quite different—which of course does not mean that he does not point to experiments or doctrines when it is necessary. He proposes an editorial history of alchemy, relying on a precise account of publications. One must admire his erudition. Fortunately, an index and a bibliography are helpful, given the number of books mentioned by Kahn. Such a history was necessary. First of all, it helps readers to understand what alchemy was. As Kahn reminds us (p. 119), the alchemist was not only an experimenter but also (and maybe above all) a reader. Thus the history of alchemy is also the history of alchemical books. Second, it gives a good view of the historical importance of alchemy as a science and even offers a kind of measure of this importance: Kahn is able to examine the "market" in alchemical books, which proves—if it was still necessary—that alchemy was not a marginal activity. Certainly, a comparison with the market in books in mathematics, physics, and so on would be welcome to help assess the importance of alchemy—but that was far beyond Kahn's scope. Finally, such a history is a valuable tool even for the historian of chemistry: it shows precisely which books were available, which is helpful when one is looking for sources. Thus, *Le fixe et le volatile* is not just one history among others of equal value; it provides original and valuable insights into the history of chemistry, considered from an editorial point of view.

Kahn's aim is not to provide an exhaustive history of alchemy; it is, rather, to show how chemistry was born, emerging slowly and gradually from alchemy (p. 6). The book is divided into seven chapters. In the first, Kahn defines alchemy as a theory grounded on experimental work, seeking to justify the possibility of the transformation of matter. Chapter 2 rehearses some aspects of medieval alchemy to help readers understand Paracelsus, who inherited and modified it. Chapters 3 and 4 are devoted to Paracelsus and Paracelsianism. Notably, Kahn shows how Paracelsian ideas diffused throughout Europe as alchemy met up with other traditions (Hippocratism, Galenism, and Neoplatonism). Classically, Kahn deals with the seventeenth century (Ch. 5) as the "golden age" of alchemy and transmutation. He provides a useful analysis of the stories of transmutation (pp. 91–104) that flourished at that time, showing how they were taken as proof of the possibility of transmutation. More important, Kahn shows how what would become chemistry appeared within the alchemical tradition; meanwhile, some earlier ambitions gradually disappeared (for example, transmutation and the idea of alchemy as natural philosophy). There was not any revolution at the end of the seventeenth century to explain why alchemy disappeared in the eighteenth century. The last two chapters describe the last century of alchemy. Even if alchemy persisted throughout the eighteenth century, Lavoisier put an end to it. Alchemy as such was not a target for Lavoisier; rather, his criticisms of some chemical theories made alchemy impossible by way of (unintended) consequence.

Kahn's method of presenting the history of alchemy cogently shows what early modern alchemy was and how it evolved to its end. Kahn provides factual descriptions; but one may regret the lack of explanations, especially of alchemy's decline. Kahn proposes some hypotheses—for example, a change in mentality or the professionalization of chemistry (Chs. 6 and 7)—to account for the decline of alchemy. But the question remains: Why did alchemy become unsatisfying? Thanks to Kahn's work, a lot of facts pertaining to the history of alchemy are established; now they should be interpreted as they bear on the decline of alchemy.

Luc Peterschmitt

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Federica Favino. *La filosofia naturale di Giovanni Ciampoli*. (Biblioteca di Galilaeana, 4.) xvii + 364 pp., figs., index. Florence: Leo S. Olschki Editore, 2015. €44 (paper).

Federica Favino's *La filosofia naturale di Giovanni Ciampoli*, the welcome outcome of long research, includes the full transcription of two unpublished philosophical dialogues by Giovanni Ciampoli, *De intellectione* and *Del sole e del fuoco*, as well as a new transcription of his *Filosofia naturale*, a work originally

published in 1654 but with many errors. Favino's erudite introductory essay and her editorial notes to the published texts add new details about not only Ciampoli's activity but also the setting and the interlocutors of the two dialogues (one is probably Ciampoli himself; the others are Virginio Cesarini, Sforza Pallavicino, and George Conn). Last but not least, her interpretation of Ciampoli's works raises new questions and opens new perspectives for research.

Giovanni Ciampoli (ca. 1589–1643) was a member of the Accademia dei Lincei, a key supporter of Galileo in Rome, and the Secretary of Briefs for two popes, Gregory XV and Urban VIII. In 1632, however, he was removed from this office and sent to govern a very undistinguished province of the Papal States. Although the main reason for Ciampoli's fall is still a subject of discussion, his fate was similar to Galileo's. Not only did he speak of being subject to persecution, as Galileo did, but their fates were at least partially a result of the change in cultural climate at the papal court.

During his exile from Rome, Ciampoli developed a vast program of writing that he pursued until his death in 1643. Some of these writings, concerning moral and religious matters, were published by Sforza Pallavicino, who tried to rescue from oblivion the work and the figure of his friend, in the *Prose* of 1649. Favino, following the earlier research of Ezio Raimondi, emphasizes that Pallavicino, an influential member of the Society of Jesus, not only polished Ciampoli's texts but also sometimes altered them so as to soften "gli accenti troppo intensi dell'autografo" (p. 24). However, she goes on to blame Pallavicino for having excluded the writings on natural philosophy from the *Prose* in an attempt, begun in 1648 with the publication of the *Rime* of Ciampoli, to enhance the official image of his friend as having given the highest expression to "moderato-barocca" poetry (pp. 24, 31, 37–38).

This raises questions not only about Pallavicino's editorial project but also about all of the writings left by Ciampoli—those concerning the *Prose* of 1649 were, according to the author of the preface to that volume, a bundle of "carte confuse, scorrette, abbozzate"—which were examined by the Inquisition after his death and are now in part lost. It also raises the further question of the possibility of drawing a line between Ciampoli's philosophical and poetical works, given that, as noted by Giovanni Baffetti, "le due prospettive, quella poetica e quella filosofica si integrano a vicenda" ("Ciampoli e Pallavicino," in *I primi lincei e il Sant'Uffizio* [Bardi, 2005], p. 132).

In any case, Favino's edition adds new elements that help us to understand better the complex philosophical figure of Ciampoli. Particularly interesting are the textual parallels between the philosophical works of Ciampoli and Pierre Gassendi. According to Favino, Ciampoli drew heavily from Gassendi's works, particularly the *Animadversiones* and the *Syntagma philosophicum*. Because these works were published after Ciampoli's death, she surmises that around 1642 Ciampoli might have had a manuscript copy of them at his disposal (pp. 134–135).

This brings us to the empiricism and the corpuscular philosophy of Ciampoli and to Galileo's mathematical philosophy. Ciampoli shared with Galileo the idea that knowledge of the physical world is derived from sense experience, but he was not in agreement with Galileo's high evaluation of the philosophical value of mathematics. Nonetheless, he was less cautious than Galileo in attributing geometrical shapes to material corpuscles. In his dialogue *Del sole e del fuoco* Ciampoli suggested, for instance, that particles of fire should have a pyramidal shape because pointed corpuscles would be apt to penetrate a body and break it into pieces, as fire does. In addition, he proposed an experiment in which these "linguette di fuoco" of pyramidal shape could be observed (pp. 293–294, 301).

In the *Filosofia naturale*, Ciampoli showed his commitment to a new Christian policy about science. In proposition 8, for instance, which is devoted to the value of received opinions in natural philosophy, he neatly distinguished, as Galileo did, between faith and science: the first is subject to authority, the second has only nature "per maestra." This statement is softened, however, in the phrase that followed: a received opinion should not be given up without "evidenza necessitata," and the search for novelties pursued out of "ambitione" is always blameworthy (p. 315). These words are suggestive of the difficulties Ciampoli faced in seeking a middle ground between the rising ideology of the new science and traditional Catholic doctrine.

Cesare S. Maffioli

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Geoffrey Gorham; Benjamin Hill; Edward Slowik; C. Kenneth Waters (Editors). *The Language of Nature: Reassessing the Mathematization of Natural Philosophy in the Seventeenth Century*. (Minnesota Studies in the Philosophy of Science, 20.) 346 pp., figs., index. Minneapolis/London: University of Minnesota Press, 2016. $40 (paper).

The Language of Nature aims to reevaluate a traditional thesis in the historiography of early modern science: that seventeenth-century natural philosophers "mathematized" in a newly effective way. The contributions are rich and diverse. But the editors provide little help in synthesizing them into a response to that thesis. They organize the volume chronologically and offer little discussion of links among the contributions.

Understanding early modern philosophy requires understanding the "project" of mathematizing nature and not just its successes, observes Justin E. H. Smith. He argues that Leibniz's shift from Descartes's attempt to explain "everything on the model of inanimate bodies, and by appeal to geometry, to the explanation of everything on the model of animate bodies, and by appeal to infinity" (p. 256), was a "continuation of the project of the mathematization of nature," even though "in such different terms as to be almost unrecognizable" (p. 269). I look forward to more accounts that treat the gap between the philosophers' accomplishments and their aspirations as a productive component of early modern mathematization, not as a failure of it.

Several contributions make it clear that early modern philosophers looked to mathematics, however conceptualized, as a guide to practices far removed from numbers or diagrams. Roger Ariew argues that Descartes and some Cartesians saw mathematics as an exemplar of demonstration (p. 120), since it "has a mode of exposition that is particularly persuasive" (p. 128). Mathematics served other Cartesians for "exercising the mind" (p. 124). Ursula Goldenbaum argues that appeals by Spinoza, Leibniz, and others to adequate ideas or causal definitions (pp. 286–287) instance the "geometrical method," which appealed to philosophers because of its "compelling power" (p. 280) but met with opposition for the "hubris" of its claims to being, besides religion, "another standard of truth" (p. 276). Goldenbaum and Ariew agree about the role of mathematics in methodological reflection but disagree about whether this counts as mathematization.

Mathematics also helped philosophers articulate their universalizing aims. Here too projects were far from successes. Daniel Garber contrasts Descartes's bluster about mathematizing physics with the "purely qualitative terms" (p. 139) of his laws of nature, whose "scope is over nature as a whole" (p. 137). Garber observes a wide gap between Galileo's "concept of an overarching law of nature" and his actual attempts to mathematize the "characteristics" (p. 146) of motion. Perhaps disagreeing with Garber, Carla Rita Palmerino argues that Galileo took his mathematical rules as "a sign" of nature's mathematical order (p. 45) and saw the limits of mathematization in the insufficiency of human understanding (p. 43). Beyond the opposition between realism and instrumentalism (p. 3), the contributions suggest an interplay between uses of mathematics to persuade and to generalize (in scope or ontology).

According to Palmerino, Galileo saw mathematics as the language of nature; for the figures discussed by Ariew and Goldenbaum, it was closer to a language of the mind or of natural philosophy. I see a similar contrast in Douglas Jesseph's article about mathematical foundations. For Isaac Barrow, mathematical demonstration was founded on understanding the "true causes" of the generation of geometric magnitudes (p. 168). John Wallis believed that mathematics was founded on the abstractions of algebra. Where for Barrow natural philosophy took its bearings from nature, for Wallis a new "science of quantity" (p. 166) undergirded a new theory of ratios. Jesseph's discussion of Barrow's materialist geometry reminded me of Hobbes's mathematics, of which Jesseph is the doyen. Hobbes emerges as noteworthy in these con-