

Schuster, John

Descartes-Agonistes. Physico-mathematics, method and corpuscular-mechanism 1618–33.
(English) [Zbl 1279.01004](#)

Studies in History and Philosophy of Science (Dordrecht) 27. Dordrecht: Springer (ISBN 978-94-007-4745-6/hbk; 978-94-007-4746-3/ebook). xix, 631 p. (2013).

Schuster's seminal book addresses one of the most important issues, now much discussed between historians of science, concerning the different interpretations of the terms "mixed mathematics", "physico-mathematics", "natural philosophy", and later "applied mathematics". The evolution from the Aristotelian mixed mathematical sciences, intermediate between natural philosophy and mathematics, to subordinate them with a merely descriptive or instrumental role to physico-mathematics, where mathematics plays a more explanatory role of matter and causes of phenomena, constitutes an exciting subject. The different interpretations of this process by various authors makes this research a very complicated challenge. Schuster's work appears to be very difficult to understand for people who have not worked or thought on this subject and who are not familiar with Descartes' works and ideas. Indeed, Schuster's aims are the reconstruction of the influential natural philosopher Descartes' thoughts in his works, with a structuring and contextualization of ideas such as mixed mathematics, physico-mathematics, natural philosophy, and method, from 1618 to 1633.

The book consists of 631 pages and is divided into thirteen chapters and two appendices, in one of which Schuster discusses Descartes' lens theory and the other dealing with Descartes' vortex in the text of *Le monde*. The author justifies the inclusion of both appendices in order to arrive at a more complete confirmation of his interpretation of Descartes' trajectory. The first chapter presents an overview of different interpretations by historians of Descartes' works in which the author emphasizes the idea of the difficulty of biographical works regarding authors of Scientific Revolution. Furthermore, he reminds us that knowledge of Descartes' works and some manuscripts is insufficient for historians to arrive at any fundamental conclusions about Descartes' ideas. One needs to contextualize by analyzing the evolution of ideas in Descartes' time and structuring it around Descartes' works.

Chapter 2, entitled "Conceptual and historiographical foundations – natural philosophy, mixed mathematics, physico-mathematics, method", sets the stage for the four key concepts: natural philosophy, mixed mathematics sciences, physico-mathematics and method, and their different interpretations from the Scientific Renaissance (1500–1600) to the Scientific Revolution (1660–1720). This chapter is indispensable for an understanding of the rest of the book, because it clarifies what the interpretations of these concepts were and why they were chosen by Schuster to reconstruct Descartes' trajectory. According to the author, "amongst the matters dealt with, the most important are a model for how the increasingly competitive and turbulent culture of natural philosophizing worked in the era of Descartes, including the question of the place and import of the subordinate mixed mathematical sciences, and the meaning Descartes and others attached to the idea, and the project of a physico-mathematics, rendering those mixed sciences more properly 'natural philosophical'." (p. 19).

Chapters 3 and 4 are devoted to Descartes' early physico-mathematics texts through the influence of Beeckman's ideas on corpuscular-mechanical natural philosophy. The author analyzes three case studies of Descartes as physico-mathematician: his manuscript on hydrostatics and the hydrostatic paradox and his work with Beeckman on the nature of accelerated fall, both belonging to a document entitled *Physico-mathematica* which dates from late 1618 or early 1619, while the third consists of a fragment on the refraction of light adapted and explained from extracts of the work by Kepler, dating from around 1620. In addition, in the fourth chapter, Schuster deals with a reconstruction of the genealogy of Descartes' discovery of the law of refraction in the late 1620s.

Chapters 5, 6, 7 and 8 constitute a bridge between the first part of the book dealing with a Descartes physico-mathematics and the later chapters dealing with a Descartes natural philosophy, written between 1629 and 1633. Chapter 5 describes Descartes' analytical mathematics, as well as his dreams of a universal mathematics and a universal method through the analysis of Rule 4. The author also analyzes the use of the proportional compass in Descartes' *Cogitationes privatae*, dated 1619, before focusing on Descartes' method discourse. Like Chapter 2, Chapter 6, entitled "Method and the problem of the histor-

ical Descartes”, consists of a reflection on Descartes’ belief in his own method. Chapter 7 returns to the description of Descartes’ program of *Mathesis Universalis* in the later *Regulae*. Schuster analyzes Rules 8, 12, 14–18 and their structure and concludes that the project of the later *Regulae* collapsed in 1628 and that Descartes now changed the direction of his intellectual agenda. In Chapter 8, the last chapter of this second part, the author explains that Descartes reinvented the identity and the agenda, and how as a physico-mathematical philosopher of nature he constructed his first system of natural philosophy, *Le monde*, between 1629 and 1633.

Chapters 9, 10 and 11 are devoted to the significance and treatment of Descartes’ *Le monde ou le traité de la lumière*, a work that he began in 1630 and which was published in 1633. Chapter 9 describes the opening chapters of this work, up to Chapter 8, as a fable to explain the mechanistic world. Chapter 10 is devoted to the aims of *Le monde* and also explores the ways in which celestial vortex mechanics was interpreted, naming it “waterworld” in homage to Schuster’s colleague Gaukroger. Indeed, Schuster emphasizes that this work is a first iteration of systematic natural philosophizing. Thus, in Chapter 11 he analyzes this system of a natural philosophy from diverse dimensions, that is, horizontal and vertical. The work is also analyzed as a gambit in the natural philosophical field. Indeed, in his explanations Schuster remarks: “This, in a sense, completes our reconstruction of the trajectory of the young Descartes, from physico-mathematician with some non-systematized corpuscular-mechanical leanings in 1619, to a systematic mechanistic natural philosopher, shaped in part by the course of his physic-mathematical endeavors in 1633” (p. 25).

Finally, in Chapter 12 he presents the *Principia* as a cosmographical system and the culmination of Descartes’ natural philosophical trajectory. The author compares the two works: *Le monde* and the *Principia*; in fact, he focuses only on the latter part of Book III and the early part of Book IV of the *Principia*. As usual, the author first analyzes the key concepts for making this comparison; cosmogony, cosmology and cosmography, from a reading of both works. He then analyzes the other resources that Descartes employs in the *Principia*, such as sunspots, novae and variable stars and the genealogy of the Earth and all other planets. The last chapter is an epilogue consisting of a survey of the subject developed in the book, with remarks on the important points and including many insights about the mature Descartes.

Throughout the book, Schuster is fully aware of the difficulty of his subject, and for this reason takes care in the introduction to every chapter to situate the reader in the history of Descartes’ trajectory, quoting and justifying the contents of the previous and preceding chapters. While these explanations are of assistance to the reader, and while there is an extensive, rich and very well documented text on Descartes’ evolution of thought, one sometimes needs a break in order to be able to follow the main thread. Nevertheless, this book helps us to deepen and change our view of Descartes’ trajectory and, in sum, to better understand the significance of Descartes’ work in the seventeenth century. At the same time, Schuster provides historians with a different and fascinating approach to the trajectory of ideas and aims of this author belonging to the Scientific Revolution.

Reviewer: [Maria Rosa Massa Esteve \(Barcelona\)](#)

MSC:

- 01-02 Research exposition (monographs, survey articles) pertaining to history and biography Cited in 1 Document
- 01A45 History of mathematics in the 17th century
- 01A70 Biographies, obituaries, personalia, bibliographies
- 00A30 Philosophy of mathematics

Keywords:

[Descartes](#); [mixed mathematics](#); [physico-mathematics](#); [natural philosophy](#); [Regulae](#); [Le monde](#); [Principia](#)

Biographic references:

[Descartes, René](#)