

Miscellanea

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The Production and Transmission of Hebrew Miscellanies on Greek Geometry: A Case Study of MS Madrid, BNE 5474¹

Of all Hebrew miscellanies on Greek geometry, MS Madrid, BNE 5474 is the only one containing a set of works which includes Euclid’s *Elements*, *Data* and *Optics*, besides *On mirrors*, often attributed to him, Theodosius of Bithynia’s *Spherics*, Menelaus of Alexandria’s *Spherica* and Autolycus of Pytane’s *On the Moving Sphere*. Moreover, the manuscript also contains the anonymous treatise *On Two Asymptotic Lines* and a fragment of Abraham bar Hiyya’s *Foundations of Understanding and Tower of Faith*. The whole manuscript appears to have been written by one sole

tain set of works on Greek geometry in a particular order? In other words, does this manuscript reflect a tradition of production of miscellanies on Greek geometry? And if so, has this tradition to be attributed to the Jewish scholars who translated these works from Arabic, particularly members of the Ibn Tibbon family, or is it borrowed from the Islamic tradition?

The textual tradition of some of the works contained in this miscellany has been thoroughly studied. For example, the Hebrew text of Euclid’s *Elements* has been Tony Lévy’s subject in some articles, where he has paid

particular attention to the different Hebrew versions of the text, their authors and their relations.³ Also, the anonymous treatise *On Two Asymptotic Lines* has been examined in detail by Gad Freudenthal, who has traced both the history of the transmission of this text and the impact in Western Europe of this work presumably written in Arabic and later translated into Hebrew.⁴ Both authors have examined the medieval sources of the mentioned texts, and a list of all the manuscripts containing them is to be

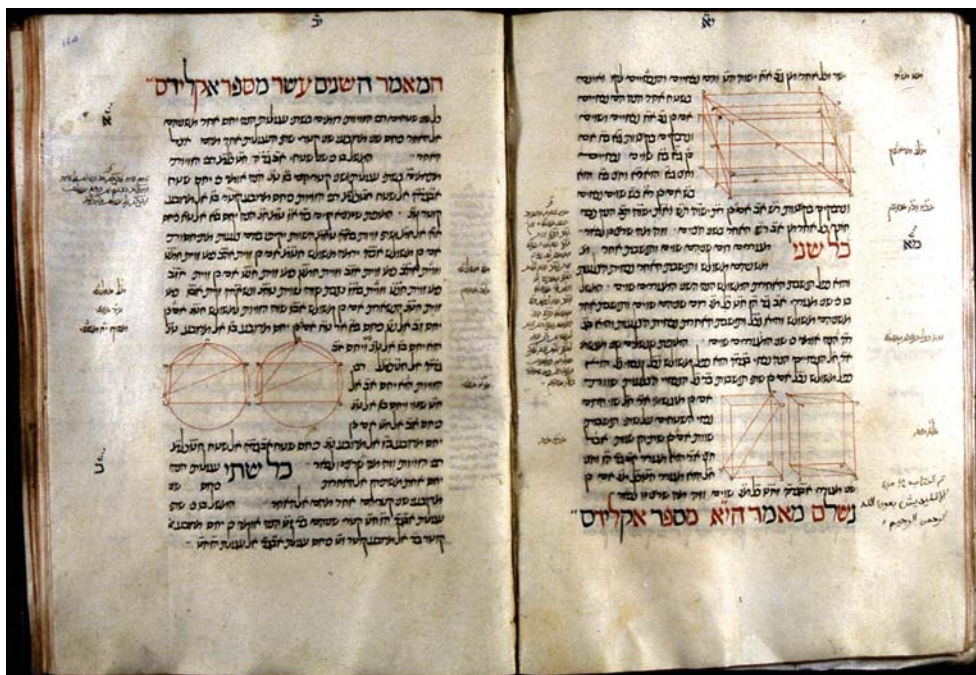


Fig. 1. MS Madrid, BNE 5474, ff. 159v-160r, © Biblioteca Nacional de España.

scribe and it can therefore be described as a monogenetic miscellany.² This fact will prove to be crucial to my main concern here: are there traces in Hebrew manuscript production of a tradition of copying a cer-

found in their studies. However, they only refer to the folios in which the particular text they are studying is to be found, and no mention of other contents of the manuscript is made, except for some particular cases.⁵

¹ This contribution is part of research carried out within the framework of Esperanza Alfonso’s ERC Starting Grant “The Intellectual and Material Legacies of Late Medieval Sephardic Judaism” (INTELEG), <http://www.lineas.cchs.csic.es/inteleg/en>.

² On the terms “monogenetic”, “homogenetic” and “allogenet-ic”, see Gumbert 2004 and 2012.

³ See Lévy 1997a and 1997b.

⁴ See Freudenthal 1988.

⁵ In the list of manuscripts containing *On Two Asymptotic Lines*, Freudenthal 1988:138 mentions MS Madrid, BNE 5474, and exceptionally specifies that the text is inserted after Euclid’s *Optics* and *De speculis* (*On Mirrors*).

fols.	Content	Quire	fols.	Bifolia: fols. in quire [fols. missing]
1r-190v	Euclid's <i>Elements</i>	1	1	VI: 12 [11]
		2	2-12	VI: 2-12 [1]
		3	13-24	VI: 1-12
		4	25-36	VI: 1-12
		5	37-48	VI: 1-12
		6	49-60	VI: 1-12
		7	61-72	VI: 1-12
		8	73-84	VI: 1-12
		9	85-96	VI: 1-12
		10	97-108	VI: 1-12
		11	109-120	VI: 1-12
		12	121-132	VI: 1-12
		13	133-142	VI: 1-10 [2]
		14	143-153	VI: 1-7; 9-12 [1]
		15	154-165	VI: 1-12
		16	166-177	VI: 1-12
		191r-232v	Theodosius of Bithynia's <i>Spherics</i>	17
18	190-200			VI: 1; 3-12 [1]
19	201-212			VI: 1-12
233r-284v	Menelaus of Alexandria's <i>Spherica</i>	20	213-224	VI: 1-12
		21	225-236	VI: 1-12
		22	237-248	VI: 1-12
		23	249-260	VI: 1-12
		24	261-272	VI: 1-12
		25	273-284	VI: 1-12
		26	285-295	VI: 2-12 [1]
285r-309v	Euclid's <i>Data</i>	27	296-307	VI: 1-12
		28	308-319	VI: 1-12
309v-327r	Euclid's <i>Optics</i>	29	320-330	VI: 1-8; 10-12 [1]
327r-330r	Euclid's (attrib.) <i>On Mirrors</i>	30	331-342	VI: 1-12
330r-333r	<i>On Two Asymptotic Lines</i> (anonymous)			
333v-340r	Autolycus of Pitane's <i>On the Moving Sphere</i>			
340v-342v	Abraham bar Hiyya's <i>Foundations of Understanding and Tower of Faith</i> (fragment)			

Table 1. MS Madrid, BNE 5474: schematic collation of quires.

Their interest is then focused on the transmission and reception of one particular text, regardless of the unity of production where every particular copy is found. In other words, no mention is made of the production of manuscripts as cultural objects, and the codices are listed just as mere bearers of texts. Attention is therefore focused on a specific text theoretically conceptualised as an independent unit.⁶

In order to complement such approach, the following case study will focus on one particular manuscript as a cultural object, and on the concept of miscellany as an intellectual product. It is my hypothesis that the choice and order of works in a monogenetic miscellany are not random, and that they are the product of an intellec-

tual tradition which considers such a choice significant and meaningful. Moreover, this kind of approach might contribute to the debate on textual connections among the different Hebrew versions of Euclid's *Elements* and other works, by providing material relations between manuscripts where the texts have been copied.

First and foremost, a detailed codicological analysis must be provided, both to exclude the possibility of later additions to the original concept of the miscellany and to localise the production of the manuscript in place and time, thus helping us to locate this particular tradition within Hebrew manuscript production. The schematic collation of quires, given in Table 1, needs some clarification:

– The original composition was made up of at least thirty-one quires, all of them sections of parchment. Some folios have been lost, resulting in the lack of parts of text: the initial eleven folios in quire 1, one folio in quires 2, 14, 18, 26 and 29, two folios in quire 13, and at least one complete quire at the end.

⁶ This vision of medieval texts with no relation to their materiality is both the result of traditional positivist approaches and of a post-structuralist conceptualisation of the text as a living entity outside its context of production. For a different view, see Dagenais 1994, esp. "Introduction: The Larger Gloss". On the importance of the materiality of manuscripts in editing medieval texts, see Sirat 1992.



Fig. 2. MS Paris, BNF héb. 684, ff. 85v-86r, © Bibliothèque nationale de France.

tion and colours of the titles are the same in both manuscripts. The Paris manuscript has a colophon, which states that it was copied in Mallorca in 1352 by Shelomo ben Yitzhak ben Moshe ibn Farhi. It can therefore be surmised that the Madrid manuscript was copied around that same date in the cultural area to which Mallorca belonged at that time, which is the Crown of Aragon, including Catalonia and Provence. This assumption seems to be reasonable not only for the scribal features of the Madrid manuscript,

- The end of the manuscript is missing, and there is thus no scribe's colophon. Nevertheless, the translators' colophons have been copied at the end of some of the works: in fol. 190v (Euclid's *Elements*), fol. 232v (Theodosius of Bithynia's *Spherics*), 309v (Euclid's *Data*), 327r (Euclid's *Optics*), and 340r (Autolycus of Pytane's *On the Moving Sphere*).⁷
- A quire signature is visible at the beginning of each quire, except in those quires lacking the first folio/s: quires 1, 2 and 26.
- The missing folio in quire 26 contained the beginning of Euclid's *Data*. As this was the first folio of this quire and therefore no quire signature is present, I wrongly interpreted in a previous study that a new, independent codicological unit written by the same scribe might start at this point.⁸ Nevertheless, a detailed codicological analysis has proved that the whole manuscript is one monogenetic unit.

The unknown scribe wrote the manuscript with a uniform Sephardic semi-cursive script.⁹ Apart from the diagrams and figures illustrating the text, the only remarkable characteristic of the script lies in the titles: these are copied in Sephardic square script using red and blue inks, in a style strongly reminiscent of other Sephardic manuscripts from the fourteenth century. As an example, the resemblance between this miscellany and MS Paris, Bibliothèque nationale de France héb. 684 is noteworthy (see Figures 1 and 2). The type of script is almost identical, and the execu-

tion and colours of the titles are the same in both manuscripts. The Paris manuscript has a colophon, which states that it was copied in Mallorca in 1352 by Shelomo ben Yitzhak ben Moshe ibn Farhi. It can therefore be surmised that the Madrid manuscript was copied around that same date in the cultural area to which Mallorca belonged at that time, which is the Crown of Aragon, including Catalonia and Provence. This assumption seems to be reasonable not only for the scribal features of the Madrid manuscript, but also for the type of miscellany which the codex is transmitting. As is well-known, the Ibn Tibbon family, author of most of the translations into Hebrew which the manuscript comprises, was active in Provence during the thirteenth century, and among the Hebrew manuscript production of fourteenth-century Provence and Aragon – including Catalonia and the Balearic Islands – there are several codices containing not only the Euclidean and Greek mathematical tradition in Hebrew, but also other scientific and philosophical works, particularly Maimonides and Averroes' *Epitomes* on Aristotle.

As far as the works in this miscellany are concerned, I have tried to trace the particular tradition of copying the Euclidean *corpus* and the other works present in this manuscript. In order to look for codices transmitting a similar tradition, three basic criteria have been followed in the selection of manuscripts. First, the set of works should be included in the same codicological unit; second, there should be at least three of the works which appear in the Madrid miscellany; and third, at least two different authors from the Madrid codex are to be present.¹⁰ As shown in Table 2, there are just five manuscripts subject to these criteria, besides our manuscript in Madrid: MS Oxford, Bodleian Library, Hunt. 16; MS Florence, Biblioteca Nazionale Centrale, Magl. III 137; MS Vatican, Biblioteca Apostolica Vaticana, ebr. 400; MS Jerusalem, National Library of Israel, Heb. 8°3915; and MS Paris,

⁷ For the Hebrew text of the colophons, see Del Barco 2003–2006, vol. 2, 191–93 (no. 113).

⁸ See Alfonso et al. 2012:332–33 (no. 38).

⁹ On the terminology of Hebrew scripts, see esp. Beit-Arie 1993.

¹⁰ These criteria have been checked by using the online catalogue of the Institute of Microfilmed Hebrew Manuscripts in the National Library of Israel (<http://aleph.nli.org.il>). Table 2 and the results of its analysis are also based on the information provided by the same online catalogue.

Works	Oxford	Florence	Vatican	Jerusalem	Paris	New York	Madrid
<i>Elements</i>	1	1					1
<i>Spherics</i>	2					1	2
<i>Spherica</i>	3					4	3
<i>Data</i>		3		1		2	4
<i>Optics</i>			1	2			5
<i>On Mirrors</i>			2		3		6
<i>On Two Lines</i>		2			4		7
<i>Moving Sphere</i>		4	3	3	6	3	8
<i>Foundations</i>			6		5		9
Date	15 th cent.	15 th cent.	14 th -15 th cent.	1473	16 th cent.	1346	14 th cent.
Script	Sephardic	Byzantine	Sephardic	Sephardic and Italian	Italian	Sephardic	Sephardic
Place of production	Sepharad	Italy?	Sepharad	Mantova	Italy	Sepharad	Sepharad
More Works in the MS	No	No	Two ¹¹	No	Five ¹²	No	No

Table 2. Hebrew manuscripts of Euclidian works.

Bibliothèque nationale de France, héb. 1021. In addition, there is one manuscript, MS New York, Jewish Theological Seminary of America, 2620, which only contains at present Menelaus of Alexandria's *Spherica*, but according to its colophon was copied together with Theodosius of Bithynia's *Spherics*, Euclid's *Data* and Autolycus of Pitane's *On the Moving Sphere*. Table 2 requires some explanations:

- All these manuscripts are either monogenetic or homogenetic miscellanies and not composite manuscripts. The only exception is the Paris manuscript, which contains two different codicological units. However, in that manuscript all the works indicated belong to the same codicological unit.
- The Oxford and Paris manuscripts seem to reproduce exactly part of the tradition transmitted by the Madrid manuscript: Oxford includes the first three works, and Paris the last four, with an almost identical order to that in the Madrid manuscript.
- Autolycus of Pitane's *On the Moving Sphere* is present in all the manuscripts, except that in Oxford. These are all the extant manuscripts containing this work, apart from another manuscript in Oxford, Bodleian Library, Opp. Add. Qu. 175, a composite miscellany which has not been taken into account because the present place of this work in the manuscript does not reflect the original conception. We should therefore attribute the Hebrew transmission of *On the Moving Sphere* solely to the Sephardic tradition.
- This *corpus* of manuscripts was produced either in the Iberian Peninsula or in Italy. The earlier codices (Vatican, New York and Madrid) are Sephardic, while

¹¹ שאלות בהנדסה (*Questions on Geometry*) and Abraham bar Hiyya's חבור המשיחה והתשובות (*Treatise on Measurement and Calculation*).

¹² This manuscript is a composite one; the information regarding date, script and place of production refers only to the codicological unit containing the works in the table. The other five works in this manuscript are a part of a different codicological unit.

those produced in Italy are fifteenth- or sixteenth-century manuscripts. It is clear that the tradition of copying this set of works (or a part of it) originated in the Sephardic area, probably in Provence and Catalonia, and later extended to Italy.

As a matter of fact, the Madrid manuscript itself followed this route from the Iberian Peninsula to Italy. Having been produced in the Crown of Aragon (Mallorca?), the Madrid manuscript has some traces of having belonged to at least one Italian reader in the sixteenth or seventeenth century. This reader was especially interested in Euclid's *Elements*, as is proved by his many marginal annotations throughout the folios with the text of this work. These annotations, written in an Italian cursive script, are all of an explanatory nature, explaining either some terms in the text translated by Ibn Tibbon, or other marginal annotations written by the copyist of the manuscript in the fourteenth century.¹³ Interestingly, the Italian reader did not only attempt to understand the Hebrew terminology used by Ibn Tibbon by explaining the text in marginal annotations. He also copied a list of some of the geometrical terms used throughout the work in the only, original flyleaf remaining at the beginning of the codex. The list, as shown in Table 3, is a bilingual lexicon in which the Hebrew term is given first, followed by the Italian term in Hebrew letters.

As examined in Table 2, the data suggest that the tradition of producing and copying a miscellany containing Euclidean works and other related geometrical treatises started in the Sephardic area, probably in Provence, and extended during the fifteenth and sixteenth centuries to Italy, where some other manuscripts belonging to the same tradition as the one reflected in the Madrid manuscript were copied. In-

¹³ These two different hands in the marginal annotations are easily discernible: one is Sephardic cursive script, and the other is Italian cursive. Both are very homogeneous and probably belong to two different persons only.

deed, a large number of codices left the Iberian Peninsula with their owners for a safer place in Italy, following massive migrations of Sephardic Jews from the Iberian Peninsula to Italy, especially after 1391 and 1492. This route was not only an intangible path for abstract texts, but an actual flow of particular manuscripts which were pivotal agents in the transmission and reception of different texts and sets of works, as proven by the Madrid manuscript itself.¹⁴ With this case study, I have attempted to approach the tradition of producing and copying a particular set of works within a miscellany. In such an attempt, the concept of miscellany, either monogenetic or homogenetic, is a keystone to determining and studying different traditions of medieval miscellanies and sets of works. Many other questions still remain unanswered, particularly those concerning the origin of the tradition. Besides the clear thematic relation among the different works in this kind of miscellany, were the Ibn Tibbons responsible for the choice of the works? Did it originate with them or did they take up a tradition that already existed in Arabic manuscript culture? I hope to receive the help of those working with Arabic manuscripts to answer this question.

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¹⁴ On the impact of Kabbalistic literature in sixteenth-century Italy as reflected in the production of two particular miscellaneous manuscripts, see Del Barco 2012.

Translation	Italian term in Hebrew letters	Hebrew term
Point	פונטו	נקודה
Line	ליניאה	קו
Surface	סופירפיציאו	שטח
Square	קוודראטו	מרובע
Center	צינטרו	מרכז
Circle	צירקולו	עגול
Diameter	דיאמטרו	קוטר
Angle	אנגולו	זוית
Triangle	טריאנגולו	משולש
?	באסה	--תר
Sides	לאטי	צלעות
Acute angle	אנגולו אקוטו	זוית חד
Obtuse angle	אנגולו אוטוסו	זוית נרוח
Right angle	אנגולו ריטו	זוית נצב
Equidistant	איקווידישטאנטי	?
? angle	אנגולו קואילטירנה	זוית ----רת
Opposite angles	אנגולי אופוסיטי	זויות מתנגדות
Exterior angles	אנגולו סטרינסיקו	זוית ח[']צונה
Interior angles	אנגולו אינטרינסיקו	זוית פנימית
Semicircle	סימי צירקולו	חצי עגול
Major arc	פרוציא-- מיורי	יותר מחצי עגול
Minor arc	פרוציא-- מינורי	פחות מחצי עגול
Compound	קונפוסטו	מורכב
?	מוטואי	---יקות
Antecedent and consequent	אנטסידיינטי אקונסיגווינטי	קודם ונמשך
Adjacent	קומוניקאנטי	משותפים
Non-adjacent	אינקומוניקאנטי	בלתי משותפים
? line	ליניאה ראציאונאל אי-----	קו מרכז--
Adjacent Line?	ליניאה קומוניקאנטי ---פרוציינטי	קו משותף בכח

Table 3. MS Madrid, BNE 5474: lexical notes on the flyleaf by an Italian reader.

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