

Celio Calcagnini on the Motion of the Earth at the Dawn of Modern Astronomy

Pietro Daniel Omodeo¹, Alberto Bardi²

¹ Università Ca' Foscari di Venezia, Dipartimento di Filosofia e Beni Culturali, pietrodaniel.omodeo@unive.it

² Tsinghua University of Beijing, School of Humanities, Department of the History of Science, alberto.bardi@live.com

Abstract: Around 1518, the Ferrara humanist Celio Calcagnini (1479-1541) wrote an original defense of Earth's motion, *Quod caelum stet, terra moveatur vel de perenni motu terrae* (The Heavens Stand, the Earth Moves, or the Perennial Motion of the Earth). It was a short but complex philosophical treatise, written in a sophisticated style, on a topic of undoubted interest to the history of cosmology. It is one of the earliest documents attesting to the Renaissance circulation of geokinetic conceptions, in the very years when the revolutionary ideas of Copernicus started to circulate and the *De revolutionibus orbium coelestium* was taking shape. Yet, Calcagnini's text has not received adequate consideration in the history of science, apart from a few exceptions. This communication is devoted to this lesser-known intellectual figure. It stems from a collaboration between the authors aimed to offer the first modern translation of *Quod caelum stet*. We will discuss the cultural context from which Calcagnini's defense of terrestrial motion emerged. It especially relied on natural and epistemological considerations within the framework of an eclectic humanistic philosophy, influenced by skepticism and Platonism. Calcagnini discussed at length the limits of our cognitive faculties and argued for the need that reason moves beyond immediate sensible appearance. He then argued for the plausibility of the Earth's motion against common sense, on the basis of a series of natural arguments.¹

Keywords: Calcagnini, Copernicus, Early Modern Astronomy, History of Cosmology, Humanism

1. Introduction

The celebrations of the 550th anniversary of Nicolaus Copernicus and the annual meeting of the Italian Society of the Historians of Physics and Astronomy at Padua University and at INAF-Astronomical Observatory of Padua in September 2023 offered us two occasions to reassess the circulation of geokinetic conceptions in the Renaissance. We chose to focus on the philosophical defense of terrestrial motion by the Ferrara humanist Celio Calcagnini (1479-1541). We believe that his *Quod caelum stet, terra moveatur vel de perenni motu terrae* (That the Heavens Stand Still, the Earth is Moved or: On the Perennial Motion of the Earth) deserves more consideration than in the past. Its significance is enhanced by its connection with the 'astronomical revolution' of his time. It was written around 1518 and first published in 1544 (Bardi & Omodeo 2024). We brought this writing to the attention of the historians of astronomy again, and presented and improve our own Italian translation of Calcagnini's *Quod caelum stet* which will soon appear in the journal *Physis*.

¹ We would like to acknowledge the project *Cosmography of Historical Waterscapes*, which received funding from Tsinghua University, Beijing and made the collaboration on this paper possible (Tsinghua University Initiative Scientific Research Program, Grant no. 20233080008). We are also thankful to the Department of History of Science of Tsinghua University, School of Humanities, and the Department of Philosophy and Cultural Heritage of Ca' Foscari University of Venice.

The Copernican relevance of Calcagnini's work did not escape the early admirers of Copernicus. The man of letters Cesare Marsili (1592-1633), for one, mentioned him in a letter to Galileo Galilei (1564-1642) from Bologna (22 April 1625):

I wish I had the great eloquence of the poet Mimnermus (the 'Copernican'), who, as Celio Calcagnini remarks in his *Discourse on the Motion of the Earth*, imagined in his poems that the Sun rests on a bed and, in such a manner, is transported from one place to another. He thus hinted at the stability of its motion in the midst of the heavens. [If I had Mimnermus's eloquence] I could aptly thank you, my Sir Galileo; but let us grant the silent affection instead of imaginative poetry, and let us believe rather in mathematical sincerity, as it is the wholehearted thanksgiving, that I here unskillfully submit to Your Excellency, of the honor I received from Lord Prince Cesi in enlisting me among the Lincei (Letter by Cesare Marsili to Galileo Galilei, Bologna, 22 April 1625, in *Le Opere*, p. 268).

Indeed, in his essay on the motion of the Earth, Calcagnini indicated Mimnermus as a literary source on terrestrial motion.

Another seventeenth-century erudite person, the Oxford librarian Robert Burton (1577-1640), in his *Anatomy of Melancholy* (1621), went so far as to present Copernicus as a sort of conventionalist who only embraced the motion of the Earth as a convenient hypothesis, and to present Calcagnini as one of the defenders of terrestrial motion as a physical reality:

[The paradox of the Earth's motion] is revived since by Copernicus, not as a truth, but a supposition, as he himself confesseth in the Preface to Pope Nicholas [sic!], but now maintained in good earnest by Calcagninus, Telesius, Kepler, Rotman, Gilbert, Digges, Galileo, Campanella, and especially by Lansbergius (Burton 1972, p. 52)

Among Copernicus scholars of the late nineteenth century, the idea of a close connection between Calcagnini and Copernicus was well-established, although the channels of the transmission of astronomical ideas between the two intellectuals was unclear. Franciscus Hipler generically considered the Italian humanist to be an imitator of Copernicus, whereas Ludwik Antoni Birkenmajer stressed their common belonging to a network of European literati, which comprised diplomats and mathematicians (Hipler 1879; Birkenmajer 1900, pp. 480-491). André Goddu's recent translation of Birkenmajer's *Mikolaj Kopernik* (1900) – on the occasion of the current anniversary – makes this Polish classic of Copernican Studies accessible to a broader international readership. It comprises an interesting chapter on Calcagnini, which brings forward the hypothesis that the Ferrara humanist was first introduced to the new astronomy in Cracow, in 1518, when he attended the wedding between the king of Poland Stanislaw and Bona Sforza, together with many Italian aristocrats, ecclesiastics and intellectuals (Birkenmajer 1900 and 2023).

In recent years, the Copernicus-Calcagnini connection has been mostly obliterated. A remarkable exception is an article by Michel-Pierre Lerner which, however, entails an exaggeration concerning the impact of Calcagnini's geokinetic defence. Lerner even deemed that Calcagnini's ~~his fame to have~~ ~~to have~~ overshadowed Copernicus's, arguing that Martin Luther's criticism of the subversion of astronomy in his table talk of 4th June 1539 targeted Calcagnini instead of Copernicus, with the infamous words "Der Narr will die ganze Kunst Astronomie umkehren" (Lerner 2009). A more balanced account of the Ferrara context as the relevant background against which the link between the two Renaissance intellectuals took place – as the place where Copernicus received his university title in canon law (1503) and Calcagnini was born and flourished – is a recent book by Marian Chachaj on Copernicus's student years. Among other aspects, Chachaj discusses the background of a possible exchange between them (Chachaj 2023).

2. Calcagnini's Brief Prosopographic Information

Born in Ferrara in 1479, Calcagnini was a learned humanist and jurist (Russo 2003, pp. 85-88). Around 1509, he was entrusted with the chair of Latin and ancient Greek at the university of his hometown, the same institution where Copernicus had graduated in canon law in 1503 under the mentorship of Filippo Bardella († 1510) and Calcagnini's godfather, Antonio Leuti († 1516) (Chachaj 2023, p. 216). Calcagnini obtained his doctorate in civil and canon law from the same university in 1514. In 1510, he became a canon at the Ferrara Cathedral. He also served as secretary to Cardinal Ippolito d'Este, a patron of philosophers, astronomers, and poets. Calcagnini cultivated the letters and established strong ties to prominent authors of his time, including his student Giambattista Giraldi Cinzio (1504-1573), and Ludovico Ariosto (1474-1533), who paid homage to him in *Orlando Furioso* (Canto 42, octave 90).

In 1517, Calcagnini accompanied Ippolito d'Este to Hungary in the Diocese of Eger, where he devoted himself to studying astronomy alongside the German humanist and astronomer Jacob Ziegler (ca. 1470-1549) (Omodeo 2014a). During these years, he worked on a paraphrase of Aristotle's *Meteorology*. It is possible that he first heard about Copernicus's planetary theory in 1518 in Krakow (Biskup, 1973, 63-64, n. 91). It is also likely that he became acquainted with Copernicus's draft on the heliocentric thesis (now known as *Commentariolus*) which circulated among Polish scholars, particularly in Krakow (Omodeo 2014b, pp. 209-213; Bardi 2023).

According to Franco Bacchelli's accurate reconstruction, one can assume that Calcagnini wrote his defense of the Earth's motion around 1518/19 (Bacchelli 2017, pp. 23-24 and Marchetti 1973, p. 496), although it was only posthumously published in his *Opera aliquot* (Basel 1544). *Quod caelum stet, Terra moveatur* was dedicated to a friend, the Ferrarese diplomat Bonaventura Pistofilo (1465/70-1533), as is evidenced by a brief dedication that accompanies the text (Calcagnini 1544, p. 387).² Both had attended the University of Ferrara and shared their admiration for Erasmus of Rotterdam (1466/69-1536). A period of intense interaction with Pistofilo was the biennium 1518-1519, especially during Calcagnini's return from Hungary, when he needed the ducal secretary's support to regain ecclesiastical benefits lost during his absence (Bacchelli, 2017, p. 24). Pistofilo gave Calcagnini a copy of Erasmus's *De libero arbitrio* (On Free Will), the renowned polemical writing against Martin Luther's theses *De servo arbitrio*. Calcagnini contributed to the theological-political controversy with the essay *De libero animi motu sententia veterum philosophorum* (The Free Motion of the Soul According to the Ancient Philosophers, 1525), dedicated to Pistofilo. The publication of Calcagnini's work drew Erasmus's attention, leading to their correspondence.

3. *Quod caelum stet, Terra moveatur*: A Neglected Source of Geokinetic Cosmology in Copernicus's Age

The 'geokinetic principle' is explicitly stated by Calcagnini in *Quod caelum stet* as follows:

[Hiketas and Archimedes] believe that the heavens, the Sun, the Moon, the stars, and the rest of the higher things, are stationary, and that nothing in the world moves except for the Earth, which, as it turns and twists around its axis at maximum speed, itself accomplishes everything that, if the Earth were stationary, would involve the motion of the heavens. (Calcagnini 1544, p. 394).

The contents of *Opera aliquot*, the work that comprises the first edition of *Quod caelum stet*, are extremely variegated. They reflect the most varied interests of a cultural diplomat and erudite humanist. The title *Opera aliquot* suggests that it includes only a selection of his writings. Yet, it is a voluminous publication, the contents of which are so disparaged as to comprise courtly poems and

² If the presumed date of writing *Quod caelum stet* were incorrect, the *terminus ante quem* is 1533, the year of Pistofilo's death. See also: Quaranta (2015).

orations, diplomatic speeches, a military report on the conflict between Ferrara and Venice of 1509, advice on navigation and the cultivation of citrus fruits. It also comprises summaries of philosophical works, among them, Aristotle's *Ethics* book one, *Politics*, and *De sensu*. The influence of Renaissance Platonism is witnessed by discussions on *Egyptiaca* and erotic magic. Calcagnini also authored short treatises on moral philosophy, on topics such as "de patientia", "de concordia", "de calumnia", and "de salute ac recta valetudine". A very brief *Apologus super inscitia* is part of the collection, as well. Moreover, he wrote an essay, on imitation, *De imitatione*, which is dedicated to his pupil Giambattista Giraldi Cinzio. The interest in poetry and theory is complemented by that in knowledge theory (*De verborum et rerum significatione*) and rhetoric (*Compendium rhetoricae*). Theology is dealt with in the anti-Lutheran *De libero animi motu sententia veterorum philosophorum* and in a tract on the Eucharist (*In sacramentum Eucharistiae sermo*). Moreover, Calcagnini addressed pedagogical issues in "opuscula" such as *Quod studia sunt moderanda* and *Encomion artium liberalium*. 'Scientific interests' especially emerge from his discussion of the measure of months (*De mensibus*) and the paraphrase of Aristotle's *Meteorologica*, in which he addressed, among other issues, earthquakes (*De terrae motu*). Thus, Calcagnini's defense of terrestrial motion should be seen as part of a vast cultural program that is well accorded to the speculative and literary treatment of this issue, rather than strictly mathematical or physical.

3.1 Calcagnini's Philosophical Perspective

Concerning Calcagnini's philosophical perspective on terrestrial motion, the beginning of his essay on the topic gestures towards skepticism as the necessary starting point.

Have you not heard that in the ancient Academy it was thought, concerning things and the entire nature, that nothing can be understood or comprehended with certainty? Such a doctrine is mere insipience or at least something like insipience (Calcagnini 1544, p. 388).

This is no destructive skepsis but rather a cognitive consideration that aims at wiping out arguments derived from the senses. Indeed, terrestrial motion, just like the mathematical truths, is not graspable through the senses but is rather supported through rational and intellectual means. For Calcagnini, philosophers – the natural scientists, as it were – should move beyond the senses, which are misleading in many ways: the Earth moves, not according to sensible perception, but according to reason.

Some might ask me what such a long speech is aimed at: to make it clear to you that you should not trust your eyes to the point of accepting as convincing and established what they tell you. I told you that this celestial sphere, which you believe to be revolving on itself at unspeakable speed, and this Sun and those stars, which you think to be involved in a single circular motion, are not only stationary, and enjoy perpetual stillness embedded in their spheres, but also, in truth, this Earth, which you believe to be fixed and motionless (so your sight deceives you) does not stand still or at rest by the weight of its matter, as most believe (Calcagnini 1544, p. 388).

Calcagnini ascribes a moral value (not only a cognitive significance) to the acknowledgment of the limits of our senses. He expresses this idea by making resort to some classical references, among them, Plato's *Gorgias*, according to which "Malum maximum hominibus opinio falsa" (i.e., "The worst evil for humans is a false opinion") (Ficino, *Argumentum*, in Plato 1663, p. 235). Moreover, he introduces a literary tropos that was going to become a standard reference of Copernican kinematic relativism from Copernicus to Digges, Bruno, Origanus and Laplace (to mention only a few important names): the metaphor of the Earth as a ship. Calcagnini expresses this concept through a line derived

from Vergil's *Eneid* III 72: "Provehimur portu terraeque urbesque recedunt," that is, "We turn away from the harbor, and the land and the cities turn away" (Omodeo 2014b, Ch. 5).

3.2 *Terrestrial Motions and Their Causes According to Calcagnini*

The motion that Calcagnini discusses in detail is the daily rotation. The attribution of this rotation to the Earth instead of to the fixed stars is expressed in very clear terms as an inversion of perspective in relation to geostatic accounts. Just like Copernicus, Calcagnini sought for classical authorities who could back his thesis:

[Hiketas and Archimedes] believe that the heavens, the Sun, the Moon, the stars, and the rest of the higher things, are stationary, and that nothing in the world moves except for the Earth, which, as it turns and twists around its axis at maximum speed, itself accomplishes everything that, if the Earth were stationary, would involve the motion of the heavens. (Calcagnini 1544, p. 394).

A closer look at *Quod caelum stet* reveals that Calcagnini also considered other possible motions of the Earth. First, he argued that a sort of libration of its axis produces a variation of inclination, determining the varying declination of celestial bodies during the year. Moreover, he hinted at the trepidation of Islamic origin and key aspects of planetary theory. Did he also consider the annual revolution? In order to address these questions, we can consider some passages, in particular those referred to the Sun and planetary theory. Relative to the Sun, one can read on its excellence and immobility:

Often, as I contemplate the perennial nature of celestial things, I am amazed by the greatness and brightness of the 'eternal light,' to which nothing less befits than motion, and of all kinds of motion that which is called circular. As it descends from itself and returns to itself, it seems not suitable, since no other contains more contrary elements and (more than any other thing) is divided within itself (Calcagnini 1544, p. 392).

Thus, motion does not look proper to the Sun. Calcagnini writes that its varying distance and the succession of seasons depend on the Earth:

From this [the Sun] nourishment is given to animate beings, from this the years and seasons follow one another. Certainly not because it [the Sun] sometimes departs [*abscedat*] from us and then turns back [*revertatur*] (which is common opinion) but because we sometimes approach it and sometimes turn away from it. And really it cannot be considered sufficiently acceptable that what for nothing needs us should desire and be conditioned by our desire; on the contrary, what without it can neither be nourished nor formed nor propagated, would cease and neglect to provide for its own needs (Calcagnini 1544, p. 389).

This clearly looks like an opening to a heliocentric hypothesis, as seasons were traditionally connected with the monthly and seasonal variation of the position of the Sun in the zodiac signs. In a Copernican perspective this shifting position – and seasons – depend on the terrestrial motion. Is Calcagnini implying such a theory, too? Regrettably, he is rather elliptic concerning planetary theory, as one can evidence through the following quotation:

And what shall I say about the trepidation of the eighth sphere, what shall I say about the motion of the various epicycles and deferents? Although all this – as Proclus said – was introduced καθ' ὑπόθεσιν (as a hypothesis) by recent authors, nevertheless they were accepted and approved with great consensus of mathematicians by those who found no other way to prove the various

aspects of the universe and what of them they call τὰ φαινόμενα. Why is it that what is inherent in the Earth they nevertheless attributed to the heavens, with supreme conflict of mind? (Calcagnini 1544, p. 393).

Calcagnini embraced a sort of (Pythagorean) discretion, similar to the one professed by Copernicus in the manuscript of *De revolutionibus*, in which he quoted a letter by Lysias and Hipparchus on the secrecy of the mathematical mysteries of the Pythagoreans. Nonetheless, Calcagnini declared ready to engage a thorough discussion of further details with supporters of the terrestrial immobility:

If [the supporters of terrestrial immobility regarding the eighth sphere and planetary theory] will privately present to me some explanation regarding these topics, then I promise that I will do the same in good faith – even by taking an oath (Calcagnini 1544, p. 393).

We believe that the above quotations and these words of challenge are enough to establish Calcagnini's openness to a more articulated theory of terrestrial motion – perhaps the one he had come across to during his visit to Poland, in Krakow, where Copernicus's theses were already known.

Quod caelum stet also lists a series of arguments and reasons for terrestrial motion, which we here summarize as follows:

- a. Self-preservation of the imperfect/corruptible bodies: Calcagnini gives a teleological explanation of motion as a self-preserving tendency. As such, it can be compared to natural phenomena such as the motion of sunflowers, which always strive to receive the solar light. He also resorts to the magnet metaphor. The Earth is attracted by the Sun just as the iron is attracted by a magnet.
- b. Excellence/imperfection argument: the excellence of the heavens and the Sun is connected with stability and immobility. By contrast terrestrial imperfection is well suited to motion.
- c. Vital principle relative to an animal-like Earth: Calcagnini sees the Earth as a living being, a big animal which is endowed with tendencies and motion.
- d. So-called 'Achilles' argument: the velocity of the Earth's rotation is less rapid and less astonishing than that of the fixed stars within 24 hours.
- e. Background argument: motion should be ascribed to the container (i.e., the fixed stars) rather than to the contained thing (the Earth);
- f. Sea tides: this phenomenon is the causal effect of terrestrial motion;
- g. Mythology: Calcagnini makes use of literary commonplaces and quotes classical sources in support of terrestrial motion. Together with Hesiod he speaks of a flying Earth or a winged Earth. He also quotes Mimnermus to argue that the Sun sleeps (hence, the Earth runs in its stead).

Most of these arguments and metaphors were to become commonplaces in the Copernican debates of the sixteenth century. Although their circulation cannot be considered a direct reception of Calcagnini, nonetheless it is remarkable that *Quod caelum stet* offers a broad collection of ideas, images, and reasons for terrestrial motion at a very early stage of the establishment of a new cosmological vision with the Earth in motion.

4. Concluding remarks

To sum up, Calcagnini's text on terrestrial motion proves an interesting document of early-modern scientific culture as it is revealing of important connections between astronomy, philosophy and humanistic literacy in general. *Quod coelum stet* offers an overview of important commonplaces

relative to terrestrial motion, which would become widespread in the wake of Copernicus's work, such as the ship metaphor referred to the moving Earth, the so-called 'Achilles argument,' the planetary-magnet metaphor, the sea-tides argument. Calcagnini's humanistic literacy shows striking similarities relative to Copernicus's. They must have common sources, shared among a sixteenth-century network of scholars who discussed the possibility of the motion of the Earth and shared general cosmological concerns. Moreover, Calcagnini's erudite inquiry into ancient predecessors contributed to the establishment of geokinetic authorities, such as Hiketas, Timaeus, Plato. His first geokinetic use of the line of *Aeneid* (III, 72), "Provehimur portu terraeque urbesque recedunt," can perhaps be taken as a marker of the cultural impact of Calcagnini's Academic-humanistic defense of terrestrial motion in the years of the elaboration of Copernicus's planetary theory and the earliest discussions thereupon. Among his sources, Plato's *Timaeus* was particularly relevant, as it provided an authoritative basis for the defense of terrestrial motion within a broader philosophical vision of the world. Calcagnini's reading of the *Timaeus* is close to that of his contemporary Copernicus. Possibly they influenced each other but, since we have only contextual elements in favor of this thesis, we should limit ourselves to stress the relevance of their kindred humanistic readings to the astronomical culture of the early sixteenth century, which considered the ancients as contemporary dialogical counterparts. Calcagnini's mixing of Platonic rationalism with skeptical attitudes should be further connected with his humanistic eclecticism. His elegant style was a display of erudition. Also, it favored a dialectic approach, closer to living forms of dialogue and reasoning, rather than mathematical deduction. His text constitutes a reservoir of images, references, arguments, not in the form of a conclusive argument but as an open-ended project.

Bibliography

- Bacchelli, F. (2017). "Il *Quod coelum stet, Terra moveatur vel de perenni motu Terrae commentatio* di Celio Calcagnini" *Schifanoia: notizie dell'istituto di studi rinascimentali di Ferrara*, 52/53, pp. 21-33.
- Bardi, A. & Omodeo, P.D. (2024). "Il *Quod caelum stet, Terra moveatur* (ca. 1518) di Celio Calcagnini: contesto scientifico e traduzione", *Physis*, 59(1), pp. 1-56.
- Bardi, A. (2023). "Copernicus and Axiomatics" in Sriraman, B. (ed.) *Handbook of the History and Philosophy of Mathematical Practice*. Cham: Springer, pp. 1-18.
- Birkenmajer, L. A. (2023). *Nicolaus Copernicus: Part One. Studies on Copernicus's Work and Biographical Materials*. Translated from Polish by Goddu A. Toruń: Wydawnictwo Naukowe Uniwersytetu Mikołaja Kopernika.
- Birkenmajer, L.A. (1900). "Solpha i Calcagnini," in Birkenmajer, L.A (ed.), *Mikołaj Kopernik*. Krakow: w drukarni Uniwersytetu Jagellońskiego, pp. 480-491.
- Biskup, M. (1973). *Regesta copernicana (Calendar of Copernicus' Papers)*, Wrocław: Ossolineum, The Polish Academy of Science Press.
- Burton, R. (1972). *The Anatomy of Melancholy* (Oxford 1621). Edited by Holbrook J., London-Toronto: Dent.
- Calcagnini, C. (1544). *Opera Aliquot*. Basle: Froben.
- Chachaj, M. (2023). *Nicolaus Copernicus Student Times: Cracow, Bologna, Rome, Padua, and Ferrara (1491-1503)*. Toruń: Wydawnictwo Naukowe Uniwersytetu Mikołaja Kopernika.
- Craig, M. (2011). *Renaissance Meteorology: Pomponazzi to Descartes*. Baltimore: The Johns Hopkins University Press.
- Hipler, F. (1879). *Celio Calcagnini und seine Schrift über die Erdbewegung*. Münster: [s.n.]
- Le Opere di Galileo Galilei. Ristampa della edizione nazionale* (1935), vol. 13. Firenze: G. Barbèra.

- Lerner, M.P. (2009). “‘Der Narr will die gantze kunst Astronomiae umkehren’: sur un célèbre Propos de table de Luther,” in Granada M.A. & Mehl E. (ed.) *Nouveau ciel nouvelle terre: La révolution copernicienne dans l’Allemagne de la Réforme (1530-1630)*. Paris: Les belles lettres, pp. 41-65.
- Marchetti, V. et al. (1973). “Calcagnini, Celio”, in *Dizionario Biografico degli Italiani*, vol. 16. Roma: Istituto dell’Enciclopedia Italiana (*ad vocem*).
- Omodeo, P.D. (2014a). “Erasmian Philology and Mathematical Astronomy: Jakob Ziegler and the Humanist Recovery of Pliny’s Natural History”, *Journal of Interdisciplinary History of Ideas*, 6(2), pp. 1-23.
- Omodeo, P.D. (2014b). *Copernicus in the Cultural Debates of the Renaissance: Reception, Legacy, Transformation*. Leiden: Brill.
- Plato (1663). *Omnia divini Platonis opera traslatione Marsilii Ficini*. Lugduni: Apud Antonium Vincentium.
- Quaranta, C. (2015). “Pistofilo, Bonaventura”, in *Dizionario Biografico degli Italiani*, vol. 84. Roma: Istituto dell’Enciclopedia Italiana (*ad vocem*).
- Russo, L. (2003). *Flussi e riflussi. Indagine sull’origine di una teoria scientifica*. Milano: Feltrinelli.