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Descartes-agonistes: Physico-mathematics, method and corpuscular-mechanism 1618-33

Emily Thomas

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These issues aside, there is little doubt that Fors's thoughtful and innovative analysis helps to provide a foundation upon which a new history of the origins of chemistry in the eighteenth century can be built. As other scholars, such as Klein, have already suggested, that history will be very different from the conventional one, traditionally focused as it is upon a theoretical revolution in pneumatic chemistry. If we follow Fors, and in my view we should, that new history will concentrate upon a detailed understanding of a variety and diversity of European institutions in which industrial and commercial activities, and underlying economic structures, profoundly shaped the conceptual formations and experimental practices of the field.

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Natural philosophy

John Schuster, *Descartes-agonistes: Physico-mathematics, method and corpuscular-mechanism* 1618-33. Dordrecht: Springer, 2013. xix + 631 pp., \$279.00, £180.00, ISBN 978-94-007-4746-3

Descartes-agonistes returns to the theme that occupied Schuster's 1977 dissertation: Descartes the natural philosopher. This later work explores the 'agonies' that Descartes undergoes as he evolves from a 'physico-mathematician' into a 'corpuscular-mechanical systematiser with recognisable physico-mathematical conceptual stitches' (p. vi). *Descartes-agonistes* is wide-ranging and ambitious: in addition to tracing the evolution of Descartes' thought, it considers Descartes' method, elucidates various murky notions surrounding the scientific revolution, and self-consciously places itself in the existing historiographical tradition. There can be no doubt that the book is a grand success: it is meticulously argued, elaborated at great depth, and provides the most developed reconstruction of Descartes' natural philosophy thus far. I will say a little more about the structure of the book before offering some comments.

Despite its substantial length, *Descartes-agonistes* is a focused study. Schuster's preface offers a semi-biographical account of his interests and influences with regards to Descartes' natural philosophy. Chapter 1 situates the book in its historiographical context. Chapter 2 provides conceptual context, wherein the excellent discussions of 'natural philosophy' and 'physico-mathematics' deserve special mention. Chapters 3 to 8 explore Descartes' trajectory from 1618 to 1633, the last four years of which saw the composition of *Le Monde*, Descartes' first systematic attempt at natural philosophy (or so Schuster – persuasively – argues). These chapters emphasise the importance of Descartes' relationship with his mentor and colleague Isaac Beeckman, and discuss Cartesian theories of hydrostatics, natural fall, optics, universal mathematics, method and plenist realism. Chapters 9 to 11 dissect *Le Monde* in detail, ranging from Descartes' laws of nature to his celestial mechanics. Schuster argues, against 'generations of simplistic glossing and easy dismissals', that Descartes' vortex theory – on which material bodies move in circular whirlpool-like motions – are the 'engine room' of his mechanistic universe (p. 469). Chapter 12 compares *Le Monde* to Descartes' more mature work of natural philosophy, the *Principia Philosophiae*. Chapter 13 provides a conclusion and summary. The book is rounded off by two appendices which further support the book's conclusions, one on the evolution of Cartesian lens theory, and one on the celestial vortex mechanics of *Le Monde*.

As this brief overview indicates, *Descartes-agonistes* is an opulent study, and a review such as this can provide but a brief sketch of it. Bearing this limitation in mind, I will comment on three aspects of the book.

My first set of comments concerns its difficulty. Whilst the book is clearly focused, and individual discussions within it are very clear – with the structure of each chapter summarised at the start, and new terms explained as they are introduced – somehow these do not add up to a transparent whole. *Descartes-agonistes* is a heavy read: it is dense in the sense that its chapters and intricately plotted sub-sections are chock-full, brimming and jostling against one another. In the preface, Schuster explains that the book's detailed table of contents and internal cross referencing are intended to provide the 'best reader's map' to its argument and conceptual architecture, and he decided not to provide a 'standard index' which tends to enforce particular 'atomised' pictures of the contents of a book (p. ix). Whilst this decision is understandable, I can't help but think that a little atomisation would render the book less difficult and more accessible.

The second set of comments concerns the historiographical discussion of Chapter 1. As Schuster explains, Descartes has been studied by many different kinds of scholars, including historians of science and historians of philosophy, and these studies take different forms. Schuster is crystal clear about the kind of study he is providing: it is 'something of the form of an intellectual biography', albeit deliberately truncated and narrowed (p. 5). Whilst Schuster could have merely stated this and moved on, instead he provides us with a remarkable meta-historiography of Descartes, a discussion that is of standalone interest in its own right. Chapter 1 defends Schuster's form of intellectual biography from various worries, including that it might assert simplistic 'billiard ball models of causation and motivation', according to which Descartes engaged with an issue because of some particular event; that it is purely 'internalist', ignoring the wider seventeenth century religious or political context; or that it merely offers a chronology of ideas thinking themselves. Schuster concludes that the sociology of scientific knowledge and contextual history of science 'far from precluding biography, require it, can facilitate it, and in turn can be enriched by it' (p. 18). *Descartes-agonistes* conclusively proves this point: this partial intellectual biography of Descartes is a treasure trove of scholarly riches. The only issue I would have welcomed more on in this historiographical discussion (especially given what I will say below) is the relationship between the history of science and metaphysics. Schuster has written more on this issue elsewhere – discussing, for example, the thesis that scientific theories are conditioned by their metaphysical background¹ – and it would be interesting to know how he conceives this relationship in Descartes.

My third set of comments concern the book's relevance for history of philosophy, specifically metaphysics. Schuster states that *Descartes-agonistes* would not be 'well categorised' as history of philosophy, and adds, 'Nor do I expect that the kinds of categories explored and deployed in this work in the service of an historical (partial) biography in context will be of particular interest or relevance within the empire of history of philosophy' (pp. vii–viii). In this respect, I argue that Schuster has underestimated the reach of his work. This is because one of the threads running throughout the latter half of *Descartes-agonistes* is Cartesian metaphysics.

Although Schuster's primary focus is on Descartes' natural philosophy, his understanding of *Le Monde* and the *Principia* as espousing *systems* necessitates enquiry into the role that metaphysics is playing. This involves a discussion of the emergence of Cartesian dualism, which Schuster argues – against existing scholarship – was only fully developed in the 1640s (pp. 353–360). It also involves a discussion of the weight we should afford to metaphysics in these systems. Schuster argues that we should not place too great a load on it: 'I find that the centre of gravity of Descartes' revised systematising strategies in the *Principia* did not reside in his metaphysical grounding of the natural philosophy ... [but in] weaving ranges of novel matters of fact ... into explanatory and descriptive narratives with cosmic sweep' (p. 26). In this, Schuster is returning to a thesis he first advanced with Judit Brody: that Descartes' cosmogony informs far-flung parts of his natural philosophy –

¹ John Schuster, 'The Role of Presuppositions and Metaphysics', in *The Scientific Revolution* (Wollongong, 1995), pp. 99–108.

including his matter theory, cosmology, cosmography, and tidal theory - in such a way as to secure the *Principles* as a coherent system.²

To illustrate, consider sunspots, dark patches that can be seen around the sun. Schuster argues that, in the *Principia*, Descartes takes sunspots as a phenomenon in need of explanation and, having provided an explanation, the thus explained phenomenon can aid in the explanation of additional facts, binding the system together (p. 566). The *Principia* holds that there are three kinds of 'elements', variously sized and shaped kinds of material bodies. As Schuster explains - in far more technical detail than is reproduced here - the *Principia* develops Cartesian matter theory to explain sunspots, arguing that bodies within the vortex of the sun move at different speeds, such that one element can change into another. The relatively larger and irregular kind of element that produces sunspots can be thrown off by stars, and ultimately inherited by planets, and this is the source of the matter that makes up the Earth (p. 567). Of course, it is not just the Earth but *all* planets that undergo this process, and Schuster argues that the relations between these matters of fact and explanations - sunspots, Earth formation, planet structure - are part of Descartes' strategy for rendering the *Principia* a coherent system (p. 576).

The thesis that these kinds of systematising strategies - rather than a grounding metaphysics - provide the centre of gravity for the latter half of the *Principia* is extremely plausible. However, Schuster's claim that this thesis holds true of the entire text is rather more radical, and I suspect this thesis is one that some historians of metaphysics would resist. Regardless of which side one comes down on, there are fascinating issues here, and *Descartes-agonistes* demonstrates that there is still much left unsaid concerning the relationship between Cartesian natural philosophy and metaphysics.

Schuster's reconstruction of Descartes' natural philosophy is an unmatched monument of scholarship, and *Descartes-agonistes* is essential reading for Descartes historians of science and metaphysics alike.

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Historiography

D. Knight, *Voyaging in Strange Seas: The Great Revolution in Science*. New Haven and London: Yale University Press, 2014. 344 pp. 55 illus. \$25.00, £10.99 (pbk), ISBN 9780300212754.

In recent decades the history of science has turned away from the search for the grand narrative toward highly localized studies, reflecting a growing sense that the history of science is just too complex and messy for a sweeping overview. Going against the tide, David Knight's recent study of 'the great revolution in science' should give us pause to reconsider this self-imposed limitation. In this ambitious work, Knight demonstrates that the grand narrative, whilst challenging, can be exciting, informative, and exacting.

²John Schuster and Judit Brody, 'Descartes and Sunspots: Matters of Fact and Systematizing Strategies in the *Principia Philosophiae*', *Annals of Science*, 70 (2013), 1–45.