Eratosthenes' division of the inhabited world into what he called *sphragides*. The word has something to do with the precious stones used for making seals, although it is not clear to the modern reader whether Eratosthenes was thinking of a) land divisions officially designated with such seals, b) the impressions made by seals, c) the stones used for making the seals, or d) something else entirely. Roller (pp. 80-91, 175) opts for the translation 'sealstones,' which was perhaps more evocative for Eratosthenes' ancient audience than the modern reader. The exact analogy may be beyond us, but the gist of the comparison is not. From Strabo's treatment of the *sphragides*, it appears that they formed a sort of quilt or mosaic of interlocking polygonal shapes that Eratosthenes used to establish the location of places within the inhabited world.

It is easy for us to underestimate Eratosthenes' achievement in taking the three dimensional sphere of the world and reducing it to manageable proportions for the purposes of studying the restricted area known as the inhabited world. Eratosthenes made the inhabited world understandable by nestling it in the two-dimensional (albeit curved) quadrilateral provided by the surface of the halved spindle whorl, which was itself notionally cut out from the terrestrial sphere. His vivid vocabulary is sometimes

reminiscent of attempts by modern cosmologists to simplify spacetime by reducing it from four dimensions to three for representational purposes.¹² Eratosthenes shares with these modern cosmologists the desire to render the big picture understandable before proceeding to talk about relative location within the simplified structure. All these processes emerge clearly from Roller's collection and show that Eratosthenes is more than the mathematical genius who came up with a surprisingly accurate estimate for the measurement of the earth's circumference.

Roller presents comments by later authors relating to Eratosthenes' famous calculation of the earth's circumference as fragments of a separate work (pp. 263-67). Roller may well be right to see the detailed calculation as presented in a separate location, with the caveat that the physical structure of books in antiquity can make it difficult to say where one work ends and another begins. If, for example, Eratosthenes' detailed calculation occupied its own papyrus roll, would this necessarily constitute a separate work? Or could it have been considered as an introduction or an appendix to the main body of the work, contained on its own series of rolls? The varied names used by ancient authors in referring to Eratosthenes' calculation do not clinch the matter, as the authors could easily be referring to a part of the whole. What we need is a sense of the time lapse between the detailed calculation and the date of the geographical work to which Strabo refers.

¹² For a good example by a popular cosmologist: J. Levin, *How the Universe got its Spots*, London: Weidenfeld and Nicholson, 2002.

Roller's decision to allocate the calculation fragments to a separate work leaves him with an admitted problem (pp. 22-24). How can Roller tell whether Strabo's references to Eratosthenes' calculations are references to the proposed separate work, or whether they are references to the main work, which appears to have contained at least an allusion to this detailed calculation? With references by Strabo to assumed cross-references by Eratosthenes, things start to get complicated. Should Strabo's references be treated as fragments of the proposed work containing the calculation? Or should they be considered as fragments of the main work? There is no real solution to this conundrum: it is inherent in any attempt to organise the fragments in such a way as to represent the physical structure and order of the lost book(s).

Roller does not present the Greek text of the fragments derived from Strabo, and this is surely the right decision. Many of his readers will not be able to read ancient Greek and for these, inclusion of the original text would have been off-putting. Those who do read ancient Greek have the ability to access Greek editions of Strabo, preferably the most up-to-date one. Currently, that is the edition by S.L. Radt.¹³ Even in the absence of the Greek text, Roller profitably broaches the question of the exact meaning of some of Greek words used by Eratosthenes, as in the case of *spondylos* and *sphragides*. In some instances, however, his statements can be confusing. For example, Roller (p. 4, n.16) refers the reader to F50 for an example of Eratosthenes' expression 'lie opposite' meaning to be 'on the same latitude or longitude.' The passage to which Roller refers is

¹³ See n. 3. To facilitate reference to the Greek text, Roller's references to Strabo should ideally incorporate the line referencing system employed by Radt. Perhaps these could be included at a second printing?

from Strabo, who uses the verb ἀνταίρειν (lit. 'rise opposite to') with the sense of 'lie on the same *latitude* as' (2.1.5; 69 C, 11). This should be distinguished from Strabo's use of the expression 'lie opposite to' (ἀντικείμεθα) which has the sense 'lie on the same *longitude* as.'¹⁴ However, Roller is right to see Strabo, in these instances, as probably using technical terminology derived from Eratosthenes.

It is worth ending with a note on the overall tone of Strabo's comments on Eratosthenes. To the modern reader, Strabo can sometimes seem dismissive of Eratosthenes' scholarship. In Strabo's day, however, the conventions of citation were different than they are today. To judge someone worthy of criticism was considered a compliment on their academic abilities; true condemnation was achieved through total silence.¹⁵ Strabo's criticisms of Eratosthenes should thus be taken as evidence of Strabo's respect for his eminent predecessor. Strabo himself did not measure up to Eratosthenes' standards, and the result can be that he muddies his reports of Eratosthenes. Conflicting figures given by Strabo for Eratosthenes' measurement of the north-south dimension of the inhabited world (discussed by Roller, pp. 154-55)¹⁶ are perhaps the result of Strabo unsuccessfully attempting to reconcile figures taken from Eratosthenes' detailed calculation of the circumference of the earth with figures taken from the body of the main

¹⁴ E.g. 11.2.13; 496 C, 28-29.

¹⁵ 1.2.1; 14 C, 26-32.

¹⁶ On distances in general, Roller sometimes (p. 201, 206) expresses the conversion rate between Roman miles and Greek stades as eight miles to the stade, when he means the reverse, eight stades to the mile.

work, whether these were rounded approximations, later revisions or merely contemporary versions of a calculation that was continuously refined and updated.

In conclusion, the Eratosthenes that emerges from Roller's collection is an original thinker who dramatically and vividly changed the way in which the world was imagined and was unrestrainedly curious about how the world had come to be as it was. Roller's book presents us with the 'big picture,' conveying Eratosthenes as an intellectual whose own grasp of the big picture helped to make the world a manageable entity, an enormous achievement in his day and deserving of fuller appreciation now.

Sarah Pothecary, 4th August 2010

www.strabo.ca,
spothecary@strabo.ca

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