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GALILÆANA
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Il Saggiatore at 400.
An early modern controversy and its legacy

edited by Dario Tessicini

Introduction

Il Saggiatore at 400. An early modern controversy and its legacy

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Abstract
The text is a short introduction to Galilei's *Il Saggiatore* and to the essays in the Focus. *Il Saggiatore* was published in response to a cometary dispute started in 1619 by the publication of the Jesuit Orazio Grassi's *De tribus cometis disputatio*. *Il Saggiatore* challenged Grassi's methodology and results, as well as prevailing beliefs about comets. The text also served as a cultural platform for Galilei and the Accademia dei Lincei. It ignited debates, prompted a response from Grassi, and led to personal attacks on Galileo, further straining his relations with the Jesuits. The volume also faced accusations of supporting Copernicanism and atomism. Four centuries later, Galileo's work continues to inspire reflection on its cultural and intellectual significance: this Focus provides multiple viewpoints on the controversies that accompanied *Il Saggiatore* and its aftermath.

Keywords
Galileo Galilei, Comets, Jesuits, Collegio Romano, Orazio Grassi, Heliocentrism, Mario Guiducci, Nicolaus Copernicus, Virginio Cesarini, Simon Mayr

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The year 2023 marks the quatercentenary of the publication of Galileo Galilei's *Il Saggiatore* (*The Assayer*), a work that is best known for its controversial scientific claims on cometary theory, and for being a turning point in its author's relations with the Jesuits. The dispute unfolded in 1619, triggered by an unusual appearance in rapid sequence of three comets observed in August-September 1618 (C/1618 Q1), November-December 1618 (C/1618 V1), and November 1618-January 1619 (C/1618 W1). The phenomena generated substantial attention from scholars, astronomers, and learned amateurs across Europe. In Rome, the Jesuits of the Collegio Romano organized four lectures by the resident professors of theology, rhetoric, natural philosophy, and mathematics, each offering a different interpretation of the comets. The lecture by the mathematician Orazio Grassi was printed anonymously in February 1619 with the title *De tribus cometis disputatio.* His work rejected the Aristotelian explanation of comets as meteorological conflagrations and argued that the three comets were celestial bodies due to their lack of parallax, regular motion, and slight enlargement under telescopic observation. Furthermore, Grassi endorsed Tycho Brahe's theory of comets having circular orbits between the Earth and the Sun, claiming that this interpretation constituted a decisive argument against heliocentrism.

In Florence, a bedridden Galileo relied on his network of correspondents for information about the comets and expressed his intention to engage in the debates. Expectations grew during the following weeks, and in June 1619, Galileo's views were presented in *Discorso delle comete*, published and signed by his friend, the Florentine nobleman Mario Guiducci. The *Discorso*'s tenets often directly contradicted Grassi and Tycho, as Guiducci-Galileo asserted that comets moved in straight lines and not circularly, that they were not solid bodies but reflections of sunlight on terrestrial vapors, and that their lack of parallax was irrelevant in determining their distance. While the *Discorso* did not overtly promote heliocentrism and the mobility of the Earth, attentive readers could infer implicit support of this hypothesis in Galileo's cometary theory. Writing under the name of a fictional pupil, Lothario Sarsi, Grassi responded in October 1619 with the *Libra astronomica ac philosophica*. This time, the defense of the Jesuit's previous positions was accompanied by some insidious allegations against Galileo, among which were his ingratitude to the Order and promotion of Copernican cosmology despite its prohibition since 1616. A forbidding reminder of this prohibition, Francesco Ingoli's list of corrections to Copernicus' *De revolutionibus* was published several months later – in May 1620. Despite the dangerous path that the dispute was taking and the calls for prudence from his friends in Rome, Galileo decided to drop his mask and respond directly to the *Libra*. His intention was made public in June 1620 through a letter from Guiducci to his former Jesuit teacher, Tarquinio Galluzzi. A complete draft of *Il Saggiatore* was sent to Rome in October 1622, but its publication was delayed due to the "mirabil congiuntura" of the election of Cardinal Maffeo Barberini as Pope Urban VIII and meticulous editorial scrutiny by the Accademia dei Lincei. Dedicated to the new pope, *Il Saggiatore* takes the form of a letter to Virginio

Cesarini, a young Lincei member (1595-1624) and chamberlain to the Pope. It is a detailed dissection of Grassi's *Libra*, which is fully transcribed in *Il Saggiatore* and thoroughly "assayed" by Galileo's trenchant rhetorics. While cometary theory remains the main focus, *Il Saggiatore* also conveys Galileo's thoughts on the use and the capabilities of the telescope (following Grassi's insinuations about its invention), on natural philosophy (famously, Galileo's arguments about the book of Nature and its mathematical language), on matter theory, on scientific methodology, and on grievances against Simon Mayr's *Mundus Jovialis* (1614). Overall, *Il Saggiatore* is a vehicle for the intellectual program of Galileo and the Lincei, although it reflects more of its author's ideas and character than some of his cautious friends might have advised. The volume sparked debates within and outside the scientific realm, provoked a further reply from Grassi (the *Ratio ponderum*, 1626), and unleashed personal attacks on Galileo. It did not help that some of Galileo's arguments on comets were not all that impregnable. As the dispute continued, *Il Saggiatore* became the target of at least two anonymous denunciations for its alleged support of Copernicanism and atomism. Ultimately, Galileo's willingness to confront his opponents exacerbated his already strained relations with the Jesuits and foreshadowed future conflicts that would profoundly impact the Tuscan scientist's personal and intellectual journey.

Four centuries later, a more nuanced perspective on *Il Saggiatore* allows us to reconsider the contextual challenges and constraints as well as the agendas and shortcomings of the various actors in the debates surrounding the volume. The cometary dispute between Grassi and Galileo does not seem to have lost its controversial nature; reflections on its intellectual and cultural relevance and on its enduring legacy continue to appear. This 'Focus' section comprises four essays that provide multiple perspectives on the cometary controversy. Eva Struhal's essay explores the reception of Galileo's epistemological and technological novelties in the arts, using the example of the Florentine painter and architect Baccio del Bianco to demonstrate how *Il Saggiatore* became a symbol of reformist attitudes toward knowledge and artistic representation. Secondly, Luis Miguel Carolino examines the reception of *Il Saggiatore*'s cometary controversy within the Jesuit Order across the decades following its publication; he reveals complex, detailed interpretations of the constraints on Jesuit cosmological speculations and challenges assumptions about the tensions between different cosmological models. Jason Dean and Nick Wilding delve into the production process of *Il Saggiatore*, merging book history with the history of science to provide a detailed reconstruction of the book's creation and its cultural context. Finally, Eileen Reeves, Huib Zuidervaart, and Albert Van Helden revisit Galileo's attack on the Dutch astronomer Simon Mayr (Marius), who claimed to have observed the satellites of Jupiter first and more precisely. They consider how Galileo's attack reverberated in nineteenth-century historiography, particularly in the writings of the Dutch physicist Johannes Bosscha Jr., the astronomer Jean Abraham Chrétien Oudemans, and the Italian mathematician, historian of science, and editor of Galileo's works, Antonio Favaro.

Baccio del Bianco and the artistic fortuna of Galileo's *Il Saggiatore*

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Abstract
This contribution takes into consideration Galileo's *Il Saggiatore* as an overlooked source for the arts in Florence during the first part of the seventeenth century. I focus on the Florentine polymath Baccio del Bianco (1604-1657), an artist, engineer, architect, and caricaturist, whose interaction with Galileo was documented by the Florentine biographer Baldinucci. Baccio had also collaborated with Galileo's friend, the architect and astronomer Giovanni Pieroni. I trace the cultural fortune of *Il Saggiatore* in seventeenth-century Florence, taking a close look at Baccio's several artistic projects from the 1620s until his death. My contribution especially highlights the confluence of artistic and natural philosophical perspectives in the fortune of Galileo's treatise. The influence of *Il Saggiatore* on Baccio del Bianco's work is exemplified by the decoration of the Camera della Notte e del Dì of Casa Buonarroti, designed in close dialogue with Michelangelo Buonarroti il Giovane. At a closer look, also Baccio's caricatures are revealed as reflections on (human) nature endowed with the same authority of Galileo's approach to natural philosophy.

Keywords
Art and science, Baccio del Bianco, caricature, Casa Buonarroti, telescope

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My contribution highlights parallels between Galileo Galilei's natural philosophy, in particular his treatise *Il Saggiatore* and the artistic concepts of the Florentine artist-engineer Baccio del Bianco (1604-1657), who was active as a military, civil, and theatrical engineer throughout his life. Baccio and Galileo moved in the same cultural circles of seventeenth-century Florence.[1] As is well known, Galileo was in contact with a number of contemporary Florentine artists.[2] Filippo Baldinucci (1625-1696), the Florentine biographer of Baccio del Bianco in his *Notizie dei Professori del Disegno,* states that Galileo was Baccio's "maestro" and explicitly mentions him in the double role of "pittore ed architetto del Granduca".[3] Since Baccio was also active as an engineer and a military architect, it is likely that Galileo instructed Baccio in the field of applied mathematics and engineering.[4] For example, Baccio was involved in projects of water management in Florence, such as the project to build a wood bridge over the Chiana for Foiano in 1642.[5]

Baccio's polyhedric artistic activity as painter, draftsman, landscape architect, engineer, theatrical designer, caricaturist, satirist, and observer of Nature spans the full extent of Baroque visuality including the "veduta al naturale" – landscapes drawn from life – elaborate theatrical decorations, opulent costume designs, caricature, and artistic representation. Due to Baccio's artistic involvement with a multitude of artistic genres, later critics are yet to agree on a conceptual framework for Baccio's idiosyncratic and heterogeneous oeuvre

1 Baccio del Bianco has been neglected by recent research. The most complete biographical source is still his life by Filippo Baldinucci, see Baldinucci, "Notizie di Baccio del Bianco". See also the sumary of biographical data in: Arcangeli, "Biografie", 76-78. Detailed aspects of his life, particularly concerning his caricatures have been studied recently, see: Grassi, "Baccio del Bianco e i suoi amici"; Rice, "The cuckoldries of Baccio del Bianco"; Cheng, "Parodies of Life"; Măgureanu, "Baccio del Bianco and the cultural politics of the Medici court".

2 The artistic milieu that Baccio and Galileo moved in and the impact of Galileo's phiosophy on the artworld after his death have been described by Alessandro Tosi, "Circa 1642: Gli Artisti intorno a Galileo". Vincenzo Viviani's *Racconto istorico della Vita del Sig.r Galileo Galilei* mentions that Galileo's opinions on art were appreciated by a series of contemporary artists "come dal Cigoli, dal Bronzino, dal Passignano, e dall'Empoli" see Gattei, *On the Life of Galilei*, 6. The interactions between Galileo and Lodovico Cardi called Il Cigoli have received the broadest attention by researchers, also because they are the most extensive and best documented. Besides the classical article by Panofsky, "Galileo as a Critic of the Arts", see also Ostrow, "Cigoli's Immacolata and Galileo's moon". For the exchanges between Galileo, Jacopo da Empoli and Michelangelo Buonarroti il Giovane in a broader culture of a fascination of the "ritratto al naturale", be it portraits or stillives, see, Massimiliano Rossi, "La Crusca nell'occhio".

3 Baldinucci, "Notizie di Baccio del Bianco", 16-51; The mention of Galileo as his "maestro", *ibid.*, 35.

4 For Baccio's activity as a military architect, engineer, and military architect see, Baldinucci, "Notizie di Baccio del Bianco"; Arcangeli, "Biografie"; for Galileo's activity as an engineer see most recently Valleriani, *Galileo Engineer*.

5 BNCF, Gal. 148, doc. 5, cc. 20r-22v.

and have labelled it "eclectic".[6] Baldinucci categorized Baccio as a *naturalist*, an artist who based his art on skillful imitation of nature and her processes, by imitating the "fare alla natura", the "workings of nature" rather than her mere appearances.

Baccio's proficiency as draughtsman of landscapes survives to this day through a sketchbook he filled with impeccably drawn "vedute al naturale" during morning walks outside Florence.[7] His mastery was recognized by Grand Duke Ferdinando II, who asked Baccio in 1642 to create a *natural portrait* of the moon ("far ritrarre al naturale") with the help of Galileo's "large and perfect telescope".[8] Baldinucci reports that the desire to imitate nature and her different appearances guided Baccio's much acclaimed stage sets "che si trovò presente, e tutto vide, che Baccio imitò quanto di maraviglioso vediamo fare alla natura in terra, in aria, ed in acqua".[9] For the Spanish court Baccio designed landscape gardens ("all'usanza della Città di Firenze").[10] These instances illustrate a career-long thread of Baccio's interest in nature and her workings, in line with contemporary concerns of natural philosophy.

Baccio's career began as an assistant to Giovanni Pieroni (Giovanni de Galliano Pieroni) (1586-1654), whose extensive communication with Galileo is well-documented. Pieroni was a man of multiple talents and professional orientations. In 1610 at the University of Pisa, Pieroni had acquired a doctorate in Natural Philosophy.[11] An accomplished astronomer, his research into the fixed stars was taken seriously by Galileo and his circle.[12] Pieroni's two professional orientations, that of military architect and that of natural philosopher have so far led parallel lives in the modern literature on this "uomo di lettere".[13]

Pieroni's involvement with the Galileian natural philosophical context proved to be an extremely important stimulus for Baccio's career. Although some scholars have highlighted the fact that Baccio's art stands in connection with "the new science", Pieroni's intellectual formation has so far not been considered as an impetus behind Baccio's career.[14] Baccio accompanied Pieroni to the Viennese Imperial court in 1622.[15] However,

6 See for example Giusti, *Pietre Dure*, 84.
7 Baldinucci, "Notizie di Baccio del Bianco", 34.
8 *Ibid.*, 30.
9 *Ibid.*, 47.
10 *Ibid.*, 48.
11 About Pieroni see: Fidler, "Dottore Giovanni Pieroni Architetto e Matematico"; Ulicny, "Albrecht of Waldstein"; Ulicny, "Giovanni Pieroni".
12 See several letters that Giovanni Pieroni adressed to Francesco Rinuccini from Vienna in 1640: OG, XVIII, 138-139, 146, 163-164.
13 On the philosophical aspect of Pieroni's career and his several points of contact with Galileo see Heilbron, *Galileo*, 330-331; 354-355.
14 For example, Mâgureanu, "Baccio del Bianco", 13; Forlani Tempesti, "Baccio del Bianco fra scherzo e scienza".
15 Baldinucci, "Notizie di Baccio del Bianco", 16.

their relationship gradually deteriorated and towards the end of 1624 Baccio precipitously left Prague where he was working for the acclaimed General Wallenstein and travelled back to Florence.

During Pieroni's years in Central Europe (1622-1654), he was an active promotor of Galileian astronomy and the Florentine's new natural philosophy. From a letter addressed to Galileo from Prague, dating from 24th July 1626 we learn that Pieroni regretted not being able to find many intellectuals in Prague who take pleasure "delle speculationi più gentili di filosofia e matematica come ho conosciuto in Italia".[16] This letter mentions that Pieroni and Kepler were eager to read Galileo's *Il Saggiatore*, which he was unable to find in Prague, implying that Pieroni was in contact with Johannes Kepler (1571-1630), the court astronomer and mathematician of Emperor Rudolf II. Pieroni let Galileo know that he was attempting to calculate the exact position of the moons of Jupiter with one of his telescopes, a "strumento assai buono, credo uscito dalle mani di V.S., poi che non mi pare inferior a quell oche il Sig.re Conte, il nipote del Sig.r Generale Tilli mi dice d' haver ricevuto da lei".[17] He ended the letter by stating that whenever possible, he publicly lauds ("celebra") Galileo and his achievements and asked to be informed about ongoing research. While the letter was written some years after Baccio left Pieroni, it is very likely that Pieroni's fascination with Galileian thinking and his writings informed his conversations with Baccio. In fact, Pieroni's letter is an important document for two other aspects contributing to the cultural success of the New Science: its oral dissemination and the importance of actors to promote and develop the essential tenets such as architects and engineers, who only recently have reappeared on the historical map of early modern natural philosophy.[18]

Stillman Drake has introduced *Il Saggiatore* as the key to understanding Galileo's success "in winning converts to his 'new sciences' with profound consequences for the orientation of modern society".[19] *Il Saggiatore,* published under the sponsorship of the renowned Accademia de Lincei enjoyed enormous popularity in Rome during the 1620s. Like his predecessor Gregory XV, the newly elected pope Urban VIII, to whom it was dedicated, approved of the treatise's contents.[20] Besides introducing readers to detailed aspects of the polemics surrounding the fundamental question of comets' appearance versus their substance and location, the treatise also introduced readers to new ways of observing nature and an open system of scientific inquiry".[21]. Such an impact of *The Assayer* becomes evident from the testimony of the Roman poet and philosopher, Virginio Cesa-

16 OG, XIII, 333-334.
17 *Ibid.*, 334.
18 Lefèvre, "Galileo Engineer".
19 Drake, *The Controversy*, VIII.
20 *Ibid.*, XIX.
21 *Ibid.*, XXIII.

rini in the introduction of Galileo's treatise where he writes: "...with the guidance of your discourses I chose a better road to philosophy and knew a surer logic, whose syllogisms, founded either on physical experiments or mathematical demonstrations, open the intellect to a knowledge of truth".[22] Baccio's own ideas of how humans understand the workings of nature parallel those presented in *Il Saggiatore*.

A Galileian program: Baccio del Bianco, Michelangelo Buonarroti il Giovane and the Impact of Il Saggiatore *on the Decoration of the Casa Buonarroti*

Between 1628 and 1629, Baccio del Bianco painted three *trompe l'oeuil* doors for Michelangelo Buonarroti the Younger's study, the so-called *Camera della Notte e del Dì* in the Casa Buonarroti.[23] As Rossi has underscored, Baccio's activity in the Casa Buonarroti inserts itself within a cultural context informed by strong aesthetic affinities to humble objects such country food, animals, local plants and an empirical naturalism that connected the Accademia della Crusca of which Buonarroti was a member and Galileo's natural philosophy focusing on the immediate experience of nature.[24]

The earliest description of the *trompe l'oeuil* doors from 1684 attributes them to Baccio, but does not explain the doors' subject matter.[25] The three *trompe-l'oeuil* doors are today identified as *Country Dance* (Fig. 1), *Country Concert* (Fig. 2), and *Study of Astronomy* (Fig. 3). They have been largely neglected in research on the Casa Buonarroti, which has focused mostly on the *Galleria* and its eulogistic representation of Michelangelo's life.[26] The meaning of the programs of rooms other than the *Galleria* have not received much attention.

In this section, I reconstruct an overarching iconographic program of Michelangelo the Younger's study that parallels central ideas of Galileo's *filosofia naturale* such as the importance attributed to the senses in ordering and understanding the world as well as the role of "God-given" senses in creating knowledge that is more reliable than that derived from books.[27] These ideas are central to understanding Galileo's thinking. They shape his discourse on sense perception and the conclusions to be drawn from it, which is a central

22 *Ibid.*, XII.

23 The most fundamental publication is still Vliegenhart, *Galleria Buonarroti*, 58-59; Goudriaan, *Florentine Patricians*, 114-119; Spinelli, "Michelangelo il Giovane", 78-81.

24 See the brilliant article by Rossi, "La Crusca nell'occhio", 197-206.

25 *Descrizione Buonarrotiana,* s. p.: "Gli due usci finti di qua e di là sotto gli due ovati, e il terzo in quest'altra facciata, dove sono figurine ed altro, sono di Baccio del Bianco".

26 The identification of the doors' iconography has not changed since the 19th century: Fabbrichesi, *Guida*, 16: "La Danza Campestre; Il Concerto Musicale; Lo Studio delle Scienze Astronomiche". Compare to the most recent listing in *Michelangelo Buonarroti il Giovane*, "Atlante", s.p.

27 For the importance of Galileo's philosophy of the "mondo sensibile" for the context of the Casa Buonarroti see Rossi, "La Crusca nell' Occhio".

topic of *Il Saggiatore*.

The study was decorated in three steps, from 1625-1638: the ceiling paintings depict Jacopo Vignali's *God Creating Day and Night*, adapting Michelangelo's statues of Day and Night from the *Cappella Medicea*. Baccio's *trompe-l'oeuil* doors from 1628 decorate the lower part of the side walls and above is a cycle of members of the Buonarroti family, which was added in 1637-1638. I propose that the three *trompe-l'oeuil* doors form a coherent iconographic program with the room's ceiling. The *Country Dance* (Fig. 1), represents two women, of which one is holding a rose, in the foreground, sitting and standing on a staircase. The other woman points towards a dance scene in the middleground. The central couple visible in this scene performs a dance move with an elegant touching of the hands. In the context of an iconography focusing on the senses, I posit that this scene represents smell and touch.

The second scene in the series of the doors with the title *Country concert* (Fig. 2) represents two youths seated on a balustrade playing a lute and singing. On the tree above Baccio depicts two birds, who invite the spectator to reflect on the comparison between the "natural music" of birds singing and human music.

In *Study of astronomical sciences* (Fig. 3), Baccio organizes the composition so that the viewer is looking through a doorway onto a scene that contains two distinct groups: in the foreground, two children balance a basket overflowing with ripe fruits, offering a bunch of grapes to the spectator, representing the sense of

Fig. 1: Baccio del Bianco, *Country dance* ("The senses of smell and touch"), 1628. Florence, Casa Buonarroti.

taste. Framed by a drawn back green curtain, Baccio represents three aristocrats engaging in telescopic observations. The scene takes place during daytime and it is therefore unlikely that Baccio represents any astronomical activity. This suggests that, if anything, the gentlemen use Galileo's "noble instrument" for its major virtue, which is to make "distant things might be seen as perfectly as if they were quite close".[28] The representation of hearing through music making, taste through fruits, smell through flowers is a long-established iconographic tradition dating back to an exemplary print-series by the Dutch artist

[28] Drake, *The Controversy*, 211.

Fig. 2: Baccio del Bianco, *Country Concert* ("The sense of Hearing") 1628. Florence, Casa Buonarroti.

Fig. 3: Baccio del Bianco, *The Study of Astronomical Sciences* ("The sense of sight"), 1628. Florence, Casa Buonarroti.

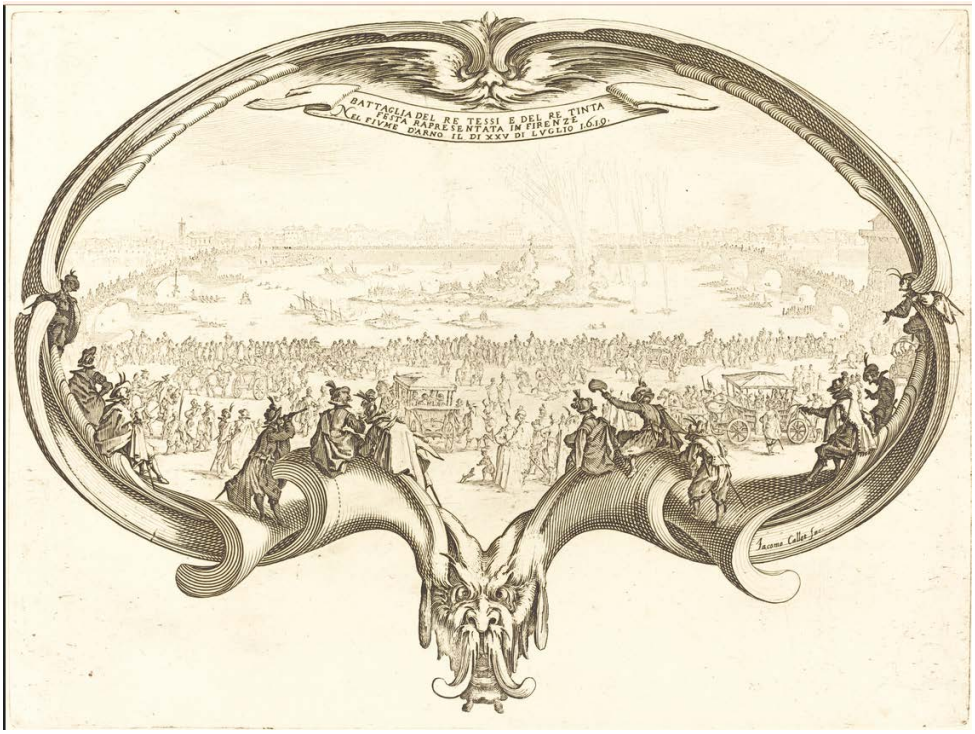

Fig. 4: Jacques Callot, *The Fan*, 1619. Image in the Public Domain, The National Gallery of Art.

Cornelis Cort from the year 1560.[29] Baccio's representation of sight is different but is comparable to the representation of the telescope in aristocratic culture on a design for a fan by Jacques Callot (Fig. 4), the French etcher who was also active for the Medici Court.[30]

Like Callot, Baccio also shows gentlemen engrossed in their telescopic observations: one gentleman's face is not visible because he is leaning out of the window, contemplating with the bare eye what the other two young gentlemen have just looked at through the telescope. One of the young men, who has been identified with Michelangelo's brother Francesco Buonarroti, wears a coat with the cross of the order of Malta suggesting that the beholder is witnessing aristocrats pass time.[31] All are engaged in vivid discussions. They

29 Welzel, "Sehen mit allen Sinnen?", 12.

30 On the relationship between seeing and scale, observer and spectacle, Callot and Galileo see Serebrennikov, "Spectacularly Small", 134-136. On the contextualisation of Callot's print within the Medicean promotion of Galileo's astronomical discoveries see Tosi, "Lune e astri Galileiani", 181-184.

31 For the identification of the costume and the identity of the young man see: Procacci, *La Casa*

are standing next to a table with an inkpot and books, some opened, some closed: the opened page of the book reveals an angular geometrical drawing that suggests a terrestrial object of observation, maybe a fortification, rather than a heavenly body.

Facing the spectator at the fresco's threshold are a girl and a toddler boy, holding fruit toward the spectator. While the putto holds a large bunch of grapes, the girl holds a plate of fruit in her lap containing peaches and an apple. The still-life and the ripe fruit that are offered to the spectator highlight a particular dimension of the sense of sight: the voracity of sight, since – as has been recently pointed out by Sanger – still life painting encourages the eye of the viewer to take on an additional mouth-like function.[32] Kuldbrandtstad Walker has pointed out that food in art can be a signifier for the sense of taste, considered a "sense of proximity and therefore lower orders of human faculty".[33] Although the scene is a visual enigma – what do the children have to do with the aristocrats – the answer could be found in a reception of ideas and practices deriving Galileo's natural philosophy, in particular his *Saggiatore*. Jusepe Ribera's *Five Senses* (Fig. 5), painted in Rome around 1615, have been associated with the culture around the Accademia de' Lincei.[34] Similarly, I place Baccio's representation of the senses in dialog with discourses present in *Il Saggiatore*, which was published a few years before the painting of the *trompe-l'oeuil* doors (1623).

The impact of Galileo's intellectual world on the decoration of Michelangelo's study in the Casa Buonarroti becomes important before the backdrop of familiarity with Galileo and his philosophical ideas, but also concerning the extensively documented fact that Michelangelo Buonarroti the Younger and Galileo were close friends.[35] Galileo and Buonarroti were both members at the Accademia della Crusca. The decoration of the Casa Buonarroti includes portraits of Galileo, as in the *Galleria degli Uomini Illustri* or in in Valerio Marucelli's scene in the Galleria, *Michelangelo a Venezia è accolto dai delegati del Doge e del Senato*.[36] Maria Giovanna Masera highlights that Michelangelo the Younger wrote a sonnett celebrating Galileo's discovery of the moons of Jupiter.[37] Massimiliano Rossi has

Buonarroti, 181; Sebregondi, "Francesco Buonarroti, Cavaliere Gerosimilitano ed Architetto Dilettante", 81.

32 Sanger and Kulbrandtstad Walker, "Introduction: Making Sense of the Senses", 1.

33 Kulbrandtstad Walker, "Appetites", 109.

34 Friedman, "Jusepe de Ribera's Five Senses".

35 About Buonarroti's friendship with Galileo see: Masera, *Michelangelo Buonarroti il Giovane*, 15, 21; Vliegenhaart, *La Galleria Buonarroti*, 9; Rossi, "Capricci, Frottole e Tarsie di Michelangelo Buonarroti il Giovane".

36 Bigazzi, "La stanza della Galleria Buonarroti dedicata da Michelangelo il Giovane alla fama die Toscani illustri", 180-188; for the identification of Galileo in Marucelli's painting see Vliegenhart, *La Galleria Buonarroti*, 227. See also Tognoni, *I volti di Galileo*, 51-55.

37 Masera, *Michelangelo Buonarroti*, 15. For Buonarroti's sonett about Galileo's discovery see OG, X, 412.

Fig. 5: Jusepe Ribera, *Allegory of Sight,* 1615. Franz Mayer Museum, Mexico City.

paralleled literary and aesthetic concepts of Buonarroti il Giovane and Galileo.[38]

Such broad cultural familiarity with Galileo and his writings suggests a profound and detailed knowledge also of Galileo's texts. I argue that rather than representing astronomical research Baccio's *trompe l'oeuil* door represents vision in its sensorial (the children who offer fruit to the beholder) and intellectual (observation through telescope) dimensions. This fresco contrasts unfiltered sensory perception against Galileo' sophisticated reasoned sensory perception, his "sensate esperienza" which is a central topic of the *Saggiatore.*[39] Galileo's New Philosophy caused a reevaluation of and an attempt to "certify" the human senses, to lift them from their embeddedness in subjectivity in line with Mersenne's lament: "One of the greatest difficulties in Physics lies in understanding the operations of

[38] Rossi, "Capricci, Frottole e Tarsie", 177.

[39] Baroncini, "Sulla Galileiana 'Esperienza Sensata'". Baroncini underscores that in the *Saggiatore* Galileo gives preference to the term "sensata prova", *ibid.,* 163. About Galileo and the senses see also: Piccolino and Wade, "Galileo's eye".

the senses".[40]

Baccio's depiction is not only interesting because it represents aristocratic engagement with Galileo's telescope but also because it illustrates how embedded telescopic observation was within contemporary aristocratic culture and the multiple actions associated with it: autoptic observation (with optical instruments), comparison with what can be seen with the bare eye, discussion, reading, geometrical drawings and writing.[41] Frequently, Galileo explained as "ritrovata da Fanciulli" or "cosa puerile" the faulty conclusions of his opponents drawn from a wrong interpretation of the data gathered through the senses as that they wrongly interpreted scientific facts.[42] The two children in Baccio's painting therefore represent a less sophisticated form of perception, a vision that is merged with touch, taste, and lack of judgment.

A basic truth about scientific instruments such as the telescope and the microscope is that they refined the meaning of what it meant to experience nature by enhancing our perception and creating new perceptual objects.[43] These instruments produced new feelings of intimacy with far away objects but also helped to develop a new understanding of distance. Emblematically, Baccio's painting thematizes different ways of enjoying and exploring nature through sight and taste. While the noblemen discuss and contemplate an invisible, far away reality, the beholder is tempted to taste and touch the fruits that are offered to him by the children.

Vincenzo Viviani's eulogistic life of Galileo's talks at length about the "noble instrument" of the telescope, which Galileo distributed initially among aristocrats (we can even trace the provenance of Pieroni's instrument), whose major virtue is to make "objects far away look as if they were close by".[44] Galileo's telescope is therefore as much an optical instrument as it is an intellectual one by challenging the *curioso* to integrate far away objects into the "here and now".

The opposition between visual perception through the telescope, that impacts the schematic drawing of the fortress on the table (focusing on the categories of "shape and place") or through the fruits that express themselves in "tastes, odors, or colors" correspond to a famous passage in the *Saggiatore*, where Galileo theorizes the difference between primary and secondary qualities.[45] While Galileo portrays the primary qualities as essential for "conceiving of a material and corporeal substance", for the shape and size of objects; tastes, odors or colors are conceived as secondary are only "names" in our imagi-

40 Kambaskovic-Sawers and Wolfe, "The Senses in Philosophy and Science", 107.

41 For the social dimension of telescopic observations see Payne, *Vision and Its Instruments*, 1-9.

42 In his *Starry Messenger*, for example, Galileo dismisses the idea that Venus is illuminated by the moon as "childish". See: Drake, *Discoveries and Opinions*, 43.

43 Shapin and Schaffer, *Leviathan and the Airpump*, 36.

44 Gattei, *On the Life of Galileo*, 21.

45 Piccolino and Wade, "Galileo's Eye", 1316; Drake, *Discoveries and Opinions*, 274.

nation.[46] Another essential element of Galileo's concept of the senses is that relying solely on the senses is misleading. In Galileo's conception the senses play a contradictory role and often observations go against immediate experiences of sensorial data. The senses need to be tempered and guided by prudence in order to turn their information into reasoned observation or what he terms "esperienza sensata".[47]

Applied to Baccio's fresco, the rich bowl of different fruits is a representation of nature and the curiosity, appetite, it stimulates in the intellectual. Baccio may even have designed his composition in a way that subjective, sensorial and easy to access experiences are foregrounded but the analytical, instrument-based verification of nature is situated in the background, indicating that they require more effort to access, and perhaps, are not achievable for everyone. The dimension of verification is addressed in the discussion of the two aristocrats about what they see through the microscope. Baccio's representation takes up two themes that are essential for the thematization of the telescope and the senses in his representation: the naturalization of vision through the telescope as one of the ways in which we visually perceive which is one of the major topics in the *Saggiatore* and the reflection on the complex relationship between scientific observation of reality and its relationship with sensorial observation more generally.[48]

Yet, the multisensorial exploration of the world and nature represented by Baccio does not transport the condescending and diminishing associations that Galileo evokes in his discussion of the secondary sensorial qualities. Rather, it is informed by curiosity and wonder for nature. Such a representation is comparable to Galileo's parable of the extraordinarily curious man with a "very penetrating mind" in the *Saggiatore*. This man is lured through the world following intense aesthetic sensations and wonder. Yet, *The Assayer* is more than just an investigation into the observation of nature. It also teaches us that the Book of Nature is continually open to all of our gazes, nature can be explored everywhere and at any time and that "scientific knowledge is infinite in scope".[49] *The Assayer* also suggests that the versatile and alert mind of a natural philosopher can solve both, theoretical and practical problems. It not only offers guiding lines for philosophers of how to read the *Book of Nature*, but also embeds the metaphorical narrative of the "man endowed by

[46] Drake, *Discoveries and Opinions*, 274.

[47] Baroncini, "Sulla Galileiana 'Esperienza Sensata'". Baroncini underscores that in the *Saggiatore* Galileo gives preference to the term "sensata prova", *ibid.,* 163. About Galileo and the senses see also: Piccolino and Wade, "Galileo's eye".

[48] The "naturalization" of the telescope in the context of the senses as the "new natural eye" is a main theme of Galileo's treatise and a metaphor employed by Faber; for a further reflection on Galileo's concept of vision and the senses see Piccolino, "I sensi, l'ambiguità, la conoscenza".

[49] Drake, *The Controversy*, XXIV.

nature with extraordinary curiosity and a very penetrating mind".[50] He raises birds and enjoys their song, until one night he hears an otherworldly beautiful song. He follows the trail of the sound until he finds a shepherd boy who blows into a hollow stick, a wooden flute, producing sounds similar to those of birds but through a different method. The man acquires the flute, but realizes, he cannot play it and cannot produce the sweet tones that have attracted him; the next day he happens to pass by a hut, within which he hears similar tones. Upon entering he finds a boy holding a bow, which he moved upon some fibers stretched over a hollowed piece of wood. After this surprising discovery of unanticipated ways of producing melodies, the man "began to perceive that still others might exist".[51] Driven by curiosity, one day the man entered an inn and found somebody rubbing the rim of a goblet thus producing a pleasant sound. He observes various insects and how they produce sound and his wonder grows. Finally, he became curious about the sound production of crickets; he continues to investigate the cricket piercing and dissecting it, until in doing so he kills it. He never discovers how the animal produces sounds, which underscores Nature's bounty in producing her effects to an extent, we never think about. The "real thing" of the Cicada, even though it is right in front of us, is equally enigmatic than the comet.

A close connection between the *Saggiatore* and the scene depicted is evident in the trompe-l'oeuil door with the title "Concerto Campestre" (Fig. 2). It represents two young men in nature, playing a lute. On the tree above, two birds listen attentively to the sound of lute-playing.

The integration of a reflection of the senses into a setting dedicated to Michelangelo Buonarroti's study is an important reference to Galileo's philosophy.

The program of the *Camera della Notte e del Di* is also closely linked to another basic and often repeated idea of the New Science: that God has given humans the senses and reason to explore nature rather than believing in what previous thinkers have stated about it. In an homage to Michelangelo's sculpture *La Notte* and a reference to the energetically floating Godfather of the Sistine ceiling, the ceiling represents frescoes of God creating the cosmos, separating sun and moon. The program for Michelangelo Buonarroti's *studio* is based on the concept of curiosity in exploring nature, a sensory curiosity that undergirds Galileo's scientific writings. The program sets the doors in relationship to the room's ceiling and draws parallels with God's profound wisdom and his capacity in creating nature for exploration by man. It defends the basic Galilean idea that humans should use God given senses to explore the Universe:

> I say that I do not want to be among those ignoramuses and ingrates toward nature and

[50] Drake, *Discoveries and Opinions*, 256.
[51] *Ibid.*, 257.

> toward God who, being given senses and reason, should wish to defer such great gifts to the mistakes of one man, or to believe blindly and stupidly what I wish to believe and subject the freedom of my intellect to anyone who is just as liable to error as I am.[52]

Also, in the introduction to his treatise *Esperienze introno alla Generazione degl' Insetti* (Florence, 1668), Francesco Redi underscores that the "supreme architect" has attributed to humans their senses "like many windows or doors through which they admire nature and the natural phenomena enter in order to make themselves known" ("come tante finestre, o porte, per le quali, o elle si affacci a mirarle, o elle entrino a farsi conoscere")[53] In consequence, the program of the *Camera della Notte e del Di* should be considered through a unified lens that unites its parts: the ceiling representing the creation of sun and moon through godfather and the *trompe l'oeuil* doors representing the senses that enable humans to explore the universe.

The Epistemic Dimension of Caricature and the Galileian Telescope

In his introductory letter to The Assayer, Johann Faber, member of the Lincei from Bamberg lauds Galileo's telescope for aiding the deficient eyesight of humanity; in fact, Faber suggests that the telescope is "the new natural eye".[54] Faber's letter therefore highlights one of the central contents of The Assayer, a discussion of how to employ the human senses in exploring the rules of nature. That Galileo's contemporaries understood the senses, how they function and how reliable they are, as a central theme of The Assayer also becomes evident from Francesco Stelluti's introductory poem to this treatise:

> Scarce a man can understand
> Though he use his senses well
> How our touch is in our hand
> How our eyes see sights, ears hear, and noses smell
> This we ask you now to tell,
> Though the tongue can scarce relate
> How it knows the varied flavors on a plate.[55]

Defending the reliability of his telescope, Galileo engages in a profound explanation of the senses and their laws. An essential function of the senses for Galileo is to bring things from non-existence to existence and in the case of the telescope, this happens through

[52] Drake, *The Controversy*, 302.
[53] Redi, *Esperienze*, 1.
[54] Drake, *The Controversy*, 154.
[55] *Ibid.*, 159.

an enlargement of observed objects otherwise not visible and therefore not existent to the bare eye.[56] Faber compares the telescope's expansion of human vision to the explorers Amerigo Vespucci and Cristoforo Columbus.[57] Galileo's telescope expands vision without limits, including being able to see the sun "marred by strange spots" and the moon's "swollen mountains". Where once we saw a nebula, we now see bright stars.[58] The telescope is aiding old humanity "with mind still sound but eyes dimmed" to see new characteristics of the stars, a sharpened quality of vision that David Freedberg has associated with the symbol of the sharp-eyed lynx of the Lincei.[59]

Such aspects of bringing what is hidden underneath the plainly visible surface to evidence, also informs the epistemic dimension of Baccio del Bianco's caricatures. Among Baccio's multiple areas of artistic engagement, his caricatures are probably the most striking and the best surviving body of his work.[60] Within Baccio's *Vita* Filippo Baldinucci offers a long definition of the art of caricature, of which he considers Baccio as one of the protagonists: "Quello però, in che Baccio del Bianco fu eccellente, e forse anche singolare, in materia di finire, fu l'inventare e toccar di penna storiette piacevoli, caramogii, e ritratti di persone con disegno caricato".[61] It is important to understand that Baldinucci's definition of caricature differs profoundly from our understanding of this art form today as "an exaggerated or distorted image of a person or a thing which is characterized by visual likeness".[62] In fact, Baldinucci clarifies that the caricaturist does not distort nature, but "always follows nature's intentions, therefore completing and perfecting her intentions, he works in a way that the ugly becomes even more ugly" ("seguitando sempre l'intenzione della natura, e dando, per così dire, adempimento e perfezione all'intento di essa, fa sì che il brutto nella sua propria bruttezza diventi senza paragone più brutto")[63] While Baldinucci's definition underscores the epistemic possibilities of caricature, modern definitions focus on the aspects of its entertainment, compromising the important connection to understanding essential aspects of the "intenzione della natura".

56 *Ibid.*, 200.
57 *Ibid.*, 154.
58 *Ibid.*, 154-155.
59 Freedberg, *The Eye of the Lynx*, 276.
60 On Baccio's caricatures see: Gregori, "Nuovi accertamenti"; Cheng, "Parodies of Life"; Rice, "The cuckoldries of Baccio del Bianco"; Forlani Tempesti, "Baccio del Bianco".
61 Baldinucci, "Notizie di Baccio del Bianco", 31. See also Baldinucci's definition of "caricare" in: Baldinucci, *Vocabolario*, 29.
62 See for a recent definition of caricature: *Oxford Dictionary of Art and Artists*: "Caricature: A form of art, usually portraiture, in which characteristic features of the subject represented are distorted or exaggerated for comic effect or to make critical comment. The term is sometimes used more broadly to denote other forms of pictorial burlesque or ludicrous representation, such as the grotesque heads of Leonardo". Brassat/Knieper, "Die Karikatur", 773-796.
63 Baldinucci, "Notizie di Baccio del Bianco", 33.

In the seventeenth century, caricatures were not simply derisions of imperfect nature, but also testimonies to the sharp-witted artist and his capability to look beneath the surface of natural appearances in order to uncover nature's true intentions, her workings. Baldinucci's definition of caricature therefore situates this genre at a central position in the understanding of nature and therefore in the conceptual vicinity of natural philosophy.

Baldinucci also underscores that not everybody can draw caricatures and that the caricaturist needs a particularly sharp wit in order to uncover the "intentions of nature" that are perceptible only to him. Baccio had a natural talent for caricature: "Opera in vero, che è propria di cervelli tagliati a tal misura solamente, e non di tutti... se non ha da natura un tale spirito; e veramente Baccio in questo fù singolare".[64] Baccio del Bianco, the "spiritoso pittore" whose perspicacious intellect perfectly guides his hand and whose sharp-witted observational skills enable him to discover natural defects present in people's physiognomy therefore resembles a natural philosopher.

Let us take a close look at a caricature which has been attributed to Baccio by Sandra Cheng (Fig. 6).[65] In the center of it is a dull-witted, laughing, and crouching giant seen in profile, on whose shoulders sits an old man with reddish curly hair, a big nose and a hunchback. The old man holds a stick onto which a pickle is pierced. The painter, a writer with thick glasses and a pointed hat, and a court jester with a telescope are all focused on this bizarre pair. I argue that the theme of this caricature highlights different modes of observation in art, poetry, and science. Many of the objects depicted in the drawing are symbolical and represent a satirical commentary on the figures' intelligence. For example, the *Vocabolario della Crusca* explains that the pickle (*cetriolo*) in Italian figuratively identifies a stupid, irrational person: "detto figuratamente d'uomo sciocco, senza senno".[66] The painter's easel abounds with symbolic hints: old ankle boots hanging off nails from the easel may refer to the label for a bad painter – *pittore de' stivali.* This term derives from *pittore da sgabelli* ("painter of stools"), which clearly arises from workshop jargon and refers to a clumsy painter of low repute who lacks basic skills in disegno, is incapable of transcending the two-dimensionality of the picture plane by creating an illusionistic representation of space, and instead fills the canvas from edge to edge with clumsy figures.[67] A "painter of

[64] *Ibid*. On Baldinucci's interest in caricature and the importance he attributes to it as cosubstantial to any form of portrait in an "apparenza dell' verità", see Rossi, "Serio Ludere", 70-74.

[65] I discovered this work through Sandra Cheng's paper at the RSA-conference 2021, who I am grateful for pointing me to the further literature on this drawing. My own interpretation of the work, however, deviates from Cheng's. In her presentation she attributed the drawing to Baccio del Bianco, an attribution that I share entirely. For the attribution to Faustino Bocchi see "Composition of grotesque Figures with an artist at work", Parker, *Catalogue of (…) Ashmolean Museum*, cat. nr. 800, 420.

[66] *Vocabolario della Crusca*, ed. 5, vol. 2, 795.

[67] Baldinucci, *Vocabolario*, 125: "Pittore da sgabelli. Dicesi per dispregio di pittore grossolano e

Fig. 6: Baccio del Bianco, *The Artist's Studio*, ca. 1628. Oxford, Ashmolean Museum.

stools" is also not in command of the more sophisticated pictorial techniques of chiaroscuro or sfumato, since he sets fields of color bluntly next to each other. The term *pittore da sgabelli* or its synonyms (*pittore da stivali, pittore da roste e boti*) are a part of the derogatory, competitive discourse practiced by artists in the workshop milieu. Baccio's painter of low repute has also hit lean times and he wears clothes that are filled with patched holes. We see on the canvas the astonishingly imprecise transformation of the motif of the two fools. The dilletante lacks the quality of being "spiritoso" a quality that Baccio displays as the inventor of this very caricature. On the easel sits a "gazza ladra", a thieving magpie, which refers to bad and unfiltered, therefore "stolen" imitation of nature. The caricatured courtier in profile with his prominent runny nose looks through a telescope but it is unlikely that it helps him discern anything as the painter is much too close to him.

In addition to the thematic parallel of including a representation of a telescope, the car-

che non punto sa disegnare (...)".

icature at the Ashmolean Museum exhibits stylistic similarities to Baccio's representation of the *Sense of Sight* at the Casa Buonarroti: the figure of the painter is similar to that of the young aristocrat holding the telescope; the spatial differentiation of figures in the background represented in lighter colors and with less distinct outlines with the figures in the foreground, the heavily delineated contours and strong colors in the group of children and fruit in the foreground as well as of the court jester with dripping nose looking through the telescope. Similar to the theme of this scene Baccio's caricature focuses on the Galileian concepts of observation, the importance attributed by the philosopher to the capabilities of evaluating what is in front of our eyes in the "grand book of nature".

An early passage on the telescope and its use is contained in a letter by Gianfrancesco Sagredo to Galileo, which specifies what can be seen through the telescope "looking at the city of Florence and some nearby place" from purposes that require sharp judgment, but for which no new instrument had been invented yet: "for distinguishing madmen from the wise, good men from those of evil counsel...".[68] In Baldinucci's opinion, Baccio's caricatures are able to lay open, what Sagredo claims Galileo's telescope is lacking: the ability to help with judgement, in distinguishing between "wise, good men from evil men and madmen". Such a moralistic aspect becomes apparent from the figure type of *caramogi* that Baldinucci associates with Baccio's caricatures. *Caramogi*, as defined in the third edition of the *Vocabolario della Crusca* are "small and ugly", dwarflike figures.[69] Baccio invented these new forms to personify his view underneath the surface of his contemporaries. Baldinucci highlights their innovative aspect: "Le storie de' caramogi fece egli in atti e gesti si nuovi, e si bizzarri, che non è chi abbia veduto ancora cosa simile [...]".[70] Baccio's caricatures are a testament to his sharp intellect, his observational skills, and a judging, moralistic gaze.[71]

Baccio's caricatures follow Galileo's emphasis on geometric representations of a natural model.[72] For the belief that nature is best understood, if assimilated to geometrical figures see Galileo's famous passage in *Il Saggiatore*: "Philosophy is written in this grand book, the universe, which stands continually open to our gaze. But the book cannot be understood unless one first learns to comprehend the language and read the letters in which it is composed. It is written in the language of mathematics, and its characters are triangles, circles, and other geometric figures without which it is humanly impossible to understand

[68] Drake, *Opinions and Discoveries*, 68. Most recently, Friedman, "Jusepe de Ribera's Five Senses".

[69] For the term "caramogio" which only turns up in the third edition of the *Vocabolario dell' Accademia della Crusca*, 287: "CARAMOGIO. Dicesi di Persona piccola, e contraffatta. Lat. Pumilius, pumilio".

[70] Baldinucci, "Notizie di Baccio del Bianco", 32.

[71] For the moralistic aspect of Baccio's caricatures see Sandra Cheng, "Parodies of Life".

[72] For this often analyzed passage see for example, Palmerino, "The Mathematical Characters of Galileo's Book of Nature".

Fig. 7: Baccio del Bianco, *Studio of a Portrait Painter* (Gab. Disegni, 3303.13). Florence, Uffizi.

a single word of it; without these, one wanders around in a dark labyrinth".[73] Understanding the grand Book of the Universe therefore requires a gaze that subjects nature and her appearances to an analysis through "the language of mathematics", that dissects reality into geometric figures.

Here it is interesting to take a look at Baccio's caricature of a portrait painter, his sitter and a priest (Gab. Disegni, 3303.13; Fig. 7).[74] We see a painter sitting in profile, painting a courtier as a *caramogio*. On the left side stands a Dominican friar also seen in profile. One of Baccio's caricatural strategies is to assimilate faces to their underlying geometrical forms: therefore, he converts the monk's round face into a circular shape. Similar to Galileo's geometrical analysis of nature and like the well-known saying of Michelangelo's "seste dell' occhio", Baccio looks at the world through "seste" (compasses).[75] Baldinucci

73 Drake, *Controversy*, 238.

74 Petrioli Tofani, *L'inventario settecentesco*, 1063.

75 On the well-known saying of Michelangelo's "seste dell' occhio" see for example Summers, *Michelangelo and the Language of Art*, 255. This association was known also in the Seicento, see: Baldinucci, "Notizie di Alberto Durero", 17. For the idea of the mathematization of Florentine visual arts through Galileo's philosophy, see: Camerota, "Il Contributo di Galileo alla matematizzazzione".

states that it is only the "spiritoso pittore", (witty, sharply intelligent painter) who is able to recognize perfectly the "intention of nature", capable of perfectly translating what his "perspicace intelletto" (acute intellect) signals.[76] Because he has a deep understanding of the defects of human physiognomies, he is able to detect these even in the most beautiful faces. The "perspicace intelletto" then perfectly guides his hand and his sharp-witted observational skills enable him to represent and magnify even minor natural defects in people's physiognomy.

Baldinucci, therefore, associates caricature with the capacity of the ingenuous artist to look below the surface of deceptive appearances, to understand and capture the "intentions" of nature or the hidden character or intentions of his sitters. The caricaturist completes a task similar to that of the natural philosopher as portrayed in *The Assayer*. He is particularly able – to stay with the words of *The Assayer* – to "read the great book of Nature" and then to define the "real objects" distinguishing them from their "appearance".[77]

It is likely that the assimilation of the Dominican's profile to a circle also carries with itself a satirical dimension. For example, "cervello tondo" is a mode of referring to a dumb, ignorant person.[78] Such an overlapping of mathematical and satirical elements suggests that, in fact, Baccio's caricatures are capable of uncovering aspects of reality invisible to other people, but unlike the telescope, they are capable of support in drawing judgements. Therefore, Baccio's caricatures are more profound than "comic drawings to parody the pomp and glamour of seventeenth-century Florence".[79] To conceptualize seventeenth-century caricature as an art form congenial with scientific investigation goes far beyond our conception of caricature as a humorous art form. Rather, these caricatures are philosophical reflections on nature and her intentions, an aspect that is prevalent throughout Baccio's *oeuvre*.

Conclusion

Focusing on two case studies of the intersections between Galileo's philosophy and the artistic oeuvre of the Florentine polymath Baccio del Bianco, this article underscores the multidisciplinary cultural context that Galileo's *Il Saggiatore*, an ostensibly natural philosophical text, has influenced. In the *Camera della Notte e del Di* for Michelangelo Buonarroti il Giovane, the thematic focus on the senses in Baccio's *trompe l'oeuil* doors reveals an adherence to values put forward by Galileo in *Il Saggiatore*. A similarity with Galileo's analysis of nature also becomes apparent from the lower genre of Baccio's caricatures,

[76] Baldinucci, "Baccio del Bianco", 33.
[77] Drake, *The Controversy*, 186.
[78] Patriarchi, *Vocabolario*, 329.
[79] Cheng, "Parodies of Life", 127.

which are interpreted here similarly to Galileo's telescope being a "new eye of nature" by highlighting aspects of reality only evident to the "pittore spiritoso". A cultural entanglement a multidisciplinary framework in which Galileo's oeuvre was received also brought with itself multifaceted epistemic demands, as illustrated by Sagredo's criticism of a lack of support for moral judgements in telescopically enhanced views. In contrast, Baccio's caricatures embraced and adopted the principles, concepts, and the advances described in *Il Saggiatore* by embedding geometrical forms as well as his moralistic judgement in order to reveal a more truthful understanding of reality, thus expanding the influence of *Il Saggiatore* in ways that Galileo had himself likely not anticipated.

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The burden of Galileo's controversy: The Jesuit revisiting of the Aristotelian cosmos in Collegio Romano (1618-1677)

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Abstract
When studying the controversy prevailing between Galileo and the Jesuits over the comets of 1618, historians tend to focus primarily on the works that led to the publication of *Il Saggiatore* in 1623. This article demonstrates that the echoes of this controversy reverberated inside the walls of the Collegio Romano well beyond the publication of Galileo's *chef-d'oeuvre*. Its philosophy and mathematics professors strove to maintain – in opposition to Galileo – the Aristotelian principle that the heavens were ontologically superior to the terrestrial region throughout decades. Even after adhering to the planetary system of Tycho Brahe and the concept of celestial fluidity, they persisted in arguing that no corruption ever took place in the celestial region. Hence, accepting Tycho's astronomical theories meant the seventeenth-century Collegio Romano professors had to reject the Ptolemaic astronomical framework even if not necessarily denying the very core of the Aristotelian cosmology. Thus, Collegio Romano remained the champion of philosophical orthodoxy within the Jesuit educational network.

Keywords
Collegio Romano, Galileo, Orazio Grassi, Comets, Celestial Incorruptibility

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In early November 1624, Galileo Galilei learned, in a letter received from Mario Guiducci, that whoever stood up for the new theories and disapproved of the Peripatetic doctrines would be vehemently and violently criticized in the public ceremony held to commemorate the opening of the Collegio Romano academic year.[1] Galileo was certainly not surprised by the news as it was neither the first time nor – in keeping with my argument in this paper – would it be the last occasion on which obedience to Aristotle was publicly proclaimed at the Roman Jesuit college.[2] However, the mood was now different. Maffeo Barberini had been elected Pope Urban VIII in 1623, and the expectations ran high among the *Lincei*. Galileo, who had received public support from Urban VIII, and the *accademici* believed a new age in the cultural politics of the Catholic Church was about to dawn. For the Roman Jesuits, this meant the Aristotelian orthodoxy was at stake. Furthermore, Galileo's *Il Saggiatore* had been published roughly one year earlier, raising the dispute with the Jesuits over the comets of 1618 to a new level in a controversy previously described as humiliating for the Jesuits from the polemic point of view.[3]

Historians have discussed Galileo's motivations for embarking on this dispute with the Jesuits at length, with some attributing it to Galileo's alleged psychological constraints and obsessive compulsion towards controversies while others place the emphasis on the social and professional nature of the debate.[4] More recently, Massimo Bucciantini, Ottavio Besomi, and Michele Camerota, among others, have convincingly demonstrated that the comet dispute requires understanding in the context of the cosmological debate arising in the aftermath of the Catholic Church's prohibition of the Copernican theory of Earth's motion, issued in 1616.[5] On the one hand, aware that the comets of 1618 were under consideration in Rome as the ultimate proof against the Copernican system, and

1 OG, XIII, 226-227.

2 For example, on 15 October 1624, Guiducci informed Galileo that he had received the copy of the conference "fatta al Collegio [Romano] contro a' seguaci di nuove opinioni, o più tosto contro a quelli che non seguitano Aristotile", OG XIII, 216.

3 Ruffner, "The Background and Early Development of Newton's Theory of Comets", 73.

4 Baldini, *Legem impone subactis*, 209 and Shea, *La rivoluzione intellettuale di Galileo*,102 ff., for example, epitomize the first tendency while Westfall, "Galileo and the Jesuits", 51 and Biagioli, *Galileo Courtier*, 268ff., account for the second. A critical review of this historiography is found in Beltrán, "Introducción. Galileo y la ciencia. Los jesuitas y la obediencia", LVII-LXXXVIII.

5 Besomi and Helbing, "Introduzione" *Discorso delle comete,* 15-22; Besomi and Helbing, "Introduzione" *Il Saggiatore*, 67-68; Bucciantini, *Contro Galileo. Alle origini dell'affaire*, 151; Bucciantini, *Galileo e Keplero*, 261-287; Camerota, *Galileo Galilei e la cultura scientifica nell'età della Controriforma,* 363-376. See also Favino, "Contro Tycho. Per una lettura contestuale del *Discorso delle comete*". In the seventeenth century, there was already the clear perception that cometary debate had further impacted on the discussion over the planetary systems. See the case of Riccioli in Gualandi *Teorie delle comete*, 83-102.

while prevented from discussing it openly,[6] in claiming that comets move in a rectilinear path between the Earth's surface and the sky, Galileo could then suggest the Earth actually moved around the Sun as Copernicus had argued.[7] On the other hand, the Jesuit mathematicians of the Collegio Romano applied their astronomical expertise to the observations of the 1618 comets to clear the way for the reception of Tycho Brahe's astronomical system. After the condemnation of Copernicus, Tycho's geo-heliocentric system appeared to orthodox Catholics as the most likely candidate for replacing the traditional Ptolemaic system, which no longer either fitted or accommodated the outcomes of the new telescopic observations (in particular the phases of Venus). Galileo soon realized this and did not hesitate to accuse the Jesuit Orazio Grassi of secretively following Tycho Brahe. At first, Grassi tried, somewhat unconvincingly, to deny the accusation. In his words,

> But, lest we waste time on useless complaints, first, I do not understand how Galileo can justly oppose my master and even declare him at fault, presumably because he appears to have sworn by the words of Tycho and to have followed him in all his vain devices. For *this is patently false*, since, except for the manner and method of calculation by which the location of the comet was sought, Galileo found nothing else in our *Disputation*, as its very words testify, in which Tycho was followed. Even with his telescope, the lynx-eyed astrologer cannot look into the inner thoughts of the mind. *But consider, let it be granted that my master adhered to Tycho. How much of a crime is that?*[8]

Although not a crime, advocating Tycho in 1619 might be perceived as an affront to the Jesuit authorities and their policy of keeping the *uniformitas et soliditas doctrinae* in place. Grassi was probably aware that, as he wrote those lines against Galileo, the *Sphaera*

[6] In March 1619, Giovan Battista Rinuccini informed Galileo that in Rome "the Jesuits presented publicly a Problem [on the distance of the comet] which has been printed, and they hold firmly that it is in the sky, and some others besides the Jesuits have spread it around that this thing overthrows the Copernican system, against which there is no surer argument than this". GG, XII, 443. Translation by Drake, *Galileo at Work,* 265.

[7] Galileo's cometary theory accounted for the changes in velocity, dimensions, and lengths of the comet. Yet it failed to explain why, arising with a vertical path, the comet moved northwards instead of pointing to the zenith. This led Galileo-Guiducci to state, somewhat ambiguously, "This forces us either to change what has been said or else to retain that, but to add some other cause for this apparent deviation". Galileo-Guiducci, *Discorso delle comete,* 182. Translation by Drake, *The Controversy on the Comets of 1618,* 57. This "other cause" was most likely the annual motion of the Earth. On this question, see Besomi and Michele, *Galileo e il Parnaso Tychonico*, 13; Camerota, *Galileo Galilei e la cultura scientifica nell'età della Controriforma*, 371ff.; Buccianti-ni, *Galileo e Keplero*, 273-274.

[8] Grassi, *Libra astronomica ac philosophica,* 5. Translation by O'Malley, *The Controversy on the Comets of 1618,* 71, my emphasis.

mundi written by his confrère Giuseppe Biancani was going through a distressing process of internal censorship in Rome on account of its "Tychonism". One year later, in 1620, Brahe's *Astronomiae instauratae progymnasmata* was submitted to the Roman Congregation of the Holy Office. Roberto Bellarmino, who happened to be an influential member of the Congregation of the Inquisition in addition to serving in the Congregation of the Index, recommended the book be expurgated of all the eulogiums bestowed on Protestant authors.[9]

Besides the confessional dimension, the Tychonic system raised some cosmological questions that challenged the traditional Aristotelian-Ptolemaic worldview. Due to the intersection of the orbits of the Sun and Mars, the Tychonic system required the celestial region to be fluid, a cosmological principle that Christoph Clavius and his close collaborators at the Collegio Romano utterly refuted.[10] Furthermore, although clearly distinct from a cosmological point of view, the idea of celestial fluidity was commonly equated with the notion of celestial corruptibility among the 1610s and 1620s Jesuit milieux. Both doctrines seemed to receive validation from the celestial novelties occurring in the seventeenth century, and particularly the appearance of bright comets over the skies in late 1618. Johann Chrysostomus Gall, a German Jesuit who trained in astronomy under Johann Lanz and Christoph Scheiner at the University of Ingolstadt, where he observed the 1618 comets with Johann Baptist Cysat, stated, in 1621, for example, that,

> The observations carried out by the most modern astronomers give plenty to think about to both those who advocate that the heavens are solid and those who want them to be incorruptible. Let it be stressed, however, that corruptibility does not necessarily follow from denying [celestial] solidity and advocating [its] fluidity.[11]

As Gall proposed, the theory of celestial corruptibility generated greater consequences than celestial fluidity. Recognizing that comets moved across a heavenly region filled with a fluid and tenuous matter implied acknowledging that there was not a complex system of solid orbs. This, therefore, collapsed the Ptolemaic astronomical tradition. Nevertheless, accepting there were processes of coming-to-be and passing away in the celestial region produced further implications: it meant jeopardizing the ontological distinction between the terrestrial and celestial regions upon which the Aristotelian cosmos was based. This was exactly the link Galileo established both when he recognized how terrestrial exhalations ascend from the Earth's atmosphere into the planetary region and on arguing that

9 Lerner, "Tycho Brahe Censured". Cf. Godman, *The Saint as Censor*, 307.

10 Lattis, *Between Copernicus and Galileo*, 61-85; Dollo, "Le ragioni de geocentrismo nel Collegio Romano"; Carolino, "Between Galileo's Celestial Novelties and Clavius's Astronomical Legacy".

11 Gall, *In sphaeram*, BGUC, Ms. 192, f. 7v. On the common association between celestial fluidity and corruption made by Scholastic philosophers, see Grant, *Planets, Stars, and Orbs*, 350.

sunspots were real changes taking place on the Sun's body.[12] Galileo's *Il Saggiatore* proposed and discussed all these topics in detail.[13]

While studying the controversy between Galileo and the Jesuits over the comets of 1618, historians tend to focus on the works that led to the publication of *Il Saggiatore* in 1623. According to the common view, "with *The Assayer* the controversy comes to its virtual end".[14] Nevertheless, as this paper demonstrates, the echoes of this controversy reverberated inside the walls of the Collegio Romano well beyond 1623. The professors of philosophy and mathematics at this college strove throughout decades to maintain – in opposition to Galileo – that the heavens were ontologically different from the terrestrial region and, thus, immune to corruption. Even after adhering to the planetary system of Tycho Brahe and, consequently, to the principle of celestial fluidity, did they persist in arguing that no processes of coming-to-be and passing away took place in the celestial region. Hence, accepting the astronomical ideas of Tycho meant, to the majority of the seventeenth century Roman Jesuits, the rejection of the Ptolemaic astronomical framework but not necessarily denial of the very core of Aristotelian cosmology.

Ugo Baldini argued that "Galileo's polemic against Grassi" led the Jesuits to adopt a "defensive closure, breaking certain links with the *neoterici*".[15] This paper demonstrates that, on the eve of the controversy, the Jesuits in Rome were already endeavouring to ensure the

[12] As Galileo-Guiducci put it, "Never having given any place in my thoughts to the vain distinction (or rather contradiction) between the elements and the heavens, there is for me no qualm or difficulty about the idea that the material of which a comet is formed having sometimes invaded these nether regions of ours, and being sublimated here, having surmounted the air or whatever else it is that is diffused throughout the immense reaches of the universe". Galileo-Guiducci, *Discorso delle comete*, 175. Translation by Drake, *The Controversy on the Comets of 1618*, 53. On the debate over celestial fluidity and corruptibility in early seventeenth-century Rome, see Bucciantini, "Teologia e nuova filosofia".

[13] The ontological distinction between the terrestrial and celestial regions established a cornerstone of the Aristotelian natural philosophy endorsed in the early seventeenth century. Among other issues, this accounted for the apparent difference between the terrestrial bodies' rectilinear and finite motion and the celestial bodies' circular and infinite motion and the absence of visible changes occurring in the celestial region. Additionally, it explained the processes of generation and corruption of terrestrial bodies by means of hylomorphism. According to this theory, every terrestrial body was composed of matter of a form or quality that could be substituted by its contrary, bringing about generation and corruption. Being made of simple and perfect matter, often identified as a fifth element, the celestial region had no such processes of processes of coming-to-be and passing away. On the theory of celestial incorruptibility in the early modern Scholastic tradition, see Grant, *Planets, Stars, and Orbs,* 206-219.

[14] Gal and Chen-Morris, "Galileo, the Jesuits, and the controversy over the comets", 38.

[15] Baldini, *Legem impone subactis*, 203 n.3. In the original Italian: "La polemica di Galileo contro Grassi introdusse un dato del tutto non previsto [...]: quella di provocare una chiusura difensiva e di spezzare certi nessi con i gruppi *neoterici*".

Aristotelian orthodoxy was respected by the Order's scholars. After the controversy, they also continued sparing no efforts to consolidate a worldview consistent both with Aristotle's authority, the outcomes of the celestial novelties and the Tychonic innovations. This furthermore explains why the Collegio Romano professors continued teaching the theory of celestial incorruptibility until as late as the 1670s and thus even after their confrères in other regions of Europe had already abandoned it. From this point of view, self-censorship in the wake of the publication of Galileo's *Il Saggiatore* hit stronger in Rome than in the Jesuit peripheries.

1. December 1618: three cometary concepts, one cosmological tenet: celestial incorruptibility

Over the Christmas holidays of 1618/19, the Collegio Romano Jesuits held a public ceremony to celebrate the appearance of bright comets over the skies of Rome. At this prestigious celebration, in addition to the professor of rhetoric, representatives of the mathematical, philosophical, and theological communities made speeches on the comets.[16] This effectively unveiled three different understandings of the comets. The theologian, who was not concerned with the nature of the comet itself, mentioned in passing how the comet resulted from viscous and greasy exhalations that ascended from the Earth's surface to the upper region of air.[17] The philosopher, who was most likely Marcellino Albergotti[18] and held responsibility for discussing the nature of comets, termed it the visual outcome of the convergence of celestial matter at a certain spot in the skies produced by the overlapping of different celestial spheres.[19] The mathematician, Orazio Grassi himself, having restrained his sphere of action to the mathematicians' area of competence, hence, discussing the location, motion, and dimensions of the comet,[20] deliberated that the comet was a celestial body that moved with a quasi-circular path between the Moon and the Sun.[21] The mathematician's speech was later published under the title of *Disputatio astronomica de tribus cometis anni M.DC.XVIII publice habite in Collegio Romano Societatis Iesu.*[22] This

16 Copies of these speeches are preserved at the Biblioteca Nazionale Centrale di Roma, Cod. F. Ges. 458. See Baldini, *Legem impone subactis*, 255-257.

17 "An quia spiritus est terrae quidam atque habitus pinguior crassiorque conglobatus in aerem uelut altor educatorque flammarum?". *Varia de Cometa Anni 1618*. BCNR, Cod. F. Ges. 458, f. 45v.

18 Baldini, *Legem impone subactis*, 256.

19 *Varia de Cometa Anni 1618*. BCNR, Cod. F. Ges. 458, ff. 38v.-39r. Baldini transcribed the philosopher's speech in *Legem impone subactis*, 257-271, here at 269-270.

20 Grassi, *Disputatio astronomica de tribus cometis*, 258.

21 *Ibid.*, 282.

22 Ottavio Besomi and Mario Helbing convincingly demonstrated that the text preserved in BNCR F. Ges. 458 is not the original but a copy made from the printed version. Besomi and

disputatio had better fortune than the other discourses publicly delivered at the Collegio Romano. Nevertheless, the arguments then made by the philosopher would influence the cometary discussion ongoing inside the walls of the Roman institution.

The three cometary doctrines espoused at the Collegio Romano, although diverging in their understandings and locations of the comets, shared a common and crucial feature: they all took celestial incorruptibility for granted. Even those who did conceive the comets as celestial bodies, preserved the principle that no celestial corruption ever took place in the celestial region.[23] The philosopher Albergotti, for example, was crystal clear in his presentation: "With this disputation, I will strive to prove that, even if one concedes, according to this hypothesis, that [comets] lighten in the skies, it does not follow from that that heaven is corruptible".[24]

Celestial incorruptibility represented a cornerstone of the Aristotelian cosmology officially endorsed by the Society of Jesus. The celebrated Coimbra Jesuits, for example, who produced an extensive commentary on Aristotle's natural philosophy at the turn of the seventeenth century, argued that heavens were ontologically distinct from the terrestrial bodies based on four evidential claims: first, in the celestial bodies, matter and form are inseparable; second, the celestial bodies move in circular (and, therefore, perfect) paths; third, the heavens occupy the highest place in the universe; finally, the celestial bodies exert an overwhelming and universal influence over the terrestrial bodies.[25] These arguments made their way into the philosophical courses of Jesuit colleges throughout Europe and we see below that Collegio Romano was no exception.

In the early seventeenth century, the Jesuit authorities in Rome were deeply committed to retaining the ontological divide that characterized the Aristotelian cosmology as a philosophical tenet. The issue emerged while the Roman authorities were involved in the challenging process of adhering to the astronomical ideas of Tycho Brahe. In the 1610s, Giuseppe Biancani submitted his *Aristotelis loca mathematica* for Jesuit Roman censorship, a book in which, among other theories, the mathematics professor in Parma argued the case for the Tychonic theory of celestial comets. One of the Roman censors, Giovanni Camerota (the other being Christoph Grienberger), was acutely displeased by the book by his confrère.[26] Apart from the eulogiums bestowed on Protestant authors, Camerota was particularly dissatisfied by the fact that Biancani argued, and in opposition to Aristotle, that the planets moved in the heaven like fish in water (*planetae in coelo gradiantur ut pi-*

Helbing "Introduzione" e "Nota ai testi", 83-85.

23 On Grassi's position, see note 62.

24 *Varia de Cometa Anni 1618*. BCNR, Cod. F. Ges. 458, f. 30r.; Baldini, *Legem impone subactis*, 260.

25 *Commentarii Collegii Conimbricensis Societatis Iesu in quatuor libros de coelo*, 39-40.

26 The censorships of Biancani's *Aristotelis loca mathematica* were published by Baldini, *Legem impone subactis*, 227-238.

sces).[27] Even worse, the Jesuit mathematician went as far as arguing, based upon the celestial location of comets, that "the heaven is generated and corruptible" claimed Camerota.[28]

Biancani's *Aristotelis loca mathematica* was eventually published in 1615. The printed version recognized celestial fluidity as one of the outcomes of the observation of the celestial novelties in the late sixteenth and early seventeenth centuries. In addition to the telescopic observations, Biancani mentioned the Tychonic observations of comets moving through planetary regions, which required them to be made up of fluid matter.[29] As far as celestial corruptibility was concerned, Biancani changed the original version submitted to the Jesuit censors. In the printed version, he adopted a more prudent stance. Upon recognizing the celestial nature of comets, Biancani raised the question of whether one could conclude, from the appearance of comets above the Moon, that there were processes of coming-to-be and passing away in the celestial region. In this context, he added, "but indeed the entire Peripatetic school exclaim against it that the heaven is ingenerated and incorruptible. Therefore, nothing new can ever happen in the heaven".[30] However, he could not resist the temptation of rhetorically inquiring how might one explain the appearance of new stars (*novae*) in 1572, 1600 and 1604 if the heavens were incorruptible.

2. Celestial comets in a Ptolemaic universe

We do not know just how Camerota reacted when he learned of the publication of Biancani's book and its defence of the theory of celestial fluidity. Before becoming an influential reviewer of the books written by the Jesuits in Italy, Camerota taught philosophy and later theology in Naples from the mid-1580s onwards.[31] This champion of Aristotelian orthodoxy almost certainly taught his students that comets were made up of exhalations that ascended from the Earth's surface to the upper region of air, where they deflagrated when coming into contact with fire.[32] Nevertheless, despite censuring Biancani's book and his sympathy for the notion of celestial fluidity, Camerota was probably aware that it still remained possible to stand up for the Ptolemaic planetary system with its solid epicycles

27 Baldini, *Legem impone subactis*, 231.

28 *Ibidem*.

29 Biancani, *Aristotelis loca mathematica*, 79. See also Granada, "Nove e comete nel periodo 1572-1623 e il dibattito Galileo-Grassi".

30 Biancani, *Aristotelis loca mathematica*, 94.

31 Gatto, *Tra scienza e immaginazione*, 281. Camerota served as a referee in Rome for almost two decades. Baldini, *Legem impone subactis*, 244. See also, Gatto, *Tra scienza e immaginazione*, 89-91.

32 This was, for example, the position held by Muzio Vitteleschi, the would-be Superior General of the Society of Jesus, when he lectured on comets in the Collegio Romano in 1590. Vitteleschi, *In libros meteorologicorum*, BNCR, F. Ges. 747, ff. 12v.-20r., at f. 13r. No lecture notes by Camerota seem to have survived.

and eccentric circles even after the mathematicians demonstrated how comets were likely to move above the Moon.

This was precisely the argument put forward by the Collegio Romano's philosophy professor, Marcellino Albergotti, on the eve of the controversy between Galileo and the Jesuits over the 1618 comets. As already seen, at the ceremony held by the Collegio Romano to celebrate the comets, Albergotti argued that the comets derived from an optical effect produced by the concentration of celestial matter at a vertical level resulting from the overlapping of celestial spheres. The comet's tail was thus nothing more than the effects of the Sun's light passing through this condensed matter. According to Albergotti, and in tune with Kepler's optical theory – which the Jesuit philosopher expressly quoted – this explained why the comet tail cone always pointed in opposition to the Sun.[33] From this point of view, the Ptolemaic cosmology remained compatible with the celestial location of the comets alongside the other celestial novelties.

After the Galileo controversy, this argument made its way into the teaching of natural philosophy at the Collegio Romano. Giacomo Lampugnano was one of its leading advocates.[34] In his course lectured in 1638/39, Lampugnano provided a comprehensive account of how to conciliate the celestial novelties and the Ptolemaic astronomical system. Accordingly, there were five feasible ways in which the incorruptibility of the heavens could be reconciled with the new celestial phenomena.

The first *via componendi incorruptibilitatem coeli cum phoenomenis in ipso concessis* simply considered that the comets and new stars had been produced not by natural means but by God's *potentia absoluta*. They were, therefore, miracles that could herald whether the death of kings and popes or the destruction of kingdoms and peoples due to the occurrence of plagues, wars, and great famines.[35] Historical evidence proved that, throughout history, comets or new stars were followed by major political events and natural disasters. Such cases then included the death in 1578 of Portuguese King Sebastião in the battle of Al-Ksar al-Kabir, in contemporary Morocco, which Lampugnano associated with the new star that appeared in the constellation Cassiopeia in 1572 (rather than the comet of 1577 which was usually taken as the token for Sebastião's disaster in Africa), and the miraculous events that led to the victory of the Habsburg Emperor Ferdinand in Prague, following the appearance of a comet on 25 June 1618.[36]

The second eventual way of recognizing how comets and new stars would pop up in

[33] *Varia de Cometa Anni 1618*. BCNR, Cod. F. Ges. 458, ff. 39v.-40r.; Baldini, *Legem impone subactis*, 270-271.

[34] Lampugnano taught at the Collegio Romano between 1632 and 1639 (logics, 1632-33 and 1636-37; natural philosophy, 1633-34 and 1637-38; metaphysics, 1634-35 and 1638-39). Villoslada, *Storia del Collegio Romano*, 327, 330, and 332.

[35] Lampugnano, *In libros Aristotelis de coelo*, APUG 2390, 42.

[36] *Ibid*., 43-46.

the skies while simultaneously retaining the principle of celestial incorruptibility consisted of arguing that those phenomena resulted from concentrations of celestial matter. This celestial matter condensed in certain points within the heavens and the Sun's rays falling upon that condensation then produced a comet or a new star. Different degrees of celestial matter concentration explained the difference between new stars and comets. According to the Collegio Romano professor, this also accounted for the different types of comets. As Lampugnano expounded,

> If there is a large [and compact] condensation, none will be the refraction of the Sun's rays from the opposite part and, therefore, a simple star will become visible, such as [those that appeared] in the years 1572, 1600 and 1604. When the comet's central parts contain large amounts of condensation and there are, around it, other parts less dense, a hairy comet (*cometa crinitus*) will appear. This happens because those less dense parts surrounding the centre do not set bound to light perfectly. Therefore, the comet refracts very little light and, for that reason, takes the shape of hairs or rays. Nevertheless, when the density is a little more than mediocre so that a fraction of light can be refracted from the opposite side of the condensation, a bearded comet (*cometa barbatus*) will shine out. Likewise, should the density be mediocre and able to refract a lot of light, a tailed comet (*cometa caudatus*) will result.[37]

According to this view, comets and new stars took place *de novo*. Under certain conditions, celestial matter happened to condense in such a way that comets or new stars appeared and shone until their disintegration months or years later.

The third means of reconciling both the notions of celestial incorruptibility and the celestial location of comets and new stars was also grounded on the principle of concentration and rarefaction of the celestial matter. However, in this case, comets and *novae* were no celestial novelties. They had been created in the celestial region at the beginning of times but only occasionally became visible when the rarefaction of heavenly matter allowed people on Earth to see them shining high in heaven.[38] Lampugnano explicitly attributed this view to the Catholic Dutch physician Johannes van Heeck, who was one of the four founding members of the Accademia dei Lincei and a ferocious opponent of Tycho Brahe for his Protestant beliefs and cosmological views.[39] In his *De nova stella disputatio*, published in 1605, van Heeck argued that the so-called *nova* of 1604 – as well as those of 1572 and 1600 – was not a new star but a body created above the Firmament

[37] *Ibid*., 48.

[38] *Ibid*., 50-53.

[39] On Van Heeck's life and works, with a particular focus on his *De nova stella disputatio* and the surrounding confessional debate, see Caredda, "Aspetti e momenti del dibattito astronomico nella prima Accademia dei Lincei", 62-105.

and similar for the later variations in the density of parts of the Milky Way that were occasionally visible to observers on the Earth's surface.[40] The Collegio Romano philosophy professor extended the argument to include comets but recognized that this theory was *ingeniosa* only insofar as stars and comets appeared above the Firmament.[41]

These two comet theories, based on the principle of matter concentration, not only preserved celestial incorruptibility, as a concentration of matter is not a change in substance, but they also sanctioned the solidity of the heavens. In the second theory, comets, like the sunspots that orbited the Sun, move with the planets in their respective heaven.[42]

However, there was a fourth way of integrating the celestial novelties into the heavens without having to acknowledge their corruptibility and fluidity, which appealed to Lampugnano more strongly (*modus hic explicanda phoenomena pulcherrimus est et ualde probabilis*). In his words,

> This opinion states that the stars seen *de novo* are nothing but some aggregation of stars, which are so small that they cannot be seen by us while separated but, concentrated by the motion of the epicycles, they become visible. For this reason, a new star was seen shining in [the constellation of] Cassiopeia at the moment when, not one, but many stars aggregated into one star. This star was not produced *de novo* but was rather ancient stars that, through their conjunction *inter se*, became visible *de novo* [aggregated in one star]. The same must be said of the other stars and the celestial comets except, moreover, that the latter have a tail, beard or hair deriving from the solar rays falling upon and refracting on these small stars.[43]

This theory was not new in the Collegio Romano. As already referenced above, the philosopher Albergotti had argued along those lines twenty years earlier in the public ceremony celebrating the comets of 1618. On this occasion, however, Lampugnano went into further detail to explain how the overlap of different epicycles produced a concentration of stars which was seen "by us [as one single star] on the same plane as if they were the lowest of them".[44] From this point of view, the controversy with Galileo did not lead the Collegio Romano Jesuits to develop new and more conservative positions with respect to the *neoterici*. They were already in place prior to the celebrated controversy.

Finally, there was the scope for simply denying that the comets and new stars were located above the Moon. [45] Lampugnano stressed that the absence of consensus among

[40] Van Heeck, *De nova disputatio*, 23-28. See Randles, *The unmaking of the Medieval Cosmos Christian Cosmos*, 84-85.
[41] Lampugnano, *In libros Aristotelis de coelo*, APUG 2390, 53.
[42] *Ibid*., 49.
[43] *Ibid*., 57-58.
[44] *Ibid*., 61.
[45] *Ibid*., 70ff.

astronomers and philosophers about the location of these phenomena left the space for recognizing that these took place below the Moon. The controversy between Galileo and Scheiner over the nature and location of the sunspots represented an example of such disagreement, according to the Jesuit.[46] Furthermore, the lack of consensus produced further epistemological consequences: observations could not serve as the main premise upon which the philosophical syllogism was based. This was particularly detrimental for those standing up for celestial corruption. Their theory relied exclusively on the postulate that new phenomena had been observed in the skies.[47] Again, Lampugnano operated exclusively within the Aristotelian philosophical framework.

In short, the appearance of comets and *novae* in the celestial region denied neither celestial corruptibility nor their solidity. By explaining these phenomena as concentrations of pristine heavenly matter, Lampugnano reinforced the authority of Aristotle and Ptolemaic astronomy. Accordingly, after presenting the heliocentric planetary system of Copernicus and the geo-heliocentric system of Tycho Brahe (whom he did not name), the Collegio Romano professor could proclaim authoritatively that "the order of planets that we approve is the one endorsed by those [astronomers] who conceive the heaven as solid, and divide it into concentric, eccentric and epicycle orbs".[48]

3. Grassi and the reception of Tycho Brahe in Rome

However, there was an important issue with Lampugnano's cometary theory. Although radically different, it still shared one common feature with Galileo's theory of comets. According to both Galileo and the Jesuit philosopher, comets were optical illusions. Galileo-Guiducci's *Discorso delle comete* describes comets as the reflection of the sunlight on vapours which, having originated on the Earth, rose perpendicular to the earth's surface through the space where the planets move.[49] Lacking the material characteristics of physical bodies meant applying the parallax technique to measure the supposed

[46] *Ibid*., 76. Here, Lampugnano probably refers to Scheiner's early understanding of sunspots as shadows of small satellites on the face of the Sun. Later, in his *opus magnum*, the *Rosa Ursina* (1626-1630), the German Jesuit agreed with Galileo that sunspots were actually on the Sun's surface. On Scheiner's cosmology and his different views on sunspots, see Ingaliso, *Filosofia e cosmologia in Christoph Scheiner.*

[47] *Ibid*., 79.

[48] *Ibid*., 108.

[49] Some historians have associated Galileo with the Aristotelian theory of comets – for example, Zinner, *Entstehung Ausbreitung der copernicanischen Lehre*, 362; Redondi, *Galileo Heretic*, 32; and, above all, Gal and Chen-Morris, "Galileo, the Jesuits, and the controversy over the comets". Nevertheless, Galileo's understanding of comets was not only substantially different from the Aristotelian theory but also had cosmological consequences that collided with the Aristotelian cosmos.

location of these illusions was simply not possible.[50] However, the Collegio Romano mathematicians were arguing against this view and maintained that comets were real physical phenomena.

Following the public ceremony held at the Collegio Romano in the Christmas holidays of the 1618/19 academic year, Orazio Grassi published the *Disputatio astronomica de tribus cometis anni M.DC.XVIII publice habite in Collegio Romano Societatis Iesu*. The booklet, which presented the viewpoint of the Collegio Romano's mathematicians, was published anonymously even though it was public knowledge who had written it.

After briefly describing the three comets that appeared in 1618, Grassi focused on the third, the brightest comet visible in Rome from late November onwards. Three arguments led the Collegio Romano mathematics professor to conclude that the comet originated above the Moon. First, he drew that conclusion from his parallax calculation. Grassi compared the observations carried out in Rome with others done on the same day in Antwerp. By paying close attention, firstly, to the distances between the comet and a set of fixed stars and, secondly, to the angle drawn from the observation of the comet in each city, he concluded that "our comet was not sublunar but clearly celestial".[51] Inspection of further observations received from Parma, Innsbruck and Cologne further corroborated this conclusion.

The second argument focused on the path of motion displayed by the comet. By comparing the angular distances of the comet to the fixed stars along its motion, the Jesuit was able to register the comet's trajectory under the background of the celestial sphere. Then, deploying a gnomonic projection, he obtained the representation of the comet's trajectory on a planisphere of the celestial sphere and concluded that the comet moved along a straight line. Seen from the centre of the universe, which Grassi took to be the Earth, the gnomonically projected straight line corresponds to the projection of the great circles of the sphere, such as the ecliptic. Grassi, therefore, concluded that "the motion of the comet was along a great circle and very much resembled the motion of the planets".[52]

Finally, Grassi proposed that the comet was placed above the Moon "by the fact that when the comet was observed through a telescope, it suffered scarcely any enlargement".[53] This optical argument, in conjunction with the other two, was subject to severe criticism by Galileo.

Nevertheless, based upon these reasons, Grassi felt entitled to claim that the comet of late 1618 moved like the other celestial bodies with a quasi-circular orbit somewhere between the Sun and the Moon. In his words,

50 Galileo-Guiducci, *Discorso delle comete*, 147-148.

51 Grassi, *Disputatio astronomica de tribus cometis*, 276. Translation by O'Malley, *The Controversy on the Comets of 1618*, 14.

52 *Ibid*., 282. *Ibid*., 17.

53 *Ibidem.*

> Thus, in order that we may now determine almost the true place of the comet, let us say that it can probably be placed between the Sun and the Moon. Since for those lights which are excited by particular motions, there is an established law according to which the more slowly they move the higher they are, and since the motion of our comet was midway between that of the Sun and of the Moon, it will have to be placed between the two of them.[54]

Historians have praised the quantitative approach of Grassi's account of the comets of 1618.[55] Nevertheless, this approach was due not to any new epistemological stance but rather to how the Jesuit was anchored in a traditional Aristotelian classification of sciences, wherein mathematics occupied a subordinate position with respect to natural philosophy. Not fulfilling all the requirements of scientific syllogism, the Aristotelian tradition considered that astronomy, as a mixed science, described quantitative aspects, such as the trajectory, dimensions, and distances of celestial bodies, without explaining the reason (*propter quid*) of those quantitative properties. This belonged to natural philosophy.[56] Grassi operated within this epistemological framework, as he himself recognized,

> Mindful that I am of supporting the single role of the mathematician, on this day I propose considering those things which do not exceed the bounds of our knowledge, limited solely to what has been proposed, which are confined to the sole domain of quantity. Hence, should I explain the position, motion, and magnitude of those fires, I shall be satisfied that I have fulfilled my purpose.[57]

This epistemological approach explains why Grassi was silent about the cosmological nature and role of the 1618 comet. In fact, as Antonio Beltrán has already argued, Grassi never put forward any cometary theory.[58] In both the *Disputatio* and the *Libra*, his major contribution is undoubtedly the celestial location of the comet but not a single word is spent on explaining the essential features of the comet or its cosmological consequences. The furthest he goes is suggesting the comet is a "crystalline globe", which, alongside Kepler's optical theory – which Grassi quoted – refracted the sunrays produc-

[54] *Ibid*., 282-284. *Ibid*., 17-18.

[55] For example, Heidarzadeh, *A History of Physical Theories of Comets*, 60, Heilbron, *Galileo*, 234, Gal and Chen-Morris, "Galileo, the Jesuits, and the controversy over the comets", 42.

[56] On the Aristotelian classification of sciences, see Weisheipl, "Classification of the Sciences in Medieval Thought"; Ariew, "Christopher Clavius and the classification of sciences".

[57] Grassi, *Disputatio astronomica de tribus cometis*, 256, 258. Translation by O'Malley, *The Controversy on the Comets of 1618*, 6-7, with my revision. Inexplicably the translation by O'Malley omitted the key sentence "which are confined to the domain of sole quantity" (*solius quantitatis terminis inclusos*) which I have translated and included.

[58] Beltrán, "Introducción. Galileo y la ciencia. Los jesuitas y la obediencia", CXVIII.

ing the characteristic tail.[59] But how was this crystalline globe produced? Did it result from a concentration of celestial matter or was it produced *de novo*? His fellow Jesuit mathematician, professor of mathematics and Hebrew at the University of Ingolstadt, Johannes Baptist Cysat, argued that the comet's body was similar to a concentration of stars that shine upon receiving the sunlight.[60] Grassi did not quote Cysat in the course of his dispute with Galileo but, in all likelihood, he shared some crucial cosmological views with him, namely the opinion that comets were produced by concentrations of celestial matter. Indeed, later, in his 1626 *Ratio ponderum librae et simbellae*, Grassi would argue that comets and planets were made up of the same matter and proposed comets were produced by the aggregation of a large quantity of corpuscles.[61] Thus, he endorsed the view that no corruption occurred in the celestial region.[62] In addition, Grassi agreed with his fellow professor at Ingolstadt that the celestial bodies moved according to the geo-heliocentric system of Tycho Brahe. This led Grassi to recognize the fluidity of celestial matter. The Collegio Romano mathematics professor made that point clear only in *Ratio ponderum*.[63]

Besomi and Helbing convincingly argue that, with his *Disputatio*, published in 1619, Grassi aimed to implicitly prove the validity of Tycho's explanation of cometary motions and, in so doing, he suggested the explanatory supremacy of the Tychonic planetary system.[64] Galileo was quick to understand this and made it clear:

> The Mathematician of the Collegio Romano has also accepted the same hypothesis for this last comet; beyond the little which that author has written about it, which agrees with Tycho's position, I am led to affirm this by seeing how much he concurs with Tycho's other

[59] Grassi, *Disputatio astronomica de tribus cometis*, 278. Translation by O'Malley, *The Controversy on the Comets of 1618*, 15.

[60] Cysat was most likely influenced by Scheiner's early understanding of sunspots as agglomerations of celestial matter moving very close to the Sun's surface. Cysat explicitly attributes this theory of sunspots to Scheiner. Cysat studied under Scheiner and is usually described as one of the witnesses in attendance when Scheiner first perceived the existence of sunspots. Cysat, Johann Baptist. *Mathemata astronomica de loco, motu, magnitudine et causis cometae*, 75-77. On Cysat's concept of comets and their similarity with stars, see in particular Siebert, *Die große kosmologische Kontroverse*, 321-325; Ribordy, "Neue Phänomene am Himmel", 247-249. A comprehensive account of the Cysat cometary theory can be found in Ribordy, "Neue Phänomene am Himmel". See also Granada, "Nove e comete nel periodo 1572-1623 e il dibattito Galileo-Grassi".

[61] Grassi, *Ratio ponderum librae et simbellae*, 70 and 111.

[62] In fact, in his *Ratio ponderum librae et simbellae*, alluding to the Peripatetic thesis that heavens were made up of *quinta essentia*, Grassi maintained that celestial matter was very pure and refined (*purissima et defaecatissima*). Grassi, *Ratio ponderum librae et simbellae*, 133.

[63] Grassi, *Ratio ponderum librae et simbellae*, 18.

[64] Besomi and Helbing, "Introduzione", *Il Saggiatore*, 18.

fantasies throughout the remainder of the work.[65]

As we have seen, Grassi first tried to repudiate the accusation. Jesuits were publicly committed to the authority of Aristotle. Aristotelian natural philosophy had for centuries matched not only with Thomist theology but also with Ptolemaic astronomy. Nevertheless, in 1626, the Jesuit mathematician openly acknowledged his reliance on Tycho Brahe. He was crystal clear in his *Ratio ponderum librae et simbellae:*

> Since we should make clear our research on comets, it should be established first which hypothesis and planetary system [*Mundi dispositio*] is better suited. I would say that I adhered to that pleasing more to Tycho, that is to say, the one that considers the heavens to be fluid.[66]

Although different reasons could explain Grassi's change of strategy in 1626, one factor certainly stands out as decisive in his decision: the fact that the Jesuit authorities in Rome accepted the planetary system of Tycho Brahe in 1620.[67] Following a distressing process of internal censorship, Giuseppe Biancani's *Sphaera mundi* was published that year. This book was the first printed work by a Jesuit author to endorse the Tychonic planetary system even though the system did not get explicitly attributed to the Lutheran astronomer.[68]

4. Did the planets move "like the birds in the air or the fish in the water"?

The reception of Tycho Brahe's geo-heliocentric system was the "coup de grâce" for Ptolemaic astronomy even though some philosophers still subsequently maintained the traditional order of the celestial bodies. Such cases include Luigi Bompiani, who taught philosophy between 1640 and 1646.[69] In his lecture-notes *Disputationes physicae*, despite discussing the Copernican system briefly (he included a representational diagram) and accepting the fluidity of the planetary heaven, he was still committed to arguing in favour of the "common opinion" (*communis sententia*) that "places the immobile Earth at the centre of the universe, surrounded by the other elements and then by the planets, which move

[65] "Il Matematico del Collegio Romano ha parimente per questa ultima cometa ricevuto la medesima ipotesi; e a così affermare, oltr'a quel poco che n'è scritto dall'Autore, che consuona con la posizion di Ticone, m'induce ancora il vedere in tutto 'l rimanente dell'opera quanto e' concordi con le altre Ticoniche immaginazioni". Galileo-Guiducci, *Discorso delle comete*, 174. I revised the occasionally misleading translation by Drake, *The Controversy on the Comets of 1618*, 52.

[66] Grassi, *Ratio ponderum librae et simbellae*, 18.

[67] On the Jesuit reception of Tycho Brahe's astronomical system, in particular see Lerner, "L'entrée de Tycho Brahe chez les jésuites".

[68] Biancani, *Sphaera mundi*, 56-57.

[69] Bompiani taught logics in 1640-41 and 1644-45, natural philosophy in 1641-42 and 1645-46, and metaphysics in 1642-43. Villoslada, *Storia del Collegio Romano*, 327, 330, and 332.

around the Earth, first the Moon, second Mercury, third Venus, fourth the Sun, fifth Mars, sixth Jupiter, seventh Saturn, eighth the heaven of [fixed] stars and in the ninth the Empyrean heaven [which is] immobile".[70]

According to the Tychonic system, all the planets moved around the Sun, and the Sun, together with the fixed stars and the Moon, orbited about the Earth, which stood still at the centre of the universe. However, for philosophers teaching after the 1651 publication of the influential *Almagestum novum* by Riccioli, there was a significant variation in this system. The Jesuit professor in Parma argued that Jupiter and Saturn were no longer Sun-centred but rather moved around the Earth.[71]

At the Collegio Romano, in keeping with their disciplinary divide, mathematicians and philosophers paid different attentions to the question of planetary systems, with the latter avoiding discussion of the *theorica planetarium*.[72] The philosophers Silvestro Mauro and André Semery preferred the Ricciolian planetary rearrangement, while Gabriele Beati favoured the Tychonic system.[73] According to this mathematics professor, who later taught natural philosophy twice at the same institution in the 1640s,[74] Riccioli's system did not account for the great eccentricity needed for the orbits of Jupiter and Saturn.[75] Nevertheless, there was also an issue with the Tycho Brahe system: it did not explain why planets moved in a fluid heaven in two apparently contrary motions (westwards and eastwards).[76] This led Beati, and other College Romano philosophy professors, to adhere to the notion, already popular among Jesuit mathematicians, that the planets moved *per lineas spirales*, thus, according to a helicoidal pattern.[77]

The adherence to geo-heliocentric systems, associated with the appearance of comets crossing the skies and the telescopic observations of Venus's phases, the four satellites of Jupiter and the apparently three-bodied Saturn, paved the way for the acceptance of a new architecture for the universe: the tripartite division of the cosmos. The idea was not new.

70 Bompiani, *Disputationes physicae*, FC 1347, ff. 313r-313v.

71 On the Tychonic planetary system and its variations, including that of Riccioli, see, among others, Schofield, *Tychonic and Semi-Tychonic World Systems*; Marcacci, *Cieli in contraddizione*; Granada, *El debate cosmológico*, 31-59; Lerner, *Le Monde des Sphères. II - La fin du Cosmos*, 39-66.

72 Although discussing the issue *Utrum Terra moueatur circa Solem*, Cattaneo did enter into details about the different world systems in his *Cursus philosophicus.*

73 Mauro, *Quaestionum philosophicarum*, 42-43; Sémery, *Triennium philosophicum*, 723.

74 Beati taught mathematics in 1638-39, 1642-44, 1646-47 and 1660-61, logics in 1647-48, natural philosophy in 1644-45 and 1648-49, and metaphysics in 1645-46 and 1649-50. Villoslada, *Storia del Collegio Romano*, 327, 330, 332, and 335.

75 Beati, *Sphaera triplex*, 131.

76 *Ibid.*, 132.

77 *Ibid.*, 118, Mauro, *Quaestionum philosophicarum*, 47. On Beati's cosmological views, see Magruder, "Jesuit Science After Galileo" and Raphael "Teaching Sunspots: Disciplinary Identity and Scholarly Practice in the Collegio Romano".

The reflection on "the work of the Days", described in the Book of Genesis, had already led some Jesuit theologians, such as the Spanish Luis de Molina, to support a tripartite division of the cosmos and thereby potentially endorse the notion of planets moving in a fluid region.

By the 1630s, the tripartite division of the cosmos became common place in the Society of Jesus philosophical courses. Yet, despite the plurality of opinions regarding the limits of the three heavens, their nature and essential matter found among Jesuit scholars, there seems to have been a great deal of consensus on this issue in the Collegio Romano.[78] The mathematics and philosophy professors in Rome divided the heavens into the planetary heaven (*caelum planetarum*), the heaven of fixed stars or Firmament (*caelum stellatum*), and finally, sealing the universe, the Empyrean heaven (*Caelum Empireum*). Furthermore, the Roman professors agreed that the planetary heaven was most likely fluid, while the other two were deemed solid.[79] For example, Silvestro Mauro, who had taught natural philosophy twice by the mid-1650s, argued that only a fluid planetary heaven could account for the complex and helicoidal motion of the planets (especially Mars and Mercury), the intersection of the solar and Mars orbits, and the movement displayed by comets and particularly by those of 1618.[80] As for the starry heaven, the constant order and stability of the stars led scholars to conclude that the firmament must be a solid heaven.[81]

In the planetary heaven, planets move "like the birds in the air or the fish in the water" as Beati put it.[82] Nevertheless, his colleague Cattaneo disapproved of the analogy because "the motion with which the planets move through the sky is supremely orderly and uniform, and therefore should in no way be compared to that lawless and unordered motion with which the fish move in the sea and the birds in the air".[83] The order in which the planets and new stars move was granted, according to the Collegio Romano professors, by angels who were supposed to drive them.[84] Cattaneo argued, in tune with the Thomist

78 On the diversity of opinions on these issues, see Randles, *The unmaking of the Medieval Cosmos Christian Cosmos*, 163-181; Carolino, "Astronomy, Cosmology and Jesuit Discipline", 680-683.

79 Beati, *Sphaera triplex*, 110-113; Cattaneo, *Cursus philosophicus*, 766-767; Mauro, *Quaestionum philosophicarum*, 43-48; Sémery, *Triennium philosophicum*, 724-725. Gabriele Beati, nevertheless, distinguished between the inferior face of Empyrean heaven, which he considered solid, and the superior side that he maintained was fluid. Beati, *Sphaera triplex*,113.

80 Mauro taught logics in 1653-54, natural philosophy in 1654-55 and 1657-58, and metaphysics in 1655-56. Villoslada, *Storia del Collegio Romano*, 327, 330, and 332.

81 Mauro, *Quaestionum philosophicarum*, 46-47.

82 Beati, *Sphaera triplex*, 111. Semery made use of the same analogy. Sémery, *Triennium philosophicum*, 725.

83 Cattaneo, *Cursus philosophicus*, 765.

84 Beati, *Sphaera triplex*, 119-120; Cattaneo, *Cursus philosophicus*, 769-772; Mauro, *Quaestionum philosophicarum*, 48; Pallavicino, *De universa philosophia*, 114; Sémery, *Triennium philosophicum*, 750.

conception of providence supported by the Jesuit hierarchy and reaffirmed both in the Order's statutes and in the *Ratio studiorum*, that non-animated bodies, such as planets and stars, were driven by intelligences that guide them according to higher and ultimate purposes. According to this view, God governed the created world through the mediation of secondary causes. Hence, angels moved the celestial bodies which exerted a universal influence over the terrestrial region.[85]

5. The Aristotelian divide: celestial incorruptibility in the 1670s

In Rome, adherence to the geo-heliocentric system of Tycho Brahe did not necessarily mean the collapse of the Aristotelian cosmological framework. While Aristotelian natural philosophy rested upon the idea there was an ontological distinction between the celestial and the terrestrial regions. We have already seen that, for example, the Jesuit professors at Coimbra in the late sixteenth century had deduced the ontological superiority of the celestial region from the assumption that celestial bodies lacked privation (matter and form were supposedly inseparable), move in a circular path, occupy a higher place, and influence the terrestrial region. This idea still remained popular in Rome until the mid-seventeenth century[86].

The reason for celestial incorruptibility lay in the matter that made up the celestial bodies, the *quinta essentia*, which Orazio Grassi had alluded to in his *Ratio ponderum librae et simbellae*.[87] In the philosophical theses sustained at the Collegio Romano by Sforza Pallavicino in 1625, the would-be professor of philosophy and celebrated historian of the Council of Trent stated it was easy to conclude, from its appropriate accidents, that the *coelum esse quintam quandam substantiam*.[88] As Pallavicino graduated in the aftermath of the controversy over comets that opposed the Jesuits against Galileo, he could not simply ignore the celestial novelties. Referring to the new stars of 1572, 1600, and 1604, he argued they were most likely not new stars but rather the aggregation of a great number of small stars otherwise invisible to the naked eye from the earth's surface. An additional explanation was God's extraordinary intervention in the regular course of nature.[89] This understanding of celestial matter and celestial novelties experienced great longevity at the Collegio Romano, taught by Luigi Bompiani, in the 1640s, and by

85 Cattaneo, *Cursus philosophicus*, 772.

86 Beati, *Natura in Arctum coacta*, 8-9.

87 See note 62.

88 Pallavicino, *De universa philosophia*, 102. Sforza Pallavicino taught philosophy at the Collegio Romano between 1639 and 1642 (logics, 1639-40; natural philosophy, 1640-41; metaphysics, 1641-42). Villoslada, *Storia del Collegio Romano*, 327, 330, and 332.

89 Pallavicino, *De universa philosophia*, 107-108.

Silvestre Mauro, in the late 1650s.[90]

Nevertheless, in the early 1660s, alternative conceptions of celestial matter did emerge at the Collegio Romano. Gabriele Beati, once an advocate of celestial incorruptibility, put forward the thesis according to which the heavens displayed an elementary nature.[91] They were made up of fire and water. As far as the planetary heaven (*caelum sydereum*) was concerned, this consisted of fire.[92] As the case, the Jesuit stated that "the heavens are by their nature corruptible".[93] The sunspots, comets, and new stars recently observed in the skies were examples of celestial corruption. Contrary to that traditionally taught at the Collegio Romano, Beati conceived of these phenomena not as the aggregation of very small and previously unseen stars but instead as the concentration of celestial exhalations provoked by the motion and conjunctions of the celestial bodies.[94] Although one could argue that the concentration of celestial matter was not a substantial change, Beati recognized that these phenomena were indeed produced *de novo*, and, therefore, the *caelum, natura sua, esse corruptibile*.[95] Nevertheless, Beati added an important caveat: the heavens may be by accident (*per accidens*) incorruptible. In his words,

> However, because of the great distance at which they are from us, their extensive matter, or the prodigious mixture of their God-given qualities, the heavens have no natural agent that can change them substantially [*substantialiter*]. Thus, the heavens may be considered incorruptible by accident [*per accidens*].[96]

Therefore, while the substance of the heavens paved the way for celestial corruption, the absence of any natural cause might lead them into remaining unchangeable. This could explain – the reader concludes – why there were relatively few comets, new stars, and sunspots in comparison to the great variety of processes of comings-to-be and passings away constantly happening on Earth.[97] In the heavenly region, these changes were produced either by the motion of the celestial bodies, natural ways imperceptible to human under-

90 Bompiani, *Disputationes physicae*, FC 1347, ff. 326v-327v.; Mauro, *Quaestionum philosophicarum*, 54-57, and 64.

91 Renee Raphael has already pointed out this apparent contradiction, which she attributes to the disciplinary distinctions and scholarly practices ongoing at the Society of Jesus. Raphael "Teaching Sunspots: Disciplinary Identity and Scholarly Practice in the Collegio Romano".

92 Beati, *Sphaera triplex*, 108.

93 *Ibidem*.

94 *Ibid*., 196, 245-248, and 253.

95 *Ibid*., 199.

96 *Ibid*., 109.

97 Beati mentioned that only some very small parts of the heaven are susceptible to corruption. *Ibid*., 108-109.

standing, or divine miracles.[98] The final cause was divine providence.[99]

By the late 1670s, Ottavio Cattaneo was much more assertive than his confrère.[100] He held no doubts in claiming "with Aristotle, whom St. Thomas follows, that the heaven is incorruptible".[101] His arguments were neither new – celestial bodies' circular motion, lack of contrary elements and terrestrial qualities, etcetera – nor particularly persuasive.[102] Nevertheless, they appeared rather convincing to orthodox theologians. Referring to the appearance of comets over the skies, for example, he determined that "it should be asserted that the cause of the comets is only God, who without doubt lit up such bodies to announce beforehand a great number of future effects".[103]

Away from Rome, in other Society of Jesus provinces, philosophy and mathematics teachers had by then developed different understandings of what Aristotelian orthodoxy consisted of. For teachers on the geographical peripheries of Europe, there was no difficulty in recognising, from the 1640s and 1650s onwards, that celestial novelties proved celestial corruptibility. In Coimbra, writing in the 1630s, Baltazar Teles did not hesitate to consider celestial bodies being as corruptible as the sublunar bodies[104]. At the University of Würzburg, Melchior Cornaeus taught, in the 1650s, that the *novae* of 1572, 1600, and 1604 showed that substantial changes took place in the heavenly region.[105] In Warsaw, one year after the publication of Cattaneo's orthodox philosophical course, Adam Kwiryn Krasnodebski serenely acknowledged, in his *Philosophiae Aristotelis explicatae*, that the heavens were corruptible.[106] Even further away, the Moravian Valentin Stansel, composing his fantastic *Uranophilus caelestis peregrinus* in São Salvador da Bahia, Brazil, at around the same date, described the planets almost as if they were terrestrial bodies:

> After telescopes were invented, mountains and valleys appeared in the stars, there is nothing that was more quarreled over or doubted by philosophers. Planetary bodies, including the earth, discharge liquids and vapors in which comets are formed, after sucking up the rays of the sun.[107]

98 *Ibid.*, 109.
99 *Ibid.*, 253.
100 Cattaneo taught logics in 1670-71 and 1674-75, natural philosophy in 1671-72 and 1675-76, and metaphysics in 1672-73 and 1676-77. Villoslada, *Storia del Collegio Romano*, 328, 330, and 332.
101 Cattaneo, *Cursus philosophicus*, 760.
102 *Ibid.*, 757-765.
103 *Ibid.*, 764-765.
104 Teles, *Summa Universae Philosophiae*, 317.
105 Cornaeus, *Curriculum philosophiae peripateticae*, vol. 1, 489.
106 Krasnodebski, *Philosophiae Aristotelis explicatae*, § 205.
107 Quoted in Camenietzki, "The Celestial Pilgrimages of Valentin Stansel", 260.

Concluding remarks

The Collegio Romano championed philosophical orthodoxy throughout the seventeenth century. In the past, the echoes of the different philosophical disputes of the late Renaissance had resonated within the college. The debates on the epistemological status of mathematics had also animated the college's intellectual ambience, eventually shaping the broader Jesuit mathematical curricula. Nevertheless, Claudio Acquaviva's generalate inaugurated a new phase in the Jesuit struggle to preserve the desired *uniformitas et soliditas doctrinae* within the Order. As Acquaviva's governance was coming to an end, the issues with Copernicanism were gaining momentum within the Catholic Church. It was against this scenario that three bright comets crossed the skies in late 1618, further raising the debate on the very foundations of Aristotelian philosophy and Ptolemaic astronomy.

The dispute was particularly intense in Rome, opposing the professors of the Collegio Romano against Galileo and the *Lincei*. At stake was not only the intellectual prestige of the contenders but, and above all, the explanatory validity of the astronomical systems of Copernicus and Tycho Brahe and the cornerstones of Aristotelian natural philosophy. Thus, as a consensus emerged that the 1618 comets moved above the Moon, both the principles of celestial solidity and incorruptibility seemed at jeopardy.

At first, the Jesuits strove to make the cometary observations compatible with the thesis of celestial solidity. On the eve of the controversy with Galileo, the philosophers proposed the *ingeniosa* thesis according to which comets were the optical output of an aggregation of stars located in different epicycles. Even if the thesis was as ingenious as it was fanciful, it returned one main advantage: its respect for both the principle of celestial solidity and that of incorruptibility. Because of its orthodox nature, this argument retained its place in the natural philosophy teaching at the Collegio Romano well into the 1640s. From the historiographical point of view, this thesis is particularly interesting because it demonstrates how for some early modern scholars, the observation of comets in the celestial region did not necessarily lead to the collapse of Ptolemaic astronomy.

Furthermore, the Collegio Romano Jesuits proved more tenacious. In addition to demonstrating that the comet of 1618 was placed between the Moon and the Sun, Grassi proposed it moved according to the cometary and, what is more, the planetary theory of Tycho Brahe. This led him and the majority of Jesuits who followed him in the Collegio Romano mathematical and philosophical chairs to recognize that the heavens were fluid. Again, this idea was aligned with the Tychonic geo-heliocentric system.

Galileo, who was forbidden to follow the heliocentric model following the Catholic Church's ban on Copernicanism in 1616, was quick to recognize the Jesuit shift towards Tychonic ideas. Accordingly, he accused Grassi of following Tycho Brahe and, in so doing, raised the question of the Jesuit commitment to following Aristotelian philosophy. Galileo, in turn, proposed a cometary thesis that acknowledged celestial corruptibility and,

as such, opposed the ontological division upon which Aristotle's natural philosophy was based. The celebrated controversy over the comets was to follow.

Analysis of the seventeenth century teaching of cosmology at the Collegio Romano proves that the controversy continued to impact on Roman Jesuits well beyond the publication of Galileo's *Il Saggiatore* in 1623. The arguments deployed in the controversy reverberated inside the classes of the Collegio Romano for decades, with the professors of philosophy and mathematics struggling to maintain – against Galileo – that the heavens were ontologically different from the terrestrial region and, thus, immune to corruption. Even after adhering to the planetary system of Tycho Brahe, they continued to stand up for celestial incorruptibility. Thus, the reception of Tycho Brahe did not equate to the collapse of Aristotelian cosmology in the Collegio Romano viewpoint.

The Collegio Romano Jesuits were therefore proclaiming the authority of Aristotle in philosophy well into the second half of the seventeenth century. In so doing, the Collegio Romano became the champion of philosophical orthodoxy within the Jesuit educational network. This was the ultimate consequence of the celebrated debate that opposed the Jesuits and Galileo over the comets and their cosmological significance.

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BGUC = Biblioteca Geral da Universidade de Coimbra.
BNCR = Biblioteca Nazionale Centrale di Roma.

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Assaying *Il Saggiatore*, with a delicate and precise bibliographical balance

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Abstract
Il Saggiatore is bibliographically more complex than it might seem at first sight: copies can vary wildly in their parts and materials. The first edition has been repeatedly misdescribed in the book trade, with a fictitious "first issue" claiming chronological and monetary priority. The authors examine both a wide sample of copies and all the available supplementary documentation to establish the most useful way to describe and understand individual copies, and the entire edition, of this book..

Keywords
Assayer (*Saggiatore*), bibliography, Giacomo Mascardi, watermarks

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For a book claiming the status and function of a precision instrument, *Il Saggiatore* managed to break a lot of rules and, despite its initial success, to inflict catastrophic damage upon its author. Generically, it presented personal marginalia in the form of a private letter in a published book; rhetorically, it uncivilly insulted both the overt object of its scorn, the non-existent Lothario Sarsi, and humiliated the covert Orazio Grassi; scientifically, its critiques were largely destructive; philosophically, it is frivolously audacious; theologically, it is provocatively heretical and was understood by some readers to endorse atomism. The reception of the first edition, though, is beyond the scope of this essay; instead, we wish to bring attention to its printing and publication. As a material object *Il Saggiatore* seems quite straightforward: an engraved title-page, an imprimatur, a dedicatory letter, an authorial portrait, commendatory verses, the text with diagrams, errata. It is stable, fixed, contained; bibliographers have constructed a neat hierarchy of four issues, each easily identifiable. The baroque excess of content would seem to be at odds with the sombre material form.

This essay will instead argue that as a physical book *Il Saggiatore* has been seriously misunderstood; that historians, librarians, dealers and collectors have had to rely on a fundamentally mistaken set of categories to describe it; and that a reintegration of material evidence within its documentary context casts light not only on its production but also its early reception, and demonstrates that we have barely begun to understand this book.

Bibliographical description[1]

We begin with a bibliographical description of an ideal copy of *il Saggiatore,* with a following examination of its component bibliographical parts.

Ideal Copy, first edition

The following description is the closest printed manifestation of Galileo's intentions with the book.

IL SAGGIATORE | Nel quale | Con bilancia eſquiſita e giuſta | ſi ponderano le coſe contenute | nella | LIBRA ASTRONOMICA E FILOSOFICA | DI LOTARIO SARSI SIGENSANO | Scritto in forma di lettera | *All'Ill.mo Rev.mo Monsre D* | Virginio Cesarini | Acc.o Linceo Nobile Fiorentino | Filoſofo e Matematico Primario | del | Ser.mo Gran Duca di Toſcana.

Collation: 4^0 (mezzana paper): π^2 $2\pi^1$ a^4 $A^4(\pm 1.4)$ B-Ee^4 Ff^6; [Gg^2]

Contents: π: 1r engraved title; 1v Imprimatur (Rome. 2 February 1623); 2r-v: dedi-

[1] Our arguments in this article are based on the 26 copies examined, therefore our assertions are based on those copies, and though they provide important insight and trends, and are not wholly conclusive of the entire print run until the authors and others can see a far greater number of copies of the print run of 600, see note 29.

cation to Urban VIII by the Accademici Lincei, Rome, 20 October 1623) || χ: engraved portrait of Galileo, verso blank || a (commendatory verses of Joannes Faber, Francesco Stelluti) || A-Z Aa-Ff: text, paginated 1-236 || Gg: *Nota di errori occorsi nello stampare* (Gg1v blank)

Typography and Layout: 36 text lines + headline with running title and page number + signature (A, A2; B, B2 ...) / catchword line, catchwords on every page. 173 (181) × 110 mm. Types: roman (for Italian), italic (for Latin), both 20 li. = 96 mm.

Non-letterpress material: engraved title-page within architectural border, the arms of Urban VIII in the upper panel held by two putti, the Lincei device (Lynx surrounded by laurel branches, topped by a crown) in the lower. Female figure holding a book and a sphere of the night sky, titled FILOSOFIA NATVRALE in the left panel, and a female figure wearing a crown, holding an armillary sphere and a compass, titled MATEMATICA in the right panel, plate dimensions 184 × 133 mm; engraved Galileo portrait: 202 × 153 mm, both signed F. Villomena.

Vignette engraved diagrams separately impressed in spaces reserved by the compositor on pp. 22, 41, 114 (3), 118, 120, 130, 132, 157, 161, 163 (2), 164 (2), 204, 205, 217. NB: p. 120, vignette with cancel in correct orientation.

We now turn to the book's component bibliographic units, introduced here as a list, and taken one by one below:

- Frontmatter unsigned preliminary gathering designated here as 'π'
- Portrait, described as '2π'
- Introductory poems, gathering 'a'
- Body 1-236, A-Ee4 Ff6
- Errata
  - Errori 236, Ff6 verso
  - Nota 237-[240], Ff6 [Gg][2]
  - Tavola 236, Ff6 verso

Frontmatter

This unit, comprising unsigned preliminary gathering π, includes the engraved title-page. Following the title-page is the license to print (p. [2], π1 verso), as well as the dedication to Pope Urban VIII (p. [3-4], π2 recto and verso).

Portrait

The engraved portrait, signed "F. Villamoena Fecit." is found between either π or 'a', or 'a' and A, depending upon the copy.[2] Dimensions of the plate (203x155 mm) and incidental

[2] The portrait and the engraved title-page are the two full-page engravings in the book. The body

scratches are identical to that of the 1613 *Istoria*, indicating that Francesco Villamena (or Mascardi) retained the engraved portrait and merely added his name to the plate before printing a second run for *Il Saggiatore*.[3] These portraits are mounted on a stub in the location noted above. Most, but not all copies examined, have the portrait, while others have only the remaining stub. Also observed are copies with the *Istoria* portrait inserted, rather than the signed portrait; these are likely sophisticated copies. The portrait is printed on paper with a different watermark from the other text associated paper stocks, in copies examined, a six-pointed star and the paper is oriented perpendicular to the rest of the book, with chain lines vertical; the octavo sheets upon which the portraits were printed were larger than those used for the rest of the book and would have been printed in a different location to the main body of the book.

Introductory Poems

This is the first major point of variance among copies. This gathering's inclusion is seemingly at random, present in some copies, and not in others, though possibly with a higher incidence of absence in fine paper copies. It is both present and absent in the authoritative Galilean presentation copies (see below). The signing of the poems' signature with a lower-case 'a' indicates they were intended by their creator to be included in the book, and are signed as such to indicate their position to the binder of the book. The 'a' signature also has catchwords, with the "IL" on the verso of a4, showing that the creator of these verses clearly indicated their intended position in the book. The inclusion or exclusion of the poems creates two issues of the book.

Body

The body and the frontmatter are the two constant units in the book. However, the body has one point of variance: Mascardi's pressmen, or whoever printed the intaglio plates, inverted the diagram on p. 120 (P4 verso). This was corrected with a cancel diagram pasted in many, but not all, copies. The inverted diagram is not mentioned in any of the three errata. As discussed elsewhere, the watermarks in this unit vary, a result of the paper stocks at hand in Mascardi's shop, the largest in Rome at the time. The body also has a bifolium cancel (A1.4), resulting from a change in Virginio Cesarini's status in the Vatican, discussed below. The addition or lack of the cancel diagram creates two states of p. 120.

of the book is illustrated with 20 engravings, printed on the same sheets as letterpress. Due to the varying location for the portrait, its accompanying stub can be seen in several places. For example, in the Magl. 3.2.406 copy in Florence, the stub follows the portrait, but in Oklahoma's copy (the non-Drake copy), the stub is between gatherings a and A.

[3] Zeitlin, "Some Points", 193, claims that the portrait in *Il Saggiatore* is a copy of that in the *Istoria*, but this is not the case.

Errata

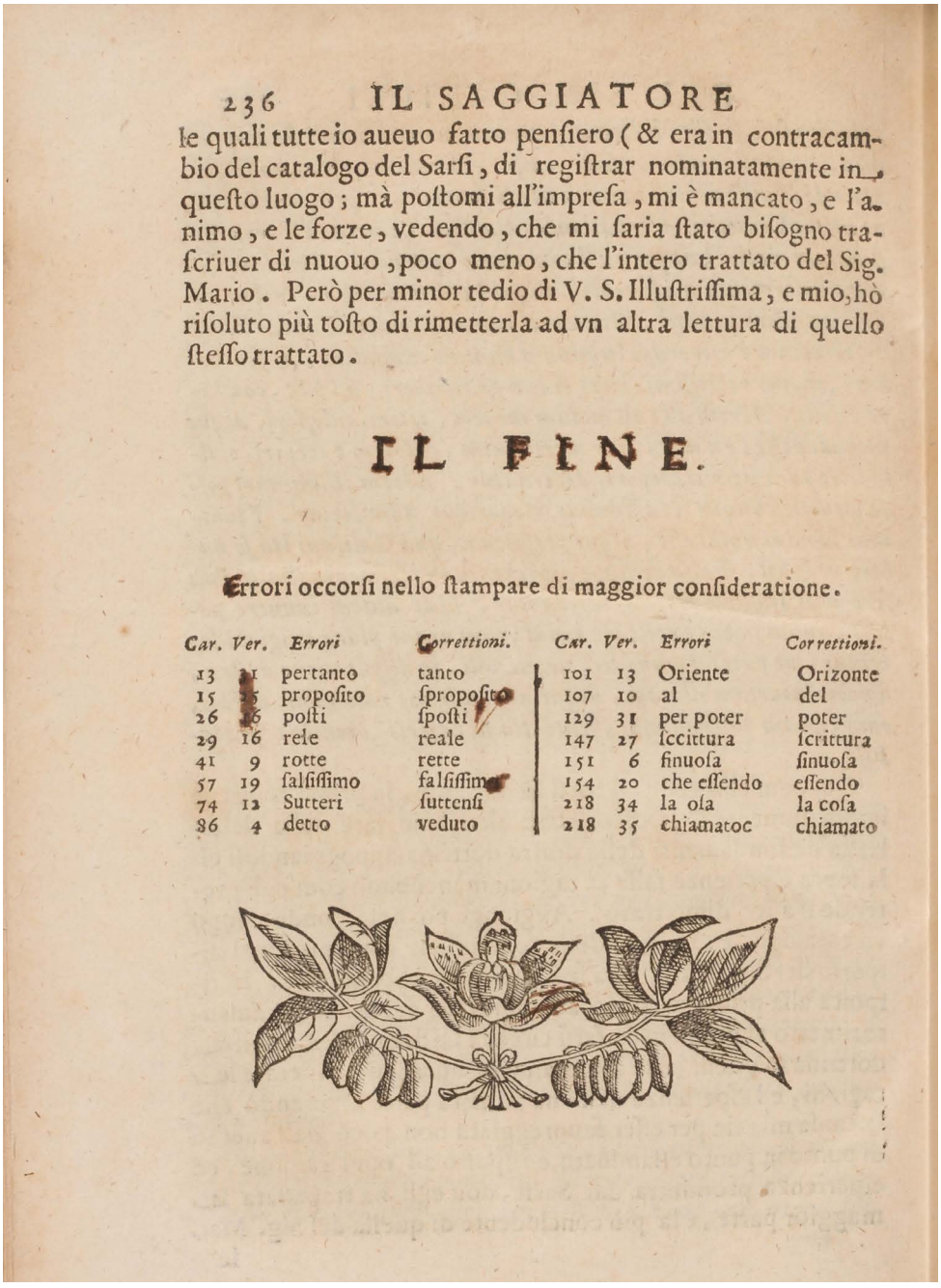
This final unit is the most complicated of the object, and has three possible variations, one of which is an intended cancel and insertion, and one of which is a second state of signature Ff. These errors arose from Galileo's inability to supervise the work of Mascardi's press in Rome from Florence, as well as from the pace of printing and the choice of editor. Indeed, Virginio Cesarini notes in a letter dated 28th October 1623, to Galileo that "the printing of your book is finished with as much accuracy as the speed of its printing would allow".[4]

- "Errori" – This is the first state of Ff. Mascardi included a list of printed errors in the book, which he titled *Errori occorſi nello ſtampare di maggio conſideratione*, and lists 16 errors on the verso of Ff6 in two columns. Upon receipt of the first complete copy of the book, Galileo was appalled at the editorial sloppiness of the finished book.[5] In response, Galileo created and caused to be printed in Florence the following item.
- "Nota" – By the 18th of November, Galileo completed his edits to the printed text, and caused the "Nota di errori occorſi nello ſtampare" to be printed. The "Nota" lists 209 errors in two columns Galileo discovered in the text, and is the best printed representation of Galileo's intentions with the book. The "Nota" is a half sheet, and as such is an unsigned signature [Gg] in two leaves. It is printed only on the lower half of the recto of the first leaf [Gg]1 and on the recto and verso of the second leaf [Gg]2. We can surmise that the recto printing on the first leaf was intended by Galileo to be cut down and pasted as a cancel for the *Errori*, covering the much shorter errata, and continuing on the recto and verso of the following leaf. However, in some copies, the half sheet is simply tipped in or inserted after Ff6, presenting the reader with two errata. We have not been able to examine the watermarks of any of the "Nota" sheets, but as this was printed in Florence, and sent out with the copies of *Saggiatore* Galileo received, we would not expect them to match any of Mascardi's paper stocks used in the printing of the book. The type used in the Florentine errata, especially the swash Italic 'N' in 'Nota', matches that used by Pietro Cecconcelli, the printer of Guiducci's *Discorso delle comete* (1619), who adopted Medicean Stars as the name of his business.[6] It is worth noting that these printed "Nota" quite often contain additional manuscript errata, in what appears to be Galileo's hand. Galileo also inserted some marginal corrections directly into the text in some copies. Collation for copies with the "Nota" should be,

4 OG, XIII, 141-142.

5 Copies with the *Errori* should have Ff6 as the final gathering.

6 See, for example, *Il parto della Vergine* by Giovanni Battista Calamai (Pietro Cecconcelli, Florence, 1623), +6v, for two similar swash 'N's.



236 IL SAGGIATORE

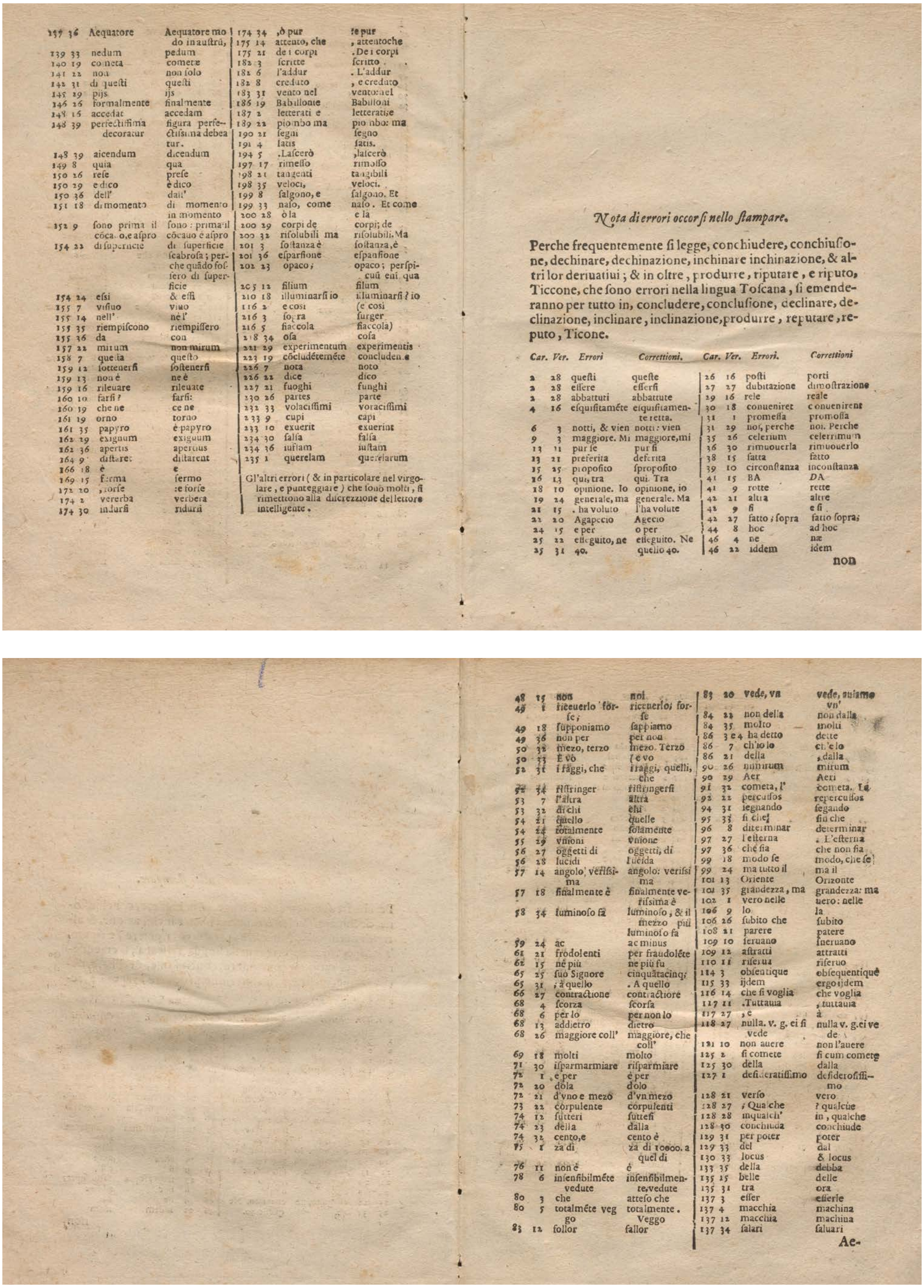
le quali tutte io aueuo fatto penſiero (& era in contracambio del catalogo del Sarſi, di regiſtrar nominatamente in queſto luogo; mà poſtomi all'impreſa, mi è mancato, e l'animo, e le forze, vedendo, che mi ſaria ſtato biſogno traſcriuer di nuouo, poco meno, che l'intero trattato del Sig. Mario. Però per minor tedio di V. S. Illuſtriſſima, e mio, hò riſoluto più toſto di rimetterla ad vn altra lettura di quello ſteſſo trattato.

IL FINE.

Errori occorſi nello ſtampare di maggior conſideratione.

Car.	Ver.	Errori	Correttioni.	Car.	Ver.	Errori	Correttioni.
13	21	pertanto	tanto	101	13	Oriente	Orizonte
15	25	propoſito	ſpropoſito	107	10	al	del
26	16	poſti	ſpoſti	129	31	per poter	poter
29	16	rele	reale	147	27	ſccittura	ſcrittura
41	9	rotte	rette	151	6	finuoſa	ſinuoſa
57	19	falſiſſimo	falſiſſima	154	20	che eſſendo	eſſendo
74	12	Sutteri	ſuttenſi	218	34	la oſa	la coſa
86	4	detto	veduto	218	35	chiamatoc	chiamato

Fig. 1



Car.	Ver.	Errori	Correttioni
137	36	Aequatore	Aequatore mo do in austru,
139	33	nedum	pedum
140	19	cometa	cometae
141	22	non	non solo
142	31	di questi	questi
145	29	pijs	ijs
146	26	formalmente	finalmente
148	16	accedat	accedam
148	39	perfectissima decoratur	figura perfectissima debeatur.
148	39	aicendum	dicendum
149	8	quia	qua
150	26	rese	prese
150	29	e dico	è dico
150	36	dell'	dall'
151	18	di momento	di momento in momento
152	9	sono prima il cocao, e aspro	sono: prima il cocauo è aspro
154	22	di superficie	di superficie scabrosa; perche quādo fosfero di superficie
154	24	essi	& essi
155	7	visiuo	viuo
155	14	nell'	nel l'
155	35	riempiscono	riempissero
155	36	da	con
157	22	mirum	non mirum
158	7	quella	questo
159	12	sottenersi	sostenersi
159	13	non è	ne è
159	16	rileuare	rileuate
160	10	farsi?	farsi:
160	19	che ne	ce ne
161	19	orno	torno
161	35	papyro	è papyro
162	29	exignum	exiguum
162	36	apertus	apertius
164	9	distare:	distarent
166	18	è	e
169	15	forma	fermo
172	20	, forse	: e forse
174	2	vererba	verbera
174	30	indursi	ridursi
174	34	,ò pur	se pur
175	14	attento, che	, attentoche
175	21	de i corpi	. De i corpi
182	3	scritte	scritto .
182	6	l'addur	. L'addur
182	8	creduto	, e creduto
183	31	vento nel	vento: nel
186	19	Babillonie	Babilloni
187	2	letterati e	letteratise
189	22	piombo ma	piombo: ma
190	21	segni	segno
191	4	latis	satis.
194	5	.Lascerò	,lascerò
197	17	rimesso	rimosso
198	21	tangenti	tangibili
198	35	veloci,	veloci.
199	8	salgono, e	salgono. Et
199	33	naso, come	naso. Et come
200	28	ò la	e la
200	29	corpi de	corpi; de
200	32	risolubili ma	risolubili. Ma
201	3	sostanza è	sostanza,è
201	36	esparsione	espansione
202	23	opaco;	opaco; perspicuā cui qua
205	12	filium	filum
210	18	illuminarsi io	illuminarsi? io
216	2	e cosi	(e cosi
216	3	sopra	surger
216	5	fiaccola	fiaccola)
218	34	osa	cosa
221	29	experimentum	experimentis
223	19	cōcludētemēte	concluden.e
226	7	nota	noto
226	22	dice	dico
227	21	suoghi	funghi
230	26	partes	parte
232	33	volacissimi	voracissimi
233	9	cupi	capi
233	10	exuerit	exuerint
234	30	falsa	falsa
234	36	iustam	iustam
235	1	querelam	querelarum

Gl'altri errori (& in particolare nel virgolare, e punteggiare) che sono molti, si rimettono alla discrezzione del lettore intelligente.

Nota di errori occorsi nello stampare.

Perche frequentemente si legge, conchiudere, conchiusione, dechinare, dechinazione, inchinare inchinazione, & altri lor deriuatiui; & in oltre, produrre, riputare, e riputo, Ticcone, che sono errori nella lingua Toscana, si emenderanno per tutto in, concludere, conclusione, declinare, declinazione, inclinare, inclinazione, produrre, reputare, reputo, Ticone.

Car.	Ver.	Errori	Correttioni
2	28	questi	queste
2	28	essere	essersi
2	28	abbattuti	abbattute
4	16	esquisitamēte	esquisitamente retta.
6	3	notti, & vien	notti: vien
9	3	maggiore. Mi	maggiore,mi
11	11	pur se	pur si
13	21	preferita	deferita
15	25	proposito	sproposito
16	13	qui, tra	qui. Tra
18	10	opinione. Io	opinione, io
19	24	generale, ma	generale. Ma
21	15	. ha voluto	l'ha voluto
22	20	Agapecio	Agecio
24	15	e per	o per
25	22	eseguito, ne	eseguito. Ne
25	31	40.	quello 40.
26	16	posti	porti
27	27	dubitazione	dimostrazione
29	16	rele	reale
30	18	conueniret	conuenirent
31	1	promessa	promossa
31	29	noi, perche	noi. Perche
35	26	celerium	celerrimum
36	30	rimuouerla	rimuouerlo
38	15	fatta	fatto
39	10	circonstanza	inconstanza
41	15	BA	DA
41	9	rotte	rette
42	21	altra	altre
42	9	si	e si
42	27	fatto; sopra	fatto sopra;
44	8	hoc	ad hoc
46	4	ne	næ
46	22	iddem	idem

non

Car.	Ver.	Errori	Correttioni
48	15	non	noi
48	1	riceuerlo forse;	riceuerlo; forse
49	18	supponiamo	sappiamo
49	36	non per	per non
50	32	mezo, terzo	mezo. Terzo
50	33	E vò	(e vo
52	31	i saggi, che	i saggi, quelli, che
52	34	ristringer	ristringersi
53	7	l'altra	altra
53	32	di chi	chi
54	21	quello	quelle
54	24	totalmente	solamente
55	19	vnioni	vnione
56	27	oggetti di	oggetti, di
56	28	lucidi	lucida
57	14	angolo, verisima	angolo: verisima
57	18	finalmente è	finalmente verisima è
58	34	luminoso sa	luminoso, & il mezzo più luminoso sa
59	24	ac	ac minus
61	21	frodolenti	per fraudolēte
62	15	nè più	ne più su
65	25	suo Signore	cinquātacinq;
65	31	; a quello	. A quello
66	27	contractione	contrattiore
68	4	scorza	scorsa
68	6	per lo	per non lo
68	13	addietro	dietro
68	26	maggiore coll'	maggiore, che coll'
69	18	molti	molto
71	30	isparmarmiare	risparmiare
72	1	, e per	è per
72	20	dola	dolo
72	21	d'vno e mezo	d'vn mezo
73	22	corpulente	corpulenti
74	12	sutteri	suttesi
74	23	della	dalla
74	32	cento,e	cento è
75	1	za di	za di 10000. a quel di
76	11	non è	è
78	6	insensibilmēte vedute	insensibilmente, vedute
80	3	che	atteso che
80	5	totalmēte veggo	totalmente. Veggo
83	12	follor	fallor
83	20	vede, va	vede, sulamo vn'
84	22	non della	non dalla
84	35	molto	molti
86	3 e 4	ha detto	dette
86	7	ch'io lo	ch'e lo
86	21	della	, dalla
90	26	nunirum	mirum
90	29	Aer	Aeri
91	32	cometa, l'	cometa. La
92	22	percussos	repercussos
94	31	segnando	segando
95	33	fi che	fin che
96	8	determinar	determinar
97	27	l'esterna	. L'esterna
97	36	che sia	che non sia
99	18	modo se	modo, che se
99	24	ma tutto il	ma il
101	13	Oriente	Orizonte
101	35	grandezza, ma	grandezza: ma
102	1	vero nelle	uero: nelle
106	9	lo	la
106	26	subito che	subito
108	21	parere	patere
109	10	seruano	seruano
109	12	astratti	attratti
110	11	riferua	riferuo
114	3	obsentique	obsequentiquē
115	33	ijdem	ergo ijdem
116	14	che si voglia	che voglia
117	11	.Tuttauia	, tuttauia
117	27	, e	à
118	27	nulla. v. g. ei si vede	nulla v. g. ei vede
121	10	non auere	non l'auere
125	2	si comete	si cum comete
125	30	della	dalla
127	1	desideratissimo	desiderosissimo
128	21	verso	vero
128	27	; Qua che	? qualche
128	28	inqualch'	in, qualche
128	30	conchiuda	conchiude
129	31	per poter	poter
129	33	del	dal
130	33	locus	& locus
133	35	della	debba
135	15	belle	delle
135	31	tra	ora
137	3	esser	esserle
137	4	macchia	machina
137	12	macchia	machina
137	34	falari	faluari

Ae-

Fig. 2

as noted above, 4^0 (mezzana paper) : $\pi^4 2\pi^1$ a^4 A^4 (±1.4) B-Ee^4 Ff^6 [Gg^2][7], and the presence or absence of the *Nota* two issues for the book.

- "Tavola" – The *tavola*, titled "Tauola degli errori occorſi nello ſtampare", is a second state of Ff, observed as a single leaf cancel for Ff6. Cesarini ordered the "Tavola" to be printed in Rome by Mascardi's press, as its inclusion required a re-setting of the type for the recto and verso of Ff6 (p. 236). In doing so, he accepted some of Tomasso Stigliani's editorial claims, and cut Galileo's list down to 136 errors in three columns, which appears on the verso of Ff6. The first state of Ff6 recto has 36 lines of type, and the second state has 37 lines of type. Two copies with the "Tavola" were examined for this article, one at the Thomas Fisher Library at the University of Toronto, and one at the Bancroft Library at the University of California, Berkeley; copies with the "Tavola" are rare in our sample set. The cancellans leaf was printed by Mascardi: ornaments at the bottom of Ff6v match those in other Mascardi imprints from 1623;[8] the paper is also the same as that used to print gathering π, the final sheet to be printed. Copies with the *Tavola* will collate as 4^0 (mezzana paper) : $\pi^4 2\pi^1$ a^4 A^4 (±1.4) B-Ee^4 Ff^6 (±6). The presence or absence of the *tavola* creates two states of Ff.

How the book came to be: from Comet book *to* Saggiatore

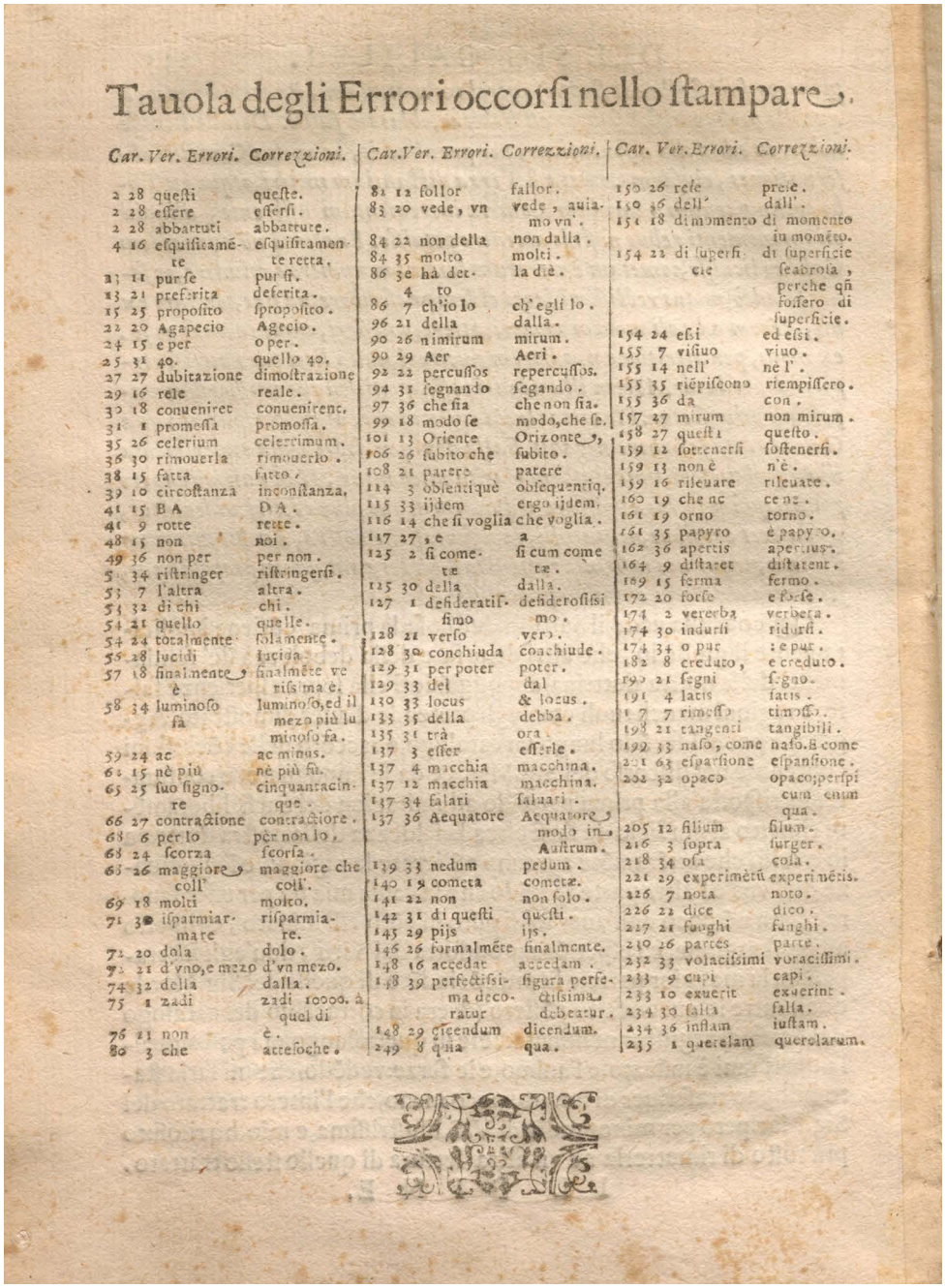
Il Saggiatore was written, printed, and published by a committee for a court. Every element of it, from text to format to modern day distribution, is predicated on this fact. We will start by combing the lush documentation of Galileo's correspondence for evidence of the divisions of labour, social dynamics and technological networks that made this book. We will then undertake a bibliographical examination of a sample from the first edition. By integrating these two sources, we seek to construct a tool for analyzing and understanding individual copies.

Disputes arising from observations and interpretations of three comets in 1618 were also disputes about natural philosophical authorship. Anonymous, pseudonymous, corporate and onymous publications sought to lay claim to unassailable epistemological positions. One does not have to believe that comets presaged disaster to note that this fraught debate on cometology and cosmology took place as Europe transitioned into three decades of unprecedented levels of espionage, propaganda, and war.[9]

[7] Of course, use of Tanselle and Bowers' principles for collation formulas should be applied as needed. Take, for example, the University College, London, copy, with the first leaf of the half-sheet *Nota* pasted over the *Errori*, as was likely intended. In this case, the final signature should be described as [Gg^2](-[Gg1]).

[8] See, for example, the printer's ornaments at the base of p. 2 of Raffaele Aversa's *Logica institutionibus praeuijs quaestionibus contexta*.

[9] For a general framework, see Biagioli and Galison, *Scientific Authorship*.



Tauola degli Errori occorsi nello ſtampare.

Car.	Ver.	Errori.	Correzzioni.
2	28	queſti	queſte.
2	28	eſſere	eſſerſi.
2	28	abbartuti	abbatture.
4	16	eſquiſitamẽ-te	eſquiſitamente retta.
8	11	pur ſe	pur ſi.
13	21	preferita	deferita.
15	25	propoſito	ſpropoſito.
22	20	Agapecio	Agecio.
24	15	e per	o per.
25	31	40.	quello 40.
27	27	dubitazione	dimoſtrazione
29	16	rele	reale.
30	18	conueniret	conuenirent.
31	1	promeſſa	promoſſa.
35	26	celerium	celerrimum.
36	30	rimouerla	rimouerlo.
38	15	fatta	fatto.
39	10	circoſtanza	inconſtanza.
41	15	B A	D A.
41	9	rotte	rette.
48	15	non	noi.
49	36	non per	per non.
51	34	riſtringer	riſtringerſi.
53	7	l'altra	altra.
53	32	di chi	chi.
54	21	quello	quelle.
54	24	totalmente	ſolamente.
55	28	lucidi	luciua.
57	18	finalmente è	finalmẽte veriſsima è.
58	34	luminoſo ſa	luminoſo, ed il mezo più luminoſo ſa.
59	24	ac	ac minus.
61	15	nè più	nè più ſu.
65	25	ſuo ſignore	cinquantacinque.
66	27	contractione	contractiore.
68	6	per lo	pẽr non lo.
68	24	ſcorza	ſcoria.
68	26	maggiore coll'	maggiore che coll'.
69	18	molti	molto.
71	30	iſparmiarmare	riſparmiare.
72	20	dola	dolo.
72	21	d'vno, e mezo	d'vn mezo.
74	32	della	dalla.
75	1	zadi	zadi 10000. à quel di
76	21	non	è.
80	3	che	atteſoche.
81	12	follor	fallor.
83	20	vede, vn	vede, auiamo vn'.
84	22	non della	non dalla.
84	35	molto	molti.
86	30	hà der-to	la diè.
86	7	ch'io lo	ch'egli lo.
96	21	della	dalla.
90	26	nimirum	mirum.
90	29	Aer	Aeri.
92	22	percuſſos	repercuſſos.
94	31	ſegnando	ſegando.
97	36	che ſia	che non ſia.
99	18	modo ſe	modo, che ſe.
101	13	Oriente	Orizonte,
106	26	ſubito che	ſubito.
108	21	parere	patere
114	3	obſentiquè	obſequentiq.
115	33	ijdem	ergo ijdem.
116	14	che ſi voglia	che voglia.
117	27	, e	a
125	2	ſi come-tæ	ſi cum comeetæ.
125	30	della	dalla.
127	1	deſideratiſ-ſimo	deſideroſiſimo.
128	21	verſo	verò.
128	30	conchiuda	conchiude.
129	31	per poter	poter.
129	33	del	dal
130	33	locus	& locus.
133	35	della	debba.
135	31	trà	ora
137	3	eſſer	eſſerle.
137	4	macchia	macchina.
137	12	macchia	macchina.
137	34	falari	ſaluari.
137	36	Aequatore	Aequatore modo in Auſtrum.
139	33	nedum	pedum.
140	19	cometa	cometæ.
141	22	non	non ſolo.
142	31	di queſti	queſti.
145	29	pijs	ijs.
146	26	formalmẽte	finalmente.
148	16	accedat	accedam.
148	39	perfectiſsima deco-ratur	figura perfectiſsima debeatur.
148	29	cieendum	dicendum.
249	8	qua	qua.
150	26	rele	reale.
150	36	dell'	dall'.
151	18	di momento	di momẽto in momẽto.
154	22	di ſuperfi-cie	di ſuperficie ſeabrola, perche qñ foſſero di ſuperficie.
154	24	eſsi	ed eſsi.
155	7	viſiuo	viuo.
155	14	nell'	nè l'.
155	35	riépiſcono	riempiſſero.
155	36	da	con.
157	27	mirum	non mirum.
158	27	queſti	queſto.
159	12	ſottenerſi	ſoſtenerſi.
159	13	non è	n'è.
159	16	rileuare	rileuate.
160	19	che ne	ce ne.
161	19	orno	torno.
161	35	papyro	è papyro.
162	36	apertis	apertius.
164	9	diſtaret	diſtarent.
169	15	ferma	fermo.
172	20	forſe	e forſe.
174	2	vererba	verbera.
174	30	indurſi	ridurſi.
174	34	o pur	: e pur.
182	8	creduto,	e creduto.
190	21	ſegni	ſegno.
191	4	latis	ſatis.
197	7	rimoſſo	timoſſo.
198	21	tangenti	tangibili.
199	33	naſo, come	naſo. ſi come
201	63	eſparſione	eſpanſione.
202	32	opaco	opaco; perſpicum enim qua.
205	12	filium	ſilum.
216	3	ſopra	ſurger.
218	34	oſa	coſa.
221	29	experimẽti	experiñeris.
226	7	nota	noto.
226	22	dice	dico.
227	21	ſuoghi	ſunghi.
230	26	partes	parte.
232	33	voraciſſimi	voraciſſimi.
233	9	cupi	capi.
233	10	exuerit	exuerint.
234	30	falta	falla.
234	36	inflam	iuſtam.
235	1	querelam	querelarum.

Fig. 3

Galileo's model of authorship was negotiated within, and, to some extent, against, the Lincean Academy.[10] Its prime mover, Federico Cesi, was keen to avoid a frontal attack on the entire Society of Jesus. His initial suggestion was that Galileo respond to the *Libra Astronomica* (1619) under the name of a student, mirroring the strategy of his Jesuit adversary, Orazio Grassi, who had written under the slightly defective anagrammatic name of Lothario Sarsi.[11] Various options, of not responding, of responding but concealing his identity, of responding and unmasking his opponent's concealed identity, or leaving the mask intact, were discussed, and gradually, collectively, the project took shape. Its subject and name shifted from the placeholder "comet material" to the "Counterweight" to the "Cometary Discourse" to the "Sarseid", and finally to the "Saggiatore", implying a serious weighing of rival claims; its genre was also decided collectively, because this dictated tone, and, despite its reputation for bitter satire, the book was actually designed to de-escalate institutional and epistemological polarizations.[12] The epistolary form was selected, and its recipient chosen from a list of contenders with various degrees of proximity to the Jesuit order, as a way of engaging without confronting. Speed was a central concern, lest the controversy seem resolved with presumed Jesuit victory.[13] Silence meant dishonour. Yet despite, or because of, this collective agenda, it took three years for the project to proceed from drawing board to drawing room.

The baroque trinity of agency (illness, weather, and politics), conspired to delay the operation, though this proved in the mid-term to be beneficial both to the author and the academy. Through all of 1620 and 1621 and on into 1622, letters pulsed from Rome to Florence urging Galileo to consign his overdue manuscript. The overlong fuse of premature preprint publicity fizzled through the curial patronage networks interwoven with those of the Linceans; a staple of news in this period is the repeated non-appearance of the manuscript.

Into print

In July 1622 Galileo finally finished the manuscript of the main text of *Il Saggiatore*, opting, with Nabokovian malice and wit, to engage in a commentary on every passage of Sarsi's

[10] The fullest account of this relationship is Galluzzi, *The Lynx and the Telescope*, chapter 8. Other reliable reconstructions include Redondi, *Galileo: Heretic*, chapter 3; Freedberg, *The Eye of the Lynx*, chapter 5; Drake, *Galileo at Work*, chapter 15; Camerota, *Galileo Galilei*, chapters 7 and 8; Heilbron, *Galileo*, chapter 6. Essential are Antonio Favaro's 'Avvertimento' in *Opere di Galileo* (henceforth OG), VI, especially pp.13-18 and Helbing and Besomi's 2005 edition.

[11] For discussions of the best mode of engagement with the author of the *Libra* and on choosing a suitable dedicatee, see *Carteggio Lincei*, 710; OG, XIII, 20, 24, 30-31, 37-39, 41, 43-44, 46-47.

[12] For the title, see *ibid*., , 11, 12, 59-60, 78-79, 82, 84-86, 100; for the genre, 25, 37-38, 41, 43-44.

[13] For the stress on speed, see *ibid*., 38-39, 47, 59-60, 68-69, 74, 77-80, 84, 88-89.

Libra, torturing the text in a live broadcast vivisection, flaying a failure. But another round of delays was to prevent it from appearing for another fifteen months. First, the Lincean bureaucrats of science were to collectively read and review the manuscript in its entirety to make sure no doctrinal or social lines had been crossed, with an explicit understanding that Galileo "moderate or mutate or silence" anything which the members did not approve: this lofty goal took several months, despite an error-filled copy being made (the first indication of a future glitch that would lay bare the conflicts inherent in amateur group publication). Herding the editorial Lynxes proved troublesome, and the idealized central corporate voice swiftly fragmented into multiple delegating memos, competing kings of forwards.[14]

Attempts to impose control over the debate by using a printer in Rome were also jeopardized by the city's self-proclaimed status as the head, navel, and most other organs of the world. The proximity of the Collegio Romano, and the Jesuits' access to the same corridors of power the Lynxes padded meant that the manuscript oscillated between two contradictory socioepistemological states: a secret, private missive, and a public utterance. Cesi's posse had to lay the foundations for the acceptance of the masterwork and also deny sneak previews to adversaries. Cesi's lynx could not exist in both states at once, and was soon out of the bag, with the Jesuits fully aware of its contents through oral reports before even the author knew of its final written form.[15] Throughout the long process of the text's publication, select audiences were granted glimpses of it, following a strategy of information control. In many ways, it makes best sense to talk of multiple media-, location- and group-differentiated 'publications' rather than of a singular, centralized, commercial event.

By late January 1623, a manuscript copy had made it to the hands of one crucial reader, the Dominican Niccolò Riccardi, known as The Monster for his memory and/or size, who served as the work's revisor and granted it its extraordinary imprimatur praising its natural philosophy (which would later be misprinted by Mascardi as 'filosofia nostrale' and then corrected by Galileo) on 2nd February 1623.[16] Minor revisions, a combination of comments from Cesi, Cesarini, Ciampoli and other Linceans, were then introduced in March, and Galileo was assured that the manuscript would finally make it to the printshop at the end of the month. A week later printing still hadn't started, with further delays anticipated due to Easter, which fell on April 16th, 1623. The Linceans were simultaneously printing sections of the "Mexican book" with Mascardi, which they hoped would be completed by 1625, but which wouldn't actually be published for nearly another thirty years, so it's unclear how well they understood or controlled the printing process.[17]

[14] On group reading and copying, see *ibid*., 99, 102-108, 111, 113.
[15] *Ibid*., 105-107.
[16] *Ibid*., 109. On the typo, see Favaro's 'Avvertimento', OG, VI, 16, fn. 4.
[17] OG XIII, 110, 113. On Mascardi, whose printshop was suggestively located between the Dominican Santa Maria sopra Minerva and the Jesuit Collegio Romano on the Via del Piè, see the entry *sub voce* in the *Dizionario Biografico degli Italiani*.

By the start of May, Galileo was assured that printing had definitely started, and towards the end of the month samples of 'the first two sheets', presumably signatures A and B (the first two printed sheets of the manuscript Galileo had submitted, rather than the eventual first half and full sheet of the assembled book, 'π' and 'a', which would in fact be the last to be printed), were sent to Galileo so that he could show off to Florentine detractors that the book really was coming into existence, and therefore had obtained a license.[18]

At his point, with Mascardi's printshop finally at work transforming the corrected manuscript into print, a crisis-cum-opportunity occurred. Pope Gregory XV died on 8th July 1623. The ensuing conclave killed off a further eight of the fifty-four participating cardinals. Papal deaths, conclaves, coronations, and the subsequent wave of cardinal investitures, were newsworthy events, and news meant job printing. Mascardi produced several such pamphlets: printing of *Il Saggiatore* was put on hold.[19] More seriously, though, the election of Maffeo Barberini to the papal tiara sucked Galileo's printing team into its vortex, leaving his book's production unsupervised. "Nearly ready" in July, the same news was repeated to the author a month later. The necessity for an engraved title-page design seems to have dawned on them only in mid-August: Galileo's solicited suggestions were unceremoniously tossed, and a design by Villamena hastily produced. By early September, all that remained was Villamena's engraving of the title-page design, the printing of the sheet and a half of the final signature Ff, which included the errata, and the laborious printing, on a rotary press, of the remainder of the book's twenty engraved images.[20]

Serial publications

At the end of September, just after the coronation of Urban VIII, the end, or rather the beginning, was in sight: only the first half-sheet of preliminaries, π "with the dedicatory letter and this figure [the engraved title-page]" remained, "which will be done next week".[21] Again, luckily for Galileo, the schedule was fictional, so he had the opportunity to insert a correction into the sample title-page that he had been sent, in time for it to appear in the edition.[22] The dedicatory letter to the new pope, composed by the chronically overworked Cesarini, was finally written and dated 20th October, over eight months after the text's imprimatur.[23] At around the same time, Cesarini's promotion to the new pope's "Maestro di Camera" required the resetting of the first sheet to be have been printed back in May, when the letter's recipient had been only Gregory XV's "Cameriere Secreto". In signature A the

[18] OG, XIII, 115-118.
[19] *Ibid*., 119.
[20] *Ibid*., 121, 125-126, 129-130.
[21] *Ibid*., 132-133.
[22] *Ibid*., 134-135.
[23] *Ibid*., 139-140.

conjugate leaves 1 and 4 are a half-page cancel, replaced by a half-sheet cancellandum, and so the collation for signature A should be A^4 (±1.4).[24]

The first assembled copy of the book was to be presented to the Pope by Cesi around 25th October; in reality the presentation took place on the 27th, with two bound copies given to Cardinal Francesco Barberini, as well as others to "diverse cardinals and other friends; and they are asked for insistently by others".[25] The next day, October 28th, a single copy was sent to Galileo by courier while a bale of books, initially promised as 70 copies, then immediately downgraded to 50, was packed and sent to him the same day.[26]

Included in this package were "eight of finer paper, which will serve as gifts to your friends there".[27] This rare and lovely documentary detail, provided by Francesco Stelluti, has led to a persistent error in editors' and dealers' descriptions of the book. Mistakenly, it has been claimed, the eight fine paper copies mentioned here constituted the totality of the fine paper issue: this claim has been used repeatedly to boost the value of any copy alleged to be made up of fine paper on the market. Despite the fact that the letter specifies that the copies were for Galileo's friends in Florence and beyond, fine paper copies with clear Roman distribution have been apotheosized into this select group, which now, wonderfully, includes at least twenty extant documented copies.[28]

The same letter from Francesco Stelluti to Galileo also acknowledged what will become another source of bibliographical confusion: the first of several improvised attempts to correct copies after their initial diffusion. One figure, on page 120, had been printed upside down. The solution, rather than to reset the already distributed type for both sides of leaf P4, reprint it, then send it to the intaglio printer to receive the correctly oriented image, then cancel the misprinted leaf, was simply to print off further copies of the diagram to be pasted over the upside-down image. An important point to note here, though, is that Stelluti's solution is late and imperfect: he says he has reprinted only "a few, that if I can have them in time, I will send to you with this [letter] so that you can have them glued over

[24] This change is borne out in the material evidence of the book. In the Linda Hall copy, a close examination of the chain line measurements for the paper reveals this cancel. The chain lines are spaced between 29 and 31mm on all leaves in A, within an acceptable range of tolerance for mould use and paper shrinkage. However, the cancel reveals itself in a "middle" chain line, in the LHL copy, roughly halfway between the top and bottom to A 1 and 4. These chain lines are 20mm apart, and are not found on A 2 and 3. Also indicative of a cancel are the dimensions of top of leaf to top chainline. On A1, that measurement is 22.5mm, A2 30mm, A3 between 2 and 6mm, and on A4 23.5mm. Even accounting for trimming, the distance between the chain lines on the top of A1 and A4 is too great for that conjugate leaf to have printed quarto.

[25] OG XIII, 140-141.

[26] *Ibid*., 141-143.

[27] *Ibid*., 142-143.

[28] The claim is repeatedly made in descriptions by Massimo De Caro, Filippo Rotundo and Umberto Pregliasco and is also found in Helbing and Besomi's edition.

that one."[29] What we see here is the beginnings of a pattern that will complicate all future attempts to distinguish between different 'issues' of the edition: some copies receive the pastedown, others do not. The lack of a pastedown is not evidence of an 'early' or 'first' issue, but rather evidence of the ad hoc solution to the printer's error, improvised alongside the edition's ongoing distribution. Presumably the same partial, incomplete, fix was performed on some, but not all, of the copies in Rome. It may well be that copies already gifted to patrons were subsequently chased down and updated with the patch. It may be that Galileo gave out some copies with the pastedown and some without. It may be that the copies destined for commercial release also received similar treatment. We simply cannot claim that copies without the pastedown are 'earlier issues' than those with. Overly neat distinctions have been made of four discreet issues of this edition, but what we hope to show in this essay is that there are actually six issues which differ from Helbing and Besomi's description, as well as two states – one for p. 120, and one for Ff6, respectively.

Let us return, though, to the narrative of the book's production. On 3rd November 1623, Tomasso Rinuccini could announce to Galileo that the book had finally been "published".[30] What he meant by that was that it was now commercially available to an out-of-network, or general, public in Rome. The book had already been available non-commercially, or privately published, for a week, and would continue to be distributed in both systems in various locations. This does not mean that groups of copies moving through these different distribution networks are different issues.

We have an improbable account of the first customer in the "Sun" bookstore on the first day of *Il Saggiatore*'s release: in history's poor script it was none other than Father Grassi, the book's target, to whom, it seems, ungracious Galileo had not bothered send a copy. Even he did not pay for his copy, though, but demanded one free from the bookseller because of his three-year wait. Further details of this copy make its 'commercial' status even more problematic: it seems the bookseller had received some copies from the Holy Office, presumably gifts to The Monster, Father Riccardi, which he then regifted (in exchange for other books, perhaps, an unnoticed perk of censorship).[31] We should be wary, too, of supposing a harsh distinction between the reception of books within the gift economy and those circulating commercially: Grassi's copy quickly joined another in the Collegio Romano (gifted or purchased, we do not know) whose contents had already been judged to be "totally beautiful, and dealing with Sarsi too modestly, and that Sarsi will have a job wanting to reply to it: in short, the Jesuits think Galileo treated them well".[32] Tracking the psychogeographies of reading micro-communities was part of the skillset of the Roman courtier.

29 OG, XIII, 142-143.
30 *Ibid.*, 145-146.
31 *Ibid.*, 147-148.
32 *Ibidem.*

Stelluti provided further details of the circulation of gift copies in Rome: to accompany publication, Cesi had had no less than sixty copies bound, "and given them to these curious cardinals and prelates and other friends, and also to many in the court of Cardinal de' Medici, and two to his Holiness".[33] It is unclear whether these copies were in temporary or, more likely, gift-book bindings, standardized but luxurious, or if they were individualized with the recipients' armorial stamps, or if they had blank cartouches for each recipient to complete. Several copies can be identified with similar tooling and the arms of contemporary cardinals, though whether this is evidence of Cesi's munificence or simply the limits of contemporary local taste is not known. What is evident, though, is that the presence of the Rome-based cardinal copies on fine paper proves definitively that the frequently cited number in dealer descriptions of only eight fine paper copies must be discontinued and ignored.

We lack comprehensive studies of fine-paper issues, but it's worth pausing for a moment to think of the labour and cost involved in making them: as each sheet was printed, a set number of fine paper sheets had to be included, preferably at the end of the run so that they might benefit from stop-press corrections. For every one of the thirty-one and a half sheets required to make a copy of the book that went through the hand press (with another leaf, or quarter sheet, added for the portrait, which only had to pass through the engraver's press), the fine paper stocks had to be kept separate: stored apart before printing, after the printing of the first side of the sheet, after being perfected, while being transported to the printer of the engravings and printed on again there, while being assembled, and while being distributed. This is a major organizational commitment.

From Stelluti's letter describing Cesi's liberality in giving out bound gift copies, and the identification of fine paper copies in cardinals' bindings, it seems highly probable that the fine paper issue included all sixty of these copies, plus the half-dozen or so Cesi had already given away. Presumably Linceans also received these nicer copies. And we know that Galileo was given eight, and it seems likely that he quickly gave these all away, as even a copy probably gifted to the high-profile original patron of the comet dispute, Leopold of Austria, is not a fine paper copy, nor that given to Orazio Morandi, and Galileo himself seems not have retained one either.[34] So the actual figure of the fine paper issue must be not the exclusive eight echoed into self-evidence, but closer to ten times that figure, or perhaps fifteen percent of the print run, ninety out of

[33] *Ibidem*.

[34] The copy, with Galileo's manuscript corrections to the *Nota di errori* is most likely Österreichisce Nationalbliothek 72.J.108 http://data.onb.ac.at/rep/1089E5F6 (miscatalogued as *Il Saggiotore*). Morandi's copy, with an autograph inscription reading 'D[omi]n[u]s Horatius Morandius dono ab Auctoris munificentia accepit. Die 18 Novembris 1623' is at Special Collections, University College Library, London, C 1623 G1. Both are ordinary paper copies.

six hundred.[35] This is the first bibliographical myth concerning the *Saggiatore* we can lay to rest. There are others.

Stelluti's letter also signaled to the author the wider distribution of the book: "next Monday [Cesi] will give the rest to the bookman, so that he can send them out of Rome to the major cities".[36] The commercial success or failure of the enterprise seems to have been of little concern to Cesi, who was already accustomed to sinking his wealth into print. The expenses for the Linceans' earlier Galileian publication, the *Istoria e Dimostrazioni Intorno alle Macchie Solari*, survive, and show that the group had optimistically and unrealistically printed 700 copies of Scheiner's seven-sheet book for 38 scudi and 1400 copies of Galileo's twenty-one-sheet book for 171 scudi, plus another 49 scudi to 'finish' the printing; about one sixth of the cost of the book's production was devoted to making its images.[37] If these figures are accurate (and they do not include waste, which probably adds another 10%), the *Istoria* required a total of 34,300 sheets of paper (we do not know if there was a fine paper issue included in this figure; paper made up just under a quarter of the total expense). The *Saggiatore*, by contrast, with its greater number of sheets but smaller print run used a total of 18,900 sheets. The production and printing of the twenty engravings in the body of the text was also considerably less time consuming than the epistemologically loaded visuals of the *Istoria*. Even printing ninety or more fine paper copies, then, must have seemed like a bargain in comparison: what was lost in sales and paper expense was gained in social distinction. Fine copies made for fine readers.

Hard cash aside, the general aim of the publication is important to bear in mind when thinking about its production: the book was not intended solely to promote a rival cometary theory or to silence a rogue Jesuit. Its job was to prise open the larger cosmological questions that had been, in the minds of the Linceans, only temporarily closed with the 1616 injunction against Copernicanism. It therefore made perfect sense to think of this as only secondarily a commercial venture: what mattered was getting copies, preferably nicely bound sumptuous copies on plush paper, into the hands of the highest echelons of theological and political authority. The material imbalance in the debate was shrewdly pointed out by Father Grassi, who complained that he was at a disadvantage as he did not have someone to pay for all his printing costs.[38]

Such lofty machinations, however, mangled with the Linceans' own involvement in papal court life. As Galileo discovered as soon as he opened his book, the usual textual transformations wrought by scribe and copyist had been supplemented, rather than

[35] The usual figure of 384 was miscalculated by Biagioli, *Galileo Courtier*, 297, fn. 94, and was corrected by Galluzzi, *The Lynx and the Telescope*, 279.
[36] OG, XIII, 147-148.
[37] OG, XIX, 265-266.
[38] OG, XIII, 153-154.

corrected, by the substitute editor, Tomasso Stigliani, a relatively well-known poet, client of Virginio Cesarini and enemy of Galileo's friend, the genuinely famous Giovan Battista Marino. As Galileo put it in a letter dated 18th November 1623 to Federico Borromeo that accompanied a gift copy (now Biblioteca Ambrosiana S.P.25), "Eight days ago some copies of my *Saggiatore* came from Rome, but so full of mistakes due to the negligence of the proofreader, that I have had to do an index of errors, and print it here in Florence and add it to the end of the work".[39]

Anachronistically, one might think that the author would have an automatic final say to textual content, but the case of *Il Saggiatore* shows us that behind this assumption there is a complex history. The text had already been modified by a scribe, a committee, a censor and a compositor, but what right had an author to reassert intention? Galileo sent some copies of his Florentine printed list of 209 errors down to Cesarini in Rome, who promised to distribute them as Galileo had asked and to throw Stigliani under the carriage.[40] We do not know how many copies of this half-sheet Galileo had printed, though they were described as only a "few", not enough to correct the entire print run. Nor do we know how he imagined Cesarini would track down purchased copies of the book. Cesarini claimed to have issued an order for Galileo's list to be reprinted in Rome, but it is unlikely that this was ever executed, as all copies examined seem to show the same textual setting.[41] Nearly a fortnight later Tommaso Rinuccini wrote to Galileo saying that he still had not seen the "indices", even though he'd checked with the printer and the bookseller. He'd heard that Cesarini still had them and would try to make sure that Grassi received one, presumably so that the errors of the "exquisite balance" would not become a new target for mockery.[42]

Resistance to the author came not just from Cesarini, perhaps feeling implicitly criticized by Galileo's errata sheet, but also by the editor he had appointed and then blamed. Stigliani, doubling down, considered Galileo's notion of error itself to be inaccurate, and proposed printing his own, emended errata sheet of thirty to thirty five corrections, while also preventing Galileo's sheets from exiting Cesarini's room.[43] Even Cesi seems not to have seen Galileo's errata sheet, though he knew of it and asked Galileo to send it to him.[44] Eventually Cesarini intervened into this client spat and produced his own compromise list of 136 errors, presumably annoying everyone involved, but neatly demonstrating that letters belong to their recipients, not their senders. To further complicate matters, rather than merely printing this, as Galileo had done, as a pastedown and addi-

39 *Ibid.*, 148-149.
40 *Ibid.*, 160-162.
41 *Ibid.*, 150-151 and 160-162.
42 *Ibid.*, 153-154.
43 *Ibid.*, 160-162.
44 *Ibid.*, 165.

tional leaf, Cesarini had Ff6 reset and reprinted on a new bifolium Ff1.6, which was then substituted for the original.[45]

Even Galileo's printed list, though, seems not to have satisfied him, and some copies of the book either have additional errata added by Galileo by hand or corrections made directly to the text. These are not always in agreement, and there is no 'ideal' copy that fully represents some initial or final authorial intention. What we experience instead is a wide range of both textual and material combinations, with the only real constant the presence of sheets π and A-Ff, that is, the engraved title-page, imprimatur and dedicatory letter and the main text block. For reasons that are still not clear, the introductory verses may or may not be present; the portrait of the author may or may not be present; the pastedown diagram correction may or may not appear on p.120; Galileo's "Nota di errori" may or may not be present, sometimes pasted over Ff6v's original list, the "Errori occorsi nello stampare di maggior consideratione", or may be tipped in after it; Cesarini's "Tavola degli errori" may or may not be present. The order of preliminaries might be π (engraved title-page, imprimatur, dedicatory letter), a (poems), χ (portrait), or π, χ, a; the portrait might be tipped in facing left or right, or not present at all.

To speak of "issues" when dealing with this card shuffling is, at best, misleading. Certainly, there are copies whose individual histories may be told, via accompanying documentation, clues from binding, or other provenance information; we do not dispute that Galileo wrote a manuscript he called *Il Saggiatore*. But we find the Procrustean Bed of Bibliographical Issues to be especially damaging to the historical record and to deeper bibliographical analysis.

The most thorough critical edition of the *Saggiatore*, by Besomi and Helbing, has enshrined the cumulative wisdom of bibliographers and is worth considering at this point, as it has become the standard reference work.[46] Four separate issues are there discerned:[47]

[45] As noted earlier, two copies of the book with the *Tavola* were located and examined – one at Toronto, and one at Berkeley. Both of these copies have the re-set recto and verso of Ff6 as a cancel leaf, mounted on a stub. Favaro notes an example in the National Library in Naples with the shelf mark 26.C.4, but the library's online catalog only lists one bizarre hybrid copy made up of the 1656 Bologna reprint supplemented with the original edition's two initial gatherings, π and 'a' (S.Q. 25. K). Favaro's copy may now be classified among the library's manuscripts as Ms. XII.E.74 (https://manus.iccu.sbn.it/cnmd/0000175696). The library's card catalog lists four copies: 33.D.51; 26 [letter obscured by punch hole, but presumably, from Favaro's note, 'C'] 4; XII.2.31; 208M.41. One of the two copies in Oklahoma contains a negative photocopy of the reset Ff6.

[46] It should be pointed out that the collation statement on p.643 erroneously described the edition as 'In-8°' rather in 4°, and refers to the engraved title-page, imprimatur, dedicatory letter and portrait leaf by Roman numerals I-V. The edition also did not notice the cancel in 'A', nor does it account for the issues resulting from the erratas, poems, and fine paper.

[47] Helbing and Besomi, 644-645. The term deployed is "tiratura", which is technically a print run. This is clearly at best imprecise, as they are discussing what the Anglophone trade calls an

- First issue: limited to eight copies, thick paper, no poems (signature 'a'), short errata, cancel slip correcting inverted image on p.120.
- Second issue: contains Faber and Stelluti poems (signature 'a'), short errata.
- Third issue: errata added to the bottom of page 236.[48]
- Fourth issue: long errata on pages 236-238.[49]

The detailed chronology we have laid out should immediately render such divisions suspicious: there simply never were four neat waves of issues, even less so print runs, whatever that might mean for a hand-press edition. The scheme combines several unrelated and qualitatively different factors: paper quality, omission or inclusion of signature 'a', pastedown corrected diagram, cancel Ff6 with 136 errors and long errata with 209 errors, and presents them as a linear narrative, assigning, moreover, primacy to the "first issue".

What, then, are we left with, and what is needed in a description of a specific copy of *Il Saggiatore*? We propose describing the paper stocks used, and based on the data in this article, asserting whether a particular copy is on fine or ordinary paper; the presence or absence of signature 'a', the preliminary poems; whether the portrait of Galileo is present, and whether it is signed by Villamena, and its location; whether the copy has the cancel diagram on p. 120; and finally, which errata is present, and if it is the "Nota", how it is attached or inserted.

We can state that for the first edition of *Saggiatore* that there are six issues, and two states for p. 120, and signature Ff, respectively:

- Issues:
  - With the poems 'a'
  - Without the poems 'a'
  - Without the added errata '[Gg]'
  - With the added errata '[Gg]'[50]
  - Printed on ordinary paper
  - Printed on fine paper
- States:
  - page 120 is in two states – with and without the cancel diagram

"issue", which in Italian is "emissione", though the term "tiratura" is commonly used, despite its emphasis on printing rather than publishing, to mean "issue".

48 The editors then say "16 errors listed", but this must be a mistake for '136', as what seems to be described here is the cancel Ff6rv, with the text ending on page 235 and the 'Tavola degli Errori occorsi nello stampare' on page 236.

49 This must correspond to Galileo's Florentine "Nota", actually printed and distributed before the so-called Third issue's errate, the "Tavola."

50 It should be noted that the "Nota" which comprises [Gg] can be inserted loosely at the end as it is a bifolium, bound in, or even tipped in, as Galileo likely intended it to be, noted elsewhere.

– Ff6 is in two states – this leaf was re-set with Cesarini's revised errata ("Tavola"), producing two states.[51]

As to a chronology for these, which has been erroneously established in the past, we can state that the re-set of Ff6 came after the original *Errori*. However, as the poems, cancel diagram, and Galileo's *Nota* circulated separately from the book, no priority or chronology can or should be deduced from their presence or absence.

We are, however, now also able to distinguish a fine paper and an ordinary paper issue, although even this apparently simple distinction may be harder to make than normal: the difference in paper quality is not that noticeable, and all copies include some sheets printed on the fine paper stock, as we shall demonstrate below. The assemblage of copies, whether they include or do not include sheet 'a', whether they include the original short errata, or one of the two longer errata, whether they received the pastedown correction to page 120, is far more random, or dependent on a variety of sometimes extremely local and contingent factors, than the notion of 'issues' allows.

Before we consider the hierarchies of value enshrined in this model, let us trace its origins. Despite the rich documentation surrounding the book's prolonged publication, it seems that the first notice of different states was not published until the late nineteenth century. This was limited to an awareness of the three different errata lists and the absence of the poems.[52] Favaro's 1896 edition, with its prime purpose to restore, in the absence of a manuscript, the author's original intention, rather than, say, the earliest, most common or latest published form of the text, in which we now may be most interested, saw these variants as corruptions to be excised. In this he followed a long line of Italian editions, most of which, since the first edition, had simply removed 'non-Galileian' elements such as the imprimatur and the poems, from the text. The question of fine paper copies or the frequent absence of signature 'a' interested Favaro hardly at all: what he wanted was Galileo's intended text. Skipping on to 1956, we find the dealers J. Irving Davis and Pino Orioli using an extremely limited data set of the two copies in the British Library, to make the grand claim, which has somehow remained pervasive to the present day, that sheet 'a' was print-

[51] We draw here on the work and definitions of issue and state by G. Thomas Tanselle in his essay "Issue and State" in his *Descriptive Bibliography* of 2020.

[52] Ferrajola, "Delle rarità o singolarità non avvertite nelle edizioni di libri specialmente di Crusca", 38, Galileo: *Saggiatore*, Roma, 1623 "[…] Ne ho due copie. Una è identica a quella descritta dal Razzolini-Bacchi [Luigi Razzolini and Alberto Bacchi della Lega, *Bibliografia dei Testi di Lingua a Stampa citati dagli Accademici della Crusca*, (Bologna, Alberto Romagnoli, 1878)], nell'altra mancano le poesie in lode di Galileo, ed è stata ristampata l'ultima carte per ristringere tutto il testo nella facc. 235 e consacrare l'intera 236 a una sterminata «Tavola degli errori» in tre colonne di minutissima lettera. Negli esemplari come quello descritto dal Razzolini-Bacchi gli errori corretti sono solo sedici". To be fair, Razzolini and Bacchi did note the frequent absence of the poems in their entry on *Il Saggiatore* on page 405.

ed last, after the rest of the book, and so its absence indicates an early issue.[53] Analysis of the book's paper stocks and contextual documentation disproves unequivocally this quite flimsy yet durable theory: the Faber and Stelluti poems were printed almost exclusively on paper watermarked with an Anchor; this paper was also used in some copies in signature Y and Ff, that is, during the normal print run. Furthermore, Stelluti's letter to Galileo announcing expedition of the first fifty copies, dated 28th October 1623, explicitly says that those copies contained the poems, with a lovely vignette on their chaotic composition:

> You will see in your book my song: I beg you to excuse me the imperfections you will find in it, because in addition to having my mind elsewhere and caught up in a thousand affairs, I had to do it in the chambers of these cardinals, in carriages and in the street when I was alone, because we never got to sit tight at home, and so I couldn't do it as I wanted.[54]

Might it be, though, that the absence of the poems from some copies indicates, perhaps, different assembly and distribution centers? Unfortunately, no clear patterns are discernible, at least from the copies we have analyzed: there is, indeed, a high proportion of fine paper copies lacking the poems, fourteen out of twenty. But these copies may or may not also omit Galileo's portrait, they usually, but not always contain only the original Ff6 errata; they may or may not be in a contemporary gift binding; they may have either Florentine or Roman early provenance. Almost every combination of states is possible. The same range of combinations is seen in fine paper copies with the poems. We are at a loss to discern any pattern or intention in the presence or absence of these components, though a wider analysis, currently hampered by the repetition of non-copy-specific descriptions

[53] Davis and Orioli, Catalogue 155, n. 21 (1956), "After having examined the various copies in the British Museum, we feel sure that both the commendatory verses and the leaves of errata and probably the portrait were added later. In confirmation of this opinion, there is the fact that this additional matter as well as the portrait are printed on paper with a different watermark from that found in the rest of the book, and that in the collected edition of Galilei there is printed a letter in which he complains of the numerous printer's errors, and states that he had to have hastily printed a leaf of corrections to add to the copies to be distributed". Some variations occur: a typical trade entry, taken more or less at random, and nicely conflating the terms 'issue' and 'state' is that of Philobiblon's *Italian Books* catalogue, Spring 2019: "[T]hree different states of the 1623 edition are known. The first issue is usually identified – as it is here – by the short errata containing only sixteen corrections printed on the verso of the last leaf (fol. F6v): during the printing Galileo was in Florence and could not supervise corrections; for the second issue he included additional errata, printed on an extra leaf bound at the end of the work. The list was further revised for a total of 137 errata in the third and final issue. Also distinctive of the first issue is the correct diagram on page 120 (fol. P4v) pasted over the misprinted one, as well as the absence of the four-leaf quire signed a, containing two poems in praise of Galileo […]"

[54] OG, XIII, 142-143.

across many library catalogues, may still reveal factors currently eluding us. It is not, for example, the case that the poems were omitted from Roman copies lest the claims of Galileo's superhuman acumen offend Jesuits or cardinals, or that Galileo excised the poems from the copies he distributed because they mentioned Della Porta as the inventor of the telescope. Perhaps a copy with poems just cost a bit more. Despite this apparent bibliographical fecundity, dealers have been keen to claim primacy for Issue 1 copies ('the earliest'), but also, when the situation suited, Issues Two ('complete'), or Issue Three ('Final') or Four ('Authorial'). But we are dealing with little more than a shell game: the important thing is to not look away.

Let us turn now to the question of the edition's paper stocks, which have to date never been described. This is surprising, given the frequency of quite subjective claims concerning copies' 'thick paper', whose feel might reflect more the storage conditions and restoration practices of individual copies rather than their production process. It seems helpful to see whether an analysis of watermarks actually provides us with clear guidelines for identifying both 'ordinary' and 'fine' paper copies. In our admittedly limited survey, we have traced several copies that seem, due to their provenance, to be good candidates for the fine paper category, and noted their watermarks; we have also done this for ordinary paper copies, and are now in a position to provide scholars with a guide to identifying these two issues.

Watermarks

Watermark identification is difficult due to the book's quarto format, as the watermarks are in the gutter of all copies. For the present article, the authors gathered watermark data for 26 copies, on both fine and ordinary paper, though in some tightly bound copies, evidence was extremely limited.[55]

Fine Paper

- Sample copy: Florence, Biblioteca Nazionale Centrale, MAGL. 3.2.406)
  - π 1-2 larger (40 mm circle dia) fleur-de-lys in crowned circle.
  - A - X smaller (35 mm dia) fleur-de-lys in crowned circle
  - Y 2-3 Paschal Lamb
  - Z 1-4 Ff smaller fleur-de-lys

[55] Copies consulted: Linda Hall Library (1), New York Public Library (1), Biblioteca Nazionale Centrale di Firenze (7), University of Oklahoma (2), Jay Pasachoff (1), Houghton Library, Harvard University (1), Stanford University (1), Boston Public Library (1), ex-Rick Watson copy (1), University of Chicago (2), University College London (1), Austrian National Library (1), Thomas A. Fisher Library, University of Toronto (2), Princeton University (2), Bancroft Library, University of California, Berkeley (2).

While there are a mix of stocks here, the variety is limited (three marks, as opposed to five or more in the ordinary paper), and the marks stylistically are more consistent. The 'Paschal Lamb' watermark may appear elsewhere, though we have also seen fine paper copies with A-Ff entirely in the smaller fleur-de-lys paper. We have not come across the Lamb watermark in ordinary paper copies. An ideal copy might exist which would have the following watermarks:

- π 1-2 thick paper and larger (40 mm circle diameter) fleur-de-lys in crowned circle.
- a Anchor in circle
- A-FF smaller fleur-de-lys

To date we have seen the Lamb paper used only in signatures Y and BB.

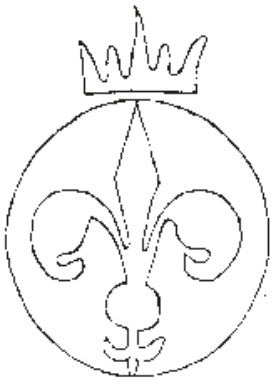
It should be noted in all copies that signature A is printed on half sheets and therefore may show zero, one or two watermarks.

Ordinary paper

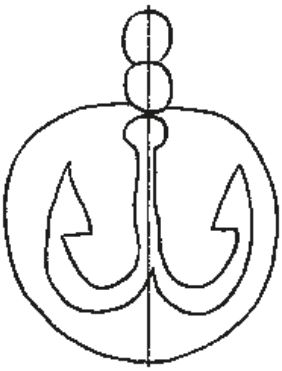
In the thirteen ordinary paper copies examined, numerous paper stocks are identified from the watermarks in each signature. Some patterns do emerge. First, the bulk of the copies examined followed this set of watermarks:

- π - larger (40 mm circle dia) fleur-de-lys in crowned circle
- a - Anchor in circle
- A - B smaller fleur de lys in circle with crown
- C - indiscernible
- D - smaller fleur de lys in circle with crown
- E - G Shield with kneeling man with hands raised in prayer
- H - I smaller fleur de lys in circle with crown
- K - Shield with kneeling man with hands raised in prayer
- L - Six-pointed star in circle, not same watermark as portrait
- M - smaller fleur de lys in circle with crown
- N - Six-pointed star in circle, not same watermark as portrait
- O - smaller fleur de lys in circle with crown
- P - Y Six-pointed star in circle, not same watermark as portrait
- Z - Shield with kneeling man with hands raised in prayer
- Aa - smaller fleur de lys in circle with crown
- Bb - Shield with kneeling man with hands raised in prayer
- Cc - Ee smaller fleur de lys in circle with crown
- Ff - Six-pointed star in circle, not the same watermark as portrait

This mix of paper stocks is slightly unusual, but is not a surprise for a printer like Giacomo Mascardi. Mascardi's press printed a high volume of work in the 1620's, and as such, would have a mix of ordinary paper stocks at hand, drawing upon them as needed in the production of books. It is tempting to read uninterrupted series of the same watermark as



4213 (1544)



583

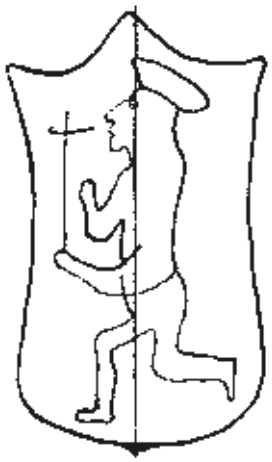
7111

indications of continual printing, and changes as indicative of disruption, but we know too little about Mascardi's presses and paper handling to be able to draw any conclusions from these shifts.

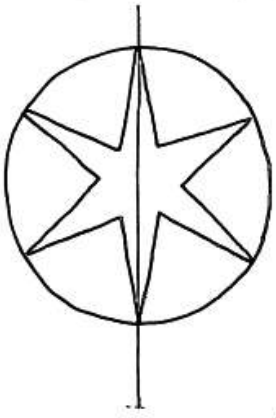
In general, ordinary paper copies of *Saggiatore* typically have the same marks as listed above, but can be in different order. Additional watermarks witnessed include a Mermaid, a Head, a Duck, an Eagle. There may be others.

Three facts are worth considering: first, all copies, whether fine or ordinary paper, seem to use the same paper for π (large fleur-de-lys), χ (six-pointed star, usually with vertical chain lines) and 'a' (an Anchor). The preliminaries are therefore not a guide to distinguishing one issue from the other. Second, the 'small fleur-de-lys' thick paper that generally makes up most or all of the fine paper copies also *always* appears in the ordinary paper copies: some sheets, such as A, B, Cc, Dd, and Ee, are *always* printed on this paper; others, such as C, D, H, I, K, L, M, N, O, P, Q, and Aa, are sometimes printed on this paper, sometimes on other paper. Put another way, anything between an eighth to a third of an ordinary paper copy may actually be on fine paper. There may be copies that blur this distinction further. Third, some sheets, such as Y and Aa, are printed on at least six different papers. Again, it is tempting to draw conclusion from these observations concerning Mascardi's printing practices, but the presence of fine paper copies shows that, even if it is hard for us to impose order on the printing and assembling process, order there indeed was.

While we have argued for a dismantling of the chronological hierarchies of issues and instead for a more neutral vocabulary of bibliographic states, we should also be aware of copies that fall outside the normal realm of possibilities. Sometimes the portrait is supplied from the *Istoria*, which had used the same plate ten years previously: the only difference is that



7628



in 1623 Villamena signed the plate, and the printer used different paper (though as it is a small half sheet, a watermark may not be evident). Sometimes the portrait is added in facsimile, which may be deduced by the lack of platemark or signs of a different printing technique; presumably it has also sometimes been taken from other copies. This may be detected by noticing differences in sewing hole position or leaf dimension or discontinuities in gauffering or marbling or wear on the edge of the bookblock. Similar techniques might reveal more substantial sophistication. Given the large number of watermarks in the ordinary paper copies, this book is perhaps more susceptible than most to silent completion by facsimile.[56] On the other hand, the previous lack of watermark documentation and an expectation of homogeneity has also led to genuine portraits, for example, being misidentified as facsimiles.

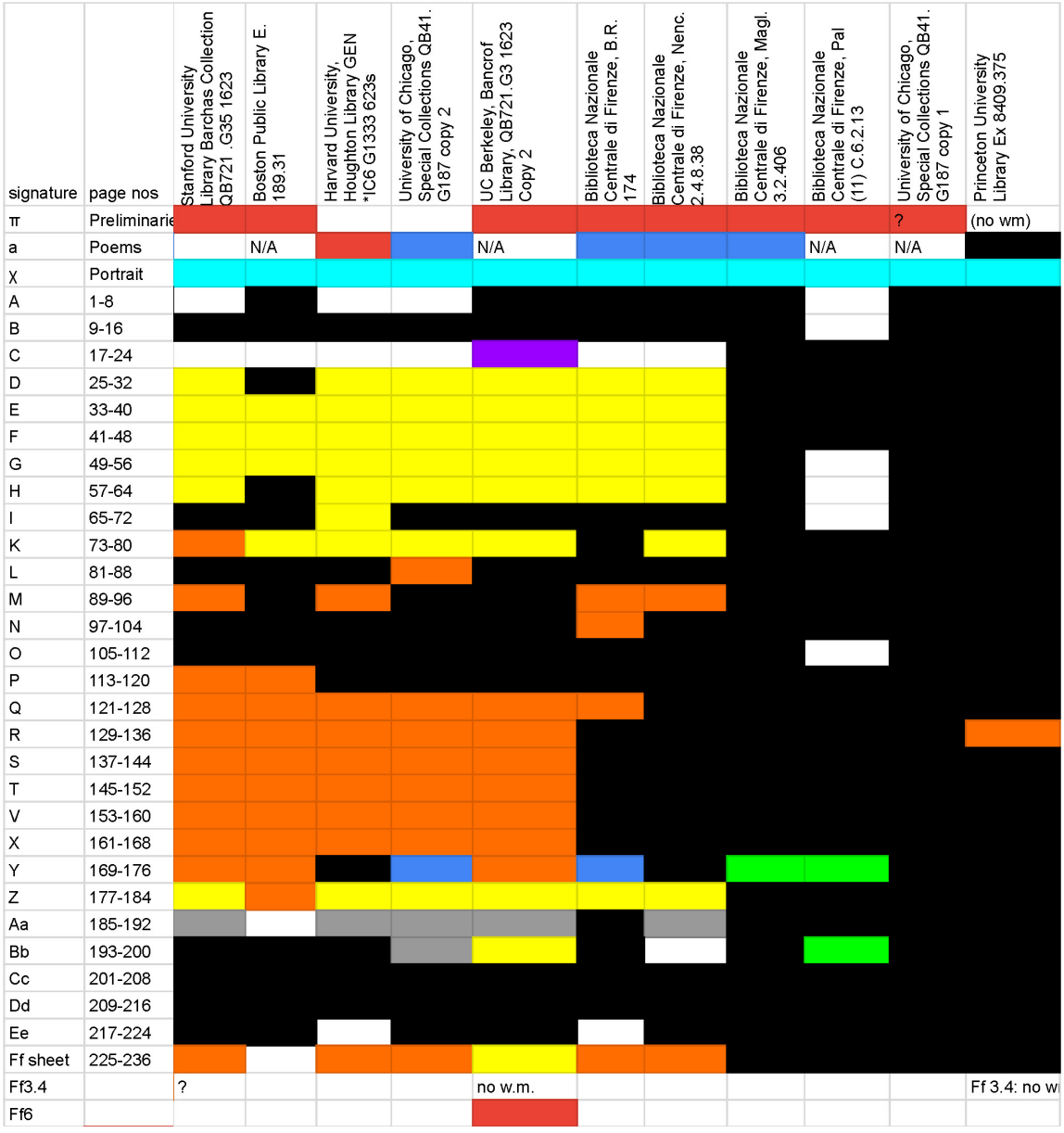
The best documented case of an abnormal copy may serve as a warning of the damage that the values embedded in bibliographical categories can wreak upon their subjects: Christie's London owns a copy sophisticated and defaced with the now infamous Cesi lynx stamp made by Massimo De Caro and deployed also on the forged Martayan Lan *Sidereus Nuncius*. The shoddy copy had been turned into a prized 'first issue' by the removal of an errata sheet, with signature A, with extended margins, supplied from another copy. The copy is now unsellable, as it probably contains some stolen components, though they will most likely never be identified.[57] In the wrong hands, bibliographical descriptions are prescriptive; our primary responsibility is to understand, in all their exuberant variety, how these books came to be as they are, rather than to arrange them into overcrowded cages.

[56] This is perhaps best embodied in the University of Chicago's "copy 1" of the book, which has a portrait supplied in facsimile, in addition to obvious sophistication seen in the gauffering of some signatures, and the lack of gauffering in others.

[57] See Wilding, "Forging the Moon", 46.

signature	page nos	Biblioteca Nazionale Centrale di Firenze, Pal (11) C.6.2.14	Jay Pasachoff/Williams College	University of Oklahoma, Special Collections, 'Non-Drake copy'	Biblioteca Nazionale Centrale di Firenze, Ms. Gal.62	Biblioteca Nazionale Centrale di Firenze, B.R. 173	Fisher Gal. 172	Fisher Gal.173	University of Oklahoma, Special Collections, 'Drake copy'	Privately owned copy, sold by William P. Watson	Fisher Gal. 174	New York Public Library, Special Collections, *KB 1623	Institute for Advanced Study, Herbert M. Evans copy
π	Preliminaries								N/A				
a	Poems		N/A				N/A	N/A		N/A			
χ	Portrait						N/A	N/A					
A	1-8												
B	9-16												
C	17-24												
D	25-32												
E	33-40												
F	41-48												
G	49-56												
H	57-64												
I	65-72												
K	73-80												
L	81-88												
M	89-96												
N	97-104												
O	105-112												
P	113-120												
Q	121-128												
R	129-136												
S	137-144												
T	145-152												
V	153-160												
X	161-168												
Y	169-176												
Z	177-184												
Aa	185-192												
Bb	193-200												
Cc	201-208												
Dd	209-216												
Ee	217-224												
Ff sheet	225-236												
Ff3.4				Ff 3.4									Ff 3.4
Ff6													

Large Fleur de lys
Small Fleur de lys
Kneeling Saint
Star
Mermaid
Eagle
Lamb
Anchor
Duck
Cherub Head
Star in circle
No mark observed


signature
page nos
Stanford University Library Barchas Collection QB721 .G35 1623
Boston Public Library E. 189.31
Harvard University, Houghton Library GEN *IC6 G1333 623s
University of Chicago, Special Collections QB41. G187 copy 2
UC Berkeley, Bancrof Library, QB721.G3 1623 Copy 2
Biblioteca Nazionale Centrale di Firenze, B.R. 174
Biblioteca Nazionale Centrale di Firenze, Nenc. 2.4.8.38
Biblioteca Nazionale Centrale di Firenze, Magl. 3.2.406
Biblioteca Nazionale Centrale di Firenze, Pal (11) C.6.2.13
University of Chicago, Special Collections QB41. G187 copy 1
Princeton University Library Ex 8409.375
π Preliminarie ? (no wm)
a Poems N/A N/A N/A N/A
χ Portrait
A 1-8
B 9-16
C 17-24
D 25-32
E 33-40
F 41-48
G 49-56
H 57-64
I 65-72
K 73-80
L 81-88
M 89-96
N 97-104
O 105-112
P 113-120
Q 121-128
R 129-136
S 137-144
T 145-152
V 153-160
X 161-168
Y 169-176
Z 177-184
Aa 185-192
Bb 193-200
Cc 201-208
Dd 209-216
Ee 217-224
Ff sheet 225-236
Ff3.4 ? no w.m. Ff 3.4: no w
Ff6
Large Fleur de lys
Small Fleur de lys
Kneeling Saint
Star
Mermaid
Eagle
Lamb
Anchor
Duck
Cherub Head
Star in circle
No mark observed

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Galileo, Simon Marius and Dutch nationalism

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Abstract
In 1898 the Dutch *Hollandsche Maatschappij der Wetenschappen* issued a prize question asking for an evaluation of Galileo's charge of plagiarism laid by Galileo against Simon Marius concerning the discovery of the satellites of Jupiter. The only submission defended Galileo, and the editor of the Society's journal, Johannes Bosscha (1831-1911), then took it on himself to defend Marius and attack Galileo, whom he saw as a usurper of the credit rightfully belonging to the Dutch engineer and scientist Simon Stevin (1548-1620). Bosscha's extreme nationalistic arguments are analyzed in this paper.

Keywords
Nationalism, Oudemans, Favaro, Johannes Bosscha, Jupiter satellites

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> The injuries caused by an immoderate admiration, one would almost say the cult of which Galileo has been the object, take on particularly serious character when, in order to hide the weaknesses of the "divine philosopher," they are attributed to those whom he denounces as his adversaries.
>
> Johannes Bosscha (1907)[1]

While engaging with "Lothario Sarsi" in *Il Saggiatore* Galileo took on some of his old adversaries, among whom Simon Marius (Mayr in German, 1573-1624), the court mathematician of the Duke of Brandenburg. Marius had twice crossed Galileo's path; first as the tutor of Balthasar Capra, the purported author of a Latin version of Galileo's book on the proportional compass, and again when Marius published his *Mundus Iovialis* in 1614. In that work he claimed to have seen the moons of Jupiter in November 1609, well before Galileo, and to have started observing them on 29 December of that year, ten days before Galileo's first sight of three of the satellites, as shown in the *Sidereus Nuncius*. Galileo had not reacted to Marius's publication, but now he decided upon an aggressive response to the claim.

Galileo first told his readers that Marius had made stealthy use of the Julian calendar: on the Gregorian calendar Marius's first observation was made on 8 January, one day after Galileo's first observation. This point was perhaps not as important as Galileo made it out to be: most if not all readers recognized that Marius had used the Julian calendar throughout his book, as was to be expected in Protestant Ansbach, where the shift to the Gregorian calendar would happen only in 1700.

Second, Marius had stated that the orbits of the satellites were inclined to the ecliptic; Galileo argued that they were, in fact, parallel to it. On this point both were in error, as later astronomers would show.[2] But the inclinations did determine where the moons would be seen above, below, or on the ecliptic.[3] Here, Galileo could correctly point out that Marius had given the wrong prediction for the period 1611-1613. *Mundus Iovialis* contained only a handful of observations; while Galileo's argument was seen by later generations of astronomers as damning, at the time it had little impact. But this evidence did bring up another point: not how many observations of the moons Marius had made, but had he made them at all? Galileo thought not. But here, in retrospect, he went too far: there is

1 Bosscha, "Simon Marius. Réhabilitation d'un astronome calomnié", 262.

2 The angular inclinations of Jupiter to the ecliptic and of the satellites to Jupiter's orbital plane are very small.

3 OG, VI, 214-217; Galileo, *Il Saggiatore*, 98-101, 467.

solid evidence that Marius did indeed observe the moons a number of times. However, the first known observation of his is dated 30 December 1610.[4]

What did other astronomers think of Marius's claim? As Galileo's correspondence shows, upon the publication of *Mundus Iovialis* Galileo's supporters, his patron Federico Cesi, chief among them, urged him to write to Johannes Kepler, the Imperial Mathematician, who had enthusiastically supported Galileo's first telescopic discoveries. Either Galileo never wrote such a letter, or Kepler did not answer it. But Kepler could hardly comment on Marius's claim: he had mocked that astronomer and his observations in the preface of his *Dioptrice* and had been forced by Emperor Matthias to apologize to him.[5] Marius had not responded graciously.

Galileo's adversary in the sunspot debate, Christoph Scheiner, could, however, speak freely. He dismissed Marius's claim, called him a usurper and a Calvinist, the latter an especially forceful insult among Catholic writers. His fellow Jesuit Giovanni Battista Riccioli did not comment on the priority dispute, and Johannes Hevelius later simply stated that Marius had discovered the moons shortly after Galileo.[6] Christiaan Huygens, suspected of having stolen the idea of his pendulum clock from Galileo, wrote to a correspondent that he hoped Prince Leopold and his fellow academicians did not think that he had "claimed the invention of others and that he resembled that Simon Marius".[7] Giandomenico Cassini noted that, judging from the details in *Mundus Iovialis*, it was clear that Marius had indeed observed the moons, but he did not further take sides.[8] In the eighteenth century Jérôme Lalande merely mentioned Simon Marius as the discoverer of Jupiter's satellites and the Andromeda nebula.[9] But Jean-Baptiste Joseph Delambre, reserving final judgment, concluded "It seems to us that one could write everything that Marius has given us, without ever having seen anything of the satellites other than in Galileo's book".[10]

Except for some writers in German-speaking regions, little attention was paid to Marius's claim until the rise of nationalism in the nineteenth century. In *Kosmos* (1845-1862), his influential, multi-volume study of culture and science, Alexander von Humboldt broached the subject of the discovery of the satellites of Jupiter by suggesting that they had been discovered, "as it would appear" [*wie es scheint*], almost simultaneously, and quite independently, on the 29th of December, 1609, by Simon Marius, at Ansbach; and on the 7th of January, by Galileo, at Padua. In the publication of this discovery, Galileo's, *Nuncius*

4 Nikolaus Vicke to Johannes Kepler, 16 July 1611, in Kepler, *Johannes Kepler Gesammelte Werke* (hereafter JKGW), XVI, 382-383.
5 Kepler, *Dioptrice* (1611), in JKGW, IV, 354. Translation by Roger Ceragioli.
6 Hevelius, *Selenographia*, 45.
7 Huygens to Ismael Boulliau, 14 May 1659, in Huygens, *Oeuvres*, II, 404.
8 Cassini, *Les hypotheses*, 39.
9 Lalande, *Astronomie*, I, 200 (§ 488).
10 Delambre, *Histoire*, I, 703.

Sidereus (1610) preceded the *Mundus Jovialis* of Simon Marius (1614).[11] Von Humboldt had his doubts about Marius's claim. In a note, he cited François Arago's proposal that priority of publication should be taken by the scientific community as priority of discovery. And he found it peculiar both that Kepler had never given Marius credit for this discovery, and that Marius had not claimed the discovery either in his *Fränkischen Kalender* for 1613, written perhaps as much as a year earlier, or in any of his letters before 1614.

Humboldt thus posed the priority question to all who read his work and who were interested in this topic. Prominent among these were Antonio Favaro (1849-1922), who sided with Galileo in his *Galileo e lo Studio di Padova* (1883),[12] and Johannes Bosscha Jr. (1831-1911), a pioneer in the introduction of thermodynamic principles in Dutch physics, and as Secretary of the *Hollandsche Maatschappij der Wetenschappen*, a towering figure in the promotion of science in the Netherlands during the onset of the so-called second Golden Age of Dutch science.[13] Bosscha was of the generation of scholars who took a deep interest in the history of Dutch science, especially that of the first Golden Age (the seventeenth century), and he played a leading part in the publication of a complete edition of the works of Christiaan Huygens, personally editing five volumes of the correspondence.[14] When it came to advocating and defending the historical claims of Dutch scientists, Bosscha could, in the words of Hendrik Lorentz, "burn with youthful indignation if in life or in the history of science he discovered an instance of injustice or usurpation".[15] And although he conceded that in science *unde habeas nemo quaerat sed oportet habere*,[16] he argued that

> … as long as humanity is divided into nations, whose reason and right to existence is determined by what they contribute to the progress of the human family, and whose reputation and prosperity depends partly on this, so long the just recognition of that which is deserved by each nation will be as important as the promotion of national science is dutiful.[17]

Bosscha had a special regard for Simon Stevin (1548-1620), an older contemporary of Galileo, whose many contributions to science and engineering included dropping balls from a height in 1584 and proving Aristotle's notion of fall wrong – before, as Bosscha

11 Humboldt, *Kosmos*, II, 357.
12 Favaro, "Polemiche intorno ai Satelliti di Giove", 419-449.
13 The phrase "second golden age" of Dutch science' was introduced by Willink, "Origins of the Second Golden Age of Dutch Science after 1860", 503-526; Id., *De Tweede Gouden Eeuw*.
14 Van Berkel, "Natuurwetenschap".
15 Lorentz, "Prof. Dr. J. Bosscha", 73-75, at 75.
16 Juvenal, *Satira*, 14, 207: "No one asks where you got [your money], but have it you must". See: https://www.loebclassics.com/view/juvenal-satires/2004/pb_LCL091.475.xml
17 Lorentz, "Prof. Dr. J. Bosscha", 74-75.

argued – Galileo did so. In 1905, Cornelis de Waard discovered the *Journael* of Isaac Beeckman (1588-1637), which contained material by Simon Stevin, one of the heroes of Dutch science in the Golden Age. Arguing for its publication, Bosscha asked:

> If today, somewhere in a forgotten corner of some library, an unknown work by Galileo were found, the entire learned world would demand its immediate publication. Should we in the Low Countries then be in doubt when in Beeckman's *Journael* a work by Simon Stevin is found – a man who if he is judged not by public renown but by the real progress achieved by his works – must certainly be placed above Galileo?[18]

Far above Galileo! In his pursuit of the heroes of Dutch science, Bosscha had become a sworn enemy of Galileo. As E. J. Dijksterhuis wrote, Bosscha's statements about Galileo "in general show a tendency to minimize his achievements, which seem hardly compatible with impartiality".[19] Bosscha also did not accept Hans Lipperhey as the inventor of the telescope because he was not Dutch, but German, preferring the Dutchman Sacharias Janssen.[20] Quite in character, he did not approve that young Cornelis de Waard, the expert on the problem of the invention of the telescope, gave both Giambattista Della Porta and Galileo important roles in the development of the instrument, writing,

> It is not inconceivable that you will get some applause, just as eager as superficial, from some Italians […] You do well, when it comes to favors and not the truth, to think that there are better reasons for seeking those of Mr. Bosscha than those of foreigners.[21]

Bosscha chose Simon Marius as his means of undermining Galileo's reputation. In a footnote to the letter from Huygens, cited above, Bosscha, editing this volume of the *Oeuvres Complètes*, wrote of Marius:

> Since his time he has been taken as a plagiarist of Galileo, who on several occasions defended himself against him. According to recent research his error was rather publishing his works in books that were little known or published too late, so that the priority escaped him.[22]

[18] "Programme de la société hollandaise des sciences a Harlem pour l'année 1906", *Archives*, ser. 2, vol. 11 (1906), xxvi.

[19] Dijksterhuis, "Galilei en zijn Strijd", 112.

[20] De Waard to Favaro, 8 September 1906, see Favaro Correspondence at the Thek@Favaro: https://teche.museogalileo.it/favaro/index.php/it/materiale-manoscritto

[21] *Ibid.*, letter no. 6729: De Waard to Favaro, 31 August 1906.

[22] Huygens, *Oeuvres*, II: 404, note 4.

Favaro, a corresponding member of the *Hollandsche Maatschappij der Wetenschappen*, received this volume, and as we will see the footnote did not escape his notice.

What was the research to which Bosscha gestured? He had asked the Leiden astronomer Ernst Frederik van de Sande Bakhuyzen (1849-1918) to check the details of Galileo's argument in *Il Saggiatore*, to compute the longitudes and latitudes of Jupiter's moons in the first reported observation by Galileo in January 1610, and to examine Marius's tables to see if the latter were better than what Galileo had produced by 1614. Bosscha's letter does not survive, but Bakhuyzen's brief report does.[23] It contained calculations of the places of the four Galilean satellites in their orbits and the formations of the satellites as seen from the Earth on five dates between 1 November 1609 and 10 January 1610 (N. S.). For these, Bakhuyzen used tables and information published by Cassini (1693), Lalande (1771) and Delambre (1821). Bakhuyzen did not check how well Marius's tables correlated with the observations of January 1610; indeed, he gave no information about Marius at all. The absence of evidence is no evidence of absence, but Bakhuyzen's results certainly could not be used in Bosscha's campaign.

But Galileo had to be taken off his pedestal, and Bosscha chose the discovery of the satellites of Jupiter as his point of attack.[24] In 1898 he therefore posted a prize question in the *Archives néerlandaises des sciences exactes et naturelles,* the official journal of the *Hollandsche Maatschappij der Wetenschappen*, with a deadline of 1 January 1900:

> A comparative and critical study is requested of the observations relating to the satellites of Jupiter mentioned in the *Nuncius Sidereus* of Galilei and the *Mundus Jovialis* of Simon Marius. We want to determine to what extent the accusation of plagiarism, brought by Galileo against Marius, may be considered well founded. (See Humboldt's *Kosmos*, II, 357).[25]

To suggest that the satellites were merely "mentioned" in the *Sidereus Nuncius* was a startling choice of words. And Bosscha offered no further specifications about what a "comparative and critical study" might entail.

If Bosscha expected many submissions for the prize, he was disappointed. There was only one, and it argued that Galileo was justified in his charge that Marius was a plagiarist. This 235-page essay, was written in a difficult German script by Joseph Klug (1862-1925), *Gymnasialprofessor*, first in Würzburg, and from 1902 at the *Royal Gymnasium* in

[23] Van de Sande Bakhuyzen to Bosscha, 8 August 1891, AHMW, no 455.

[24] This priority dispute has been discussed earlier by North, "The Satellites of Jupiter" and Vanin, "On Simon Mayr's (Marius)".

[25] "Programme de la société hollandaise des sciences a Harlem pour l'année 1898". *Archives*, ser. 2, vol. 2 (1899), 6; De Bruijn, *Inventaris*, no. 1137.

Nuremberg.[26] Klug began by laying out the history of the problem, describing Galileo's discovery of Jupiter's satellites, the publication of the *Sidereus Nuncius*, Marius' publications, Marius's character, and Galileo's accusations of Marius's plagiarism.[27] Klug also reviewed the reactions of astronomers from the seventeenth to the nineteenth century to the controversy. In part II he analyzed Marius's writings: his correspondence, his annual prognostications from 1609 to 1613, and his reliance on information gleaned not only from Galileo's *Sidereus Nuncius*, but possibly also from letters such as Galileo's letter to Prague about the phases of Venus,[28] and the more than hundred predictions of the satellite positions Galileo would publish as an appendix to his third sunspot letter.[29] All this information, Klug argued, formed the basis of Marius's claim in his *Mundus Iovialis*. Marius could have obtained the few observations he discussed in his book from material published by Galileo, Klug stated, but that was of course, not proof, or even evidence, that he had done so. The parallel with the Dreyfus affair, where the argument was that the accused officer could have written the spy report and therefore that he *must* have done so, was actually pointed out in one of referees' report.[30] Since Klug's essay, finally published in 1906, is easily available at the digital Marius Portal we will limit ourselves to this brief description.[31]

How did the *Hollandsche Maatschappij* go about judging Klug's essay? Bosscha studied the manuscript for some time, making negative comments in the margins. In response to the first sentence of the manuscript, "Galilei, der Begründer der wissenschaftlichen und experimentellen Mechanik…". ("Galileo, the founder of scientific and experimental mechanics…."), for instance, Bosscha underlined *Wissenschaftlichen* and commented "not sohe did not understand it at all, because he did not know the law of inertia". In his view, then, Galileo's work was not scientific.

After spending a month with the manuscript, Bosscha sent it out for refereeing, proceeding as follows. The first page was removed, presumably because it contained the author's name. With a cover letter, it was then sent to the first referee, the earlier mentioned Ernst Frederik van de Sande Bakhuyzen, who sent it on, with his report, to the next referee, Jacobus Cornelius Kapteyn (1851-1922) in Groningen, who in turn sent the package, including his second report, to the third referee, Jean Abraham Chrétien Oudemans (1827-1906), director of the Utrecht observatory. Bosscha instructed the referees to read

26 Folkerts, "Klug, Joseph".

27 AHMW, no. 1137. Although the title page of the manuscript is missing because it was removed by Bosscha before the entry was sent out for refereeing, its title was presumably the same as a later published version.

28 Galileo to Giuliano de' Medici, 11 December 1610, in OG, X, 483.

29 OG, V, 241-245.

30 The referee's reports are preserved with Klug's essay in AHMW, no. 1137.

31 www.simon-marius.net. See also Gaab, Leich (eds.), *Simon Marius and his Research*.

Galileo's accusation in *Il Saggiatore* carefully and then "to consult the *Sidereus Nuncius* and the *Mundus Jovialis*, and to decide whether the writer comes to his judgment on objective grounds". He explained:

> The question was posed by me because I had made quite a study of it and expected that someone else would not only do the same, but would also make his results known, something for which I could not find the time. The writer says, in fact, very little that is new. In reading the paper, I have made some remarks in pencil in order to orient myself somewhat in this long piece, and also a few times to vent my impatience, but by no means in every place where this would have been appropriate or where I had comments.[32]

Bosscha thus offered no indication of his true motives. Time was short, and Bosscha wanted his referees to concentrate only on the astronomical core and to skip everything else, no matter how uneasy they might feel about it. He continued:

> The exceptional length of the answer, 235 pages in folio, in German and in German script, makes judging it very difficult, so that it will be burdensome to get it done before the April meeting of the directors. The difficulty is not a little increased by the many details that the writer treats. Strictly speaking, the referees do not have to concern themselves with these. They merely have to read carefully Galileo's accusation in *Saggiatore* […] to consult the *Sidereus Nuncius* and the *Mundus Jovialis*, and to decide whether the writer comes to his judgment on objective grounds. What other have written about these [details] is not relevant, other accusations, suspicions, characterizations even less because they lead to the opposite of what is meant by the question: an *objective weighing* of the judgment of Galileo. The referee will feel himself nevertheless somewhat *unheimisch* when he is urged to leave everything involved in the case and is adduced by the writer unread and unjudged. And so refereeing it becomes a task of endurance, not to mention gathering the supplementary literary material.[33]

The third referee, Oudemans, finished this last review at midnight on 30 April 1900, writing to Bosscha that the "pencil notes in the margins" had been of great help to him, but that he nevertheless also "had himself checked everything".[34] Indeed, all three referees wrote lengthy reports, including many calculations. A few days later, at the annual meeting of the *Hollandsche Maatschappij*, the unanimously negative verdict of Bosscha and the referees was accepted. It was announced as follows in the 1901 issue of the *Archives:*

[32] Bosscha to Van de Sande Bakhuyzen, 5 February 1900, AHMW, no. 1137.
[33] *Ibidem*.
[34] Oudemans to Bosscha, 30 April 1900, AJB, box 23.

> The lengthy essay [...] 235 folio pages, written in German, was submitted successively to Messrs J.A.C. Oudemans in Utrecht, E.F. van de Sande Bakhuyzen in Leiden and J.C. Kapteyn in Groningen. The reports submitted show that the jury members were led to examining the question posed for themselves, which unavoidably meant a great deal of work. The three referees reported the same [conclusion]: Galileo's accusations had no serious grounds. As for the essay, in spite of the zeal demonstrated by the author, a biased judgment as well as incomplete research put him on the wrong track and led him, erroneously, to the contrary conclusion. Therefore, the too superficial investigation of certain points of prime importance was sufficient to disallow the prize award for this essay. According to this unanimous advice of the referees and the motion of the directors, the assembly decided not to award the prize.[35]

Even in this announcement, Bosscha's bias showed through his use of the phrase "led him, erroneously, to the contrary conclusion". Because Bosscha did not notify the essayist of the decision, Klug had to wait until he read it in the *Archives*. Having labored over his essay, he asked Bosscha for its return, but his request was refused, perhaps because the manuscript had been heavily annotated by Bosscha himself. When Klug appealed this decision to the President of the *Hollandsche Maatschappij*, asking that at least the technical parts of his entry be returned, a compromise was reached whereby a clean copy of the entire manuscript would be sent to its author.

In October 1900, Klug sent a copy of his essay to Favaro, with whom he had corresponded earlier. Favaro, who had kept close watch on Dutch views of Marius, published a brief paper in which he challenged the decision of Bosscha and the referees.[36] He began by making two observations. First, the observations of Jupiter's moons in the *Sidereus Nuncius* were something more than "mentioned" in the wording of the prize question, but the word did describe those of Marius's *Mundus Iovialis*. Second, the reference to Humboldt's *Kosmos* in that same question was an invocation of that historian as an authority, but in Marius's case it was not based on an in-depth study.[37] Favaro then referred to Christiaan Huygens's reference to Marius in his letter published in vol. 2 of the *Oeuvres Complètes*, and said it showed that in the seventeenth century Marius was considered the prototype of a plagiarist. And what were those *recherches récentes* referred to in the footnote to this letter? At this point Favaro called Bosscha's bluff: the referees had investigated the prize question themselves, and their results clearly represented entirely new research that should not be lost to the history of science, and should therefore be published:

35 "Programme de la société hollandaise des sciences a Harlem pour l'année 1900". *Archives*, ser. 2, vol. 4 (1901), 2. Note that at the request of Oudemans, the order of refereeing was changed, putting Oudemans last.

36 Favaro, "Galileo Galilei e Simone Mayr", 220-223.

37 *Ibid.*, 220-221.

> [T]he principal motive that induced me to publicly call attention to this argument, in the periodical that is above all devoted to treating questions of this sort, finds its *raison d'être* in the desire, which will certainly be shared by a great number of scholars, to see the publication of a work in which, based on its scope, the question must have been treated in great depth, and to publicly reveal the facts and reasons that induced the distinguished judges to pronounce themselves in a way that many will find entirely opposed to the one which up to now has generally been held. Certainly, no one was guided by preconceptions, just as I myself am not guided by any preconception in expressing such a wish, but only by the objective that is surely common to my illustrious colleagues of the *Hollandsche Maatschappij der Wetenschappen:* the triumph of the truth.[38]

The challenge could not be ignored. But how should it be answered? Could Bosscha simply print the three referees' reports in the *Archives*? He turned to Oudemans for help, and together they wrote a lengthy reply to Favaro, entitled "Galilée et Marius", which Bosscha published, without having it refereed, in the *Archives* in 1903: "Animated by the same desire as Mr. Favaro, to see the truth triumph, we voluntarily answer his summons".[39]

The principal argument for the rejection of the treatise was that it provided absolutely no evidence [*preuves*] of the crime imputed to Marius, and the new studies that, according to Mr. Favaro, had to be conducted to arrive at the judgment required only the ordinary resources of astronomy. Oudemans and Bosscha had to decline the honor of having arrived at an entirely new conclusion, and they cited a number of earlier studies that had come to the same conclusion.

> But the question cannot be decided by the authority of other scholars, however eminent they might be. Further, the question does not deal with the priority of discovery, for given the telescope, this could not escape the first curious observer who directed his instrument toward Jupiter, and it seems to us of little merit. The question posed in the competition is to know if Marius committed a plagiarism and if Galileo had the right to reproach him for it.[40]

Before dealing with that question, Oudemans and Bosscha described the state of astronomy in 1609. In a note about Galileo and the Leaning Tower of Pisa, an experiment that, according to Favaro, dealt a fatal blow to the Peripatetic philosophy, Oudemans and Bosscha – though likely Bosscha alone – wrote: "If that is the significance of the experiment, the Peripatetic philosophy had been overthrown for more than four years. The experi-

[38] *Ibid.*, 223.

[39] Oudemans and Bosscha, "Galilée et Marius", 116. To ensure a wide distribution of the article throughout Europe, 275 extra offprints were made. See: Oudemans to Bosscha, 12 March 1903 (AJB, box 23).

[40] *Ibid.*, 118.

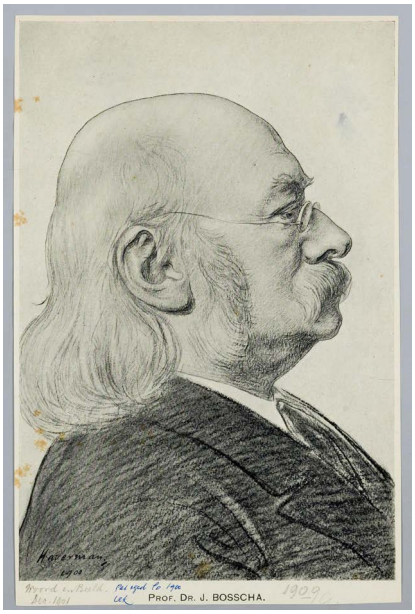

Fig. 1 – Johannes Bosscha (engraving by Hendrik Haverman, 1900, Wikimedia commons).

Fig. 2 – Jean Abraham Chrétien Oudemans in 1884 (Bibliothèque Nationale de France).

ment was described in *Beghinselen des Waterwichts, beschreven door Simon Stevin van Brugge 1586*". And after citing the relevant passage in that work, they continued, "The first works of Simon Stevin are full of facts and demonstrations that were later attributed to Galileo by others or which he attributed to himself".[41] After all, Galileo had numerous correspondents in Belgium! Galileo, then, had not found these results independently but somewhat later; rather, he had actually obtained them from Stevin.[42]

They also discussed the emergence of the telescope. In the rapid spread of this new invention, in 1608-1609, men from Holland, France, and Italy tried to make money from the device of which each claimed to be the inventor: "Among them one regrets finding Galileo".[43] In describing the presentation of a telescope made by Galileo to the Venetian Senate, Oudemans and Bosscha made no mention of the fact that this device, magnifying eight or nine times, was a rather more powerful instrument, than the simple three – or four – powered spyglasses offered for sale by others at the moment. The negative letters in the corre-

41 *Ibid.*, 120, note 1.
42 *Ibid.*
43 *Ibid.*, 125.

spondence of the period were highlighted in their account and a brief analysis of Galileo's explanation of the workings of the telescope in his *Sidereus Nuncius* showed, in their view, that he knew little or nothing about optics. Here Oudemans and Bosscha finally gave the magnifying powers of telescopes made by Galileo. Citing, among other examples, Kepler's *Narratio* of 1610, in which the Imperial astronomer described his first observations of Jupiter's moons through a telescope made by Galileo, even though Jupiter, Mars, Mercury and Sirius appeared square with blue, red and yellow diameters, Oudemans and Bosscha concluded: "It seems to us that with this information the supposed superiority of Galileo's instruments cannot be sustained at all".[44] So much for Galileo; what about Marius?

Oudemans and Bosscha started by citing verbatim the introduction to *Mundus Iovialis*,[45] and ended with the question:

> Can one, in good faith, doubt the sincerity of this account of Simon Marius? Not only everything he says bears […] the mark of very great verisimilitude, but he himself names the highly placed witness by whom one may inform himself about everything he has said.[46]

In their reading, Marius had worked under Tycho Brahe and was familiar with instruments, and when he had an instrument in his hands that increased his visual acuity by a factor of about ten (though Marius does not mention magnification in his *Mundus Iovialis*), he naturally turned it to the heavens and examined the Moon and Jupiter. The latter, approaching opposition, was the brightest object in the night sky. And once that planet was in the field of view, "could the appearance of the three stars arranged in a straight line with Jupiter have escaped him?" [47] This was a reference to first observation described by Marius, made on 8 January 1610 (N.S.), but Oudemans and Bosscha backdated it to before Jupiter reached opposition, which it had on 7 December 1609:

> And how can he who recognizes the merit of an author who first published a discovery be called a plagiarist, when he says he had occasion to make it at the same time or a bit earlier? Does the merit of a discovery depend solely on a date, which almost always, and particularly in this case, depends only on chance? Must Galileo's merit be measured solely by such petty details? If Marius had attached an importance to it capable of diverting him from the path to the truth, why did he recognize that Galileo had preceded him in the discovery of the 4th satellite? Does one believe that in the entourage of Prince Maurice, in September 1608, among elite military officers and engineers, among whom Simon Stevin was conspicuous, no one

44 *Ibid*., 132.
45 See also Prickard, "The 'Mundus Jovialis' of Simon Marius".
46 Oudemans and Bosscha, "Galilée et Marius", 135.
47 *Ibid*.

> thought of observing the Moon with Lipperhey's instrument, and noticed at least as many details as are shown in the large drawings of the *Nuncius* published in March 1610? And if, after the publication of that book, one of [these officers and engineers] had published that he had seen the same 18 months earlier, should he have been called a usurper and plagiarist?[48]

In this tortured account, then, Marius *noticed* three little stars near Jupiter around the planet's opposition and began *observing* them on 8 January 1610. (In the entire month of December, he never noticed the fourth.) And Galileo was credited solely with discovering the fourth. In reality, what gave Galileo's discovery of the moons its true scientific value was, in the first place, the care he took in observing the formations of the satellites at exactly reported dates and times, and then his persistence in studying them long enough to obtain a sufficiently complete description of the new phenomenon. But according to Bosscha, Marius was a "modest worker," one who did not rush to reap the glory or material advantage of the fruit of his labors.[49] This section of the paper ended as follows:

> Because the verdict pronounced by Galileo on the work of Marius has lasted up to our own days with a persistence that is found so often among the errors of the history of science, and especially in the case of Galileo, isn't the *Hollandsche Maatschappij of Wetenschappen* right to ask about the substance of the evidence to which Mr. Favaro refers in his *Chronologia Galilaeana*:
>
> > 1614. Simon Marius published in Nuremberg his *Mundus Jovialis*, with which he tried to usurp from Galileo the discovery of the Medicean planets".[50]

There was nothing objective in this lengthy introduction. Marius was a modest worker, Galileo an opportunist who stole his rival's glory, not to mention his material rewards, and Stevin, and by implication the Netherlands, were the victims. As Cornelis de Waard was to say when Bosscha was preparing another installment in this controversy, "I hope that [Bosscha] will use evidence in his next study and not ordinary *coups d'authorité*".[51]

The next section of Oudemans and Bosscha's article dealt with Galileo's accusation. The *Sidereus Nuncius* was briefly praised for its arguments for the Copernican theory, although in a footnote they explained that Simon Stevin had openly declared his Copernicanism much earlier, and that the intellectual climate in the Dutch Republic was at this particular time receptive to heliocentrism. They gave figures for the orbital times published by Galileo in his *Discorso*. They also singled out deviations from a straight line in several observations "mentioned" by Galileo in the *Sidereus,* and concluded that in 1610

48 *Ibid*. See also Prickard, "The 'Mundus Jovialis' of Simon Marius", 371.
49 Oudemans and Bosscha, "Galilée et Marius", 136.
50 *Ibid*.
51 De Waard to Favaro, 15 November 1906, Favaro Correspondence.

he was not particularly interested in latitudinal deviations, giving as a possible explanation an atmosphere around Jupiter. When *Mundus Iovialis* appeared, the title alone must have displeased Galileo: the author's name reminded him of the unpleasant episode with Baldassare Capra in 1607. But what really irked Galileo, according to Oudemans and Bosscha, were the words *ope perspicilli Belgici*, "by means of the *Dutch* telescope", which undercut the title words of the *Sidereus, perspicilli nuper a se reperti beneficio*, or "with the help of a spyglass recently invented [or made] by him".[52]

Whereas Marius had been candid about the source of his telescope, they argued, Galileo had tried to claim the invention for himself. Here, Galileo's initial reaction in 1614 is given an interesting twist. Although advised by the Lincei to write to Kepler, Galileo had apparently not done so. Yet, Oudemans and Bosscha concluded that the fact that Kepler's reply (!) was never published showed that Kepler had taken Marius's side.[53] Here the lack of evidence is twisted into evidence of dishonesty. At least one reader of the article took this point as a proven fact: Kepler's letter was willfully destroyed.[54]

After giving the background to *Il Saggiatore* and citing Galileo's charge against Marius in full, Oudemans and Bosscha started by removing the accusations that were manifestly false: Marius had nothing to do with Capra's plagiarism; Marius did not hide the fact that his dates were Julian, and Marius's error on latitudes were explained by the fact that he "had come to recognize this phenomenon very late" (*tarde admodum in cognitionem hujus pheanomeni veni.*) All this came from the referee's reports cited above. Galileo's charge that Marius could not have been observing the satellites before 1612 was countered as follows:

> To pretend that before having found his law of the variations in latitude Marius did not see the satellites is a ridiculous assertion, one which could lead to the conclusion that Galileo himself, who had never formulated any rule before Marius's publication, had himself not observed the satellites before Marius. In our view, extending that reasoning to the conclusion that in writing his publication Marius had not even seen the satellites constitutes a gross insult. One would have to admit that Marius had lied in saying that he had observed Jupiter with a telescope. [147-148] And Galileo had himself written in 1611 that Jupiter's satellites could be verified not only by telescopes made by him, but also by instruments made anywhere by any craftsman, provided they were well wrought and of sufficient magnification.[55]

[52] Oudemans and Bosscha, "Galilée et Marius", 139.
[53] *Ibid.*, 140.
[54] Lynn, "Galileo and Marius", 63.
[55] Galileo to Piero Dini, 21 May 1611, in OG, XI, 106-107. The context here was that of verifying Galileo's discoveries, which had been denied by many up to the testimony of the mathematicians of the *Collegio Romano* to Cardinal Bellarmine, 21 April 1611.

Was this also the case a year earlier, when no one was able to verify Galileo's discoveries announced in *Sidereus Nuncius*? The two volumes containing Galileo's correspondence for the period 1610-1612, volumes 10 and 11 of the *Opere*, in which the problem of verification of his discoveries during 1610 and 1611 were discussed at length, were published in 1900 and 1901, respectively, so Oudemans and Bosscha should have known that between March 1610 and May 1611 (the reference in the citation above), the art of making good telescopes underwent enormous improvement. Using Galileo's statement of May 1611 to argue that telescopes made in any place with a skilled and willing craftsman could have shown Jupiter's satellites in January 1610, or even in December 1609, leaves the reader wondering. If Favaro clearly stood on the side of Galileo, Oudemans and Bosscha adopted the opposite stance. As far as Galileo's accusation, based on the latitudes of the satellites, that Marius had not observed these bodies before 1612, it was once again countered by citing Marius's statement "I came to know this phenomena very late".[56]

The more technical part of the paper, supplied by Oudemans, dealt with the respective theories of the inclinations of the planes of the moons and concluded that Galileo did not arrive at his theory that the orbital planes were parallel to the ecliptic until 1623.[57] Oudemans then showed that Marius's tables were reasonably good for that time and that his ideas about latitude were fine for the period of his observations (1610-1613), provided that one bore in mind that Marius came to considering latitudes late in the game, and that these early observations were made without wire micrometers, which were adopted only in the 1660s.

Taking a small detour, Oudemans and Bosscha pointed out that Marius had found a way to resolve the fixed stars into discs, presumably by stopping down the aperture of his telescope drastically, and that he had expressed surprise that with his excellent telescopes Galileo had not observed this phenomenon. Since they knew that even the telescopes available in 1903 could not resolve the stars into discs, they concluded, "It was thus Marius who discovered the spurious disc and by this proved not only that he was a good observer, but also that he had at his disposal a telescope better than the one used by Galileo".[58] Again Galileo's correct inability to resolve stars into discs was evidence of his shortcomings. while Marius's erroneous observation added to his credit.

Beaten down by the Galilean juggernaut, they related, Marius did not have a happy life: "After the publication [of *Mundus Iovialis*], when he was long-suffering, nothing further of his appeared on this subject; he died on 26 December 1624, a little more than a year after

[56] Oudemans and Bosscha, "Galilée et Marius", 147, note 1.

[57] *Ibid.*, 149. In March 1903 Oudemans wrote to Bosscha that he preferred that in their joint article would be stated "that the astronomical part was edited by me and the historical part by you". He also expressed as his whish not to be responsible for "everything you [Bosscha] have written", AJB, box 23.

[58] *Ibid.*, 165.

learning of Galileo's cruel aggression".[59]

Oudemans' and Bosscha's paper included a number of appendices. Oudemans "verified" the accuracy of Marius's tables; Bosscha calculated the field of view of the Dutch or Galilean telescope, arriving at a figure roughly half the 15 arcminutes currently accepted, and presented a French translation of the added text of the second edition of *Mundus Iovialis,* along with somewhat more accurate values of the orbital periods of the satellites. Oudemans calculated that for the latitude deviations from a straight line during the period of Marius's observations, one could simply look at precise observations made from 1857 to 1859, when these were closely repeated, and finally he showed *using Marius's tables* that a recent claim[60] that Galileo had observed an eclipse of Europa on 12 January 1610 was in error, and that Marius was correct in saying that Galileo's first observations were not very accurate.

This was not the end of the story for Bosscha. When Klug's improved prize submission, "Simon Marius aus Gunzenhausen und Galileo Galilei", appeared in the *Abhandlungen* of the *Königlich Bayrische Akademie der Wissenschaften* at the end of 1904,[61] Bosscha felt that he had to take up the cudgels for Marius again, because Klug's essay had caused at least one important critic in Germany to change his mind, and to decide that Galileo had been correct in his accusations.[62] Again, he chose Oudemans as his co-author, but this time his colleague was somewhat more critical of Bosscha's pronouncements. In several of his letters Oudemans told Bosscha that he did not want a certain phrase or argument to appear under his name.[63] But after Oudemans' death, in December 1906, Bosscha could write as he pleased.[64] The result appeared in two parts in the *Archives* the following year

[59] *Ibid.*, 154-155. The date is Julian, and one would expect a note to that effect.

[60] Houzeau, *Vade-Mecum de l'Astronome*, 665.

[61] Klug, "Simon Marius". According to the index of the *Abhandlungen*, Klug's essay was already published in 1904, which is confirmed by the copy in the British Museum, bearing the stamp "3 Jan. 1905". However, the printed text reached Bosscha and Oudemans only in September 1905. See AJB, box 23: Oudemans to Bosscha, 24 September 1905, in which letter Oudemans noted as his first response: "It can be seen from everything that this Klug is not an astronomer, and yet he wants to speak the highest word on an astronomical subject. He is nothing more than a stupid and, in his struggle, false dilettante". On 4 October 1905, he was a lot more nuanced: "reading further [in Klug] I find things which, if true, compromise Marius quite a bit".

[62] Gerland, Review, 840-841: "So [Klug's] work could […] banish Marius's claims to the discovery of Jupiter's satellites from science forever". See also Bosscha, "Simon Marius. Réhabilitation d'un astronome calomnié", 260-261.

[63] Oudemans to Bosscha, 10 March 1903 and 11 January 1906, AJB, box 23.

[64] After Oudemans' death, Bosscha asked the Utrecht astronomer Albertus Antonie Nijland (1868-1936) to take over Oudemans' role, but although Nijland agreed, no collaboration happened. Nijland to Bosscha, 1 August 1907, AJB, box 23.

with the title "Simon Marius. Réhabilitation d'un astronome calumnié".[65] After once again painting Marius as a victim, Bosscha busied himself with calculations and comments regarding Galileo's particular ability as an observer and as a scholar in general. For instance, he adduced Galileo's *Jovilabe* as evidence of his sloth, in contrast to Marius's diligence. At the end of the first installment, Bosscha told the reader that he was dividing this work into seven chapters, all technical, except for the final two: Kepler's relations with Marius and the two cases of Galileo and Capra! At the age of 76, Bosscha was not about to give up his assault on Galileo. But only one of the chapters appeared. In 1909 Bosscha stepped down as Secretary of the *Hollandsche Maatschappij*, and died two years later. His efforts have certainly had an impact on the reputation of Marius. The 400th anniversary of the appearance of *Mundus Iovialis* was celebrated in style at a number of events held in the Franconian area of Germany, Marius's home turf. Bosscha's attacks on Galileo have led to nothing. Even if, in retrospect, there was no need for a vigorous defense. Favaro met every one of attacks with reasoned arguments, and, even supplied Bosscha with new information. But in the constant reassessment of Galileo by historians since 1907, the name Bosscha appears nowhere. Upon Bosscha's death in 1909, Cornelis de Waard asked Favaro whether he had heard the news, and characterized Bosscha as "the man who loved Marius too much".[66] Perhaps it would have been more appropriate to call him the man who hated Galileo too much.

[65] Bosscha, "Réhabilitation d'un astronome calomnié".

[66] De Waard to Favaro 16 June 1911, Favaro Correspondence.

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Abbreviations

AHMW = Noord-Hollands Archief, Haarlem: archive of the *Hollandsche Maatschappij der Wetenschappen*.

AJB = Noord-Hollands Archief, Haarlem: personal archive of Johannes Bosscha.

Archives = *Archives néerlandaises des sciences exactes et naturelles* (Haarlem), [several years].

JKGW = *Johannes Kepler Gesammelte Werke*. Edited by Max Caspar, Walther von Dyck et al. Munich: 1938-2017.

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– STUDIES –

From chemical atomism to Lutheran orthodoxy: The journey of Johann Sperling's physics from Wittenberg to the peripheries

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Abstract
As a disciple of Daniel Sennert and an influential professor of medicine at the university of Wittenberg, Johann Sperling embraced his master's compromise between atomism and peripatetic natural philosophy. This paper discusses the reception of his textbook entitled *Synopsis physica* (1640), by exploring a student's notebook (1644-1645) composed at the Lutheran school of Eperjes (Prešov) in the Kingdom of Hungary. Studying this adaptation of Sperling's textbook can help us understand the emerging need to train ministers and theologians locally, as Western universities became less accessible to Eastern protestants due to the Thirty Years War. In addition to being the first text professing chemical atomism in the Kingdom of Hungary, the manuscript employs natural philosophy and physics as guidelines to discuss scriptural and natural theology as well as religious anthropology. I will argue that both its atomism and its theological inquiry do justice to the capacity of intellectual peripheries to pragmatically handle the knowledge produced in intellectual centres.

Keywords
atomism, chemical principles, religious anthropology, natural theology, physics, notebooks

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Introduction: Physics on the frontier of Europe

In early modern studies, intellectual history traditionally focuses on the works of influential scholars, which implies overwhelming attention paid to printed materials, while manuscripts produced by students during their schooling are rather neglected documents. In fact, they deserve more attention because students' notebooks, lecture notes, and *dictata* were the most common vehicles of knowledge transfer from academic centres to peripherical institutions. Examining them might reveal how knowledge acquired in education was transformed and adapted to local needs. It may also enable us to measure how and in what sense university education was useful to those who, instead of pursuing an intellectual career at a European scale or participating in the Republic of Letters, returned to their homes and became schoolmasters or ministers in smaller communities.[1]

I intend to discuss this local adaptation on the example of a manuscript conserved at the College Library of the Transtibiscan Reformed Church District in Debrecen.[2] It contains annotations on natural philosophy, metaphysics, ethics, and dialectic. These subject matters are distributed into six parts: a physics textbook with a lost titlepage (ff. 13-134); a "Brevis ac Synoptica Metaphysicae Delineatio" (ff. 135-186); a "Brevis Ethicae Christianae Delineatio" (ff. 187-235); "Canones selectiores ex Christophori Scheibleri Topica excerpii" (ff. 236-239), an excerpt from the logic of Christoph Scheibler, a professor at the university of Giessen; an "Ethica Wendleri" (ff. 240-244), excerpts from Michael Wendler, a Wittenberg professor, and a "Theoria Transcendentalis Primae Phylosophiae Seu Metaphysicae" (ff. 245-254). In this paper, I will focus on the textbook of physics. In the past, this section drew the attention of István Jakucs, a historian of science and a teacher of physics of the Reformed High School of Debrecen. He stated that the text was authored in 1644-1645 at the protestant school of Eperjes (Prešov) by Samuel Dürner, and as the main source of the manuscript section, he identified the *Synopsis physica* of Johann Sperling, a renowned professor of medicine and physics at the university of Wittenberg. Jakucs's articles on the topic remained unpublished in the collection of the College Library, but they were quoted by Jolán M. Zemplén, a historian of early modern physics in Hungary. They both shared a reserved opinion about the value of this textbook, and they were both puzzled by their perception that the manuscript handled physics as a handmaid of theology.[3] As such, the work was a dead end for them rather than a step towards the

1 On the methodology to discuss students as agents of knowledge transfer in the early modern period, see Lepri, "The Bees' Honey".

2 CL, Ms. R 302.

3 The first mention of the manuscript by Jakucs, where he was still unable to identify the author: CL, Ms. R 3089 (I), 3-4. Jakucs identified the author as Samuel Dürner and the main source as Sperling in his next work: CL, R 3099, 3-4. Jakucs's unpublished results were used to describe the manuscript by M. Zemplén, *A magyarországi fizika…* , 179-180; M. Zemplén, *A felvidéki*

further development of natural philosophy into modern experimental physics. In this regard, their interpretation remained ahistorical and teleologically focused on the values of modern materialist sciences.

A revaluation of the work is in order, all the more because it anticipates meaningful intellectual aspirations that can be observed in the history of the Eperjes school in the second half of the seventeenth century, and through which the school joined debates on recent scientific development on an international level. As one of the wealthiest cities of Upper Hungary, Eperjes became a centre of Lutheran reformation very early. The school of the town was transformed into a humanist institution, as its leadership adapted the pedagogical principles of Leonhard Stöckel (1510-1560), the reformer in the nearby town of Bártfa (Bardejov) and a former disciple of the English itinerant humanist Leonard Cox and Melanchthon. To implement these changes, they appointed Zsigmond Torda of Gyalu, a Neo-Latin poet, to be the rector of the school in 1550. The same office continued to be occupied by eminent Protestant intellectuals, such as Severin Sculteti (?-1600), who later became the deacon of the five royal free cities, and Johannes Bocatius (1569-1621), a renowned Neo-Latin poet originating from Lausitz, who left this position to lead the school of Kassa (Košice), where he was elected judge of the city as well.[4] By the mid-seventeenth century, the famous college hired teachers from abroad, including Ernest Hilarius Birner from the Palatinate, who was appointed co-rector of the school. In 1640, he directed the institution with Samuel Dürner, a Hungarian German born in the nearby Kisszeben (Sabinov). When Birner left in 1641 to direct the school of Besztercebánya (Banská Bystrica), Dürner stayed alone at the head of the institution as rector. He led the school during a difficult period aggravated by the endgame of the Thirty Years War, when for students, traveling to Western universities became difficult. The city was ravaged by plague, and it was occupied by the army of George I Rákóczi, Prince of Transylvania. The Peace of Linz in 1645 guaranteeing religious freedom for the Protestants of the kingdom put an end to this turmoil, though they realized that they had to be more cautious about their future. Dürner therefore set out to improve the quality of the local education. In advanced classes, his pupils were thus taught philosophy and theology as well.[5]

Dürner's initiatives culminated after his death in a project to transform the school into an academy providing an education equivalent to the level of a university. The plan elaborated by rector Johannes Bayer (1630-1674) was declined by Leopold I, but the Lutheran nobles and burghers of the kingdom raised sufficient funds to construct a new building which was inaugurated in October 1667 as a gymnasium. Despite this refusal to grant a superior official status, the school continued to lecture future ministers in philosophy

fizika… , 103-104; see also: Jakucs and M. Zemplén, "Debrecen és a magyarországi fizika…".

4 Hörk, *Az eperjesi ev. ker. collegium…* , B/32-46; Gömöry, *Az eperjesi ev. kollégium…* , 9-10.

5 Hörk, *Az eperjesi ev. ker. collegium…* , B/58-62; Gömöry, *Az eperjesi ev. kollégium…* , 11-17.

and theology. But after 1671, the Protestants of Hungary lost the trust of the monarch and many of their intellectuals fell victim to a long period of persecution. Until 1750, the school could only reopen for short periods.[6]

Natural philosophy was a field where the instructors of the school displayed a strong inclination towards scientific novelties. The aforementioned Johannes Bayer, the initiator of the development of the gymnasium, returned from his studies in Wittenberg with considerable intellectual baggage. He criticised Aristotelian physics and published two treatises in favour of the novel scientific methodology of Francis Bacon (*Ostium vel atrium naturae*, 1662; *Filum labyrinthi*, 1663).[7] His colleague and fellow student in Wittenberg, Isaacus Zabanius (1632-1707) occupied his cathedra in Eperjes after becoming well-versed in another current topic of natural philosophy, namely corpuscular theory. In 1667, Zabanius published a treatise discussing 24 arguments for the existence of atoms in Wittenberg (*Existentia atomorum*). One can assume that he represented this new theory with vigour or even with arrogance in Eperjes, as he engaged in harsh debates with his Aristotelian fellows and the local Jesuits, which was probably the cause of his discharge together with the culminating anti-Protestant persecutions of the 1670s. Having left the town, he was appointed teacher and minister in Nagyszeben (Sibiu).[8]

In the following pages, I will argue that Dürner's textbook of physics must be interpreted in the historical context which I have described above. This context has two main components: first, the relevance of scientific debates over recent issues at Protestant universities; second, the increased importance of teaching a versatile set of knowledge locally, or in other words, training *domi docti*, in order to ensure the continuity of Protestant intelligentsia during a difficult historical period which offered reduced mobility for recruitment.

Sperling's textbook and the Eperjes manuscript as commonplace-books

Born on the 29th of June 1614, Samuel Dürner commenced his studies in Nagysáros (Veľký Šariš), Sárospatak (later known as a famous stronghold of puritan Calvinism), Lőcse (Levoča), and Eperjes. To participate in higher education, he started a journey abroad sponsored by the city of Eperjes in 1635, studying at the gymnasium of Toruń and

6 Hörk, *Az eperjesi ev. ker. collegium…*, C/1-41; Gömöry, *Az eperjesi ev. kollégium…*, 17-31; Bán, "A magyarországi felsőoktatás…", 280; Mészáros, *Az iskolaügy története…*, 366-368, 571-573.

7 Berg, *Angol hatások…*, 134-146; Felber, *Ján Bayer*; Tschižewskij, "Johannes Bayer…"; M. Zemplén, *A magyarországi fizika…*, 263-275; M. Zemplén, *A felvidéki fizika …*, 114-125.

8 M. Zemplén, *A magyarországi fizika…*, 259-263; M. Zemplén, *A felvidéki fizika…*, 110-114. The following paper criticizes Zemplén's discussion of Zabanius's atomism as a forerunner of modern materialism for missing the historical context; the present essay joins this view: Guba, "Isaacus Zabanius' *Existentia Atomorum*".

at the university of Königsberg.[9] After his return, he pursued the typical career of a protestant intellectual. First, he was commissioned to lead the school of Eperjes, then he was appointed secondary minister (*pastor secundus*) of the German Lutheran community of the town. Shortly after rising to the rank of primary pastor in 1652, he died. As an educator, he presided over several disputations, two of which have survived in print. The first discussed the benign influence of angels over the ecclesial, public, and private life of humans as well as diabolical temptations.[10] The other one dealt with a topic more rooted in natural physics, yet it tied physics with religious concerns: in 1641 and in 1643, the organ of the German temple was struck by lightning. In the text, the physical explanation of the events goes hand in hand with a theological interpretation, which is concluded by a meditation on how to avoid thunderstrikes: instead of illicit magic, the true remedy is Christian life.[11] As we shall see, Dürner employed here the same method that he used in the classroom to enrich Sperling's physics with additional theological applications.

Sperling made a profound impact on the education of natural philosophy in Eperjes. The classroom use of his *Synopsis physica* persisted at the school even after Dürner's death. His openly atomist successor, Zabanius, who was a disciple of Sperling in Wittenberg and defended his disputation under his supervision, was recorded to have taught physics from the textbook in 1667.[12] This constant influence was not a phenomenon specific to intellectuals in the Hungarian Kingdom. In fact, Johann Sperling's textbook was widely used and commented on in Lutheran Central Europe. In Wittenberg, where he served several times as dean of the faculty of letters and as rector of the university, Sperling was a renowned zoologist as well, but today's history of science knows him better as a disciple of and a successor to Daniel Sennert (1572-1637), an atomist and a pioneer of early experimental chemistry. The *Synopsis* was probably his most successful work.[13]

9 Only the date of his enrolment at Königsberg (27th of May, 1636) is registered in documents: Szögi, *Magyarországi diákok…*, 143 (no 1203). About his enrolment in Toruń, the only extant proof is in his biography published on the occasion of his funeral by his auxiliary minister, Johann Sartorius, who also studied in Toruń and in Königsberg: Sartorius, *Letzter Ehren-Dienst*, f. D1r. See in the following bibliography: RMNy, no 2476.

10 Dürner, *Exercitium scholasticum adumbrans sanctorum angelorum beneficia…* (RMNy 1935.) Defended by Johannes Ketzer.

11 Dürner, *Exercitium scholasticum, considerans fulmen Eperiense memorabile…* (RMNy 2004.) Defended by Samuel Atilis.

12 Molnár, *A közoktatás története Magyarországon…*, 338. His disputation presided: Sperling, *Exercitatio physica de intellectu*. The print is not listed in VD17. Its copy in National Széchényi Library, Budapest (from here on NSzL): RMK III 2048.

13 Sperling, *Synopsis physica*; see Kathe, *Die Wittenberger Philosophische Fakultät*, 236-237; Koch, "Die Wittenberger Medizinische Fakultät (1502-1652)". For a bibliography on Wittenberg atomism, see the next chapter.

From 1640 to 1688, library catalogues list 16 editions of the textbook.[14] Its popularity was presumably due to its simple and clear outline designed to present a both basic and comprehensive overview of the entire Aristotelian body of natural philosophy. In addition, it was written in an easy Latin and in a typographically well-structured, catechetic form, where every unit was discussed according to the same formula: definitions of primary notions (*praecepta*) followed by questions and axioms derived from the prior arguments. The textbook divides physics into a general and a particular part. The first deals with general principles of physics, such as the four causes, chance, accidents and fate, the affections of bodies (quantity, quality, magic [*sic!*], place, time, and movement), whereas the second part discusses the particularities of natural bodies, including celestial bodies, elements, meteors, the generation and the corruption of things, minerals, stones, and metals, as well as animated bodies, such as plants, animals, and humans.

Proof of its popularity is found in the numerous editions that were extensively studied by seventeenth-century pupils. The library of the Hungarian students' association of Wittenberg – known also as the Hungarian *coetus* in literature – which was founded by Georg Michaelis Cassai (1640-1725), a professor of Hungarian origin, who permanently settled in Wittenberg, has preserved, in addition to works of Hungarian authors and the disputations of Hungarian students, three examples of Sperling's work, respectively the edition of 1668, 1673, and 1678. They are all annotated by different hands.[15] Marginal notes, underlining, and other handwritten additions are present in abundant numbers in other copies as well. Some of them presumably helped students memorize the text and imprint its message, including keywords and prompt summaries of affirmative or negative

[14] 1640 (VD17 23:641246V); 1645 (VD17 14:643890Y; a different variant from the same year: VD17 1:091022U); 1649 (VD17 12:636734U); 1652 (VD17 29:736238Z); 1656 (VD17 39:114235Y); 1658 (VD17 39:114257B); 1661 (VD17 1:087492K); 1668 (VD17 3:013852Q); 1671 (VD17 3:670584C); 1673 (VD17 3:605066B); 1678 (VD17 3:013953C); 1683 (VD17 14:636959F); 1684 (VD17 15:727300A; a variant: VD17 1:068662Y); 1688 (VD17 23:706014L).

[15] The collection is kept today in the Universitäts- und Landesbibliothek Sachsen-Anhalt of Halle (from here on: UL Halle): Ung II 211 (3) (Sammelband, edition of 1668); Ung V 89 (1673); Ung V 105 (1) (Sammelband, edition of 1678). About the Hungarian library, see Fitz, "Georg Michaelis Cassai und seine Bibliothek"; Bucsay, *Régi magyar könyvek…*, 19-26; Pálfy, *Bibliographische Seltenheiten…*; G. Klement, "Külföldön tanuló magyarországi diákok olvasmányai…"; Gábor, "Die Bibliothek der in Wittenberg studierenden Ungarn…". The catalogue of the Hungarian library of Wittenberg was established in 1755. Its modern edition lists printed disputations presided by Sperling: Gábor and Trojahn, eds., *Bibliotheca Nationis Hungariae*, no. 590, 603, 609, 614, 621. In addition to the printed editions, a handwritten copy dated to the 1650s of the *Synopsis physica* is registered amongst the manuscripts of Cassai's collection: Pálfy, *Katalog der Handschriftensammlung…*, 67-68 (no. 15, ff. 1-91).

answers to close-ended questions examined by the author.[16] Others, perhaps dictated by a professor, correct banal errors,[17] whereas of course, many of them carry additional information or polemical remarks, including a most interesting annotation from a copy of the first edition: judged by their movement, location, and size, the handwritten entry claims that comets are not meteors (i.e., sublunar phenomena), which was at odds with traditional peripatetic meteorology .[18] These entries testify to the cumulative potential of knowledge facilitated by the schematic outlines of the textbook. A book entry which can be found in a copy from the library of the Hungarian students' association casts an interesting light on the way the textbook was processed: it reveals that Sperling's book was completed with Kirchmayer's series of disputations when professors discussed physics at the university.[19] Natural philosophy was taught by several members of the Kirchmayer family in Wittenberg, who presided over numerous disputations in physics,[20] but the author of the entry certainly alluded to Georg Kaspar Kirchmayer (1635-1700), the disciple of Sperling who posthumously published his zoological work, and who supervised countless physical dissertations on various topics, including natural curiosities and monsters, which were already cherished subjects in Sperling's teaching according to his book.[21]

16 Forschungsbibliothek Gotha, Math 8° 00617/11 (01) (1656), 20: "An formae inducantur?" ("Do forms get introduced [to the things by some superior power, such as stars]?") – on the margin, the response is resumed as follows: "non inducantur" ("No, they do not"); UL Halle: Ung II 211 (3) (1668), 66: "At omne corpus naturale habeat motum?" ("Does every natural body have movement?") – on the margin: "Neg." ("No.").

17 While describing the four temperaments or complexions – sanguine, melancholic, phlegmatic, choleric –, the book commits an obvious error: "Sanguineum calidum et humidum est. Cholericum calidum et humidum". ("Sanguine is warm and humid. Choleric is warm and humid"). The annotator using one of the copies of the Hungarian students' library (1668 edition) corrected the description of choleric to "calidum and siccum" ("warm and dry") (UL Halle, Ung II 211 [3], 198). The error persists even in later editions, and an owner of the edition from 1673, also preserved in the Hungarian collection, had to make the exact same correction (UL Halle, Ung V 89, 198).

18 Dresden, Sächsische Landesbibliothek – Staats- und Universitätsbibliothek, Hist. nat. A. 1282.y, misc.1, on the back endpaper: "Cometa non est meteora".

19 UL Halle, Ung V 89 (edition of 1673), inside of the front cover: "Collegium Physicum a Kirchmajeri physicae Sperlingianae explicandae inservire poterit. Id enim in hunc adornatum et prelectum fuit Wittebergae". ("Kirchmaier's collegium in physics could be useful for the explanation of Sperling's physics. This was ornated and taught with that in Wittenberg").

20 See Theodor Kirchmayer, *Schediasma physicum De viribus mirandis toni consoni publice ventilandum*; Kirchmayer, *Διάσκεψις physica, qua vanitas pulveris sympathetici, ut vulgo vocant, ostenditur*, etc.; and Sebastian Kirchmayer, *Quaestionum physicarum in Cap. de monstris nobiliorum*; Kirchmayer, *Dissertatio physica de aestu maris*; Kirchmayer, *Dissertatio physica de formis accidentariis et partialibus*; etc.

21 Sperling's zooloy with Georg Kaspar Kirchmayer's disputations as appendix: Sperling, *Zoologia physica posthuma*. Some of Georg Kaspar Kirchmayer's other disputations: Kirchmayer, *De ven-*

The tension between this wide range of curious topics betraying an interest in the marvels of nature on the one hand and the extreme conciseness and the axiomatic character of Sperling's textbook on the other called for an edition enriched with scholia. This was accomplished by the polymath and publicist Daniel Hartnack (1642-1708), who worked as a teacher at several Lutheran schools and as rector at Bremen, Altona, and Schleswig. His *Admiranda physica*, published in 1683, is built on the skeleton of Sperling's textbook, but he expanded the two hundred pages of the original work to 669.[22] In his commentaries, he abundantly cites the most renowned encyclopaedic works from both the ancients (Pliny) and the moderns (Theodor Zwinger's *Theatrum*, Scaliger's *Exercitationes*, Ulisse Aldrovandi's zoological works, Jean Bodin's *Universae theatrum naturae*, and Bartholomäus Keckermann's *Systema physicum*).[23] Hartnack's sources reveal an interest in a multiconfessional community of knowledge, including eminent representants of Jesuit scholarship, such as commentators of peripatetic philosophy, like Toletus, Melchior Cornaeus, and the complete Coimbra courses, or Athanasius Kircher, the famous scrutator of natural curiosities.[24] However, when it comes to theological nuances, he turns to the authorities of Lutheran orthodoxy, like Leonhard Hutter and Balthasar Meisner.[25] Like Sperling himself, Hartnack is not prevented by the Aristotelian framework of the book from discussing the scientific novelties of his century. The list of names is equally impressive: Kepler, Tycho Brahe, Galilei, Gassendi, Descartes, Henricus Regius, Marin Mersenne, and Torricelli.[26] But Hartnack's eclecticism in fact reaches its peak when he cites the Paracelsian and Rosicrucian Robert Fludd.[27] It seems that for Hartnack, Sperling's *Synopsis* worked as a commonplace book offering structure and keywords to gather facts and scientific opinions from his various readings. This method, as Ann Blair has convincingly demonstrated, was crucial in early modern natural history in accumulating information and juxtaposing concurring views in an encyclopaedic way.[28]

In Eperjes, Dürner handled Sperling's book in the same spirit when he dictated his own teaching on physics. The course finished in the first quarter of 1645, and we can only

torum caussis atque originibus; Kirchmayer, *Ex physicis disputationem publicam, de fulmine*; etc.; this one was defended by a German student from Hungary: Kirchmayer, *Ex physicis disputationem publicam, de nive*.

22 Hartnack, *Admiranda physica*. There is another surviving edition from 1684 (VD17 1:068662Y). About the author as an antecedent of modern journalism who disseminated political news as well as scientific novelties, see Weber, "Daniel Hartnack".

23 For example, Hartnack, *Admiranda physica*, 21, 24, 27, 29, 39, 74-75, 116, 317, etc.

24 *Ibid*., 18, 26, 27, 151, 167, 187, 258, 270, 344, 403, 412.

25 *Ibid*., 179, 181, etc.

26 *Ibid*., 125, 151, 198-201, 243, 309.

27 *Ibid*., 304, 309, 314.

28 Blair, "Humanist Methods in Natural Philosophy"; on notetaking used in natural history by Gesner and Aldrovandi, see Blair, *Too Much to Know*, 21, 62-63, 96-97, 212.

conjecture that the anonymous student who recorded it in the notebook was perhaps also the one who took the notebook to Debrecen where it is currently held.[29] Dürner preserved the division into general and particular physics as well as the majority of the subdivisions. The inner organization of the chapters is also similar to that of Sperling's book, with the difference that some units contain a division (*divisio*) in addition to the main definition, and axioms (*axiomata*) are sometimes called *canones*. Here, the questions are called *problemata* or *theologicae applicationes*, and they always conclude the chapters as they receive much more emphasis in Dürner's work than in Sperling's. Dürner dictated the final text to his pupil, but he wanted the notebook to remain open for further additions as the student used broad margins and left blank every second page until he abandoned this method at page 155. But even so, he used the empty spaces throughout to reflect on the main text,[30] to add problems to discuss,[31] and to comment on the scientific controversies of the time.[32] Dürner, whose guidance formed this notebook, realised precisely that Sperling's work was designed to structure further entries as a commonplace-book. Accordingly, Dürner not only determined the visual appearance of the dictated text so it could fulfil this function, but also shaped the content of the original textbook on the ground that he realized its flexibility and openness.

Atomism and chemistry in Sperling's work and reception

The atomism of Democritus as revived by Gassendi in the first half of the seventeenth century is traditionally regarded as an important step towards modern materialism and an autonomous concept of nature obeying the laws of mechanics instead of transcendent influences.[33] However, recent scholarship has demonstrated that far from being a homogeneous theory, early modern atomism had multiple facets; its origin is not necessarily to be sought in Democritus, and its history is not perfectly continuous with his exact doc-

[29] CL, Ms. R 302, 293, on the margin: "Finem imposui Eperiessi in A[nn]o 1645 sub ferula […] D. N. D. M. […] Samuel Dürneri". On the 31st of March of the same year, the student finished the textbook about ethics (187r). The notes on physics are concluded with a table of contents which was signed by "Andr. Tap." The initials "A. F." can be read on the same page as well (294). The student's first name was presumably Andreas.

[30] *Ibid.*, 142: here, the student added a reflection about the credibility of the assertion that the term *elementum* is related to *alimentum*.

[31] *Ibid.*, 108: An additional philosophical problem was inserted into the blank page in relation to theology: "An mundus sit creatus?" ("Whether the world is created?")

[32] For instance, there is a long marginal note about gold-making and gems: *ibid.*, 213-215.

[33] A classical work of science history claiming that Democritian-Epicurian atomism anticipated modern science in that it emancipated nature from the ethical, religious, and philosophical aspects of human life, and it freed nature from transcendent determinism by introducing the notion of randomness derived from the coagulation of atoms: Lenoble, *Histoire de l'idée de nature*, 89-135.

trines.[34] In fact, early modern physicists inherited form Antiquity at least three different concepts which they could interpret as some sort of corpuscles. Beyond the atom, one of them was Aristotle's teaching on *minima* (and its complementary concept of *maxima*): according to the philosopher, every substance has its specific minimum (and maximum) size, below (and above) which it cannot subsist in a stable form. This axiom did not contradict the teaching that matter was continuous, and natural bodies could be divided *ad infinitum*. Yet, some early modern scholars, especially Julius Caesar Scaliger and Sébastien Basson, advanced the idea that minima were indivisible components of materials, and accordingly the four elements have their respective minima. Scaliger's interpretation caused the notion of minima to merge with that of atom, while corpuscular theory apparently remained compatible with Aristotle's physics. The third notion which interacted with the concept of atoms was expressed by the term *semina rerum*, which described active entities inside matter rather than inert corpuscles. *Semina* were described to harbour formative power or potential of growth. This vivifying nature of corpuscles was professed even by Democritian atomists like Epicure and Lucretius, not to mention Paracelsus's theory of *panspermia*, where *semina* were explicitly spiritual substances responsible for procreation, growth, or diseases.[35]

This diversity of early modern corpuscular theory enabled Antonio Clericuzio to demonstrate in his magistral book the close interdependence of three, seemingly contradictory and incompatible, theories of matter in seventeenth-century physics – Aristotelianism, atomism, and the Paracelsian model of the three chemical principles: salt, sulphur, and mercury. These three components were intended to explain phenomena that the qualities of the four elements (warm-cold and humid-dry) were unable to cope with, including tastes, odours, colours, solidity, combustibility, and medicinal properties. Although the chemical explanation based on these occult qualities might appear too vitalist (mystical or philosophical) to be harmonized with atomism, traditionally considered as a mechanical conception of nature, Clericuzio argues that that was not the case for most early modern atomists. Daniel Sennert, Sperling's master, might have criticized Paracelsus for his lack of religious orthodoxy, yet he accepted his three chemical principles as additional explanations to the qualities of the four elements. In his theory, not only earth, water, air, and fire, but also salt, sulphur, and mercury are composed of atoms. Sennert's atomism is qualitative rather than mechanical, for atoms include formative and spiritual powers which generate substances and determine their properties.[36]

[34] For example, Meinel, "Early Seventeenth-Century Atomism"; Newman, *Atoms and Alchemy*; Lüthy and Nicoli, eds., *Atoms, Corpuscles and Minima in the Renaissance*.

[35] In addition to the above-mentioned works, see Clericuzio, *Elements, Principles and Corpuscles*, 9-33; Kubbinga, *Making molecularism I*, 45-64, especially 51-56.

[36] Clericuzio, *Elements, Principles and Corpuscles*, 27-30; and Newman, "Experimental Corpuscular Theory in Aristotelian Alchemy". As a partisan of traducianism, i.e., the transmission of the

In his mature works, including his *Institutiones physicae*, Sperling is even more inclined to atomism than his teacher, but he keeps employing the chemical principles as well. Agreeing with Basson, he deduces the properties of salt, sulphur, and mercury from the texture of the atoms composing them. Although Sperling had the lion's share in the polemics over Sennert's heritage, his *Synopsis physica* is less engaged in scientific controversies.[37] It is a basic and simple textbook written in a catechetical form to introduce students to the rudimental notions of physics, and if this format of questions and answers may encourage any debate, that remains within the framework of scholarly disputations, to which end the units of the textbook can be easily adapted. Accordingly, atomist or chemical explanations are less developed in this work. However, they are present at many levels as evident truths. When arguing for the existence of atoms, he mentions not only Scaliger, Basson, and Sennert, but also Democritus and Aristotle.[38] He formally denies that Democritus was the first to discover atoms, and he even transposes the origin of corpuscular theory to mythical times, i.e., the age of Moses, almost acknowledging the atomic model as a part of *philosophia perennis*.[39] Aristotle's enrolment in the ranks of atomists suggests that the theory of minima is regarded by Sperling as a certain type of atomism. It is true indeed: the textbook introduces the notion of atom to discuss quantity amongst the affections of natural bodies. Substances have minimal and maximal quantities, and the atom is a fundamental instance of minima.[40] Atoms are mentioned on several occasions in the book. They compose elements, including air.[41] Fire has its own atoms which remain even after

human soul through natural generation as opposed to its direct creation by God, he argued that even the soul is composed by atoms contained in semen. See Stolberg, "Particles of the Soul"; Hirai, "Mysteries of Living Corpuscles", 256-260.

37 Due to his chemical approach, Johannes Freitag from Groningen attacked Sennert for his alleged Paracelsian impiety. Sennert replied to him in his *Hypomnemata physica* (1636). The follow-up of this polemic extended into Sperling's activity as well. About this controversy, see also Eckart, "'Auctoritas' versus 'Veritas'…"; Clericuzio, *Elements, Principles and Corpuscles*, 30-32.

38 Sperling, *Synopsis physica*, 144-145.

39 *Ibid.*, 145: "Doctrinam enim hanc de atomis etiam Mochus Phoenicius, qui ferme Mosis coaetaneus fuit, proposuit, quem postmodum Democritus, Plato, Empedocles, et alii secuti sunt". ("This doctrine of atoms was proposed by Mochus the Phoenician, who lived almost at the same time as Moses; it was later shared by Democritus, Plato, Empedocles, and others"). Certain early modern scholars, like Isaac Casaubon considered the possibility of identifying Moses with Mochus. While Casaubon only accepted the philological likeliness that the name Mochus could be read as Moses, others, like John Selden and Ralph Cudworth, identified the very person of Mochus with Moses. Others, like Daniel Sennert, Sperling's master suggested that the Phoenician might have been in contact with the Hebrews. See Levitin, *Ancient Wisdom in the Age of the New Science*, 358, 358n, and 391-392.

40 Sperling, *Synopsis physica*, 71.

41 *Ibid.*, 121.

extinction renders their warmth inefficient.[42] Atoms have a distinguished role in Sperling's meteorology as well. According to the textbook, exhalations (*effluvium*) which emanate from earth and water as a result of the influence of stars can be simple (*simplex*), in which case they are described as unblended clusters of atoms, or mixt (*mistum*), which category includes smoke (*fumus*) and steam (*vapor*).[43] Furthermore, in Sperling's book, atoms have a distinctive function in one of the most crucial natural processes of Peripatetic physics, the *mixtio*, i.e., the generation of blended matters from the four elements.[44]

In Dürner's physics, atomic theory receives less emphasis in comparison to the traditional outlines of Aristotelian natural philosophy. Whereas Sperling introduces the notion of atom in his chapter on quantity, Dürner limits his considerations to the concepts of minima and maxima as the two possible extremities of quantity. He primarily employs these two concepts in relation to natural bodies – implying that a specimen of a certain animal species, for example, can neither rest beneath a minimal size nor exceed a maximal expanse, unless as a result of some malfunction of nature – though the text explicitly encourages the reader to consult Sperling's textbook for more information about the terms minima and maxima.[45] Considering how extensively Sperling was used for education in Eperjes later on, even by Dürner's successors, it is not unlikely that a firm definition of atom was needed at this point if professors wanted their students to understand Sperling's argument. This was all the more necessary as the term atom did occur in the dictated text. For instance, meteorological phenomena are defined clearly and unambiguously as bodies "generated from atoms," which is perfectly in line with Sperling's discussion of the topic.[46]

In terms of chemical principles, Dürner's debt to Sperling's textbook is even more obvious. The *Synopsis physica* deals with them in a chapter connected to the exhalations (*effluvia*), the same section where atoms are described, directly following discussion of the four

[42] *Ibid.*, 131.

[43] On the composition of *effluvium*: *ibid.*, 139-140; for the definition of meteors as effluvium: *ibid.*, 163.

[44] *Ibid.*, 189-190. About Sennert's opinion about the function of atoms in *mixtio*, see Lolordo, *Pierre Gassendi and the Birth of Early Modern Philosophy*, 133-138.

[45] As many times before, the manuscript refers to Sperling as *the* author (*Autor*) here. Minima and maxima are discussed in relation to the second one of the three main properties describing the quantitative dimension of bodies: finiteness (*finitas*), extremities (*termini*), and shape or contour (*figura*): "Terminabilitas et haec indicat quantitatem suos habere terminos sc[ilicet?] eo maximum et minimum de quibus videatur Autor. Hos si excedat vel deficiat natura particularis oritur corpus monstrosum". (CL, Ms. R 302, 57.) ("Terminability indicates that quantity has its extremities, such as their maximum and minimum; for further details about them see the author").

[46] *Ibid.*, 190: "Meteora dicuntur corpora imperfecte mixta ex fumo halitibus aut vapore variarumque rerum atomis generata". ("Meteors can be defined as mixt imperfect bodies generated by exhalation from smoke or from the vapour and the atoms of different things").

elements.[47] Although nothing corresponds to this exact chapter in Dürner's manuscript, the commitment to chemical explanations is omnipresent in the notebook, especially in relation to minerals and stones which are described without further ado as originating from the three principles. Far from mechanically echoing Sperling's words to discuss the genesis of minerals, Dürner is able to apply chemical terms to analyse the consolidation of stones from liquids on his own.[48] It seems that he perfectly embraced the mindset necessary to explore chemistry, however minerals constitute an important matter to him in other contexts as well. First, it has local significance to him as salt mining around Eperjes is a topic that he judges worthy of being raised.[49] Second, the importance of salt and sulphur also emerge as biblical symbols (as in the expression "the salt of the earth"[50] and as the brimstone of hell[51]) in the notebook.

Although Dürner apparently had no intention to polemize against more traditional views on matter, and his *dictata* lacks several passages where Sperling dealt with corpuscular explanations, the particular mixture of atomism and chemistry developed by Sennert and Sperling was fundamental for him. His dictated classroom text can be revaluated as the first atomist treatise in relation to the Kingdom of Hungary, and it certainly anticipated some novelties in natural philosophy which later found their way to the academy of Eperjes.

Theological applications of physical doctrines in Dürner's teaching

In teaching the future generation of protestant intellectuals, affirming the links between physics and theology was as important as introducing novel scientific notions. There is nothing exceptional in the fact that Sperling's textbook tends to Christianize peripatetic

47 Sperling, *Synopsis physica*, 152-153.

48 The chapter "De mineralibus in genere" defines its topic as follows: "Sunt vero Minerali corpora Naturalia mixta e sulphure, mercurio et sale beneficio propriae formae formata, et e mineris ac visceribus terrae eruta". (CL, Ms. R 302, 211, "Minerals are indeed mixt natural bodies shaped out of sulphur, mercury, and salt into proper form to be useful, and dug out of mines and the inside of the earth"). According to Dürner, salt and sulphur take part in the solidification of stones. *Ibid.*, 215: "Lapides sunt corpora mixta, pura, ex succo lapidescente producta vi salis et sulphurus lapidifici concreta". ("Stones are mixt or pure bodies produced from petrifying moisture and condensed by the force of lapidifying salt and sulphur"). The reference to salt and sulphur here is Dürner's personal choice of words. This definition reads in Sperling's book as follows: "Lapides sunt mineralia crassa, dura, ignobilia, ex succo lapidescente et spiritu lapidifico genita". (Sperling, *Synopsis physica*, 201: "Stones are solid, hard, and worthless minerals, generated from petrifying moisture and lapidifying spirit").

49 CL, Ms. R 302, 220.

50 *Ibid.*, 220.

51 *Ibid.*, 223: "Cur infernus titulum fluvii sulphurei obtinuit Esaia 30 capite v[erso] ultimo?" ("Why is hell referred to as a stream of sulphur in the last verse of Isaiah 30?")

physics, seeking to clarify the relationship between natural philosophy and theology. The author regrouped his thoughts pertaining to this matter in each chapter under headings which exposed problems or questions. For instance, he did not miss the opportunity to inquire whether the Holy Scriptures have any supreme authority in the matter of physics,[52] or whether God proceeds anything against nature, a question which the professor of Eperjes considered in his turn according to the manuscript.[53] However, the notebook from Upper Hungary contains many times the original number of theological applications of the printed textbook.

Some of these questions derive from the usual polemics with Platonic and Peripatetic philosophy from a Christian point of view. Thus, Dürner refutes ancient doctrines, such as the eternity of the world[54] or the existence of a world soul (*anima mundi*).[55] Other theological applications scrutinize God's agency in nature by explaining the causes of evil in the Creation. While he finds an easy interpretation of the existence of poisons or venoms ("Whether poisons have some goal") by emphasizing their medical use instead of their harmful effects,[56] exonerating God for having created fleas and bed-bugs requires a more complex argument. Despite the Christian goals of his physics, Dürner rejects the pious yet naïve opinion that these parasites bite humans "to wake them up from their importune sleep so they can continue their prayers,"[57] and opts for a more nuanced theological explanation in addition to the physical causes that engender these little beasts: the reason they exist is "to frequently remind us about our sin, to exercise an external punishment and to convince us that this life is loathsome and we should ardently long for the afterlife".[58] And when it comes to justifying divine providence creating irregularities in nature, such as monsters ("Whether divine providence is the cause of monsters"), Dürner introduces a scholastic distinction in order to tell apart the different levels of divine causality: "A distinction is in order. Their permissive cause is indeed God, but not their defective cause which distorts monsters, because aberration comes either from the excess or from the flaws of nature".[59]

However, this Christianizing interpretation is applied specifically to natural theology and the Christian contemplation of divine action in nature. Despite the frequency of this

[52] Sperling, *Synopsis physica*, 4. Although it is implied that physics may not contradict Scripture, Sperling affirms the independence of the disciple from the Bible regarding its goals.

[53] CL, Ms. R 302, 31; Sperling, *Synopsis physica*, 29.

[54] CL, Ms. R 302, 107: "An mundus sit aeternus?" ("Is the world eternal?")

[55] *Ibid.*, 108: "An mundus sit animatus?" ("Is the world animated?")

[56] *Ibid.*, 45: "An venena aliqua habeant finem?" ("Do venoms have some goal?")

[57] *Ibid.*, 45: "ut noctu ex importuno somno homines excitent ad praeces Deo reddendas".

[58] *Ibid.*, 45: "Finis Theologicus est lapsus nostri crebra in memoria revocatio, 2. Poenarum externarum actio, 3. vitae hujus abjecta creditio et futurae ardens desideratio".

[59] *Ibid.*, 53: "An divina providentia sit causa monstrorum? / Distinguendum causa promissiva [recte: permissiva?] quidem est Deus, sed non defectiva quae aberrat monstrum, siquidem aberratio illa vel oritur est naturae excessu vel defectu".

kind of inquiry, Dürner appears to be very cautious about the accessibility of the divine presence in the things of nature. Inquiring "if any deity is present in the things of nature," he replies with reservation that "one must distinguish between the force of deity regarded intensively and extensively. In every created thing, there is an instance of extensive governance of the deity, yet not intensive, for the specific way of being present in the things of nature may vary".[60] Later, he endorses this cautiousness by restricting the majority of the divine activity in nature to its influence through secondary causes.[61] Contemplation of God in creation is, nevertheless, a primary issue in the notebook. This matter appears on the occasion of various topics, such as the observation of meteorological phenomena[62] or quadruped animals.[63] The contemplation of divine things in the visible words is affirmed to be imposed on us, when the author resorts to the famous Ovidian *topos* according to which the fact that the human gaze is directed towards heaven, while the muzzles of animals towards the earth, is a symbolic message about our special dignity and duties.[64] However, creation itself is unable to reveal God. In a theological digression pertaining to the chapters on heaven, Dürner raises the question "whether the heavens talk about the glory of God". Rather than sharing enthusiasm towards creatures that sing the splendour of their Maker, the answer emphasises the necessity of an active engagement in Christian believers:

> A distinction is in order. [The heavens] discuss the glory of God not out loud (*vocaliter*), but by offering an opportunity (*occasionaliter*) because they inspire an occasion and they almost transform people so they discuss the glory of God themselves. He heaven is not created to be like a mirror, through which the divine omnipotence, wisdom, and goodness shine, for those things must be devotedly celebrated by us all.[65]

60 *Ibid.*, 33: "An in rebus naturalibus esse velimus numen aliquid insit? / Distinguendum inter virtutem numinis intensive et extensive spectatam. In omnibus rebus creatis datur numinis divini gubernatio extensive non autem intensive quia specialis modus adessendi in rebus naturalibus variat".

61 *Ibid.*, 39: "Anne causa efficiens universalis occurit ad omnes causarum secundarum operationes?" ("Does the universal efficient cause precede all operations of secondary causes?")

62 *Ibid.*, 193: "Quomodo ergo homo Christianus meteora salutaria contemplari debet?" ("How should a Christian contemplate meteors in a salutary way?")

63 *Ibid.*, 247: "Quid usus redundat in hominem Christianum ex contemplatione quadrupedum?" ("What kind of benefit can a Christian person have from the contemplation of quadrupeds?")

64 *Ibid.*, 242: "Quid causa est quod facies brutorum in terram prona creata sit, hominis vero non ita?" ("Why are the faces of animals created so they are turned towards the earth, whereas the human face is not?") Cf. Ovid, *Metamorphoses*, 1.84-86.

65 CL, Ms. R 302, 119: "An coeli enerrant gloriam Dei? / Distinguendum. Enarrant gloriam Dei non vocaliter sed occasionaliter quia occasionem suggerit et mutat quasi hominem ad enarrandam gloriam Dei. Creatum non est Coelum instar speculi ex quo lucescit divina omnipotentia, sapentia, bonitas, ista a nobis omnibus devote est celebranda".

Dürner's reservations about natural theology can be explained by the Protestant pessimism concerning religious anthropology as a domain of theology addressing the fall of man through sin and the restoration of his fallen nature by divine grace. When it comes to the four elements, Dürner is intrigued to know if "the body of the first man was composed by elements also in the state of perfection,"[66] while the mixture (*mixtio*) of humors incites him to ask "if Adam, the first man, had any temperament in the state of integrity".[67] Similar inquiries in a scholastic vein are carried out about the resurrected body as well: "Will the glorified body have qualities, and what will they be like?";[68] "Can motion be ascribed to glorified bodies?"[69] Dürner subjects the soul of both the innocent and the fallen man to a similar treatment by asking "why the rational soul was infused into the man during the first creation via inspiration?", and "if the rational soul, as considered after the fall, was infused by divine intervention".[70] While discussing the faculties of the soul in the final section of the annotations on physics, Dürner meticulously analyses the corruption and the weakness caused by the fall on human intellect ("if the blindness of our intellect after the fall can be healed"[71]) and in the will ("if man had free will before the fall"[72]). A most intriguing *quaestio* is dedicated to the ethical dimension of artificial memory. In seventeenth-century protestant scholarship, mnemonic aids, such as local memory rooted in ancient rhetorical practices or printed post-Ramist encyclopedias, were often regarded as a remedy for the insufficiency of the memory in the fallen man, and were discussed as a partial reparation of man's damaged nature.[73] For Dürner, the usage of *ars memoriae* raises, in the first instance, a moral problem: "Is it permitted to recourse to artificial memory?" The response is based on a distinction between licit and illicit magical practices, and while it doesn't condemn every human effort to ameliorate the faculty of

66 *Ibid*., 149: "An corpus primi hominis constabat ex elementis et quidem in statu perfectionis".

67 *Ibid*., 189: "An primus homo Adam in statu integritatis habuerit temperamentum?"

68 *Ibid*., 65: "An corpora glorificata suas habitura qualitates et quales futurae?"

69 *Ibid*., 69: "An corporibus glorificatis adscribendus sit motus?"

70 *Ibid*., 256: "Cur anima rationalis in prima creatione per inspirationem homini infusa est?"; "An anima rationalis post lapsum considerata immediate infundat divinitus?"

71 *Ibid*., 258: "An coecitas intellectus nostri post lapsum sit sanabilis?"

72 *Ibid*., 260: "Num homo ante lapsum libera fuerit voluntatis?"

73 The idea that memory was weakened by original sin and that aiding it by artificial means can be justified on a moral and religious level was already known to medieval mnemonic art: Yates, *The Art of Memory*, 58-59. In the seventeenth century, it was Alsted who put the art of memory into a chiliastic perspective by establishing a mimetic relationship between history and encyclopedias: both shared a circular movement starting from the fall (and the loss of knowledge) and ending in the fulfilment of redemption by the return of Christ (and the restauration of knowledge). The interest of influential Herborn professors in Ramon Llull's combinatoric method is probably one of the reasons why Dürner stigmatized certain forms of mnemonic art as illicit magic. See Hotson, *Paradise Postponed*, 75-84.

memory, it expects the real restoration of the fallen intellect from divine intervention:

> A distinction is in order. Artificial memory stems either from physical or diabolical magic. This former, provided that it aims at salutary goals and is motivated by a necessity, is not to be condemned in a simple and absolute way, whereas the latter must be detested for it is prohibited by a divine command. However, the palm goes to that kind of artificial memory which is derived from the art of praying, where we are anointed with the unction of the Holy Spirit as a philosophical [?] reward.[74]

Despite the restrained capacity of the human intellect to comprehend God's message in creation, the human body seems to have for the professor of Eperjes a rich symbolic potential to exploit. The interdependence of internal organs, especially in the case of man regenerated by faith, embodies all kinds of moral teachings that a Christian must absorb about neighbourly love, selflessness, and reciprocity.[75] This charitable humility represented by the bowels is explained in the following terms:

> Intestines in a human being apparently symbolize that one must be ready to serve. Like the duty of the bowls is the most inferior one in the body, Christian charity of the soul must be likewise willing to serve together with the internal parts of the renewed soul, wherever a neighbour can be helped.[76]

The manuscript features an equally strong interest in natural curiosities, such as monsters, unusual behaviour in animals, or extraordinary results produced by changes in nature. It would be easy to regard these descriptions as proof of Dürner's naïve vision of an overly "enchanted" world, where irregularities reveal either God's exceptional ways or a dramatic conflict between supernatural powers. But in fact, both Sperling and the professor of Eperjes are rather sceptical about the epistemological value of these strange beliefs.

74 CL, Ms. 302, 259: "Distinguendum. Artificialis memoria sive constat ex magia Physica, sive Diabolica. Illa semper si fines salutares sibi praefixos habeat in casu necessitatis simpliciter et absolute non est contemnenda, haec est detestanda quia divinitus prohibita. Palmam tamen ea obtinet memoria artificialis quae ex arte precandi habetur, ubi inungimur unguento [...]ius[?] Sancti Spiritus pretio philosophico [?]".

75 *Ibid*., 284: "Quid ex constitutione epatis observandum venit morale?" ("What kind of moral observation can be made from the constitution of liver?") "Quid sibi volunt intestina hominis quoad moralem contemplationem?" ("What do bowels denote with respect to moral contemplation?"), "Scire aveo quid venae in homine renovato denotent?" ("I desire to know what the veins of the renewed man symbolize").

76 *Ibid*., 284: "Intestina in homine promptitudinem serviendi repraesentare videntur. Nam ut intestinorum est vilissima in corpore praestare munia, ita pariter dilectio Christiana animae visceribus innovatae prompta sit ad deserviendum ubicunque proximus adjuvari potest".

Sperling, for instance, evokes the myth of the barnacle goose – a species that procreates by growing on trees, according to the Scottish historian Henry Boyce – only to lampoon it.[77] He asks if it is true that the Sun dances during Easter, yet he explains that this is only an optical phenomenon caused by vapor.[78] In his turn, Dürner quotes this argument in the manuscript.[79] While the explanation of such problems is always conformed to religious orthodoxy, it goes hand in hand with a meticulous analysis of the given belief. When it comes, for example, to lightning in the section about meteorology, Dürner, by introducing a scholastic distinction, tends to accord some limited validity to the opinion that lightning can be produced by the devil ("An diabolus excitare possit fulmina?" – "If the devil can induce lightning"): "We make a distinction between permissive power and power which is merely effective. We agree that the devil often has the permissive power to induce lighting, but he has no effective power to do so".[80] If God occasionally allows the devil to produce lightning, he retains the power to *efficiently* cause thunder for Himself, or more accurately, for nature ruled by Him. Scrutinizing the monstrosity is also invested with an ethical significance. This is the case, for instance, when Dürner rejects regarding women as monstruous beings, a prejudice attributed to Aristotle himself. Whereas in the same section he discusses the true nature of syrens ("*mulieres aquaticae*"), questioning Aristotle's misogyny is not a meaningless thought experiment for Dürner because it also enables to him to reaffirm that women must be christened as much as men are.[81]

But most of the theological applications concern the exegesis of Scripture. Any kind of natural phenomena, animate or inanimate being can serve as a pretext for the author to get involved in scriptural theology. Some of these hermeneutical problems are taken directly from Sperling's textbook, including an inquiry into rainbows in meteorology: did they exist prior to the flood? As the answer is affirmative, it attests that Sperling and Dürner made significant steps towards the autonomy of physics from theology, albeit both disciplines keep their complementary value in the explanation: as an optical phenomenon, rainbows did exist before Noah because their natural causes (water drops in the air) were present.[82] However, it didn't have meaning as a sign for the covenant be-

77 Sperling, *Synopsis physica*, 238.

78 *Ibid*., 110.

79 CL, Ms. R 302, 139: "An Sol tempore ortus sui tripudiet in festo Paschatos?" ("Does the rising Sun dance in Easter time?")

80 *Ibid*., 197: "Distinguendum inter potentiam permissivam et mere effectivam. Concedimus Diabolo non raro adesse potentiam intendendi fulmina permissivam, non vero effectivam".

81 *Ibid*., 53: "An mulieres sint monstra?" ("If women are monsters"); "An mulieres sint baptizanda?" ("If women are to be christened"); "An mulieres aquaticae sint monstra?" ("If aquatic women are monsters").

82 Sperling, *Synopsis physica*, 184: "An Iris fuerit ante diluvium?" ("If rainbow existed before the flood"); CL, Ms. R 302, 202: "An Iris extiterit ante diluvium?".

tween God and men. Yet Dürner is much more inclined to scriptural applications, and he adds many of them to his arguments.

In the section about heaven ("*De coelo*"), he discusses the interplay between nature and extraordinary divine signs in the case of the solar eclipse which took place during the passion of Christ and the stars which will fall from the sky on Judgment Day.[83] In meteorology, he dwells on the symbolism of snow in the Old Testament, whereas the subject of rain serves as an opportunity to speculate on the quality of the water that caused the flood.[84] Since according to Aristotelian physics, earthquakes are caused by subterranean winds, it is in meteorology as well that Dürner discusses the abyss that swallowed Korah, Dathan, and Abiram for rebelling against Moses in Numbers 16.[85] The biblical symbolism of minerals is particularly rich in Dürner's opinion. In the section on metals, he unleashes his imagination and suggests that the golden ring that the prodigal son receives as a sign of reconciliation from his father is a symbol of the Holy Spirit, although its reading as a metaphor does not seem to be implied at all by the text of the Gospel.[86] While discussing stones, the professor explains the meaning of the "rocky ground" from the Parable of the Sower amongst other biblical metaphors involving rocks.[87] Furthermore, Dürner shows interest in Christ's metaphorical usage of salt in several of his expressions.[88] Ultimately, the Christian symbolism of the human body, so important in Dürner's anthropology, appears in an exegetical context as well, including for instance consideration of the allegorical significance of clothing in the Gospel.[89]

83 *Ibid.*, 137: "Quo sensu stellae sub novissimum diem coelitus decident Matth. 24 v. 29". ("In which sense did the stars fall down from the sky on Judgment Day?"), and "Qualis fuit ecclipsis illa quae tempore passionis Christi orta fuit, et quenam ejus causa" ("What kind of eclipse was the one that took place during the passion of Christ, and what was its cause?").

84 *Ibid.*, 205: "Cur verbum Dei dicitur Nix Esa 55. 205 [recte: 207]" ("Why is the Verb of God denoted with the word snow in Isa 55,207"); "Qalis fuit aqua diluvii Gen 7 v. 18?" ("What was the water of the flood like?")

85 *Ibid.*, 210: "Qualis fuit hiatus terrae qui absorpsit Coredatan et Abylon [sic!] Num 16" ("What kind of opening of the earth swallowed Korah, Dathan and Abiram in Num 16?").

86 *Ibid.*, 214: "Cur Spiritus Sanctus annulo aureo Luc 15 comparatur?" ("Why is the Holy Spirit compared to a golden ring in Luke 15?").

87 *Ibid.*, 216: "Cur Salvator noster temporarios verbi sui auditores saxoso comparat agro Luc 8?" ("Why did our Saviour call rocky ground those who listens to his words only temporarily?"); 217: "Cur Apostoli et Christiani fideles vivi lapides appellantur 1 Pet 2 v 5?" ("Why are the Apostles and the faithful Christians called living rocks in 1 Pet 2,5?").

88 *Ibid.*, 220: "Quare verbum Dei salis nomine a S. S. salutatur Marc. 9 cap v 50?" ("Why is the verb of God greeted with the name of salt by the Holy Spirit in Marc 9,50?"); 221: "Scire desidero quid Christus Salvator titulo salis terrae significet Matth. 5 v 13?" ("I long to know what Christ, our Saviour, expressed by the term 'the salt of the earth'?").

89 *Ibid.*, 286: "Quomodo Christiani ad mandatum Christi Luc. 12 Lumbis suis sunt praecingendi?" ("How must Christians have their waist girded at the command of Christ in Luke 12?").

Although Dürner didn't lay particular emphasis on topics which might be controversial between denominations, there are a few exceptions, where he provides ammunition for religious debates. Some of them concern ethics and ecclesial discipline, such as the celebration of a birthday, which is permitted only to express our gratitude to God,[90] or the beating of the breast in penance, of which Dürner is tolerant.[91] Another potentially controversial field is Christology, where the right interpretation of Christ's divinity and humanity is key to Protestant communion theology.[92] Lutherans based their doctrine of the real presence of Christ's body in the communion bread on the notion of *ubiquitas*, i.e., the omnipresence of Christ's glorified body. To argue for this conviction, they had to demonstrate that Christ's human and divine natures can be equally ubiquitous because they are inseparably attached to each other in his person: where his divine nature is, there is his human nature. Dürner discusses this question in relation to the affections of natural bodies (time, place, etc.) by asking "if Christ's human nature is at a certain place". The answer reads as follows:

> Christ's human nature must be considered either in terms of his personal condition [i.e., his condition as one of the persons of the Trinity], or in terms of his glorified natural condition. Considering the first one, it is everywhere (*ubique*) because it is contained in the person of the infinite verb (τοῦ λόγου), whereas considering the second one, it can be located at some point in space, which doesn't mean it is a corruptible natural body but it is a consequence of the definition of 'whereness' (*ubietas*).[93]

The following two assertions are both true at the same time: 1. Christ's body is everywhere as his divine and human nature are inseparable from one another – Lutheran orthodoxy requires that even our choice of words reflect this attachment: there must be an interchangeability between the terms 'divine' and 'human' (*communicatio idiomatum*). 2. Christ's resurrected body has ascended to heaven; thus, it is to be found at a specific place. Decades earlier, *ubiquitas* was a crucial point in the conflicts between Lutherans

[90] *Ibid*., 93: "Anne licitum est Christianis temporis natalis diem celebrare" ("Are Christians allowed to celebrate their birthday?").

[91] *Ibid*., 286: "An omnis tactus pectoris homini Christiano interdictus est?" ("Is any touch of the chest prohibited to Christians?").

[92] An example for Christological application: *ibid*., 231: "An generatio Filii Dei tollat ejus aeternitatem?" ("If the fact that the Son of God was generated [from the Father] deprives him of his eternity?").

[93] *Ibid*., 73: "An humana Christi natura sit in loco? / Humana Christi natura vel consideratur in sua sorte personali vel, in sorte glorificata naturali, priori consideratione est ubique, quia subsistit in persona infiniti του λόγου, posteriori autem modo ades[s]entiam in localitates quae non est corpus naturale corruptibile sed ubietatis definitione".

and Calvinists in the Kingdom of Hungary, and it was a touchstone for Lutheran orthodoxy.[94] By the 1640s, even the opponents of the Lutherans discussed body and space in Aristotelian terms to point out the absurdity of Christ's corporeal omnipresence, and it this regard, this debate was not much different from earlier confessional conflicts, starting with the Marburg colloquy.[95] Therefore, the right interpretation of the Eucharist, in the light of both the Scripture and natural philosophy, remained important in the training of young Lutheran intellectuals. In 1650, the Lutheran school of Kassa (Košice), a town in the vicinity of Eperjes, hosted a disputation where *ubiquitas* was demonstrated using a terminology very familiar from the textbook from Eperjes: Christ's body was considered omnipresent in the person of the Verb (τοῦ λόγου). It cannot be a coincidence that the list of the numerous dedicatees, pastors, and educators from Upper Hungary included the name of Samuel Dürner.[96]

[94] Regarding the life of a Lutheran minister of Késmárk (Kežmarok, Slovakia), these controversies are in the focus of Sebők, *A Humanist on the Frontier*.

[95] E. g., in the sermons of István Geleji Katona (1489-1649), the Calvinist bishop of Transylvania. See Sebestyén, "Csodakritika Bornemisza Péter…", 95-99; Sebestyén, "'Mert ahol test vagyon…'". For the international context of how polemics on communion theology used Aristotelian terms and their influence on protestant physics, see Leijenhorst, Cees. "Place, Space and Matter"; Leijenhorst and Lüthy, "The Erosion of Aristotelianism"; Lüthy, "The Confessionalization of Physics", 92-101.

[96] Horváth, *Σὺν τῷ Θεῷ Pia et placida dissertatio de omnipraesentia carnis Christi in persona τοῦ λόγου*. (RMNy 2306.) Presided by rector András Horváth, defended by Georg Melochowski. It is remarkable that at some point of the disputation, the unity of body and soul in human nature is argued on the ground of Renaissance neo-Aristotelian natural philosophy, taught in Wittenberg as well as in Eperjes, involving also the Ovidian topos of human face turned to the sky: "Homo itaque constat ex anima rationali et corpore, ex quibus nec anima nec corpus eius nec coeterae corporis humani partes constant. Christus ex divina et humana natura tanquam partibus est compositus, quod de neutra eius natura verum est. Intelligit totus homo et ridet non corpus non venter. Homo enim apud Aristotelem est, qui intelligit, non anima, intelligit tamen ut loquitur subtilissimus *Iul. Caesar Scaliger*, per animam. Erecto in coelum vultu conditus est homo, non pes, non anima ejus. Quicquid autem totius est modo posteriori, illud et omnium eius partium est, per et propter ipsum totum". (*Ibid*., f. B3r. – the italics are mine. "The human is composed of rational soul and body which compose neither the soul nor the body nor any other parts of human body. Likewise, Christ is composed of parts of divine and human nature, which is not true of any of his natures. [Aristotle] spoke about the entire human being: it is neither the body nor the stomach which smiles. For it is the human being which, according to Aristotle, is capable of understanding, not the soul, but as the eminent Julius Caesar Scaliger puts it, they understand via their soul. Humans have been created so that they are directed towards the sky with their face, not their feet and not their soul. Whatever the whole possesses in this latter way, it also belongs to each of their members via and because of the whole").

Conclusion: The Wittenberg tradition of natural philosophy

In Eperjes, as much as in the Wittenberg of Sennert and Sperling, Paracelsian chemistry and atomism constituted an evident fundament rather than an impediment to Christianizing natural philosophy in the framework of Lutheran orthodoxy. The significance of atomism did not pass unnoticed by Dürner, even if he did not consider it to be necessary to be defended against a more conservative Aristotelianism, and his confident proficiency in using chemical terms in particular is evident in the manuscript. But the real direction of his efforts to accumulate knowledge and to use the guidelines of physics to structure this knowledge leads him towards theology. A principal domain in which he shows interest is controversial theology in terms of the defence of Lutheranism against Calvinists. His focus on this subject persists in the next section of the manuscript, detailed discussion of which would exceed the scope of this paper. It discusses metaphysics by posing questions (*quaestiones*) in theology in the same way that Dürner posed questions earlier in relation to physics. This time, they address both Catholicism and Calvinism in relation to justification by faith, the existence of purgatory, and the real presence of Christ in the Lord's Supper.[97]

But there was also another set of interests that Dürner expressed in teaching physics: scrutinizing natural theology, the book of nature, religious anthropology, and the relationship between nature and humanity prior and posterior to the fall. As much as controversial theology, this use of natural philosophy and natural history was in line with both the local needs of candidates for ministers and the main trends of education in Wittenberg. The influence of the university in these matters dates back to earlier times. Péter Laskai Csókás (Latinized as Monedolatus, ?-1587), a minister at the court of Alba Iulia, the residence of the Prince of Transylvania. Laskai Csókás studied in Wittenberg several times, returned to the town in 1585 to publish a voluminous treatise entitled *De homine*, inspiring at least one follower in the Hungarian territories. It was a unique enterprise combining the Neoplatonist hermetism of Cusanus and Pico with a Christian anthropology rooted in the doctrine of original sin to read the *liber naturae* as a treasury of divine symbols.[98]

[97] CL, Ms. R 302, (with recommencing pagination in "Brevis ac Synoptica Metaphysicae Delineatio"), 38: "An fides in Abstracto justificat?" ("Does faith justify in abstract terms?"); 40: "An Purgatorium sit Ens Rationis?" ("Is purgatory a rational entity?"); 74: "An Corpus Christi vere sit praesens in S. S. Coena?" ("Is Christ's body actually present in the Holy Communion?"); 97: "An Sacramenta sint signa?" ("Are sacraments signs?")

[98] Laskai Csókás, *De homine magno illo in rerum natura miraculo et partibus eius essentialibus*. About the Neoplatonic source of his works: Tardy, "Aspetti della fortuna di Pico nella cultura ungherese"; Bolberitz, *The Beginnings of Hungarian Philosophy*; Bernhard, *Konsolidierung des reformierten Bekenntnisses im Reich der Stephanskrone*, 337-338, 347-348. His inexorable biblicism was stressed only recently in the literature: Szabó, "Laskai Csókás Péter az emberről". About his homeland influence: H. Hubert, "Egy morális antropológia 1614-ből". It is remarkable that he

The surviving disputations of students from Hungary and Transylvania attest that, due to Sperling and his collaborators, they learnt how to use humanist natural histories to participate in relevant discussions.[99] Regarding the benefits of natural history in theology, the seventeenth century scholars in the Kingdom of Hungary and in Transylvania remained in sync with their colleagues from Wittenberg, where the chemical atomism of Sennert and Sperling coexisted with the numerous reprints of works perpetuating the Christian moral allegories of medieval bestiaries, such the successful *Animalium historia sacra* (1612) authored by Wolfgang Franz, a professor of theology. Decades after its first publication, Daniel Hartnack still cited it in his commentaries on Sperling's physics,[100] and a Hungarian translation was penned in 1691 by a Transylvanian minister.[101] Likewise, in 1659, János Apácai Csere, a follower of Alsted and the author of the first encyclopaedia in Hungarian, simultaneously used Franz's book and Sperling's *Institutiones physicae* to teach zoology at the high school of Alba Iulia, and he certainly could distinguish between the value of the symbolic interpretations by the first for future preachers and the pertinence of the strictly philosophical observations by the other.[102]

German schooling set a good example for Dürner about how to integrate natural history into the training of preachers. If professors in the Kingdom of Hungary and Transylvania strengthened this link further with regard to local requirements, they had no reason to be ashamed. Connecting natural philosophy to theology was not a sign of backwardness on their part. Rather, it resulted from their ingenuity and pragmatic thinking.

already shared the traducianist view on the birth of the soul, which was professed in Sperling's times later on: Vidal, *The Sciences of the Soul*, 52.

99 Their most frequently cited authority was Scaliger's *Exercitationes*. The distinction between manifest and occult qualities of this post-Paracelsian physics which was still fundamental for Sperling appears in this disputation presided by Johann Christoph Weniger and defended by Melchior Roth from Kassa (Košice): Weniger, *Ex physicis de mirandis naturae operibus*. (About occult qualities in Sperling's physics, see Dym, *Divining Science*, 61-66.) Scaliger is taken as an absolute authority in a disputation on Christian anthropology discussing how original sin weakened our innate knowledge (presided by Esaias Viccius and defended by Johann Fridel from Sopron, Western Hungary): Viccius, *Ex anthropologia de principiis nobiscum natis*.

100 Hartnack, *Admiranda physica*, 317.

101 It was published in 1702 posthumously: Franz, *Egy jeles vad-kert*.

102 Kiss, "Bethlen Miklós Apáczai Csere János iskolájában", 284-286. About Apácai, see Hotson, *The Reformation of Common Learning*, 352-358.

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The Galileo Museum in Florence recently published *Thek@Favaro. Integrated Archive on the Life and Work of Antonio Favaro* (https://teche.museogalileo.it/favaro/).
This digital archive contains the extensive Favaro correspondence (a collection of over ten thousand letters), along with an extraordinary corpus of manuscripts, printed works, documents, and iconographic artifacts.
The *Thek@Favaro* thus provides an indispensable tool for the scientific community to reconstruct the intellectual biography of the Paduan scholar and delve into a crucial aspect of Galileo's legacy: the creation of the National Edition of the Works of Galileo Galilei (1890-1909).
To introduce this significant resource, *Galilaeana* has asked Sara Bonechi and Michele Camerota to highlight some of the most interesting aspects of Antonio Favaro's life and work.

Il Museo Galileo di Firenze ha recentemente pubblicato la *Thek@Favaro. Archivio integrato sulla vita e sull'opera di Antonio Favaro* (https://teche.museogalileo.it/favaro/).
L'Archivio digitale contiene l'immenso epistolario favariano (una raccolta di oltre diecimila lettere), insieme a uno straordinario corpus di manoscritti, opere a stampa, documenti e reperti iconografici.
La *Thek@Favaro* fornisce così alla comunità scientifica uno strumento indispensabile per la ricostruzione della biografia intellettuale dello studioso padovano e per l'approfondimento di uno snodo cruciale della 'fortuna' di Galileo: la realizzazione della Edizione Nazionale delle *Opere* di Galileo Galilei (1890-1909).
Per presentare questa importante risorsa, *Galilæana* ha chiesto a Sara Bonechi e Michele Camerota di illustrare alcuni degli aspetti di maggior interesse della figura e dell'opera di Antonio Favaro.

Antonio Favaro e i suoi corrispondenti

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English title
Antonio Favaro and his correspondents

Abstract
The Museo Galileo has recently published online the vast collection of Antonio Favaro's manuscripts, documents, and letters (Thek@ Favaro: https://teche.museogalileo.it/favaro/it/). The value of this material for the reconstruction of Favaro's crucial work – especially in the field of Galilean studies – is absolutely essential. This brief contribution, based on a talk given on September 10, 2021, at the Museo Galileo, outlines the editorial criteria adopted by the Edizione Nazionale of Galileo's works, which Favaro carried out between 1890 and 1909. The paper also highlights the significance of Favaro' s extraordinary correspondence (over ten thousand letters) for a deeper understanding of the connections and collaborations among European historians of science from the late 19th to the early 20th century.

Keywords
Antonio Favaro, Galileo Galilei, Edizione Nazionale of Galileo's *Works*, History of Science

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In un ricordo consegnato, nel 1925, alle pagine di *Isis*, Giuseppe Gabrieli – bibliotecario della Corsiniana e insigne studioso delle vicende dell'Accademia dei Lincei – qualificava Antonio Favaro come "uno degli ultimi grandi storici della scienza", equiparandolo a Paul Tannery e a Pierre Duhem. In un cinquantennio di alacre attività, notava Gabrieli, Favaro aveva "da solo prodotto nella storia della scienza quanto dieci lavoratori della sua taglia tutt'insieme ora non oserebbero più nemmeno tentare".[1]

In effetti, la bibliografia favariana è impressionante (annovera oltre 500 titoli) e documenta un'operosità davvero fuori dal comune. In larghissima misura dedicati a Galileo, gli studi di Favaro indagano ogni aspetto della vita e dell'opera dello scienziato pisano, anche i più minuti, e accompagnano, per gran parte, la realizzazione di un vero e proprio capolavoro editoriale: l'Edizione Nazionale delle *Opere* di Galileo.

Fin dal 1881, Favaro aveva delineato i contorni di questa nuova e "definitiva" (così gli piaceva connotarla) edizione galileiana, che si proponeva di ovviare alle lacune e ai difetti della cosiddetta "prima edizione completa", pubblicata in sedici tomi da Eugenio Albèri tra il 1842 e il 1856. Come lo studioso padovano metteva in evidenza, il lavoro di Albèri presentava cospicue manchevolezze sia nell'organizzazione interna, sia nelle modalità di pubblicazione dei testi: trascrizioni erronee, indebiti ammodernamenti lessicali, "alterazioni o fraintendimenti di vocaboli o forme, per incompiuta conoscenza della storia della lingua",[2] omissioni di importanti autografi e documenti, un ordinamento delle scritture farraginoso e bizzarro, che vedeva, per esempio, il Carteggio "incastrato senza plausibile motivo fra le opere astronomiche e le meccaniche"[3] e la separazione delle lettere di Galileo da quelle dei corrispondenti. Di fronte a tali "mende gravissime",[4] Favaro aveva, nel 1881, elaborato il progetto di una "edizione veramente completa" delle *Opere* di Galileo, articolata anch'essa (come già quella di Albèri) secondo una divisione tematica che distingueva cinque sezioni: gli scritti fisico-meccanici, quelli astronomici, le opere letterarie, il Carteggio, i documenti biografici, cui si aggiungevano gli indici onomastici e degli argomenti.[5]

A testimonianza della sagacia del piano editoriale favariano, va ricordato che lo storico padovano specificava con estrema esattezza – cioè senza alcuna variazione rispetto alla di là da venire Edizione Nazionale – il numero dei tomi dell'opera: il prospetto dei venti volumi previsti nel 1881 rimase, infatti, inalterato all'atto della stesura del decreto con cui, il 20 febbraio 1887, il Ministro della Pubblica Istruzione, Umberto Coppino, impegnava lo Stato a realizzare "una nuova edizione, integrata e compiuta" delle *Opere* galileiane.[6]

1 Gabrieli, "A. Favaro e gli studi italiani di storia della scienza", 456.
2 Favaro, "Galileo e le edizioni delle sue Opere", 55-56.
3 *Ibid.*, 54.
4 *Ibid.*, 57.
5 Cfr. Favaro, "Intorno ad una nuova edizione delle Opere di Galileo", 35.
6 Cfr. il testo del Decreto ministeriale che avviava l'Edizione Nazionale riportato in Favaro, *Per la Edizione Nazionale delle Opere di Galileo Galilei …* , [3].

Il disegno della Edizione Nazionale era stato, dunque, predisposto con una diligenza e una precisione davvero fuori dal comune. Favaro, ideatore e principale promotore dell'intrapresa, ne fu nominato 'Direttore'; ad affiancarlo come 'coadiutore letterario', con la responsabilità della cura dei testi, venne chiamato il filologo Isidoro Del Lungo, che si avvaleva dell'assistenza del poco più che ventenne ma già competentissimo collega, Umberto Marchesini. A fungere da 'consultori' erano invece i fisici Valentino Cerruti e Gilberto Govi e l'astronomo Giovanni Virginio Schiaparelli.

Quella delle *Opere* di Galileo era la prima Edizione Nazionale varata dal giovane Stato italiano, e si affiancava ad altre iniziative editoriali che, a livello internazionale, miravano a raccogliere i lavori dei grandi scienziati della prima età moderna. Ricordiamo che nel 1888 David Bierens de Haan aveva dato inizio alla stampa delle opere di Huygens, nel 1890 Philippe Tamizay de Larroque aveva intrapreso la pubblicazione del carteggio di Peiresc, nel 1891 Paul Tannery e Charles Henry cominciarono a editare gli scritti di Fermat, mentre nel 1897, gli stessi Tannery e Henry, in collaborazione con Charles Adam, avevano avviato la grande edizione delle opere di Descartes.

Rispetto a queste imprese, quella guidata da Favaro si segnala per ampiezza di impianto, completezza, precisione ecdotica, proponendosi come un esempio insuperato tra le edizioni di classici della scienza.

Di particolare significato fu anche il puntuale rispetto dei tempi di pubblicazione previsti. A dispetto della vastità e complessità dell'opera (che annovera alla fine circa 12000 pagine), i venti volumi (in ventuno tomi) uscirono a stampa, presso l'editore Barbèra di Firenze, nel giro di un ventennio, dal 1890 al 1909, al ritmo regolare di un volume l'anno.

Rispetto a quanto delineato nel 1881, Favaro decise di mutare il criterio di pubblicazione dei testi: non più un ordinamento tematico-disciplinare (analogo a quello già adottato nell'edizione Albèri), ma uno puramente cronologico:

> Il trovare [...] – scriveva – che il Viviani stesso [primo ideatore di una raccolta di scritti galileiani] aveva ammessa una divisione delle Opere di Galileo in astronomiche, meccaniche, fisiche e matematiche, ci aveva da principio indotti ad accettare in massima una analoga distribuzione, seguendo tuttavia scrupolosamente in ogni categoria l'esatto ordine cronologico. Se non che, dopo maturo consiglio, abbiamo dovuto considerare che da un lato i criteri di distribuzione, dai quali sarà partito il Viviani, non possono oggidì accettarsi senza sindacato, mentre dall'altro non v'ha che un ordine solo, il quale sia consono all'andamento razionale da darsi alla nuova edizione delle Opere di Galileo, cioè l'ordine cronologico generale, come quello che è meglio atto a rappresentare fedelmente la figliazione naturale delle idee in quella mente sublime.[7]

[7] *Ibid.*, 34.

Su base cronologica fu anche pubblicato il carteggio galileiano, che Favaro e i suoi collaboratori concepirono come inteso a comprendere non solo le lettere di Galileo e a lui dirette, ma anche quelle in cui corrispondenti coevi riportassero notizie sullo scienziato pisano. In tal senso, i documenti raccolti assommavano a circa quattromila trecento lettere, "mentre – come lo stesso Favaro notava con comprensibile orgoglio – il più accurato degli editori che ci precedettero n'aveva a mala pena messo insieme un migliaio e mezzo".[8]

È, invero, impossibile sovrastimare la rilevanza di questo imponente *corpus* epistolare per la conoscenza non solo della vicenda biografica e delle acquisizioni intellettuali di Galileo, ma anche dei tratti più peculiari e propri della cultura scientifica della prima età moderna. Da una parte, infatti, il flusso comunicativo ci consente di scrutare fin nei dettagli la vita privata dello scienziato pisano, e ci guida nella comprensione dell'itinerario di stesura delle sue opere, introducendoci nel laboratorio teorico in cui furono forgiate le innovative proposte galileiane; dall'altra, nei volumi del carteggio trovano spazio le molte, variegate voci dei contemporanei, dando così conto delle loro istanze e aspettative, delle loro reazioni e dei loro giudizi, il che contribuisce a restituirci – come rilevava lo stesso Favaro:

> un quadro animato e vivente del più glorioso periodo della storia scientifica italiana; nel quale intorno al protagonista ed alla principale azione (che è la lotta del nuovo metodo sperimentale colla Scolastica e col peripatetismo male inteso) si aggruppano le nobili figure di tanti illustri scienziati e tante altre azioni secondarie, quali per un lato quali per un altro tutte interessanti.[9]

Tutti i testi compresi nei venti volumi dell'Edizione Nazionale furono editati con estrema cura, appoggiandosi sempre alle fonti originali e conformemente alla scelta editoriale di escludere ogni intervento interpretativo.

È noto che lo studioso padovano e il suo principale collaboratore, Isidoro Del Lungo (sul cui ruolo cruciale ha, già diversi anni orsono, lucidamente richiamato l'attenzione Massimo Bucciantini),[10] scelsero di attenersi a una forma di edizione strettamente documentaria, che evitava "qualsiasi illustrazione d'ordine storico e scientifico",[11] ossia ogni commento e/o intervento interpretativo, la cui inevitabile obsolescenza avrebbe compromesso l'affidabilità nel tempo dell'opera. Se, ad oggi, l'Edizione Nazionale è ancora il riferimento obbligato per chi studi Galileo lo dobbiamo a quella decisione, che, a tutti gli effetti, contribuiva a fissare con ineccepibile precisione il testo galileiano, annettendogli il rigore e la perentorietà propri dei classici.

[8] Favaro, "Galileo e le edizioni delle sue Opere", 65.
[9] Favaro, *Per la Edizione Nazionale delle Opere di Galileo Galilei …* , 38.
[10] Bucciantini, "Scienza e filologia: l'Edizione Nazionale delle Opere di Galileo".
[11] Favaro, "Galileo e le edizioni delle sue opere", 64.

Benché particolarmente sostenuta da Del Lungo (e quasi naturale conseguenza del suo zelo ecdotico), l'idea di una esatta e 'neutra' resa dei testi, che non indulga all'inserimento di alcunché di "subiettivo", mantenendo il "carattere impersonale" dell'edizione, si accordava perfettamente con la sensibilità storiografica di Antonio Favaro. I suoi lavori hanno, pressoché tutti, una forte connotazione documentaria, tesi come sono a valorizzare l'elemento fattuale, la notizia, l'informazione comprovata.

Si tratta di un sentire (e di un conseguente *modus operandi*) ispirato al modello della scuola storica e largamente frutto dello *Zeitgeist* positivista, di una temperie, cioè, dominata dal culto dei 'fatti', e in cui i documenti costituivano – secondo una suggestiva espressione di Edward Carr – "l'Arca del Patto nel tempio dei fatti".[12]

Occorre però notare che – in Favaro e non solo in lui –, al di là dei convincimenti positivisti, il "feticismo documentario" (ancora locuzione di Carr) testimonia in qualche modo, una "ansia di verità obiettiva posta al di fuori del pensiero dello storico, quasi come creazione naturale, salda e ferma".[13] In tale prospettiva, il documento diventa il catalizzatore di una tensione finalizzata ad elevare il rango epistemico del sapere storico, con l'annettergli una oggettività congenere a quella delle scienze naturali. In effetti, se accanto a una 'filosofia spontanea' degli scienziati, se ne postulasse una analoga degli storici, potremmo dire che il desiderio di far parlare i documenti (o di parlare attraverso i documenti) incarni un'esigenza di integrità veritativa da sempre connaturata alla disciplina.

Per fare un solo esempio attinente al campo della storia della scienza, si pensi alla "istorica purità" candidamente (ancorché maldestramente, alla luce degli esiti) invocata da Vincenzo Viviani quale suggello di verità del proprio *Racconto istorico della vita di Galileo*: "porgo le seguenti memorie – scriveva l''ultimo discepolo' – con istorica purità, e con intera fedeltà registrate".[14] Idealmente, la "istorica purità" comporta la stretta aderenza al referto documentario e una conseguente rinuncia a qualsivoglia elemento interpretativo in grado di inquinare la limpida schiettezza della notizia acquisita con animo sgombro. Era il medesimo atteggiamento tacitianamente spassionato, *sine ira ac studio*, cui alludeva Paolo Giovio nel confessare: "Quando scrivo l'istoria, mi scordo d'ogni cosa che mi possa alterare la purità della fede storica".[15]

Oggi sappiamo bene che l'appello metodologico a una rigorosa assenza di pregiudizialità e all'avalutatività (intesa in senso generico, non nella peculiare accezione weberiana) è, dal punto di vista storiografico, un mero *flatus vocis*, una astrazione utilizzabile al più in termini prescrittivi e, per dir così, deontologici, quale monito a una serena, onesta accettazione del dato documentale.

[12] "Il feticismo ottocentesco per i fatti era integrato e garantito dal feticismo per i documenti. I documenti costituivano l'Arca del Patto nel tempio dei fatti" (Carr, *Sei lezioni sulla storia*, 20).

[13] Chabod, *Lezioni di metodo storico*, 65.

[14] OG, XIX, 599.

[15] Giovio, *De le lettere facete et piacevoli …* , 125.

E invero – a dimostrazione della ineliminabile presenza dei punti di vista – la cauta riservatezza nell'esprimere giudizi da parte di Favaro non implicava affatto una mancanza di opinioni. Come ha dimostrato Paolo Galluzzi, in un libro di recente pubblicazione che illumina un aspetto assolutamente inedito del dibattito intellettuale italiano tra Otto e Novecento,[16] lo storico padovano intratteneva idee forti sulle principali questioni al centro della discussione culturale della sua epoca. In particolare, egli – come pure l'amico/nemico Raffaello Caverni – guardava con simpatia alla corrente cattolica proto-modernista di ispirazione rosminiana. Per molti anni l'impresa dell'Edizione Nazionale ne mobilitò le energie in modo totalizzante e, per motivi che sarebbe qui fuori luogo discutere, gli consigliò prudenza. Nondimeno, al completamento dell'opera, Favaro non esitò a dichiarare le proprie convinzioni con più aperta franchezza, e, per così dire, si tolse anche qualche sassolino dalle scarpe.

Resta, comunque, un dato indubitabile che l'Edizione Nazionale sia costruita su un impianto di severa "impersonalità", senza alcun cedimento ad esigenze esplicative, cioè alla tentazione di accompagnare le scritture pubblicate con note o commenti volti ad orientarne la comprensione e/o l'interpretazione.

Oltre all'ideale di impronta positivistica di cui si è già detto, a far propendere i curatori per un assetto esclusivamente documentario ha di certo contribuito la volontà di sottrarre la figura di Galileo alle distorsioni e agli stravolgimenti operati nell'ambito dell'aspra disputa allora in corso tra laici e cattolici, i quali, entrambi, rivendicavano alla propria causa il magistero galileiano. A lavoro completato, Antonio Favaro avrà modo di sottolineare come l'Edizione Nazionale, nella sua "neutralità", potesse favorire un dibattito tra le opposte fazioni meno ideologico e strumentale, nonché più storicamente attendibile:

> La lotta intorno a Galileo ed al principio per il quale il suo nome viene agitato come una bandiera, – scriveva – ferve oggidì più che mai: noi siamo lieti e superbi d'aver consacrata la vita a mettere i contendenti in pieno assetto di battaglia, affinché la verità, per la quale convien credere che d'ambe le parti lealmente si combatta, abbia il suo piano e definitivo trionfo.[17]

L'intenzione favariana convergeva con i propositi del Ministero della Pubblica Istruzione (promotore dell'opera), desideroso di non innescare polemiche che avrebbero senz'altro peggiorato i già tormentati rapporti del giovane Stato unitario con la Chiesa di Roma. Si spiega così il rilievo di Favaro per cui la decisione di astenersi da "qualsiasi illustrazione d'ordine scientifico o storico" era "*conforme al preciso mandato ricevuto*". La scelta di eliminare dagli apparati ogni parere, opinione o commento, oltre che motivata dal

[16] Galluzzi, *Galileo, Rosmini, Darwin. Triumviri del cattolicesimo riformatore*.
[17] Favaro, "Galileo e le edizioni delle sue opere", 71-72.

desiderio di impedirne un rapido invecchiamento, rispondeva, dunque, a una puntuale, inequivocabile – irenica, nelle sue finalità – disposizione ministeriale.[18]

Purtroppo, nonostante il valore di indispensabile strumento di lavoro per gli studiosi di Galileo, l'Edizione Nazionale ebbe una circolazione assai limitata, tanto da venir definita un'opera "eccellente, ma quasi clandestina".[19] Già nel 1904, quando l'impresa si avviava alla conclusione (era in uscita il quindicesimo volume), Alessandro D'Ancona, dalle pagine del *Giornale d'Italia*, ne lamentava la mancata distribuzione commerciale, segnalando che le 500 copie tirate erano "sufficienti del certo ad arricchire Biblioteche ed Accademie, e qualche privato; ma insufficienti del tutto alle dimande e ai bisogni degli studiosi". D'Ancona informava inoltre che la direzione dell'opera, cioè Favaro, aveva richiesto al Ministero che "se ne facesse una tiratura speciale, di minor formato e da porsi in commercio", incontrando però una netta chiusura:

> la ragione per la quale siffatta ragionevole proposta venne respinta, – continuava D'Ancona – fu questa: che le spese della speciale tiratura sarebbero state sostenute dal Ministero, ma i proventi se li sarebbe goduti il Demanio.[20]

Il realtà, la ristampa "economica" dell'opera venne autorizzata e, nel 1890, ne uscì anche – in un formato più piccolo e al costo non eccessivo di 5 lire il primo tomo. Più che per la contrarietà del Ministero, l'impresa naufragò per le difficoltà finanziarie che tormentavano la casa editrice Successori Le Monnier, che aveva assunto l'onere della pubblicazione, cosicché il volume stampato nel 1890 rimase orfano dei futuri fratelli e, nella sua solitudine, costituisce al giorno d'oggi una autentica rarità bibliografica.

Al fine di portare a compimento le ricerche che gli consentirono di realizzare il progetto dell'Edizione Nazionale, Favaro ricorse all'ausilio di numerosissimi studiosi, le cui missive formano una straordinaria raccolta di oltre diecimila lettere. Se scorriamo lo sterminato elenco di corrispondenti vi troviamo personaggi di primo piano dei più svariati campi della cultura italiana (per citare solo qualche nome: Papini, Govi, D'Ancona, Boncompagni, Guasti, Schiaparelli, Vailati, Formiggini), nonché molti protagonisti della storia della scienza internazionale: Pierre Duhem, Adam Charles, Moritz Cantor, Ludwig Birkenmajer, John Joseph Fahie, Henri Bosmans, Paul Tannery, Emil Wohlwill, George Sarton, tra gli altri.

In virtù di queste significative presenze, il carteggio non rappresenta solo una risorsa indispensabile ai fini di una (assolutamente auspicabile) ricostruzione delle vicende connesse all'approntamento della Edizione Nazionale galileiana – si pensi che il solo Del

[18] *Ibid.*, 64-65 (corsivo mio).
[19] *Ibid.*, 69.
[20] D'Ancona, "Petrarca, Galilei, Leonardo, Mazzini, e la Crusca nell'Edizione Nazionale".

Lungo vi compare con ben 1296 lettere, mentre dell'assistente per la cura del testo, Umberto Marchesini, restano 1007 missive –; ma, di fatto, l'analisi dei suoi contenuti può altresì servire a cogliere con maggiore precisione interessi e orientamenti teorici diffusi nella comunità degli storici della scienza dell'epoca. Certo, è lecito pensare che il centro di gravità degli interventi sia costituito da Galileo, ma ciò non toglie che spunti differenti e prospettive più generali non emergano anche a partire dal *particulare* galileiano.

Al pari degli scambi economici, quelli epistolari sono incentrati sul doppio registro del dare e dell'avere. Ecco perché, a fronte delle risposte ai quesiti posti da Favaro, stanno le richieste, le curiosità, i giudizi dei suoi interlocutori.

Farò due esempi al fine di meglio illustrare il punto in questione. Le tre lettere di George Sarton – tutte risalenti al 1913 – contengono notizie interessanti sugli esordi di *Isis*, periodico da lui fondato proprio in quell'anno: vi si trovano le ansie per l'intrapresa appena avviata, le preoccupazioni legate alla scarsità di abbonamenti, i timori del fallimento economico, nonché dettagli sulla collaborazione di Favaro, che faceva parte del *Comité de patronage* della rivista, e, in quel 1913, vi pubblicò ben due saggi (uno su Guarino Veronese e l'altro sul Tartaglia).

A sua volta, la corrispondenza di Giovanni Papini (20 lettere scritte tra il 1908 e il 1912) ci rende notizia di un singolare progetto del letterato fiorentino, volto a dimostrare come l'empirismo classico britannico troverebbe salde radici nella filosofia di Galileo e della sua scuola:

> La mia tesi, forse un po' troppo arrischiata, – osservava Papini – è questa: che la maggior parte delle idee fondamentali della così detta filosofia inglese (Bacone, Hobbes, Locke, Berkeley, Hume) ebbero origine in Italia e di là passarono in Inghilterra. Mi occorre dunque aver le prove dei contatti intellettuali fra i due paesi per stabilire almeno la possibilità di una tale influenza, senza contare tutte quelle, dirette, che ho già raccolte.[21]

Papini cercava dunque le pezze d'appoggio in grado di documentare le (supposte) radici galileiane dello "idealismo inglese" (così lo chiamava). Al di là del giudizio di merito sulla fondatezza dell'ipotesi di lavoro, vale la pena di notarne la premessa, consistente nella riduzione della complessa e multiforme epistemologia galileiana a una concezione essenzialmente empirista.

In sostanza – per tornare al nostro argomento – i carteggi non sono mai monotematici, soprattutto quando a corrispondere sono personaggi contraddistinti da spiccato talento, apertura mentale, passione ideale, desiderio di spaziare nel vasto campo della conoscenza.

[21] G. Papini ad A. Favaro, 17 dicembre 1910, Domus Galilaeana di Pisa, *Carteggio Favaro*, n. 8163; cfr. Museo Galileo, *Thek@ Favaro*, https://bibdig.museogalileo.it/tecanew/opera?-bid=43237&_ga=2.158678206.563705633.1691251315-1989880909.1685950866&%22=

Gli epistolari sono poi dotati di una intrinseca, naturale dinamicità, che è giocoforza assente dalla presentazione compiuta, retoricamente rifinita e apoditticamente strutturata, che del pensiero viene fatta in libri ed articoli. Da questo punto di vista essi svolgono un importante ruolo integrativo rispetto alle opere, contribuendo ad illuminare il senso autentico delle formulazioni (soprattutto delle più complesse e controverse) e le motivazioni e circostanze che ne hanno segnato la genesi e accompagnato il processo di sviluppo. La possibilità di poter disporre di informazioni su una concettualizzazione ancora allo stato fluido, non sistematizzata, contribuisce così a darci un quadro veritiero dell'analogo storiografico di ciò che Hans Reichenbach denominava (in riferimento agli scienziati) il 'contesto della scoperta', ossia di un terreno di indagine che, se forse non è di precipuo e cruciale interesse per l'epistemologo, lo è di certo per lo storico in quanto attiene al concreto itinerario evolutivo delle idee.

Al contempo, l'esame del commercio epistolare tra grandi personaggi della cultura ci restituisce una sorta di 'flusso della coscienza' di una comunità intellettuale, rendendo notizia di sintonie, dissensi, diatribe, gioie, malumori e, anche, sentimenti privati. L'apertura dei cuori, oltreché delle menti, fa irrompere prepotentemente sulla scena la dimensione del vissuto, della quotidianità, del personale, consegnandoci vivide immagini di umanissime esistenze.

Insomma, leggere le corrispondenze ci pone dinnanzi a una replica della vita reale quasi in forma drammaturgica, rendendoci – come notava lo stesso Favaro a proposito del carteggio galileiano – spettatori di "un vero dramma, nel quale i diversi attori parlano per lettera essi medesimi, e ad ogni frase mostrano qualche lato del loro carattere".[22]

In conclusione, dunque, non si può se non salutare con gioia e gratitudine l'iniziativa del Museo Galileo di mettere a disposizione degli studiosi questa immane congerie di materiali, realizzando così un'impresa del tutto in linea con l'orientamento favariano di fornire le basi documentarie atte a sostenere interpretazioni e letture, anche radicalmente dissonanti, ma sempre costruite a partire dalla conoscenza delle fonti autentiche e delle testimonianze originali.

[22] Favaro, "Galileo e le edizioni delle sue opere", 66-67.

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Antonio Favaro e l'edizione nazionale galileiana. Ragguaglio su una teca digitale

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English title
Antonio Favaro and the National Edition of Galileo's works. Survey of a digital collection

Abstract
Sebastiano Timpanaro Snr., the first director of the Domus Galilaeana in Pisa, recognised that the philological and historical work of Antonio Favaro should be one of the principal concerns of the institute that had been entrusted to him at the beginning of the 1940s. He thus, together with Giovanni Gentile, the institute's president, took action to ensure that the Domus acquired Favaro's library and archive which were in the care of Favaro's son Giuseppe. The delays due to the worsening effects of the war and the unexpected deaths of Timpanaro and Gentile prevented the material, following its acquisition, from being used for a systematic study. Now the *Theka@Favaro*, curated by the Museo Galileo, carries forward this original intention through the use of modern computer technology. It constitutes a multifaceted digital library capable of providing anybody interested with first-hand material together with useful tools for its interpretation and contextualisation.

Keywords
Antonio Favaro, Sebastiano Timpanaro sr., Giovanni Gentile, Domus Galilaeana, digital archives

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L'11 febbraio 1943 Sebastiano Timpanaro senior, direttore di una Domus Galilaeana che emetteva i primi vagiti, raggiunse a Modena Giuseppe, il figlio di Antonio Favaro, docente di anatomia nella locale Università. La visita, sollecitata da Timpanaro nonostante le titubanze del suo ospite,[1] riguardava l'acquisizione da parte del neonato istituto pisano dell'archivio di Antonio Favaro e della sua biblioteca galileiana. Le trattative andavano avanti da tempo, erano precedenti all'inaugurazione della Domus e, soprattutto, avevano coinvolto in prima persona il suo presidente, il senatore Giovanni Gentile. E se Gentile esprimeva riconoscenza a Giuseppe Favaro per la decisione di legare per testamento alla Domus i libri e le carte del padre,[2] Timpanaro non giudicava limpido questo cambio di rotta, che contraddiceva evidentemente propositi diversi espressi in precedenza[3]. Due giorni dopo l'incontro, chiariva a Gentile che qualche gabella da pagare era in effetti stata richiesta:

> Sono pure stato a Modena e ho parlato col Favaro; ma avrei bisogno di riferirVi a voce a quale condizione si potrebbe ottenere subito i libri, gli opuscoli e i manoscritti galileiani di Antonio Favaro. Per lettera il Favaro mi ha pregato di non parlarVene. […] Io credo che occorrerebbe accontentare il Favaro, altrimenti si rischia di non avere nulla nemmeno dopo la morte: come sapete, un testamento si può sempre disfare. La biblioteca galileiana di Antonio Favaro è, specialmente per i manoscritti relativi all'edizione nazionale di Galileo, di valore inestimabile.[4]

Sia Giuseppe Favaro che Sebastiano Timpanaro sr. vantavano con Gentile rapporti di lunga data: istituzionali e opportunistici nel caso del primo, segnati da profonde affinità

1 "Vi prego però di osservare che con le immense difficoltà e con i gravi disagi che porta con sé il viaggiare in questi tempi, la vostra venuta a Modena non avverrebbe senza vostro gravissimo incomodo. Io vi consiglierei perciò di mettere in iscritto (possibilmente in digitoscritto) i vostri quesiti e di mandarmeli, ed io vi risponderei punto per punto", Giuseppe Favaro a Sebastiano Timpanaro sr., 4 dicembre 1942, Archivio della Domus Galilaeana di Pisa (d'ora in poi DGP), 9. *Corrispondenza di Giuseppe Favaro a Sebastiano Timpanaro sr.*

2 Cfr. Giovanni Gentile a Giuseppe Favaro, 29 maggio 1942, Archivio Giovanni Gentile - Fondazione Roma Sapienza, AFG (di seguito indicato solo con AGG), serie 1. *Corrispondenza*, sottoserie 3. *Lettere di Gentile*, fasc. 562. La lettera è collocata fra quelle indirizzate a Sebastiano Timpanaro sr.

3 "Il professor Favaro mi scrive sconsigliandomi di andare a trovarlo, per via dei 'gravi disagi' e delle 'immense difficoltà' del viaggio. Egli mi invita a rivolgergli per iscritto le domande. Come capite benissimo, si tratta di una forma di rifiuto, perché sulle ragioni della visita che gli avevo preannunziato non ci possono essere dubbi. Del resto, avevamo ben compreso che qualcosa di nuovo c'è dal giorno in cui ci scrisse del codicillo in favore della Domus", Sebastiano Timpanaro sr. a Giovanni Gentile, 6 dicembre 1942, *Sebastiano Timpanaro sr. Profilo, carteggi (1911-1949) e altri documenti*, 142.

4 Sebastiano Timpanaro sr. a Giovanni Gentile, 13 febbraio 1943, *ibid.*, 148.

intellettuali e da reciproca stima per il secondo. Anche se le convinzioni politiche indurrebbero piuttosto a pensare il contrario. Forte del percorso comune che il padre aveva avuto con Gentile all'interno della Commissione Vinciana (ma anche della sottocommissione per la trascrizione e la pubblicazione del codice Arundel),[5] Giuseppe Favaro gli si era rivolto per entrare a farne parte a sua volta, anche a costo di sottoporsi "ad un esame su qualsiasi argomento di Leonardologia".[6] L'esito favorevole delle sue istanze non si sarebbe ripetuto in seguito per l'ottenimento di una cattedra all'Università di Padova (agognata fino allo spasimo per ripercorrere le orme del padre e del nonno), nonostante i tentativi di trarre vantaggio dalle leggi razziali[7] o la pervicacia nel proclamarsi (se mai ce ne fosse stato bisogno) "fascistissimo".[8]

Un abisso dal dissenso e dall'incredulità manifestata a Gentile da Sebastiano Timpanaro sr. di fronte all'obbligo del giuramento imposto ai professori universitari a seguito delle leggi eccezionali: "ho pensato che esso si dovesse interpretare come un atto di adesione al fascismo e ho dichiarato senz'altro che quest'adesione, in coscienza, non posso darla".[9] Le divergenze politiche ("Io non sono fascista e non lo diventerò"[10]) non scalfivano comunque la fiducia nella comune volontà "di combattere l'indifferentismo e il teologismo che [dominavano] ancora nella scuola italiana".[11] Una fiducia candida, nata da antica ammirazione, fin da quando, "studente in matematiche"[12] poco più che ventenne, Timpanaro scriveva all'ancor giovane professore, interrogandolo in merito ai "concetti di immanenza e trascendenza",[13] e ripagata nei decenni con largo credito sul piano umano e professionale. Fisico di

5 Cfr. anche la corrispondenza, discontinua ma duratura nel tempo, di Antonio Favaro a Giovanni Gentile in AGG, serie 1. cit., sottoserie 2. *Lettere inviate a Gentile*, fasc. 2223.

6 AGG, serie 1. cit., sottoserie 2. cit., fasc. 2224. "Il far parte della Commissione Vinciana – non mancava di precisare – è un segno accarezzato da lunghi anni non solo da me, ma anche da mio padre stesso, dal quale appresi la tecnica della lettura dei manoscritti vinciani ed imparai sotto la sua guida a scrivere correntemente in carattere vinciano con la mano sinistra", Giuseppe Favaro a Giovanni Gentile, 8 agosto 1925, *ibid.*

7 "Come ella sa, in base alle recenti disposizioni, tutti i professori ebrei vengono eliminati. Ora appunto la mia cattedra di Anatomia umana normale di Padova, occupata dall'ebreo prof. Terni, rimarrà vacante, ed io desidero venirvi trasferito dall'Università di Modena. La pregherei perciò vivissimamente di fare tutto il possibile per ottenermi da parte del Ministro un tale trasferimento", Giuseppe Favaro a Enrico Carusi, 12 settembre 1938, AGG, serie 1. cit., sottoserie 4. *Corrispondenza tra diversi*, fasc. 409.

8 *Ibidem.*

9 Sebastiano Timpanaro sr. a Giovanni Gentile, 7 dicembre 1926, *Sebastiano Timpanaro sr.*, cit., 115. Sui rapporti fra Sebastiano Timpanaro sr. e Gentile cfr. Canfora, *Timpanaro e Gentile*, 19-25.

10 *Sebastiano Timpanaro sr.*, 116.

11 *Ibidem.*

12 Sebastiano Timpanaro sr. a Giovanni Gentile, 26 aprile 1911, *ibid.*, 113.

13 *Ibidem.*

mestiere, ma "appassionatissimo e quasi tormentato dal problema filosofico",[14] Timpanaro individuava nell'indagine storica la chiave critica irrinunciabile per comprendere la dimensione unitaria del pensiero filosofico e scientifico. Una visione originale per il dibattito contemporaneo, quella dell'identità di filosofia e scienza, che lo allontanava in ugual misura dagli idealisti e dai positivisti, le principali falangi che si combattevano nell'agone filosofico, come anche dai cultori di ricerche erudite scambiate troppo spesso per storia delle idee.[15] E la Domus Galilaeana non poteva che incarnare i principî del suo direttore, attivo e infaticabile nel dotarla di un patrimonio, attraendo donazioni e acquisendo biblioteche e archivi privati di scienziati e storici della scienza, ma al tempo stesso incrollabile nella convinzione che "il fine principale" del suo istituto non fosse "quello di conservare, ma quello di produrre".[16] "La Domus è, e vorrà essere con sempre maggiore consapevolezza – scriveva a pochi mesi dall'inaugurazione –, un centro di studi di storia, di critica, di filosofia delle scienze fisico-matematiche, con particolare riguardo a Galileo".[17]

Galileo, l'ultimo filosofo della natura, scienziato e letterato al tempo stesso, personificava quel sapere inscindibile fatto di scienza, filosofia e letteratura, del quale Timpanaro promuoveva una sorta di rinascita.[18] Un'immagine insolita e avanzata per quegli anni, nata dai frutti di una lettura accurata e di una conoscenza profonda della fatica ventennale di Antonio Favaro, che ancora in pochi erano riusciti a cogliere. Più apparenti che reali le affinità col Galileo commemorato da Gentile in una delle conferenze celebrative del terzo centenario della morte promosse dalla Reale Accademia d'Italia:[19] "grande matematico", "meccanico", "grande osservatore e ricercatore dei fenomeni naturali", "astronomo e col suo cannocchiale felice scopritore di nuove stelle", faro di "una nuova epoca non pure nella storia del pensiero italiano, ma nello svolgimento della civiltà umana" grazie a una grande "passione scientifica" che non gli diede "mai tregua", commista a "una grande passione filosofica, una costante, vigilante, acuta coscienza delle ragioni profonde su cui la sua scienza si appoggiava".[20] Filo-

[14] Sebastiano Timpanaro sr. a Giovanni Gentile, 8 settembre 1920, *ibid.*, 115.

[15] Cfr. Bucciantini, "Galileo e la cultura italiana del Novecento: Timpanaro, Banfi, Geymonat", 263-288 (poi in *Scienze e storia nell'Italia del Novecento*, 67-97).

[16] Sebastiano Timpanaro sr., "La Domus Galilaeana", 711.

[17] *Ibidem.*

[18] Cfr. Bucciantini, "Galileo e la cultura italiana del Novecento", e Stabile, "Sebastiano Timpanaro sr. e Galilei", 125-152.

[19] Gentile, "La filosofia di Galileo", 377-393. La conferenza si tenne a Pisa il 17 giugno 1942. Sull'apparato cerimoniale per il terzo centenario della morte di Galileo, cfr. Baioni, "Celebrazioni di Galileo durante il fascismo: l'anniversario del 1942", 409-424.

[20] Gentile, "La filosofia di Galileo", 379-380; "un bisogno incoercibile – teneva a spiegare Gentile – di quella sicurezza che dà ad ogni nostro possesso la consapevolezza del titolo su cui esso si fonda, e però il dominio delle nostre ragioni in confronto delle ragioni dell'avversario: quella sicurezza obbiettiva che un dommatismo scientifico non può mai avere e che deriva dalla critica del filosofare, che alle verità della scienza può imprimere il sigillo della certezza. […] Non c'è

sofo come "ogni uomo che vuol essere uomo per davvero",[21] il Galileo gentiliano, punto di equilibrio fra Democrito e Platone, soffriva tuttavia gli artifici di un linguaggio inadatto,[22] annegando più volte in problemi non suoi.[23] E per l'inaugurazione della Domus, fissata in quegli stessi giorni, Gentile optò addirittura per un Galileo politico e nazionalista (quel Galileo di regime che aveva ispirato nel 1929 la prima ristampa dell'edizione nazionale delle opere), con una spruzzata supplementare di revanscismo bellico:

> Galileo torna alla sua città natale: alla città dei suoi studi giovanili, delle prime lotte, delle prime gioie per l'intuizione di un mondo nuovo. Torna in giorni che egli non sperò mai per questa Italia, allora tutta raccolta nel pensiero e nei fantasmi dell'arte: prona del resto nel servaggio esterno ed interno. Oggi che egli torna, l'Italia libera finalmente, una, fiera nella coscienza dei diritti che le conferiscono il suo passato gloriosissimo e il suo apporto indistruttibile al vitale patrimonio spirituale dell'umana civiltà, sta in campo contro nazioni che in altri tempi sarebbe parso follia sfidare: combatte e vince. Italia immortale, contro la quale *portae Inferi non praevalebunt*. Questa è l'Italia degna di Galileo e questa Italia, rappresentata dal suo Governo è qui oggi tutta presente in ispirito e plaude a Pisa che ha trovata finalmente la casa dove il suo grande figlio possa essere accolto; e restare sempre vegliato e servito dall'amore de' suoi concittadini. Studiato seriamente e così veramente onorato.[24]

più la scienza, ma la teoria della scienza; la quale teoria non si può più costruire con lo stesso metodo della scienza e postula una superiore veduta, in un campo diverso da quello in cui spazia l'occhio dello scienziato" (*ibid.*, 380).

21 *Ibid.*, 379.

22 "E qui è la radice profonda della sua grandezza: nel vigore speculativo con cui stringe insieme ed unifica gli opposti motivi del filosofare platonico e del democriteo. Anche qui da una parte razionalismo e idealismo e finalismo: dall'altra, sensismo empirico, e quindi materialismo e meccanismo. […] L'eterno *aut-aut* del pensiero: o spirito o materia; e chi vede il mondo cogli occhi dello spirito non ha occhi per vederne la materialità e il meccanismo" (*ibid.*, 383).

23 "Una natura come questa di Democrito, che è pur quella a cui si rivolge Galileo, è bensì l'oggetto del conoscere; ma finché si rimanga nel mondo del puro materialismo democriteo riesce effettivamente inconoscibile. Perché la conoscenza è possibile soltanto se c'è l'oggetto da conoscere, ma se c'è anche il soggetto che lo deve conoscere; e conoscere lo può soltanto se si distingue e oppone all'oggetto. Nella posizione naturalistica c'è (astrattamente, s'intende) l'oggetto, ma non c'è il soggetto. E viene a mancare perciò la conoscenza vera e propria, col suo valore logico, con la sua distinzione di vero e di falso, con la libertà che è la condizione d'ogni affermazione in cui la verità si faccia valere, e non sia un semplice effetto meccanico come la caduta di un grave. Disastrosa conseguenza dello stesso materialismo; ma ineluttabile una volta che l'uomo esaurisca tutto il conoscibile della natura propriamente detta, e risolva ogni accadere nel meccanismo della causalità. […] Galileo, e qui è la sua grandezza, apre gli occhi: e non si rassegna al puro democritismo. Egli è anche platonico" (*ibid.*, 385-386). Cfr. anche Torrini, "Galileo nel Novecento tra Italia e Europa. Sguardi", 57-76 (poi in Id. *Galileo nel tempo*, 271-303).

24 AGG, serie 5. *Attività scientifica e culturale*, sottoserie 9. *Enti diversi*, fasc. *Domus Galilaeana*. Si

Alla cerimonia inaugurale della Domus Giuseppe Favaro non presenziò per impegni universitari. Si limitò nell'occasione a inviare "la serie degli *Amici e corrispondenti*",[25] destando in Sebastiano Timpanaro sr. quell'inquietudine che sarebbe culminata qualche mese dopo nel viaggio esplorativo a Modena. L'edizione nazionale era il mattone principale su cui poggiavano le riflessioni di Timpanaro su Galileo e il suo pensiero, il metodo storico di Antonio Favaro assumeva un significato peculiare nella sua idea unificante di filosofia e scienza. Far acquisire alla Domus quella biblioteca e quell'archivio non si riduceva a mero collezionismo o a una vacua campagna promozionale, ma rispondeva a un indirizzo culturale di fondo convinto e meditato. Timpanaro dovette perciò persuadere Gentile ad accondiscendere alle pretese di Giuseppe Favaro, dando inizio a un estenuante processo di trasferimento che si sarebbe protratto negli anni. La biblioteca galileiana di Antonio Favaro e le "più di 50 filze Soennecken" con "la corrispondenza relativa all'edizione nazionale delle opere"[26] da lui stesso ordinata erano custodite nella villa Barbariga di Fiesso d'Artico, residenza estiva della famiglia. Giunsero subito alla Domus alcuni pezzi che per le dimensioni ridotte e la particolare delicatezza avrebbero patito una spedizione cumulativa: un quaderno autografo di Giovanni Virginio Schiaparelli,[27] la *Lettera a Cristina di Lorena* "nell'edizione lillipuziana del Salmin"[28] e il volumettino dei *Pensieri, motti e sentenze*. Le nove casse di libri e manoscritti, approntate durante l'estate per essere affidate all'"agenzia Gondrand, sezione di Padova",[29] furono invece bloccate dal precipitare della situazione, soprattutto dopo l'armistizio dell'8 settembre. Giuseppe Favaro si risolse alla fine a ricollocare i libri nelle librerie a vetri per proteggerli dall'umidità dell'inverno e rimandò la spedizione all'anno successivo,[30] confidando in una soluzione rapida della "gravissima crisi", cui non si giunse però tanto rapidamente:

> Apprendo come neppure Pisa venga risparmiata dalle bombe degli alleati di Badoglio – scriveva mesi dopo a Timpanaro ostentando il suo disprezzo –, e voglio sperare che la Domus seguiti ad essere rispettata. Tuttavia neppure a Fiesso la biblioteca galileiana trovasi al

tratta di alcune pagine di appunti per il discorso inaugurale da leggere alla Domus.

25 Giuseppe Favaro a Sebastiano Timpanaro sr., 11 giugno 1942, DGP, Archivio, 9. cit.

26 Giuseppe Favaro a Sebastiano Timpanaro sr., 17 aprile 1943, *ibid.*

27 *Ibidem*. Il quaderno autografo al momento non si è ritrovato.

28 Giuseppe Favaro a Sebastiano Timpanaro sr., 23 aprile 1943, *ibid.*.

29 Giuseppe Favaro a Sebastiano Timpanaro sr., 12 luglio 1943, *ibid.*

30 "Sempre nell'ipotesi che queste nostre terre venete non siano teatro di fatti d'arme – paventava scrivendo a Gentile –, nel qual caso la mia povera villa con quanto contiene verrebbe annientata; per ora intanto credo che la biblioteca sia più sicura qui che a Pisa. Abbiamo qui parecchi soldati tedeschi in buoni rapporti con la popolazione; purtroppo non s'è pienamente al sicuro dai bombardamenti aerei anglo-americani. […] Sono talmente sfiduciato per tali nostre condizioni, che in queste ferie estivo-autunnali non ho potuto attendere, com'era mia abitudine, ad alcun lavoro", Giuseppe Favaro a Giovanni Gentile, 11 ottobre 1943, AGG, serie 1. cit., sottoserie 2. cit., fasc. 2224.

> sicuro, per le frequenti aeromachie che avvengono nel cielo veneto: nella scorsa settimana è caduta una bomba poco lontana da Villa Favaro, demolendo completamente una casa e massacrando i relativi inquilini.[31]

Il reiterato procrastinarsi della consegna fece sì che Giovanni Gentile, ucciso nell'aprile del 1944, non assistesse mai all'ingresso della biblioteca e delle carte di Antonio Favaro fra i fondi della Domus Galilaeana. Ancora nell'ottobre del '45 Giacomo Gaetani dell'Aquila d'Aragona, direttore generale delle accademie e delle biblioteche, rassicurava Timpanaro riguardo alla "conservazione della Biblioteca Galileiana donata alla Domus dal Favaro", informandolo di aver ottemperato alla sua richiesta di scrivere al Prefetto di Venezia per fargli "impartire le opportune disposizioni affinché la Villa Favaro, dove quella biblioteca [era] raccolta, [fosse] esclusa da eventuale requisizione od occupazione".[32] A riprova del perdurante e quasi struggente interesse del Timpanaro a salvare i libri e le carte di Antonio Favaro, e non meno dell'attitudine camaleontica del suo "fascistissimo" figlio a ottenere favori anche a regime caduto.

Le ragioni della bramosia entusiastica di Sebastiano Timpanaro sr. nel far sì che Antonio Favaro divenisse uno degli emblemi fondativi della Domus Galilaeana escono dalle righe di una rievocazione dello studioso e della sua opera a cento anni dalla nascita, che Timpanaro affidò alle pagine della *Fiera letteraria*.[33] La mole degli scritti galileiani del Favaro (di tutt'altra pasta rispetto a quelli che "sanno di lucerna"[34]) non doveva considerarsi propedeutica a un lavoro sintetico mai compiuto, e non era certo "una promessa non mantenuta",[35] fandonia cui proprio l'autore aveva dato credito, fino a confessare "che il suo non era un temperamento sintetico e che dove non c'era più da frugare e indagare perdeva lo slancio".[36] Quasi che il Favaro per primo non avesse avvertito la portata di quella "vera e

31 Giuseppe Favaro a Sebastiano Timpanaro sr., 27 marzo 1944, DGP, Archivio, 9. cit.

32 *Sebastiano Timpanaro sr.*, 221.

33 Timpanaro sr., "L'opera galileiana di Antonio Favaro", 7.

34 *Ibidem*.

35 *Ibidem*.

36 *Ibidem*. A detta di Timpanaro la notizia è riportata da Giovanni Giovannozzi in una lettera a Isidoro Del Lungo conservata alla Domus fra quelle donate dagli eredi per costituire un fondo dedicato. La lettera non è fra quelle giunte fino a noi. Quanto alla corrispondenza di Antonio Favaro a Giovanni Giovannozzi, ad oggi si è reperito poco o niente. Tuttavia da quanto scritto dal Giovannozzi al Favaro il 20 aprile 1916 appare chiaro che l'argomento, fra i due, era stato oggetto di discussione: "Grazie delle sue due nuove pubblicazioni galileiane. *Ad multos annos!* Ma a me tarda vederLe dare in luce il lavoro sintetico riassuntivo, della *Vita*, e quasi quasi mi impazientisco quando veggo uscire ancora semplici monografie. Io mi rassegnarei a non vederle pubblicare più niente per qualche tempo, finché non fosse fatto e finito quell'altro lavoro, il quale anche mi sembra non debba mai richiederle né molto tempo né molta fatica. A quando, dunque?", DGP, *Fondo Favaro*, Carteggio, 80, 8 (2617), n. 8830.

propria opera organica", della sua "potente armonica unità", figlia dello "stesso metodo".[37]

> Egli non ha nulla da vedere con coloro che raccolgono fatterelli, tanto per passare il tempo. È verissimo – contestualizzava Timpanaro – che il suo ideale era l'impersonalità, ma con questa parola, cara a Flaubert e a Verga, voleva significare e, ciò che più importa, riuscì sempre a ottenere l'eliminazione di ogni elemento arbitrario, passionale, polemico in senso volgare: riuscì a fare storia che, per variare di gusti e di teorie, non diminuisce di valore. Favaro non raccoglie con animo passivo e distratto i documenti, ma li legge, li analizza, li corregge, li illumina con la sua luce chiara e riposante.[38]

Solo i "cattivi filologi"[39] divaricano le strade di filologia e critica. Ma non Antonio Favaro: "la sua mentalità è tutta critica; i documenti sono per lui pensieri".[40] E non basta: "il suo grande senso storico" ne marca la distanza abissale, ne sancisce la "superiorità sugli storici della scienza del suo tempo".[41] Della schiera di coloro per i quali "in fondo la scienza non ha storia"[42] Timpanaro vedeva il simbolo in Pierre Duhem, alfiere di una scienza "tutta fatta" e impermeabile a ogni contesto, un susseguirsi di verità "massicce come cose materiali", "compiute e chiuse in se stesse", "monadi senza finestre",[43] rispetto alle quali lo scienziato quasi non ha parte. Col suo Galileo Antonio Favaro sbaragliava queste certezze fallaci, grazie a "nuovi criteri storiografici" e a "un nuovo concetto della scienza".[44] Ma a partire dal suo lavoro erano soprattutto i "numerosi spunti di critica scientifico filosofica" che per Timpanaro avrebbero aperto nuove strade, permettendo di "andare molto lontano".[45] Studiare "punto per punto" l'opera "atlantica" di Antonio Favaro, annunciava Timpanaro fra la promessa e l'auspicio,

> sarà uno dei compiti che la Domus Galilaeana dovrà assolvere, e assolverà certamente se l'Università degli Studi di Pisa e la Scuola Normale Superiore continueranno a voler bene a questa loro più giovane sorella, che ha cominciato a vivere tra gli allarmi e le bombe e ne risente ancora gli effetti.[46]

37 Timpanaro sr., "L'opera galileiana di Antonio Favaro", 7. E si poteva andare anche oltre: "i volumi dell'Edizione Nazionale e i libri, i saggi, le note del Favaro si possono considerare come i capitoli di una stessa opera" (*ibid.*).
38 *Ibidem.*
39 *Ibidem.*
40 *Ibidem.*
41 *Ibidem.*
42 *Ibidem.*
43 *Ibidem.*
44 *Ibidem.*
45 *Ibidem.*
46 *Ibidem.*

Dire che la *Thek@ Favaro* nasce qui non è poi così iperbolico. Sebastiano Timpanaro sr., morto poco più che sessantenne alla fine degli anni Quaranta, vide a mala pena iniziato il proprio progetto. Negli anni successivi il carteggio fu dotato di un catalogo con cui si intese rispettare l'ordinamento cronologico puro delle lettere, dato da Favaro stesso, utile a chi debba muoversi all'interno delle proprie carte o al curatore di un'edizione critica, un po' meno a chi voglia consultare un archivio per singoli corrispondenti. La parte restante del fondo, che oltre a scritti e materiali preparatorî conteneva anch'essa non poche lettere, rimaste per motivi svariati separate dalle altre, fu depositata in un armadio, priva di un qualsiasi strumento che ne consentisse un'analisi sistematica. Più avanti negli anni fu estrapolata una raccolta di centinaia di ritagli di giornale, messa insieme da Antonio Favaro prima e da suo figlio Giuseppe poi, recidendo però ogni legame fra i singoli pezzi e quanto aveva fatto loro da cornice. Non parrebbe che l'opera "atlantica" del Favaro ricoprisse per le gestioni successive quel ruolo centrale nell'attività della Domus che aveva ispirato la direzione di Sebastiano Timpanaro sr. Lo studio delle sue carte si arenò e la sua figura, emblematica del secolo della filologia scientifica e del positivismo storico, rimase appannaggio esclusivo di pochi addetti ai lavori.

Grazie a un accordo stretto fra il Museo Galileo e l'ultimo commissario prefettizio della Domus Galilaeana, oggi avviata alla chiusura, la *Thek@ Favaro*[47] (quarta in ordine di pubblicazione dopo le tre sorelle più anziane dedicate a Galileo, a Raffaello Caverni e a Leonardo)[48] getta le basi per approfondire personalità, ricerche storiche e imprese filologiche di Antonio Favaro, attuando di fatto i piani di Timpanaro, anche se in un panorama radicalmente trasformato dall'avvento delle tecnologie digitali. Il carteggio è stato interamente catalogato e digitalizzato, mantenendo la segnatura esistente, ormai storicamente attestata. Agli oltre mille corrispondenti già censiti[49] se ne sono aggiunti altri grazie all'identificazione di molte firme non lette in precedenza, riducendo al minimo i mittenti ignoti. Il contenuto delle cartelle racchiuse nell'armadio è stato ordinato, catalogato e digitalizzato anch'esso, insieme a una parte dell'archivio di Isidoro Del Lungo, consultore letterario dell'edizione nazionale galileiana, depositata dagli eredi alla Domus più o meno negli stessi anni, ma preclusa alla lettura dall'assenza di una benché minima sistemazione.

L'archivio Favaro ha adesso un suo ordinamento complessivo, pur oscillando fra segnature vecchie e nuove. Le serie in cui è suddiviso, fra lavori preliminari all'edizione nazionale galileiana, studi su Galileo e su temi diversi, carteggio, appunti, bibliografie, miscellanee, scritti e recensioni di altri autori, figure e prove di stampa, oltre a restituire documentazione di rilevanza particolare (un carteggio istituzionale specchio dei rapporti

47 https://teche.museogalileo.it/favaro/it.

48 https://www.museogalileo.it/it/biblioteca-e-istituto-di-ricerca/progetti/teche.html.

49 Per una panoramica sui corrispondenti di Antonio Favaro si veda l'articolo di Michele Camerota in questo fascicolo e, in un quadro assai più parziale, anche Sodi, "La fondazione della Domus Galilaeana e il fondo Antonio Favaro", 101-116.

non sempre fluidi con gli ambienti ministeriali lungo il corso dell'avventura editoriale, centinaia di ritagli di giornale, pagine di riviste o piccoli estratti da testate remotissime e altrimenti irrecuperabili, numerose riproduzioni fotografiche preparate per i facsimili secondo i procedimenti allora in uso) rendono ragione del metodo di lavoro di Antonio Favaro, delle strategie seguite per raccogliere e disporre quell'enorme mole di dati e documenti, in tempi nei quali non si era sorretti da alcun ausilio tecnologico. Metodo e strategie che ancora oggi possono illuminare la via a chiunque voglia fare storia sulle fonti. Lasciano stupiti l'abilità organizzativa e la dedizione al lavoro di un uomo capace contemporaneamente di curare un'edizione critica di tale livello, di dedicarsi a una costellazione di studi propedeutici, di tenere corsi universitari su materie prevalentemente non affini, di ricoprire varie cariche istituzionali e di tener quotidianamente vivo un carteggio di oltre mille corrispondenti. Una tempra fisica e una stabilità mentale non connaturate ai suoi collaboratori, costantemente in affanno a seguire i ritmi sovrumani e ad assecondare le pretese del direttore dei lavori.

Manoscritti, carteggio e documenti vanno a formare solo una delle sezioni della *Thek@ Favaro*: anche le opere a stampa di e su Antonio Favaro possono essere studiate, con tutte le medesime opportunità offerte dalle teche digitali per attingere dati e informazioni nelle pieghe degli archivi di personalità (ricerche mirate per chi ha già conoscenze approfondite sull'argomento, ricerche estensive per chi deve formarsi un'idea di massima, facilità nel creare indici personalizzati, lettura delle pagine a video). Ma è il contesto a dar sapore alla pietanza, ed è indispensabile darne conto. Una cronologia ampia, circostanziata e corredata di un'iconografia originale, che va da 1847 (anno di nascita di Antonio Favaro) al 1964 (anno della seconda ristampa delle *Opere di Galileo Galilei*, l'unica dell'Italia repubblicana) registra i fatti salienti della vita, dell'opera, delle relazioni umane e professionali di Antonio Favaro, ma anche delle tappe, degli inciampi e dei traguardi dell'edizione nazionale galileiana, perché l'uomo e la sua creatura sono indistricabili nel fluire degli avvenimenti che via via hanno inciso sull'uno e sull'altra. Un regesto biografico *ad hoc* ritrarrà invece quella galassia di personaggi, fra loro diversissimi, legati nel bene e nel male alle vicende private, all'attività di accademico e di studioso, agli affetti familiari di Antonio Favaro.

Una biblioteca digitale complessa che voglia essere riflesso attendibile di una figura, di un ambiente o di una fase storica, non può limitarsi a quanto conservato nelle collezioni dedicate o nei lasciti personali. La partecipazione di altre istituzioni sarà vitale anche nel caso della *Thek@ Favaro* per acquisire testimonianze ulteriori o procedere a una ricostruzione virtuale del carteggio il più possibile completa. Prima di una ricerca capillare negli archivi dei singoli corrispondenti giunti fino ai giorni nostri, gli accordi di collaborazione siglati con enti proprietari di cospicui nuclei documentari integreranno il contenuto del fondo della Domus Galilaeana: l'Istituto Veneto di Scienze, Lettere ed Arti ci restituirà il Favaro socio e presidente della prestigiosa istituzione veneziana, il Centro per la storia dell'Università di Padova il Favaro docente e storico della tradizione secolare dello Studio

patavino, l'Archivio Giunti, che conserva le carte Barbèra, il Favaro curatore nei rapporti con la casa editrice che pubblicò la sua edizione. La Biblioteca Nazionale Centrale e la Biblioteca Marucelliana di Firenze, legatarie di due altri tronconi dell'archivio Del Lungo, ci sveleranno il Favaro amico e corrispondente del filologo e cruscante fiorentino, un Favaro senza veli, occhio critico confidente e sincero sull'Italia liberale, dipinta come "un quadro animato e vivente" (e sono le sue stesse parole)[50] del nostro paese, a cavaliere fra i due secoli.

Chi abbia familiarità con l'edizione nazionale delle opere di Galileo e con gli studi di contorno avrà subito notato quanta influenza quell'edizione e quegli studi abbiano sulla struttura della *Thek@ Favaro*, quanto Antonio Favaro ne sia modello oltre che oggetto, nei metodi di ricerca, nei criteri di classificazione delle fonti, negli strumenti di supporto per l'inquadramento dei materiali raccolti. Persino questo stesso 'ragguaglio' lo scimmiotta un po' nell'impianto argomentativo, e neppure il titolo è stato scelto a caso. Antonio Favaro ha fatto scuola anche dimostrando in concreto come una collaborazione interdisciplinare fra esperti nei diversi campi sia basilare per la riuscita di progetti simili, avvalendosi delle competenze diversificate di consultori e collaboratori e del "benevolo concorso di tutti gli studiosi".[51] Promettendo di non lasciare "inesplorato alcun angolo" che gli fosse stato "additato come possibile ricettacolo di un documento galileiano", ammetteva di non "disperare di toccare la meta" solo potendo "contare sulla cortese cooperazione di coloro che, o per essere preposti ad archivii pubblici o privati, a pubbliche o private biblioteche, o per trovarsi in possesso di una qualche scrittura o di Galileo od a lui relativa" potevano considerarsi "naturali alleati nel superare le difficoltà" frapposte al felice esito del suo incarico.[52]

Quasi un secolo dopo, alla metà degli anni Sessanta del Novecento, sempre nel teatro della Domus Galilaeana, Eugenio Garin teneva la relazione finale di un convegno sulla ricognizione delle fonti per la storia della scienza, che non era stato esente da attriti fra gli specialisti nelle diverse materie. Interessato in quegli anni al pensiero filosofico di Galileo, alla cui comprensione avrebbe dato un contributo tutt'altro che irrilevante proprio grazie all'acume interpretativo che lo aveva guidato lungo le pagine dell'edizione nazionale,[53] Garin non poteva non aver presente l'eredità di Antonio Favaro (e sicuramente non era insensibile ai faldoni della sua corrispondenza conservati proprio in quelle sale), quando dettava alla comunità degli studiosi la linea da seguire:

50 Favaro, *Per la edizione nazionale delle opere di Galileo Galilei sotto gli auspici di S. M. il Re d'Italia. Esposizione e disegno*, 38. Favaro definiva il carteggio galileiano non "soltanto una serie di documenti, sì anco un quadro animato e vivente del più glorioso periodo della storia scientifica italiana".

51 Favaro, "Annunzio della edizione nazionale delle opere di Galileo Galilei", 943.

52 *Ibid.*, 944.

53 Cfr. anche Torrini, "I 'Galilei' di Eugenio Garin", 71-88 (poi in Id., *Galileo nel tempo*, 305-322).

> Lo storico-storico – chiamiamolo così – dovrà collaborare con lo storico delle idee, con lo storico dell'educazione, con lo scienziato competente nei vari campi, col filologo, col linguista, col paleografo, col bibliotecario, con l'archivista. Tale collaborazione dovrà curare innanzitutto la raccolta, la scelta e il coordinamento del materiale. Che sarà materiale d'archivio, di biblioteche e di musei.[54]

Questa, la tradizione che lo spirito delle *Teche* tiene a mantenere viva.

[54] Garin, "Relazione di sintesi", 294. Un paio d'anni dopo, presentando la ristampa dell'antologia *Dal carteggio e dai documenti* pubblicata nel 1915 da Favaro e Del Lungo, Garin evidenziava i frutti di una tale collaborazione: "A quasi sessant'anni dal compimento dell'opera il vanto del Favaro resta per molta parte non confutabile, a testimonianza della bontà dei criteri, forse non tutti espliciti, ma certo validi, in un campo di cui ora molto si discorre, e non sempre felicemente: quello della storia della scienza. L'edizione galileiana trae la sua consistenza proprio dal fortunato convergere di perizia filologica, di cultura specifica (scientifica) e di capacità storica (di storia del pensiero). Il che, forse, non si verificò altrettanto bene nella parallela e pressoché contemporanea grande edizione di Descartes (1897-1913), curata dall'Adam e da quell'insigne storico delle scienze che fu Paul Tannery, ma in cui l'armonizzazione delle varie competenze fu minore, e più scarso l'apporto della storia del pensiero filosofico e scientifico" (*Dal carteggio e dai documenti. Pagine di vita di Galileo*, X-XI).

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– ICONOGRAPHY –

Vincenzo Viviani: un ritratto ritrovato

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English title
Vincenzo Viviani: the portrait regained

Abstract
The paper brings to light an original portrait of Vincenzo Viviani found in a private collection in Florence. A head-size canvas (*tela da testa*) which may be identified with one of the portraits of the mathematician painted by Giusto Suttermans, the official court portraitist of the Medici family. Through the study of the Flemish painter's life written by Filippo Baldinucci and, especially, thanks to the inscription on the back of the canvas, it seems possible to identify the portrait as that owned by the Senator Giovan Battista Clemente Nelli, then printed by Francesco Allegrini for the *Serie di ritratti di uomini illustri con gli elogj dei medesimi*, which was released in four folio volumes between 1766 and 1773 by the publisher Giuseppe Allegrini.

Keywords
Vincenzo Viviani, portraits collection, Giusto Suttermans, Florence, seventeenth-century

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L'*Eloge di Monsier Viviani* scritto da Bernard de Fontenelle per l'Academie Royale des Sciences, tradotto in italiano con l'aggiunta di alcune note per la *Serie di ritratti di uomini illustri con gli elogj dei medesimi*, si apre con un ritratto a stampa del matematico fiorentino.[1] Inciso da Francesco Allegrini, fratello di Giuseppe promotore dell'intera impresa editoriale, il ritratto raffigura Viviani fino all'altezza del busto e il corpo ruotato verso sinistra, mentre guarda impassibile lo spettatore (Fig. 1). Consapevole del proprio ruolo e della dignità sociale raggiunta in seno alla corte granducale, indossa un semplice ma al contempo eloquente abito scuro bordato di pelliccia, lasciato aperto sul petto per mostrare la camicia come imponeva la moda del tempo; una veste che richiama vagamente la toga accademica, tanto denigrata ma mai abbandonata neppure dal venerato maestro Galileo.[2] Un'effigie – secondo l'uso – corredata in calce di un altisonante dedicatoria destinata a celebrarne l'immagine pubblica. Ecco perché il cartiglio in calce, oltre a ricordarne il nome e la casata, intuibile anche dallo stemma gentilizio posto al centro, menziona il suo status di primario matematico granducale.[3] Erano stati Ferdinando II e il principe Leopoldo a offrigli tale carica, senza però il significativo appellativo di filosofo, aggiunto nella dedica, forse per piaggeria nei confronti del Nelli.

Un'immagine funzionale a rivendicare in un'ottica partigiana la supremazia culturale di Firenze e dei Medici. Corredate dai ritratti, in effetti, le biografie avrebbero dovuto tracciare "un'istoria del rinascimento delle scienze, e delle arti, quasi unicamente dovuto al genio della Nazione e alla magnificenza, e al gusto della Casa Sovrana dei Medici". Era stato infatti grazie agli uomini illustri toscani che era iniziata – a detta dell'Allegrini che firma la prefazione all'opera – "a comparir più chiara la verità, e diffondersi tanta luce nel mondo per mezzo delle nostre scoperte da farne trionfar la ragione, e dissipare gli antichi fantasmi dell'ignoranza".[4] Sulla scorta di questi vettori culturali i ritratti, al pari degli *Elogi*, che segnano il passaggio da una tradizione biografica municipale e regionale a quella encomiastica di matrice nazionalistica tosco-italiana sempre più ostile alla Francia,[5] assolvono la funzione di una biografia dipinta che funziona come una sorta di introduzione figurata,

1 De Fontanelle, "Eloge de Monsieur Viviani", 137-148.

2 Tognoni, "Galileo togato: ritratto d'accademico", 77-84.

3 Questa la trascrizione integrale della didascalia: "*VINCENZIO DI IACOPO VIVIANI FRANCHI / PATRIZIO FIOREN.NO MATTEMATICO / DE SEREN.MI G.D.DI TOSCANA, GEOMETRA, / E FILOSOFO CELEBERRIMO. / nato il dì V Ap.le MDCXXII. morto il dì XXII Sett.bre MDCCIII. / Al Nobil Giovane il Sig:re Sinibaldo Nelli / Patrizio Fiorentino. / Preso da un Quadro in Tela di Giusto Subtermans appresso il Sig:re Gio: Batta: Nelli / Erede del sud:o Viviani. /* [in basso a sinistra] Girolamo Traballesi del: [in basso a destra] Fran: Allegrini inci: 1763".

4 *Serie di ritratti d'uomini illustri toscani con gli elogj istorici dei medesimi, consacrata a Sua Altezza Reale la Serenissima Maria Luisa infanta di Spagna, Arciduchessa d'Austria, Gran-duchessa di Toscana*, pp. nn. Per un panorama sull'editoria toscana del Settecento cfr. Pasta, *Editoria e cultura nel Settecento*.

5 Dionisotti, "Biografia e iconografia", 420-421.

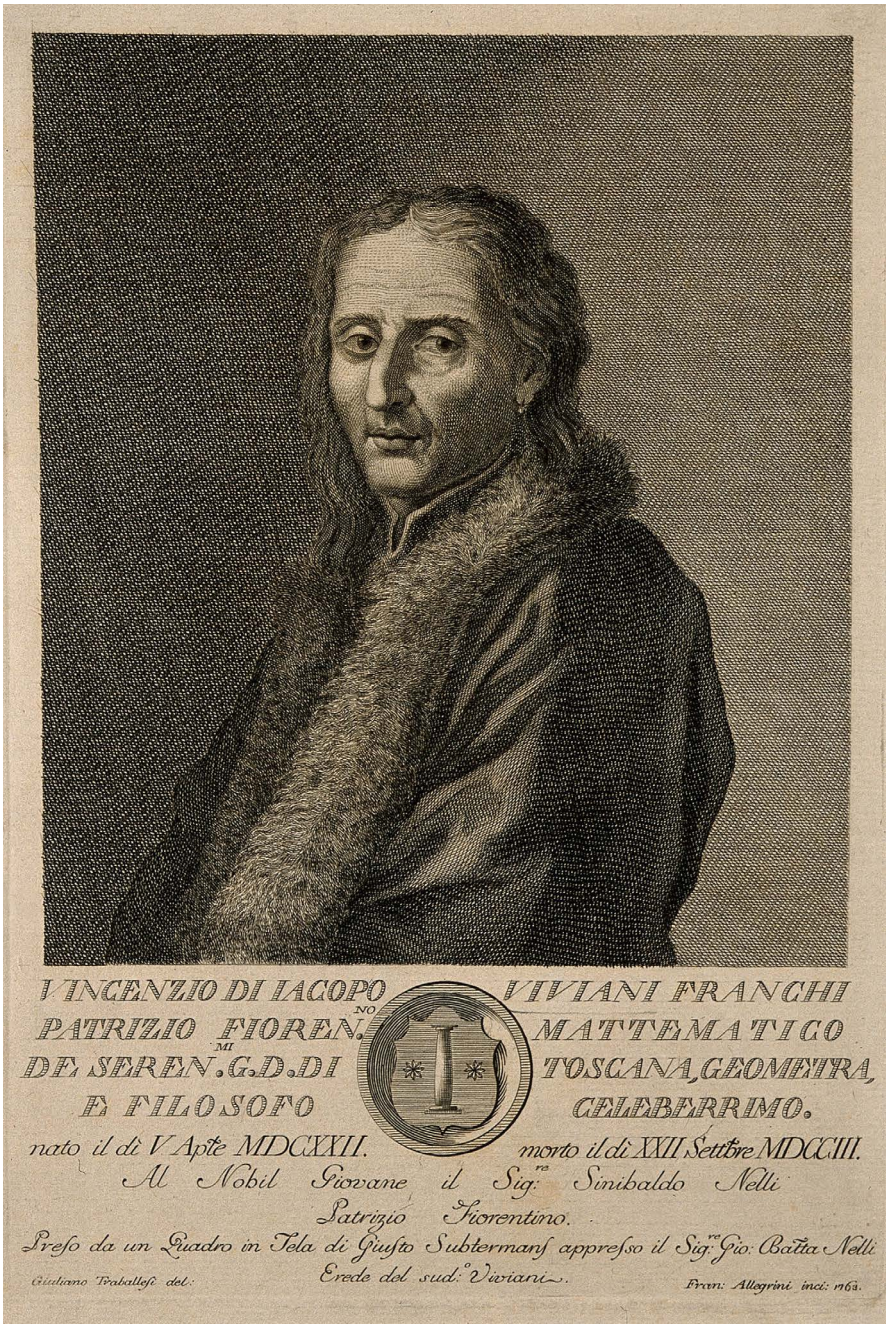

Fig. 1 – Giuseppe Allegrini, *Ritratto di Vincenzo Viviani, in Serie di ritratti d'uomini illustri toscani con gli elogj istorici dei medesimi…* , Firenze, appresso Giuseppe Allegrini, 1766-1773, Vol. II.

in grado di rappresentare "un non so che di sublime, e di grande". Nello specifico alle effigi "dei nostri illustri Maggiori" era stato affidato il compito di stimolare il lettore all'*imitatio* pedagogica, consegnando al contempo i singoli artefici all'immortalità:

> giacché secondo il savio parere di Sallustio, non si dee negare, che anco le *Immagini*, benché mute, non abbiano al cuore dei docili osservatori una certa forza d'esempio, e con tacito linguaggio non gli accendano all'imitazione di coloro, che sono da esse gloriosamente rappresentati.[6]

Particolare cura, in quest'ottica, venne riservata anche alla ricerca delle fonti iconografiche da riprodurre, giacché l'attendibilità delle effigi costituiva una preoccupazione assai sentita anche in passato.[7]

> fedelmente copiate per la maggior parte degli originali, che si conservano, o nei pubblici monumenti, o presso le private Famiglie, delle quali preventivamente era incominciata a pubblicarsi la serie.[8]

Un copione puntualmente rispettato anche per l'effigie di Viviani incisa nel 1763, ovvero tre anni prima dell'inizio della pubblicazione della collana, che vide la luce a Firenze in quattro volumi *in folio* tra il 1766 e il 1773 per i tipi di Giuseppe Allegrini. All'immagine del matematico fiorentino conservata nelle gallerie granducali, il *Ritratto di Viviani* dipinto da Pietro Dandini per la serie gioviana degli Uffizi o il pastello di Domenico Tempesti custodito nella collezione del Gran Principe Ferdinando,[9] tuttavia si preferì il ritratto di Suttermans conservato, come ricorda la didascalia, "*appresso il Sig:re Gio: Batta: Nelli*". Un'opera che il senatore fiorentino aveva acquistato da Carlo e Angelo Panzanini, che l'avevano ereditata direttamente dallo stesso Viviani. Un'opzione dettata forse dalla facilità di accesso che Allegrini poteva vantare nei confronti della raccolta del Nelli. D'altronde appena l'anno prima dalla medesima collezione era stato derivato anche il *Ritratto di Gali-*

6 *Serie di ritratti d'uomini illustri toscani con gli elogj istorici dei medesimi*, pp. nn.; Sallustio, *Bellum Iugurthinum*, IV, 5: "Nam saepe ego audivi Q. Maximum, P. Scipionem, praeterea civitatis nostrae praeclaros viros solitos ita dicere, cum maiorum imagines intuerentur, vehemen- tissime sibi animum ad virtutem accendi. Scilicet non ceram illam neque figuram tantam vim in sese habere, sed memoria rerum gestarum eam flammam egregiis viris in pectore crescere neque prius sedari, quam virtus eorum famam atque gloriam adaequaverit".

7 Esemplari gli studi pionieristici di Dionisotti, "La Galleria degli uomini illustri", 182-192; e Haskell, *Le immagini della storia*, 25-71.

8 *Serie di ritratti d'Uomini Illustri Toscani*, "Prefazione", pp. nn.

9 Cfr. la scheda di Alice Turchi in Spinelli, *Il Gran Principe Ferdinando de' Medici (1663-1713). Collezionista e mecenate*, 162, n. 13: Pietro Dandini, *Ritratto di Vincenzo Viviani*, olio su tela, 60 x 47 cm, Firenze Galleria degli Uffizi, inv. 1890, n. 282, dipinto nel 1704.

leo, sempre per mano di Francesco Allegrini, inserito nello stesso volume al n. XLII, prima di quello di Viviani posto al n. XLV (Fig. 2).[10] Ma certo sulla scelta dovette influire anche il fatto che a eseguire il ritratto fosse stato Giusto Suttermans, il "pittore d'uomini grandi"[11] della corte medicea per quasi mezzo secolo, dal 1621 fino al 1670, prima per Maria Maddalena d'Austria e poi per il nipote, il granduca Ferdinando II tra i principali ammiratori del pittore fiammingo.[12] Non solo "un pittore di semplici ritratti, ma universale […] che ha saputo con mirabile artifizio e franchezza imitare quanto mai fece la natura; ma nel formar poi sulle tele l'effigie degli uomini è stato tanto singolare, che può bene avere luogo fra quei rinomati artefici" capace di "consegnare alla posterità altre memorie, che di monarchi o di eroi o di nobilissime persone".[13]

In effetti, le qualità di straordinario ritrattista del pittore fiammingo erano state riconosciute e apprezzate a corte sin dal suo arrivo a Firenze, cosicché in sessant'anni di operosa attività, tra granduchi e granduchesse, principi e cardinali, nobili e funzionari, servitori e buffoni, furono davvero poche le personalità della corte a sfuggire al suo pennello. Nel 1635 anche Galileo ricorse al suo talento commissionandogli il suo ritratto da donare a Elia Diodati in segno di riconoscenza per aver tradotto in latino la *Lettera a Madama Cristina di Lorena*. Un'effige celebrativa contraddistinta da una forte tensione intellettuale, eletta a icona e maschera dello scienziato pisano, colto nella sua sconcertante verità di uomo dotato di straordinarie capacità intellettuali.[14] Non a caso l'opera venne inserita da Cosimo III nella Tribuna - a detta di Baldinucci - per "far vedere agli occhi degli eruditi in un tempo

[10] Tognoni, OG/Appendice, vol. I, 124-126, scheda D55; e Tognoni, *I volti di Galileo. Fortuna e trasformazione dell'immagine galileiana tra XVII e XIX secolo*, 76, 117-121. Al medesimo binomio disegnatore-incisore della stampa di Viviani (Giuliano Traballesi e Francesco Allegrini) si deve anche il *Ritratto di Evangelista Torricelli* (1762), inserito nel terzo volume della *Serie di ritratti di uomini illustri*, 125. Una derivazione, ancora una volta e non a caso – come dichiara la didascalia in calce - ricavata da un ritratto conservato nella collezione di matematici allestita da Giovan Battista Clemente Nelli: "Cavato da un Quadro in Tela appo. l'Ill.mo Sig.re Gio: Batta. Nelli", cfr. *infra*.

[11] Baldinucci, *Notizie dei professori del disegno da Cimabue in qua*, IV, 503.

[12] *Sustermans: sessant'anni alla corte dei Medici.*

[13] Baldinucci, *Notizie dei professori del disegno… ,* 475-476, che ricorda come il pittore fiammingo "in diversi tempi colorì al vivo" anche tre ritratti di Francesco Redi, nel 1666 nominato da Ferdinando II Protomedico e responsabile della spezieria e fonderia granducale, 503-504: cfr. Matteoli, "Toscani illustri. Lo scienziato aretino Francesco Redi: apporti all'iconografia", 53-55. Sul ruolo finanziario e sociale del pittore fiammingo: Fantoni e Goldenberg Stoppato, "Suttermans, Painter and Courtier of the Medici", 31-42.

[14] Si tratta del *Ritratto di Galileo* conservato nella Galleria degli Uffizi, inv. 1890 n. 745: cfr. Tognoni, *OG*, Appendice, vol. I, scheda D; e Id. *I volti di Galileo*, 9-16. Dipinto nell'estate nel 1635, il ritratto giunse in Francia a Elia Diodati all'inizio del 1636, che a sua volta, su suggerimento di Vincenzo Viviani, donò l'opera a Ferdinando II de' Medici nel 1656, che era già in possesso di un ritratto dello scienziato pisano dipinto da Suttermans intorno al 1640.

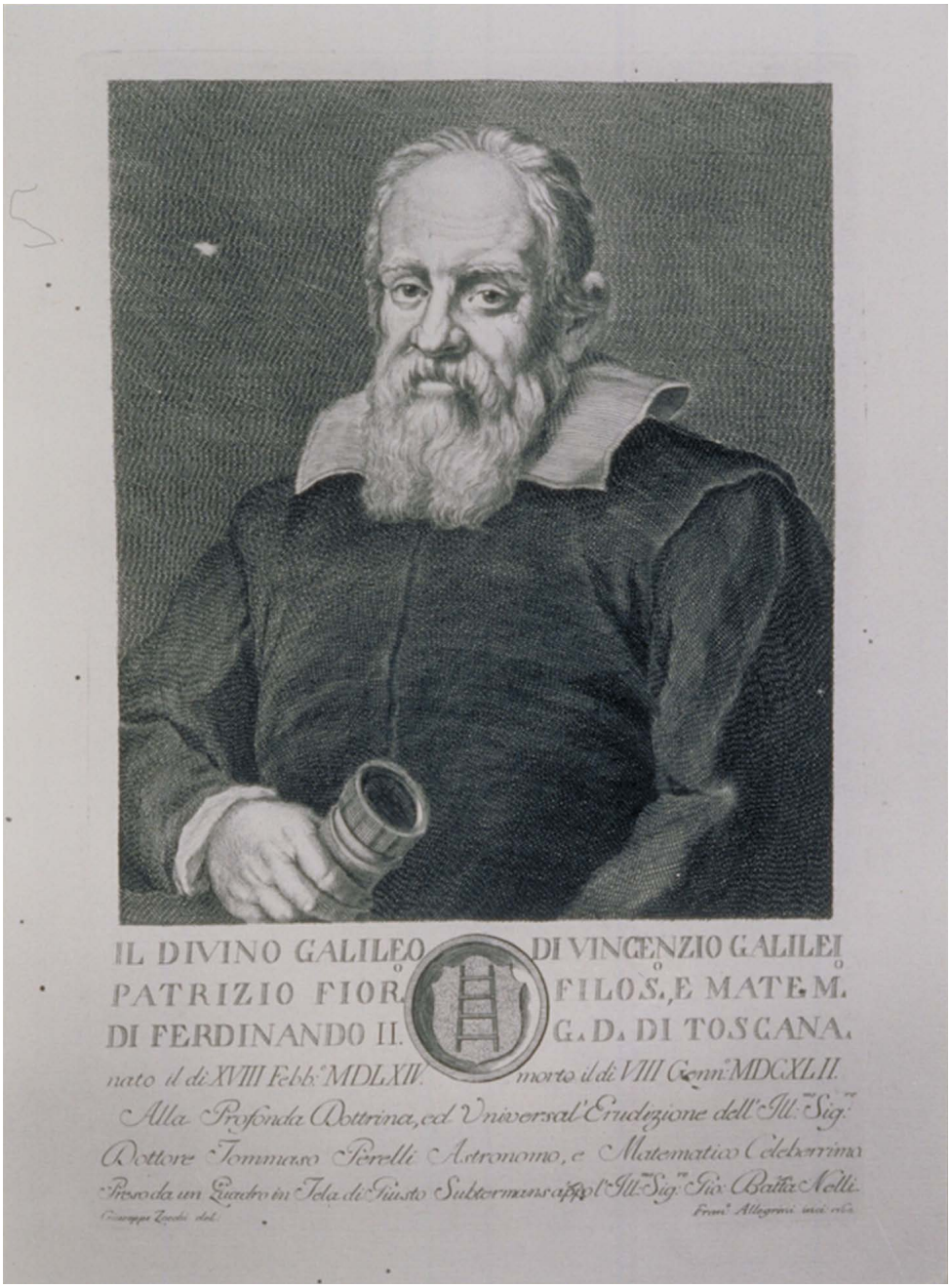

Fig. 2 – Giuseppe Allegrini, *Ritratto di Galileo, in Serie di ritratti d'uomini illustri toscani con gli elogj istorici dei medesimi…* , Firenze, appresso Giuseppe Allegrini, 1766-1773, Vol. II

stesso due stupendi miracoli della natura, nella persona di colui che quivi si rappresenta al vivo, e anche dell'arte nella pittura di Giusto". [15]

Dopo il ritratto di Galileo e contestualmente a quello di Francesco Redi,[16] dunque, non poteva mancare l'immagine del fedele allievo Vincenzo Viviani, il matematico granducale che era subentrato nella carica alla morte di Evangelista Torricelli, a sua volta succeduto al celebre scienziato pisano. Una commissione strategica richiesta direttamente a Suttermans da Ferdinando II, come ricorda lo stesso Filippo Baldinucci, che a detta del Marmi redasse la biografia del pittore fiammingo raccogliendola dalla viva voce dello stesso artista.[17] Un racconto che peraltro avrebbe potuto trovare una puntuale conferma nelle parole di Viviani. I due infatti si conoscevano bene, non solo perché facevano parte della stessa *élite* culturale fiorentina di metà Seicento. Entrambi, ad esempio, erano membri dell'Accademia della Crusca; ma soprattutto Viviani aveva chiesto aiuto al letterato fiorentino per determinare con certezza "anno, mese, giorno, ora e luogo della morte del divino Michelangelo Buonarroti"[18] nel tentativo di saldare la nascita di Galileo, avvenuta il 15 febbraio 1564, con la morte di Michelangelo avvenuta, solo tre giorni dopo come scriverà nel *Racconto istorico*, la biografia in forma epistolare dedicata al maestro.[19] Visto il rilievo documentario della testimonianza di Baldinucci al fine della nostra ricerca, utile riportarla nella sua interezza:

> non è da maravigliarsi, che al nostro pittore, da un sovrano fosse ordinato il procurare di fare il ritratto di quel virtuoso [Viviani]. Ripugnava a tal richiesta la modestia del Viviani, mentre quegli, per rendere obbedienza a quel grande, replicava l'instanze. Finalmente ebbe la cosa suo fine. Fu il ritratto fatto pervenire alla mano di chi l'avea ordinato, il quale vedendolo vestito del proprio abito civile, ebbe vaghezza di averne uno in altro abito più espressivo delle qualità letterarie, che adornavano l'animo della persona dipinta; onde volle che Giusto di nuovo il ritraesse: e così il nostro pittore fece l'altro bellissimo ritratto, che è quello appunto, che poi fu fatto pervenire in mano dello stesso Viviani: la persona del quale, in più che mezza figura, vedesi in atto di sedere con libri attorno, ed una lavagna: ed esso con stile e gesso alla mano, con moto e gesto spiritoso, alza l'occhio e la testa verso la sinistra parte; quasiché

15 Baldinucci, *Notizie de' professori del disegno…* , 508.

16 Francesco Redi che in una lettera al letterato Benedetto Menzini del 22 febbraio 1686, parlando dei ritratti del "famoso Giusto Susterman", conferma il giudizio di Baldinucci affermando che non solo sono "somigliantissimi all'originale", ma "si mirano più brillanti certe grazie, le quali ne' volti degli originali o non si ravvisano così alla prima, o veramente non vi sono così scintillanti"; cfr. Menzini, *Dell'opere di Benedetto Menzini*, 289, contenente le prose volgari.

17 BNCF = Biblioteca Nazionale Centrale Firenze: Marmi, Anton Francesco, *Notizie di vite e opere di diversi pittori*, s.d. [ante 1731]. ms. II.II. 110, c. 286.

18 BNCF, Ms. Gal. 11, c. 168v, citato da Segre, "Viviani's Life of Galileo", 221.

19 OG, XIX, 597-632; su cui oltre allo storico contributo di Favaro, "Vincenzo Viviani e la sua Vita di Galileo", 683-703, si veda Torrini, "*Una vita difficile: il* Racconto istorico della vita di Galileo Galilei *di Vincenzo Viviani*", 33-47 (ora in Torrini, *Galileo nel tempo*, 111-128).

> immerso in profonda speculazione, vada richiamando e combinando specie e fantasmi, ordinati alle sue mobili e peregrine invenzioni geometriche.[20]

Un'immagine presa a modello, come altre sue opere, da altri artisti. Ad affermarlo, ancora una volta, Filippo Baldinucci che nella alla vita di Robert Nanteuil ricorda come Domenico Tempesti, poco dopo il suo ritorno dal soggiorno parigino presso il celebre intagliatore francese patrocinato da Cosimo III, ricevette l'incarico da parte dello stesso granduca di eseguire alcuni ritratti di personaggi della corte medicea: il marchese Cerbone del Monte, il protomedico Francesco Redi e lo stesso Vincenzo Viviani.[21] In realtà, il ritratto di Viviani inciso dall'Allegrini su disegno di Girolamo Traballesi appare sensibilmente diverso per taglio e impostazione da quello inciso e dipinto dal Tempesti (Fig. 3). Se dunque riteniamo veritiero il racconto di Baldinucci, dobbiamo presupporre che l'incisore si sia servito dell'altro ritratto raffigurante Viviani dipinto da Suttermans, anche se il biografo fiorentino ricorda come in questa versione il matematico fosse contornato da libri e una lavagna. Altrimenti è necessario ipotizzare che esista un terzo modello di mano del pittore fiammingo non registrato dalle fonti. Fatto sta che l'incisione dell'Allegrini è in palese rapporto con un altro ritratto del matematico granducale: quello conservato presso l'Accademia della Crusca, dove Viviani era stato ammesso con il nome di Rinvigorito nel settembre del 1661.[22] Un'opera dalla tenuta qualitativa debole realizzata da un modesto copista fiorentino, ma che riecheggia il prototipo alla base dell'incisione inserita nella *Serie di ritratti di uomini illustri* attestandone, almeno in ambito fiorentino, la diffusione tra la fine del Seicento e i primi anni del Settecento, quando venne realizzata anche questa tela.[23] Offrono un riferimento cronologico *ante quem* per quest'opera i *Diari* dell'Accademia: poco dopo la scomparsa di Viviani, nell'adunanza del 5 dicembre 1703, toccò all'Arciconsolo Alamanno Salviati mettere ai voti la decisione di collocare un suo ritratto in Accademia; mentre nella seduta del 17 luglio 1704 venne stabilito che il successivo 24 luglio si svolgesse "una pubblica Accademia in lode del Rinvigorito",[24] che

20 Baldinucci, *Notizie dei professori del disegno…*, 501-502.

21 Baldinucci, *Notizie dei professori del disegno…*, V, 299: "Ha poi fatto, pure di comandamento della medesima A.S., il ritratto [¼] di Vincenzio Viviani, il celebre matematico: i quali tutti ritratti ha condotti con gran perfezione e finezza, siccome fa di ogni altra sua opera, non pure d'intaglio, ma eziandio di pastelli ad imitazione del già suo maestro". Il pastello è conservato nella Galleria degli Uffizi, inv. 1890, n. 282, cfr. Spinelli, "Una precisazione e qualche aggiunta a Domenico Tempesti", 37-38.

22 La cui impresa, costituita da una "Vite con paglione alle barbe" e con il motto dantesco "Quindi ripreser gli occhi miei virtute" (*Paradiso*, XIV, 82. I), fu approvata il 18 agosto 1690: cfr. Ciardi, and Tongiorgi Tomasi, *Le pale della Crusca. Cultura e simbologia*, 32, 362.

23 https://www.accademicidellacrusca.org/scheda?IDN=367 dove è visibile una riproduzione del *Ritratto di Viviani* (ultima consultazione del novembre 2022).

24 AAC = Archivio dell'Accademia della Crusca, *Serie Diari e Verbali*, *Fascicolo fascetta 77*, *Diario*

Fig. 3 – Domenico Tempesti, *Ritratto di Vincenzo Viviani*, Londra, Wellcome Library no. 9457i.

si tenne nella loggia grande del palazzo del duca Salviati, dove oltre a un gran numero di accademici parteciparono "molti soggetti riguardevoli per nobiltà e per lettere".[25]

Più vicino al modello, se non addirittura il prototipo dal quale verosimilmente deriva la copia della Crusca, è il Ritratto in prima tela recentemente emerso in una collezione privata fiorentina e che qui presentiamo per la prima volta (Fig. 4). Una tela da testa in buone condizioni conservative e di buona tenuta qualitativa, che raffigura Viviani in età matura fino all'altezza del busto, privo di qualsiasi elemento aggiuntivo destinato a suggerirne l'identità come si scorge anche nell'incisione dell'Allegrini.[26] Un'opera da sistemare tra le glorie di famiglia di cui purtroppo non si conosce tutta la storia collezionistica. Una preziosa traccia sulla sua provenienza è offerta tuttavia dall'etichetta applicata sul retro, dove un'iscrizione vergata a mano con una grafia in corsivo approssimativamente riconducibile ai primi dell'Ottocento dichiara:

dell'Informe (1696-1728), c. 130.

25 La prolusione, affidata a Luca degli Albizzi, venne seguita dalla lettura di alcuni sonetti in sua lode, seguiti dalla *Canzone In morte di Vincenzo Viviani* composta dal senatore fiorentino e accademico della Crusca Vincenzo da Filicaia, *Poesie toscane*, 201-213. Cfr. Favaro, *Amici e corrispondenti di Galileo*, 1096-1097.

26 Molto diffuso sul mercato romano, il formato della "tela da testa" corrispondeva per lo più a 65 cm x 45 cm. Il ritratto di Viviani misura 72 cm x 57 cm.

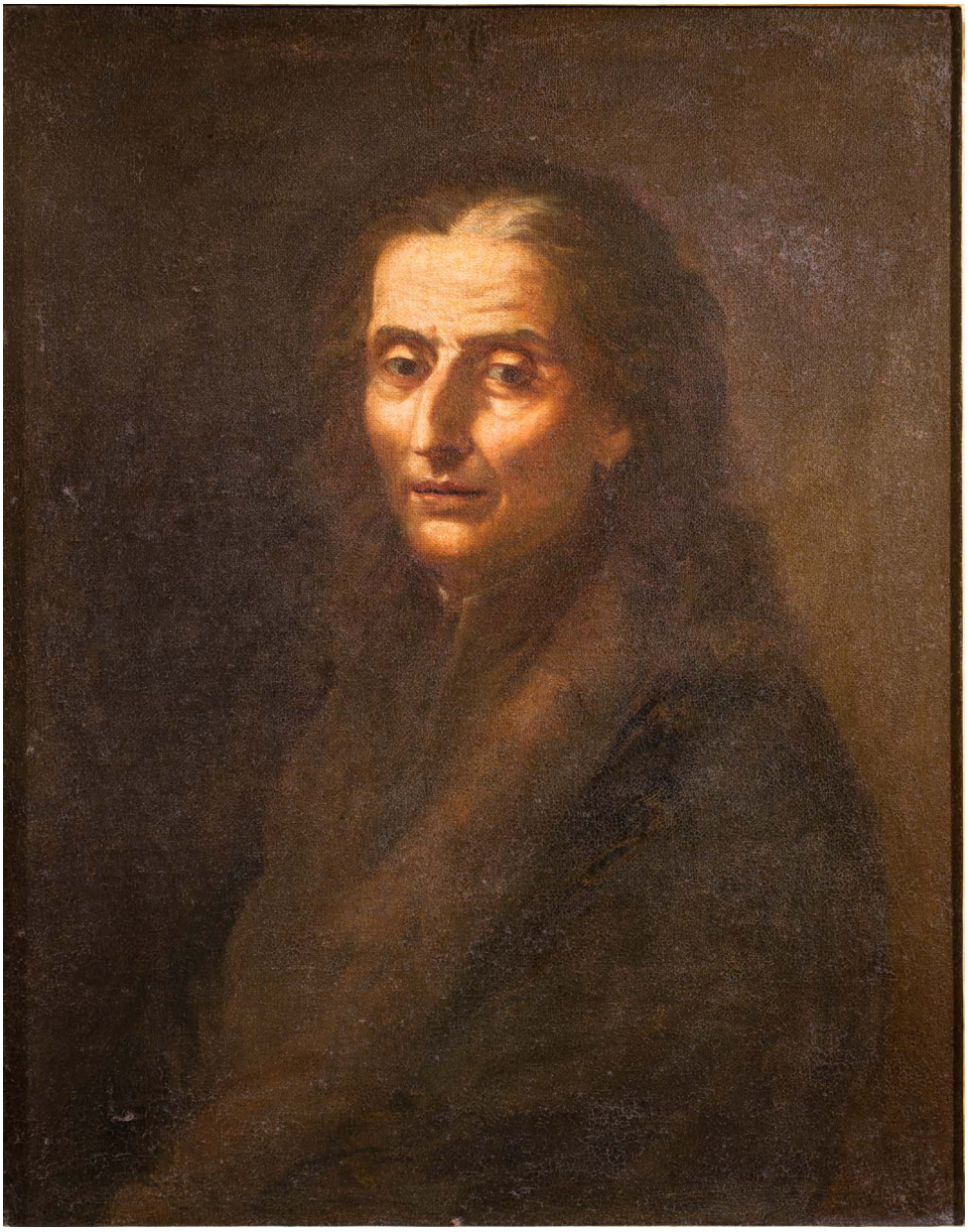

Fig. 4 – Giusto Suttermans (?), *Ritratto di Vincenzo Viviani*, Firenze, Collezione privata.

> Ritratto di Vincenzio di Iacopo Vi= / viani Franchi Mattematico, dipinto / da Giusto Substermans, e ripro[dotto] / nella Serie degli Uomini [Illustri] [...] / Toscani dell'Allegrini [...] /. Questo quadro era [...] / Sig:re Sena:re Gi[ovan Battista Clemente Nelli] / detto Viviani, [...] casa del quale fu / comprato in occasione di una / privata vendita fatta dal Sig:re Si= / nibaldo Nelli di Lui Figlio.

Sebbene frammentaria, la scritta identifica il *Ritratto di Viviani* con quello tradotto a stampa dall'Allegrini per la *Serie di ritratti di uomini illustri* certificandone al contempo la provenienza dalla raccolta di Giovan Battista Clemente Nelli (Fig. 5). Il nome del senatore fiorentino, citato anche nella didascalia a corredo dell'incisione, non è più leggibile sull'etichetta. È comunque facilmente ricavabile in quanto l'epigrafe in chiusura qualifica Sinibaldo Nelli come il "figlio" del possessore del dipinto. Essendo Sinibaldo l'unico nell'albero genealogico con questo nome è indubbio che si tratti del secondogenito di Giovan Battista Clemente Nelli, nato nel 1756 dall'unione con Anna Scarlatti, la prima moglie del senator fiorentino.[27] Dopo la morte del padre, caduta nel 1793, d'altronde fu proprio Sinibaldo, insieme ai fratelli, uno dei principali fautori della dispersione dell'ingente patrimonio di famiglia per lo più derivato dall'eredità di Viviani. Quest'ultimo, infatti, aveva istituito suo erede il nipote *ex-sorore*, l'Abate Jacopo Panzanini, che alla morte di Viviani nel 1703, oltre ai mobili, contrariamente a quanto stabilito nel testamento, ricevette in eredità anche parte della biblioteca e dei manoscritti inizialmente destinati all'Arcispedale di Santa Maria Nuova di Firenze.[28] Venuto a mancare l'Abate Panzanini, la collezione nel 1733 passò alla famiglia e successivamente ai nipoti Carlo e Angelo Panzanini, che iniziarono la vendita di tutti i materiali, fino a quando intorno al 1750, Giovan Battista Clemente Nelli comprò parte della raccolta dei "Ritratti di tutti Geometri della Scuola Galileiana, di quella di Federigo Comandino, e di molti altri Mattematici italiani" tra cui verosimilmente si conservava anche la tela raffigurante Viviani.[29] La notizia ora trova puntuale riscontro in un elenco manoscritto, finora rimasto inedito, proveniente da un fondo della famiglia Nelli affluito nella Biblioteca Nazionale Centrale di Firenze: la *Nota de' libri di Sinibaldo Nelli e de' ritratti del Perelli*, ovvero l'"Astronomo, e Matematico Celeberrimo" dedicatario - come ricorda la didascalia - del già menzionato ritratto di Galileo inciso dall'Allegrini. Dalla collezione del lettore di mate-

27 Nato nel 1756 dal matrimonio con Anna Scarlatti e scomparso nel 1813.

28 Nelli, *Vita e commercio letterario di Galileo Galilei nobile e patrizio fiorentino Mattematico e filosofico sopraordinario de' Gran Duchi di Toscana Cosimo e Ferdinando II*, 761-763; e Id., *Discorsi di architettura / del senatore Giovan Batista Nelli*, 17-18. Per i materiali confluiti a Santa Maria Nuova: Diana, "Una collezione di strumentaria scientifica all'avvento dell'ospedale moderno: gli strumenti fisico-matematici di Vincenzo Viviani e l'ospedale di Santa Maria Nuova di Firenze (1871-1895)".

29 Nelli, *Vita e commercio letterario…* , 765; e Favaro, *Amici e corrispondenti di Galileo*, 1128-1130.

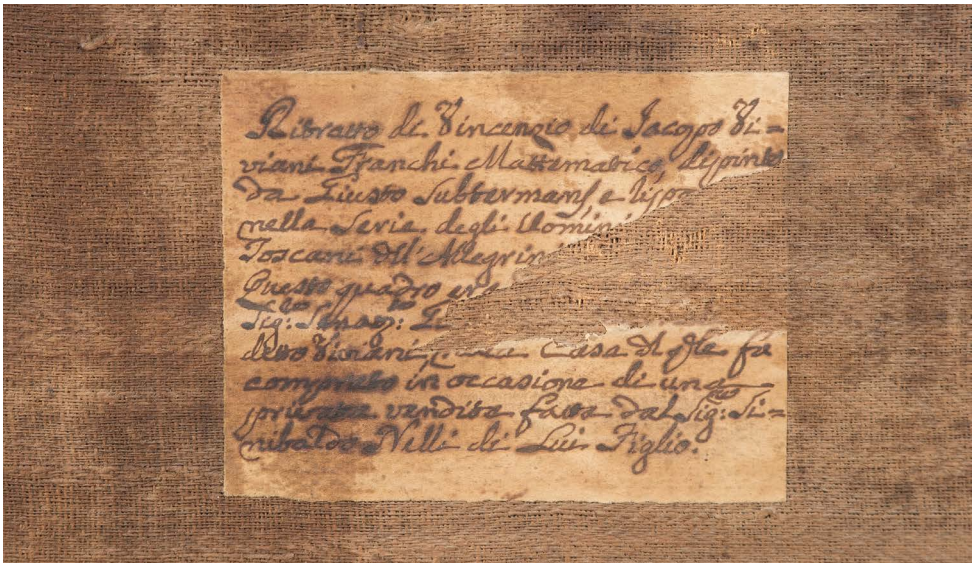

Fig. 5 – Giusto Suttermans (?), iscrizione posta sul retro della tela.

matica dello Studio pisano, Tommaso Perelli, transitarono infatti anche alcune opere poi confluite in quella del senatore fiorentino,[30] come il ritratto di Vincenzo Viviani che compare nella prima pagina del documento manoscritto, forse perché tra i primi dipinti a pervenire in suo possesso.[31] Si tratta, in ogni caso, di una nota di lavoro aggiornata nel tempo, a giudicare dalla grafia e dalla reiterazione di alcuni nomi, che confermano la veridicità del racconto del Nelli.

L'alienazione promossa dai figli del Nelli, almeno per il consistente patrimonio librario e manoscritto, venne interrotta nel 1805, quando Carlo Lodovico infante di Spagna, dispose l'ordinanza di sequestro dei manoscritti nelliani, acquistati nel 1818 dal Granduca Ferdinando III e donati alla biblioteca Palatina nel 1822.[32]

Al "*Nobil Giovane*" Sinibaldo, del resto, è dedicata anche la stampa incisa dall'Allegrini. Una dedica al primo figlio maschio di Giovan Battista Clemente Nelli, al tempo della traduzione a stampa ancora bambino (1763), ma con ogni probabilità già designato erede

30 Nelli, *Vita e commercio letterario…* , 872, come il busto plasmato in bronzo dal Foggini su commissione di Viviani.

31 BNCF, II._.294, ins. 43, *Nota de' libri di Sinibaldo Nelli e de' ritratti del Perelli*, in cui si citano anche i ritratti di Torricelli, Magalotti, Sagredo, Borelli, Cavalieri, Castelli, Ricci, Salviati, Comandino e Tycho, Copernico e Keplero.

32 Favaro, *Documenti inediti per la storia dei manoscritti galileiani nella Biblioteca nazionale di Firenze*, 58-60.

dell'opera, quasi sicuramente venduta tra il 1793, anno della morte del padre e il 1813, anno della sua scomparsa.

Tornando al *Ritratto di Viviani*, resta da capire per converso chi comprò il dipinto in questo lasso temporale e verosimilmente appose l'etichetta ancora oggi visibile sul retro della tela, che lo ritrae in età matura, tra i quaranta e i cinquant'anni a giudicare dalle fattezze somatiche restituite con marcato naturalismo che si manifesta nello studio insistito della fisionomia quasi caricata.[33] In effetti il volto, che si staglia su uno sfondo neutro incorniciato da lunghi capelli bruni leggermente incanutiti sulla sommità e colpito in pieno dalla luce che spiove da sinistra, appare segnato da rughe che si concentrano attorno alla bocca, agli occhi e sulla fronte, mettendo in evidenza il naso adunco e l'incarnato chiaro, ricordato dalle fonti.[34] Un'opera in cui l'impostazione della figura e gli accentuati effetti luministici rimandano alla ritrattistica fiorentina d'impronta barocca, come si ravvisa anche in altre opere dipinte da Suttermans tra il sesto e il settimo decennio del Seicento, quando la materia pittorica, a causa dell'affievolirsi delle forze e per l'indebolimento della vista, talvolta si assottiglia fino a lasciar trasparire la preparazione scura sottostante. Un termine di confronto si ravvisa, ad esempio, con l'*Autoritratto* del pittore proveniente dalla raccolta del Cardinale Leopoldo de' Medici, assai vicino per stile e impostazione del modello, presentato fino all'altezza del fianco e volto di tre quarti a destra con lo sguardo puntato dritto verso l'osservatore. [35] Una vicinanza stilistica avvertibile anche nell'uso della luce tersa che provoca decisi contrasti chiaroscurali fra il volto imbevuto di luce e il fondo bruno. Ma al di là degli elementi stilistici, a favore di questa proposta cronologica propende il fatto che la carriera di Viviani subisca una decisa accelerazione proprio a partire dalla fine degli anni cinquanta del Seicento. Membro dell'Accademia del Cimento a partire dalla sua istituzione, avvenuta nel 1657, nel 1661, come già ricordato, Viviani venne eletto membro Accademico della Crusca; nel 1664, su segnalazione di Colbert, ricevette la proposta da Luigi XIV di diventare suo primo astronomo, mentre nel 1666 venne nominato primo matematico del granduca Ferdinando II. E forse fu proprio questo evento a spronare il granduca a dotarsi, come aveva fatto con i suoi predecessori e altre personalità illustri della corte, di un suo ritratto. In ogni caso, si tratta di un'immagine in evidente corrispondenza con la traduzione a stampa realizzata dall'Allegrini, che

[33] Nel catalogo della mostra della Galleria Palatina l'esecuzione è fissata al 1665 ca.: Goldemberg Stoppato, *Prospetto cronologico*, 17. Con molta probabilità il ritratto venne dipinto dopo il 1666, anno in cui Viviani venne nominato matematico granducale.

[34] Tocci, *Vita di Vincenzio Viviani fiorentino detto Erone Geonio scritta dal can. Pierfrancesco Tocci fiorentino detto Critone Geonio*, 132: "Fu di statura più tosto alta, di carnagion bianca, di pelo, e di capello nero: l'occhio ebbelo d'un colore turchino chiaro, e sempre brillante, e vivo".

[35] Goldenberg Stoppato, *Un granduca e il suo ritrattista: Cosimo III de' Medici e la stanza de' quadri di Giusto Suttermans*, 28-29, n. 2: olio su tela, 79 cm x 63 cm, Firenze, Galleria degli Uffizi, inv. 1890, n. 1646, la cui esecuzione è fissata tra il 1655 e il 1660.

restituisce le fattezze e i volumi del prototipo attraverso un disegno rigido e un brusco modellato chiaroscurale che in alcuni passaggi tradisce la qualità dell'originale. Ma che il dipinto si tratti di una versione vicina se non addirittura il prototipo stesso lo conferma un ulteriore dettaglio assente in tutte le altre testimonianze figurative che ritraggono il matematico fiorentino, ma visibile nel ritratto conservato all'Accademia della Crusca e nella stampa della *Serie di ritratti di uomini illustri*: un piccolo orecchino sul lobo dell'orecchio sinistro di Viviani.

Certo allo stato attuale delle ricerche, risulta difficile stabilire con certezza se sia il ritratto dipinto da Suttermans o una copia di bottega, considerando che per tutta la sua lunga attività, ed in particolare nella parte finale della lunga e prolifica carriera, il pittore fiammingo venne affiancato da numerosi collaboratori impegnati a dipingere o replicare per suo conto ritratti da inviare nelle corti europee.[36] Largo ricorso alla bottega dovuto a un'energia creativa che iniziava a scemare, ma soprattutto imputabile alle ristrettezze economiche in cui la corte versava alla metà del secolo. Per questo motivo assai frequentemente si allontanò da Firenze per soddisfare le corti di Modena, Parma e Innsbruck. Nel 1649, al pari di altri cortigiani, Ferdinando II lo aveva privato della provvisione mensile, mentre nel 1654 gli era stato imposto un accordo finalizzato a contenere il compenso per le sue opere, che variava in base all'esecutore, maestro o collaboratore: "Copie che si faccino fare da essi Ritratti e ritocche da lui, proprio la metà de' prezzi […] con patto di darli telai, tele mesticate".[37]

Per un responso definitivo sull'autografia dell'opera è dunque necessario attendere il risultato di indagini diagnostiche più approfondite. Evidente, però, che si tratti di un testimone affidabile nella serie iconografica, da tenere in considerazione per ricostruire la storia dell'iconografia di Vincenzo Viviani, tra le personalità più ritratte a corte come ricorda Pier Francesco Tocci, il canonico di San Lorenzo: "Si ha dalle Lettere, che appresso diversi si conservano, l'istanze che di fuori venivan fatte per aversene i Ritratti, i Busti in Marmo, le Medaglie; a segno che vedendosi egli già assicurata per tutti i versi l'immortalità del nome, e di sé leggendo i pubblici Elogj".[38] E che non si tratti di una

[36] *Ibidem*, 17.

[37] ASF = Archivio di Stato di Firenze, *Guardaroba medicea* 669bis, c. 727, *Prezzi Accordati con il signor Giusto Suttermano pittore per i Lavori che occorreranno farsi*, 27 agosto 1654, citato da Stoppato, *Un granduca e il suo ritrattista*, 17, che intorno alla metà del secolo tra i collaboratori di Suttermans ricorda Carlo Bossi, autore di due ritratti di Leopoldo de' Medici. Invece, durante i ripetuti soggiorni alla corte di Modena, avvenuti tra il 1649 e il 1659, affiancò il pittore fiammingo Jan van Ghelder, il figlio di sua sorella Chiara. Sui prezzi concordati da Suttermans per la realizzazione dei ritratti medicei cfr. Fumagalli, "Dipingere ritratti nella Firenze del Seicento", 21-32, mentre per i nomi di alcuni mesticatori attivi a Firenze tra la fine Seicento e i primi del Settecento: Incerpi, *I mesticatori granducali. Artigiani e pittori dagli ultimi Medici alla Reggenza lorenese*, 17-35.

[38] Tocci, *Vita di Vincenzio Viviani fiorentino*, 132.

mera testimonianza di circostanza lo dimostra la penetrazione della sua immagine nelle quadrerie delle famiglie nobili fiorentine. Al di là del sentito omaggio di Lorenzo Bellini, lettore anatomico dell'Ateneo pisano e protomedico del granduca Cosimo III, che nel 1693 si rivolse a Giovan Battista Foggini per scolpire un busto del matematico granducale da inserire in una serie più ampia di uomini illustri come "perpetuum grati animi monumentum",[39] rimane, anche, l'inventario della galleria del conte Capponi. Tra le 62 effigi di uomini insigni della raccolta, accanto alla nutrita rappresentanza di filosofi, artisti, religiosi e letterati fiorentini e ai più rinomati scienziati europei figuravano ben due ritratti di Vincenzo Viviani.[40] Un inserimento quasi obbligato in virtù della sua attività di ingegnere e ingegnere idraulico per la corte granducale, ma in parte dovuto al suo impegno per la riabilitazione del pensiero del venerato maestro, che dopo la condanna per "veemente sospetto di eresia" rischiava di rimanere ingiustamente trascurato dalla comunità scientifica europea. A suffragare tale ipotesi il fatto che in entrambi i casi i ritratti di Viviani seguano le effigi di Galileo: nel primo caso compreso tra quello di Galileo all'età di settanta anni e quello di Robert Southwell, il futuro presidente della Royal Society di Londra conosciuto dal matematico fiorentino nell'estate del 1660 quando aveva soggiornato a Firenze e con il quale aveva instaurato un saldo legame di amicizia;[41] mentre il secondo ritratto, inventariato come opera del "Landini",[42] risultava inserito tra "Il Galileo, di Monsieur Giusto" e quello di Paolo Sarpi. Un privilegio riservato comunque a pochi in seno alla corte fiorentina, almeno a giudicare dalla testimonianza del segretario granducale Apollonio Bassetti. Incalzato da Cosimo III, preoccupato che il tirocinio di Domenico Tempesti presso Robert Nanteuil si trasformasse in un mero apprendistato finalizzato all'incisione di ritratti, Bassetti, scrivendo all'abate Carlo Antonio Gondi residente a Parigi, lo avvertiva, ammonendolo, che a corte serviva:

39 Tognoni, "Da scienziato a eroe del risorgimento: simulacri e monumenti di Galileo tra Sette e Ottocento", 215-216.

40 BNCF, ms. II.-.184, 29, *Nota de' ritratti di uomini illustri che sono presso il Senatore Conte Capponi*, ff. 187-189, nn. 18, 25. La trascrizione integrale dell'inventario, a cura di Gino Corti, è consultabile on-line sul sito del The Getty Provenance Index® Databases. Nella raccolta figuravano anche i ritratti dei principali sodali dell'Accademia del Cimento: Francesco Redi, Lorenzo Magalotti, Giovanni Alfonso Borelli e Niccolò Stenone.

41 Boschiero, "Robert Southwell and Vincenzo Viviani: their friendship and an attempt at italian-english scientific collaboration", 87-108.

42 Non improbabile che si tratti di un errore di identificazione compiuto nella trascrizione dall'estensore dell'inventario. Potrebbe trattarsi di Pietro Dandini, autore del già citato *Ritratto di Viviani* destinato alla serie gioviana della Galleria degli Uffizi, ma anche dell'effigie della Royal Society, dove un ritratto raffigurante Viviani venne presentato dal "Dr. Wilson of Florence" nel 1883. Suggestivo ipotizzare che si tratti della stessa opera citata nell'inventario Capponi: cfr. Robinson and Forbes, "The Royal Society Catalogue of Portraits", 312, olio su tela 97,8 cm x 75,6 cm, Inv. RS.9350.

> un buon Professore di bolino […] capace d'inventar et esprimere correttamente ogni sorte di cosa perché altrimenti si renderebbe qui molto inutile la di lui perizia limitata solamente ai Ritratti poiché questo paese, e questa Corte non sono come la Francia, dove abbonda la moltitudine de' personaggi cospicui Nationali, e stranieri dentro di sopravvivere al Mondo col mezzo de Ritratti per il Pregio della loro fama, ò nella Nascita, ò nelle Armi, ò nelle lettere ò nel Ministerio. Ma tra di Noi una volta che fussero delineate le immagini de Serenissimi Padroni si fermerebbe quivi tutto il ripiego del Professore.[43]

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[43] Corsini, "Un ritratto di Antonio Cocchi eseguito da Domenico Tempesti", 198-199, lettera di Apollonio Bassetti da Pisa a Carlo Antonio Gondi a Parigi del 2 aprile 1678.

Abbrevations

BNCF = Biblioteca Nazionale Centrale Firenze.
AAC = Archivio dell'Accademia della Crusca.
ASF = Archivio di Stato di Firenze.

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GALILÆANA, XX, 2 (2023)
– ESSAY REVIEWS –

"A radical relationship with the world of nature". Natural history collecting in the Modern Age

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Book review of Giuseppe Olmi, *Arte e scienza lungo la via Emilia. Storia naturale, illustrazioni e collezioni nell'età moderna*. Firenze: Edifir, 2022.

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Giuseppe Olmi has usefully collected some of his essays published over the past twenty years in an elegantly printed and richly illustrated book (*Arte e scienza lungo la via Emilia. Storia naturale, illustrazioni e collezioni nell'età moderna*, Florence, Edifir, 2022). Olmi himself tells us with his usual and elegant modesty about his recent book:

> I respond to the repeated and affectionate solicitations of my friends and colleagues Cristina De Benedictis and Arturo Fittipaldi […] to publish a collection of my old essays […] I thought it opportune to reprint here some of the works concerning personalities and facts of the modern age belonging to my region, Emilia Romagna. The fundamental themes are those that have for the most part distinguished my activity as a researcher, namely those of collecting and illustrating nature.[1]

These themes, which are widespread today, were certainly not such when Olmi started to devote himself to them half a century ago. Olmi dedicated himself to this subject on the basis of very characterised historiographic premises. It is no coincidence that the book we are discussing is dedicated to the memory of Paolo Prodi, Olmi's teacher. But let's go step by step.

Olmi dedicated – and never stopped – his energies as a young scholar to Ulisse Aldrovandi. Olmi collected the results of his first research on Aldrovandi in a small book published in 1976, in the introduction of which he declared:

[1] Olmi, "Nota introduttiva", in *Arte e scienza…* , 7.

> When, a few years ago, I began the exploration of the manuscripts of the Bolognese naturalist Ulisse Aldrovandi, I did so with objectives that were overall precise and clearly delimited. What interested me then – and which, moreover, still interests me today – was to deepen an aspect that is anything but secondary in the activity of our scientist, that of his attitude towards the figurative arts.[2]

Where did Olmi's interest in Ulisse Aldrovandi come from? This question can be effectively answered with the words of an illustrious scholar, a pupil of Roberto Longhi and then of Francesco Arcangeli, and a key figure in the history of art in Emilia Romagna in the second half of the twentieth century: Andrea Emiliani. Celebrating the seventy-five years of Paolo Prodi with pages included in a volume edited by Gian Paolo Brizzi and Giuseppe Olmi, Emiliani wrote:

> The *Teorica delle arti figurative nella Riforma cattolica* was published as a pre-printed extract in 1962 and, immediately after, in the *Archivio italiano per la storia della pietà* in 1965 [...] I still think that it was useful to contribute precisely to the knowledge of the fundamental issues of our work in relation to a decisive age like the second half of the sixteenth century. Those issues were identified especially in the context of that research which, in those days, was fervently activated and invested the problem of a conscious historical cataloguing and not only of archiving the artistic and cultural heritage in the Italian churches and, in this case, in the churches of Emilia-Romagna [...] Prodi's work project was [...] to move in the direction of Cardinal Gabriele Paleotti. The direction proved decisive to nourish in depth the visual prospecting that the figurativeness of the images, and in particular those of Ludovico [Carracci], allowed in an increasingly explicit way [...] Even Giuseppe Olmi, in 1977, in the interpretation given to the theme, in itself very relevant, of *Osservazione della natura e raffigurazione in Ulisse Aldrovandi* published in Trento, could enter into a consciously public historical dimension of a science offered to the life of man; and it was also his path parallel to the world of artists and Ludovico Carracci in particular.[3]

The long essay published by Prodi to which Emiliani referred to was precisely the one entitled *Ricerca sulla teorica delle arti figurative nella Riforma cattolica*. This essay will be republished in 1984 and Paolo Prodi will accompany it with a dense afterword. Prodi described the character of his research as follows:

> What I believe I have discovered in cardinal Gabriele Paleotti's papers is that his goal was to go far beyond the catechetical-pastoral concerns for the instruction of the illiterate people.

2 Olmi, "Premessa", in *Ulisse Aldrovandi*, 9.
3 Emiliani, *Paolo Prodi…* , 97-98.

> In drawing up his treaty [*Discorso intorno alle imagini sacre et profane*] he wanted, with the collaboration of intellectuals and artists, develop a theological thought and a spirituality capable of support the reform of the Church and society. Beyond a specific collaboration, which I tried to illustrate in my first publications, this translates into the attempt to create a naturalistic-historical culture that could support painters in the leap of cultural promotion which leads to the conquest of the autonomy of their "art" and to intellectual ascent [...] The figure of Ulisse Aldrovandi is particularly significant for the relationships it tends to build between the new classification of nature, the biblical theology and the representation techniques. What is interesting to emphasize is the development of a new cultural awareness of the distinction between the world of nature, which must be investigated with reason and senses, and the divine world, whose knowledge comes from faith and the revelation that Church preserves and transmits from generation to generation. The problem that is posed is not simply that of consequences of this approach in the representation techniques, but of the presence for the scientist and the artist of two books, that of nature and that of the Bible, which must be read with different methods and between which it is necessary to find harmony.[4]

In 1984 Prodi also wrote, together with Olmi, the essay *Gabriele Paleotti, Ulisse Aldrovandi e la cultura a Bologna nel secondo Cinquecento*. Here we read words that are fundamental to understanding Olmi's decades-long research: the naturalistic museum of Aldrovandi "was intended to encourage research and teaching. Aldrovandi remembers continuously and proudly this public function of his museum. This feature is further reaffirmed in his will, where he declares to leave to his city, after his death, what he laboriously collected and sorted".[5]

History of natural history collecting became in the following years a very fortunate subject of study; Olmi's research has not only had an international scope, but has played a masterful role. However, it is important to remember that Olmi's long work cannot be restricted to the perimeter of the history of collecting; his many essays preserve the original motivation born from the historiographical enterprise that Olmi shared with Paolo Prodi since the Seventies of last century.

Arte e scienza lungo la via Emilia. Storia naturale, illustrazioni e collezioni nell'età moderna consists of six essays: "I Cappuccini emiliano-romagnoli e la scienza nell'età moderna" (9-72); "*Il nobile caos di un picciol mondo*: arte e natura nelle collezioni estensi di Modena" (73-109); "Bologna nel secolo XVI: una capitale europea della ricerca naturalistica" (111-132); "Lo studio della natura a Parma nel tramonto dell'antico regime" (133-172);

4 Prodi, *Arte e pietà nella chiesa tridentina*, 42-44.

5 Olmi and Prodi, *Gabriele Paleotti, Ulisse Aldrovandi e la cultura a Bologna nel secondo Cinquecento*, 95, 98.

"Lodovico di Borbone, aristocratico *cultor prestante de' naturali e chimci studj*" alla fine dell'Antico regime" (173-205); "Padre Cesare Majoli, *uomo laboriosissimo per la storia naturale*" (207-239).

It is noteworthy to recall that the first essay was originally published in the volume, edited by Giovanni Pozzi (himself a Capuchin and a distinguished scholar of the history of literature) and Paolo Prodi, *I cappuccini in Emilia-Romagna. Storia di una presenza* (2002). We know how important the role of naturalistic collections and pharmacies in the convents of monastic orders has been in the modern age. Olmi shows the importance of the contribution made between the sixteenth and eighteenth centuries to the study of natural history by the Capuchins of Emilia-Romagna. Through little-known sources and unpublished documents, Olmi reconstructs the profile of some Capuchins such as "the friar Gregorio da Reggio [...] certainly a protagonist of that extraordinary impetus with which, at the beginning of the modern age, the study of nature was approached" (10). The knowledge of many places, facilitated by the wanderings caused by his religious activity, allowed friar Gregorio to explore the territory of Emilia Romagna and to build a vast network of relationships. Friar Gregorio had relations with the greatest contemporary naturalists: suffice it to mention Ulisse Aldrovandi among the Italians, Charles de l'Écluse among the foreigners. Thanks to a large and rare documentation, Olmi highlights the relationship between the spiritual activity of the Capuchins and their dedication to naturalistic research:

> Because of his commitment to research and his preparation, friar Gregorio must certainly be considered, in the field of natural history, what today we would call a true professional. In the course of the modern age and, in particular, in the seventeenth century, however, there were also numerous Capuchins who, without being able to boast of specific skills, made significant contributions to the knowledge of the world of nature. We allude to those friars who worked as missionaries in distant and hostile lands and who, in the daily struggle for survival and amid the difficulties encountered in spreading the Gospel message, found the time and strength to observe the environment around them and to transmit news about it to Europe. (26-27)

On the basis of unpublished documents and a fascinating iconographic set, Olmi, in all the essays collected in the volume, guides us along the Emilia to discover characters, places, and cultural relationships. Olmi shows us the importance of naturalistic museums and the activities that are connected to them: the direct observation of nature and the reproduction of the specimens studied in order to establish a stable and shared knowledge.

Bologna is at the centre of Olmi's historical investigations. It is the city of Ulisse Aldrovandi, who makes it a European capital of naturalistic research. Aldrovandi created a very rich private collection, but he did even more: "Aldrovandi deployed all his skill [...]

in creating a dense network of relationships and collaborations, which made his museum and more generally Bologna not only a crossroads for scholars and artists, but also a point of arrival and departure of dried plants, seeds, animal and mineral finds, illustrations, information and opinions" (117). But Bologna is not the only object of study by Olmi. Olmi studies the history of a clearly recognizable area of Italy under the ancient regime in a doubly polycentric perspective. The relationships between art and natural history that we discover through Olmi show us a territory made up of several centers, such as Modena (the Estense Gallery) or Parma (the University, the Museum of Antiquities). And cultural relations also show us how these centers interacted with other centers in Italy from the sixteenth to the eighteenth century. Olmi constantly combines cultural history with political history. Olmi never forgets that history is *histoire à part entière*.

Olmi's favourite historiographical objects are letters exchanged between naturalists, naturalistic museums, iconographic documents. Krzysztof Pomian, one of the founders of the history of collecting, wrote many years ago that one cannot examine objects independently of the men who give them specific functions and that men and their behaviors could not be analyzed without the objects that determine their social position. Since then, the number of books published on art and nature collecting has become colossal. But few books link artistic and naturalistic collecting to the history of the men of a region (always studied taking into account its relations with other Italian and European regions) as Olmi's book.

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Owen Gingerich (1930-2023): astronomer, historian, metaphysician

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On May 28, astronomer and historian of astronomy Owen Gingerich passed away at the age of 93. He was born on March 24, 1930, in Washington, Iowa, into a Mennonite family. When the present writer found in a Dictionary of Anabaptism the surname Gingerich among the followers of this religious current in sixteenth-century Germany and first met Gingerich on the occasion of an international conference in Munich (2003),[1] he chanced to ask him – confident in the openness and familiarity with which Gingerich welcomed younger scholars – if that was the origin of his family, to which he answered in the affirmative.[2]

Gingerich's father, Melvin, was a professor of history, co-editor of *The Mennonite Encyclopedia*[3] and author of several books on Mennonite arguments. Owen started high school at Bethel College (North Newton, Kansas), where his father taught, and his college studies at Goshen College (Indiana), a Mennonite college to which his father transferred in 1947 as a professor of history. At that college Owen continued his studies, taking courses

1 Conference "Astronomy as a Model for the Sciences in Early Modern Times", 21-23 March 2003. See Gingerich, "The Invisible Astronomical Network, 1543-1600".
2 Gingerich, Melvin and Ruth Runion-Slear, "Gingerich (Gingrich, Guengerich, Gingery) family".
3 Krahn, Cornelius, Gingerich, Melvin, and Harms, Orlando, eds. *The Mennonite Encyclopedia*.

in chemistry, although he had not yet completed his basic studies at Bethel College. His vocation, however, was directed towards astronomy: at the age of nine, with the help of his father and following instructions he found in a book, he had built his own telescope, and could see the rings of Saturn; later, in Indiana, he built a new one, of eight inch aperture, with which he observed variable stars; he spent some summers at Harvard College Observatory[4] and collaborated with the magazine *Sky & Telescope,* founded in 1941 and aimed at astronomy amateurs.[5]

Gingerich finally decided to follow his astronomical vocation and study at Harvard College Observatory with the intention of becoming a science journalist. At Harvard he graduated with a Master of Arts in 1953, receiving his doctorate in 1962 with a thesis in astronomy entitled *The Study of Non-Gray Stellar Atmospheres*, under the direction of Charles Allen Withney. Earlier, having already married Miriam Sensenig in 1954, he taught for three years (1955-1958) at the American University of Beirut, where he moved on account of his status as a conscientious objector to military service, in accordance with his Mennonite faith. From there he continued to submit numerous articles to *Sky & Telescope*.

Gingerich pursued his academic career at Harvard from 1963, as an astronomer at the Astrophysical Observatory of the Smithsonian Institution and from 1967 he combined it with the teaching of the History of Astronomy in the History of Science Department, as an assistant to I. Bernard Cohen. He retired in 2000 but remained active as professor emeritus until shortly before his death. In this obituary we will focus only on his decisive contributions to the history of astronomy and to the astronomical and scientific revolution of the sixteenth and seventeenth centuries, among the various other fields to which he devoted his activity so brilliantly.[6] As he himself says in his most fortunate book – *The Book Nobody Read: Chasing the Revolutions of Nicolaus Copernicus*, a book translated into a dozen languages, including Italian – his specialty was the calculation of the flow of photons through the outer layers of stars, but in his spare time he used a computer to recompute the medieval Alfonsine Tables and their Renaissance competitors, such as the *Prutenic Tables* of Erasmus Reinhold (1551, based on Copernicus' planetary models) and the *Almanach nova* of Johannes Stöffler and Jacobus Pflaum (1499). This allowed him to compare the predictive efficiency of Ptolemaic and Copernican astronomy in his first steps as a historian of astronomy in the 1960s, an interest that – as he again confesses in *The Book Nobody Read*, a largely autobiographical

4 "While an undergraduate, I had the marvelous opportunity to go to Harvard College Observatory as summer assistant for Harlow Shapley, then the most famous astronomer in America", Gingerich, *God's Universe*, 2.

5 DeVorkin, Interview of Owen Gingerich on 2005 October 18.

6 Of his contributions to the field of astronomy and astrophysics, we will mention only his edition, with Kenneth R. Lang, of *A Source Book in Astronomy and Astrophysics 1900-1975* and his edition of *Astrophysics and Twentieth-Century Astronomy, to 1950*.

book – was awakened by reading Arthur Koestler's *The Sleepwalkers*: *A History of Man's Changing Version of the Universe*, published in 1959.

Koestler's antagonistic presentation of Copernicus and Kepler (the hero of the story in that work) and the evaluation of Copernicus' work (*De revolutionibus*, 1543) as "the book that nobody read", determined the territory to which Gingerich dedicated his historical research and the two figures on which he mainly concentrated his efforts. The territory had already been defined since the early 1960s and was finally delimited at the 1964 Hamburg symposium of the International Astronomical Union (IAU) and the International Union for the History and Philosophy of Science (IUHPS). There he met the also young Polish astronomer Jerzy Dobrzycki, similarly interested in the history of astronomy and Copernican studies. Appointed Vice-Chairman of the IAU Commission for the History of Astronomy, Gingerich was involved in the preparations for the commemoration of the 500th anniversary of Copernicus' birth (1973) in Poland, which was preceded by another important centenary: the fourth centenary of Kepler's birth (1971).

His first publications in this field, however, were about Kepler. In 1963 he presented to the History of Science Society "The Computer versus Kepler", in which he set forth the results of his comparison of Kepler's calculations (developed in his 'battle with Mars' in the *Astronomia nova*) on the 'vicarious hypothesis' with the results of the program he developed for the IBM-7094 computer at the Harvard Observatory.[7] In 1968 he presented at the XIIth International Congress of the History of Science (Paris) "The Mercury Theory from Antiquity to Kepler" and at the Keplerian centenary celebrations "The Computer versus Kepler Revisited" (at the conference held in Kepler's home town of Weil der Stadt in 1971), "Kepler as a Copernican" (published in *Johannes Kepler, Werk und Leistung*, Linz, 1971) and "Johannes Kepler and the New Astronomy", a lecture delivered in 1971 to the Royal Astronomical Society.[8]

In these works, Gingerich already demonstrated a complete technical knowledge of the *Astronomia nova* and of the philosophical, physical, and cosmological elements present in Kepler's adherence to heliocentrism. Although not with the same intensity as Copernicus, Kepler has been the subject of Gingerich's continued interest throughout his career, as shown by later articles collected in *The Eye of Heaven* (the present writer especially recommends "Kepler, Galilei, and the Harmony of the World", where the presentation of the Keplerian harmonic vision of the cosmos with its special attention to intellectual priesthood is recorded with a clear sympathy that reveals a deep spiri-

7 The article was published in *American Scientist*, 52 (1964), 218-226, and is collected in Gingerich, *The Eye of Heaven*, 357-366.

8 Articles also collected, along with others, in *The Eye of Heaven.* To these may be added the entry "Kepler" in the *Dictionary of Scientific Biography*, vol. 7, 289-312.

tual affinity),[9] or the article "Johannes Kepler and the *Rudolphine Tables*" published in 1971 in *Sky & Telescope.*[10] Another very significant contribution of Gingerich to Kepler studies lies in his supplement to the seminal biography of Kepler published in 1948 by Max Caspar, the editor of the *Gesammelte Werke*. In his biography, intended for a learned but non-specialist audience, Caspar had abundantly used and quoted both Kepler's correspondence and his manuscript legacy preserved in St. Petersburg, but had omitted to give the precise references so as not to encumber the reader (although one may think that the reason lay also in the absence of a modern critical edition of the sources).[11] Translated into English by C. Doris Hellman in 1959, this limitation of the biography was signalled by the translator and resolved in small measure. For several decades, Gingerich marked the references to the sources in the margins of his copy and finally, in 1993, with the collaboration of Alain Segonds, he republished the biography fully updated with the references to the sources, an index of subjects and places and bibliographical references.[12]

In 1970, the *Journal for the History of Astronomy* was launched under the editorship of Michael Hoskin. In this project, which built a bridge and inspired communication between astronomers and historians of astronomy and has established itself as the most important journal in its field, Gingerich served from the very beginning as Reviews Editor (so indicated in the first mention of the editorial board in 1973) and from 1975 as Associate Editor (Reviews) until his retirement in 2007, remaining as Associate Editor until 2022. In addition to the many articles published there, Gingerich took special care of the review section, a genre he personally cultivated throughout his career. The unpublished document *Owen Gingerich: Bibliography* (deposited in the Mennonite Historical Library, Goshen College, Goshen, Indiana) collects from an initial review of Max Born's *The Restless Universe* published in *Sky and Telescope* in 1951, 315 reviews published until 2011 across different journals.[13]

1970 was also the year in which the first volume of the *Dictionary of Scientific Biography* appeared, under the direction of Charles Gillespie. Gingerich collaborated on it from the

[9] Gingerich, *The Eye of Heaven*, 389-406.

[10] Collected in Gingerich, *The Great Copernicus Chase,* 122-131. This work collects 36 articles published by Gingerich in popular science journals, most of them in *Sky & Telescope*.

[11] The correspondence was only collected in the *Gesammelte Werke* up to 1599, in vol. xiii published in 1945. Volumes xiv-xviii, which collected the later correspondence, were published between 1949 and 1959.

[12] Caspar, *Kepler*. We may add to all this Gingerich's direction of James Voelkel's doctoral dissertation, *The Composition of Kepler's Astronomia nova*, one of the most important works on Kepler published in recent years.

[13] A lightly edited copy of this Bibliography has been included in the on-line edition of the *Journal for the History of Astronomy* 54 (3), 2023, as a complement of the Obituary written by Richard L. Kremer and James Evans.

first volume, contributing thirteen entries on historical[14] and contemporary astronomers, among the latter one dedicated to Harlow Shapley, of whom Gingerich had been a disciple and assistant at Harvard.[15]

But the years immediately before and after 1970 were marked by Gingerich's participation in the preparation and celebration of the 500th anniversary of the birth of Copernicus, the highlight of which was to be an international conference in Poland. In this framework he met and established a lasting friendship, as mentioned above, with Jerzy Dobrzycki. As a member of the committee in charge of planning the international festivities, Gingerich had to decide on the theme of his contribution. On the occasion of his stay in Cambridge (England) in 1970 during a sabbatical leave, Gingerich – still influenced by the interpretation of Copernicus and the *De revolutionibus* given by Koestler in *The Sleepwalkers* – had a conversation with Jerry Ravetz, also a member of the Committee.[16] They discussed, under the shadow of Koestler's verdict that "nobody had read the *De revolutionibus*", the few readers in the second half of the sixteenth century who were able to assimilate "such a formidable technical book [...] beyond the opening cosmological chapters".[17] They concluded that this might be a good subject to investigate in view of the 1973 celebrations. The encounter with Ravetz had taken place on Gingerich's way to Edinburgh, where he planned to consult the rich collection of ancient books at the Royal Observatory.

It was there at the Royal Observatory that the unsuspected discovery took place. If it did not change Gingerich's life, it definitely determined his dedication to the history of astronomy, to Copernicus and to the study of his work, as well as providing him with subjects to contribute to the Centennial celebrations. Among the rare books in the collection that the 26th Earl of Crawford had bequeathed to the Observatory in 1888 was a copy of the first edition (Nuremberg, 1543) of the *De revolutionibus*. Once Gingerich examined it, he was able to verify that it was a copy that lacked annotations and comments on the preliminary pages and cosmological chapters of the first book but was profusely annotated in the remaining five technical books. The initials (ERS) on the spine of the

[14] In addition to the aforementioned entry on Kepler, the one dedicated to Messier, whose Catalogue of Nebulae had been the subject of his first article, published in 1953 in *Sky and Telescope*, and the one dedicated to Erasmus Reinhold in vol. 11 (1975), 365-367, where he collected the results of his discovery of the copy of Copernicus' work annotated by the German astronomer, which we will discuss later. To Kepler he also dedicated a fundamental article in *The General History of Astronomy*, vol. 2: *Planetary astronomy from the Renaissance to the rise of astrophysics, Part A: Tycho Brahe to Newton*, 54-78. Gingerich was on the Editorial board of this General History as Chairman for the International Astronomical Union.

[15] *Dictionary of Scientific Biography*, xii, 345-352.

[16] See Ravetz, *Astronomy and Cosmology in the Achievement of Nicolaus Copernicus*.

[17] Gingerich, *The Book Nobody Read,* 21.

binding prompted Gingerich to conclude that the owner and annotator of the work was none other than Erasmus Reinhold, a native of Saalfeld, professor of higher mathematics at the University of Wittenberg and author of the *Tabulae prutenicae* (1551) based on the models in Copernicus' work.[18]

Thus began a thirty-year investigation, in which Gingerich found the constant support of his wife, leading him through libraries all over the world to search for and inspect copies of Copernicus' work to establish the growing pool of possible readers and ascertain its impact and reception in the second half of the sixteenth century and the beginning of the seventeenth century. Reinhold's copy made it possible to establish that Koestler's verdict did not correspond to reality and that at least Reinhold had carefully read the technical parts of the book, although he had not taken Copernicus' cosmological approach into consideration. It remained to be seen what other copies of the first edition showed, but it soon became clear to Gingerich that the investigation should be extended, as Jerzy Dobrzycki pointed out to him, to the copies of the second edition (Basel, 1566) as well.[19]

The early results of the research gave Gingerich fodder for his speeches at the Copernican celebrations: "'Crisis' versus Aesthetic in the Copernican Revolution" was read at a meeting of the American Association for the Advancement of Learning held in 1972 and published in 1975; at the Toruń congress he read "Erasmus Reinhold and the Dissemination of the Copernican Revolution" (published in 1973); "The Astronomy and Cosmology of Copernicus" was presented at the extraordinary session of the International Astronomical Union and published in 1975; "Heliocentrism as a Model and as a Reality" was offered in 1973, at a symposium of the American Philosophical Society and published in 1975.[20] These articles show the dual dimension of Copernicus' work: on the one hand a bold cosmological proposal (heliocentrism), not based on new observations or on a greater predictive capacity,[21] nor on a real simplification of the planetary models as a response to a presumed 'crisis' and 'collapse' of astronomy, but "like Einstein's revolution four centuries later, motivated by the passionate search for symmetries and an aesthetic structure of the universe";[22] on the other hand some models or *theoricae* of planetary motion with a predictive function. This reductive reception was the one proposed by Andreas Osiander in his famous *praefatiuncula* "Ad lectorem" and the one that was mostly adopted

[18] See the description in *ibid*., 22-25. See also the description of the annotations in Gingerich, *An Annotated Census of Copernicus' De Revolutionibus*, 268-278.

[19] Gingerich, *The Book Nobody Read*, 32 f.

[20] All of these are collected in *The Eye of Heaven*.

[21] In "Remarks on Copernicus' Observations", 99-107, Gingerich showed that Copernicus' 16 new planetary observations, whose typical errors exceeded half a degree, were aimed more at confirming the already assumed heliocentric cosmology than at providing more correct astronomical predictions.

[22] "'Crisis' versus Aesthetic in the Copernican Revolution", in *The Eye of Heaven*, 199 f.

by the astronomers who annotated their copies of the *De revolutionibus*. With this, the revolutionary dimension of Copernicus' cosmological proposal, missing at that moment any physical validation and in contradiction to Sacred Scripture, was lost, but the technical assimilation of heliocentric astronomy was made possible.[23]

Examination of copies of the *De revolutionibus*, however, was producing unexpected and surprising results. The copy in the Beinecke Library at Yale revealed a profuse series of annotations, in the spirit of Reinhold, by Johannes Praetorius.[24] More important was the result of inspection of the first-edition copy in the Biblioteca Vaticana Ms. Ottoboniano lat. 1902, thought to be owned and annotated by Tycho Brahe, which showed many points in common with the second-edition Prague copy, also owned by Tycho Brahe. The handwriting of the annotations was the same, but there was one point that caused perplexity: a table of longitudes and latitudes of European cities, written on a flyleaf at the beginning of the Vatican copy, showed Wratislavia in Silesia at the top of the list, but Copenhagen and Uraniborg were missing. At the History of Science Society Annual Meeting in Norwalk in October 1974, Gingerich presented the results of the examination of the Praetorius and Brahe copies, but at the same session (titled "Evaluation of the New Research Resulting from the Copernicus Commemoration Year 1973") Robert Westman, who had already pointed out the importance of Michael Maestlin's annotations to his copy of the first edition (preserved in Schaffhausen),[25] showed that there was another copy with very rich annotations by the same hand in Liège. Westman questioned the attribution to Brahe of those three copies because of differences with Brahe's handwriting.[26]

These difficulties resulted in a collaboration between Gingerich and Westman that ultimately led to the important discovery that the author of the annotations to the Prague, Vatican and Liège copies (a fourth copy was soon added in Wrocław) was not Brahe, but the itinerant astronomer Paul Wittich (ca. 1546-1586), a native of Wratislavia (Breslau or Wrocław) –this explained the presence of that city in the table of longitudes and latitudes – who had visited and shown Brahe his copies and his notes on the occasion of his visit to Uraniborg in 1580. Upon Wittich's death in 1586, Brahe tried his best to obtain

23 Robert S. Westman had also reached this result in "The Melanchthon Circle, Rheticus and the Wittenberg Interpretation of the Copernican Theory", 165-193.

24 See Gingerich, *Census*, 306-313.

25 Westman, "Michael Mästlin's Adoption of the Copernican Theory", 53-63.

26 See Gingerich, *The Book Nobody Read*, 81-83. In a personal communication on 16 May, Westman wrote to me: "When I gave my presentation at the History of Science Society in 1974 in which I showed a comparison of annotations from Liège, Prague and the Vatican, Edward Rosen (who was presiding over the session) tried to stop me from speaking (!) and Derek DeSolla Price passed me a note, after I sat down, which said: 'How can you doubt that the annotations are by Tycho Brahe?' To his great credit, Owen then proposed that we should collaborate in determining who actually composed the annotations".

Wittich's copies until he eventually acquired them in 1600, only a year before his death. Gingerich and Westman presented the results of this research in their joint work *The Wittich Connection*.[27]

The *Census* finally appeared in 2002 and the companion *The Book Nobody Read* in 2004. By 1973-74 Gingerich had located approximately 200 copies.[28] The *Census* collected and described a total of 601 copies (277 of the first and 324 of the second edition, of which Gingerich claims to have personally examined 95% of the total sum).[29] Assuming a print run for each edition of 500 copies and regardless of the number of copies destroyed, it is reasonable to assume that there were still a greater or lesser number of surviving copies to be located. When the present author was preparing, in collaboration with Félix Gómez Crespo, the edition of the unpublished translation of the *De revolutionibus* (the first three books) into Spanish, carried out at the beginning of the seventeeth century by the astronomer Juan Cedillo Díaz (ca. 1565–1625), we discovered the existence of several copies of the 1543 and 1566 editions in Spain not included in the *Census*, among them a copy of the second edition, which once belonged to Francisco Pérez de Cabrera, VI Marquis of Moya, to whom Cedillo was chaplain and secretary. Cedillo commissioned around 1592 the luxurious binding of the copy, which is now in the Archive and Library Zabálburu in Madrid. When I personally examined the copy, I noted that it has some marginal annotations and corrections in the first and second books, most likely in Cedillo's hand.[30] On Christmas 2017 I communicated to Gingerich this discovery and he replied:

> I thank you very much for the information about three more copies of De rev not in my Census, as well as other corrections. I have now learned of 50 more copies of the 1566 edition as well as a dozen more copies of the first edition. The publisher of the Census (Brill) said that they had printed 500 copies, which they anticipated would fill the need for 20 years. However, the book went out of print in about 2 years! I am not sure I will remain in sound mind long enough to produce a revised edition, as there are other projects also stirring, and everything these days takes at least twice as long. Since I personally typed all of the material for reproduction in the volume, it is rather formidable to even think about a second edition. Incidentally, another copy with Reinhold's notes (but in a student's hand) has been recovered.[31]

[27] Gingerich and Westman, *The Wittich Connection: Conflict and Priority in Late Sixteenth-Century Cosmology*; on Brahe's protracted effort to acquire the copies, see *ibid.*, 20-23. See also Gingerich, *The Book Nobody Read*, 101-112.

[28] Gingerich, "The Astronomy and Cosmology of Copernicus", 166.

[29] *Gingerich, Census*, VII, X. In 2016 he published a brief and brilliant synthesis of Copernicus' achievement, which is perhaps his last work on the Polish astronomer: *Copernicus: A Very Short Introduction*.

[30] Cedillo Díaz, *Ydea astronomica de la fabrica del mundo*, 125-127.

[31] Email dated 27.12.2017. I have subsequently acquired knowledge of several more copies in

It is initially surprising, given Gingerich's interest in technical questions of astronomy and observational records, that Tycho Brahe did not form a more integral part of his work as a historian. Moreover, Brahe, to whom the annotations to Wittich's copies were mistakenly attributed initially by Gingerich,[32] has been to some extent revised by Gingerich following the reattribution to Wittich and a certain positive reassessment of Ursus.[33]

Nevertheless, Gingerich continued to study Brahe's interventions on celestial novelties: in 1977 he published a popular article on the comet of 1577[34] and in 2004 he gave a lecture in Padua – in the very room at the university where Galileo delivered his three lectures on the nova of 1604 – on "Tycho Brahe and the Nova of 1572", on the occasion of the Conference *1604-2004: Supernovae as Cosmological Lighthouses*.[35] Very important and seminal was the article, in collaboration with James R. Voelkel, "Tycho Brahe's Copernican Campaign", *Journal for the History of Astronomy*, xxix (1998), whose suggestively oxymoronic title has inspired subsequent work by younger scholars.[36]

Nor has Galileo been the object of great interest from Gingerich. It is true that in 1974 he examined in Florence the second-edition copy of the *De revolutionibus* that had belonged to Galileo. He was surprised, however, by the absence of technical annotations, which led him to state that Galileo was "a scientist with little interest in technical mathematical astronomy".[37] Gingerich had known Maria Luisa Righini Bonelli, director of the Museo di Storia della Scienza (now Museo Galileo) in Florence, at least since 1964,[38] and in the museum's journal he published an article on the censorship of *De revolutionibus*

Spain. It would undoubtedly be of interest to carry out an update of the *Census*, perhaps in the form of a collective article in which scholars of different nationalities carry out, starting from the Gingerich archive, the indication of new copies with a more specific examination of those that present annotations of interest.

32 See, for example, "The Astronomy and Cosmology of Copernicus", in *The Eye of Heaven*, 177-181. The substance of the article was collected in a version published in 1973 for a more general audience in "Copernicus and Tycho".

33 *Gingerich, The Book Nobody Read*, 115: "Ursus may well have been innocent of plagiarism". On Ursus, see also Gingerich and Westman, *The Wittich Connection*, 50-69.

34 Gingerich, "Tycho Brahe and the Great Comet of 1577", *Sky & Telescope*, 54 (1977), 452-458, collected in *The Great Copernicus Chase*, 89-97.

35 Gingerich, "Tycho Brahe and the Nova of 1572", 3-12. The present author recalls with emotion his second personal meeting with Gingerich at this conference and their conversations about his private library of rare books and how, at an auction, he had the good fortune of acquiring by chance a copy of Ursus' *De astronomicis hypothesibus* (Prague, 1596), bound unbeknownst to him in a copy of Michael Maestlin's *Ephemerides* (Tübingen, 1580).

36 See Boner, "The New Star of 1604 and Kepler's Copernican Campaign", 93-114; Granada, "Tycho Brahe's Anti-Copernican Campaign", 185-207; Mehl, "Kepler's Second Copernican Campaign: The Search for an Annual Stellar Parallax After the Roman Decree (1616)", 191-209.

37 *Gingerich, Census*, 122; Id., *The Book Nobody Read*, 143.

38 Cf. his presentation to Jerzy Dobrzycki, *Selected Papers on Medieval and Renaissance Astronomy*, 7.

in 1981.[39] Apart from an article on the trial, published in 1982,[40] and two others on the phases of Venus,[41] Gingerich concentrated his attention on the *Sidereus Nuncius* and to a large extent on very important contributions published in *Galilaeana*. In collaboration with Albert Van Helden, he published two pioneering articles on the relationship between telescopic observations and the rapid passage to printed work,[42]

But as early as 1975, in the collective volume *Reason, Experiment, and Mysticism in the Scientific Revolution,* which gathered the contributions to a symposium held in Capri in 1974, Gingerich – imitating Kepler's conversation with Galileo about the *Sidereus nuncius* – discussed Galileo's lunar observations with his astronomer colleague Guglielmo Righini.[43] Gingerich made two important points in his commentary on Righini's dating of Galileo's lunar observations: the first was that the observations are always "heavily theory-laden" and that after the first surprise at what the telescope showed of the lunar surface, Galileo interpreted what he saw in the light of his Copernican convictions (and his rejection of cosmological dualism); the second, which presented a position that was to preside over later articles, was that Galileo's lunar drawings were not intended to map the moon, that is, a precise description of the lunar relief, but to illustrate the conceptual results of his observations.

It always struck me as strange that Gingerich did not participate in the great international congress which, to commemorate the 350th anniversary of Galileo's *Dialogue* and under the initial impulse of Maria Luisa Righini Bonelli, took place in 1983 in Florence and other Italian cities on *Novità celesti e crisi del sapere.*[44] He chose, however, *Galilaeana* to publish two masterly articles on Galileo and the *Sidereus nuncius* that take up the conversation with Guglielmo Righini (and the subsequent 2003 article in collaboration with Albert Van Helden) in the context of the appearance of an alleged and exceptional copy of the Galilean *capolavoro.*

In 2007, Horst Bredekamp published *Galilei der Künstler,*[45] where he analyzed in detail a previously unknown first-edition copy of the *Sidereus Nuncius,* acquired in 2005 by the

[39] Gingerich, "The Censorship of Copernicus'*De revolutionibus*", collected in *The Eye of Heaven*, 269-285.

[40] Gingerich, "The Galileo affair", *Scientific American,* 247/2 (1982), 132-143, collected in *The Great Copernicus Chase*, 105-122.

[41] Gingerich, "Galileo and the Phases of Venus", *Sky & Telescope,* 68 (1984), 520-522, collected in *The Great Copernicus Chase*, 98-104; "Phases of Venus in 1610", *Journal for the History of Astronomy,* xv (1984).

[42] Gingerich and Van Helden, "From *Occhiale* to Printed Page: The Making of Galileo's *Sidereus Nuncius*"; "How Galileo Constructed the Moons of Jupiter".

[43] Righini, "New Light on Galileo's Lunar Observations", in *Reason, Experiment, and Mysticism in the Scientific Revolution*; Gingerich, "Dissertatio cum Professore Righini et Sidereo Nuncio", *ibidem*.

[44] *Novità celesti e crisi del sapere,* ed. by Paolo Galluzzi.

[45] Bredekamp, *Galilei der Künstler: Der Mond. Die Sonne. Die Hand*.

New York bookseller Richard Lan. The copy was characterized by showing, instead of the black-and-white engravings of the Moon present in the known copies, as many watercolors, in addition to presenting on the frontispiece an inscription by Galileo himself ("Io Galileo Galilei f".) and the stamp of the Library of Prince Cesi, founder of the Accademia dei Lincei. In his careful examination of the copy,[46] Bredekamp certified its authenticity, the Galilean authorship of the watercolors and maintained that they had been painted by Galileo on a "proof copy" provided by the printer in the course of the edition, in which Galileo had made the watercolors in the blank spaces destined for the engravings of the Moon. Consequently, the drawings of the Moon in Ms. Gal. 48 at the Biblioteca Nazionale of Florence, hitherto considered as the basis for the engravings, came to be seen as independent of the 1610 edition and as a later work for a second edition that was never realized. The authenticity of the copy was announced in Padua in April 2007 at a press conference by Horst Bredekamp and William R. Shea, who also wrote a very positive review of *Galileo der Künstler* in *Isis*.[47]

Gingerich had examined the copy in 2005, when it was presented to him by Richard Lan, while he was negotiating the purchase with the Italian book dealer Marino Massimo De Caro. Gingerich did not deny the authenticity of the frontispiece, nor in general of the copy, but was suspicious of the drawings. The copy was finally acquired that same year by R. Lan for the sum of 400000 dollars and subjected to a new and meticulous inspection in Berlin in 2008 by a team of experts from fourteen institutions with all possible technical means. That team confirmed Bredekamp's initial findings and under his direction conducted an exhaustive study of the copy published in 2011.[48]

However, Gingerich had published an article in *Galilaeana* in 2009 in which, through Sherlock Holmes-like detective work – based on his knowledge of the tight chronology of production of the *Sidereus nuncius* in just six weeks, the chronology of the lunar phases in January and February and the comparative examination of watercolors, engravings of the printed edition and drawings of the Galilean manuscript in the Biblioteca Nazionale of Florence – he concluded that "Bredekamp's claims for the priority of the M-L [Martayan-Lan] drawings compared to Galileo's Florentine sheets cannot be sustained. *I now turn to evidence that strongly suggests that the M-L drawings are in fact forgeries*".[49]

[46] *Ibid*., 101-216.

[47] *Isis,* 99 (2008), 402-403.

[48] *Galileo's O*, vol. I: *Galileo's Sidereus Nuncius: A Comparison of the Proof Copy (New York) with Other Paradigmatic Copies*; vol. 2: Needham, *Galileo Makes a Book: The First Edition of* Sidereus Nuncius, *Venice 1610*.

[49] Gingerich, "The Curious Case of the M-L *Sidereus Nuncius*", 162; emphasis by Gingerich; Bredekamp waived a reply. In a successive article ("The Mystery of the Missing 2") Gingerich established, by cross-checking with the autograph manuscript of the *Sidereus Nuncius* (published by Favaro in OG, III, 1) that "the Florentine bifolium sheet is Galileo's source for the reworked

The reader can examine the evidence adduced by Gingerich in William Shea's exposition of it in an article published in *Galilaeana* the following year, in which Shea rejects it, referring to the anticipated rejoinder that Bredekamp would have given in *Galilei der Künstler*.[50] However, in a review of *Galileo's O* published in the first issue of 2012, Nick Wilding, who had exchanged opinions with Gingerich, pointed out that the Cesi library stamp was not authentic (in addition to the copy not appearing in the extant inventories of the prince's library) and that "Bredekamp's attribution of the images to Galileo is, sadly, unconvincing".[51] Meanwhile, in 2012, M. De Caro, who had offered the copy to Lan and in his company had visited Gingerich in 2005 to show him the copy and request his expert opinion, had been arrested as a plunderer of the Biblioteca dei Girolamini in Naples, of which he had been appointed director in 2011. In May 2012 Wilding reported to Paul Needham, author of the second volume of *Galileo's O*, the existence on the frontispiece of the M-L of the mistaken word *pepiodis* instead of the correct *periodis* credited on all authentic copies and on June 11 he announced his findings on ExLibris (an online discussion forum of New York rare books dealers). The next day, in the same forum, Paul Needham acknowledged, "I was wrong". [52]

Gingerich once referred to himself as "a professional scientist and a historian of science, but also an amateur theologian".[53] Evidently, this dimension of theologian is tied to his Christian faith of Mennonite confession, but also to his epistemological position, contrary to a 'debased positivism' that places the origin of scientific theories in the observational record and based instead on the conviction that what we choose to look at is already 'heavily theory laden'. These initial presuppositions, expectations or convictions were called "Metaphysics" by Gingerich in the William Belden Noble Lectures on Christian religion and the issues of the day, delivered at Harvard in 2005 and published the following year under the title *God's Universe*. "Metaphysics" were, for Gingerich, the initial assumptions that led Copernicus to develop his cosmological proposal of a heliocentric universe and Kepler to assume it as a reality. It is also the conviction, associated with a teleological perspective and the complete acceptance of the scientific results of astrophysics and biology, that the origin and evolution of the universe responds to the

lunar diagrams in *Sidereus nuncius*".

50 Shea, "Owen Gingerich's Curious Case", 102-106.

51 *Renaissance Quarterly*, 65, no. 1 (2012), 217-218. Wilding was even harsher in his assessment of the M-L copy as a forgery in the *Letter to the Editor* that appeared in *Isis*, 103 (2012), 760.

52 Schmidle, "A Very Rare Book: The mystery surrounding a copy of Galileo's pivotal treatise". In 2014, Bredekamp and his collaborators published a not initially foreseen vol. 3 of *Galileo's O: A Galileo Forgery: Unmasking the New York SN*. A reconstruction of the unmasking process can be found in Nick Wilding, "Forging the Moon". For a presentation of the figure of M. De Caro, see Luzzatto, *Max Fox o le relazioni pericolose*.

53 Gingerich, *God's Universe*, 13.

intention and purpose of a creator and curator: "I believe in intelligent design, lower case *i* and lower case *d*",[54] not to be confused with the political ideology of Intelligent Design as an alternative to the theory of evolution. In sum, Gingerich proposes a theistic 'metaphysics' as opposed to atheistic, by him designated as a "persuasion, but not proof", "a perspective for viewing God's universe, a universe where God can play an interactive role unnoticed by science, but not excluded by science".[55]

The interplay of scientific work and historical research provided Gingerich with fuel for this metaphysical and teleological perspective in the person and work of Johannes Kepler, with whom Gingerich strongly (it seems to us) identified.[56] It is not surprising that he concludes his book with the words with which Kepler ended his *Harmonice mundi* of 1619.[57]

In the Epilogue to *God's Universe*, Gingerich pointed out that the powerful transcendence that had created and sustained the universe with a purpose and intention that includes us as contemplative surveyors of the universe is not only "a *something* but can take on the mask of a *someone*; a *which* that can connect with us as a *who*, in a profound I-Thou relation", a God in sum *persona*.[58] Gingerich knew that these were meta-physical considerations or reasons, not physical, i.e., not scientific; reasons, in short, of the heart "that reason does not know".[59]

Owen Gingerich was a member of important academies and societies, including the American Astronomical Society, the American Philosophical Society, the American Academy of Arts and Sciences, and the International Academy of the History of Sci-

[54] *Ibid.*, 68.

[55] *Ibid.*, 78, 111. Gingerich contemplates only the Atheism/Theism dichotomy and does not consider the possibility (of Brunian and to some extent Spinozian matrix) of an immanent causality associated with an ontological monism. Four years earlier, at a Conference on "Cosmic Questions" of the American Association for the Advancement of Science, Gingerich contributed "Scientific Cosmology Meets Western Theology: A Historical Perspective". There, on the question of a 'creator' of the Big Bang universe, he cited the position taken by Stephen Hawking in *A Brief History of Time*, which evokes a universe as a totality and to which Gingerich opposed the theistic perspective: "If the universe – Hawking said – is really completely self-contained, having no boundary or edge, it would have neither beginning nor end: *it would simply be*. What place, then, for a creator?", 37; emphasis added.

[56] *God's Universe*, 77: "Kepler's life and works provide central evidence that an individual can be both a creative scientist and a believer in divine design in the universe, and that indeed the very motivation for the scientific research can stem from a desire to trace God's handiwork".

[57] *Ibid.*, 112 f., 121.

[58] *Ibid.*, 120.

[59] *Ibid.*, 121, with reference to Pascal, *Pensées*, 423 in the edition Lafuma. In 2013, Gingerich delivered the Hermann Lectures on Faith and Science at Gordon College in Massachusetts. The lectures, on a similar argument, were published the following year under the title *God's Planet* by Harvard University Press.

ence. He had received the Order of Merit of the Republic of Poland for his research on Copernicus, the Jules Janssen Award of the French Astronomical Society and had been named doctor *honoris causa* of the University of Zielona Gora in Poland. With his death, a giant of science, of its history and of the philosophical dimension or presuppositions of science, disappears. It is to be expected that at least a significant part of his rare books collection will go to the Houghton Library at Harvard University.

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Paolo Rossi's legacy. His personal library and papers preserved at the Museo Galileo library

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In October 2006 Paolo Rossi (1923-2012), one of the most distinguished historians of science and philosophy of the postwar period, commissioned the Museo Galileo Library to preserve, after his death, his personal library and papers.

Here are some excerpts from his deed of gift:

> I like to think that the books – some of which came from my father's library and which I began collecting during the war years – won't go missing, but will serve the work of young people who are dedicated to our studies. The papers also reflect the life I entirely devoted to study…
>
> Mi piace pensare che i libri – alcuni dei quali provengono dalla biblioteca di mio padre e che ho iniziato a raccogliere durante gli anni della guerra – possano non andare dispersi, ma servire al lavoro di giovani che si dedicano ai nostri studi … Anche le carte rispecchiano la vita che ho per intera dedicata allo studio…

After his death, the materials arrived in two steps:

- **June 2012:**

  160 boxes corresponding to about 140 linear meters of items and consisting of:
  – Modern monographs
  – Miscellaneous materials and serial issues
  – Archive (correspondence excluded)

- **May 2017:**

  215 boxes corresponding to about 190 linear meters of items and consisting of:
  – Ancient & modern monographs
  – Miscellaneous materials and serial issues
  – Archive (recent years) + Correspondence

Relocating the materials from Rossi's apartment to the Museo Galileo Library was no small matter. In both relocations two library people and four porters were involved in the book boxing and hundreds of bulky boxes left Rossi's apartment through the windows thanks to a freight elevator.

Rossi's personal library

In autumn 2012 we immediately started cataloging the books and arranging and describing the archival materials. It was a hard job, that has engaged the library staff for many years.

Fig. 1 – Books belonging to Rossi's personal library.

The cataloging of the book materials has recently been completed, and now that Rossi's entire personal library is cataloged, it is possible to make an analysis of this valuable collection and extrapolate some summary data (NB the numbers in round brackets refer to the number of publications).

- **Publication types:**
  - ancient monographs (273)
  - modern monographs (9,573)
  - miscellaneous materials (pamphlets, off-prints, photocopies etc.) (6,018)
  - serials (330)

- **Chronological span:**
  - 16th century (35)
  - 17th century (35)
  - 18th century (198)
  - 19th century (234)
  - 20th-21th centuries (15,700)

- **Main languages:**
  - Italian (12,827)
  - English (2,082)
  - French (931)
  - Latin (147)
  - German (101)
  - Spanish (50)

- **Minor languages:**

  Ancient Greek, Portuguese, Polish, Japanese, Russian, Dutch, Modern Greek, Hebrew

- **Least represented languages:**

  Catalan, Romanian, Danish, Estonian, Finnish, Hungarian and Turkish

- **Main authors:**

This is a sort of ranking of the most represented authors among the approx. 6,000 ones who are included in Rossi's library. As you see, Rossi himself is included, together with his undisputed masters (Garin and Banfi), his preferred authors (Bacon, Vico and Galileo), some classics of philosophy, several of his friends and colleagues, and some reference points for a scholar of his time (Croce, Gentile and Vailati).

Rossi, Paolo (371)
Garin, Eugenio (224)
Banfi, Antonio (71)
Zambelli, Paola (63)
Vasoli, Cesare (59)
Cesa, Claudio (51)
Bellone, Enrico (48)
Croce, Benedetto (46)
Vailati, Giovanni (46)
Bacon, Francis (45)
Galilei, Galileo (44)
Casini, Paolo (43)
Vico, Giambattista (42)
Elkana, Yehuda (42)
Raimondi, Ezio (38)
De Liguori, Girolamo (38)
Hume, David (37)
Hegel, Georg Wilhelm Friedrich (37)
Bruno, Giordano (37)
Kant, Immanuel (36)
La Vergata, Antonello (36)
Aristoteles (35)
Geymonat, Ludovico (34)
Ciliberto, Michele (34)
Bobbio, Norberto (34)
Restaino, Franco (33)
Vickers, Brian (31)
Gentile, Giovanni (31)
Crisciani, Chiara (30)
Sichirollo, Livio (30)

What emerges from these figures is that Paolo Rossi's personal library is a very large library: it consists of more than 16,000 works for a total of approximately 21,000 physical items, considering the periodical issues, the multi-volume works and so on. All these materials are currently housed in an external depot, 5-minute walking from the library. In order to optimize space, the books are arranged in triple and quadruple rows on 1-meter deep shelves.

Rossi's personal library is very heterogeneous: it mainly contains texts on the history of philosophy and on the history of science but there are also many books on historical, political, sociological and religious topics.

Fig. 2 – Rossi's books' current location in the library deposit.

It is also a highly significant library because it undoubtedly helps to define the cultural profile of its owner, reveals his educational background and sheds light on his interests and skills. This is true in the case of all personal libraries. What is striking and what really impressed the library staff who was in charge of cataloguing these books is that Rossi's library is a 'speaking' library: Paolo Rossi left a lot of 'traces' on many books, such as underlinings and annotations on the side margin, witty and often amusing comments which contribute to better delineate his philosophical positions and personality.

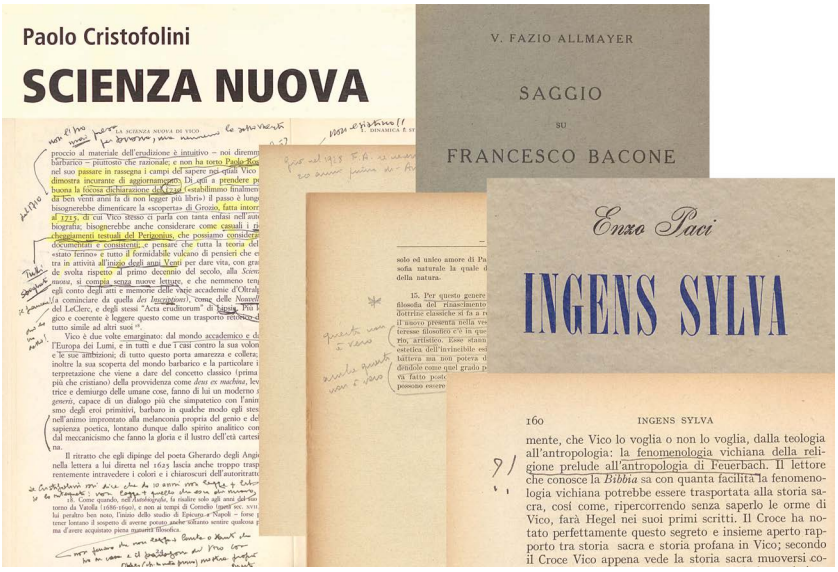

Fig. 3 – Books with Rossi's handwritten annotations.

An analysis of the Rossi's library allows us to aswer some questions. For example:

– Which are the books by or on Vico that Rossi preserved in his library?

Click here to see the list in chronological order of the about 150 monographs of his book collection.

– Another question: What did Rossi read in the early '50s, before the publication of his book on Bacon?

The answer to this question is not easy. But his personal library can offer an indication.

Click here to see the list of the about 700 monographs and articles belonging to Rossi's library published between 1950 and 1956. Of course Rossi could have bought or read these books and articles much later. So the list is not proof of what Rossi read but an indication as to what he might have read.

Rossi's papers

Regarding the archive, we completed, some years ago, the arranging and describing of the 1st part, while the 2nd part, consisting mainly of correspondence and, as such, protected by the privacy law, has still to be described.

Fig. 4 – Folders and documents belonging to Rossi's archive (left). An open folder (right).

These are the main series that are already arranged and described:

- writings and notes dealing with the history of philosophy and the history of science.
- drafts, proofs and preparatory materials of about 120 Rossi's publications (so that you can see the genesis and the different versions and revisions of Rossi's works: his books but also the journal articles and the book reviews, the notes, the introductions and the prefaces to the new editions and so on).
- final texts or drafts of about 150 papers that he presented at conventions and conferences.
- documents related to teaching and dissemination activities (for example the drafts of the radio programs of the '80s where Rossi interviewed philosophers, scholars and so on).
- informational materials on about 350 events (congresses, conferences, book presentations etc.). Paolo Rossi preserved, not casually but in an organized way, the invitation letters, programmes, depliant, his annotations on speeches and papers etc.
- a wide selection of journal articles and press clippings from major Italian newspapers and dealing with philosophical and cultural topics but also with social, political and current affairs.
- a collection of documents regarding Antonio Banfi.

Overview of the archival materials

• **List of the books read:**

About 40 pages with the list of the books Rossi read between 1946 and 1950.

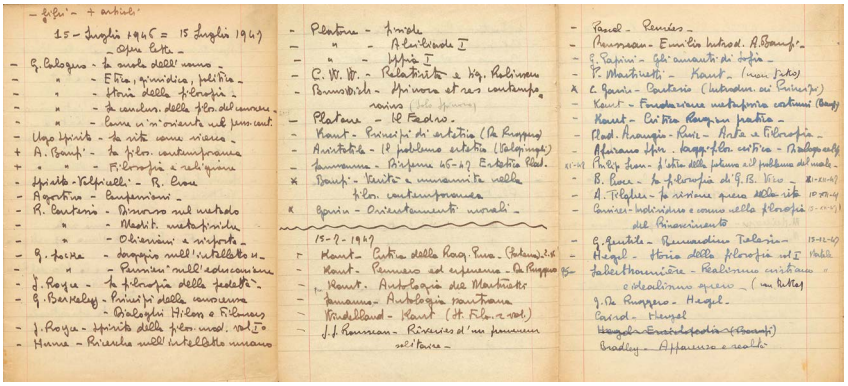

Fig. 5 – Lists of the books read.

• **Two drafts of** *I segni del tempo*

See below the first page of the handwritten draft and the corresponding page of the typewritten one.

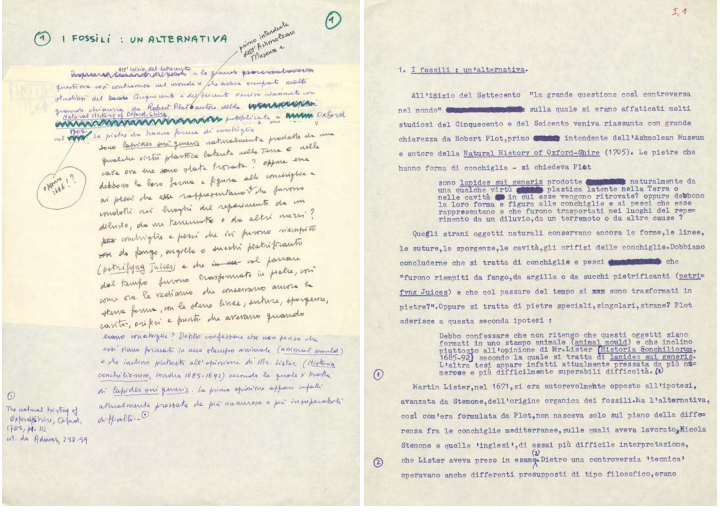

Fig. 6 – Handwritten (left) and typewritten (right) drafts of *I segni del tempo*.

Search tools

The Rossi's Legacy books and documents can be searched through the Museo Galileo collective database, which allows integrated consultation of all the Museo Galileo's collections (books, scientific instruments, medals, archival documents, historical, modern and digital photographs etc.), as well as of the data produced in connection with various research projects.

Click here to launch a search on the Collective database.

Moreover, the Rossi's Legacy web page offers the possibility to download the papers' inventory and the PDF lists of the various types of publications belonging to Rossi's personal library.

Click here to access the web page and see the links in the "Related resources" area.

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