

THE BOOK OF MICHAEL OF RHODES
A FIFTEENTH-CENTURY MARITIME MANUSCRIPT

EDITED BY PAMELA O. LONG, DAVID MCGEE, AND ALAN M. STAHL

Volume 2: Transcription and Translation
edited by Alan M. Stahl

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translation by Alan M. Stahl

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1. Michael, of Rhodes, d. 1445. 2. Naval art and science—Early works to 1800. 3. Navigation—Early works to 1800. 4. Mathematics—Early works to 1800. 5. Astrology—Early works to 1800. 6. Calendars—Italy—Early works to 1800. 7. Shipbuilding—Early works to 1800. I. Long, Pamela O. II. McGee, David, 1955– III. Stahl, Alan M., 1947– IV. Rossi, Franco. V. Title.

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INTRODUCTION TO THE MANUSCRIPT

FRANCO ROSSI

This essay provides a detailed description of the manuscript of Michael of Rhodes that is the subject of the present edition. It includes a description of the subject contents, a discussion of the manuscript's position vis-à-vis related manuscripts, and an analysis of the manuscript's material properties, including the papers and inks used. It contains as well an analysis of the hands and morphology of scripts, a discussion of the dating of the manuscript, and an account of its composition and fasciculation.

A second essay by the present author in volume 3 of this edition contains an assessment of Michael of Rhodes as a writer and also describes the illustrations of the manuscript in detail. Finally, it discusses the discovery, made during the course of this research, that Michael of Rhodes wrote a second manuscript book, currently in the Biblioteca Nazionale Marciana and formerly attributed to Pietro di Versi.¹

CONTENTS OF THE MANUSCRIPT

The manuscript is miscellaneous and composite by nature even with the table of contents provided by Michael of Rhodes. However, it can be usefully subdivided into sections corresponding to the subjects treated. Additional subdivisions can then be identified within these sections without affecting the continuity of the text as a whole. A suitably detailed description follows:

• Summary	fols. TOC 1b–TOC 4a
• Arithmetic and algebra ²	fols. 1b–90-2a, 194a–203a
Problems related to the commerce of pepper	fols. 1b–4a, 64b–65a, 68a–69a
Calculation with fractions	fols. 4b–11b
The rule of three	fols. 9a–10b
Rules of algebra	fols. 12a–19b
Problems of alligation	fols. 19b–20b, 197b–198b

1. This manuscript, Venice, Biblioteca Nazionale Marciana, Ms. It. IV, 170 (= 5379), is available in a recent edition. See Pietro di Versi, *Raxion de' marinieri: Taccuino nautico del XV secolo*, ed. Annalisa Conterio (Venice: Comitato per la Pubblicazione delle Fonti relative alla Storia di Venezia, 1991).

2. For the subdivisions in this section I am very much indebted to the valuable contribution by Raffaella Franci, "Mathematics in the Manuscript of Michael of Rhodes," vol. 3, pp. 115–146.

Problems of barter	fols. 20b–27b, 63b–64a, 71b–72a
Problems of partnership	fols. 28a–30b, 43a–44a, 49a, 194a–196b
Problems of freight	fols. 30b–32b
Playing dice	fols. 33a–35b, 90-1b
Buying jewels in a partnership	fols. 35b–37a, 65b–67b
Recreational problems	fols. 37b–39b, 44b–45b, 50a–54a, 57b–61a, 90-1b–91-1a, 199b–201b
Finding numbers in a given proportion; finding a number such that . . . ; dividing a number into two parts	fols. 40a–42b, 46a–46b, 54b–56a, 61b–63b
Problems of the <i>marteloio</i>	fols. 47a–48b
Squared numbers	fols. 56b–57a
Various commercial problems	fols. 69b–71a
Various algebraic problems	fols. 72b, 74b–76b, 89b–90-1b, 91-1b–90-2a, 199a, 203a
Problems involving travel	fols. 73a–74a
Calculating square roots	fols. 77a–79b
Calculating cubed roots	fols. 79b–82a
Calculating with radicals	fols. 82b–90-1a
Problems of geometry	fols. 196b–197a
• Michael’s professional <i>curriculum vitae</i>	fols. 90-2b–93b, 204a
• Astrology, astronomy, and chronological computations	fols. 95a–111b, 129b–135a, 185a–190a
Solar calendar for the twelve months of the year	fols. 95a–102b
Instructions for drawing blood in all the months of the year	fols. 102b–103a
Description of the signs of the zodiac	fols. 103a–110a
Properties of the signs of the zodiac dominating hours of the day and days of the week	fol. 110a
List of stars and information about the day they rise	fols. 110a–111a
Odious and perilous days	fols. 111a–111b
The four times to avoid	fol. 111b
Table of the Christian and Jewish Easter from 1401 to 1500	fol. 129b
Table of the signs of the zodiac	fols. 130a–130b
Rules of the tables of Solomon for the Jewish moon	fols. 131a–135a
Instructions on how to know when the moon turns, by means of mariners’ rules	fols. 185a–186b

Position of the moon in relation to the sun	fol. 187a
Calculation of the epact	fols. 187b–188a
Instructions on knowing when the month begins and numerical names of the months for hand calculations	fols. 188a–189b
Calculating on fingers to find the Jewish Passover and from this the Christian Passover (Easter)	fols. 189b–190a
• Orders given by the captain general of the sea, Andrea Mocenigo, to the Venetian galleys in 1428	fols. 111b–118b
• Instructions for navigation	fols. 118b–127a, 190b–193b
To enter the port of Venice	fols. 118b–119b
Portolan made by Zuan Pires, pilot of the Flanders sea	fols. 120a–121a
Crossings of Spain	fols. 121a–121b
Crossings from Ouessant to Calais in the Flanders channel	fols. 121b–122b
Waters and tides of Flanders	fols. 122b–123b
Tides and waters of Ireland and Wales and of the island of England	fols. 123b–125a
Names of the winds in Spanish	fol. 125a
To know how to enter into Sandwich	fol. 125b
To enter the port of Sluys	fol. 125b
To enter Santander	fols. 125b–126a
Soundings of the channels of Flanders	fols. 126a–127a
Portolan for the coast of Apulia	fols. 190b–192b
Portolan for the Gulf of Salonika	fols. 192b–193b
• Instructions for sail making	fols. 127a–129a
• Shipbuilding	fols. 135b–182b
Galley of the Flanders design	fols. 135b–147b, 202b
Galley of the Romania design	fols. 148a–156a
Light galley	fols. 156b–164a
Lateen-sailed ship	fols. 164b–168a
Square-sailed ship	fols. 168b–180a
Instructions on making masts and yards	fols. 180a–181b
How to make rigging	fols. 181b–182a
Ship under sail (illustration)	fol. 182b
• Pseudo-heraldic coat-of-arms (illustration)	fol. 147b

- Prayers, invocations, ritual and magical formulas fols. 183a–185a, 193b
- St. Christopher (illustration) fol. 202a
- Portolans added later by different hands fols. 205a–210b
- Portolan from Venice to Constantinople along the coast as the galleys go fols. 205a–206a
- Portolan for the crossings of the Gulf of Venice fols. 206b–207a
- Portolan from Cape Maléas to the island of Famagusta fols. 207a–208a
- Portolan from Venice to Tana, on the route of the galleys by the coast fols. 208a–210b
- Last wishes of Giovanni da Drivasto, *paron zurado* of Marino Dandolo, August 29, 1473 fols. 238a–238b

COMPARISON WITH OTHER MANUSCRIPTS

Not very many late medieval Venetian manuscripts of “nautical” interest have come down to us.³ In fact, there are fewer than ten. Several of these manuscripts seem to be unique and unrelated to the others; others instead reveal relationships or affinities that are altogether astonishing.

Based on a rigorous analysis of the intrinsic and extrinsic elements of these manuscripts, we can identify at least six generational lines that are sufficiently independent from each other, each of which, as is customary, has been assigned a letter of the alphabet:

- A) *Zibaldone da Canal*. Mercantile manuscript of the fourteenth century.⁴
- B) *Michael of Rhodes*.
 - B¹) *Raxion de’ marinieri*.⁵
 - B²) *Libro di marineria*.⁶
 - B^{2a}) *Arte de far vasselli*.⁷
 - B^{2b}) *Trattato de re navali cavato dall’esemplar di G. B. R.*⁸

3. To be sure, there may be others still hidden in private collections, or lost and unrecognized in libraries, perhaps even public ones.

4. New Haven, Yale University, Beinecke Rare Book and Manuscript Library, Ms. 327. This text was edited over forty years ago in an edition containing contributions by Frederic C. Lane, Thomas E. Marston, and Oysten Ore that are fundamental for the period under study. See Alfredo Stussi, ed., *Zibaldone da Canal: Manoscritto mercantile del sec. XIV* (Venice: Comitato per la Pubblicazione delle Fonti relative alla Storia di Venezia, 1967). See also John E. Dotson, trans., *Merchant Culture in Fourteenth Century Venice: The Zibaldone da Canal* (Binghamton, N.Y.: Medieval and Renaissance Texts and Studies, 1994).

5. Venice, Biblioteca Nazionale Marciana, Ms. It. IV, 170 (= 5379); published as Pietro di Versi, *Raxion de’ marinieri*.

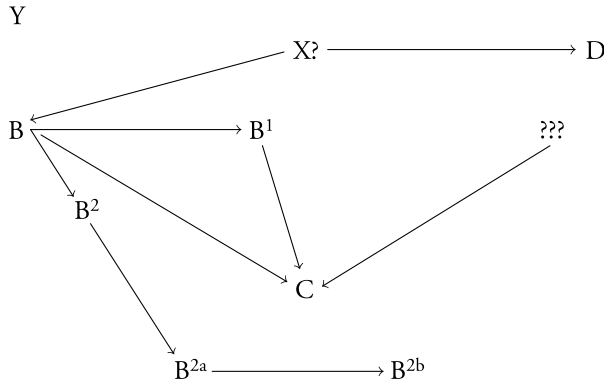
6. Also *Fabrica di galere*, Florence, Biblioteca Nazionale Centrale, Ms. Magliabechiano, cl. XIX, cod. 7.

7. Vienna, Österreichische Nationalbibliothek, Collezione Marco Foscarini, cod. CCCXVIII, n. 6391. In the manuscript catalog of the Foscarini collection is the following description: “È del sec. XVI, di 116 carte in 8° ben conservate” (“It is from the sixteenth century, of 116 well-preserved leaves in octavo”). See Tommaso Gar, “I codici storici della collezione Foscarini, che si conservano nell’Imperiale Biblioteca di Vienna,” *Archivio Storico Italiano*, ser. 1, 5 (1843): 281–505, at 426.

8. Gian Battista Ramusio, also known as *Trattato dell’arte di fabbricar navi*, Milan, Biblioteca Ambrosiana, Ms. H. 149 inf. I am grateful to Mauro Bondioli for bringing this reference to my attention.

- C) *Algune raxion per marineri li quali serano utile a saver.*⁹
 D) Manuscript of Giorgio “Trombetta” da Modone.¹⁰
 E) *Ragioni antique spettanti all’arte del mare et fabriche de vasselli.*¹¹
 Y) *Libro da navegar.*¹²

Bearing in mind that the *Zibaldone da Canal* and the *Ragioni antique* have their own story to tell with respect to Michael, the relationship between his manuscript and the remaining texts could be visualized in the following manner:



The comparative textual analysis of the individual manuscripts¹³ can assist us in illuminating what was transferred by Michael of Rhodes from B to B¹, as well as the debts owed by C with respect to B and B¹, and the debts of B² with regard to B. Similarly it allows the emergence of the “genetic”

9. Padua, Biblioteca del Museo Civico, Ms. C.M. 17. Also known as *Arte veneziana del navigare*, or perhaps better as *Algune raxion per marineri li quali serano utelle a saver*, as suggested by Ornella Pittarello, who is studying it in view of an upcoming new edition. I would like to thank Pittarello, who very kindly made available to me a copy of her thesis in which she transcribes and introduces the manuscript. See Ornella Pittarello, “Testimonianza di una civiltà mercantile: Il ‘Libro veneziano del navigare’, ovvero ‘Algune raxion per marineri li quali serano utelle a saver’ (Padova, Biblioteca Civica, MS C.M. 17),” Laurea thesis, Venice, Università Ca’ Foscari, 2002–2003. Now “outdated” but still useful in several ways is Mirella Blason, “Il C.M. 17 della Biblioteca Civica di Padova e la rotta veneziana delle galee di Fiandra (1428),” *Bollettino del Museo Civico di Padova* 73 (1984): 163–178.

10. London, British Library, Cotton Ms. Titus A. XXVI.

11. Greenwich, National Maritime Museum, Ms. NVT 19, which is available in a published edition: Giorgetta Bonfiglio Dosio, ed., *Ragioni antique spettanti all’arte del mare et fabriche de vasselli: Manoscritto nautico del sec. XV* (Venice: Comitato per la Pubblicazione delle Fonti relative alla Storia di Venezia, 1987).

12. This is a recently identified manuscript of “nautical” character from Venice, now held in Bergamo, Civica Biblioteca Angelo Mai, MA 334. This manuscript has not yet been adequately studied and, in order to avoid superficial conclusions, will not be discussed here in relation to the others just mentioned. It is my intention to study the manuscript in the near future. I thank Raffaella Franci for kindly drawing my attention to it.

13. For an analytical comparison of the texts of the Marciana codex once attributed to Pietro di Versi (B¹) and the C.M. 17 of Padua (C), see Annalisa Conterio, preface to *Raxion de’ marineri*, xxxviii–xli, with the proviso that the conclusions she reaches are not always shared, and occasionally should be rejected, in particular because Conterio did not have the opportunity to consult the manuscript of Michael of Rhodes.

link between B and B^{2b} through the intermediary variants of B² and B^{2a}. Once this analysis is extended to A, D, E, and Y, we can recognize possible affinities or hierarchical relationships within the entire group.

In any case, the comparison highlights the complex relationships among the manuscripts being studied here, through which we can perceive the intensive circulation of the knowledge they contained. This circulation of knowledge developed through a dense weave of borrowings and contaminations that are not always easily distinguishable or quantifiable, but are nevertheless deserving of study.

The manuscripts of Michael of Rhodes and of Giorgio “Trombetta” da Modone may have derived their respective shipbuilding sections—which are complementary and not repetitive—from a common source (X) that at this moment might perhaps be intuited though not definitively identified, one that ties these texts together with a strong bond of affinity.

Having already remarked that the *Raxion de' marinieri* derives directly from Michael's first effort, it remains for us to clarify the relationship between both manuscripts coming from the hand of the Rhodian (respectively B and B¹) and the work of the Paduan manuscript C.M. 17 (C). It is incontestable that C, composed between 1445 and 1446, was transcribed directly from B¹, to the point that in many parts it appears to be an actual copy (albeit not always respectful of the systematic order of the original). Nevertheless several parts of it—such as the “Portolan fatto per Zuan Pires”—are better linked to B rather than to B¹. Thus we can suppose that the anonymous compiler of C had had at least the opportunity to gain access also to Michael's major work. Other parts, instead, reveal no particular connection (not even indirect ones) with that manuscript.¹⁴

On the other hand, B², B^{2a}, and B^{2b} are partial copies of Michael's manuscript. To put it more precisely, in addition to other texts on shipbuilding that cannot be directly linked to him,¹⁵ these manuscripts contain materials he prepared on naval architecture including illustrations, drawings, diagrams, and renderings, as can be easily grasped in the summary below. Apart from the sail-making instructions (which actually appear here within a more systematically logical context), these items are also presented in exactly the same order that Michael followed. The only discrepancies seem to be lexical in kind: in transcribing Michael's texts the copyist of B² felt it opportune to partly update the vocabulary, pruning it of any overly archaic-sounding elements and bringing it closer to the contemporary usage of the first half of the sixteenth century. In so doing, the copyist in some ways rewrote Michael's texts, modernizing only what was necessary to make them easier to read.

The manuscript of B² is almost certainly written in the hand of Giovanni Battista Ramusio, a singular figure of great erudition, an enthusiast of voyages and geographical explorations as well as of anything that could be remotely connected to navigation, and the author of the collection *Delle navigationi et viaggi* (“Of navigations and voyages”) published in three volumes in Venice between

14. This is certainly not the venue in which to identify all the sources of C.M. 17, not all of which can be attributed to B and B¹. In any case, see Conterio, preface to *Raxion*, and especially Pittarello, “Testimonianza di una civiltà mercantile.”

15. For the identification of these sources, see Mauro Bondioli, “Early Shipbuilding Records and the Book of Michael of Rhodes,” vol. 3, pp. 243–279.

1550 and 1559.¹⁶ For one, B^{2b} explicitly provides the name of Ramusio, the manuscript's owner, as an integral part of the title itself: *Trattato de re navali cavato dall'esemplar di G.B.R.* (Treatise of things nautical derived from the exemplar of G.B.R.). In addition, a comparison with Ramusio's will, written in his hand,¹⁷ seems to fully confirm the hypothesized attribution. Thus B² would have been written by Giovanni Battista Ramusio, and, given the "freshness" of the writing, very likely went back to the 1520s to 1530s. B^{2a} was derived at a later stage from B² and not directly from B. Some time later, B^{2b} was derived from B^{2a}, as is suggested by certain minor omissions in the iconographic commentary that differentiates B^{2a} and B^{2b} with respect to B². In effect, the two copies B^{2a} and B^{2b} are absolutely identical in terms of their written texts, illustrations, drawings, renderings, diagrams, and even in the number of pages left deliberately blank.¹⁸ Furthermore, based on the results of paleographic analysis we can hypothesize that B^{2a} was copied no later than the middle of the sixteenth century, and that B^{2b} was written at the latest during the decade between 1570 and 1580.

From all of this it seems manifestly evident that Giovanni Battista Ramusio, at least for a certain period of time, had the manuscript of Michael of Rhodes at his disposal. From whom he received it, and under what terms, is information that eludes even the most nuanced hypothesis.

Several subjects of the Michael of Rhodes manuscript—the instructions for knowing when the month begins and numerical names of the months for calculation by fingers; the instructions for sail making; and the *raxion del martoloio*, to name a few—can also be found in D. However, the level of overlap among these shared topics is really quite minimal, as if the substantial shared interest in particular topics had been derived from sources that were entirely distinct and unrelated to one another. And yet, at least with regard to shipbuilding, both Michael of Rhodes and Giorgio "Trombetta" da Modone seem to have drawn from the same source, as amply demonstrated by linguistic analysis of the two texts.

Manuscript E, on the other hand, is a different case. In fact, several sections of this text correspond perfectly with the texts that Michael presents, so much so that we might hypothesize that the anonymous compiler of *Ragioni antique* copied directly from Michael's manuscript. Or else we might suppose that they transcribed their respective texts, unknowingly, from the same common source, although for obvious reasons this seems less likely. This is the case, for example, with the solar calendar for twelve months of the year, or the properties of the signs of the zodiac that govern the hours of the day and the days of the week. Elsewhere the correspondences are much more nuanced, being limited to the simple presence of the same topics; thus it seems very difficult to support the idea that E was derived from B. Examples include instructions for calculating the epact (by calculating on one's fingers) useful for finding the dates of the Jewish Passover, which were

16. His family originally came from Rimini; he was born in Treviso in 1485 and died in Padua in 1557. At Venice he was secretary of the Senate and the Council of Ten, and an envoy of the Republic to the court of Louis XII. See Giovanni Battista Ramusio, *Navigazioni e viaggi*, ed. Marica Milanese, 6 vols. (Turin: Einaudi, 1978–1988); in particular see vol. 1, xi–xxxvi. Still relevant is Antonio Del Piero, *Della vita e degli studi di Gio. Battista Ramusio* (Venice: Visentini, 1902). Additional biographical details can be found in Massimo Donattini, "Giovanni Battista Ramusio e le sue 'Navigazioni': Appunti per una biografia," *Critica Storica*, n.s., 17 (1980): 55–100.

17. Venice, Archivio di Stato, Notai di Venezia, Testamenti, B. 211, n. 420 (Angelo Canal).

18. I do not believe we need to give too much weight to the fact that B^{2a}, unlike B^{2b}, lacks an annotation about the copy's source.

undoubtedly derived from a source other than B. Furthermore, every portolan in E can be linked to sources other than those used by B.

Subject	B	B ¹	C	B ²	B ^{2a}	B ^{2b}	D	E
Arithmetic and algebra	■							
Professional vita	■							
Solar calendar for the twelve months of the year	■ ¹⁹	■	■					■ ²⁰
“Amaistramento a tuor sangue per tuti li mexi del’ano” (instructions for drawing blood in all the months of the year)	■ ²¹	■						
Description of the signs of the zodiac	■							■ ²²
Properties of the signs of the zodiac dominating hours of the day and days of the week	■ ²³	■	■					■ ²⁴
List of the stars and information about the day they rise	■	■	■					■ ²⁵
“Dì uziagi e zorny pericholoxi” (odious and perilous days)	■ ²⁶	■	■					■ ²⁷
“4 tenpore che se die vardar” (the four times to avoid)	■	■	■					■ ²⁸
Table of the Christian and Jewish Passover from 1401 to 1500	■	■ ²⁹	■ ³⁰					■ ³¹
Table of the signs of the zodiac	■	■	■					■ ³²
“Raxion dela taula de Salamon ala luna zudescha” (method of the table of Solomon for the Jewish moon)	■	■ ³³	■ ³⁴					
“Amaistramento di saver quando fa la luna a raxion uxa i marineri” (instructions on knowing when the moon is new, by means of mariners’ usage)	■	■ ³⁵	■ ³⁶					

19. Also partially in A. Days of the month are represented by symbols.

20. Text largely coincides with B, with slight lexical variations.

21. Also partially in A, with slight lexical variations. In A only the days from the 26th to the 30th.

22. Text largely coincides with B, albeit with slight lexical variations. Lacks the graphical representations of the signs of the zodiac.

23. Also partially in A.

24. Texts largely coincide with B, with slight lexical variations.

25. List repeated twice within a few folios, the first in the same sequence with respect to other chapters as in B. Texts largely coincide with B, with slight lexical variations.

26. Partially also in A. The days of the month are represented by symbols.

27. List repeated twice within only a few folios, the first in the same sequence with respect to other chapters as in B. Texts largely coincide with B, with slight lexical variations and apparent omissions due to distraction.

28. Text largely coincides with B, with slight lexical variations.

29. From 1444 to 1533.

30. From 1444 to 1543.

31. Table for the years 1411–1498. Data for the epact and the Jewish Passover are absent.

32. Text largely coincides with B, with slight lexical variations.

33. Coincides only partially with B. The table covers from 1444 to 1455; the table in B covers the years from 1435 to 1530.

34. Coincides only partially with B; the table covers from 1444 to 1455.

35. Coincides only partially with B. Exemplified for the years 1444–1445; in B exemplified for the years 1435–1436.

36. Coincides only partially with B; exemplified for the years 1445–1446.

Subject	B	B ¹	C	B ²	B ^{2a}	B ^{2b}	D	E
Position of the moon in relation to the sun	■	■ ³⁷	■ ³⁸					■ ³⁹
Calculation of the epact	■	■ ⁴⁰	■ ⁴¹					■ ⁴²
“Amaistramento a saver quando intra el mese” (instructions for knowing when the month begins) and numerical names of the months for calculations on the hand	■	■ ⁴³	■ ⁴⁴				■ ⁴⁵	■ ⁴⁶
Calculation on fingers to determine the Jewish Pass- over and from this the Christian Passover (Easter)	■	■ ⁴⁷	■ ⁴⁸					■ ⁴⁹
Orders given by the <i>chapetagno generale da mar</i> (captain general of the sea), Andrea Mocenigo, to the Venetian galleys in 1428	■	■	■					
Entry to the port of Venice	■	■	■					■ ⁵⁰
“Portolan fatto per Zuan Pires, pedotta del mar di Fiandria” (portolan made by Zuan Pires, pilot of the Flanders sea)	■	■	■ ⁵¹					■ ⁵²
“Traverse de Spagna” (crossings of Spain)	■	■	■					■ ⁵³
“Traverse da Ossente a Chales in chanal di Fiandres” (crossings from Ouessant to Calais in the Flanders channel)	■	■	■					■ ⁵⁴
“Aque e marie de Fiandria” (waters and tides of Flanders)	■	■	■					■ ⁵⁵
“Marie e aque d’Erlanda e de Gaules e del’isola de Ingletera” (tides and waters of Ireland and Wales and of the island of England)	■	■	■					■ ⁵⁶
Names of the winds in Spanish	■	■						
“Per saver entrar in Sentuzi” (to know how to enter into Sandwich)	■							

37. Text differs from B.

38. Text differs from B. Almost identical to B¹. In B¹ exemplified for the year 1444, in C for the year 1445.

39. Text is essentially the same with regard to its methodological formulation, with slight lexical variations.

40. Text differs from B. Exemplified for the years 1444–1445.

41. Text differs from B. Closer to B¹. Exemplified for the years 1445–1447.

42. Text differs from B, although the same with regard to its methodological formulation.

43. Text differs from B. Exemplified for the year 1444; in B exemplified for the year 1436.

44. Text differs from B. Closer to B¹. Exemplified for the year 1444.

45. The exemplification is extremely reduced with respect to B.

46. Text is largely the same as B, though with significant lexical variations.

47. Coincides only partly with B. Exemplified for the year 1444; in B exemplified for the year 1436.

48. Coincides only partly with B. Closer to B¹. Exemplified for the year 1444.

49. The subject is the same, but the texts do not present significant correspondences other than for the numbers of the joints of the right hand.

50. Text largely the same as B, though with significant lexical variations.

51. Closer to B.

52. Text differs from B.

53. Text differs from B.

54. Text differs from B.

55. Text differs from B.

56. Text differs from B.

Subject	B	B ¹	C	B ²	B ^{2a}	B ^{2b}	D	E
“Per intrar al porto del’Eschioza” (to enter the port of Sluys)	■							
“Per voler intrar in Sancto Ander” (to enter Santander)	■							
“Sonde d’i chanalli de Fiandria” (soundings of the channels of Flanders)	■							
“Portolan per la riviera de Poya” (portolan for the coast of Apulia)	■	■	■					■57
“Portolan per lo golfo de Salonychi” (portolan for the Gulf of Salonika)	■	■	■					■58
Instructions for sail making	■	■	■59	■60	■61	■62	■63	■64
“Raxion del martoloyo” (problems of the <i>marteloio</i>)	■	■65	■66				■67	■68
Galley of Flanders	■			■69	■70	■71		■72
Galley of Romania	■			■73	■74	■75		■76
Light galley	■			■77	■78	■79	■80	■81
Lateen-sailed ship	■			■82	■83	■84		

57. Text largely the same as B, but with slight lexical variations.

58. Text largely the same as B, but with slight lexical variations.

59. In inverse order.

60. Inserted within the chapter on the galley of Romania.

61. Coincides with B².

62. Coincides with B².

63. Text differs from B. Measurements do not match. Inverse order.

64. Text differs from B. Measurements do not match. Inverse order.

65. Text differs from B.

66. Text differs from B. Closer to B¹.

67. Text differs from B, but similar with respect to structural elements.

68. Text differs from B, but similar with respect to structural elements.

69. Coincides with B, but with slight lexical variations. Fol. 8r of B² which begins “Questa galia del sexto de Fiandra” (“This galley of the Flanders design”) corresponds, with slight lexical variations, to fol. 202b of B that dates from the second phase of the manuscript’s composition, i.e., 1444–1445. Because of this, the *incipit* of fol. 8v of B², “La galia antedita,” necessarily differs from the *incipit* of fol. 142b of B, “Quista galia in chontro del sesto de Fiandria.” In fact the preceding folio of B² contains a written text, while the folio of B contains the drawing of the hull of the galley of Flanders. Lacunae as in B.

70. Coincides with B².

71. Coincides with B².

72. Text differs from B, but can be partially superimposed in occasional points.

73. Coincides with B, but with slight lexical variations. Lacunae as in B.

74. Coincides with B².

75. Coincides with B².

76. Text differs from B, but can be partially superimposed in occasional points.

77. Coincides with B, but with slight lexical variations. Initial part mutilated as in B (fols. 156b and 157a torn out). Lacunae as in B.

78. Coincides with B².

79. Coincides with B².

80. Text differs from B.

81. Text differs from B, but can be partially superimposed in occasional points.

82. Coincides with B, but with slight lexical variations.

83. Coincides with B², but with slight lexical variations.

84. Coincides with B^{2a}.

Subject	B	B ¹	C	B ²	B ^{2a}	B ^{2b}	D	E
Square-rigged ship	■			■ ⁸⁵	■ ⁸⁶	■ ⁸⁷		
“Amaistramento de far albori e antene” (instructions on making masts and yards)	■			■ ⁸⁸	■ ⁸⁹	■ ⁹⁰	■ ⁹¹	
“Raxion de far sartia” (how to make rigging)	■			■ ⁹²	■ ⁹³	■ ⁹⁴	■ ⁹⁵	
“Nave a velo” (ship under sail; illustration)	■			■ ⁹⁶	■ ⁹⁷	■ ⁹⁸		
Prayers, ritual, and magic formulas	■ ⁹⁹							
Pseudo-heraldic ensign (illustration)	■							
St. Christopher (illustration)	■							

HISTORY OF THE MANUSCRIPT

The proven, undisputed information we possess regarding the vicissitudes of the Michael of Rhodes manuscript is extremely limited. We can only say with absolute certainty that its history must not have been particularly serene.

Already in 1473, just a few decades after it was composed, the manuscript could be found outside of Venice in a mariner’s sack embarked on a Venetian galley. At least, this is what we can deduce from the presence on fols. 238a and 238b of the presentation of the last wishes of Giovanni da Drivasto, “*paron zurado* of the magnificent sir Marino Dandolo.”

The three hands represented by brief notes on the pasted-down front endpaper (numbered fol. Ala in this edition) probably represent three owners of the manuscript, in the second half of the fifteenth century, the beginning of the sixteenth century, and the end of the sixteenth century, respectively. The manuscript’s location in Venice in the early sixteenth century seems well attested, in view of the fact that Giovanni Battista Ramusio was able to extract a partial copy from it. The Magliabechiano XIX.7 codex, better known under the somewhat infelicitous title *Fabrica di galere*, which as noted earlier was almost certainly by Ramusio, contains among its texts a copy of the ship-building section of Michael’s manuscript.¹⁰⁰

85. Coincides with B, but with slight lexical variations.

86. Coincides with B², but with slight lexical variations.

87. Coincides with B^{2a}.

88. Coincides with B, but with slight lexical variations.

89. Coincides with B², but with slight lexical variations.

90. Coincides with B^{2a}.

91. Text differs from B.

92. Coincides with B, but with slight lexical variations.

93. Coincides with B², but with slight lexical variations.

94. Coincides with B^{2a}.

95. Text differs from B.

96. Coincides with B.

97. Coincides with B and with B².

98. Coincides with B, B², and B^{2a}.

99. Texts of similar interests, but different actual content, are also found in A.

100. Cf. Augustin Jal, “Mémoire no. 5,” in Jal, *Archéologie navale* (Paris: Arthus Bertrand, 1840), 2: 1–133; Roger Charles Anderson, “Jal’s ‘Memoire No. 5’ and the Manuscript ‘Fabrica di Galere,’” *Mariner’s Mirror* 31 (1945): 160–167; Frederic C. Lane, *Venetian Ships and Shipbuilders of the Renaissance* (Baltimore: Johns Hopkins University Press, 1934), 56–57.

For several decades during the first half of the twentieth century the Michael of Rhodes manuscript was in the private collection of Federico Patetta, docent of history of Italian law at various Italian universities; *Accademico d'Italia* from 1933; member of the Royal Academy of Sciences of Turin; member of the Accademia dei Lincei and of numerous national historical delegations and academies; and indefatigable collector of manuscripts and autographs, largely of historical-juridical interest. Patetta cataloged the manuscript as no. 32 in his collection, as attested by the note of ownership in his own hand on the first folio.

At his death (October 28, 1945), all of Patetta's manuscripts and autographs were acquired by the Vatican Library (Biblioteca Apostolica Vaticana), as per his testamentary disposition: "Lego alla Biblioteca Vaticana in Roma tutti i codici manoscritti, autografi, pergamene, documenti di mia proprietà . . ." (I bequeath to the Vatican Library in Rome all the manuscript codices, autographs, parchments, documents belonging to me).¹⁰¹

The manuscript of Michael of Rhodes, however, appears not to have ever arrived at the Vatican Library, perhaps because in the meantime Patetta himself may already have parted with it, or perhaps for other reasons that cannot be determined at the moment. In any case Paul Oskar Kristeller made no mention of it in his *Iter Italicum* in which he treats the Patetta Estate of the Vatican Library.¹⁰²

However, the codex appears inexplicably in the catalog of Nicolas Rauch's Swiss bookstore *Beaux Livres* (p. 123), printed in 1,350 copies in 1949, in which it features as being for sale at the price of 70,000 Swiss francs. In this catalog the manuscript is described as "Manuscrit italien d'une importance capitale pour l'histoire de la marine et de la construction des bateaux au XVe siècle" (Italian manuscript of capital importance for naval history and shipbuilding in the fifteenth century) and further below as "le seul document authentique existant sur l'archéologie navale de cette époque" (the only extant authentic document on shipbuilding of this period). Its description, together with the reproduction of several folios, highlights with particular effectiveness its rarity and significance.¹⁰³

In 1966 it made a fine show in the Sotheby's catalog of July 11, 1966, as lot no. 254, which was purchased for 5,500 pounds by a certain Berthier.¹⁰⁴

Despite its extreme importance, the manuscript remained inaccessible to scholars, who during this time lamented its absence to no avail; it reappeared in a later auction at Sotheby's on December 5, 2000, as lot no. 54.¹⁰⁵ Thanks to the disinterested generosity of its purchaser, the current owner, the manuscript has been edited in this venue and thus put at the disposal of the international scholarly community.

101. Federico Patetta, holographic will, May 6, 1935, published by the notary Mario Bordon, of the Notary College of Savona, December 20, 1945.

102. Paul Oskar Kristeller, *Iter Italicum: A Finding List of Uncatalogued or Incompletely Catalogued Humanistic Manuscripts of the Renaissance in Italian and Other Libraries* (London: Warburg Institute, 1963–1966), 6: 400–406. Nor is it mentioned in the Vatican Library's typescript catalog of the collection.

103. Nicolas Rauch, *Livres précieux et autographes des XV^e et XVI^e siècles*, catalog no. 2, lot no. 123, auction cat. (Basel: Benno Schwabe, 1949), 123–126. I thank Mauro Bondioli for his valuable recommendation of this catalog and Gilberto Penzo who kindly lent me a copy.

104. Sotheby's London, *Catalogue of Important Western and Oriental Manuscripts and Miniatures*, July 11, 1966, lot 254, auction cat., entry by Andreas Meyer (London: Sotheby and Co., 1966), 89–93.

105. Sotheby's London, *Western Manuscripts and Miniatures*, December 5, 2000, lot 54, auction cat. (London: Sotheby and Co., 2000), 60–72.

DESCRIPTION OF THE MANUSCRIPT

The manuscript, which is made entirely of paper, is currently in a rather mediocre state of preservation. A questionable rebinding procedure likely dating to the first decades of the twentieth century has to a large degree compromised the legibility of the volume's exterior appearance, although in no way modifying what is assumed to have been the codex's original composition. The procedure involved covering (or rather, clumsily wrapping) the spine and slightly less than half of the front and back boards in low-quality red leather. The remaining half of the boards not covered in red leather—actually more on the front than the back—preserves a considerable portion of what must have been the wooden boards' original external cover: a musky green leather, quite worn over time and especially by evident handling. Nevertheless, a significant part of the back board, clearly the portion not treated by the binding procedure described above, remains uncovered. The codex is kept closed by a leather strap ending in a metal clasp, which starts from the back board and is attached to the front board by an eyelet also of metal.

The dimensions of the individual folios vary in height between 19.5 and 19.7 cm, and in width between 13.5 and 14.3 cm. The thickness of the whole volume varies between 5.5 and 6.1 cm, based on the amount of pressure applied while measuring. The boards measure respectively 20.5 cm in height, 14.3 cm in width, and 0.5 cm in thickness.

The writing area extends in height from 15.5 to 16.5 cm, and between 10.5 and 11.0 cm in width. Each folio averages 25–27 lines of writing. The number of lines¹⁰⁶ can nevertheless vary, even significantly, where there are arithmetic and algebraic operations, drawings, full-page illustrations and geometric diagrams, decorative dividers, and line spacing more or less widened from one paragraph to another. Clearly all this creates a specific individuality to each folio of the volume. Thus the number of lines and the broadening of the writing area cannot be seen in themselves as particularly significant elements.

The writing area is delineated on the left and right sides of each folio by two vertical lines marked by lead point. The upper margin is marked by a hole made with a pointed instrument that was pressed with enough strength to puncture several folios, at about 1.5 cm from the edge, along the line that defines the external limit of the writing area. The lower margin, which is not always rigorously respected, tends to be located at about 2.5–3.5 cm from the edge of the folio, and is clearly affected by the presence of the arithmetic operations, drawings, and diagrams mentioned earlier.

There are no noticeable traces of other marks either for line spacing or for ruling. Nevertheless, the lines of writing maintain a singularly regular and uniform arrangement on the folio and run parallel one after the other, albeit with a slight tendency to stray up or down with respect to the median horizontal writing axis and toward the right as they get closer to the lower margin. The paper's thickness and its evident opacity, however, lead us to strongly doubt that the *scriptor* would have used a guide sheet of ruled paper underneath.

The *incipit* of each paragraph is indicated by a capital letter that sticks out significantly past the left margin, and by a notable widening of the line spacing.

106. And consequently also the writing area.

The most significant separations between individual paragraphs (i.e., those marking the chapters and sections that constitute the manuscript's supporting structure) tend to be suggested graphically by dividers that have both a decorative and separating function. These dividers can be found quite frequently in certain Venetian writing centers that can generally be linked to the cultivated spheres of Greeks who had chosen Venice, *alterum Bisantium*, as a new and more comfortable homeland of choice.¹⁰⁷ While each design has its own graphical individuality, these dividers can be grouped into four distinct typological variants:

- A) braided with thorns;
- B) braided without thorns;
- C) chained with thorns;
- D) chained without thorns.

In its current configuration the manuscript is composed of 253 folios, in turn divided into 17 fascicules or gatherings. Of these 253 folios, the first 10 were undoubtedly added at a later date after the codex was originally bound, perhaps during the course of the more recent reconditioning procedure.¹⁰⁸

The paper of these first 10 folios clearly seems to have been made considerably later (well into the sixteenth century), and is of undoubtedly higher quality than the remaining original folios, to which it is certainly unrelated. The folios are of limited thickness, made of regular and uniform pulp tending in color toward a light ochre, and entirely free of the spots of grease and dirt that mark many other parts of the manuscript. These stains amply attest to the repeated handling of the manuscript by hands not accustomed to cleanliness—and thus, in their own way, to the extraordinary fortune of the manuscript. Nevertheless, these additional folios do not fit well within the context of the structure of the volume.

A faint, partial trace of a watermark, in which it might easily be possible to discern some sort of representation, does not correspond at all to what was described in Sotheby's "Description of the Manuscript"—"watermarks of three hills in a circle (of the type of Briquet 11851–11888, extensively used throughout the late 14th and 15th centuries) and a sun (of the same type as Briquet

107. In this regard, see Venice, Biblioteca Nazionale Marciana, Cod. Gr.Z.301 (coll. 635), a collection of mathematical and astronomical treatises in Greek; and also Cod. Gr.Z.263 (coll. 1025), the *Pneumatics* of Hieron in Greek. The codices are also described in *La scienza a Venezia tra Quattrocento e Cinquecento: Opere manoscritte e a stampa*, exh. cat., Biblioteca Nazionale Marciana, October 3–15, 1985 (Venice: Stamperia di Venezia, 1985), 14, 21, 35, 38. I would like to thank Elisabetta Barile for her generous and valuable recommendation. See also Alexander Turyn, *Dated Greek Manuscripts of the Thirteenth and Fourteenth Centuries in the Libraries of Italy*, 2 vols. (Urbana: University of Illinois Press, 1972), plates 2: 49, 237, and 246; and Elpidio Mioni, *Introduzione alla paleografia greca* (Padua: Liviana, 1973), plate XVI. The *scriptor's* connection to the cultivated sphere of Greeks in Venice was also suggested by Conterio, preface to *Raxion de' marinari*, xiv.

108. Oddly, there is no mention of these added folios in the codex's description in the printed catalog of the Swiss antiquarian bookseller Nicolas Rauch: "Michalli Daruodo.—Traité de la construction des galères et des nefes latines. Manuscrit autographe en italien, sur papier, daté de la première moitié du XVe siècle (1444). In -4 de 3 ff. n. ch. (ch. par erreur 204, les ff. 90 et 91 en double, les 2 feuillets manquent), 35 ff. n. ch., la plupart blancs, peau verte sur ais de bois, le dos nouvellement recouvert d'une peau rouge." (Michael of Rhodes: Treatise on the construction of galleys and lateen ships. Autograph manuscript in Italian, on paper, dated to the first half of the fifteenth century (1444). In -4 of 3 ff unnumbered (numbered by mistake 204, folios 90 and 91 in duplicate, two pages missing), 35 leaves unnumbered, the majority blank; [bound in] green leather over wooden boards, the spine recently rebacked with red leather.) Rauch, *Livres précieux*, 123.

13903–13982 but not closely resembling any particular example).¹⁰⁹ Unfortunately it does not allow us any greater precision with regard to chronological attribution. We can only offer the hypothesis that unused waste sheets, likely recovered from another manuscript in which they had not been used, were reutilized as guard leaves in order to strengthen the volume. The thread used for sewing and attaching this quire, which is quite extraneous to the original architecture of the codex, is thin and of perfect caliber, very different from the thicker and mediocre quality used for the original binding. It further confirms the hypothesis that the invasive intervention is modern. This last procedure is so botched and clumsy that we can attribute it to someone utterly unskilled in binding and book restoration.

In contrast, the paper of the manuscript in its original composition demonstrates an entirely different workmanship. It is fairly mediocre, somewhat thick but at the same time extremely fragile and easily fragmented, of irregular grain and quite unhomogeneous texture. In color the paper tends toward a light ochre (although it is considerably darkened from repeated handling) and is of the type commonly used between the second half of the fourteenth century and the first half of the following century. The absence of a watermark—of which not even a minimal trace could be discerned—would lead us to assume that this paper might come from an eastern source rather than from a northern Italian paper factory.

As stated earlier, the manuscript is in mediocre condition. Undoubtedly its material condition has been partly compromised by repeated handling, the physical damage sustained, and especially the modest quality of the writing support. Nevertheless, some responsibility for its condition can be attributed to the nature and actual dimensions of the manuscript; while it cannot be called a “knapsack book” (*libro da bisaccia*) in the fullest sense of the term, it could always find its way into the baggage of traveling merchants and mariners. Several rudimentary efforts at restoration, such as those still noticeable today at fols. 103b/104a, 104b/105a, 140b/141a, 146b/147a, 183b/184a, and 193b/194a, reflect the damage that occurred early on within the more frequently consulted sections, subjected to inevitable wear and inexorable degradation. From the materials used, these “restoration” efforts seem to date to a period not too distant from the time when the codex was first written. Tears and lacerations occur more frequently especially in the central part of the manuscript—i.e., the part of the codex that is most easily opened quickly and carelessly to full opening, but also the part that was most sought after and consulted by mariners and seamen in general. On the other hand, this is not the case for the first half of the work, which is a veritable *liber abbaci* (abacus book), by its very nature reserved for less frequent and less casual consultation.

Examination of the manuscript’s foliation, and in particular several significant peculiarities, allows us to hypothesize with a fair degree of certainty about the procedures followed by the *scriptor* during the various phases of his work, from the preparation of the writing surface to the arrangement of gatherings for final binding.

First of all it should be observed that the foliation, in the same hand to which a good part of the manuscript can be attributed, almost certainly preceded the writing of the text and constituted an integral part of the preliminary procedures for the preparation of the writing area. In other words, we can surmise that before the text was written, Michael of Rhodes saw to it that the folios were

109. Sotheby’s London, *Catalogue*, July 11, 1966, 89.

numbered in a systematic progressive order, after having folded and recut the available paper in quartos and packaged everything into gatherings composed on average of 8–9 bifolia each. The *scriptor* followed a page numeration method that was fairly typical for manuscript books: he gave the same number successively to the verso of each folio (in this edition identified with the letter “a”) and to the recto of the folio immediately following in the gathering sequence (identified with the letter “b”), writing the number at the upper extremity of the left and right margin of each folio.

This statement is further supported by a rather interesting detail. The verso of several folios (i.e., in this edition indicated with “a”), from fol. 147a up to 151a and from 156a up to 161a, presents traces of another foliation on its lower external margin. In this case it is in an upside-down position with respect to the normal orientation of the writing, and numerated in descending order with respect to the progression of the folios. This numeration begins with the number 160 and continues with the numbers 159, 158, 157, 156, 151, 149, 148, 147, and 146. Originally there may also have been 150, but the absence of the folio numbered 156b/157a, unfortunately missing today, allows us only to hypothesize its earlier existence.¹¹⁰ Most likely Michael of Rhodes made an error in the preliminary numeration of his folios, perhaps out of distraction, repeating numbers that had already been used earlier. Having realized his mistake, he did not throw the folios away but simply inverted their arrangement in the gathering. Not too concerned to cancel the first numeration, he reutilized the folios after having renumbered them, this time according to the correct succession of folios within the gathering.

Not every folio appears to have been numbered. However, it is not possible to distinguish with absolute certainty the cases in which foliation was actually deliberately omitted by the *scriptor* from those in which it has simply become materially impossible to read. Several folios may have been excessively trimmed at the time of binding—whether for the original or the later binding procedure it is impossible to know—and consequently lost the foliation when it was too close to the folio’s upper margins.

The 10 added folios do not present any obvious traces of numeration. On the other hand, the lack of numeration on the first three folios of the manuscript in its original form, which contained the index of materials or “table of contents,” could not have been anything other than intentional. In this edition, in order to avoid confusion with the remaining folios, these initial three folios have been renumbered from TOC [table of contents] 1b to TOC 4a. The original foliation is interrupted at folio 204b. The verso of this and another 35 folios following have been numbered for this edition from 205a to 241a; some of these contain various texts added at a later date in various hands that are distinct from the prevailing one, while some are blank. The folios assigned the numbers 240a and 240b had already been numbered 141a and 141b by the same hand to which the original foliation of the manuscript has been attributed.

Nevertheless, the *scriptor* made several accidental errors, such as repeating numbers or superimposing corrections. While they may be fairly negligible in quantity and practical consequences, they are not insignificant for the aims of an effective and comprehensive analysis of the codex, because they constitute very clear traces of the *scriptor*’s method of operation. Foliation errors encountered are as follows:

110. The numbered folio 156b/157a was almost certainly torn out subsequent to the binding of the manuscript, as the current folio 157b clearly contains an acephalous text.

- 40a corrected (“3” crossed out);
- 47a/b corrected from “147” by crossing out the first numeral;
- 79b superimposed on “78,” with “9” constructed on the lower eyelet of “8”;
- 80b, multiple foliation with “79,” “80,” “90”;
- 90a/b and 91a/b repeated;
- 113a/b repeated;
- 132a/b both numbered “32”;
- 144b corrected from “145,” with final “4” written over “5”;
- 151b corrected from “152,” with final “1” written over “2.”

The ink used for the foliation is a rather dark brown, tending almost toward black, and never varies in color or intensity throughout the folios. In some cases it is decidedly different from the ink used in writing the text of these folios.

The generalized repetition of the semantic and verbal invocation “Ihesus” on each folio, recto and verso, can also be considered as an integral part of the preparatory phase of the writing area.

Despite its apparent vicissitudes, amply reflected in its mediocre state of preservation, the manuscript has reached us almost essentially intact with regard to composition. Although today several folios are clearly missing, having been carelessly torn out (in particular fols. 9b/10a, 156b/157a, and 215b/216a, the last of which was almost certainly blank), none of the gaps goes so far as to hinder the understanding and significance of the work. Folios 9b/10a and 156b/157a were undoubtedly lost subsequent to the binding of the manuscript. In fact there is a lack of continuity in contents between the closing words (the explicit) of fol. 9a and the opening words (incipit) of fol. 10b; the same holds for fols. 156a and 157b.

Moreover, there are occasional breaks between the explicit of one folio and the incipit of the following one (for example between fol. 65a and fol. 65b, and between fol. 70a and fol. 70b). These can be attributed not to the loss of intermediary folios but rather to errors Michael made while copying texts from which he directly drew his material, or to gaps that were already present in these texts.

In the manuscript we can essentially discern five principal hands, labeled according to their order of appearance A, B, C, D, and E.¹¹¹

Hand A clearly comes from the mercantile sphere,¹¹² although corrupted and practically softened by the writer’s own particular word usage and especially by his being essentially outside this sphere and its associated genre of writing;¹¹³ this is the hand of Michael of Rhodes. The manuscript foliation, the index of various subjects into which this is articulated, and, clearly, the manuscript itself from fol. 1b to fol. 204a are all to be attributed to this hand.

The writing is somewhat rounded and fluid and generally moderately cursive (more so than the design of each letter); it is also particularly small and rather closed within itself, at least up to fol.

111. There are an additional three hands on the pasted-down front endpaper, numbered A1a in this edition.

112. Gianfranco Orlandelli, “Osservazioni sulla scrittura mercantesca nei secoli XIV e XV,” in *Studi in onore di Riccardo Filangieri* (Naples: L’Arte Tipografica, 1959), 1: 445–460; reprinted in his *Scritti di paleografia e diplomatica*, ed. Roberto Ferrara and Giovanni Feo (Bologna: Istituto per la Storia dell’Università di Bologna, 1994), 147–178.

113. A fundamental work on this topic is Federigo Melis, *Documenti per la storia economica dei secoli XIII–XVI (con una nota di paleografia commerciale a cura di Elena Cecchi)* (Florence: Leo S. Olschki, 1972).

199a. From 199b onward, oddly coinciding with the change in ink, the module clearly becomes larger and the letter design less careful. Individual letters tend to be placed next to one another rather than actually being linked, and thus do not give rise to the usual morphological deformations produced by linking strokes. Exceptions, of course, occur in the classic and almost obligatory cases of ligatures such as “ch,” “sc,” and “st,” and the links “de” and “di.” While it is precise, adequately uniform, and regular, Michael’s hand occasionally reveals a particular precious affectation, more apparent in certain individual letters rather than in the overall layout. This affectation is easier to recognize in capital letters, especially when they occur at paragraph headings as a paragraph marker.

The *ductus*,¹¹⁴ which is intentionally poised at least at the beginning of a page, by the end of it indulges inevitably in a certain cursiveness perhaps due to tiredness of the hand. Similarly words are, as a rule, well separated from one another, although occasionally articles and prepositions become joined to the adjectives and nouns that they introduce.

Capital letters are usually reserved for paragraph headings, since each sentence essentially comprises the entire paragraph and contains no obvious internal breaks. The punctuation, which is very limited, does not correspond to any syntactic rule; thus there are no traces at all of a consistent and orderly graphical decoration of logical separators. If anything, it constitutes in the intentions of the *scriptor* an additional instrument utilized to separate individual words rather than different parts of the discussion. Occasionally (but according to no clear or rigorously observed rule) the most significant separation with regard to logical-syntactic value is represented by a transverse bar. Overall, the punctuation certainly does not facilitate our understanding of the concepts, which are often obscure and virtually reserved to a restricted group of experts, subject by subject.

With regard to the salient characteristics of the most significant capital letters, we can easily observe how the “A,” which always lacks the horizontal bar, is simply constructed by crossing two inclined strokes, and thus can be easily confused with a fairly enlarged “X.” At any rate, it does not distinguish itself from the latter other than by the greater size of the module—in addition, of course, to its different phonetic restitution. The “C,” “F,” “N,” “O,” and “P” are capitalized simply by enlarging their respective lower-case letters. The “D,” although distorted by the evident cursiveness and by the similarly apparent expansion of the module, tends to evoke models of the capital letter more specifically rustic than epigraphic. The “E,” “M,” “Q,” and “S” instead betray a clearly uncial origin. The “I” and “L” are quite characteristic, singularly similar in aspect to the capital forms of corresponding cursive models in use today. The “S” very closely resembles the number “6,” similarly to what can be found in the best examples of “modern” chancery. It is sometimes easily confused with “E,” especially when the latter, in its peculiar uncial typology, closes the intermediary horizontal line with the lower line almost like an eyelet. The latter is strongly curved toward the top and constructed without a break such as the rounded, right-leaning prolongation of the vertical line. The doubling of the internal segment of the “Q,” which occasionally also appears in the letters “C,” “E,” and “T,” is typical and constant, with clearly decorative rather than structural aims. The “T” is also quite particular, very similar to an overlapping “Z” and “I.” There is no substantial difference, on the other hand, between the initial “U” and “V.”

114. I.e., the distinctive manner in which the strokes are traced on the writing surface.

Turning to the lower-case letters, the dimorphism of “d” (which is sometimes uncial and sometimes straight) is not particularly noteworthy. On the other hand the prepositions “de” and “di” take on significant importance, as their correct interpretation is essential to an accurate reading of the text, especially in passages where the meaning is more ambiguous. Even the “s” displays the usual dimorphism, although without following a regular rule: sometimes it is round, when it occurs as an initial letter, almost like a slightly miniaturized capital letter, whereas it is always straight when it occurs within the body of a word. The “e,” which lacks an eyelet, is constructed by bringing together a short vertical stroke and a barely visible horizontal stroke. The “i,” usually elongated at the bottom when at the end of a word, occasionally appears with the diacritical mark of a dot, and other times not; it seems to follow no rules, almost according to the whim of the *scriptor*. The ligature “ch,” as with the upper ligature “st,” is regular and typified. The latter is not always easily distinguishable from the similar “sc.” Only the context can assist us in more problematic cases. The “u” and “v” occur in the two morphological variants with equivalent phonetic value. The “z” always takes the form of a “3” slightly raised above the line. It is often confused with the number, and so it becomes very easy to read “zo” (in the sense of “ciò” [this] or “giù” [down]) in place of “30.” In this case as well, only the context of the discussion can help resolve the ambiguity.

Abbreviations are used in moderation and conform to the typical records of mercantile writings, and almost never pose troublesome difficulties of interpretation:¹¹⁵ abbreviations can be made by truncation, by contraction, by letter in superscript, by specific letter, by tachigraphic note, by proper and conventional symbol, and with general or particular reference. One particularity concerns the consonant “q” abbreviated by a horizontal line across the descender, used both for “qui” and for “que,” whether in the whole word (usually “qui” in the meaning of “who”) or in the case of a prefix (“que-sto,” “que-sta” [this], “que-sti,” “que-ste” [these]).

The “technical” abbreviations in the first section of the manuscript, which is entirely dedicated to mathematics, are specific to that particular discipline. More will be said of these below, in our discussion of the transcription criteria that have been adopted.

Thus the hand of Michael of Rhodes, while adhering to the customs and writing canons of its time and place, reveals more than a few personal contributions, and in particular a significant degree of personalization—elements demonstrating that it cannot be attributed to a professional scribe. Moreover, the earlier observations regarding the preliminary phases of preparation of the writing area, the pagination methods, and above all the general organization of the codex lead us to believe without a doubt that the primary occupation of Michael of Rhodes (whom Armando Petrucci would certainly define as “alfabeta dell’uso”¹¹⁶ [literate through practice]) is certainly not that of a copyist.

Hand B appears for the first time at the head of fol. TOC 1b (“Scritti e ricordi di Michele Daruodo” [Writings and remembrances of Michael of Rhodes]), and a second time at fol. 204a: “Questi sono i Ricordi e Scritti d’un tal Michele Daruodo Veneziano il di cui Nome si vede di sopra e f. 90” (These are the remembrances and writings of a certain Michael of Rhodes, a Venetian, whose name appears above on fol. 90), immediately beneath Michael’s last handwritten autobiographical annotation. Thus it repeats what had already been stated as a title at the beginning of

115. See Armando Petrucci, *Breve storia della scrittura latina* (Rome: Bagatto Libri, 1989), 161.

116. Armando Petrucci, *Prima lezione di paleografia* (Rome: Laterza, 2002), 20.

the manuscript, almost as if to mark the end of Michael's autographical text at that particular spot. The design of the individual letters, posed with affectation and intentionally calligraphic,¹¹⁷ does not facilitate the dating of these few lines, which likely go back to a period around the end of the nineteenth century and the beginning of the twentieth. This hypothesis is actually supported by the language itself, which vaguely recalls the flavor of late nineteenth-century Italian even in its brevity and extreme concision. If anything, this might perhaps narrow it down more precisely to the later second half of the nineteenth century, i.e., before the manuscript underwent the invasive and clumsy intervention of rebinding and the addition of those initial 10 folios concerning which we commented earlier. One notable orthographic peculiarity is the symbol used to divide syllables at the end of a line: "Vene-ziano." Another linguistic curiosity is the transformation of an indication of provenience "da Ruodo" (from Rhodes) into a veritable surname, with a capital letter "Da-ruodo," in line with what the anonymous extensor of the note in hand B (being perhaps as unfamiliar with geography as he was with paleography) could have read correctly at fol. 90-2b: "Michalli da Ruodo." Thus it is likely that one of the more recent owners of the manuscript, precisely because it was anonymous and lacked a heading, felt practically obliged to confer title, content, and authorship at the beginning and end of the manuscript, demonstrating a complete lack of conservational sensitivity for it.¹¹⁸

The preparation of the four portolans located from fol. 205a to fol. 210b can be attributed to a third hand, C: "Portulan da Venesia fina a Constantinopoli pe[r] Rivera como le galie vano"; "Portolan per i traversi del Colpho de Venexia"; "Portolan da Cavo Malio fina al'isola de Famagosta"; "Portolan da Venesia infina ala Tana, ala via dele galie per staria" (Portolan from Venice to Constantinople along the coast as the galleys go; Portolan for the crossings of the Gulf of Venice; Portolan from Cape Maléas to the island of Famagusta; Portolan from Venice to Tana, on the route of the galleys by the coast). The writing, which most likely goes back to the later second half of the fifteenth century, is undoubtedly more typical of a book hand than a chancery (i.e., documentary) hand: calligraphic in its own way, orderly, without smudges or corrections of any kind, lacking ligatures between individual letters, sufficiently composed, airy, if anything marked by a precious and persistent affectation. In any case the ink used, which lacks even minimal chromatic variations, would attest to the speed and continuity with which the entire work was carried out.

The writing area of the folios in this section of the manuscript, which is definitely extraneous to Michael's text, was prepared in a manner somewhat different from the preceding folios. Each folio, lacking the *invocatio* "Ihesus," has been preliminarily given margins by lead point, and each one was ruled, again by lead point. It was lined horizontally, so as to allow a constant number of 29 lines of writing perfectly parallel with each other (at least when there are no skips in the units of ruling due to the *incipit* of a new portolan or to other intermediary breaks). Each folio was also lined vertically, just like the grids in a modern square-ruled notebook, to allow the perfect columnar arrangement of abbreviations for wind directions and distances in miles between points along the coast. Furthermore, portolan titles are always underlined in red ink to facilitate their immediate identification

117. The individual letters are written with extreme care and are rigorously separated from one another.

118. The same criticism can also be leveled at Federico Patetta. In fact he had no compunction about adding, in his own hand at the bottom of the same fol. TOC 1b, the note of ownership "Federico Patetta / Ms. n° 32"—thus further expanding (albeit by only a little) the set of hands found in the manuscript itself.

within the writing area, which itself was already aesthetically well arranged, almost as if to confirm the great care given to the formal aspect of the texts by the *scriptor*, certainly more practiced in book script than Michael of Rhodes.

The writing attributed to hand D appears in fol. 225b: “Chi vol far una tavola de Salamon die saver quanto / son una ora, che son ponti 1000 e 80, son una ora, / e una luna son di 29, ore 12, ponti 793” (Whoever wishes to make a table of Solomon should know how much an hour is, which is 1,080 points, which is an hour, and a moon is 29 days, 12 hours, 793 points). Three lines in all, written almost as a note, perhaps as a written reflection, a mnemonic recollection, a personal musing, an extrapolation in the form of a general rule about what Michael of Rhodes states in fol. 131a regarding the table of Solomon, and later in fol. 186a regarding the duration of the lunar cycle: “dichotte che una luna sie di 29, ore 12, ponti 793, arigordandotti che 1080 punti serà ora 1, e ore 24 serà di 1” (I tell you that a moon is 29 days, 12 hours, 793 points, remembering that 1,080 points will be an hour, and 24 hours will be 1 day).

The last two written folios of the codex belong to hand E, at fols. 238a and 238b. This text, which has nothing remotely to do with the contents of the rest of the manuscript, is a sort of presentation of a last will by a certain Giovanni da Drivasto, *paron zurado* of Marino Dandolo, written on August 29, 1473, almost certainly on board a Venetian galley docked “al Chiarcho” (Charchi, now Khálkhi, a small island near Rhodes). The testator (about whom it has not been possible to find additional information) likely found himself out of writing paper and resorted to using a couple of folios that had been left unutilized toward the end of the manuscript in order to write down his last wishes. If nothing else this event, quite significant in itself, documents the fact that several decades after Michael’s manuscript was composed, it was no longer located in Venice but was perhaps traveling with its current owner.

The writing, in a strongly personalized lower-case cursive, appears initially difficult to read especially because the words, more than the individual letters, are rarely separated from each other but run together almost without a break. There are no traces of capital letters or of punctuation marks other than an occasional transverse bar that certainly does not help to separate phrases into intelligible sentences. Apart from these the writing seems to flow uninterrupted, in places is confused and uncertain, does not lack errors and changes of mind, and is seriously inaccurate from morphological, grammatical, and syntactical points of view. To summarize (quoting another definition of Armando Petrucci), the author of these two final folios cannot be other than a “functional semi-literate” (*semialfabeta funzionale*), someone who certainly had not had many opportunities to develop adequate confidence in writing.¹¹⁹

With regard to the inks used in the manuscript, we must highlight how from its beginning (i.e., from fol. 1b) at least right through fol. 199a Michael of Rhodes used a single ink, which was a dark brown color that tended toward black, with the significant exceptions of annotations at fol. 93b for which he utilized inks that are substantially different from one another. It appears that Michael also used the same ink for the initial table of contents and for the foliation, up to and including fol. 204a. Starting with fol. 199b, almost to underscore a sort of temporal break occurring between two different times of writing—also indicated by the widening of the writing spacing that occurs precisely from fol. 199 onward—the ink used is quite different, of a rather light and faded sepia

119. Petrucci, *Prima lezione*, 20.

color. Further confirming the existence of this break, it should also be noted how the last three items in the table of contents—covering the contents of folios 199b through 201b, to which we should also add the contents of folios 102b and 103a, which are completely ignored in the first version of the table of contents—are written in the same light sepia-colored ink. Michael used this same ink to write the additions to his autobiographical digression regarding the death of his first wife Dorotea at fol. 91-1b, the death of his son Teodorino at fol. 92a, the death of his second wife Cataruccia at fol. 93a, and lastly the privilege of the steelyard, a first time at fol. 93b and a second time at fol. 204a.

As the inks used by other hands in the manuscript are not relevant to the aims of its analysis, we see no reason to discuss them here.

THE DATE OF THE MANUSCRIPT

Thanks to several explicit comments by the author, it is possible to estimate fairly closely the stages in which the manuscript was written. Indeed, in the first folio of the table of contents (TOC 1b) Michael makes certain to add the date 1434 with the invocation. Despite its being placed in the table of contents (which is usually among the last sections to be undertaken when writing a book), this date can in no way be interpreted as the date when the manuscript's composition was completed (i.e., the *terminus ad quem* of Michael's efforts). For a variety of reasons that emerge from several intrinsic peculiarities of the manuscript itself, it should instead be understood as the date of the beginning of its composition—i.e., its *terminus a quo*.

To begin with, a careful examination of the handwriting of the autobiographical annotations, and especially the arrangement on the page of paragraphs and the spaces between them, clearly allow us to grasp how these were surely written without a break to cover the more salient episodes of Michael's *cursus honorum*, starting with his first deployment as an oarsman on a Venetian galley—"In the name of God. I, Michael of Rhodes, shall write below about the time I came to Venice. It was on June 5, 1401. / And first, I signed on in Manfredonia as an oarsman with the nobleman Pietro Loredan, son of the late Alvise Loredan"¹²⁰—up to the annotation about his enlistment as *armirai* of the galleys of Flanders in 1436 at fol. 93a: "I signed on as *armirai* with the noteworthy Francesco Capello, my *comito* Lazaro Parizotto, *paron* Corzulla, in 1436 on the voyage to Flanders."¹²¹

Following this entry, Michael's handwriting changes radically, at least with regard to its general arrangement (the module, *ductus*, and especially the inks change significantly). What is more important, however, is that he no longer seems capable of organizing the salient stages of his career with the same reliability, the same attention to extrinsic forms, the unvarying attention to symmetry, that he had demonstrated earlier. This was precisely because they were no longer being entered in a single writing sequence (as had occurred at least up to the note regarding 1436), but only once

120. MOR, fol. 90-2b: "Qui de sotto scriverò mi Michalli da Ruodo el tenpo veny in Venexia. Zò fu 1401 adi 5 zugno. / E primo m'achordiè in Manfredonia per homo da remo chon el nobile homo miser Piero Loredan fu de miser Alvise Loredan."

121. MOR, fol. 93a: "M'achordiè per armiragio chon el spectabile homo miser Franzescho Chapello, el mio chomitto Lazaro Parixotto, paron Chorzulla, del 1436 al viazio de Fiandria." And see Venice, Archivio di Stato, Notatorio di Collegio, R. 6, fol. 157r.

a specific appointment had been attained. Michael notes these appointments in the space he intentionally left blank for this specific purpose (just under three and a half folios), with a truly unusual carelessness that is certainly out of place and unjustifiable in a written project with clearly appreciable aesthetic characteristics.

It is possible to conjecture a first phase of intensive writing that would have extended from 1434 to 1436, i.e., up to the moment of departure of the convoy of Flanders.¹²² This phase would have comprised the first section of the arithmetic-algebraic instructions, the autobiographical annotations up to the mention of his election as *armirao* of the galleys of Flanders in 1436, and all the subsequent sections up to and including fol. 199a.

An even more precise definition of the writing periods might be suggested if we wish to give particular weight to the fact that the chronological computations that Michael proposes always refer to the years 1435 and 1436: for instance the table of Solomon that begins at fol. 131b, or the calculation of the epact and the duration of the lunar cycle at fols. 185a and 185b, as well as the entire remaining chronological-astronomical examination at fols. 188a–190a. In other words, we could think of the biennium 1434–1435 as the period of composition of what, by weight, appears to be the first half of the manuscript (the portion dedicated to arithmetic and algebra).¹²³ The first months of 1436 would have been dedicated to the remaining sections up to fol. 199a. Since Michael's election as *armirao* of the galleys of Flanders is dated February 14, 1436, we can justifiably believe that this—give or take a day—was the *terminus a quo* for the composition of the portion of the manuscript from fol. 90-2b to fol. 199a. Thus during the months of forced inactivity while waiting to embark on his next voyage, Michael of Rhodes might have managed to organize a systematic and up-to-date *curriculum vitae*, perhaps based on the various contracts granted him by the Camera dell'Armamento. He would have reworked his written and oral sources on shipbuilding into a sufficiently methodical text, obviously postponing laying out the iconographic decoration to a later date precisely in order not to slow down his writing rhythm. He would have focused on writing the portolans, and presented his—or someone else's?—astrological knowledge, leaving the necessary spaces blank for the graphical representation of the signs of the zodiac. He used the current year (1436) and the year just passed (1435) as preferred references for his complex chronological-astronomical explanations, as indeed was common practice in contemporary

122. In that year the convoy of four galleys, two of which were heading directly for London and two to Bruges, left Venice on Sunday, April 22, after much resistance by the *patroni* and the partners, who were rightly concerned by the news that was arriving about the war between the king of England and the duke of Burgundy. The ships returned no earlier than the end of April of the following year. On this occasion the Senate was obliged to authorize all who wished to do so to unload merchandise that belonged to them from the galleys on which it had already been stowed. Venice, Archivio di Stato, Senato, Deliberazioni Miste, R. 59, fols. 142r–142v, 149v, and 154v.

123. The hypothesis that the time invested in writing the mathematics section was undoubtedly more substantial than the time required for the remaining sections is by no means devoid of merit. Indeed, as Raffaella Franci rightly points out in her essay in this edition, Michael of Rhodes did not limit himself to transcribing the sources at his disposal in a slavish and mechanical manner. Instead he carefully analyzed the entire system of calculations, which he clearly verified one at a time, and repeatedly presented solutions in multiple and not always justifiable methodological variations. In so doing, Michael demonstrated an unusual familiarity with the subject, which he had undoubtedly mastered and was not merely repositing superficially as an easily grasped and well-received literary genre. This section, therefore, could be considered the most original section of the entire manuscript. See Raffaella Franci and Laura Toti Rigatelli, *Introduzione all'arimetica mercantile del Medioevo e del Rinascimento: Realizzata attraverso un'antologia degli scritti di Dionigi Gori (sec. XVI)* (Urbino: Quattro Venti, 1982).

treatments of the subject. In other words, Michael would have taken the time when not at sea to bring a large portion of his entire work to completion.

At any rate, starting at fol. 199b, the variation in color and quality of the ink clearly reflects a gap in the writing continuum. The later phase of writing, which can be dated to the last months of 1444, could have ended naturally in the very first months of 1445, as suggested not only by the entry related to the achievement of the *grazia della stadera* (privilege of the steelyard), but also by the perfect correspondence between the ink used for this entry, the ink used in all the texts included between fol. 199b and fol. 204a, and, in a singular coincidence, the ink used for the other work of Michael of Rhodes once attributed to Pietro di Versi, which can be dated to 1444–1445. During the course of the intermediate phase, i.e., between 1437 and 1444, Michael may have been able to make entries regarding his *cursus honorum* after 1436, as well as perhaps the apparent integration of the magic-ritual formula to soothe toothaches at fol. 184b, for which he had only been able to write the title in a first round, perhaps because he didn't have the source immediately available to him. He could also have prepared the illustrations, tables, drawings, and copies of the diagrams—which certainly required longer periods of time to be made, especially for a hand that was objectively less skilled in drawing. For these, Michael had left the needed space near the respective captions.

The texts from fol. 199b onward, however, constitute a sort of meaningless resumption of previously treated subjects, sometimes even useless and overabundantly repeated. For example, the mathematical problems that Michael of Rhodes presents in these last folios (fols. 199b–201b, 203b) add nothing new to what he had presented earlier. The same riddle with the preestablished result of the 15 Christians versus 15 pagans at fol. 201b is merely a different formulation on the basis of 10 (though much reduced and almost banalized with regard to the explanation) of the same question presented at fols. 91-1a–91-1b with 15 Christians and 15 Jews, that time calculated on the basis of 9. Similarly, the algebraic rule presented at fol. 203a: “The topic of the fifth chapter is squared unknowns and numbers equal to an unknown”¹²⁴ had already been presented—and certainly more clearly and with plenty of examples—starting at fol. 13a.

And finally, the material added to fol. 202b—regarding the quantity and quality of timber, of artisans, of ironware, pitch, and oakum needed to construct a galley of Flanders—aside from being absolutely isolated from the context in which it was inserted, appears really to be a later integration of information already presented in the first section. Nevertheless, an interesting feature is the similar disposition of writing lines, the design of the letters, the *ductus* itself: quite surprisingly, these can be linked to the more generally extrinsic characteristics of the folios dedicated earlier to shipbuilding, more than to the folios immediately preceding and following it, with respect to which this folio seems to remain essentially extraneous.

Several autobiographical additions that occur after fol. 90-2b can also be attributed to this last phase, enriching the cold and bureaucratic list of appointments with some human depth. These additions related to the death of Michael's first wife Dorotea at fol. 91-2b: “And at this point I found that my wife Dorotea had died”; the death of his son Teodorino at fol. 92a: “And my son Teodorino died on this voyage”; and the death of his second wife Cataruccia at fol. 93a: “And on this voyage I found my wife Cataruccia dead.”¹²⁵

124. MOR, fol. 203a: “La natura del quinto chapitulo ssie zensso e numero ingual a chossa.”

125. MOR, fol. 91-2b: “E in questo troviè mia moier Dorattia morta”; fol. 92a, “Et in questo viazio morì mio fio Thodorin”; fol. 93a: “Et in questo viazio truovè mia moier Chataruzza morta.”

COMPOSITION OF THE MANUSCRIPT

To better understand the actual composition of the manuscript and its fasciculation, its structure is analyzed below.¹²⁶ As noted above, the manuscript is made up of 17 gatherings, not all of which contain the same number of folios. In fact this number can vary from a minimum of 1 + 1 folios to a maximum of 10 + 10 folios, although on average each gathering, or fascicule, is composed of 8 + 8 folios.

fasc. 0	fols. 5 + 5	[fol. A1a]	<i>[pasted-down endpaper]</i>
		[fols. A1b–A11a]	<i>[blank]</i>
fasc. 1	fols. 1 + 1	[fol. A11b]	<i>[blank]</i>
		[fol. A12a]	<i>[blank]</i>
fasc. 2	fols. 4 + 7	[fol. TOC 1b]	
		[fol. TOC 2a]	
fasc. 2	fols. 4 + 7	[fol. TOC 2b]	
		[fol. TOC 3a]	
		[fol. TOC 3b]	
		[fol. TOC 4a]	
		fol. 1b	
		[fol. 2a]	<i>[not numbered]</i>
		[fol. 2b]	<i>[not numbered]</i>
		fol. 3a	
		fol. 3b	
		fol. 4a	
		fol. 4b	
		fol. 5a	
		fol. 5b	
		fol. 6a	
		fol. 6b	
fol. 7a			
fol. 7b			
fol. 8a			
[fol. 8b]	<i>[not numbered]</i>		
fol. 9a			
<i>[fol. 9b]</i>	<i>[missing folio, torn out subsequent to binding]</i>		
<i>[fol. 10a]</i>			
fol. 10b			
fol. 11a			

126. Square brackets and italics indicate editorial interventions in the foliation.

fasc. 3	fols. 8 + 8	fol. 11b fol. 12a fol. 12b fol. 13a fol. 13b fol. 14a fol. 14b fol. 15a fol. 15b fol. 16a fol. 16b fol. 17a fol. 17b fol. 18a fol. 18b fol. 19a
<hr/>		
		fol. 19b fol. 20a fol. 20b fol. 21a fol. 21b fol. 22a fol. 22b fol. 23a fol. 23b fol. 24a fol. 24b fol. 25a fol. 25b fol. 26a fol. 26b fol. 27a
fasc. 4	fols. 8 + 8	fol. 27b fol. 28a fol. 28b fol. 29a fol. 29b fol. 30a fol. 30b fol. 31a fol. 31b fol. 32a fol. 32b fol. 33a

		fol. 33b	
		fol. 34a	
		fol. 34b	
		fol. 35a	
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		fol. 35b	
		fol. 36a	
		fol. 36b	
		fol. 37a	
		fol. 37b	
		fol. 38a	
		fol. 38b	
		fol. 39a	
		fol. 39b	
		fol. 40a	<i>["3" crossed out]</i>
		fol. 40b	
		fol. 41a	
		fol. 41b	
		fol. 42a	
		fol. 42b	
		fol. 43a	
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fasc. 5	fols. 9 + 9	fol. 43b	
		fol. 44a	
		fol. 44b	
		fol. 45a	
		fol. 45b	
		fol. 46a	
		fol. 46b	
		fol. 47a	<i>["1" crossed out]</i>
		fol. 47b	<i>["1" crossed out]</i>
		fol. 48a	
		fol. 48b	
		fol. 49a	
		fol. 49b	<i>[blank, only invocation and border framing at the end of the page]</i>
		fol. 50a	
		fol. 50b	
		fol. 51a	
		fol. 51b	
		fol. 52a	
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		fol. 52b	
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		fol. 55b	
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		fol. 57a	
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		fol. 58a	
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		fol. 59b	
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		fol. 60b	
		fol. 61a	
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fasc. 6	fols. 8 + 8	fol. 61b	
		fol. 62a	
		fol. 62b	
		fol. 63a	
		fol. 63b	
		fol. 64a	
		fol. 64b	
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		fol. 65b	
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		fol. 67a	
		fol. 67b	
		fol. 68a	
		fol. 68b	
		fol. 69a	
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		fol. 69b	
		fol. 70a	
		fol. 70b	
		fol. 71a	
		fol. 71b	
		fol. 72a	
		fol. 72b	
		fol. 73a	
		fol. 73b	
		fol. 74a	<i>[no "Ihs" (fols. 74a–77a)]</i>
		[fol. 74b]	<i>[not numbered]</i>
		fol. 75a	
		[fol. 75b]	<i>[not numbered]</i>
		fol. 76a	
		fol. 76b	
		fol. 77a	
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fasc. 7	fols. 10 + 10	fol. 77b	<i>["Ihs" resumes]</i>		
		fol. 78a			
		fol. 78b			
		fol. 79a	<i>[no "Ihs" (fols. 79a–91-1b)]</i>		
		fol. 79b	<i>[corrected from "78"]</i>		
		[fol. 80a]	<i>[not numbered]</i>		
		fol. 80b	<i>[also numbered "79" and "90"]</i>		
		fol. 81a			
		fol. 81b			
		fol. 82a			
		fol. 82b			
		fol. 83a			
		fol. 83b			
		fol. 84a			
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		fol. 86a			
		fol. 86b			
		fol. 87a			
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				fol. 87b	
				fol. 88a	
				fol. 88b	
				fol. 89a	
				fol. 89b	
				fol. 90[-1]a	
		fol. 90[-1]b			
		fol. 91[-1]a			
		fol. 91[-1]b			
		fol. 90[-2]a	<i>[number repeated by scriptor; "Ihs" resumes]</i>		
		fol. 90[-2]b	<i>[number repeated by scriptor]</i>		
		fol. 91[-2]a	<i>[number repeated by scriptor]</i>		
		fol. 91[-2]b	<i>[number repeated by scriptor]</i>		
		fol. 92a			
		fol. 92b			
		fol. 93a			
		fol. 93b			
		fol. 94a	<i>[blank, only invocation]</i>		
		[fol. 94b]	<i>[blank; not numbered; no "Ihs"]</i>		
		fol. 95a			
<hr/>					
fasc. 8	fols. 10 + 10	fol. 95b			
		fol. 96a			
		fol. 96b			
		fol. 97a			

		fol. 97b
		fol. 98a
		fol. 98b
		fol. 99a
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		fol. 100a
		fol. 100b
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		fol. 108a
		fol. 108b
		fol. 109a
		fol. 109b
		fol. 110a
		fol. 110b
		fol. 111a
		fol. 111b
		fol. 112a
		fol. 112b
		fol. 113[-1]a
		fol. 113[-1]b
		fol. 113[-2]a
		<i>[number repeated by scriptor]</i>
		fol. 113[-2]b
		<i>[number repeated by scriptor]</i>
		fol. 114a
		<hr/>
fasc. 9	fols. 8 + 8	fol. 114b
		fol. 115a
		fol. 115b
		fol. 116a
		fol. 116b
		fol. 117a
		fol. 117b
		fol. 118a

		fol. 118b	
		fol. 119a	
		fol. 119b	
		fol. 120a	
		fol. 120b	
		fol. 121a	
		fol. 121b	
		fol. 122a	
		<hr/>	
		fol. 122b	
		fol. 123a	
		fol. 123b	
		fol. 124a	
		fol. 124b	
		fol. 125a	
		fol. 125b	
		fol. 126a	
		fol. 126b	
		fol. 127a	
		fol. 127b	
		fol. 128a	
		fol. 128b	
		fol. 129a	
		fol. 129b	
		fol. 130a	
		<hr/>	
fasc. 10	fols. 8 + 7	fol. 130b	
		fol. 131a	
		fol. 131b	
		fol. 132a	<i>[numbered "32" by scriptor]</i>
		fol. 132b	<i>[numbered "32" by scriptor]</i>
		fol. 133a	
		fol. 133b	
		fol. 134a	
		fol. 134b	
		fol. 135a	
		fol. 135b	
		fol. 136a	
		fol. 136b	
		fol. 137a	
		fol. 137b	
		fol. 138a	
		<hr/>	
		fol. 138b	
		fol. 139a	
		fol. 139b	
		fol. 140a	

		fol. 140b	
		fol. 141a	
		fol. 141b	
		fol. 142a	
		fol. 142b	
		fol. 143a	
		fol. 143b	
		fol. 144a	
			<i>[stub between with some writing and drawing]</i>
		fol. 144b	<i>[superimposed over "145"]</i>
		fol. 145a	
<hr/>			
fasc. 11	fols. 8 + 7	fol. 145b	
		fol. 146a	
		fol. 146b	
		fol. 147a	<i>[numbered "160" upside down at bottom right]</i>
		fol. 147b	
		fol. 148a	<i>[numbered "159" upside down at bottom right]</i>
		fol. 148b	
		fol. 149a	<i>[numbered "158" upside down at bottom right]</i>
		fol. 149b	
		fol. 150a	<i>[numbered "157" upside down at bottom right]</i>
		fol. 150b	
		fol. 151a	<i>[numbered "156" upside down at bottom right]</i>
		fol. 151b	<i>[superimposed over "152"]</i>
		fol. 152a	
		fol. 152b	
		fol. 153a	
<hr/>			
		fol. 153b	
		fol. 154a	
		fol. 154b	
		fol. 155a	
		fol. 155b	
		fol. 156a	<i>[numbered "151" upside down at bottom right]</i>
		<i>[fol. 156b]</i>	<i>[missing folio, torn out subsequent to binding]</i>
		<i>[fol. 157a]</i>	
		fol. 157b	
		fol. 158a	<i>[numbered "149" upside down at bottom right]</i>
		fol. 158b	
		fol. 159a	<i>[numbered "148" upside down at bottom right]</i>
		fol. 159b	
		fol. 160a	<i>[numbered "147" upside down at bottom right]</i>
		fol. 160b	
		fol. 161a	<i>[numbered "146" upside down at bottom right]</i>
<hr/>			

fasc. 12	fols. 8 + 8	fol. 161b		
		fol. 162a		
		fol. 162b		
		fol. 163a		
		fol. 163b		
		fol. 164a		
		fol. 164b		
		fol. 165a		
		fol. 165b		
		fol. 166a		
		fol. 166b		
		fol. 167a		
		fol. 167b		
		fol. 168a		
		fol. 168b		
		fol. 169a		
		<hr/>		
				fol. 169b
				fol. 170a
				fol. 170b
				fol. 171a
				fol. 171b
				fol. 172a
				fol. 172b
				fol. 173a
				fol. 173b
				fol. 174a
		fol. 174b		
		fol. 175a		
		fol. 175b		
		fol. 176a		
		fol. 176b		
		fol. 177a		
<hr/>				
fasc. 13	fols. 8 + 8	fol. 177b		
		fol. 178a		
		fol. 178b		
		fol. 179a		
		fol. 179b		
		fol. 180a		
		fol. 180b		
		fol. 181a		
		fol. 181b		
		fol. 182a		
		fol. 182b		
		fol. 183a		

		fol. 183b	
		fol. 184a	
		fol. 184b	
		fol. 185a	
		<hr/>	
		fol. 185b	
		fol. 186a	
		fol. 186b	
		fol. 187a	
		fol. 187b	
		fol. 188a	
		fol. 188b	
		fol. 189a	
		fol. 189b	
		fol. 190a	
		fol. 190b	
		fol. 191a	
		fol. 191b	
		fol. 192a	
		fol. 192b	
		fol. 193a	
		<hr/>	
fasc. 14	fols. 8 + 8	fol. 193b	
		fol. 194a	
		fol. 194b	
		fol. 195a	
		fol. 195b	
		fol. 196a	
		fol. 196b	
		fol. 197a	
		fol. 197b	
		fol. 198a	
		fol. 198b	
		fol. 199a	
		fol. 199b	
		fol. 200a	
		fol. 200b	
		fol. 201a	
		<hr/>	
		fol. 201b	
		fol. 202a	
		fol. 202b	
		fol. 203a	
		fol. 203b	<i>[blank; no "Ihs"]</i>
		fol. 204a	
		fol. 204b	<i>[blank]</i>
		[fol. 205a]	<i>[no "Ihs"; and henceforth]</i>

		[fol. 205b]	
		[fol. 206a]	
		[fol. 206b]	
		[fol. 207a]	
		[fol. 207b]	
		[fol. 208a]	
		[fol. 208b]	
		[fol. 209a]	
<hr/>			
fasc. 15	fols. 7 + 8	[fol. 209b]	
		[fol. 210a]	
		[fol. 210b]	
		[fol. 211a]	<i>[blank]</i>
		[fol. 211b]	<i>[blank]</i>
		[fol. 212a]	<i>[blank]</i>
		[fol. 212b]	<i>[blank]</i>
		[fol. 213a]	<i>[blank]</i>
		[fol. 213b]	<i>[blank]</i>
		[fol. 214a]	<i>[blank]</i>
		[fol. 214b]	<i>[blank]</i>
		[fol. 215a]	<i>[blank]</i>
		<i>[fol. 215b]</i>	<i>[missing folio, torn out subsequent to binding]</i>
		<i>[fol. 216a]</i>	
		[fol. 216b]	<i>[blank]</i>
		[fol. 217a]	<i>[blank]</i>
<hr/>			
		[fol. 217b]	<i>[blank]</i>
		[fol. 218a]	<i>[blank]</i>
		[fol. 218b]	<i>[blank]</i>
		[fol. 219a]	<i>[blank]</i>
		[fol. 219b]	<i>[blank]</i>
		[fol. 220a]	<i>[blank]</i>
		[fol. 220b]	<i>[blank]</i>
		[fol. 221a]	<i>[blank]</i>
		[fol. 221b]	<i>[blank]</i>
		[fol. 222a]	<i>[blank]</i>
		[fol. 222b]	<i>[blank]</i>
		[fol. 223a]	<i>[blank]</i>
		[fol. 223b]	<i>[blank]</i>
		[fol. 224a]	<i>[blank]</i>
		[fol. 224b]	<i>[blank]</i>
		[fol. 225a]	<i>[blank]</i>
<hr/>			
fasc. 16	fols. 8 + 7	[fol. 225b]	
		[fol. 226a]	<i>[blank]</i>
		[fol. 226b]	<i>[blank]</i>
		[fol. 227a]	<i>[blank]</i>

[fol. 227b]	[blank]
[fol. 228a]	[blank]
[fol. 228b]	[blank]
[fol. 229a]	[blank]
[fol. 229b]	[blank]
[fol. 230a]	[blank]
[fol. 230b]	[blank]
[fol. 231a]	[blank]
[fol. 231b]	[blank]
[fol. 232a]	[blank]
[fol. 232b]	[blank]
[fol. 233a]	[blank]
<hr/>	
[fol. 233b]	[cut folio, only residual margin]
[fol. 234a]	
[fol. 234b]	[blank]
[fol. 235a]	[blank]
[fol. 235b]	[blank]
[fol. 236a]	[blank]
[fol. 236b]	[blank]
[fol. 237a]	[blank]
[fol. 237b]	[blank]
[fol. 238a]	
[fol. 238b]	
[fol. 239a]	[blank]
[fol. 239b]	[blank]
[fol. 240a]	[original numeration "141"; blank, only invocation]
[fol. 240b]	[original numeration "141"; blank, only invocation]
[fol. 241a]	[pen trial]
[fol. 241b]	[pasted-down endpaper]

TRANSCRIPTION CRITERIA

As is customary, several fundamental standards¹²⁷ were observed in preparing the transcription, with the aim of facilitating textual reading and comprehension while making every effort to respect the original intentions of the *scriptor* as closely as possible:

127. See "Norme per la pubblicazione dell'Istituto Storico Italiano," *Bullettino dell'Istituto Storico Italiano* 28 (1906), vii–xxiv; Alessandro Pratesi, "Una questione di metodo: L'edizione delle fonti documentarie," *Rassegna degli Archivi di Stato* 17 (1957): 312–333, which he subsequently merged into the chapter "L'edizione delle fonti documentarie" in his *Genesi e forme del documento medievale* (Rome: Jouvence, 1987), 99–109; Giampaolo Tognetti, *Criteri per la trascrizione di testi medievali latini e italiani*, Quaderni della "Rassegna degli Archivi di Stato," 51 (Rome: Ministero per i Beni Culturali e Ambientali, 1982); Armando Petrucci, *La descrizione del manoscritto: Storia, problemi, modelli* (Rome: La Nuova Italia Scientifica, 1984); and Philippe Contamine, "La noblesse et les villes en France, XIVe–XVe siècle: Progetto di norme per l'edizione delle fonti documentarie," *Bullettino dell'Istituto Storico Italiano per il Medioevo e Archivio Muratoriano* 91 (1984): 491–503.

- 1) Even in the case of an autographic text that can be attributed to the hand of a single *scriptor*, we cannot find the kind of morphological and linguistic consistency that might allow us to identify the most prevalent usages, in order to establish well-organized and regular standards with which to expand abbreviations. Thus it is clear that no single solution allows for a disciplined respect of the original reading. Consequently, no matter what criterion is preselected, there will always be criticisms and reproofs, even if the effort is configured as an attempt, not always guaranteed success, to mediate between two opposed subjectivities: that of the author of the texts and that of the reader.

Every abbreviation has been written out in full. The only exceptions regard specific abbreviations in the mathematical section that represent algebraic operators (“chu” for cubed,¹²⁸ “co” or “C” for “chosa,”¹²⁹ “n” or “N” for number, “Rx” for root, “□” for square, “Ç” for “zensso,” “zenso,” or “censo”¹³⁰), as these clearly function within the forms of the *abbacus* tradition and in the *scriptor*’s mathematical language.¹³¹

- 2) Articulated prepositions have been made uniform according to modern Italian usage, linking preposition and article.
- 3) Paragraph headings have been maintained; they are usually indicated by the *scriptor* by a slightly enlarged capital letter that protrudes significantly into the left margin, and follow a wider line spacing than usual.
- 4) Punctuation has been converted to modern usage, especially with the intention of making the logico-syntactic structure of the sentences easier to understand, making sure to avoid changes that might significantly distort the *scriptor*’s own style.
- 5) Capital letters are used only for sacred persons, proper names, family names, and always after a period, following modern usage. The terms “santo,” “santa,” “santi” (saint/saints) are transcribed with the initial capitalized only when they form part of a toponym, and not when used as personal predicates. A capital letter is used to distinguish “Luna” (Moon) as an astrological name from “luna” (moon) in other contexts; and likewise for “Sol”/“sol” and “Sul”/“sul.”
- 6) The letter “j” is not distinguished from the letter “i.” Instead we have respected the *scriptor*’s use of “y,” clearly only in cases where it does not correspond to “ij.” Similarly, the forms “ch” and the extremely precise “tt” and “ss” at the beginning of a word are maintained, in accordance with the *usus scribendi* (i.e., the writer’s personal word usage). The vowel “u” is always distinguished from the consonant “v.” In addition the morphology of the letter “ç” is maintained even when it is not an algebraic operator.
- 7) The vowels “a” and “o” have been accented when they have a value as a word (“à” corresponding to the modern Italian “ha” ([he/she/it] has) and “ò” corresponding to “ho” ([I] have).
- 8) Numerals are written just as they are found in the manuscript and consistent with the *scriptor*’s intentions, preserving their specific morphology: “1,” “1°,” “1^a,” “un,” “uno,” “una” (1, 1st, a/an).

128. Third power.

129. The unknown in a problem.

130. The square of the “chosa” (unknown).

131. See MOR, fol. 18b. In this regard see also Gilio da Siena, *Questioni d'algebra: Dal Codice L.IX.28 della Biblioteca Comunale di Siena*, ed. Raffaella Franci (Siena: Servizio Editoriale dell’Università di Siena, 1983), xii.

- 9) Intentional lacunae in the text are represented by three periods within square brackets [...]. Areas that are impossible to read due to tears, lacerations, erasures, etc., are represented instead by three asterisks ***. Every such case is accounted for in a note.
- 10) Addenda to the reading, to amend possible omissions by the *scriptor* due to an oversight or apparent slip of the pen (*lapsus calami*), are suggested in italics within square brackets. In the more significant cases, justification for the addendum is provided in a note.
- 11) An apostrophe is used at the end of a word to indicate the dropping of a final vowel or syllable. In addition, the apostrophe is used at the beginning of a word to indicate the elision of the initial vowel.
- 12) The criterion for folio numbering is respected according to the book hand adopted by the *scriptor* [e.g., fols. 2a–2b instead of fols. 1(verso)–2(recto)].
- 13) When it falls in the middle of a line of text, the end of the folio is represented by a single vertical bar [|].

Translated from the Italian by Claire Calcagno