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*La rivoluzione culturale di Lucrezio. Filosofia e scienza nell'antica Roma*  
by Marco Beretta

Rome: Carocci, 2015. Pp. 311+ ill. ISBN 978–88–430–7945–2. Paper €32.00

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The last decades have witnessed a steadily growing interest in the scientific and philosophical value of Lucretius' *De rerum natura*. Long admired and studied for its literary charm, the magnum opus of Roman Epicureanism has greatly benefited from the emergence of reception studies as well as from a renewed attention to Latin as a language of ancient and modern science. Building on this body of research, Marco Beretta's straightforward but ambitious book claims that Lucretius' work deserves a much fairer treatment than is usually accorded to it as a piece of didactic poetry, a philological conundrum, and an Epicurean source-text. According to Beretta, far from being the singularly splendid masterpiece of an isolated mind, the *De rerum natura* stems from a fertile (and even 'revolutionary') intellectual milieu, mirrors Lucretius' attraction to scientific experimentalism, and has therefore never ceased to fascinate Western physicists and physicians.

Opposing the long-standing tendency to play down the importance of Roman science, the first chapter argues that the lively cultural environment of the late Republic provided an excellent basis for Lucretius' physical poem. Beretta offers a short survey of the Romans' fervid activities in such different fields as medicine, geometry, astronomy, and engineering, paying special attention to the dramatic increase in the production of technical and scientific writings between the end of the first century BC and the beginning of the first century AD. Most of the evidence cited comes from the works of well-known authors like Cicero, Varro, Seneca, and Pliny, but relevant pieces of archaeological evidence (such as the Antikythera Mechanism) are also taken into account. Cultural historians might have wished to see a closer examination of the admittedly huge amount of bibliography recently produced on such themes;<sup>1</sup>

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<sup>1</sup> See, e.g., Beretta's discussion of the role of libraries [42–44], which could have benefited from the insights of König, Oikonomopoulou, and Woolf 2013, 124–417.

yet the declared (and, for this reviewer, praiseworthy) purpose of the chapter is to show Lucretius' embeddedness in the 'revolutionary' atmosphere of the late Republic from the broadest possible perspective. To cite just one example, readers accustomed to the (by now standard) view of Lucretius as an Epicurean fundamentalist may be impressed by Beretta's intriguing claim that the first appearance of the word *vitrum* in *De rer. nat.* 4.143–154, 601–602, reflects the emergence of the art of glassblowing around the middle of the first century BC.

For Beretta, however, the most powerful factor of intellectual transformation in Lucretius' day was the diffusion of Epicureanism. Chapter 2 illustrates the core tenets of Epicurus' ethics and natural philosophy, their relationship to previous traditions (Democritus, the Academy, and the Peripatos, above all), and their remarkable impact on the Stoic-influenced Roman debate. In consideration of the book's focus on Lucretius, special attention is paid to the deconstructive potential of Epicurus' anti-teleological discourse in the Roman political context. Notwithstanding certain simplifications,<sup>2</sup> the chapter does an effective job of pointing out the depth of the Epicureans' interest in science and the theoretical foundations of the Epicurean polemic against Eudoxus and Euclid. Especially valuable are the synopsis of Epicurus' treatise *De natura* [67–68], the re-assertion of Asclepiades of Bithynia's contested dependence on Epicurean doctrines [79–83], and the suggestion that the Epicurean love for gardens and natural spaces shaped the Romans' lifestyle and architecture [93–99].

Chapter 3 turns to the *vexata quaestio* of Lucretius' biography and sources. The fact that Beretta is a historian of science and not a philologist may have played a role in his choice of reassessing the evidence on Lucretius' life both inside and outside the poem. As Beretta himself acknowledges, tentative speculations about this desperately obscure poet—his social status and personal experiences—have flourished since the Renaissance *Vita Borgiana*. With the decline of biographical criticism, classical scholars have been more and more

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<sup>2</sup> For instance, Beretta [60] clearly has Lucretius in mind when making the unlikely claim that *Epicurus* simultaneously destroyed the foundations of the Platonic, Aristotelian, and Stoic systems. (As recently restated in Kechagia 2010, 132–155, there is no evidence that Epicurus ever criticized the contemporary Stoa.) Likewise, it is quite reductive to define the Stoic theories of religion and divination as 'superstitions' [84].

unwilling to make new conjectures (or to accept old ones), and the strikingly incoherent body of hypotheses about Lucretius' life has even become an object of ridicule.<sup>3</sup> Beretta is wise enough to avoid gratuitous assumptions and essentially questions the ancient *vulgata* concerning the poet's folly and Cicero's role as 'editor' of the *De rerum natura*. Beretta also challenges the common assertion that Lucretius' accounts of scientifically relevant experiences are mainly based on 'bookish' materials. Although this reviewer has reservations about the possibility of ascertaining Lucretius' aristocratic background [113–114] or his familiarity with southern Italy [115–116], several of Beretta's remarks are undoubtedly of great interest. For example, the recent recovery of some iron rings in a Samothracian sanctuary [119–120] seems indeed to confirm Lucretius' claim about autopsy in 6.1044–1046.<sup>4</sup> Unlike David Sedley [1998, 93], who famously argued that Epicurus' *De natura* was Lucretius' 'sole philosophical source and inspiration', Beretta holds that the *De rerum natura* reports a number of original experiments and relies on a variety of sources, from Aristotle's biological writings to Asclepiades of Bithynia and the Stoics. Moreover, on the basis of Knut Kleve's identification of a few Lucretian lines in the Villa of the Papyri at Herculaneum [Kleve 1989],<sup>5</sup> Beretta assumes that Lucretius visited the Villa and the Campanian littoral [132]. Though not all readers will be convinced by this final inference (since, among other things, the *De rerum natura* may have reached Herculaneum after Lucretius' death), it should be recognized that Lucretius' relationship to Philodemus and other post-Hellenistic writers is still a largely open issue.<sup>6</sup>

Chapter 4 elucidates the foundations of Lucretius' theory of matter, from the principles of atomic weight and motion to the ideas of void, mixture, and swerve (*clinamen*). What makes Beretta's treatment particularly interesting is his emphasis on the biological, qualitative character of Lucretius' atomism. Beretta defines the corpuscularian physics of the *De rerum natura* as 'the science of seeds' ('la scienza dei semi'), since Lucretius analogically re-uses the agricultural notion of *semen* in order to make the Epicurean concept

<sup>3</sup> A vein of sarcasm underlies Holford-Stevens 2002.

<sup>4</sup> The passage has been interpreted as an eye-witness account also in Sedley 1998, 52–54.

<sup>5</sup> As recalled by Beretta, Kleve's identification has been questioned in Capasso 2003.

<sup>6</sup> On matters of poetic theory and pedagogic method, see most recently Beer 2009.

of atoms vivid (and palatable) in the eyes of Roman readers. The poet's conscious attempt to connect the mechanics of invisible bodies with the perceptible evidence of organic life is also witnessed by his prevalent focus on atomic interactions (and not on the atom as a single entity) as well as by his attention to the results of atomic aggregation, the so-called *concilia*. With an effective readjustment (and some due distinctions), Beretta interprets the Lucretian *concilia* as molecules and offers interesting remarks on the impact of the *De rerum natura* on modern alchemy. Beretta might have found further support for his thesis in Myrto Garani's insight that Lucretius' interest in elemental compounds derives from Empedocles (whose physics is readapted in the poem to an atomistic framework) [Garani 2007].

Chapter 5 discusses Lucretius' scientific method and its relationship to the ancient tradition. After recalling that Epicurus' followers shared a firm faith in thegnoseological value of sensorial experiences, Beretta shows how Lucretius took up and at the same time expanded the Epicurean theory of knowledge, atomic films (*simulacra*), and the senses. Special attention is devoted to the account of visual perception in *De rer. nat.* 4, which Beretta rightly interprets as an Epicurean response to Aristotle [168–174]. More generally, the chapter reaffirms the poet's well-known preference for visual evidence, analogical arguments, and empirical immediacy, arguing once again that several Lucretian demonstrations are founded on personal experiments. Some of the passages cited are perhaps more appropriate than others to serving Beretta's purpose.<sup>7</sup> Yet Beretta's reaction against the narrowly philological view of Lucretius as a 'fundamentalist' epitomizer of previous accounts [176], and his observation that the empirical method of the *De rerum natura* is not identical with that of other Epicurean sources [184],<sup>8</sup> are a most welcome contribution to the scholarly debate. In all likelihood, we will never know for sure which of Lucretius' *exempla* are based on 'original' research, and in this chapter Beretta himself points out the poem's debt to Empedocles' analogical imagery. But in the absence of specific textual correspondences, the assumption that all Lucretian arguments are borrowed from elsewhere

<sup>7</sup> For instance, whereas the description of ocular anatomy in 3.408–415 displays an admittedly uncommon attention to human physiology, the snake-argument in 3.657–665 echoes a tradition of animal dissections dating back at least to Aristotle (as I have argued in Tutrone 2014a).

<sup>8</sup> For a rich discussion of this problem, see Asmis 1984, esp. 293–320.

simply mirrors the professional devaluation of Lucretius' contribution by a community of word-lovers (the *philologoi*) who have much to gain from closer cooperation with historians of science.

In chapter 6, Beretta deals with Lucretius' approach to cosmological issues, pointing out that the *De rerum natura* ultimately aims to promote the 'new world order' ('il nuovo ordine dell'universo') of Epicurean philosophy. Beretta is aware of the work of Elizabeth Asmis [2008], and it is, of course, no accident that the chapter attaches great importance to the Lucretian notion of *foedera naturae*—that is, to the idea that natural laws are not imposed by a metaphysical authority but rather by the necessary agreement of things. As Beretta shows, the contrast between the concepts of *prescriptive* and *descriptive* natural law will have a second lease on life in the modern age, when scientists like Newton revive the Epicurean tradition. As for Lucretius' own understanding of cosmology and astronomy, however, Beretta restates the common scholarly view that the *De rerum natura* contains a series of clumsy and often 'regressive' demonstrations, which may be partly explained as the result of two intellectual difficulties: the unsuitability of the Epicurean analogical method for the analysis of distant phenomena, and Lucretius' unease with the close association between astronomical research and religious astrology in Roman culture. Still, since Beretta concedes that in passages like 5.621–628 and 705–750, Lucretius follows patterns of explanation which are either different or more recent than those followed by Epicurus, one may wonder if, far from being awkwardly backward-looking, the cosmology of the *De rerum natura* takes part in a (largely unknown) scientific debate entailing the reception/revitalization of Presocratic and classical doctrines. The second part of chapter 6 [198–206] is very interesting, as it identifies the 'revolutionary value' of Lucretian cosmology in its reintegration of sublunary and celestial physics, challenges any fixist (or anachronistically evolutionary) view of Lucretius' biology,<sup>9</sup> and reassesses the validity of the Epicurean method of multiple explanations.

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<sup>9</sup> In the modern debate, fixism opposes any evolutionary theory about the origin and transformation of species. Fixism is often associated with creationism (the belief in the existence of a creator god), but it should be recognized that applying such modern definitions to the history of ancient science may be greatly misleading. Lucretius, for instance, argues fiercely against creationism but is at times inclined to fixism.

Chapter 7 discusses Lucretius' conception of natural evolution and historical progress, arguing that the poet of the *De rerum natura* is 'the most explicit' ('il più esplicito' [207]) among the ancient authors who believed in the progressive development of history. Analogous claims have been made in the past about Seneca,<sup>10</sup> but neither this nor other interpretive issues—especially, the cultural and conceptual gaps between ancient and modern paradigms of progress—are dealt with in depth in the chapter. At the very beginning [208], Beretta declares that a comprehensive analysis of the secondary literature on Lucretius' notion of progress is beyond the scope of his treatment. This is not only understandable but also reasonable. Yet, when noticing that Beretta endorses John Masson's thesis—formulated in the heyday of positivism (1909)—that Lucretius' faith in permanent progress is a necessary corollary of his rejection of religion [217], readers are led to wonder whether this chapter might have benefited from a more careful discussion of the recent bibliography. However, there are also several points which are of indubitable interest. For example, Beretta highlights the double-sided nature of Lucretian progress and its strict dependence on human moral choices, showing how, from a certain stage of development onwards, Lucretius regards the pressure of need, unenlightened by Epicurean wisdom, as insufficient to produce positive progress. Moreover, when reassessing the poet's approach to natural history, Beretta observes that a fixist understanding of the genetic makeup of organisms [cf. 5.923–924] co-exists with an appreciative, naturalizing view of vegetable-grafting (5.1361–1364) and with the general claim that mankind's constitution gradually evolved and softened [5.1013–1018].<sup>11</sup>

It is worth mentioning that both chapter 7 and chapter 8 reproduce, with some revisions, previously published materials [cf. Beretta 2008a, 2008b]. To be sure, the eighth chapter is one of the most valuable in the book, in part because the author steps into a very congenial field of inquiry: Lucretius' reception in the history of modern science. After briefly remarking on Lucretius' *Nachleben* between Late Antiquity and the Middle Ages [219–221], Beretta digs into the scientific re-use of the *De rerum natura* from the time of

<sup>10</sup> See, above all, Edelstein 1967, 169–175. For a critical reconsideration of this and other modernizing readings, see Tutrone 2014b.

<sup>11</sup> As acknowledged by Beretta at the start of his survey, the most thorough contribution to the understanding of Lucretius' stand in this field is Campbell 2003.

Poggio Bracciolini's rediscovery (1417) to the 20th century. Beretta chooses the 'direct or indirect involvement of natural philosophers and scientists' ('coinvolgimento diretto o indiretto di filosofi naturali e scienziati' [222]) in the modern editions of the poem as a *fil rouge* for his (potentially immense) survey. Throughout a notably well-informed discussion, Beretta succeeds in showing how famous editions of the *De rerum natura*, such as those by Ferrando (1472–1473), Lambin (1563–1564), Nardi (1647), Marchetti (1717), and Munro (1866), influenced the Western debate on the nature and motion of atoms, the existence of void, the origin of diseases, and the autonomy of research. From Girolamo Fracastoro to James Clerk Maxwell, from Galilei and Newton to Heisenberg and Einstein, more than five centuries of history are revisited to highlight the everlasting appeal of Lucretius beyond the boundaries of literature. Quite correctly, such a long-lived series of re-appropriations is interpreted by Beretta as a proof of 'the multifaceted and interdisciplinary character of scientific culture' ('il carattere multiforme e interdisciplinare della cultura scientifica' [264]). Those who insist on regarding poetry as indifferently imaginative and ancient atomic physics as annoyingly arid may learn a lesson here.

The book includes an appendix with the most famous *testimonia* on Lucretius' life and work (a useful complement to chapter 2), a pluri-lingual bibliography (especially remarkable for its list of Lucretian editions from the Renaissance to the 21st century), and an *index nominum*. Even if, of course, opinions differ—for the reading of classical texts is, by definition, as unpredictable as the Lucretian *clinamen*—students of ancient and modern science should be grateful to Marco Beretta for assembling such a bold and accessible work.

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