

Early-Modern Magnetism: Uncovering New Textual Links between Leonardo Garzoni SJ (1543–1592), Paolo Sarpi OSM (1552–1623), Giambattista Della Porta (1535–1615), and the Accademia dei Lincei

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Magnetic attraction and repulsion and the behaviour of a magnetic iron needle, pivoted for example in a magnetic compass, were phenomena well known in the sixteenth century, and partly even in Antiquity and the Middle Ages.¹ Philosophers, physicians and technicians experimented with natural lodestones, iron, compasses and other magnetic devices and argued for several theories to account for these effects. Yet the work, *De magnete* (1600), by the English physician, William Gilbert (1544–1603), traditionally was considered the first important monographic study to examine comprehensively, systematically and experimentally the lodestone

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1 On the study of magnetism from Antiquity to the sixteenth century, cf., as a starting point: Gustav HELLMANN, "Die Anfänge der magnetischen Beobachtungen", *Zeitschrift der Gesellschaft für Erdkunde zu Berlin* 32 (1897), pp. 112–36; Jean DAUJAT, *Origines et formation de la théorie des phénomènes électriques et magnétiques*, Paris, Hermann & co, 1945; Heinz BALMER, *Beiträge zur Geschichte der Erkenntnis des Erdmagnetismus*, Aarau, H.R. Sauerländer, 1956; Albert RADL, *Der Magnetstein in der Antike: Quellen und Zusammenhänge*, Stuttgart, F. Steiner Verlag, 1988; Nicolas WEILL-PAROT, *Points aveugles de la nature: la rationalité scientifique médiévale face à l'occulte, l'attraction magnétique et l'horreur du vide (XIIIe-milieu du XVe siècle)*, Paris, Les Belles Lettres, 2013.

and its effects.² It has come to be accepted, however, that Gilbert based his research on the work of several predecessors and was supported substantially by the aid of some contemporary colleagues. It is known also that he did not always give credit to those scholars on whose work he relied, while on occasion he was quite critical of his predecessors' work. Despite this rather more mixed legacy than his fame would suggest, Gilbert significantly enriched the experimental understanding of the lodestone's effects, the magnetic powers of planet Earth itself and their use for navigational purposes. This made him, at least in some senses, the "father of magnetism" and provided some basis for this otherwise slightly exaggerated title.

Other published works in the period are not comparable to Gilbert's in their scope, method and purpose, although they prove that research on 'magnetism' at that time was experimentally based. Already in the late sixteenth century, for example, the Neapolitan polymath and magician Giambattista Della Porta (1535–1615), had devoted an entire book to experiment-based research on the lodestone in his famous and best-selling work, *Magia naturalis* (1589).³ There were antecedents on the subject as well, such as the celebrated medieval letter, *Epistola de magnete*, written by a certain Petrus Peregrinus in 1269, and circulated in numerous manuscripts, then translated into Italian and printed for the first time in 1520 under the name of the medieval erudite, Raimundus Lullus (1232–1316).⁴ However, Gilbert

2 Cf. William GILBERT, *De magnete, magneticisque corporibus, et de magno magnete tellure; physiologia noua, plurimis & argumentis, & experimentis demonstrata*, London, Short, 1600. On this work, cf. Duane H. D. ROLLER, *The De magnete of William Gilbert*, Amsterdam, Hertzberger, 1959; Stephen PUMFREY, *William Gilbert's Magnetic Philosophy, 1580–1684: The Creation and Dissolution of a Discipline*, Ph.D. diss. University of London, 1987.

3 Cf. Giambattista DELLA PORTA, *Magiae naturalis libri XX*, Napoli, Salvian, 1589, pp. 127–49. The first edition of this work, printed in 1558, did not include the long treatise on magnetism. Cf. also note 110. Here, other works also should be mentioned: Robert NORMAN, *The New Attractive; Containing a Short Discourse of the Magnes or Loadstone*, London, Ballard, 1581; Daniel SENNERT, *Epitome naturalis scientiae*, Wittenberg, C. Heiden, 1618, pp. 387–94. Sennert's work goes back to his university disputations dated before 1600, cf. Christoph H. LÜTHY, William R. NEWMAN, "Daniel Sennert's Earliest Writings (1599–1600) and Their Debt to Giordano Bruno", *Bruniana & Campanelliana* 6 (2000), pp. 261–79. The section of his work devoted to the lodestone has to be dated, according to textual references, after 1601.

4 Cf. Petrus PEREGRINUS, *Opera*, Loris STURLESE, Ron B. THOMSON (eds.), Pisa, Scuola normale superiore, 1995. The first print can be found in Raimundus LULLUS, *De virtute magnetis*, Roma, Marcello Silber, 1520. On this, cf. also George SARTON, "The First Edition of Petrus Peregrinus 'De magnete' before 1520", *Isis* 37 (1947), pp. 178–79.

was viewed as the first to treat the subject in a detailed, full-length, study.

The modern transcription of an anonymous manuscript, published in 2005, has prompted a revision of this view. This manuscript clearly precedes Gilbert's work in chronology, scope and content: it has been dated to the 1580s; it deals extensively and comprehensively with the subject of magnetism, and carries the title, "Due trattati sopra la natura, e le qualità della calamita".⁵ The work has been attributed to the Jesuit, Leonardo Garzoni,⁶ who is known to have inspired later Jesuits in their research on magnetism, such as Niccolò Cabeo⁷ and Niccolò Zucchi.⁸

The editor of the modern transcription of this manuscript, Monica Ugaglia, has argued, moreover, that the "Due trattati" probably influenced Della Porta's study on magnetism, and presumably were known to the historian and natural philosopher, Paolo Sarpi OSM (1552–1623), arguably the most famous of our three protagonists: best-known as author of the *History of the Council of Trent* (1619) and defender of Venice during the papal interdict of the Republic between 1606–07; on good terms at first, later he clashed often with members of the Society of Jesus; in the scientific sphere he was an adherent of the Copernican system and supporter of Galileo Galilei; he corresponded with the leading scientific figures of his day across Europe, and through his ties at the University of Padua he actively engaged with several fields including anatomy and astronomy.⁹

5 The modern edition of the manuscript is: Leonardo GARZONI SJ, *Trattati della calamita*, Monica UGAGLIA (ed.), Milano, FrancoAngeli, 2005. The "rediscovery" of the work was reported previously in Ugo BALDINI, *Legem impone subactis: studi su filosofia e scienza dei Gesuiti in Italia, 1540–1632*, Roma, Bulzoni, 1992, pp. 96, 363–65. Cf. also the short note by August ZIGGELAAR SJ, "Due veneziani, Paolo Sarpi e Leonardo Garzoni S.I., nella storia della fisica", in: Mario ZANARDI (ed.), *I gesuiti e Venezia: momenti e problemi di storia veneziana della Compagnia di Gesù: atti del convegno di studi, Venezia, 2–5 ottobre 1990*, Padova-Roma, Giunta regionale del Veneto-Gregoriana, 1994, pp. 583–585. Important results are summarised in Monica UGAGLIA, "The Science of Magnetism before Gilbert. Leonardo Garzoni's Treatise on the Loadstone", *Annals of Science* 63.1 (2006), pp. 59–84.

6 Leonardo Garzoni, * 1543 Venezia, S.J. 1568 Brescia, † 10.III.1592 Venezia (Monica UGAGLIA, "Introduzione", in: Leonardo GARZONI SJ, *Trattati della calamita*, Monica Ugaglia (ed.), Milano, FrancoAngeli, 2005, pp 7–83 (p. 10); *Sommervogel* III, 1249).

7 Niccolò Cabeo, * 26.II.1586 Ferrara, S.J. 1602, † 30.VI.1650 Genova (*Sommervogel* II, 483).

8 Niccolò Zucchi, * 6.XII.1586 Parma, S.J. 28.X.1602 Padova, † 21.X.1670 Roma (*Sommervogel* VIII, 1525).

9 On Sarpi's biography and his interest in the natural sciences, cf. also note 41.

Sarpi's studies on magnetism (which we have observed probably included familiarity with the "Due trattati") in turn may have been known to Gilbert. Garzoni's work thus is of enormous significance for the history of research on magnetism in the early-modern period, and indeed has been judged as such in numerous recent publications.¹⁰ However, Ugaglia's well-argued assertions concerning the complex means by which the "Due trattati" may have influenced research on magnetism at the time, including the attribution of the manuscript to Garzoni, are based entirely on circumstantial evidence: no other copy of the "Due trattati" had been identified, and Sarpi's studies on magnetism hitherto have not been found.

The present paper brings to light two further manuscripts of this work; it shows that, while their close analysis confirms Ugaglia's circumstantial evidence, it also takes the matter in another direction. These two manuscripts, identified with Garzoni for the first time here, for the most part faithfully replicate the contents of the "Due trattati" manuscript, yet in certain key aspects, they also differ from it significantly. A detailed discussion of this newly-identified material provides the means to resolve three questions that form the basis of this discussion: first, to consider whether the assumption remains valid that Garzoni was the author of the work on the lodestone; second, to consider the extent to which the insights provided by this research may help establish with more certainty the nature and extent of the manuscript's dissemination; third, to explore in what ways the findings relating to this manuscript help obtain a clearer picture of early-modern research on magnetism.

The research presented here is based on analysis that is historical-philological, rather than from the perspective of the history of science. Yet, the essay aims to provide a useful framework to researchers in both of these fields, thereby facilitating a better understanding of the scope and novelty of the material in question.

10 Cf. on the reception of Garzoni's work in recent times: Nicolas WEILL-PAROT, *Points aveugles de la nature*, pp. 244–55; Silvia PARIGI, "I gesuiti e l'azione a distanza", in: Paola VASCONI (ed.), *Cristoforo Clavio e la cultura scientifica del suo tempo atti del convegno tenutosi presso il Liceo 'Ennio Quirino Visconti', 18 ottobre 2012*, Roma, Gangemi editore, 2015, pp. 93–102; Agustín UDÍAS VALLINA, *Jesuit Contribution to Science. A History*, Cham, Springer, 2015, p. 49; David WOOTTON, *The Invention of Science: A New History of the Scientific Revolution*, London, Allen Lane, 2015, p. 328; Mark A. WADDELL, *Jesuit Science and the End of Nature's Secrets*, Farnham, Ashgate, 2015, p. 66.

1. The Three Manuscripts: Connections and their Contexts

Before proceeding to the analysis of the texts themselves, it is useful to outline in the first instance the context and format of their production. The first manuscript under discussion, containing two treatises – “Due trattati sopra la natura, e le qualità della calamita”, attributed to Garzoni and recently edited by Ugaglia – comprises around 200 pages and is to be found in Milan.¹¹ It likely was unfinished and is not dated, but probably was written in the 1580s. It will be referred to here as MS0.

The first of the recently discovered manuscripts, discussed here, is a text of 450 pages with the title, “Trattato delli maravigliosi effetti della calamita et delle cause loro”, held in Madrid.¹² Even though it has been catalogued, this manuscript will be analysed in detail for the first time in this paper; it will be referred to as MS1. It contains mainly the first of the two treatises that comprise MS0: while the first treatise is reproduced extensively and verbatim, the second MS0 treatise appears in MS1 arranged in a different order, ostensibly lengthened and with almost no literal transcriptions.

The second of the manuscripts can be identified with an already-known work: it is a treatise of thirty-seven pages, titled “Della Calamita”, and it forms part of a collection of works by Della Porta, located in Montpellier.¹³ It will be called here MS2. It too will be linked to MS0, by uncovering for the first time that a list of magnetic experiments and phenomena was drawn predominantly from the opening section of the second treatise in MS0.

When considered together, and in terms of the process of production, we can confirm that MS0 contains Garzoni’s research on the lodestone. This apparently unfinished work was revised and prepared for printing at a later date, presumably by Garzoni himself. Even though later sources indicate the intention to print the work, the printing draft had not been identified. As it will be shown, the printing draft most probably is contained in MS1. Furthermore, and independently from the textual traces pointing to the intention to print the complete work, the first part of the second treatise of MS0 was copied verbatim and divided into 140

11 Milan, Biblioteca Ambrosiana, S. 82 sup: “Due trattati sopra la natura, e le qualità della calamita” (fols. 250–357).

12 Madrid, Biblioteca Nacional, Ms 2020: “Trattato delli maravigliosi effetti della calamita et delle cause loro”.

13 Montpellier, Bibliothèque Universitaire, Section Médecine, H. 169: “Della Calamita” (pp. 251–88).

individual observations. Paolo Sarpi possessed this short work. Sarpi prepared a copy of this study for Della Porta, who used it as a basis for his *Magia naturalis*. Until now, this transmission and use of MS0 was identifiable only through circumstantial evidence, since no manuscript had been found. Now it can be demonstrated that MS2 contains a version of this exact part of the work (the first part of the second treatise of MS0), to which Sarpi and Della Porta seem to have had access.

It can be shown, too, that Della Porta's manuscript copy of a section of MS0 was transferred to the Accademia dei Lincei after his death, and it was incorporated there into a collection of manuscripts of his works. A later copy of this material can be identified in MS2, the "Della Calamita". In the extant correspondence between two members of the Accademia (Nicolas Claude Fabri de Peiresc and Cassiano Dal Pozzo), a possible template of this manuscript (MS2) is mentioned. We have some chronological traces of this manuscript, too, since the contents of MS2 also reveal that its *Vorlage* (either template or antigraph, that is the manuscript that MS2 was based on), can be traced from Garzoni to Della Porta via Sarpi, subsequently developed by enlisting the later research of a relatively unknown scholar named Jacques de la Ferrière around the year 1635.

A lack of sufficient conclusive evidence precludes the establishment of a definitive genealogy of these works and the relationship between them, that is, between MS0, MS1, and MS2. However, what we do know of the complex interplay between these texts can be simplified usefully in a chart. In the chart shown here, rectangles represent printed sources that refer to the manuscripts or that were influenced by them. Hexagons indicate individuals that are mentioned in the sources, but from whom we have no original statements in any source. Ellipses represent manuscripts under consideration (especially MS0, MS1, MS2). Dashed lines point to connections that must remain suppositions for now, while straight lines symbolise demonstrable connections. Arrow directions determine the relationship between subject and object in relation to the theme/subject written along the arrows.

The diagram shown here can point to the current shape of what we know and what remains to be understood of the textual trajectory of Garzoni's study of magnetism in this period. But in the meantime, let us proceed with our exploration of the significance and place of MS1 and MS2 in this complex history, by turning to the current state of research across a number of fields that can shed light on these manuscripts, both directly and indirectly.

2. Summary and Critical Discussion of the Current State of Research

As previously noted, the MS0 manuscript is located in the Biblioteca Ambrosiana in Milan (under the shelfmark “S. 82 sup”). This composite manuscript volume comprises, together with two comprehensive library inventories, the “Due trattati sopra la natura, e le qualità della calamita” (210 pages), which are identified in the index as “del Padre Leonardo Garzoni”.¹⁴ The author attribution in the index presumably comes from a librarian or reader of the manuscript in the nineteenth century and therefore cannot be held as certain.¹⁵ The manuscript itself dates back to the manuscript collection acquired by the *Ambrosiana* in 1609 from the library of Gian Vincenzo Pinelli (1535–1601), a renowned book and manuscript collector of the sixteenth century.¹⁶ Pinelli was in touch with several scientists of his time and it is not surprising that he possessed a manuscript on magnetism.¹⁷

No fewer than seven hands can be identified in the production of the “Due trattati” text. The manuscript either could have had one single original draft, which would have been copied at different stages, or it may have been extended successively through the use of various drafts; it also could be an archetype, written gradually without an original draft. Both of the work’s two treatises are separated from one another markedly, due to a change of scribe, and two different scribes are recognisable within both the first *trattato* and

14 Cf. UGAGLIA, “Introduzione”, pp. 81–82. The treatises can be found in the manuscript in fols. 250–357. Hereafter, references are to the treatises’ folia. According to Ugaglia, none of the inventories provide evidence on the origins of MS0.

15 This later author attribution also is discussed by Nick WILDING, “Leonardi Garzoni, *Trattati della calamita*, ed. Monica Ugaglia”, *History of Universities* 23 (2008), p. 221–23.

16 Cf. Angela NUOVO, “Gian Vincenzo Pinelli’s Collection of Catalogues of Private Libraries in Sixteenth-century Europe”, *Gutenberg-Jahrbuch* 82 (2007), pp. 129–43; EADEM, “The Creation and Dispersal of the Library of Gian Vincenzo Pinelli”, in: Robin MYERS, Michael HARRIS, Giles MANDELBROTE (eds.), *Books on the Move: Tracking Copies through Collections and the Book Trade*, London, Oak Knoll Press, 2007, pp. 39–67; EADEM, “Manuscript Writings on Politics and Current Affairs in the Collection of Gian Vincenzo Pinelli (1535–1601)”, *Italian Studies* 66.2 (2011), pp. 193–205; Nick WILDING, *Galileo’s Idol: Gianfrancesco Sagredo and the Politics of Knowledge*, Chicago, The University of Chicago Press, 2014, p. 28; WOOTTON, *The Invention of Science*, pp. 273–74.

17 Some relevant examples of Pinelli’s interactions will be mentioned in the course of this paper. Pinelli’s library also held scientific studies by Ettore Ausonio and Giuseppe Moletti. Cf. NUOVO, “Manuscript Writings on Politics”, p. 195.

the second one. The work thus appears to consist of two different treatises, which however were not written totally independently from one another. The second treatise of the work is incomplete, a matter that will be dealt with later in this paper. The manuscript contains, moreover, many corrections and some additions, as well as 105 illustrations, some small diagrams *in margine*, some very large and complex sketches, and diagrams to which the text also refers.

The first circumstantial evidence that identifies the Jesuit Garzoni as the possible author of MS0 (the position held by Ugaglia), comes to us through secondary textual sources that link Garzoni with a manuscript on the lodestone.¹⁸ Information on Garzoni's life is scarce and comes mainly from archival documents from the Society of Jesus, to which Garzoni belonged.¹⁹ He was born into a patrician family in Venice in 1543, began his philosophical studies before 1565 and entered the Society of Jesus in Brescia in 1568. We know that he lectured philosophy in Padua and also studied theology there. From 1679 onwards he stayed in Venice again – interrupted by a brief stay in Verona around 1588 – and died in Venice in 1592. These biographical traces, not only are very scarce, but they also are not helpful in understanding the reasons and circumstances for his interest in magnetism. Moreover, Ugaglia confirms that it “is [...] impossible to reconstruct Garzoni's didactic career, in the course of which he might have written his treatise”.²⁰

Ugaglia's dating of MS0 to the 1580s is partly due to biographical evidence on Garzoni's teaching activity and partly to the fact that MS0 contains reference to a work written by Francesco Maurolico (1494–1575) and published in 1575.²¹ Already in 1593, then in 1599 and in 1676, Jesuit bibliographies report that Garzoni was the author of a work on the lodestone.²² One of these works also reports

18 Cf. Timoteo BERTELLI, “Sulla epistola di Pietro Peregrino di Maricourt e sopra alcuni trovati e teorie magnetiche del secolo XIII”, *Bullettino di bibliografia e di storia delle scienze matematiche e fisiche* 1 (1868), pp. 65–99, 101–39, 319–420 (pp. 23–24); BALMER, *Beiträge zur Geschichte der Erkenntnis des Erdmagnetismus*, p. 65.

19 Cf. UGAGLIA, “Introduzione”, pp. 10–11.

20 Cf. UGAGLIA, “The Science of Magnetism before Gilbert”, p. 62.

21 Cf. UGAGLIA, “Introduzione”, p. 11. Cf. also below, note 151.

22 Cf. *ibid.*, pp. 12–13. Cf. also Antonio POSSEVINO SJ, *Bibliotheca selecta qua agitur de ratione studiorum in historia, in disciplinis, in salute omnium procuranda*, 2 vols, Roma, Typographia Apostolica Vaticana, 1593, vol. 2, pp. 114, 135; IDEM, *Apparatus ad philosophiam, primo ad eam, quae uera est*, Vicenza, G. Graecus, 1599, pp. 107r, 163v; Pedro DE RIBADENEYRA SJ, *Bibliotheca scriptorum Societatis Jesu. Opus inchoatum a R. P. Petro Ribadeneira, ... anno... 1602. continuatum a R. P. Philippo Alegambe... usque ad*

that Leonardo's brother, Costantino Garzoni SJ,²³ wanted to print his work after his death.²⁴ In 1645, the Jesuit Mathematician, Mario Bettini,²⁵ reports that Garzoni's nephew ("nepos"), Marco Garzoni SJ,²⁶ asked him to translate Garzoni's work from Italian into Latin and to print it.²⁷ He did not accept this request, not least because Garzoni's teachings already had become widely disseminated ("vulgata").

Early-modern authors learnt indirectly from Garzoni's studies mainly through the works of two Italian Jesuits: Niccolò Zucchi and Niccolò Cabeo.²⁸ Cabeo's *Philosophia magnetica* (1629), which was printed almost fifty years after the presumed dating of Garzoni's work, refers directly in his preface to Garzoni's studies; indeed, he accuses Giambattista Della Porta of plagiarising Garzoni.²⁹ In his work, Cabeo does not quote Garzoni directly, but he drew heavily on Garzoni's study, while he occasionally also criticises his fellow-Jesuit's theories, for a number of complex reasons that lie outside the scope of this study.³⁰ For his part, Zucchi reports in an unpublished study on magnetism ("*Philosophia magnetica per principia propria proposita et ad prima in suo genere promota*"), that he had used Garzoni's work in 1612 for his own writing and research.³¹ Along with Della Porta, Zucchi also accuses Paolo

annum 1642, recognitum et productum ad annum... 1675. a Nathanaele Sotvello, Roma, J. A. de Lazzaris Varesius, 1676, p. 549. Interestingly, in 1593, Possevino relates that Garzoni's manuscript "exists" in a non-specified Jesuit library ("exstat apud nos"), while in 1599 the manuscript "existed" in some library ("exstabat apud nostros"). Possibly, Garzoni's manuscript was transferred to another library meanwhile. Cf. also note 147.

23 Costantino Garzoni, * 1547(?), † 1629 (UGAGLIA, "Introduzione", p. 10).

24 Cf. RIBADENEYRA, *Bibliotheca scriptorum Societatis Jesu*, p. 138.

25 Mario Bettini, * 6.II.1582 Bologna, S.J. 1595, † 7.XI.1657 Bologna (*Sommervogel* I, 1426).

26 Marco Garzoni, * 1571 Venice, S.J. 1591, † 2.X.1630 Venice (*Sommervogel* III, 1250).

27 Cf. Mario BETTINI SJ, *Apiaria universae philosophiae mathematicae*, Bologna, J. Bapt. Ferronius, 1642, p. 87 (IX, *progymn.* V, X). On Marco Garzoni, cf. note 79.

28 Cf. UGAGLIA, "Introduzione", pp. 13–15.

29 This plagiarism accusation is also repeated in RIBADENEYRA, *Bibliotheca scriptorum Societatis Jesu*, p. 138. On the historical notion of 'plagiarism', cf. also note 150.

30 Cf. Nicolò CABEO SJ, *Philosophia magnetica*, Ferrara, F. Succius, 1629, praef., pp. 23, 56, 57, 144, 155, 156, 275, 276, 284, 397, 398. Cf. also below, note 102.

31 Cf. Rome, Biblioteca Nazionale Vittorio Emanuele II, *Fondo Gesuitico* 1323: Niccolò ZUCCHI SJ, "*Philosophia magnetica per principia propria proposita et ad prima in*

Sarpi and William Gilbert of plagiarising his fellow-Jesuit's work. Specifically, it was alleged that Sarpi would have had access to Garzoni's manuscript and would have passed it on to Gilbert and others; Zucchi maintained that the proof for this was in the (lost, and therefore unverifiable) letters between Sarpi and Gilbert. In this context, Zucchi mentions only some key points from Garzoni's theories.³²

Another Jesuit, Juan Eusebio Nieremberg,³³ made reference to Cabeo's *Philosophia magnetica*, in an appendix that Nieremberg added to his *Curiosa y oculta filosofia* (1630) – a work that dealt with the lodestone itself in one of its books.³⁴ In this appendix, Nieremberg referred to Garzoni as well, although his knowledge of Garzoni's work evidently was transmitted through Cabeo alone. Nieremberg furthermore tells his readers that he had access to read Cabeo's work only after he had composed his own treatise

suo genere promota" (fols. 59r–78r). The reference to Garzoni is on fols. 62v–63r. An extended version of this study was published in Niccolò ZUCCHI SJ, *Nova de machinis philosophia in qua, paralogismis antiquae detectis, explicantur machinarum vires unico principio, singulis immediate*, Roma, Manelphius, 1649, pp. 145–227. In this printed text, no reference is made to Garzoni or Sarpi. It can be assumed that Zucchi began his studies on magnetism at the Roman College in 1612 and continued to rework his manuscript at least until 1653, as he discussed a theory by Emmanuel Maignan, which Zucchi mistakenly dates to 1613, but actually was published in 1653 (*Cursus philosophicus: Pars secunda philosophiae naturae*, Toulouse, Bosc, 1653).

32 Zucchi mentions that his Jesuit confrere did not know about the magnetic "radiation" of the Earth, but that he did know about the directive power and the declination of the magnetic needle from the (geographical or celestial) North Pole, although not about its local variation, (that is, the extent of declination varies in different places).

33 Juan Eusebio Nieremberg, * 1595 Madrid, S.J. 1614 Salamanca, † 7.IV.1658 Madrid (Sommervogel V, 1725).

34 Cf. Juan Eusebio NIEREMBERG SJ, *Curiosa filosofia, y tesoro de maravillas de la naturaleza, examinadas en varias cuestiones naturales*, Madrid, Imprenta del Reyno, 1630, p. 213v; IDEM, *Curiosa filosofia y tesoro de maravillas de la naturaleza, examinadas en varias cuestiones naturales*, Madrid, Imprenta del Reyno, 1634, p. 172v. This reference is unknown to Ugaglia. Cf. on Nieremberg also Víctor NAVARRO BROTONS, "Tradition and Scientific Change in Early Modern Spain: The Role of the Jesuits", in: Mordechai FEINGOLD (ed.), *Jesuit Science and the Republic of Letters*, Cambridge, Mass., MIT Press, 2003, pp. 285–330 (p. 335); Víctor NAVARRO BROTONS, "Los jesuitas y la enseñanza, asimilación y difusión de los saberes y prácticas científicas en la España del siglo XVII", in: Luís Miguel CAROLINO, Carlos ZILLER CAMENIETZKI (eds.), *Jesuitas, ensino e ciência: séc. XVI–XVIII*, Casal de Cambra, Portugal, Caleidoscópio, 2005, pp. 135–61 (p. 144); D. Scott HENDRICKSON, *Jesuit Polymath of Madrid: The Literary Enterprise of Juan Eusebio Nieremberg (1595–1658)*, Leiden/Boston, Brill, 2015, pp. 102–03.

on magnetism.³⁵ Similarly, in Athanasius Kircher SJ's³⁶ work concerning the lodestone (*Magnes*, 1641), and in notes taken from Kircher's *Magnes* by Danish physician Nicolaus Steno (1638–86), Garzoni is mentioned briefly, but always together with Cabeo and without further details.³⁷ Hence, we cannot assume that any of these later authors knew Garzoni's work directly, but only indirectly, through Cabeo's 1629 references to Garzoni's work.

According to current research, then, the supposition of Garzoni's authorship of MS0 is based on three main foundations. First, according to the testimony of later seventeenth-century sources, Garzoni had addressed this topic, and the little direct information that we have about it from these sources aligns with the content of MS0; second, Cabeo's work – the most akin to Garzoni content-wise – resembles the content of MS0, sometimes strikingly; third, by the nineteenth century, the manuscript had been attributed to Garzoni in the Ambrosian index.

The second major source of circumstantial evidence relating to MS0 specifically concerning its reception is linked to the names of Della Porta, Sarpi and Gilbert, in turn later connected to Garzoni's work by his fellow-Jesuits, Cabeo and Zucchi. This is despite the fact that Garzoni's name does not appear anywhere in the works of the three above-mentioned authors (Della Porta, Sarpi and Gilbert). The threads that link them, instead, need to be traced through the figure of Della Porta and his connection to Sarpi. In 1589, Della Porta published a long treatise on the lodestone as the seventh book of his *Magia naturalis*, in which he presented numerous magnetic experiments.³⁸ In the preface to this treatise, Della Porta explicitly mentions Sarpi as a specialist on 'magnetism', to whom he owed

35 Cabeo's work was finished in October 1629, while Nieremberg's work was printed in August 1630: however, Nieremberg seems to have completed his text already in July 1629, a few months before Cabeo's was finished. It would seem, thus, that Nieremberg did not want to change the contents of his work at the time of its publication a year later, and decided instead to acknowledge Cabeo's work in the appendix.

36 Athanasius Kircher, * 2.V.1602 Geisa (Germany), S.J. 2.X.1618 Paderborn, † 27.XI.1680 Roma (*Sommeroogel* IV, 1046).

37 Cf. Athanasius KIRCHER SJ, *Magnes, sive de arte magnetica opus tripartitum*, Roma, L. Grignanus, 1641, proem., p. 87; Niels STENSEN, *Niels Stensen: A Danish Student in His Chaos Manuscript*, 1659, H. D. SCHEPELERN (ed.), Copenhagen, Univ. Libr., 1987, p. 15. According to Schepeleern, Steno excerpts the section from the introduction to Kircher's *Magnes*. Ugaglia also does not mention the section by Steno.

38 Cf. note 3.

much.³⁹ In *De magnete*, Gilbert confirmed that much of Della Porta's information derived from Sarpi, and that Della Porta had limited knowledge about magnetic phenomena.⁴⁰ Much later, Cabeo and Zucchi raised similar accusations, as we have noted previously.

In the case of Sarpi, unfortunately little has remained of his original studies on magnetism; his reflections in the *Pensieri* are fragmentary and do not address the subject of experimental research on the effects of magnetism, while his correspondence after 1602 revolves mainly around the topic of magnetic declination.⁴¹ Moreover, while we have reports on Sarpi's manuscript studies on magnetism by two eighteenth-century historians, Francesco Grisellini (1717–87) and Marco Foscarini (1696–1763), their comments cannot be verified because Sarpi's manuscript was lost in a fire in Venice in 1769.⁴² Nevertheless, in Grisellini's biography of Sarpi, the historian, natural scientist and geographer mentions a two-part work written by Sarpi, containing in the first part some notes ("detatte") without a specific order, and in the second part a compilation of 141 phrases on magnetic phenomena, where the most important areas of experimental research were summarised cursorily. Almost contemporaneously, the Venetian Foscarini described a treatise on

39 Cf. DELLA PORTA, *Magia naturalis*, p. 127; UGAGLIA, "Introduzione", p. 62.

40 Cf. GILBERT, *De magnete*, p. 6.

41 Cf. Paolo SARPI, *Lettere di Fra Paolo Sarpi*, Filippo Luigi POLIDORI (ed.), 2 vols, Firenze, G. Barbèra, 1863, vol. 1, pp. 8, 10–11, 68; vol. 2, p. 9; Paolo SARPI, *Lettere ai gallicani*, Boris ULIANICH (ed.), Wiesbaden, F. Steiner, 1961, pp. 4, 6–8, 10, 13, 67–68, 38; Paolo SARPI, *Pensieri naturali, metafisici e matematici*, Luisa Cozzi, Libero Sosio (eds.), Milano/Napoli, R. Ricciardi, 1996, pp. 509–12. On this, cf. also Antonio FAVARO "Giovanfrancesco Sagredo e Guglielmo Gilbert", in: Lucia ROSSETTI, Maria Laura SOPPELSA (eds.), *Adversaria Galilaeiana: serie I–VII (Contributi alla storia dell'Università di Padova)*, Trieste, Edizioni Lint, 1992, pp. 100–03; GARZONI, *Trattati della calamita*, pp. 68–79; Petrus Josephus VAN KESSLER, "Paolo Sarpi, Galileo Galilei and the Philologists", *Mededelingen van het Nederlands Instituut te Rome* 36 (1974), pp. 101–12; Nicla RIVERSO, *Paolo Sarpi: A Scholar in the Age of Transformation*, Ph.D. diss. University of Washington, 2010, pp. 116–25, 127–32; Libero SOSIO, "Paolo Sarpi, un frate nella rivoluzione scientifica", in: C. PIN (ed.), *Ripensando Paolo Sarpi: atti del convegno internazionale di studi nel 450o anniversario della nascita di Paolo Sarpi*, Venezia, Ateneo veneto, 2006, pp. 183–236 (pp. 189–96).

42 On this fire, cf. UGAGLIA, "Introduzione", p. 72, note 128. Cf. Francesco GRISELINI, *Memorie anecdote spettanti alla vita ed agli studj del sommo filosofo e giureconsulto f. Paolo Servita*, Losana, G. Nestenus, 1760, pp. 34–42, 359. Sarpi's manuscript also is mentioned in: Venice, Biblioteca Nazionale Marciana, *mss. Italiani* cl. 11, n. 8 123 (6932): "Miscellanea di storia veneziana" (fols. 221v, 362v); Venice, Biblioteca Nazionale Marciana, *mss. Italiani* cl. 2, n. 8 129 (4914): "Opuscoli e frammenti del Padre Paolo Sarpi" (pp. 170, 279).

magnetism by Sarpi as part of the Venetian manuscript collection, but he only mentions the second treatise with the 141 experiments, which comprised twenty pages. Included in Foscarini's notes, a confrere of Sarpi writing much later than him, Bonfiglio Capra OSM, paraphrases two of Sarpi's experiments and a further unknown author compares the whole dossier with the experiments of the well-known natural scientist, Pieter van Musschenbroek (1692–1761). Capra's comments also belong to the eighteenth century, and all of these authors from that period – Grisellini, Foscarini, Capra, and the anonymous author – aim to present Sarpi as a pioneer researcher on magnetism. Exact quotations from Sarpi's treatises, however, cannot be found, neither in Foscarini's, nor in Grisellini's works.

Ugaglia's analysis not only takes into account these archival references, but also endeavours to make connections between them, biographically in the first instance, and content-wise in the second instance. The most important connections identified by Ugaglia will be summarised briefly here, while the biographical references require some further elaboration. First, Sarpi and Della Porta not only knew each other, but both also dealt with Pinelli, the owner of the library where the MS0 was preserved.⁴³ We may add that all three were in contact in Venice, while Sarpi was in touch with Pinelli in Padua as well.⁴⁴ In addition, in his *Pensieri*, Sarpi referred to a sort of magnetic gadget, which he apparently saw in Naples, perhaps in Della Porta's Accademia de' Secreti, the Academy founded by Della Porta around 1560, where he performed his magic show and where Sarpi was a visitor.⁴⁵ We know, too, that Garzoni worked and taught in Padua and Venice. Pinelli also was in contact with

43 Cf. Adolfo RIVOLTA, *Contributo a uno studio sulla biblioteca di Gian Vincenzo Pinelli*, Monza, Scuola tipografica editrice Artigianelli, 1914, p. 36; GARZONI, *Trattati della calamita*, p. 70; Tommaso CAMPANELLA, *Lettere, 1595–1638: non comprese nell'edizione di Vincenzo Spampanato*, Germana ERNST (ed.), Pisa/Roma, Istituti editoriali e poligrafici internazionali, 2000, p. 116; Germana ERNST, *Tommaso Campanella the Book and the Body of Nature*, Dordrecht/New York, Springer, 2010, pp. 25–26; Jaska KAINULAINEN, *Paolo Sarpi: A Servant of God and State*, Leiden/Boston, Brill, 2014, pp. 59–60; WOOTTON, *The Invention of Science*, pp. 273–74.

44 Cf. Fulgenzio MICANZIO, *Vita del Padre Paolo, dell'ordine de' servi e theologo della serenissima Repubblica di Venetia*, Venezia, 1658, pp. 49, 74, 75, 83. Cf. also William EAMON, *The Professor of Secrets: Mystery, Medicine, and Alchemy in Renaissance Italy*, Washington, D.C., National Geographic, 2010, p. 200.

45 Cf. SARPI, *Pensieri naturali, metafisici e matematici*, p. 236. On Della Porta's Academy, cf. William EAMON, *Science and the Secrets of Nature: Books of Secrets in Medieval and Early Modern Culture*, Princeton, N.J., Princeton University Press, 1994, pp. 194–233.

the Society of Jesus, which later even tried to acquire his library.⁴⁶ If MS0 was written by Garzoni, it seems highly probable that the manuscript was accessible to Sarpi as part of Pinelli's collection, and that Sarpi possibly sent or gave copies to Della Porta and Gilbert.

In the case of Gilbert, the facts are less clear. The reports that Gilbert knew of Garzoni's work stem from the Jesuits' later polemical accusations of plagiarism.⁴⁷ As to his links with Sarpi, Gilbert's letters apparently were destroyed in the 1666 Great Fire of London, and the known remaining sources do not mention anywhere that he knew Sarpi or that he received anything from him.⁴⁸ While it remains unclear whether Sarpi and Gilbert had ever met in person, Sarpi's first biographer, Fulgenzio Micanzio (1570–1654), explained that in Venice Sarpi had met a certain "ultramontano" who was researching magnetism.⁴⁹ Whether that researcher was Gilbert is only speculation, but if a meeting did take place, the evidence points to it occurring after 1600.

As to the links between the two men's research and writing on magnetism, we know from Sarpi's extant correspondence that he had made no reference to magnetism prior to 1600. Then, his letters from 1602 attest that he had studied Gilbert's work, *De magnete* (1600), and that he greatly appreciated the book.⁵⁰ References to Gilbert's work in Sarpi's surviving letters are limited mainly to the geomagnetic theory of declination. According to Grisellini/Foscarini, however, this was only one topic among many others that Sarpi apparently had addressed in his now-lost manuscript. Whatever the case, the surviving evidence suggests that Sarpi seemed to have focused solely on one specific aspect of *De magnete*, and did not even mention the large variety of Gilbert's experiments, which the Englishman was accused of having plagiarized from the Servite's own work, according to the Jesuit, Zucchi.

Sarpi's admiration of Gilbert makes it unlikely that he would have considered Gilbert as having plagiarised his work. In contrast

46 Cf. Paolo GUALDO, *Vita Ioannis Vincentii Pinelli, patricii Genvensis: in qua studiosis bonarum artium, proponitur typus viri probi & eruditi*, Augsburg, Christophorus Mangus, 1607, pp. 38, 45; NUOVO, "The Creation and Dispersal of the Library", pp. 43, 45, 47, 56.

47 On the controversy of the Jesuits against Gilbert, cf. PUMFREY, *William Gilbert's Magnetic Philosophy*, pp. 134–95.

48 Cf. *ibid.*, p. 18.

49 Cf. Micanzio, *Vita del Padre Paolo*, p. 62. Cf. also KAINULAINEN, *Paolo Sarpi*, p. 59.

50 Cf. note 41.

to Sarpi, Della Porta accused Gilbert of plagiarising his work on magnetism, a charge he made in the Italian translation of his *Magia naturalis* (1611).⁵¹ But we must take into account that Della Porta was seventy-six years old at this point, and already on previous occasions he had raised accusations of plagiarism, evidently relating to concerns over his scientific legacy; in a letter from 1611, Della Porta again accused Gilbert of plagiarism, and of Copernicanism.⁵²

Following Ugaglia's analysis, further, a line of argument may be traced in relation to the content of MS0 that is similar to that concerning the biographical considerations discussed above. For example, it would seem that Della Porta not only described experiments that he probably had not conducted, but he also gave explanations that seemed to be taken from others.⁵³ The experiments were similar in many ways to those described in MS0, and on occasion can be considered direct translations from the Italian, particularly in the first part of the second treatise of MS0. Della Porta also borrowed a key theoretical notion that the author of MS0 had developed thoroughly (the so-called *due faccie* of the lodestone), but in a way that blurred the explanatory capacity of this concept, quite possibly due to lack of knowledge or understanding of the actual theory.⁵⁴ This will be discussed further below.

51 Cf. Giambattista DELLA PORTA, *Della Magia Naturale del Sign. G.B. della Porta ... libri XX. Tradotto da Latino in volgare, con la giunta d'infiniti altri secreti, etc.*, Giovanni DE ROSA (transl.), Napoli, Gio. Giacomo Carlino, 1611, p. 291. Cf. also Silvio MAGRINI, "Il De magnete del Gilbert e i primordi della magnetologia in Italia in rapporto alla lotta intorno ai massimi sistemi", *Archivio di storia della scienza* 8 (1927), pp. 17–39 (pp. 21–27); Luisa MURARO VAIANI, *Giambattista della Porta mago e scienziato*, Milano, Feltrinelli, 1978, p. 143; PUMFREY, *William Gilbert's magnetic philosophy*, p. 77.

52 The issue of Della Porta's old age is also addressed by PUMFREY, *William Gilbert's magnetic philosophy*, p. 90. On Della Porta's plagiarism accusations, cf. Louise George CLUBB, *Giambattista della Porta, Dramatist*, Princeton, N.J., Princeton University Press, 1965, pp. 44–45. These accusations also concern the invention of the telescope, that Della Porta attributed to himself. The letter, in which Della Porta harshly attacks Gilbert as "barbarus anglus", is edited in Giuseppe GABRIELLI, "Giovanni Battista della Porta Linceo", *Giornale critico della filosofia Italiana* 8 (1927), p. 373. This accusation evidently is added by the translator (Giovanni de Rosa), but this actually is a pseudonym of Della Porta, cf. CLUBB, *Giambattista della Porta*, p. 35.

53 Cf. UGAGLIA, "Introduzione", pp. 53–60. Cf. also note 101.

54 Cf. note 100 and also Bernardo CESI SJ, *Mineralogia sive naturalis philosophiae thesauri*, Lyon, Prost, 1636, p. 537; Alfonso PANDOLFI, *Disputationes De Fine Mvndi: In Quobus Quaecunq; a Varijs Philosophorum Sectis in hoc argumento naturali lumine sunt constituta, refelluntur. Euangelica, Propheticaque doctrina vnice recipitur, & propugnatur. Opus posthumum*, Bologna, Ferronius, 1658, p. 251. Cesi borrows the expression "facies magnetis" from Della Porta; Pandolfi, who describes himself

As to the link between Sarpi and MS0, some pertinent observations may be made. First, from the scant information that we have, we know that Sarpi's manuscript on magnetism reflects what is found in MS0 and that his experiments – as far as we know about them indirectly – seem to resemble those from MS0. Second, the two-part division of Sarpi's work appears to correspond *prima facie* to the two-part division of MS0; however, the two manuscripts differ significantly in length, and Sarpi's twenty pages cannot be considered comparable to the tenfold longer MS0. Third, in the first part of the second *trattato*, MS0 contains a list of magnetic phenomena – 129 at most (although they are not numbered this way) – and not the 141 identified with Sarpi's work. Fourth, Sarpi's reported calculation of the magnetic inclination at 45° cannot be found in Garzoni. However, it seems that the similarities outweigh the differences, leading Ugaglia to present the following conclusions: the probability that Sarpi knew MS0, or parts of it; that he engaged in some modifications (by adding experiments, and shortening theoretical parts), which he then transmitted to Della Porta in one way or another before 1589; and that Della Porta in turn used the text in his *Magia naturalis*. These conclusions will be corroborated and developed in the course of the present analysis through the presentation of further evidence.

As with Sarpi, Ugaglia's analysis reveals several similarities between MS0 and Gilbert's later work.⁵⁵ Yet, as we have noted already, such similarities cannot be borne out through biographical data, except by supposition – that Sarpi had sent materials to Gilbert. On a philological level, meanwhile, only vague similarities can be found, and, unlike Della Porta, Gilbert's work does not contain almost-literal transcriptions of MS0. Also in contrast to Della Porta, Gilbert integrates the experiments in a completely independent metaphysical framework, evidently not deriving his findings directly from those contained in MS0.⁵⁶ Even though Gilbert's alleged plagiarism as a possible line of MS0's reception cannot be excluded,

as Cabeo's "concivis" and "amicus" (p. 249), discusses Cabeo's translation of Garzoni's concept.

55 Cf. UGAGLIA, "Introduzione", pp. 60–68.

56 In turn, one might also expect to find similarities in a comparative reading of Della Porta's *Magia naturalis* and Gilbert's work. VAIANI, *Giambattista della Porta mago e scienziato*, pp. 143–84, thoroughly keeps track of the content similarities between Della Porta and Gilbert. However, in this case, direct evidence of plagiarism cannot be demonstrated philologically, at least, of the kind that Della Porta levelled against Gilbert.

it is much more difficult to argue than the line that identifies MS0 with Garzoni as author, then links it with Sarpi, and then with Della Porta: it is this interpretive thread that will inform the analysis that follows.⁵⁷

3. Tracing New Textual Links by Way of the “Trattato delli maravigliosi effetti della calamita et delle cause loro” (MS1)

The current state of research, based on one known relevant textual artefact (MS0), now can be developed further on account of the two other textual works mentioned in the essay’s introduction. The first of these manuscripts, “Trattato delli maravigliosi effetti della calamita et delle cause loro”, or MS1, has never received scholarly attention; here, it will be shown that it contains important new information that points to MS1 constituting a clean copy (“Reinschrift”) of MS0, presumably conceived by Garzoni himself, revised, and developed in preparation for printing. While it cannot be shown with certainty that the copy analysed here was produced by Garzoni himself, or even that it was edited during Garzoni’s lifetime, or was a copy of another (lost) manuscript, its particular features link it with MS0 in many salient ways that warrant further attention.

The scarce codicological evaluations of MS1 date it to the seventeenth or eighteenth centuries, but without providing evidence for this dating.⁵⁸ The manuscript has its own binding and contains 225 folia, that is, about 450 pages, with the format 222 x 165 mm. It is held in the Spanish National Library in Madrid with the shelfmark “Ms 2020”. Its previous shelfmark (“L. 129”) reveals its provenance: it belonged to the collection of the nineteenth-century literary figure, Serafín Estébanez Calderón.⁵⁹ However, the original provenance of MS1 remains unclear. The title page reads: “Trattato delli maravigliosi effetti della calamita et delle cause loro. Distinto in due libri”. No editor or author is mentioned, either on the title

57 Cf. UGAGLIA, “Introduzione”, pp. 49–50. Ugaglia does not exclude that Norman and Sennert could have known Garzoni’s work (cf. note 4). However, there are no good reasons to argue in favour of this view either.

58 Cf. *Inventario general de manuscritos de la Biblioteca Nacional*, 7 vols, Madrid, Ministerio de Educación Nacional, Dirección General de Archivos y Bibliotecas, 1959, vol. 5, p. 423; Paul Oskar KRISTELLER, *Iter Italicum: A Finding List of Uncatalogued or Incompletely Catalogued Humanistic Manuscripts of the Renaissance in Italian and Other Libraries*, 7 vols, London, Warburg Institute, 1963, vol. 4, pp. 519ff; Gregorio DE ANDRÉS, “La colección de manuscritos del literato Serafín Estébanez Calderón en la Biblioteca Nacional”, *Cuadernos para la Investigación de la Literatura Hispánica* 14 (1991), pp. 79–97 (p. 91).

59 Cf. DE ANDRÉS, “La colección de manuscritos”, p. 91.

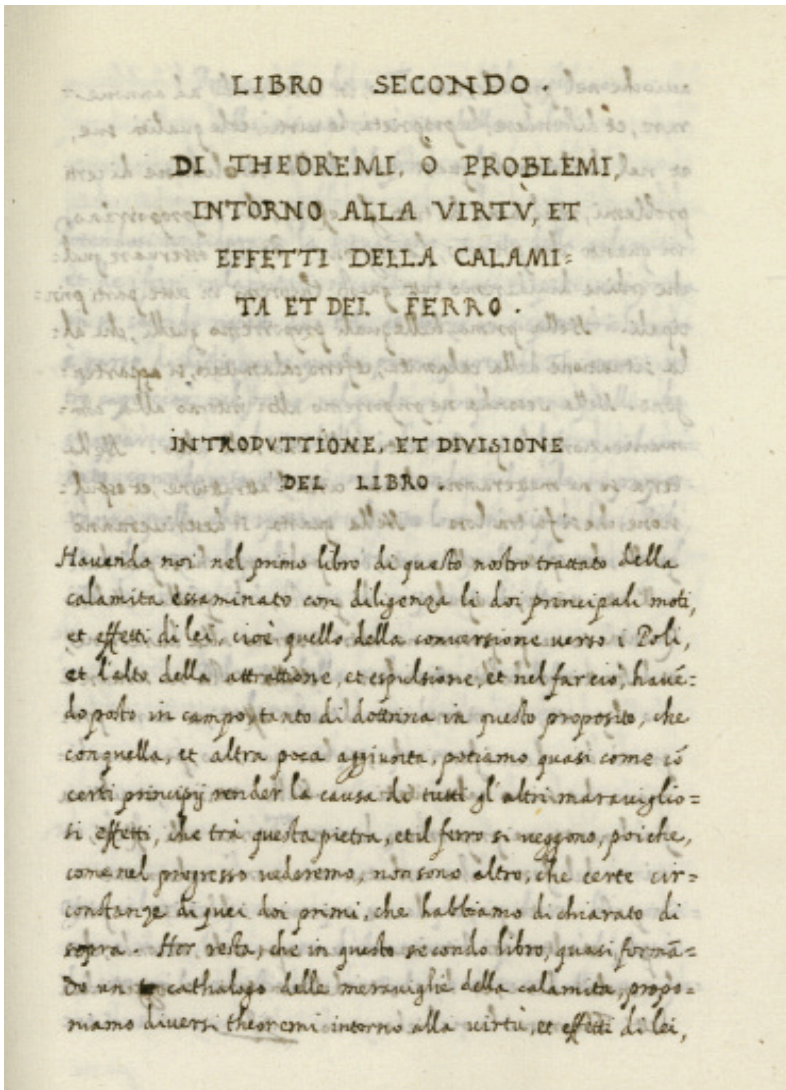


Fig. 1

Beginning of the second book of MS1
 Madrid, Biblioteca Nacional, Ms 2020: "Trattato delli marauigliosi effetti
 della calamita et delle cause loro"
 (fol. 141r)

page or in any other place. Furthermore, there is no colophon, but the last page (225r) is marked with a sign which indicates the end of the transcription.

3.1 The Structure of MS0 and MS1

The structure of MS1 is very similar to that of MS0, hence it makes sense to analyse them comparatively.⁶⁰ As noted previously, MS0 comprises two treatises. The first treatise (1r–73r) is identified as the “first book” in the introductory table of contents (250r: “Tavola delli capitoli del primo libro”). It contains seventeen chapters, in which the author presents his natural philosophical principles of two magnetic “movements”: directive force and attractive force. To these are added a few doxographical chapters and fragments that critically address the positions of previous scholars. The “second treatise” (76r–105v) in MS0 is further divided into “two parts”. The first of these parts (76r–86v) comprises short descriptions of experiments and magnetic phenomena, which are numbered in ninety short “conclusions”, accompanied by thirty-nine “corollaries” (“Corollario”) inserted in between. The second part of this second treatise (86v–105v) is devoted to the explanation of each of these magnetic phenomena, in light of the theoretical concepts of the first treatise. This last part remained incomplete, and only seventeen of the ninety phenomena were explained.⁶¹ The structure is outlined, not only through the respective headings and the table of contents, but also in an introduction (1r). This structure can be described as follows:

- Book/Treatise 1 (1r–73r)
 - Introduction
 - 17 chapters
- Treatise 2 (76r–105v): *Trattato secondo della Calamita, diviso in due parti*
 - Part 1 (76r–86v): *Parte prima. Nella quale si propongono 90 conclusioni nelle quali si contengono quasi tutti li effetti che intorno a li moti della attrattione e del voltarsi a i Poli nel ferro et nella calamita si veggono*
 - 90 conclusions and 39 corollaries
 - Part 2 (86v–105v): *Seconda parte del secondo trattato, nella*

60 Cf. UGAGLIA, “The Science of Magnetism before Gilbert”, pp. 62–63.

61 WOOTTON, *The Invention of Science*, pp. 273–74, surmises that the lost part went missing during the transportation of the manuscript. From a codicological point of view, there is no evidence that points to this.

quale si rende la causa delli effetti proposti nella prima
-17 explanations

MS1 is divided clearly into two books. The first book (2r–139r) revolves around the natural philosophical principles of the movements of the lodestone, also accompanied by doxography and criticism to previous scholars. Unlike MS0, this book is divided further into two parts, both complete, and each devoted to one of the two magnetic movements: the first part (4r–54r), in eight chapters, addresses the directive force, while the second part (54r–139r), in ten chapters, discusses the attractive force. The second book (141r–225r) is devoted to the “Theorems or Problems” of magnetic effects (cf. Fig. 1), analysed in two parts: first (142r–209r), magnetic phenomena related to the position or orientation of the lodestone; and second (209v–225r), those phenomena related to magnetic susceptibility, in particular iron’s capacity to be magnetized by a lodestone. The first part has four chapters – the first two chapters contain eleven theorems each, and the second two sections contain eighteen and thirty-three theorems respectively; the second part has two chapters with a total of twenty theorems, seventeen and three respectively.

The codex does not include a table of contents. However, the introduction (3r–v) explicitly outlines its structure: the first book lays the foundations (“in universale della natura della calamita”) and the second focuses on individual phenomena (“descendendo piu al particolare”). The first part leads the way (“apra la strada”) to the second part, where the causes of the phenomena and their effects are explained (“trovare le cause”). This results in the following structure:

- Book 1 (2r–139r): *Della natura, e moti della calamita*
 - Introduction
 - Part 1 (4r–54r): *Prima parte del primo libro nella quali si tratta del primo moto di voltarsi ai polo [sic.]*
 - 8 chapters
 - Part 2 (54r–139r): *Seconda parte del primo libro, nella quale si tratta del secondo moto, cioè della attratione*
 - 10 chapters

- Book 2 (141r–225r): *Di theoremi o problemi intorno alla virtu, et effetti della calamita et del ferro*
 - Part 1 (142r–209r): *Prima parte dei Theoremi che spettano alla situatione o sito della calamita, et del ferro calamitato*
 - Chapter 1: 11 theorems
 - Chapter 2: 11 theorems

- Chapter 3: 18 theorems
- Chapter 4: 33 theorems
- Part 2 (209v–225r): *Seconda parte dei Theoremi, della communicatione della qualità della calamita ad altri corpi*
 - Chapter 1: 17 theorems
 - Chapter 2: 3 theorems

3.2 Closer Comparison between MS0 and MS1

Further comparisons between MS0 and MS1 are in order at this point, with respect to, (1) their structures, (2) some of their contents, and (3) codicological/palaeographic aspects. As we have mentioned already, a thorough analysis of content, methods and theories will not be undertaken here.

(1) The structure of MS1 is connected to the structure of MS0, and presents a preconceived development and elaboration of the latter. The first book of MS1 explicitly arranges the content according to the two main magnetic movements analysed (directive force, attractive force). This division follows MS0 only implicitly. This approach is manifested more clearly in the second book/treatise. In this section, both MS0 and MS1 proceed according to a formal deductive method: first, single observations are formulated, and then these observations are explained with recourse to the natural philosophical principles outlined in the first book/treatise.⁶² Both MS0 and MS1 likewise are divided into two parts but, while in MS0 this division is based on methodological criteria (each part corresponds to each step of the quasi-deductive method), in MS1 the structure is based on the two physical powers of the lodestone. Further, in MS1 the division of the theorems into two parts corresponds to the two types of physical properties/powers of the lodestone/iron (position and susceptibility). This order is followed implicitly already in the first part of the second treatise in MS0. In MS0, we find ninety conclusions and thirty-nine corollaries, while MS1 has ninety-three theorems. And, in contrast to MS0, each theorem in MS1 is followed immediately by an explanatory note. The structure of MS1 thus seems to indicate that it is a final version of MS0.

(2) With regard to content, primarily in the first parts of both MS0 and MS1, long segments can be identified as being identical in wording.⁶³ A more comprehensive treatment of this subject, such as a critical edition of MS1, would establish these correlations with more accuracy. Initial analysis nevertheless already reveals an especially important contrast

⁶² Cf. note 154.

⁶³ For example, the introduction in MS1 constitutes an almost exact transcription of the introduction in MS0, and the contents of the last chapter of the first book in MS1 – chapter eight – correspond to the eighth chapter in MS0.

between MS1 and MS0 regarding the first book. In a doxography of other authors, MS1 addresses (62v–63r) Della Porta's opinion in relation to the cause of magnetic attraction.⁶⁴ The whole passage is located between the critique of the opinions of Gerolamo Cardano (1501–76) and Petrus Peregrinus. This is interesting for two reasons. On the one hand, this paragraph on Della Porta cannot be found in MS0 (52r); here Peregrinus' opinion comes right after Cardano's. On the other hand, the section on Della Porta is based explicitly on his *Magia naturalis*, published in 1589. Hence this would constitute the *terminus a quo* of the composition of MS1. If we agree on Garzoni's direct authorship, his death on 10 March 1592 would be the *terminus ante quem*.

A comparison between MS0 and MS1 in relation to the second treatise is much more difficult to establish with accuracy. The magnetic phenomena that are described in both textual testimonies are very similar, often identical, but they are not an exact transcription of MS0, at least to the extent that this can be established in the absence of a critical edition of MS1. In addition, some theorems are mentioned in MS1 that have no correspondence with MS0. This shall be illustrated through three examples. First, MS0 mentions that a diamond cannot override the attractive force of the lodestone (86v, nr. 85). MS1 devotes a single theorem (169v, th. 18) to the misconception that a diamond could transfer a directive force to iron, accompanied by its extensive rebuttal. Della Porta also addressed this issue in 1589, and we do not find any trace of it in MS0.⁶⁵ Second, the author of MS1 also considered the idea of a magnetic telegraph as superstitious and mistaken (207r). This fantastic gadget was not mentioned anywhere in MS0, but it did appear in Della Porta's *Magia naturalis*.⁶⁶ Third, the penultimate

64 The passage says: "Simile a questa, in qualche parte è la opinione del porta, che dice che la calamita è una mistura di pietra, et di ferro, et che pure essendovi dentro più pietra, che ferro, il ferro che ivi sta rinchiuso per non esser sopra fatto, et vinto dalla pietra, desidera per conservarsi, et diffendersi le forze, et la compagnia del ferro, che sta fuori, et per questo lo tira, che se tal volta un pezzo di calamita tira l'altro, ciò non fa per la pietra, ma per il ferro, che vi sta chiuso dentro, ma se ciò è vero per qual causa, con una faccia la tira, et con l'altra la scaccia? Per qual ragione ancora un ferro calamitato tira a se un altro ferro? Forse perché in quel ferro vi è più di pietra che ferro, et pero richiede nuovo aiuto, et nuove forze dall'altro? O pure essendo in esso più ferro che pietra, non più il ferro ma la pietra che è in seno, desidera il comercio, et l'aiuto della pietra, o della virtù di lei, che sta nell'altro?"

65 Cf. DELLA PORTA, *Magia naturalis*, p. 145.

66 Cf. *Ibid.*, p. 128. Cf. also Giambattista DELLA PORTA, *Taumatologia e criptologia*, Raffaele SIRRI (ed.), Napoli, Edizioni scientifiche italiane, 2013, pp. 6–7; Timoteo BERTELLI, "Di un supposto sistema telegrafico magnetico: indicato da alcuni autori

theorem of MS1 (223r) concerns a stone that can be found in iron mines and is also magnetic. In the detailed explanation, this mineral is identified with the so-called “white lodestone”, made known, for example, through Gerolamo Cardano’s work, *De subtilitate* (1550).⁶⁷ Together with the usual location of this mineral on the island of Elba, off the coast of Tuscany, another location close to Naples is referenced (223v). This mineral is not mentioned either by Della Porta, or in MS0, and the reference to the location in Naples cannot be found in Cardano or in any other author’s work.

From this, it follows that the author of MS1 not only organised old material in a new way, and filled up gaps with recourse to the first part, but the writer also discovered new sources and gathered very thorough knowledge on the matter. This information was not obtained exclusively from other literary sources, but probably was collected through personal experience as well. Della Porta’s work of 1589 in particular was carefully inspected, interestingly enough without this leading to an accusation of plagiarism against him – a fact that shall be addressed in the final section of the paper.

(3) In relation to scope, palaeographic appearance, editorial revision and illustration of both manuscripts, it is possible to identify important differences between them. MS0, as already mentioned, is part of a composite manuscript and was produced by several scribes; it contains numerous corrections and additions and it remained incomplete. MS1 is a more complete work and about one-third longer than MS0, although for the moment the contrast in length can be established only in approximate terms, due to the fact that different scribes composed MS0 with varying formats. In the margins of both MS0 and MS1, numerous marginal titles can be found, typical of the printing style of the time: in MS0, however, these were added subsequently by another hand. And more importantly, MS1 was produced by a single, very meticulous, scribe who did not participate in the composition of MS0.⁶⁸

dei secoli XVI e XVII”, *Bullettino di bibliografia e di storia delle scienze matematiche e fisiche* I (1868), pp. 186–96.

67 Cf. Girolamo CARDANO, *De subtilitate libri XXI*, Basel, Petrina, 1560, p. 498; NORMAN, *The New Attractive*, p. 2; Ulisse ALDROVANDI, *Musaeum metallicum: in libros IIII distributum*, Bologna, Bernia, 1648, p. 560; Benedetto CERUTI, Andrea CHIOCCO, *Musaeum Franc. Calceolarii iun. Veronensis: in quo multa ad naturalem, moralemque philosophiam spectantia, non pauca ad rem medicam pertinentia erudite proponuntur, & explicantur; non sine magna rerum exoticarum supellectile*, Verona, Tamus, 1622, p. 263; Georges FOURNIER, *Hydrographie contenant la théorie et la pratique de toutes les parties de la navigation*, Paris, Soly, 1643, p. 532.

68 The hand that composed long sections (76r–95v) of the second treatise of MS0 has a certain similarity to the scribe of MS1.

Some corrections by a second hand in MS1 suggest a possible proofreading of the text.⁶⁹ The profusion of corrections in MS1 makes it plausible to conclude that this exemplar was intended as the print template, and that MS1 was not a mere late transcription of a now lost print template. Not only did the number of illustrations in MS1 increase in comparison to MS0, but they also were revised in many cases. While MS0 contains 105 illustrations and diagrams, MS1 possesses a total of 123, which can be considered a very rich array of pictures for a work of this nature. The quantity and accuracy of complex diagrams also suggest that MS1 was a print template, rather than a copy of it.

From this we can establish that the outer form and internal arrangement and content of MS1 point to a print template whose preparation was underway already during the compilation of MS0. However, the decisive arguments to support this thesis, as well as that identifying Garzoni's authorship of the work, are to be found outside the text. Previously, we noted that Jesuit bibliographical works mentioned not only that Garzoni had composed a book on the lodestone and that this book had never been printed, but also that his brother had intended to print it after Garzoni's death. Jesuit mathematician Bettini provides the decisive evidence on this point. The request made to him by nephew Marco Garzoni to translate his uncle's study on the lodestone into Latin made reference apparently to a work in which Garzoni enunciated "100 problems and 100 theorems".⁷⁰ The denominations "problems" or "theorems" appear already on the title of the second book of MS1, but are not mentioned with this terminology anywhere in MS0 (cf. Fig. 1).⁷¹ Bettini, thus, very likely identified MS1 as written by Garzoni.

3.3 Dating the MS1

With regard to the dating of MS1, it is clear that the manuscript could

69 Not only orthographic mistakes were amended, but semantic and morphosyntactic corrections also were made (32r, 32v, 65v, 68r, 77v, 79r). The corrections seldom appear as interlinear interventions; for the most part, they are inserted at the margin.

70 Cf. BETTINI, *Apiaria universae philosophiae mathematicae*, p. 87.

71 Indeed, this only refers to the second book of MS1, and the figure of 100 given by Bettini does not correspond to the actual ninety-three. This imprecision can be attributed to the fact that Bettini probably was making an approximate mention of this list, possibly even reflecting a general lack of interest in the proposal, which he turned down. The hypothesis that only the second book of MS1 corresponds to Garzoni's work seems less plausible, in the light of the narrow conceptual interrelation between the two parts and the methodologically-based structure of the study into two parts. Moreover, the second book of MS1 makes reference to the first book (e.g. 215v). Thus, if Garzoni is the author of the second book of the version provided in MS1, then he is also the writer of the first book.

not have been composed before 1589, on account of its reference to material from Della Porta's work published in that year. As to a possible *terminus ante quem*, a number of factors point to the improbability of it having been produced very far into the seventeenth century. Even if we discount the authorship issue and the year of Garzoni's death in 1592 – and assuming that the composer (or the author who completed the work) was an expert – the fact remains that neither Gilbert's *De magnete* of 1600, nor subsequent works by other authors on 'magnetism', are mentioned: Jesuit sources, for example, refer to Gilbert's work already from 1609.⁷²

The hypothesis that MS0 was an abridged version of an alleged original draft developed in MS1 also seems highly improbable. Compared to MS1, MS0 was much less developed, and nothing seems to suggest that the scribes of MS0 would have borrowed parts selectively from MS1, or that the scribes of MS0 intentionally would have omitted new literature and additional experiments from MS1.⁷³

Another important question about the dating of MS1 relates to the Jesuit Niccolò Cabeo, who we may recall mentioned Garzoni's work and obviously drew on it in his 1629 publication, *Philosophia magnetica*. If Cabeo's reference to Garzoni drew on MS1 (instead of MS0, or other unidentified textual precedents), the text of MS1 must have been composed before 1627, that is, the date when Cabeo's work received *imprimatur*.⁷⁴ As to the question of identifying MS0 or MS1 as possible sources for Cabeo's references to Garzoni, there remain arguments both for and against the hypothesis that Cabeo relied directly on MS1, rather than MS0. At first glance, some evidence seems to support the view that Cabeo used MS1, not MS0, as he mentions subjects present in MS1, but absent from MS0.⁷⁵ Moreover, Cabeo structures the four

72 Cf. Juan DE PINEDA SJ, *In Salomonem commentarios Salomon præuius, id est, De rebus Salomonis Regis libri octo*, Lyon, H. Cardon, 1609, pp. 208, 222; Luis ALCÁZAR SJ, *Vestigatio arcani sensus in Apocalypsi. Cum Opusculo de sacris ponderibus ac mensuris*, Antwerpen, Keerbergh, 1614, p. 226; Laurenz FORER SJ, *Disputatio philosophica, de magnete sive Herculeo lapide*, Ingolstadt, Haenlin, 1618, p. 4.

73 A further consideration on this score is that, in contrast to MS0, the second book of MS1 not only was completed – such that any 'explanation' missing from MS0 was added to MS1 – but also the theorems and explanations received systematic new arrangements. The structure of MS1 thus seems to suggest that MS1 drew on material from MS0, and on occasion rearranged it or added to it, and not the other way around.

74 Ugaglia has argued on several occasions that Cabeo might have known both treatises of MS0, that is, the more theoretical section as well as the more experimental one. Cf. UGAGLIA, "Introduzione", pp. 50–53.

75 For example, Cabeo mentions and criticises the superstition that a diamond could

books of his work in a similar way to MS1 (and not MS0, which is structured differently).⁷⁶ Such observations nevertheless should be tempered by the fact that the subjects introduced in Cabeo's work are set out differently in MS1, and the structure is still quite distinct from MS1 as well.⁷⁷ Several of the subjects dealt with by Cabeo also can be found in numerous texts of the time, and in similar forms, without necessarily having been drawn from MS1.⁷⁸ In other words, it is possible that Cabeo drew on MS0, making his own interpretations of that text; then, based on his knowledge of other literature, perhaps he chose to address topics that do not appear in MS0, and only coincidentally can be found in MS1 as well.

3.4 Author Attribution of MS1

The question about Garzoni's authorship similarly cannot be answered with certainty. The most obvious reason for this, of course, is that neither MS0 nor MS1 include reference to their author/s. This anonymity could suggest that the scribe of MS1 did not know the identity of MS0's author, and simply relied on its anonymous material. We can only speculate about this, while not excluding the possibility that Garzoni was the author.

As to the view presented in this essay – that Garzoni finished the preparation of MS1 before his death in 1592 – this is not the only conceivable scenario. An unknown colleague or a relative could have undertaken the completion of the work. However, there is no evidence to suggest that this was the case, given that the person would have required sound knowledge about magnetism (and therefore likely would be identifiable); Garzoni's relatives are not

magnetise an iron needle, and the alleged discovery of a magnetic telegraph. Cf. CABEO, *Philosophia magnetica*, pp. 274, 302.

76 Both in MS1 and in Cabeo's work, one book is dedicated to each of the natural philosophical principles of attractive and directive force, and one book each treats the effects (*effectus*) of each force.

77 Unlike MS1, Cabeo tackles first the attractive force, not the directive force. Furthermore, the second book of MS1 is devoted, not to the phenomena of attraction and orientation to the north, but to those of location and susceptibility. This thematic division does not have a direct equivalent in Cabeo's work.

78 For discussions about the diamond and the telegraph, cf. GILBERT, *De magnete*, p. 143; Famiano STRADA SJ, *Prolusiones academicae*, Lyon, P. Cavellat, 1627, p. 306; CERUTI, CHIOCCO, *Musaeum Franc. Calceolarii iun. Veronensis*, p. 266; Pierre Jean FABRE, *Palladium Spagyricum*, Toulouse, P. Bosc, 1624, pp. 78–79. Strada was a Jesuit, too: Famiano Strada, * 1572 Roma, S.J. 8.IX.1591 Roma(?), † 6.IX.1649 Roma (*Sommervogel* VII, 1605).

known to have possessed any such specialisation,⁷⁹ and the role of Costantino Garzoni seems to have been limited to seeking the completion of preparations for the printing of the “Due trattati” (“accept excudendum”).⁸⁰ The problem of the anonymity of MS0 and MS1, and the possible reasons for it, shall be addressed again in the final section of this essay.

4. “Della Calamita” (MS2): Further Explorations through New Textual Links

Hitherto, the “Della Calamita” text (or MS2) has been analysed only as part of a well-known manuscript collection of works by Della Porta, and not with respect to other manuscripts on magnetism. Here, it will be shown that MS2 constitutes a later copy, probably only slightly modified, of the missing manuscript attributed to Sarpi by his biographer, Grisellini, and by the Venetian librarian, Foscarini. According to this view, Sarpi would have copied fragments of MS0; he probably carried out a few modifications and then he sent this document to Della Porta, who may have made some more slight amendments. Afterwards, presumably after Della Porta’s death in 1615, Della Porta’s exemplar was copied in the Accademia dei Lincei, where he had been a member. At least one contemporary magnetic experiment was added to the text around 1635; this copy, or a later copy of it – originally owned by the Lincei – can be found in MS2. Tracing the complex trajectory of this manuscript is testament to its value and interest for some of the key players in early-modern scientific discourse; it sheds new light on the chronology and modes of transmission concerning ideas about magnetism among the subject’s leading protagonists and milieu.

MS2 is part of a composite manuscript known today as “Opere diverse non stampate di Gio. B. Della Porta”, held in the University Library of Montpellier, Section Medicine, under the shelfmark “ms. H. 169’”.⁸¹ The relevant part (p. 251–88) of the paginated manuscript

79 On Marco Garzoni (1571–1630), cf. Paul F. GRENLER, *The Universities of the Italian Renaissance*, Baltimore, Johns Hopkins University Press, 2002, p. 130.

80 Cf. RIBADENEYRA, *Bibliotheca scriptorum Societatis Jesu*, p. 549: “Scripsit, sed morte praeventus non evulgavit. [...] Leonardo demortuo, frater eius Constantinus librum suo asserturus Auctori accepit excudendum, avide a multis expertitum, et crebro a Nicolao Cabeo nostro in eiusdem argumenti opere commendatum.”

81 Cf. Guillaume LIBRI, *Histoire des sciences mathématiques en Italie, depuis la renaissance des lettres jusqu’à la fin du dix-septième siècle*, 4 vols, Paris, Renouard, 1841, vol. 4, p. 406; F. FIORENTINO, “Della vita e delle opere di Giovan Battista de la Porta”, *Nuova antologia di scienze, lettere ed arti* 21 (1880), pp. 251–84 (p. 272); GABRIELI, “Giovan Battista della Porta Linceo”, p. 365; Giuseppe GABRIELI, “Bibliografia Lincea I. Giambattista Della Porta”, *Rendiconti della R. Accademia nazionale dei Lincei, classe di scienze morali, storiche e filologiche* 8.6 (1932), pp. 206–77 (p. 221); Gioacchino

is titled “Della Calamita” (=MS2). The entire composite manuscript is part of a series of manuscripts in Montpellier, which belonged formerly to the Roman library of the Albani.⁸² As with many other Albani manuscripts, the document originally was held in the library of the Accademia dei Lincei, a scientific society founded in 1603. After the death of the Accademia founder, Frederico Cesi (1585–1630), these manuscripts were transferred to the library of Accademia member, Cassiano Dal Pozzo (1588–1657). The complete manuscript H. 169 has 391 pages, with the format 260x200 mm, and contains numerous works or textual fragments by Della Porta, especially of his unpublished “*Taumatologia*”.⁸³ At the end of the manuscript (385–91), there is a letter by Giovanni Battista Longo to an unknown addressee, dated 2 August 1635. Although the letter might have been enclosed later, according to palaeographic analysis neither Longo nor Della Porta can be considered scribes of the manuscript; therefore, it is certainly not an autograph.⁸⁴

To date, research has tended either to classify MS2 (that is, the section containing a treatise on the lodestone) as the preparatory work or draft of the section addressing the lodestone in Della Porta’s *Magia naturalis* of 1589; or it has established a link between MS2 and some brief statements on the procedures about how to increase the power of the lodestone, contained in Della Porta’s “*Taumatologia*”.⁸⁵ Only one study cites a short passage from MS2, but without evaluating its content or comparing it to other works on magnetism.⁸⁶

PAPARELLI, “La ‘*Taumatologia*’ di Giovambattista della Porta”, *Filologia romanza* 2 (1955), pp. 418–29 (p. 429); DELLA PORTA, *Taumatologia e criptologia*, pp. xii–xiii.

82 The manuscript H. 169 carried in this former library the signature N° 930. Cf. ADA ALESSANDRINI, *Cimeli linnei a Montpellier*, Roma, Accademia nazionale dei Lincei, 1978, pp. 19–46.

83 Cf. *Ibid.*, pp. 78–98. The scribe of MS2 corresponds however with the scribe of another manuscript on alchemy held in Montpellier (H. 168), which probably also derives from the Lincei.

84 Cf. *Ibid.*, pp. 88, 240. The letter was written by a scribe not involved in the writing of the rest of the composite manuscript of Della Porta’s works.

85 Cf. *Ibid.*, p. 94; FIORENTINO, “Della vita e delle opere di Giovan Battista de la Porta”, pp. 289–90; PAPARELLI, “La ‘*Taumatologia*’ di Giovambattista della Porta”, p. 429; DELLA PORTA, *Taumatologia e criptologia*, pp. 6–7.

86 Cf. ENRICA SCETTINI PIAZZA, “Una vocazione interrotta. Peiresc e i Lincei”, in: MARC FUMAROLI, FRANCESCO SOLINAS, VERONICA CARPITA (eds.), *Peiresc et l’Italie: actes du colloque international, Naples, le 23 et le 24 juin 2006*, Istituto italiano per gli studi filosofici, Palazzo Serra di Cassano, Paris, A. Baudry et cie, 2009, pp. 75–90 (pp. 80–81). Here, the last paragraph of the manuscript is quoted (cf. note 92), but in another context and without analysing its content. Cf. also note 114.

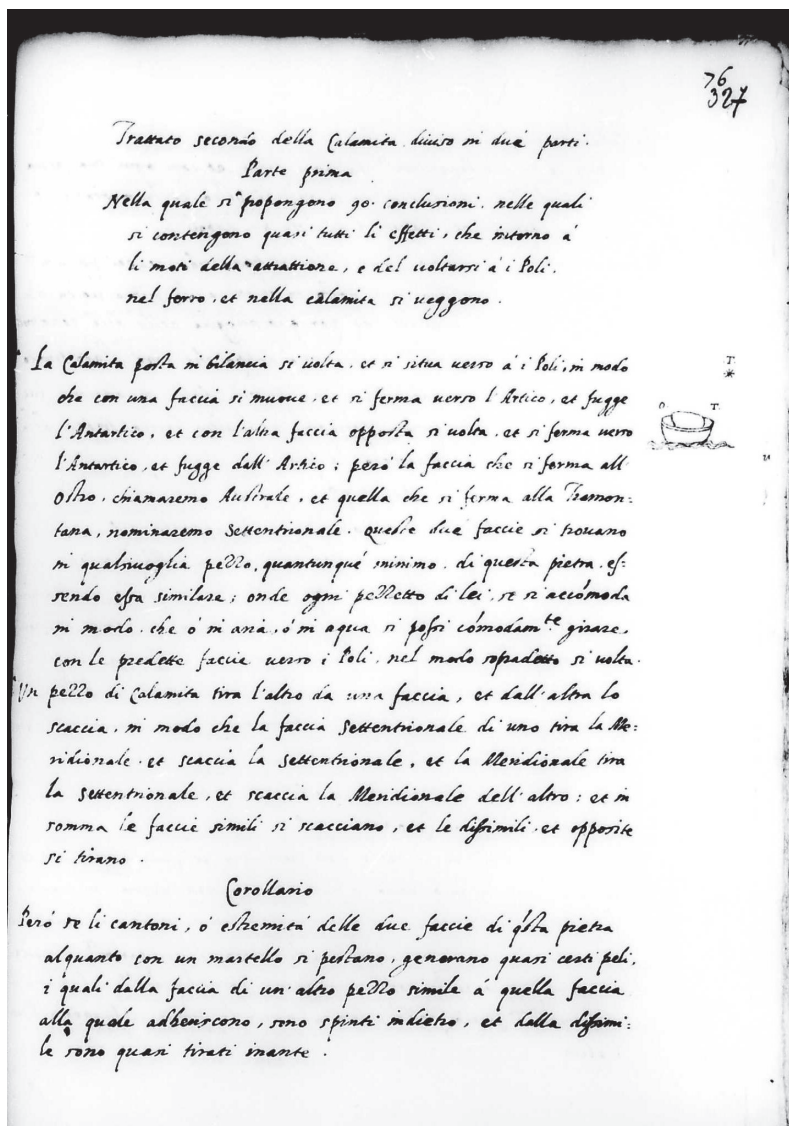


Fig. 2

Beginning of the second treatise of MSO
 Milan, Biblioteca Ambrosiana, S. 82 sup: "Due trattati sopra la natura, e le
 qualità della calamita"

(fol. 76r)

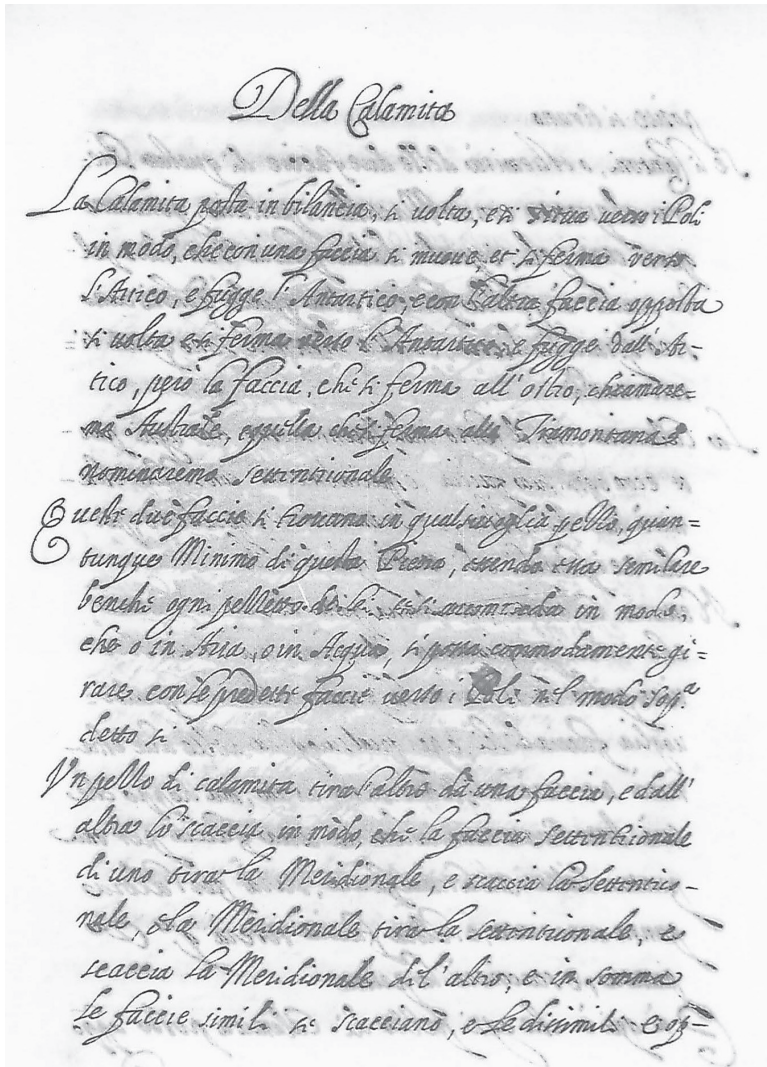


Fig. 3

Beginning of MS2

Montpellier, Bibliothèque Universitaire, Section Médecine, H. 169: "Della

Calamita"

(p. 251)

4.1 Comparison between MS0 and MS2

The similar features that can be traced in MS0 and MS2 lie in the fact that MS2 is a copy of a significant section of MS0 (part one of treatise two, fols. 76r–87r). This fragment, by contrast, cannot be found in MS1, thus discounting the need for a similar comparison between MS1 and MS2. Yet, despite their similarities, MS2 also contains several differences with respect to MS0, especially in their (1) palaeographic and compositional aspects, as well as (2) in terms of content.

(1) If we turn to the texts' palaeographic and compositional features, the title given in MS0 ("Trattato secondo...") is omitted in MS2. Also, MS0 possesses a great array of small illustrations and diagrams *in margine*, which are missing in MS2. MS0 furthermore is subdivided into ninety "conclusions", listed with absolute numbers, and thirty-nine "corollaries", inserted amongst the conclusions and numbered accordingly, adding up to a total of 129 paragraphs. MS2 instead contains 142 short, indented, paragraphs that are not numbered, each of which describes one magnetic phenomenon (cf. Fig. 2 and 3).

A critical comparison between MS0 and MS2 reveals many minor differences, and other more significant ones. First, despite the difference in number (142 vs. 129), the 142 paragraphs of MS2 largely correspond to the 129 paragraphs of MS0 with regard to their content. In fact, in MS2 no differentiation between conclusions and corollaries is made. However, the similar material was presented in a different layout, mostly due to entirely formal reasons.⁸⁷ This explains why the almost identical material adds up to 129 paragraphs in MS0, but to 142 paragraphs in MS2. Yet, some divisions newly introduced to MS2 seem to suggest that this new structure of MS2 also was motivated by the criteria of content.⁸⁸ All

87 In some cases, one conclusion of MS0 is split up into two or more paragraphs in MS2. The following fragments were divided into two paragraphs: conclusion 1, the fifth corollary after nr. 13, the conclusions 22, 54, 55, 62, 68, 81, the first corollary after conclusion 88 (into three paragraphs), and the second corollary (into four paragraphs). MS2 omits one conclusion (nr. 14) and one corollary (first corollary after nr. 6) of MS0. Many of the split conclusions/corollaries were divided in the place where the scribe in MS0 began a new line, but did not start new numbering. This formal reason does not explain all cases (for example, this is not the case in the division of conclusions 1 and 22).

88 In those cases where the scribe of MS0 did not 'prepare' or 'prefigure' the divisions by beginning a new line, the formal separation is due to content, that is, in cases where in a fragment of MS0, two (or more) magnetic properties/effects are explained.

together, MS2 has two extra paragraphs, the final two, which cannot be found in MS0 and will be analysed further below.

MS0 and MS2 also contain differences within paragraphs. In the first place, these differences concern orthography.⁸⁹ In some cases, compared to MS0, MS2 concretises and extends the description of a magnetic phenomenon, for example in relation to the magnetisation of iron (nr. 16 in MS0, p. 259 in MS2). In other cases, MS2 omits some words from MS0; for example, according to MS0 a magnetic piece of iron preserves its power “a hundred and two hundred years” (nr. 89), while in MS2 (287) it is only “a hundred years”. On this occasion, it seems that a merely redundant addition has been erased, but such additions or deletions also can be interpreted as content-motivated. This would lead to the conclusion that the author of these modifications approached the work with a certain expertise.

It seems that very few corrections were made to MS2 after its completion; these were done, (even though not with total certainty,) possibly by the same scribe.⁹⁰ By these corrections, MS2 accommodates its reading to that of MS0. In another more important case (281), the word “falso” appears at the beginning

89 MS2 compared to MS0: “ago” instead of “aco”, “habbiamo” instead of “haviamo”, “dalla” instead of “de la”, “doppo” instead of “da poi”, “e” instead of “et”. In these cases, from a philological perspective, it can be concluded that, concerning the writing style, MS0 is more bound to Latin than MS2. Many other small morphosyntactic differences can be apprehended, such as the addition or deletion of conjunctions, prepositions or particles, the swapping between indeterminate and determinate articles, or minor changes in the word order. These changes have no direct heuristic value for the present case, but occasionally they can be useful to correct or amend the modern transcription by Ugaglia. For example, Ugaglia (Cf. GARZONI, *Trattati della calamita*, p. 284) replaces the apparently grammatically incorrect “acquistato” for “acquistata” in the following passage: “Con la qual virtù li detti ferri, essendo lei debole, fanno debolmente li effetti che suol fare il ferro con la qualità delle due faccie dalla calamita acquistato”, whereas in MS2 (285) a different word is provided: “acquistano”.

90 According to Janis Bell, the entire volume in MS H. 169 was edited by Dal Pozzo himself. I was not able to find clear proof of this hypothesis with regard to the corrections in MS2. Cf. Janis BELL, “Cassiano Dal Pozzo’s Copy of the Zaccolini Manuscripts”, *Journal of the Warburg and Courtauld Institutes* 51 (1988), pp. 103–25 (p. 122): “This volume [MS H. 169] also reveals hallmarks of Cassiano’s editorial procedures, including elaborate pen illustrations of the text and a biography of the author appended at the end.” Bell does not deal further with the minor corrections. In one case in MS2 (p. 261), one correction is made, in which “insieme” is crossed out and “in piedi” is written above it; in another case (p. 280), an omitted phrase is attached to the end of the line over the margin. On p. 283, a word is corrected to “smarisce”, consistent with MS0.

of a paragraph, which can be interpreted as a qualification of the content of the magnetic phenomena described, a point which will be analysed further below.

(2) Turning to content, as already mentioned, MS2 concludes with two paragraphs (287–88) that do not have a correspondence in MS0, and therefore seem especially interesting in order to contextualise MS2. The first of these two paragraphs addresses the “orbe della virtù”, that is, the area within which the lodestone can attract iron without direct contact.⁹¹ The second added fragment addresses two experiments (“due mostre”), which a certain “Monsu della Ferriera Medico francese” had conducted. The first concerns the magnetisation of iron; the second describes a lodestone, situated under a table, that is capable of moving the pointer of a compass in a sundial (“horiolo a sole”) placed on the table.⁹² These experiments with the sundial are related to the magnetic compass, which usually was attached to portable sundials.⁹³ This instrument and many other similar experiments are described on several occasions in MS0 (especially nr. 59–71), and in the copied fragment in MS2 (271–78). However, the instrument is spelled differently (“horologio da sole”) in these instances, and “Monsu della Ferriera” is not mentioned anywhere else in MS0/2.

91 The fragment says: “Orbe della virtù s’intende in due Modi, l’uno quanto lontano tira il ferro, l’altro quanto un ferro può attraher la virtù a far mover la bussola, talché tenendo una calamita nascosta nel petto [undeciphered abbreviation, maybe: fino a] due palmi lontano, passandorci il ferro facci mover la calamita.” This concept also is found in other places in MS0 (for example, in nr. 50) and MS2 (267–68), but as “sfera della (sua) attività”. But this concept refers primarily to the area of influence within which a lodestone can magnetise iron. The syntagma “orbe della virtù” cannot be found anywhere in MS0; it cannot be found within the copied fragment of MS2 either.

92 The fragment says: “Monsu della Ferriera Medico francese fece due mostre di prova fatte sulla calamita, sopra di levar la virtù ad un ferro calamitato, il che segue mentre al ferro é stata data la virtù di sotto in su, nel fregarlo con la calamita il medesimo con l’istessa di su in abbasso, che subito lascia il tirar, che faceva. L’altra è, che essendosi posto un Horiolo a sole, sopra una tavola, e sopra quella due lastre di pietra girando sotto la Tavola a dirittura del’Horiolo la calamita, non ostante l’interposizione di corpi con solidi girava l’indice dell’Horiolo, o ferro calamitato, come se non ci fusse interposizione.” A similar attempt is already described in Francesco GIUNTINI, *Commentaria in Sphaeram Ioannis de Sacro Bosco accuratissima*, 2 vols, Lyon, P. Tinghius, 1577, vol. 2, p. 256.

93 On sundials with magnetic compass cf. HELLMANN, “Die Anfänge der magnetischen Beobachtungen”; Joseph DRECKER, *Gnomone und Sonnenuhren*, Aachen, 1909; Hans-Günther KÖRBER, *Zur Geschichte der Konstruktion von Sonnenuhren und Kompassen des 16. bis 18. Jahrhunderts*, Berlin, Dt. Verl. der Wiss., 1965.

4.2 Analysis of the Differences between the Manuscripts in Historical Context

The similarities and differences between MS0 and MS2, as briefly outlined thus far, provide valuable circumstantial evidence for the purposes of this analysis, especially when viewed in light of all of the sources under consideration in this essay, and their respective philological and historical contexts. In the case of MS2, three contextual considerations are worthy of note: (§ 4.2.1) the manuscript's connection to Sarpi's missing treatise on magnetism; (§ 4.2.2) the relationship between MS2 and the section on magnetism in Della Porta's *Magia naturalis*; (§ 4.2.3) and, finally, the role of the Accademia dei Lincei as the provenance of MS2.

4.2.1 Sarpi's Manuscript and "Della Calamita" (MS2)

We have noted already that Della Porta praised Sarpi as an expert on magnetism in 1589; that he probably had personal contact with him; that both consulted Pinelli's library, and that sources of the seventeenth century accused Sarpi of plagiarising Garzoni. Sources of the eighteenth century, furthermore, offer indirect evidence on the scope and content of a treatise on magnetism written by Sarpi. These considerations have led Ugaglia to suggest that Sarpi probably copied parts of MS0 and likely extended that manuscript's list of 129 magnetic phenomena to the longer list of 141 phenomena in his own text.

For the most part, Ugaglia's thesis can be corroborated in light of our new analysis of MS2. In particular, we will suggest that it is possible that Sarpi copied a section from MS0, and that he might have integrated this copy into his own treatise on magnetism as referred to by Grisellini. It also seems probable that MS2 is based on Sarpi's lost manuscript copy of the respective section of MS0. This set of textual relationships, mutual influences, and flow of ideas between these authors and their works, can be established here, for the first time, with new evidence. In making this claim, and by drawing specific comparisons between MS2 and Sarpi's lost work, many similarities emerge: for example, it certainly is not a coincidence that the alleged 141 paragraphs of Sarpi's treatise almost correspond to the 142 paragraphs of MS2. Furthermore, the estimated length of Sarpi's manuscript, of twenty pages (according to Foscarini, one of our main sources of information on Sarpi's lost text), suggests that it could be the *Vorlage* – or template/antigraph – of MS2, which is only a slightly longer text of thirty-seven pages, taking into consideration format and writing style. The contents of both manuscripts do appear to be extremely similar: Capra's sketch of Sarpi's research, summarised in

five points, is completely consistent with the content of MS2.⁹⁴ The same can be said for the points on content that Grisellini makes on Sarpi's manuscript.⁹⁵ If, as it is assumed here, MS2 is based on a manuscript composed and owned by Sarpi, it seems consistent that MS2 is not illustrated. One would expect that Grisellini or Foscarini would have mentioned the presence of drawings in their accounts.

But Ugaglia's thesis also requires revision. Sarpi, as it seems, did not increase the number of experiments of MS0; he simply borrowed the same material from MS0, and formatted it differently, thereby producing a longer list than MS0 *prima facie*. Ugaglia's assumption that Sarpi knew MS0 in its entirety, and not only the section copied into MS2, cannot be demonstrated by the evidence at hand. Moreover, in Sarpi's manuscript the last two paragraphs of MS2 did not appear, as it will be shown in (§ 4.2.2) and (§ 4.2.3).

These new findings do not discount the possibility that Sarpi wrote further studies on magnetism, a likelihood that seems to be corroborated by Grisellini's brief account of Sarpi's work.⁹⁶ This would be consistent with Sarpi's interest in geomagnetism and magnetic declination, expressed in letters from 1602 onwards.⁹⁷ These topics were addressed in MS0/2 only briefly, but received

94 UGAGLIA, "Introduzione", accounts for Foscarini's second point on the diffusion of magnetic power through the "atmosphere" only on the first part (I.9) of MS0, but in the corollary to conclusion 60, a reference to the following can be found: "Dal che si raccoglie che da tutte due le faccie della calamita, come da due centri, la virtù di essa per l'aere d'ogni intorno (come si è detto di sopra) si diffonde."

95 Uniquely, the indication that Sarpi estimated the inclination of the magnetic needle to 45° definitely has no correspondence in MS0 or MS2. However, this could be the result of a later amendment, added by Sarpi or by a reader during the following 150 years.

96 Such alleged further study by Sarpi may correspond to what Grisellini identified as the first part of Sarpi's manuscript, and whose content can only be speculated upon. Grisellini, e.g., describes concrete place-bound data of magnetic declination, which Sarpi would have recorded. RIVERSO, *Paolo Sarpi*, pp. 124–25, underlines Sarpi's own and independent research, and makes reference to his hostility towards the Society of Jesus, which had contributed to the plagiarism accusations.

97 Cf. also note 41. According to Grisellini, Sarpi would have researched the declination along one particular meridian. No comments are made on this particular research, either in MS2, or in Foscarini's description of the presumed *Vorlage* of MS2. Sarpi's alleged 'longitude-experiment' does not find correspondence either in MS0. On Garzoni's identification of the declination, cf. also CABEO, *Philosophia magnetica*, p. 56; Stephen PUMFREY, "'O tempora, O magnes!' A Sociological Analysis of the Discovery of Secular Magnetic Variation in 1634", *The British Journal for the History of Science* 12.2 (1989), pp. 181–214 (p. 188); GARZONI, *Trattati della calamita*, p. 132, note 84.

focused attention in Gilbert's *De magnete* (1600). After reading Gilbert's work in 1602, Sarpi possibly continued the studies of his MS0-based manuscript in this direction (geomagnetism and magnetic declination). This also would help explain why Sarpi so enthusiastically praised Gilbert as the first "solid" author on magnetism, instead of accusing him of plagiarism, like his Jesuit contemporaries did. Even though there is no evidence that Sarpi knew the complete text of MS0, he most likely knew the majority of what was copied in MS2. The treatment of these topics in Sarpi's fragment of the research of MS0, presented also in MS2, was so minor compared to that developed in Gilbert's monumental work that it did not compete with Gilbert's superior research, and thus cleared Gilbert from the accusation of plagiarism in Sarpi's view. It however remains a mystery why Sarpi never mentioned in his letters his magnetism studies with which he was engaged, and which is demonstrated by the archival evidence of the eighteenth century; his silence is odd on this score, regardless of what the studies contained.

4.2.2 Della Porta's *Magia naturalis* and MS2

Concerning the relationship between Della Porta's *Magia naturalis* of 1589 and MS2, our analysis of MS2 largely corroborates the hypothesis that MS2 can be considered an extended transcription of a manuscript that Della Porta received from Sarpi, and which the former used as the basis for the section on magnetism in his *Magia naturalis*. From our analysis of MS2, moreover, it can be argued that Della Porta not only used a *Vorlage* of MS2 as the basis for his Latin *Magia naturalis*, but that MS2 also shows traces of a redaction most likely not conducted by Della Porta himself.

Ugaglia has proven meticulously that Della Porta occasionally translated sentences from MS0 into Latin verbatim. Interestingly, these close connections to MS0 mostly correspond to the section of MS0 that is also featured in MS2. This is significant for our understanding of the relationship between all of these texts. It bears further discussion in the example provided here, found in both MS0 and MS2, of the phenomenon that fire destroys the magnetic properties of iron. In the first treatise of MS0, as well as in the near-identical section transcribed in MS2, it is said that magnetised iron, when blistering hot, loses its bipolarity as well as its attractive force, as does the lodestone.⁹⁸ In other words, magnetised iron and lodestone lose that which was defined as

98 Cf. GARZONI, *Trattati della calamita*, pp. 195–97, 282–84.

“qualità delle due faccie”, one could say, their magnet-identity.⁹⁹ But cooled-down iron, contrary to cooled-down lodestone, does not lose its capacity of being magnetised again by a lodestone; iron thus has a “qualità di una faccia”, that is, a sort of passive magnet-identity, the more so as a lodestone keeps attracting this particular iron. This double concept of ‘qualità’ was introduced for the first time in MS0 and depended on the Aristotelian notion of ‘qualitas’, but the author of MS0 conceived it in a novel and creative way in order to explain magnetic phenomena. Della Porta translates the observation on heated iron and its remaining capacity verbatim in his *Magia naturalis*.¹⁰⁰ He wrote about a “faciei virtus” – that is, the translation of “la virtù di una faccia” –, even though this concept neither appears nor is explained anywhere else in his work.¹⁰¹

It is significant that exactly this translated sentence was highlighted in MS2 with the marginal note “falso” (cf. Fig. 4). The physical reasons for this alleged refutation are debatable, but Ugaglia already has underlined that Garzoni’s theory of the “qualità di una faccia” led him to “observe” experimentally, on theoretical grounds, an effect that in reality could not be observed.¹⁰² The physical and scientific background at this point are less important than the philological one: it would be odd to assume that Della Porta could be the author of this critical side note in MS2, taking into account that he borrows and translates the sentence

99 On Garzoni’s metaphysics, cf. UGAGLIA, “Introduzione”, pp. 17–39.

100 Della Porta contends that a blistering hot piece of iron previously magnetised can return to its previous original state and then be magnetised again. Cf. GARZONI, *Trattati della calamita*, p. 282: “Quando la virtù delle due faccie del ferro è esterminata, sempre gli resta quella di una faccia sola.” Cf. DELLA PORTA, *Magia naturalis*, p. 146: “sed vis ea e ferro igne exterminatur, remanet faciei virtus, quam prius ante magnetis contactum habuerat.” Cf. also UGAGLIA, “The Science of Magnetism before Gilbert”, p. 72.

101 Here it is useful to recall that Della Porta’s knowledge on magnetism was not valued highly by key figures such as Gilbert (cf. *De magnete*, pp. 6, 73, 95, 102, 103, 138, 143, 144, 166). This was possibly due, amongst other reasons, to the acknowledgment that Della Porta merely copied MS0 without himself performing the experiments described there.

102 Cf. UGAGLIA, “The Science of Magnetism before Gilbert”, p. 72. The argumentation of this experiment is complicated and not directly relevant here. If one considers Niccolò Cabeo’s good knowledge of Garzoni’s and Gilbert’s work, it is not surprising that Cabeo criticises Garzoni and his theory of the “qualità di una faccia” explicitly in this example, and that he looks to Gilbert as the main authority instead. Cf. CABEO, *Philosophia magnetica*, pp. 154–60.

uncritically in his *Magia naturalis*.¹⁰³ This seems to suggest, as it will be demonstrated below, that MS2 was produced after Della Porta's time, but that it stems from his copy of the respective part in MS0.

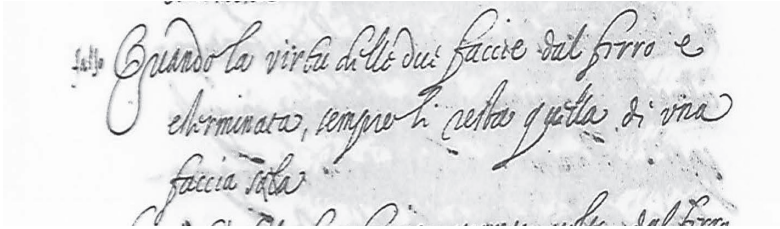


Fig. 4

A marginal note ("falso") in MS2

Montpellier, Bibliothèque Universitaire, Section Médecine, H. 169:
"Della Calamita" (p. 282)

The sentence in MS2, discussed above, proves not only the proximity of MS0/MS2 to Della Porta's Latin text, but also suggests that Della Porta did not have any (or at least firm) knowledge of the first part of MS0, in which the concept of "qualità di una faccia" is explained in detail. However, this may not be the whole story, since we can observe two instances in which Della Porta refers to ideas that are not included in the text of MS2 (or Della Porta's presumed source), but which are expressed in a similar way to those parts of MS0 that were not copied into MS2. The first case regards Della Porta's comparison of a lodestone weakened through the use of fire with a "corpse".¹⁰⁴ This metaphor is not found in MS2, but it is present in the first treatise of MS0.¹⁰⁵ The second case involves the refutation of a conviction that continued to circulate from ancient times: that garlic could prevent the lodestone from attracting iron.¹⁰⁶ Although this is mentioned both in the *Magia naturalis*

103 Cf. also note 90.

104 Cf. DELLA PORTA, *Magia naturalis*, p. 146: "et eo vapore expirato, omni tunc prorsus vigore denudatus est, et ubi semel virtutem illam amiserit, iam cadaver frustra tentatur denuo vivificari".

105 Cf. GARZONI, *Trattati della calamita*, pp. 196–97: "onde per una vehemente operazione di fuoco questa pietra resta (per dir cosi) exanimata, in modo che non è più veramente calamita ma rimane quasi come un cadavero di quella forma".

106 On this myth, cf. Daryn LEHOUX, *What did the Romans know? An Inquiry into Science and Worldmaking*, Chicago/London, The University of Chicago Press, 2012, pp. 133–54; WOOTTON, *The Invention of Science*, pp. 268–83.

and in MS2,¹⁰⁷ Della Porta specifically refers to the superstition as circulating among seamen, while MS0 mentions this only in the work's introduction (1r), the part that Della Porta presumably did not have access to.¹⁰⁸

However, in both cases, Della Porta plausibly referred to these ideas (regarding the "corpse" and the "seamen's belief") without relying necessarily on MS0, since both referred to common opinions held at that time.¹⁰⁹ It is interesting to note that in the first edition of his *Magia naturalis* (1558), Della Porta mentions uncritically the sailor's belief in the properties of garlic; this first edition of his work did not include the treatise on the lodestone, which was present only in the edition of 1589.¹¹⁰ In 1589, Della Porta claims that he has proven the falsehood of the belief through experimentation, a point that is not made either in MS0 or in MS2.¹¹¹ As a matter

107 MS2 (p. 284), as well as the list of phenomena in MS0 (nr. 84), assert clearly, as does Della Porta (1589), that garlic does not damage the lodestone or inhibit its attractive force. Cf. DELLA PORTA, *Magia naturalis*, p. 145. Cf. also W. E. MAY, "Garlic and the Magnetic Compass", *The Mariner's Mirror* 65.3 (1979), pp. 231–34. Cf. also MS1 (2v, 170v).

108 Della Porta criticises the alleged opinion of the seamen, which says that garlic damages the magnetic compass and impedes the needle from pointing towards the north.

109 It must be noted that vitalist metaphors in relation to the lodestone were widely disseminated in the sixteenth century. Already Thales had referred to the lodestone as something "animated." Cf. GARZONI, *Trattati della calamita*, p. 196–97, note 161, and Aristotle, *De anima*, 405a19–21. Della Porta's comparison therefore could be a mere coincidence, that is, an obvious analogy in view of the "deadly" effect of fire to a "living" magnet. Cf. also John HENRY, "Animism and Empiricism: Copernican Physics and the Origins of William Gilbert's Experimental Method", *Journal of the History of Ideas* 66.1 (2001), pp. 99–119; Angus FLETCHER, "Living Magnets, Paracelsian Corpses, and the Psychology of Grace in Donne's Religious Verse", *ELH* 71.1 (2005), pp. 1–22. Nicolas WEILL-PAROT, "Magnetic Attraction as a Challenge to the Inanimate Realm. The Example of Walter Burley", in: Danielle JACQUART, Nicolas WEILL-PAROT (eds.), *Substances minérales et corps animés = Mineral Substances and Animate Bodies: de la philosophie de la matière aux pratiques médicales, 1100–1500 = From the Philosophy of Matter to Medical Practices, 1100–1500*, Montreuil, Omniscience, 2012, pp. 87–110. Moreover, Della Porta includes in the same paragraph alchemistic theories, which also find little correspondence in MS0.

110 Cf. Giambattista DELLA PORTA, *Magia naturalis sive De Miraculis rerum naturalium libri 4*, Napoli, Cancer, 1558, p. 90. This difference between the edition of 1558 and 1589 is not accounted for in WOOTTON, *The Invention of Science*, p. 270. The edition of 1589, in this regard, is identical to subsequent Latin editions.

111 MS0/MS2 emphasizes the falsehood, but makes no reference to any test conducted by the author. On the refutation of Della Porta, cf. also LEHOUX, *What did the*

of fact, in MS2 only a certain section of MS0 has been preserved, and we have argued that Della Porta could have relied on this part exclusively. Yet, it cannot be excluded that Della Porta knew MS0 in its entirety (i.e. both its treatises). However, there is more evidence that supports the thesis that he only knew the section transmitted in MS2.

The comparison of the discrepancies between MS0 and MS2 with Della Porta's Latin text can shed light on the question of whether MS0 or MS2 is closer to the text of the *Magia naturalis*. In some instances, for example, Della Porta evidently follows readings only preserved in MS2 and not in MS0.¹¹² But this philological evidence is not completely conclusive.¹¹³ Whatever the case, it seems that the text in Della Porta's possession included only the fragments that were featured also in MS0, and that the last two paragraphs (nr. 141 and 142) of MS2 were added subsequently.

4.2.3 The Accademia dei Lincei and MS2

MS2 also contains text that is not found in MS0: the final fragment of MS2 bears witness to the work of an unidentified author, who

Romans know?, pp. 145–46; WOOTTON, *The Invention of Science*, p. 268. Besides this, a contemporary source, Michele Mercati's (1541–93) *Metallototeca*, equally criticizes the seamen's story on the effect of garlic, but without demonstrable connection to Della Porta (or MS0). Cf. Michele MERCATI, *Metallototeca opus posthumum*, Roma, J.M. Salvionus, 1717, p. 166. On the work, cf. Bruno ACCORDI, "Michele Mercati (1541–1593) e la Metallototeca", *Geologica romana* 19 (1980), pp. 1–50. According to Accordi (p. 7), Mercati's work was finished before 1589. Della Porta is not mentioned anywhere. Also the author of the completed second book in MS1 (170v) gives more importance to this misconception and its refutation.

112 For example, when Della Porta measures the durability of magnetised iron not to "one hundred or two hundred years" (MS0), but only to "one hundred years" (MS2). Cf. DELLA PORTA, *Magia naturalis*, p. 142. In a second instance, Della Porta even seems to follow the reading of a paragraph (nr. 141) of MS2, a paragraph only to be found in MS2 (and not in MS0): Della Porta refers to the concept, "orbis virtutis" (*ibid.*, p. 139), not that of "sphaera activitatis" (which is mentioned in MS0 in various places, cf. note 92). On this concept, see also Fritz KRAFFT, "Sphaera activitatis–orbis virtutis. Das Entstehen der Vorstellung von Zentralkräften", *Sudhoffs Archiv* 54 (1970), pp. 113–40. Cf. also ZIGGELAAR, "Due veneziani".

113 When Della Porta wrote "one hundred or two hundred years" (MS0) instead of "one hundred years" (MS2), it can be presumed that Della Porta simply wanted to renounce to a rather redundant enlargement of the formulation. What Della Porta says about the "orbis virtutis" is more consistent with what is said in MS0 (corollary to nr. 11) under the name of "sfera della attività." What, on the contrary, is described in MS2 under the name "orbe della virtù" hardly has any corresponding passage in Della Porta's *Magia*. Cf. GARZONI, *Trattati della calamita*, p. 263, note 240.

extended the text of his MS0-based *Vorlage*, which presumably was transmitted to Della Porta through Sarpi, as has been explained in the previous two sections of this essay. As shall be argued in this section, MS2's additional paragraph(s), or "Sondergut" (that is, material that only appears in MS2), is connected to the work within the Accademia dei Lincei. Uncovering this complicated trajectory of MS2 requires starting with the last paragraph of MS2, in which the experiments of the already-mentioned "Monsu della Ferriera" are described; this figure may be identified as the French physician, Jacques de la Ferrière.¹¹⁴ De la Ferrière was a physician from Agenais, and member of the staff of the archbishop of Lyon, Alphonse-Louis de Plessis de Richelieu.¹¹⁵ We know very little about this scholar and almost nothing about his interest in magnetism, but it can be argued that his experiments, which are described in MS2, originated from around 1635, that is, long after Della Porta's death in 1615.

In order to reach this conclusion, first we have to acknowledge the almost total lack of original sources written by de la Ferrière. His name is mentioned mostly as a topic of conversation in the correspondence of other intellectuals, mainly in the letters of the famous French scholar and Lincei-member, Nicolas Claude Fabri de Peiresc (1580–1637).¹¹⁶ In all this correspondence, de la Ferrière

114 His biographical data remains unknown to date, which might have led to the unlikely assumption that Della Porta himself was witness to these experiments of de la Ferrière. Cf. SCETTINI PIAZZA, "Una vocazione interrotta. Peiresc e i Lincei", p. 80: "Nell'ultima pagina del manoscritto, troviamo un riferimento di della Porta agli esperimenti fatti da Jacques de la Ferrière sulla calamita". Piazza draws here upon MS2. We can exclude this scenario with some certainty, taking into account biographical evidence and the provenance of MS2.

115 The few biographical references come from: Pierre GASSENDI, *Opera omnia*, 6 vols, Lyon, L. Anisson, I. B. Devenet, 1658, vol. 5, p. 238; Philippe TAMIZEY DE LARROQUE (ed.), *Lettres inédites de quelques hommes célèbres de l'Agenais*, Agen, Ferran frères, 1893, p. vii; Nicolas Claude FABRI DE PEIRESC, *Les Correspondants de Peiresc: Lettres inédites publiées et annotées*, Philippe TAMIZEY DE LARROQUE (ed.), 2 vols, Genève, Slatkine Reprints, 1972, vol. 2, p. 51, note 1.

116 This analysis is based on the following sources: Nicolas Claude FABRI DE PEIRESC, Gabriel NAUDÉ, *Gabriel Naudé: Lettres inédites écrites d'Italie à Peiresc: 1632–1636*, Philippe TAMIZEY DE LARROQUE (ed.), Paris, L. Théchener, 1887, pp. 43, 66–67, 69; Nicolas Claude FABRI DE PEIRESC, *Lettres de Peiresc*, Philippe TAMIZEY DE LARROQUE (ed.), 7 vols, Paris, Imprimerie nationale, 1888–98, vol. 3, pp. 282, 297, 445, 625; vol. 4, p. 479, 502, 508, 525, 551, 569, 592, 601; vol. 5, p. 767, 768, 771, 775, 781, 784, 787; vol. 7, p. 697, 722, 726, 728–30, 750; PEIRESC, *Les Correspondants de Peiresc*, vol. 2, pp. 51, 75, 77, 768, 769; Nicolas Claude FABRI DE PEIRESC, Gabriel NAUDÉ, *Peiresc: Lettres à Naudé, (1629–1637)*, Phillip J. WOLFE (ed.), Paris/Seattle, Papers on French

only once is linked to the topic of magnetism.¹¹⁷ In a letter of 26 June 1635 to the Roman librarian Claude Menestrier (1580?–1639), Peiresc refers to certain magnetic experiments conducted by de la Ferrière, unfortunately without describing these experiments any further.¹¹⁸ Moreover, de la Ferrière is only mentioned in letters between 1635 and 1637 (albeit this may be partly related to the scope of edited correspondence). It is thus very unlikely that he was academically active during Della Porta's lifetime, that is, before 1615. As a preliminary result, we can state that de la Ferrière's experiments recorded in MS2's final paragraph most likely were conducted around 1635.

Independent of de la Ferrière's experiments and their inclusion into MS2 we can establish proof of a further line of transmission of Della Porta's *Vorlage* of MS2. Della Porta had been a member of the Accademia dei Lincei as well, and Dal Pozzo, who inherited the Lincei library after the academy's founder Cesi had died in 1630, collected Della Porta's extant manuscript works. MS2 is part of a composite manuscript that bears witness to this undertaking. Either Della Porta's own manuscript treatise on the lodestone

Seventeenth Century Literature, 1983, p. 50; Nicolas Claude FABRI DE PEIRESC, *Lettres à Cassiano dal Pozzo, 1626–1637*, Jean-François LHOTE, Danielle JOYAL (eds.), Clermont-Ferrand, Adosa, 1989, pp. 176, 177, 179, 185, 186, 188, 196, 197, 203, 237, 242, 260, 264, 266, 269, 270. De la Ferrière is not mentioned in Gabriel NAUDÉ, Jacques DUPUY, *Lettres de Gabriel Naudé à Jacques Dupuy: 1632–1652*, Phillip J. WOLFE (ed.), Edmonton, Alta, Canada, LEALTA/ALTA, 1982; Gabriel NAUDÉ, Nicolas BRETTEL DE GRÉMONVILLE, *Lettres de Naudé à Grémonville*, Kathryn WOLFE, Phillip J. WOLFE (eds.), Paris; Seattle, Papers On French Seventeenth Century Literature, 1986; Nicolas Claude FABRI DE PEIRESC, Girolamo ALEANDRO, *Correspondance de Peiresc et Aleandro*, Jean-François LHOTE, Danielle JOYAL (eds.), 2 vols, Clermont-Ferrand, Adosa, 1995. Only two letters (one to M. Maran and one to Peiresc) written by de la Ferrière himself have been found and edited. Cf. LARROQUE (ed.), *Lettres inédites de quelques hommes célèbres de l'Agenais*, pp. 48–51, 52–55.

117 For Peiresc, de la Ferrière mainly was a contact person in relation to his research on geology. Cf. particularly ALESSANDRINI, *Cimeli lincei a Montpellier*, pp. 116–18; David FREEDBERG, "Cassiano and the Art of Natural History", in: Francis HASKELL, Mirka BENEŠ (eds.), *The Paper Museum of Cassiano Dal Pozzo, Ivrea*, Olivetti, 1993, p. 149; David FREEDBERG, *The Eye of the Lynx: Galileo, His Friends, and the Beginnings of Modern Natural History*, Chicago, University of Chicago Press, 2002, pp. 332–34; Gaston GODARD, "Les travaux géologiques de la première Accademia dei Lincei (1603–1651)", *Travaux du Comité français d'Histoire de la Géologie (3ème série)* 25.5 (2011), pp. 119–37.

118 Cf. PEIRESC, *Lettres de Peiresc*, vol. 5, p. 781: "Au reste je crois bien qu'il vous aura fait voir son Aymant et les experiances qu'il en a faites." Menestrier was an important contact of Peiresc, in the area of magnetism, cf. *ibid.*, vol. 5, p. 661; PEIRESC, *Lettres à Cassiano dal Pozzo, 1626–1637*, p. 180.

(as received from Sarpi), or a later copy of it, or even MS2 itself was copied by (or on behalf of) Dal Pozzo and sent to Lincei-member Peiresc in 1636. This hypothesis is borne out by taking into account the correspondence of these two Lincei-members (Peiresc and Cassiano Dal Pozzo).¹¹⁹ In multiple letters of 1635/6 to Dal Pozzo, Peiresc mentions a certain “discorso della calamità [sic.] del Porta”.¹²⁰ Obviously, he refers to a treatise by Della Porta on the lodestone, most likely to be linked to the text of MS2. A short outline of these letters helps to trace the transmission of this treatise on the lodestone, but unfortunately does not reveal anything about its content: in a letter of 30 May 1635 Peiresc makes reference to the magnetic demonstrations that Della Porta had undertaken, even though he probably refers to his *Magia naturalis*.¹²¹ Shortly after, he describes in detail some magnetic phenomena and finally he thanks Dal Pozzo for his offer of sending him “a copy of the magnetic observations of Della Porta.”¹²² On 29 April 1636 Peiresc thanks Dal Pozzo for the reception of this copy.¹²³ On 5 June 1636 he admits to not yet having read Della Porta’s treatise.¹²⁴

119 Peiresc became a member in 1625, cf. SCHETTINI PIAZZA, “Una vocazione interrotta. Peiresc e i Lincei”.

120 Interestingly, Marin Mersenne told Athanasius Kircher in 1640 that Dal Pozzo owned a manuscript by Gerolamo Cardano on the lodestone. Cf. Marin MERSENNE, *Correspondance du p. Marin Mersenne*, Cornelis DE WAARD (ed.), 17 vols, Paris, Éd. du Centre National de la Recher. Scientif., 1933–88, vol. 9, p. 37: “Scrisperunt ad me manuscriptum Cardani de magnete esse apud Equitem ilium adeo celebrem dal Pozzo, quo facilè possis uti, ne quid omittas.” The Cardano manuscript is yet to be found, and there is no reference to it in Kircher’s work. There is, however, no reason to assume that this document is a *Vorlage* of MS2, given that Cardano’s studies on magnetism (cf. CARDANO, *De subtilitate*, pp. 492–504) contain much less detail on magnetic phenomena than is the case in MS2.

121 Cf. PEIRESC, *Lettres à Cassiano dal Pozzo, 1626–1637*, p. 190. Before mentioning Della Porta, Peiresc relates to the experiments of the French Mathematician Jacques Aleaume (1562–1627), which he had seen in Paris. On this, cf. also a letter of 1632 in PEIRESC, *Lettres de Peiresc*, vol. 7, p. 225.

122 Cf. PEIRESC, *Lettres à Cassiano dal Pozzo, 1626–1637*, p. 192: “Ma accetto pur volentieri la graziosa offerta ch’ella mi fa, d’una copia di quelle osservazioni magnetiche di G.B. dalla Porta.”

123 Cf. *Ibid.*, p. 237.

124 Cf. *Ibid.*, p. 241. Obviously, Peiresc’s references of 26 June 1635 to de la Ferrière’s already mentioned magnetic experiments were not based on a reading of the “discorso della calamità”, which he had not read by 1636. This also renders it very implausible that it was Peiresc who added de la Ferrière’s experiments to MS2 or its *Vorlage* in 1635.

Although we can assume a very close connection between MS2 and the “discorso della calamità”, which Dal Pozzo had sent to Peiresc, some doubts however remain as to whether these two manuscripts can be identified with each other. Also, if Peiresc’s remarks about his “discorso della calamità” do not lead to any conclusions on its content, it is difficult to accept, on codicological grounds, that MS2 could be precisely that manuscript owned by Peiresc.¹²⁵ But which text did Dal Pozzo use to compose the copy for Peiresc? Definite answers cannot be given, but it is more plausible to believe that MS2 was the direct or indirect *Vorlage* of Dal Pozzo’s copy, or that the “discorso della calamità” and MS2 shared a common undiscovered *Vorlage*, which was used by Dal Pozzo. Due to these uncertainties, the dating of MS2 itself still remains unclear, but with regard to the dating of the *Vorlage* of Peiresc’s copy, 30 May 1635 can be considered the *terminus a quo*; that is, the day in which the treatise is mentioned for the first time in Peiresc’s letter. For MS2, a possible *terminus ante quem* could be 2 August 1635, since Longo’s letter attached to the composite manuscript is dated to that day.¹²⁶

If we combine our findings regarding the last paragraph of MS2 with de la Ferrière’s experiments from around 1635 together with the findings regarding the circulation of Della Porta’s “discorso della calamità” between Dal Pozzo and Peiresc, we obtain a more complete picture. The last two paragraphs of MS2 probably derived from an experimental activity with the lodestone within the Accademia’s entourage. These experiments could have been reported to Dal Pozzo, either by de la Ferrière himself, or indirectly through a letter to Dal Pozzo by another scholar – evidence we lack in either case.¹²⁷ Dal Pozzo, for his part, and as owner of Della Porta’s “discorso della

125 To corroborate this claim, we have to take into account that Peiresc does not mention anywhere that he had received further works by Della Porta, together with his treatise on magnetism – which would have been the case, as MS2 is part of a composite manuscript including several works by Della Porta. There are no codicological indications that MS2 was added to this composite manuscript (H. 169) at a later point of time. In MS2 traces of a correction also can be found that suggest the existence of a version closer to MS0 and therefore, very possibly at least, MS2 would have preceded the copy that was sent by Dal Pozzo to Peiresc.

126 This *terminus* remains very uncertain, as Longo’s letter also may have been added at a later date, although dated on August 1635.

127 Taking into account that, prior to 1635, de la Ferrière does not appear in the (edited) correspondence of the Accademia member, Peiresc, it seems improbable to date MS2 much before 1635, since no traces reveal that the two last paragraphs were added belatedly to an already existing manuscript.

calamità", added these experimental findings to this treatise, thereby composing the text named here as MS2: "Della Calamita".

4.3 Identifying MS2: Consolidation of the Results

In bringing together the analysis above concerning MS2, a number of conclusions can be presented as the most probable. Sarpi owned a treatise that in one way or another stemmed from MS0. Its content was newly "formatted" by Sarpi, so that the numbering was changed and the illustrations were not copied. It is possible that Sarpi also made minor amendments or modifications to the text. He did not copy the two last paragraphs of MS2, as they presumably did not appear in his *Vorlage* (MS0 or a subsequent copy of it). Sarpi, in turn, gave Della Porta a copy of his now-lost treatise. Della Porta then used this as a draft for the composition of his Latin *Magia naturalis* in 1589. After Della Porta's death in 1615, his unpublished works were merged by members of the Accademia in a new manuscript copy that, among other items, also included MS2. To this end, probably a *Vorlage* of MS2 was used, which Della Porta possibly owned himself after receiving it from Sarpi. At the same time, the two last paragraphs of MS2 were added. These two paragraphs either were subsequently added to Della Porta's copy as "work in progress", or they were produced after new research that had not yet been integrated in the *Vorlage* of MS2. During the composition of MS2, or possibly during a later correction, some amendments were made in order to adjust MS2 to its *Vorlage*. It was during this process that, in one case, a magnetic phenomenon was remarked to be "false", as noted in the margin of MS2. It remains unclear whether this is a side note that also appeared in the *Vorlage* or if it was proof of a "work in progress", produced within the environment of the Accademia dei Lincei, the final destination where MS2 yet again appears to have been used and copied in the long series of transmissions outlined in this analysis. Despite many uncertainties, it remains highly probable that MS2 can be dated to the year 1635 for, in that year, Peiresc refers to the manuscript either directly or indirectly, as we have seen in the analysis above.

5. Analysis of Results in Light of Current Research on Early-Modern Magnetism

The analysis of MS0, MS1 and MS2 – the trajectories of these manuscripts, their authors, and the chronology of their production – essentially support Ugaglia's thesis that links MS0 with Garzoni, and thus confirms his intellectual heritage in the history of early-

modern studies in magnetism. Through this analysis of the three manuscripts, studied for the first time together, and in relation to each other, it has been possible to strengthen the foundations of Ugaglia's thesis about the authorship and dissemination of MS0, through the presentation of further circumstantial evidence. It could be shown as well that MS0 had a much wider impact on early-modern scientific discourse than was assumed by Ugaglia. In this way, the following conclusions can be made: Garzoni is the anonymous author of MS0, which was intended to be printed subsequently. MS0 was the direct or indirect *Vorlage* for Sarpi's manuscript (now lost), which in turn provided the *Vorlage* for the treatise on the lodestone in Della Porta's *Magia naturalis*. The new findings presented here concerning MS1 and MS2 support this thesis. MS1 can be considered the print template that was thought to have been lost, which stemmed from MS0 and which probably was composed during Garzoni's lifetime, meaning that it was produced before his death in 1592. On the contrary, MS2 seems to bear witness to a vertical filiation with MS0, transmitted through Sarpi via Della Porta to Peiresc. MS2 probably was composed in 1635. MS1 and MS2 are completely independent from one another and present a horizontal connection, inasmuch as both seem to have stemmed in one way or another from MS0.

5.1 A Jesuit as a Pioneer Researcher on Magnetism?

What are the consequences of these findings for current research on magnetic phenomena in the sixteenth and seventeenth centuries, and resulting from the historical-philological reconstruction undertaken here? First, in relation to the matter of authorship – especially the probability that Garzoni was the author of MS0, as we have seen –, the key question to be answered is whether the author of the first experimental study on the lodestone was a member of the Society of Jesus. Garzoni's work preceded by several decades other Jesuit studies on magnetism, such as those by Niccolò Zucchi (beginning in 1612, printed in 1649), Lorenz Forer¹²⁸ (printed in 1618), Niccolò Cabeo (printed in 1629), and Athanasius Kircher (printed in 1631).¹²⁹ Second, with our research into MS1 and

128 Lorenz Forer, * 1580 Luzern (Germany), S.J. 1600 Luzern, † 7.I.1659 Regensburg (Germany) (*Sommervogel* III, 858).

129 On Zucchi, cf. note 31. On Forer, cf. note 72. On Cabeo, cf. note 30. On Kircher's first treatise on magnetism, cf. Athanasius KIRCHER SJ, *Ars magnetica: hoc est disquisitio bipartita emperica seu experimentalis, physico-mathematica de natura, viribus et prodigiis effectibus magnetis*, Würzburg, Zinck, 1631.

MS2 supporting the hypothesis of Garzoni as MS0's author, and extending this hypothesis further, by providing evidence of later sources drawing on this work (thus pointing to its circulation across time and space, and in a variety of milieu), the key role of the Jesuits in the so-called 'scientific revolution' begins to come into view.

In considering these questions, and in light of the findings from this analysis, some issues still need to be explored: (§ 5.1.1) What might have been the intellectual and academic context in which Garzoni's studies originated? (§ 5.1.2) Why is MS0 incomplete and why did it involve so many scribes? (§ 5.1.3) Why were MS0 and MS1 anonymously transmitted and never published? (§ 5.1.4) Why does Sarpi make no mention of Garzoni's works? (§ 5.1.5) Why does the author of MS1 mention Della Porta's *Magia naturalis*, without accusing him of plagiarism? Some of these questions can be addressed only speculatively, but their salient points shall be considered in the following discussion.

5.1.1 Garzoni's Academic Context

The scant details that we have about Garzoni's life shed little light on why he worked on an experimental study about lodestones. All Jesuits were required to teach in the Society's colleges and universities, and we know that Garzoni also engaged in this important aspect of Jesuits' academic lives.¹³⁰ Philosophy teachers, as was the case of Garzoni, produced commentaries on Aristotle's works as the basis for their teaching activity, which often provided the foundations for later published works.¹³¹ Yet, establishing a connection between Garzoni, the texts on magnetism studied here (written in Italian), and this kind of learning and teaching activity (in Latin) presents a challenge. It is implausible, for example, that this study on magnetism arose from a commentary that Garzoni might have written on Aristotle's *De anima* (as proposed by Ugaglia), in which the lodestone is briefly mentioned, since neither the content nor the form of MS0/1 seem to suggest this possibility.

While the Jesuits certainly made use of the role of the *scriptor* – a Jesuit scholar who was released from teaching duties and commissioned with the composition of specialist works –, this was not particularly common in the sixteenth century, and tended to be

130 The obligation to teach applied to all Jesuit scholastics and priests, as issued in a decree of 1560. Cf. Paul F. GRENDELER, "The Culture of the Jesuit Teacher 1548–1773", *Journal of Jesuit Studies* 3.1 (2016), pp. 17–41.

131 Cf. UGAGLIA, "Introduzione", p. 40.

limited to the Jesuits of the Roman college.¹³² Moreover, the subject of ‘magnetism’ did not play any significant role in the Jesuit curriculum of the sixteenth century. In Aristotelian physics, more broadly, the case of magnetic attraction was considered problematic, as being an apparent instance of ‘action at a distance’, so it did appear occasionally in commentaries on Aristotle, and was addressed by Jesuits in their commentaries as well.¹³³ However, within this context, it certainly was not considered as a key topic in the sixteenth century and, as far as we know, it did not generate a particular line of experimental description or research practice, as we can observe in the commentaries from the period. Also, the prospect that ‘magnetism’ was included within the mathematics curriculum of the Jesuits at this time seems improbable: according to current research on this question, the topic did not play any particular role in the curriculum. Garzoni’s work reflects this, for it contains no mathematical demonstrations or methods, and in any case there is no biographical proof that Garzoni was involved in the study of mathematics.¹³⁴

Finally, it should be emphasised that the notable Jesuit interest in the subject of magnetism during the seventeenth century (Cabeo, Zucchi, Kircher and many more) was little in evidence in the sixteenth century.¹³⁵ This late (compared with other areas of

132 Cf. Ugo BALDINI, “Die Philosophie und die Wissenschaften im Jesuitenorden”, in: J.-P. SCHOBINGER (ed.), *Die Philosophie des 17. Jahrhunderts; Bd. 1, Allgemeine Themen, Iberische Halbinsel, Italien (Grundriß der Geschichte der Philosophie 3.1.2)*, Basel, Schwabe, 2011, pp. 669–769 (p. 686).

133 Cf. COLLEGIUM CONIMBRICENSE SJ, *In octo libros Physicorum Aristotelis Stagiritae*, Coimbra, A. á Mariz, 1592, pp. 670–73; Girolamo DANDINO SJ, *De corpore animato lib. VII. luculentus in Aristotelis tres de anima libros, commentarius peripateticus*, Paris, Chappeletus, 1610, pp. 431–45; FRANCISCO SUÁREZ SJ, *Disputationes Metaphysicae (Disp. 1–27)*, Carolo BERTON (ed.), Paris, Vives, 1866, pp. 664–65.

134 On mathematics among Jesuits, cf. e.g. Volker R. REMMERT, “‘Our Mathematicians Have Learned and Verified This’: Jesuits, Biblical Exegesis, and the Mathematical Sciences in the Late Sixteenth and Early Seventeenth Centuries”, in: Jitse M. VAN DER MEER, SCOTT MANDELBROTE (eds.), *Nature and Scripture in the Abrahamic Religions: Up to 1700*, 2 vols, Leiden/Boston, Brill, 2008, vol. 2, pp. 665–90; Ugo BALDINI, *Saggi sulla cultura della Compagnia di Gesù (secoli XVI–XVIII)*, Padova, CLEUP, 2000, pp. 49–98; and note 139.

135 For an overview, cf. the following studies: Ulrich Gottfried LEINSLER, *Dilinganae Disputationes: Der Lehrinhalt der gedruckten Disputationen an der Philosophischen Fakultät der Universität Dillingen, 1555–1648*, Regensburg, Schnell + Steiner, 2006, pp. 316–23; Mark A. WADDELL, “The Perversion of Nature: Johannes Baptista Van Helmont, the Society of Jesus, and the Magnetic Cure of Wounds”, *Canadian Journal of History* 38.2 (2003), pp. 179–98; Martha BALDWIN, *Athanasius Kircher and the Magnetic Philosophy*, Ph.D. diss. University of Chicago, 1987; PUMFREY, *William Gilbert’s Magnetic Philosophy*, pp. 97–125, 134–241.

research) Jesuit interest principally was prompted by the Society's cosmological confrontation with Gilbert's Copernicanism. It was prompted, too, by reactions to the controversial replica of the quasi-magnetic 'weapon salve', demonized by the Jesuits, and by the worldwide indexing of the values of magnetic declination, which mainly was conducted through an epistolary-based network around Kircher and used to gain knowledge on this particular geomagnetic phenomenon. It was inspired also by the methods and ideas developed in Athanasius Kircher's works on magnetism, which combined partly museum-like approaches with theological-tropological ones. No evidence of any of these later ideas and approaches can be traced to, or identified in, MS0/1.

According to our current understanding of this area of research in the sixteenth century, Garzoni's work on magnetism cannot be considered an enterprise institutionally fostered or commissioned by the Society of Jesus, to which he belonged. It seems, instead, to be a sort of private commission.

5.1.2 MS0 as 'Work in Progress'

It certainly would be plausible that the "Due trattati" manuscript (MS0) constituted a research in progress, and that the version that has come down to us still was in a state of continuous rewriting. Probably Garzoni had "handed in" his research in sections, so that various scribes transferred it step-by-step in MS0. In this sense, it has to be taken into consideration that the introduction of MS0 sets out the structure of the two treatises that comprise the work, indicating that its two-part structure was envisioned in this way from the outset and not as the result of any implicit or tacit research practice. Information concerning the precise number of ninety conclusions in the second treatise and their corresponding explanations does not appear in this introduction, however. Although there is no codicological proof, we may assume that the research for this more experimental work began by collecting and recording the phenomena which now are preserved in the first part of the second treatise of MS0. This research process may have been followed, or accompanied, by a more general and theoretical reflection about the 'principles of magnetism' in terms of natural philosophy, which now constitutes the first treatise of MS0. The manner in which the second and unfinished part of the second treatise is structured may lead to the assumption that recording and explaining the phenomena were two separate undertakings, with the explanatory section remaining incomplete. In another scenario, MS0 may stem from a different text, comprising an equally incomplete draft that

was inexplicably transcribed by different scribes in various phases; or else, MS0 may be the product of teamwork, including research undertaken by a group. In any case, the argument that the work presented in MS0 was a ‘work in progress’ seems consistent with the fact that the closely-related MS1 is a much extended and re-worked version, leading MS0 to appear as its draft text.

5.1.3 The Anonymous Transmission of Garzoni’s Work

The anonymous production of MS0 and MS1, and the fact that it was never printed, may be explained by the hypothesis that the author, whether Garzoni or another Jesuit, wanted to escape the order’s internal censorship, or disseminate the work without the inevitable religious connection that would have been established through authorial identification.¹³⁶

Firstly, it is worth noting that Cabeo’s *Philosophia magnetica*, which partially drew on Garzoni’s work, was examined by the Jesuit censorship institute (*Collegio dei Revisori generali*) in 1627 (that is, two years before publication and decades after Garzoni’s work was produced), and Cabeo was required to apply some corrections.¹³⁷ However, these instructions do not have any bearing on MS0/1, as they regard aspects of Cabeo’s work that are not contained in either text.

As is well known, the Society of Jesus was familiar with experimental studies of the *physica particularis* not immediately relevant for Catholic theology,¹³⁸ through the works of such

136 On the Society’s internal book and thesis censorship, cf. Lucio BIASIORI, “Il controllo interno della produzione libraria nella Compagnia di Gesù e la formazione del Collegio dei Revisori generali (1550–1650)”, *Annali della Scuola Normale Superiore di Pisa, Classe di Lettere e Filosofia* 5 (2010), pp. 223–49; BALDINI, *Legem impone subactis*, pp. 75–119.

137 Cf. BALDINI, *Legem impone subactis*, pp. 95–98. Cf. also UGAGLIA, “Introduzione”, p. 97, note 15. Jesuit censorship was a *censura praevia*, that is, a preventative censorship to be conducted by fellow-Jesuits before their works were printed.

138 On Garzoni’s context, cf. UGAGLIA, “Introduzione”, pp. 39–43. For further references to the Jesuit context, cf. Ugo BALDINI, *Saggi sulla cultura della Compagnia di Gesù*; Ugo BALDINI (ed.), *Christoph Clavius e l’attività scientifica dei Gesuiti nell’età di Galileo: atti del convegno internazionale, Chieti 28–30 aprile 1993*, Roma, Bulzoni, 1995; BALDINI, *Legem impone subactis*; Mordechai FEINGOLD (ed.), *The New Science and Jesuit Science: Seventeenth Century Perspectives*, Dordrecht/Boston, MA, Kluwer Academic Publishers, 2003. BALDINI, *Legem impone subactis*, p. 363, dates the origins of De Dominis’ *De radiis* (1611) to some lectures held between 1590 and 1595. We also know that De Dominis provided Fulgenzio Micanzio, on William Cavendish’s request, with a copy of Gilbert’s *De magnete* in 1617. Cf. Fulgenzio MICANZIO OSM, *Lettere a William Cavendish (1615–1628)*, Roberto FERRINI (ed.), Roma, Istituto storico O.S.M., 1987, pp. 67, 80; Karl Josef

Jesuits as Marc' Antonio De Dominis,¹³⁹ Christoph Clavius,¹⁴⁰ and Christoph Scheiner.¹⁴¹ However, if Garzoni's work had been printed in his lifetime, it certainly would have constituted the first of its kind; that is, a self-contained, non-Latin study – not composed in a commentary form – on a clearly delineated, natural philosophical experimental subject that had no direct relevance to theology or a teaching activity.¹⁴² The Jesuit publication landscape of the sixteenth century did not include the sort of academic publication in Italian that MS0/1 constituted. Given its oddity in its context and provenance, perhaps it is not surprising that the manuscripts remained unpublished. Even in manuscript form, further, its author remained unidentified – a practice that was not unknown within the Society of Jesus, and perhaps a cautious choice in this case.¹⁴³ Yet, even its anonymous authorship did not ensure its publication and, instead, quite mysteriously, Garzoni's work was never printed.

This is despite the fact that, in many respects, Garzoni's work may not have elicited particular disapproval from the censors. In terms of its contents, the metaphysics developed or postulated in

SCHUHMAN, *Hobbes: Une Chronique. Cheminement de sa pensée et de sa vie*, Paris, J. Vrin, 1998, p. 28. For the Jesuit interest in medicine, cf. also Christoph SANDER, "Medical Topics in the *De Anima* Commentary of Coimbra (1598) and the Jesuits' Attitude towards Medicine in Education and Natural Philosophy", *Early Science and Medicine* 19.1 (2014), pp. 76–101.

139 Marc' Antonio De Dominis, * 1560 Rab (Croatia), S.J. 1579, † 9.XI.1624 Roma (*Sommervogel* III, 129).

140 Christoph Clavius, * 25.II.1538 Bamberg, S.J. 1555, † 3.II.1612 Roma (*Sommervogel* II, 1212).

141 Christoph Scheiner, * 25.VII.1575 Markt Wald (Germany), S.J. 1595, † 18.VII.1650 Nysa (Poland) (*Sommervogel* VII, 734).

142 Clavius' comments on Euclid and Sacrobosco can at least be linked to the context of Jesuit education.

143 For example, we may note that the volumes of the commentaries on Aristotle, produced at the Jesuit Coimbra College, were published (from 1592 onwards) under the collective name of the college instead under the name of its author, Manuel de Góis SJ. Cf. e.g. COLLEGIUM CONIMBRICENSE SJ, *In octo libros Physicorum*. On this *cursus*, cf. Cristiano CASALINI, *Aristotele a Coimbra: Il Cursus Conimbricensis e l'educazione nel Collegium Artium*, Roma, Anicia, 2012. This Coimbra-approach, however, cannot be interpreted as a strategy to cope with censorship, but to identify the commentaries as a collective enterprise, suitable as a course book for other Jesuit colleges. Struggles over censorship arose only in the first two decades of the seventeenth century, when the Coimbra commentary on Physics was suspected by internal Jesuit censorship. The respective documents are held at Rome, Archivum Romanum Societatis Iesu, *Fondo Gesuitico* 660 (fols. 70r–76v).

MS0 and ascribed to Garzoni, remains Aristotelian; it is true that, with the introduction of a “qualità delle due faccie”, the work explores creative ways within the Aristotelian framework, which were not entirely traditional.¹⁴⁴ Indeed Cabeo, who followed Garzoni in this aspect, often is categorised as a rather unorthodox Aristotelian by modern historians of philosophy.¹⁴⁵ But it remains that neither Garzoni’s concept of a “qualità delle due faccie”, nor his experimental approach necessarily would have brought Garzoni’s work to the attention of censors, or would have impeded its publication. Indeed, matters were more complicated than the risk of censorship question alone.

The study of magnetism obviously did not collide with any question of faith and did not seek any confrontation with the Aristotelian principles of natural philosophy in general. Yet, Garzoni may have been aware that his work potentially could cause concern among some of his Aristotelian-Thomist colleagues. This is worth considering if we recall that, between 1586 and 1591, when Garzoni was in Venice, the development of the *Ratio studiorum* within the Society entered its key phase, while the Venetian Jesuits had become involved in the discussion on censorship regulations as well as on the *libertas opinionum*.¹⁴⁶ In the case of Garzoni, he had introduced his modified Aristotelian *qualitas* (“qualità delle due faccie”) and not simply referred to a *qualitas occulta* – an approach most likely to be rejected by some Jesuits in those decades. Garzoni’s ideas could have been considered daring simply because this concept of quality was unconventional and had no basis in the works of Aristotle,

144 Cf. UGAGLIA, “Introduzione”, pp. 17–39.

145 Cf. Stephen PUMFREY, “Neo-Aristotelianism and the Magnetic Philosophy”, in: John HENRY, Sarah HUTTON (eds.), *New Perspectives on Renaissance Thought: Essays in the History of Science, Education and Philosophy: In Memory of Charles B. Schmitt*, London, Duckworth, 1990, pp. 177–89; Craig MARTIN, “With Aristotelians like These, Who Needs Anti-Aristotelians? Chymical Corpuscular Matter Theory in Niccolò Cabeo’s Meteorology”, *Early Science and Medicine* 11.2 (2006), pp. 135–61.

146 Cf. *Mon. paed.*, vol. 6, pp. 66, 67, 70, 267–68. Cf. also note 136 and Marcus HELLYER, “Because the Authority of My Superiors Commands’: Censorship, Physics and the German Jesuits”, *Early Science and Medicine* 1.3 (1996), pp. 319–54; Christoph SANDER, “The War of the Roses. The Debate between Diego de Ledesma and Benet Perera about the Philosophy Course at the Jesuit College in Rome”, *Quaestio* 14 (2014), pp. 31–50. On internal “obedience” within the Society of Jesus towards the end of the sixteenth century cf. also Silvia MOSTACCIO, *Early Modern Jesuits Between Obedience and Conscience During the Generalate of Claudio Acquaviva (1581–1615)*, Burlington, Ashgate, 2014.

Thomas Aquinas or other major authorities.¹⁴⁷ Moreover, in the Venice of that time, book publication was considered an especially liberal activity, and easily suspect; as a result, and out of caution, the Jesuits in that city especially tended towards conformity, and therefore sought to limit their engagement with the printing press to subjects of the safest possible kind.¹⁴⁸

In view of these considerations, then, Garzoni probably avoided publishing or circulating his work 'as a Jesuit'. This would be conceivable if we take account of the fact that the text does not seem to be directly connected to the academic goals of the Society at that time. On another note, the work tries to establish a certain space within the contemporary frameworks established by Aristotelian metaphysics and natural philosophy, with a view better to describe and explain magnetic phenomena. In the climate of the discussions taking place at that time within the Society of Jesus, this would have provided some foundation for a possible decision on Garzoni's part to postpone the publication or to produce it anonymously.

5.1.4 Sarpi's Silence

This hypothesis about the anonymous transmission of Garzoni's work also would be consistent with the fact that Sarpi did not mention any treatise on the lodestone (MS0), or the Jesuit, Garzoni, in his extant correspondence or in his works. But he possibly knew both the author and manuscript and chose not to admit it: after all, Sarpi was a known

147 Cf. UGAGLIA, "Introduzione", pp. 23–27. As mentioned before (cf. n. 22), the Jesuit Possevino refers to Garzoni's treatise, along with Clavius' mathematical works, in a section dealing with the possible danger presented by the investigation of matters beyond faith which exceed human understanding ("Quibus in rebus disquirendis citra fidei periculum exerceri possint ingenia"). The case of magnetic attraction, being a typical instance of a so-called "occult quality", was often used by authors of the period as an example of a natural phenomenon caused by something beyond human understanding, and natural philosophy was considered to be unable to account for it. Garzoni, on the contrary, did present his own natural philosophical solution and did not admit the impossibility to give any explanation at all. However, it seems that Possevino qualifies Garzoni's work as approaching the topic of 'magnetism' in a way by which the mind is sharpened without presenting any danger. Cf. POSSEVINO, *Bibliotheca selecta*, vol. 2, p. 114: "Exstat vero apud nos liber Leonardi Garzonii viri de Societate nostra nondum editus, in quo cum mirabiles vires acutius, quam plerique eatenus alii, magnetis, sine [sic.] lapidis Herculei, exposuisset, reliquit modum, quo in eiusmodi rebus ingenia sine discrimine possent exacui". Cf. also BALDINI, *Legem impone subactis*, p. 385, note 74.

148 Cf. William J. BOUWSMA, *Venice and the Defense of Republican Liberty: Renaissance Values in the Age of the Counter Reformation*, Berkeley, University of California Press, 1968; KAINULAINEN, *Paolo Sarpi*, pp. 33–38.

critic of the Jesuits, so he may have preferred to remain silent about this connection. If Garzoni and Sarpi indeed had met in Pinelli's circle, or they even collaborated in drafting the MS0, it may have been in their mutual interests that their research on magnetism was not explicitly acknowledged or named, or, if collaborative, not presented to the public as their joint work. When later Jesuits such as Zucchi accused Sarpi of plagiarism, this possibly had some ideological overtones – in wanting to damage the reputation of one of their severest critics¹⁴⁹ – however, what the Jesuits observed as plagiarism may in fact have constituted (undeclared) collaboration between the two authors. Since no known documentary evidence can shed further light on the matter, such reflections on the reasons for Sarpi's silence for now must remain in the realm of conjecture.

5.1.5 No Accusation against Della Porta in MS1

Sarpi was not the only figure accused of plagiarism in this case: as we have seen earlier in this essay, seventeenth-century Jesuits maintained that Della Porta also had plagiarised Garzoni's work on the lodestone. Indeed, we observed that Della Porta copied fragments from the second treatise of MS0 – the text that Della Porta most likely possessed as his own copy of a *Vorlage* of MS2. Yet, Della Porta paid credit to Sarpi alone, and not to Garzoni: this may have been because he did not know that the study that had been passed to him was the work of the Jesuit, Garzoni. For his part, it is remarkable that the author of MS1 makes mention of Della Porta's *Magia naturalis* of 1589, without protesting that Della Porta evidently had copied parts of its earlier incarnation, the MS0. Perhaps this was because the work circulated anonymously, and was unpublished, and therefore a charge of plagiarism was more difficult to make on these bases, since the author himself had not laid claim to his own work, and it remained out of the public sphere, in manuscript. While this may have prevented Garzoni (or MS1's author) from criticising Della Porta's plagiarism, it did not prevent his confreres from doing so, but the context was different: several decades had passed since MS0/1, and these Jesuits were invested in reinstating Garzoni as the originator of the manuscripts in question, and of the ideas they contained. Of course, the variety of responses to MS0/1, and the indignation of Garzoni's Jesuit defenders in the seventeenth century, also may be accounted for

149 Rivero (cf. note 96) points out that the accusation of plagiarism against Sarpi, made by later Jesuits, might have been politically motivated. On Sarpi's relation to the Jesuits, cf. also KAINULAINEN, *Paolo Sarpi*, pp. 53–55.

by the porous boundaries that still existed around the question of plagiarism, and that many different attitudes about what precisely constituted plagiarism abounded at the time.¹⁵⁰

It may be useful to consider, furthermore, that the postponing of the printing of Garzoni's own work may have undermined the claims he could make concerning the plagiarism of his work: at the time when MS1 was composed, Della Porta's work had been printed already. Thus, in a way, the tables had turned. Garzoni (or another author) might have intended to rework the relevant fragments in MS1 so that the accusation of plagiarism could not be so easily cast back onto Garzoni. If the text of MS0, instead of MS1, had been printed after 1589, Della Porta could have made his own allegations against the author of the text. In fact, the text of MS0/2 had been very much modified in MS1, in a way that made the traces of plagiarism much more difficult to identify.

5.2 Garzoni's Heritage: Some Final Reflections on the Processes underlying the Production of the Manuscript

The newly-identified findings outlined in this essay play another important role in assessing the impact of Garzoni's work. The historical, even though indirect, impact of Garzoni's research was substantial. His writings influenced many key protagonists in the areas of natural history and natural philosophy during the early-modern period – figures such as Sarpi, Della Porta, Cabeo, Zucchi and Peiresc, as we have seen. In her evaluation of Garzoni's legacy, Ugaglia above all mapped the conceptual, methodical and experimental lines of his impact, so that, for example, we can see how Della Porta might have borrowed this or that experiment from Garzoni, or how Cabeo would have borrowed some of his ideas; or, more generally, we may observe how Garzoni's drive towards experimental research gradually became familiar territory for those working in the field.

Garzoni's work is significant in another way as well, concerning its composition, that is, its structure. As has been shown, he separated, at least in the conceptual layout of his work, the natural philosophical discussion on the principles of magnetic effects, from their direct application on a list of phenomena or effects. Hence, we

150 On the historical notion of 'authorship' and 'plagiarism' cf. e.g. Pamela O. LONG, *Openness, Secrecy, Authorship: Technical Arts and the Culture of Knowledge from Antiquity to the Renaissance*, Baltimore, Johns Hopkins University Press, 2001; Trevor James Neilson Cook, *Plagiarism and Proprietary Authorship in Early Modern England, 1590–1640*, Ph.D. diss. University of Toronto, 2012, pp. 27–83.

find in his writings a theoretical section dealing with the conceptual foundations, and a part where these principles are used to explain a given set of observed effects. This deliberate composition again is underlined in light of both newly-analysed manuscripts under consideration in this essay: MS1 attests a renewed reflection on the structure of the work, and MS2 evidences that the purely experimental part of the work was studied in isolation and disconnectedly from the other, more theoretical, part of the manuscript.

Garzoni's compositional principle is not completely new in the area of 'magnetism'. Already in 1575, Italian philosopher and mathematician Francesco Maurolico (1494–1575) worked on a list of magnetic "problems" with a question-answer format.¹⁵¹ Garzoni knew his work.¹⁵² But here two important differences can be noticed: Maurolico did not develop any natural philosophical principles, which were tailored to the field of magnetism, and to which he could recur. Besides this, he still proceeded in the form of *quaestiones*, in which certain questions are raised.¹⁵³ In the second part of Garzoni's work no "questions" can be found, but only theses, mostly generalized observations, such as: "If one positions the lodestone in this way, then this and this happens". For Garzoni, such an observation corresponds to an *effetto*, whereas his theoretical explanation was identified with the concept of *causa*. Since ancient times, this differentiation has been conceptually determinant for natural philosophy, but what is relevant here is that both concepts were separated, not only methodically, but also structurally in the composition of the *Oevre*, and then subsequently reconnected.¹⁵⁴

The textual relation of MS0 to MS1 suggests that these observations

151 Cf. FRANCESCO MAUROLICO, *Opuscula mathematica*, Venezia, Francisci, 1575, pp. 100–02; IDEM, *Problemata mechanica cum appendice*, Messina, P. Brea, 1613, pp. 49–55. The two editions contain slightly different versions of the appendix on the lodestone and they are dated to February 1569 (in the 1575 edition) and to May 1569 (in the 1613 edition). Garzoni certainly used the 1575 edition.

152 Cf. UGAGLIA, "Introduzione", p. 11.

153 Cf. BRIAN LAWN, *The Rise and Decline of the Scholastic Quaestio disputata: With Special Emphasis on Its Use in the Teaching of Medicine and Science*, Leiden, Brill, 1993; OLGA WEIJERS, *In Search of the Truth: A History of Disputation Techniques from Antiquity to Early Modern Times*, Turnhout, Brepols, 2013.

154 On some of the historical stages of this Aristotle-based differentiation, cf. Cornelis Hendrik LEIJENHORST, Christoph H. LÜTHY, J. M. M. H. THIJSSSEN, "The Tradition of Aristotelian Natural Philosophy. Two Theses and Seventeen Answers", in: Cornelis Hendrik LEIJENHORST, Christoph H. LÜTHY, J. M. M. H. THIJSSSEN (eds.), *The Dynamics of Aristotelian Natural Philosophy from Antiquity to the Seventeenth Century*, Leiden/Boston, Brill, 2002, pp. 1–29.

first were merely collected, before proceeding to the theoretical explanation of these effects/phenomena. Besides this, Sarpi's and Della Porta's examples (MS2) prove that these observations could be "exported", so to speak. Admittedly, Garzoni's alleged "pure observations" are deeply entrenched in his metaphysics and his "theoretical terms" – for example, the "qualità di una faccia" –, but this did not prevent Della Porta from integrating these observations in his own framework of natural philosophy.¹⁵⁵

This structure of 'observation versus explanation' can be found in other authors of the seventeenth century on the topic 'magnetism', even though we cannot assume these authors knew Garzoni's work. So proceeds Galileo's pupil Benedetto Castelli (1578–1643) in his "Discorso sopra la calamita" (1639, in manuscript) with twelve observations that he explains in terms of corpuscularian physics.¹⁵⁶ Also Athanasius Kircher, in his *Magnes* (1641), chooses a numbered combination of definitions, *axiomata* and *postulata*, which he applies to dozens of *theoremata*, *propositiones*, *pradoxa* and *pragmata*.¹⁵⁷ Despite the fact that Kircher seems to tend towards an Euclidean, geometrical, methodical ideal, the *theoremata* more or less correspond to empirical observations, like those of Garzoni. As is well known, René Descartes (1596–1650) integrated thirty-four observations, which he had received from Marin Mersenne OM

155 The concepts 'observation terms' (e.g. 'blue') and 'theoretical terms' (e.g. 'electric field') have been introduced to the debate in the philosophy of science mainly by Rudolf CARNAP, "Beobachtungssprache und theoretische Sprache", *Dialectica* 12.3–4 (1958), pp. 236–48. On this, see also Wolfgang STEGMÜLLER, *Beobachtungssprache, theoretische Sprache und die partielle Deutung von Theorien*, Berlin, Springer, 1970. A discussion on the applicability of these concepts to the historical subject here presented will not take place, as at this point the aim is to portray the self-perception of the author, to differentiate between 'effects' and 'causes' and to devote to each one of them a separate treatise/paragraph. On the concept of magnetic poles within scientific discourse, cf., as a case study, Friedrich STEINLE, "Goals and Fates of Concepts: The Case of Magnetic Poles", in: Uljana FEEST, Friedrich STEINLE (eds.), *Scientific Concepts and Investigative Practice*, Berlin/Boston, De Gruyter, 2012, pp. 105–26.

156 Cf. Benedetto CASTELLI, "Discorso sopra la calamita", Antonio FAVARO (ed.), *Bulletino di bibliografia e di storia delle scienze matematiche e fisiche* 16 (1884), pp. 548–64; Antonio FAVARO, "Intorno ad un 'Discorso sopra la calamita' del p.d. Benedetto Castelli: pubblicato integralmente per la prima volta ed illustrato", *ibid.*, pp. 545–48; Piero E. ARIOTTI "Benedetto Castelli's Discourse on the Loadstone (1639–1640). The Origin of the Notion of Elementary Magnets Similarly Aligned", *Annals of Science* 38.2 (1981), pp. 125–40.

157 Cf. KIRCHER, *Magnes*, index; IDEM, *Ars magnetia*; PUMFREY, *William Gilbert's magnetic philosophy*, p. 355.

(1588–1648) in the form of a list, in the large, explanatory program of corpuscularianism in his *Principia philosophiae* (1644).¹⁵⁸ Here, these observations are explained one after another, based on principles developed earlier in the work. In the work called *Observation of ondervindingen aen de magneetsteen* (published in 1651), by Laurens Reael (1583–1637) and Caspar Barlaeus (1584–1648), this program is even divided in terms of language and person. The East Indies navigator and general, Reael, delivered in Dutch more than 100 magnetic phenomena, which the university professor Barlaeus commented on and explained in Latin.¹⁵⁹

Another key conceptual element of Garzoni consists, not only in considering attractive and directive force as the two movements of the lodestone – already suggested by Jofrancus Offusius (before 1530–after 1557) in 1570 –, but also in devoting one part of his work to each of these movements.¹⁶⁰ Cabeo also structured his books according to a similar division. Gilbert devotes the five books of his work to the five movements of the lodestone, amongst them also attractive force (“coitio”) and directive force (“directio”).¹⁶¹ And in his manuscript work, “De magnete libri tres”, written by the Roman librarian Leone Allacci (1588–1669), one book is dedicated to the attractive power of the lodestone, one to its directive power and the last to the lodestone’s medical powers.¹⁶²

These two compositional structures obviously are based on conceptual and methodical assumptions. Nevertheless, these

158 Cf. René DESCARTES, *Principia philosophiae*, Amsterdam, L. Elzevier, 1644, p. 267–70 (=pars IV, §145). Descartes adopts this list, which follows roughly Gilbert’s book division, and he thanks Mersenne for it on 25 December 1639, cf. René DESCARTES, *Oeuvres de Descartes*, Charles ADAM, Paul TANNERY (eds.), 11 vols, Paris, Vrin, 1964–74, vol. 2, p. 636. It presumably was written in autumn 1639. The list initially was only manuscripted, cf. MERSENNE, *Correspondance*, vol. 8, pp. 754–62, but it was printed with few amendments in Marin MERSENNE, *Cogitata physico-mathematica in quibus tam naturæ quàm artis effectus admirandi certissimis demonstrationibus explicantur*, Paris, A. Bertier, 1644, pp. 245–51.

159 Cf. LAURENS REAEL, CASPAR BARLAEUS, *Observation of ondervindingen aen de magneetsteen: en de magnetische kracht der aerde*, Amsterdam, L. Spillebout, 1651.

160 Cf. JOFRANCUS OFFUSIUS, *De divina astrorum facultate, in larvatam astrologiam*, Paris, J. Royerius, 1570, p. 12, identifies four different types of movement. Cf. also GILBERT, *De magnete*, p. 46.

161 Cf. GILBERT, *De magnete*, pp. 45–46.

162 This work, written around 1630, has escaped scholarly attention. It is located in Rome, Biblioteca Vallicelliana, *Carte Allacci LXXVII: “De magnete libri tres”*. The author of this essay intends to present this finding more comprehensively in a forthcoming article.

assumptions are no more starkly evident and tangible than they are in the manner in which a book is structured. Despite the fact that Garzoni's work had not been printed as a book until recently, and even if we cannot assume that all of the above-mentioned authors knew of his manuscript, it seems that this approach used by Garzoni was considered to be particularly useful and acceptable to some authors of the early-modern period.

In conclusion, the analysis undertaken in the course of this essay, has helped bring into view more clearly the various and important inter-connected scholars involved in the manuscript transmission of Garzoni's work. Further, the specifically philological methodology employed here has provided new insights into how the dynamics of the transmission process itself shaped and reflected the intellectual currents of the study of magnetism at the time. By undertaking a philological and codicological micro-analysis of key texts from this period, it has been possible to discern important processes at work that might otherwise be invisible to the historian of science: we have seen how scholars left traces of certain, often tacit, research interest, for example through the selective copying of certain passages, the intentional omission or modification of other passages, the novel rearrangement of contents, and addition of marginal notes to given content. In this sense, the history of science itself, it has been shown, to some extent can be traced through the process of transcribing, developing, correcting, and rearranging words in a text, bearing witness to how authors recorded, codified and increased the knowledge of the field. Through this process, it has been possible to identify the Jesuit, Leonardo Garzoni, as a pioneering figure in the constellation of early-modern researchers into the world of magnetism.

Translated by Carmen Correa

Summary

William Gilbert's work, *De magnete* (1600), often is referred to as the first monographic study on magnetism in the early-modern period. Recently, however, it has been argued that the Jesuit, Leonardo Garzoni, wrote an experimental study on the subject twenty years earlier and that his research influenced particularly the work of Giambattista Della Porta and Paolo Sarpi, two important protagonists in the history of studies in magnetism. However, to date, Garzoni's authorship of an anonymous treatise in manuscript, located at the Biblioteca Ambrosiana in Milan, and taken to bear witness to his research, has been based only on circumstantial evidence. This

article outlines the identification of two further manuscript copies of this treatise, which have not been studied so far. It shall be argued that the evidence contained in these manuscripts corroborates the assumption that Garzoni indeed is the author of the work that was transmitted anonymously. Moreover, it can be shown that the work was completed and prepared for print later on. These findings also allow us to argue more conclusively that Paolo Sarpi knew Garzoni's work and passed it to Giambattista Della Porta, who bequeathed his copy to the Accademia dei Lincei and thereby made it available to some of the academy's most important members, Nicolas Claude Fabri de Peiresc and Cassiano Dal Pozzo. Finally, the dynamics of this textual transmission provide insights into how scholars approached the study of 'magnetism' in the early-modern period.

Zusammenfassung

William Gilberts Werk *De magnete* (1600) gilt oft als erste monographische Studie über den Magnetismus in der Frühen Neuzeit. Erst in jüngerer Zeit konnte gezeigt werden, dass der Jesuit Leonardo Garzoni bereits rund zwanzig Jahre zuvor eine experimentell ausgerichtete Arbeit über den Magnetismus verfasst hatte und dass er hiermit Giambattista Della Porta und Paolo Sarpi stark beeinflusste. Garzonis Autorschaft an diesem nur handschriftlich überlieferten Werk ist jedoch allein auf einen Indizienbeweis gestützt, da die bekannte Handschrift aus der Ambrosiana in Mailand Garzoni nicht eindeutig als Autor benennt. Dieser Aufsatz berichtet erstmals von zwei neuen handschriftlichen Textzeugen dieses Werks, mit Hilfe derer sich nun die Autorzuschreibung an Garzoni weiter erhärten lässt. Zudem lässt sich zeigen, dass das Werk für den Druck vorbereitet wurde. Auch kann nun besser belegt werden, dass Sarpi Garzonis Werk kannte und dieses in Teilen an Della Porta weitergab, durch dessen Nachlass es später einigen der wichtigsten Mitgliedern der Accademia dei Lincei zugänglich gemacht wurde, Nicolas Claude Fabri de Peiresc und Cassiano Dal Pozzo. Aus der Dynamik dieser Überlieferung und Verbreitung von Garzonis Werk können wichtige Rückschlüsse darauf gezogen werden, wie frühneuzeitliche Gelehrte das Forschungsthema Magnetismus erschlossen und behandelten.

