
Seneca e le scienze naturali edited by Marco Beretta, Francesco Citti, and Lucia Pasetti

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This volume collects a number of essays on Seneca and the natural sciences, many of which were first presented at a seminar held at Ravenna in 2008. All were later revised and further developed for publication, and some new ones have been added. The book presents a special interest in that Seneca's scientific writing is dealt with from different standpoints and with different approaches. This entails the collaboration of different branches of learning, which include not merely the traditional literary and philosophic approaches but also perspectives belonging in fields that can be associated in various ways with the history of science. The university of Bologna in general, and the editors of this volume in particular, have proved well-deserving of our praise in promoting this fruitful approach to ancient scientific texts. This volume marks a new milestone along a path that has already arrived at some important results, and will hopefully be followed by further contributions in the study of the scientific texts of antiquity.

In the first essay, 'Il concetto di legge naturale in Lucrezio e Seneca' [1-17], Marco Beretta analyzes the concept of natural law, not merely in Lucretius and Seneca but from Democritus down, on the basis of the use of juridical terms («νόμος», 'lex', 'foedus', 'ius') variously applied to natural processes, and its influence on the idea of 'natural law' in modern science. The main focus is the Stoic conception of 'natural law' as it is related to and, to a certain extent, identified with the divine reason ruling the cosmos—an idea later accepted by the Christians, who added the notion of 'miracle' as God's exceptional intervention temporarily changing or suspending the natural laws that he has established.

The opposite view is represented by the Epicureans and is illustrated in conjunction with Lucretius' use of such expressions as 'foedera naturai'

[1.586], ‘fati foedera’ [2.254], ‘aevi...leges’ [5.58], and the like. Any theological or metaphysical connection is, of course, excluded: all natural phenomena are caused by the atoms moving in the vacuum and are regulated by rules inherent in the natural processes themselves (*foedera*) rather than by laws dictated by an external power; yet all occur inescapably within the frame of temporal succession (*aevi leges*). Contingency and necessity somehow coexist in Lucretius’ universe. Beretta’s main contribution here lies in calling attention to the slight changes taking place over time in such phenomena as human evolution [book 5], which he connects with the Epicurean doctrine of the atomic swerve (*clinamen*). According to him, then, Lucretius does not uphold the fixity and immutability of natural processes.

Only one page and a half are devoted to Seneca. After an initial remark about the ‘Lucretian’ spirit of the *Naturales quaestiones*, aiming to deliver men from superstition (for which a reference to Italo Lana’s still fundamental *Lucio Anneo Seneca* [1955] might have been in order), Beretta analyzes some instances of Seneca’s use of ‘lex’ and ‘ius’ in connection with nature. His conclusion is that, though Seneca accepted the Stoic idea of natural law as stemming from a divine and providential mind, he sometimes associates it with the simple task of explaining some regular occurrences in natural phenomena. It can be said that, to a certain extent, he concurs in this with Lucretius and that the two contributed to the elaboration of the concept of natural law in modern science in which all metaphysical references have disappeared and natural law is conceived of as the common principle underlying a definite set of phenomena.

This essay offers a fascinating panorama of the evolution of a basic scientific concept, though rather cursorily for reasons of space and approach (the study of the actual appearance of juridical terms in relation to nature). The treatment of Seneca in particular would have benefited from a wider outlook. Also, some statements ought to be qualified. For example, though Cicero did, as remarked by Beretta [5-6], uphold the rationality of the cosmos, he was far from accepting all the consequences drawn by the Stoics from the alleged interconnection of all its components, as is clearly demonstrated by his attitude to divination [cf., e.g., [Setaioli 2005](#), 241–263].

Piergiorgio Parroni, in his paper ‘Il linguaggio «drammatico» di Seneca scienziato’ [19–29], offers an inquiry into Seneca’s use of poetic quotations and allusions as a tool to win the reader’s emotional involvement in the investiga-

tion of nature—or rather, a sample of an inquiry still largely to be carried out. He first illustrates a case [*Nat. quaest.* 7.10.1] in which the quotation of Ovid, *Met.* 2.71 is accompanied by several hints at the same Ovidian passage in the immediate context. He then goes on to point out what he terms ‘hidden quotations’ in Seneca’s text. He only dwells on a few passages, which he analyzes with unquestionable flair for poetic traces. For example, at *Nat. quaest.* 1.3–4, he convincingly points out the influence of a famous Ovidian passage, *Met.* 4.121–124 (Pyramus and Thisbe), and the full import of the subsequent textual quotations from *Met.* 6.65–67 (the multicolored fabric woven by Arachne) to describe the rainbow. So, he contends, when Seneca in the immediate context appeals to *pictura* in relation with the rainbow (‘in picturae modum’), this must refer to the colors and figures in a tapestry rather than to a painting. I should like to point out that Parroni’s interpretation is supported by a passage in Aristotle’s *Meteorologica* 3.4.375a23 ff. Not only does Aristotle refer to tapestries and embroidery, he does so in order to illustrate the difficulty of clearly perceiving the fading of one shade into the other in the rainbow—the same effect that Seneca, who certainly knew Aristotle’s work, chooses to illustrate through Ovid’s words: *ut ait poeta*.

At times, when an expression is used in its proper meaning by Seneca, it may be unsafe to take it as a ‘hidden quotation’ of a poetic passage in which it is used metaphorically,¹ as maintained by Parroni; but the assumption is supported by Seneca’s frequent use of *Met.* 15 and is well illustrated by him. The influence of Lucretius’ section on earthquakes [*De rer. nat.* 6.567: *tantam terrarum...molem*] appears probable in itself, since it refers to the same phenomenon. But Parroni points out a whole web of reminiscences of this Lucretian passage in Seneca’s work.

Sometimes, however, one may proceed too far along this way. According to Parroni, ‘portenta vincimus’ [*Nat. quaest.* 1 *praef.* 5] is reminiscent of ‘portenta perempta / si non victa forent’ [Lucretius, *De rer. nat.* 5.37–38]. He is certainly right when he contends that Seneca’s text needs no correction and should be understood in the sense that conquering the passions (the monstrous *portenta*) is not enough to attain virtue; but, since in Lucretius the *portenta* are the real monsters conquered by Hercules, one must suppose a shift in meaning effected by Seneca. This is by no means impossible. But it is surely difficult to accept Parroni’s suggestion that Seneca read ‘vincta’

¹ *Nat. quaest.* 6.4.1 *tanti molem ponderis* ≈ Ovid, *Met.* 15.1 *tantae pondera molis*.

(‘chained’) in Lucretius—the reading given by the two main manuscripts, the Oblongus and the Quadratus—rather than ‘victa’ (‘conquered’) found in the Itali, which, as Parroni himself concedes, is undoubtedly the correct reading in Lucretius. He proposes to take Seneca’s ‘vincimus’ as the first person plural of ‘vincio’ (‘vincimus’: ‘we chain, restrain the passions’) rather than of ‘vinco’ (‘vincimus’: ‘we conquer the passions’). In his edition too [2002, 11], Parroni translates ‘incateniamo dei nostri’. However, what comes immediately before in Seneca, ‘superiores sumus’, surely anticipates ‘vincimus’.² In the very passage that Parroni adduces to support his interpretation, ‘quo maior nulla victoria est, vitia domuisse’ [*Nat. quaest.* 3 praef. 10], taming the vices is presented as a victory—more: the greatest possible victory. In my opinion, then, Seneca is speaking of conquering the passions, not of chaining or constraining them.

In the next essay, ‘Originality and Independence in Seneca’s *Naturales quaestiones* Book 2’ [31–47], Harry M. Hine analyzes some of Seneca’s ways of bestowing a Roman stamp on his philosophy of nature on the basis of the second book of the *Naturales quaestiones*.

He starts by pointing out that Seneca has inserted a lengthy discussion of the Etruscan divination from lightning—i.e., a native Italian subject matter—in a book on the physics of this phenomenon as previously investigated by the Greeks. This is of course true but it is not entirely correct to state, as Hine does [34], that in his treatment Seneca makes no room for the philosophical problems posed by divination that one would expect to find discussed in a Greek treatise. Quite the opposite: at the very beginning of this section [2.32 ff.], we find a philosophical discussion culminating [2.38] in the opposition between predestination and free will—one of the thorniest problems of Stoic philosophy—which Seneca tries to solve by resorting to Chrysippus’ refutation of the Idle Argument (ἄργον λόγος): to the objection that, if a sick man is fated to recover, he will whether he takes the trouble to call for a doctor or not, Chrysippus—and Seneca—reply that the sick man is fated to call for a doctor as well [see [Setaioli 2014a](#)].

Hine then emphasizes the fact that Seneca carries out his discussion on the basis of an original Latin terminology rather than a rendering of Greek terms. Hine does recognize that Seneca’s distinction between ‘fulmen’ and ‘fulgur’

² Cf. *Nat. quaest.* 4b.13.1, where ‘superior futura est’ anticipates ‘vincat’.

is his way of rendering the one existing in Greek between two words coming from different stems, «ἀτραπή» and «κεραυνός»; but the deeply Stoic (and Greek) ideas underlying Seneca's discussion of the archaic form 'fulgēre' and the more recent 'fulgēre' [2.56.2] seem to escape Hine. Like the Greek Stoics, Seneca stresses the gradual loss of the close correspondence between language and reality in the passage from ancient forms to more recent speech: the archaic 'fulgēre', with its short vowel, mirrored the swiftness of lightning much more closely than 'fulgēre' [cf. Setaioli 1988, 39 and n123].

Hine then tries to explain why, if the third book was originally the first of the *Naturales quaestiones*, the second (which by this reckoning would be the last one) opens with the fundamental distinction of heavenly, meteorological, and earthly phenomena that one might expect at the beginning of the work, followed by a treatment of *spiritus*, which may have been in place in all books treating atmospheric phenomena. He suggests that Seneca, as in the *Epistulae morales*, addresses his teaching to beginners and starts, therefore, with visible phenomena, reserving the theoretical principles to the end. Hine has undoubtedly grasped one of Seneca's most conspicuous traits: he is a teacher addressing pupils who need to be instructed. It is rather difficult, however, to equate a physical treatise (however unsystematic) with the philosophical and ethical project traced in the letters, which will necessarily start with admonition and only after the pupil's 'conversion' permits appeal to his reason and imparting Stoic philosophy's theoretical foundations [cf. Setaioli 2014b].

Hine then goes on to the most important point of his essay. In connection with 2.21.1, where Seneca states that from this point on he will dismiss his teachers and start moving on his own, he remarks that the philosopher is not claiming complete originality but rather independent thinking, implying critical appropriation of the wealth of earlier thought, which is also the necessary condition for any real progress of science. This is absolutely true. Seneca's statement at 2.21.1 only marks the return to his Stoic source influenced by Aristotle after the previous doxographic insertion [cf. Setaioli 1988, 395–396]. But I cannot but completely agree with Hine's view concerning Seneca's idea of independent thought, which exactly corresponds to my contention in a paper first published in *Aufstieg und Niedergang der römischen Welt* [Setaioli 1985, 849–856] and then collected and updated in a book on Seneca [Setaioli 2000, 111–217, 397–408, esp. 206–215]. In this paper, I pointed out

in much greater detail how Seneca developed this idea from the rhetorical theory of imitation. Regrettably, it seems to be unknown to Hine but the concurrence of the conclusions does amount to support of the correctness of our results.

Finally, Hine discusses a scientific statement by Seneca which may indeed be his own since it is presented by him as his own conclusion: the reason why wine congealed by lightning is poisonous after it is melted down again [2.53.1–2: cf. 2.31.1]. As no other ancient writer known to us alleges that wine can be congealed by lightning, Hine suggests that Seneca may have confused two different phenomena described as noteworthy by ancient authors: the evaporation of wine caused by lightning and its freezing in cold weather. Be that as it may, Seneca is merely offering a plausible (*veri simile*) explanation of the phenomenon: the presence in lightning of a *vis pestifera*, allegedly recognizable in other phenomena too, which is left behind in the congealed wine. In other words, lightning poisons wine because...it is poisonous! A rather obvious truism.

Seneca's real contribution, clearly, is not in his originality in the modern sense but in his nonetheless modern idea of how reading and culture contribute to the molding of an independent mind which will be able to proceed farther on the path traced by the great men of previous ages.

Francesca Romana Berno, in a paper entitled 'Non solo acqua. Elementi per un diluvio universale nel terzo libro delle *Naturales quaestiones*' [49–68], examines the description of the cosmic flood closing the third book of the *Naturales quaestiones* in the light of the doctrine of the transformation of the four elements into one another that was previously presented in the same book [ch. 10]. The flood is brought about, mainly, by earth's transmutation into water, which disrupts the cosmic balance, thus causing the return to primeval chaos and the end of the world as we know it. The widespread doctrine of the transformation of the elements, Berno points out, had also been put forward by a poet not too far in time from Seneca, whom the philosopher knew very well: Ovid, in Pythagoras' long speech in the 15th book of the *Metamorphoses*. She then proceeds to illustrate Ovid's presence in the third book of the *Naturales quaestiones* by discussing the numerous quotations from, as well as allusions to, the *Metamorphoses*. In particular, before the description of the flood, Seneca [3.20.3–6, 3.26.4] resorts to quotations from Pythagoras' speech in Ovid's 15th book in order to ex-

emply—and support with the poet’s authority—some unusual phenomena connected with water. Here, then, Ovid is used as a reliable scientific source. Things change in Seneca’s description of the flood [3.27.19–28.2], where he quotes Ovid’s treatment of the same subject in the first book of the *Metamorphoses*. Here the emphasis is on the literary aspect: though Seneca calls Ovid *poetarum ingeniosissimus*, he criticizes him for marring an otherwise powerful description with petty and irrelevant details. One might perhaps have stressed the fact that this criticism may have been prompted, besides by personal emulation in the treatment of a similar subject, by the different levels (mythological and scientific-philosophical respectively) of Ovid’s and Seneca’s descriptions. One might have equally remarked that the latter’s criticism [2.27.14 *lascivire*] of Ovid is in keeping with his own father’s [Seneca, *Rhet. contr.* 2.2.12] and Quintilian’s [*Inst.* 10.1.88 *lascivus*, 10.1.98], and that it is based on the principle of what is fitting (τὸ πρέπον) [*Nat. quaest.* 2.27.15 *quid deceat*].

Berno concludes that in the description of the flood Seneca may have intended to go beyond Ovid’s treatment of the subject in the first book of the *Metamorphoses* by resorting to the ‘scientific’ picture sketched by Ovid himself in his 15th book concerning the transformation of the elements into one another and, particularly, of earth into water. In other words, he may have wished to correct Ovid the mythological poet through Ovid the ‘physicist’, to put it in terms that we have suggested before.

It should be added that Berno conducts her argument with extreme clarity and an admirable command of all the relevant literature.

In ‘Le piene del Nilo nelle *Naturales quaestiones* di Seneca’ [69–80], Pasquale Rossi offers a mere report of the doxography concerning the floods of the Nile contained in the surviving part of book 4a of the *Naturales quaestiones* and in the summary of the lost part given by Ioannes Lydus in his *De mensibus*. Rossi’s paper may be supplemented with the next one by Daniele Pellacani, ‘Le piene del Nilo. Nota bibliografica’ [81–92], which offers a survey of the bibliography on the main aspects of book 4a. Both papers are useful as collections of material but contain no original contributions.

Arturo De Vivo’s ‘Seneca e i terremoti (*Questioni naturali*, libro VI)’ [93–106] investigates the structure of the sixth book of the *Naturales quaestiones*. After observing that Seneca here presents the study of nature as a return to earlier interests [6.4.2] rather than as a breach with his past pursuits, as

he has done in a previous book [3 *praef.* 1–2], De Vivo stresses the symmetrical arrangement of the various parts of the book. The proemial section and the epilogue, roughly equivalent in extent, serve as a frame enclosing a doxography on earthquakes and their causes. They both refer to a contemporary event—the recent earthquake in Campania—and both are ethical and admonitory in character. Together they make up well over a third of the whole book and take up a space that is well over the half of the physical section proper, which they encompass. The quotations from Virgil are also evenly distributed: the proem and the epilogue have one each, while there are six in the doxography in between. Two historical excursus are inserted in the doxography—also symmetrically, that is, roughly at the same distance, respectively, from the beginning and the end of this section. One deals with Nero’s expedition to the source of the Nile, flatteringly presented as prompted by the emperor’s love for truth [6.8.3–5]; the other is introduced in reference to a quotation from Callisthenes and bitterly condemns his murder at the hands of Alexander the Great [6.23.2–3].

De Vivo contends that the two excursus interact with each other and that the reference to Nero should be read in the light of the negative judgment passed on Alexander. He refers to a passage in the 10th book of Lucan’s *Pharsalia* in which Caesar expresses in words³ undoubtedly reminiscent of Seneca’s praise of Nero in the first excursus⁴ his strong desire to learn about the source of the Nile. As De Vivo points out, Lucan [10.272] also pairs Caesar with Alexander, whom he condemns as strongly as Seneca. This contention is the main point made by De Vivo’s paper. Though it must necessarily remain a hypothesis, it is undoubtedly well argued and plausible.

Francesco Citti, in ‘L’opzione della scienza. A proposito di Seneca, *De otio* 4,2’ [107–117], after an exhaustive survey of the interpretations of the expression ‘*mari ac terris inserta*’⁵ at *De otio* 4.2, accepts Dionigi’s explanation: lands contained in the sea (such as islands) and waters contained in the land (such as rivers and lakes). By referring to a wealth of texts attributable to, or influenced by, Posidonius, he then suggests that Seneca meant to prompt

³ Lucan, *Phar.* 10.188–189 *cum tanta meo vivat sub pectore virtus, / tantus amor veri.*

⁴ *Nat. quaest.* 6.8.3 *ut aliarum virtutum ita veritatis in primis amantissimus.*

⁵ This is Erasmus’ text. Manuscript A has *maria a terris*, while R and V have ‘*emaria terris*’.

the would-be investigator of nature to reflect on the interweaving of land and water which creates the different continents.

The last three essays deal with the reception of the *Naturales quaestiones*.

Hiro Hirai, in 'Seneca's *Naturales quaestiones* in Justus Lipsius' *Physiologia Stoicorum*: The World-Soul, Providence and Eschatology' [119–142], offers an interesting survey of the way in which Justus Lipsius uses Seneca's work in his *Physiologia Stoicorum*. Hirai systematically analyzes all of Lipsius' 53 quotations of the *Naturales quaestiones*. He points out that Lipsius uses Seneca in his effort to harmonize Stoicism and Christianity, not rarely forcing the Roman philosopher's positions. As Hirai clearly shows, the parts of Seneca's work that Lipsius regards as most significant, and repeatedly quotes are: the preface to the first book, chapter 45 of the second book, and the description of the deluge (and universal conflagration) at the end of the third book [3.27–30]. He uses the first of these texts to stress the ethical ends of the investigation of nature, to confirm the existence of providence, and to identify God with the World-Mind, that is, with an incorporeal creator—a conception at odds with authentic Stoicism. Lipsius draws the same conclusions from 2.45, which lists the names which can be applied to God in accordance with Stoic pantheism. Finally, he uses the third Senecan text in order to illustrate his own conception of the end of the world. A useful appendix lists the titles of all chapters of the three books of the *Physiologia Stoicorum* and all the passages from the *Naturales quaestiones* quoted by Lipsius.

Bardo Maria Gauly's 'Aliquid veritati et posteris conferant: Seneca und die Kometentheorie der frühen Neuzeit' [143–159] offers an extremely interesting survey of the reception of book 7 of Seneca's *Naturales quaestiones*, containing his theory on comets, by such astronomers and scientists of the early modern age as Tycho Brahe, Galileo, Kepler, and Libert Froidmont (Libertus Fromondus). Though Tycho Brahe had proved that comets must be placed beyond the Moon and revolve around the Sun (and cannot, therefore, be regarded as atmospheric phenomena, as maintained by Aristotle and denied by Seneca), he still considers them to be accidental and temporary. Galileo is even less innovative in that he admits regarding comets as phenomena either in the atmosphere or in outer space as equally defensible. Even Kepler takes comets to be temporary and, like Tycho Brahe and Galileo, does not accept Seneca's idea that they move along established, though yet unknown, orbits. Froidmont, though he develops his theory of comets in close connection

with Seneca's, is closer to Aristotle; while he admits that certain comets move in the space beyond the Moon, he maintains that others do form in the atmosphere.

In the seventh book, Seneca admits in passing [7.2.3] that the heliocentric system of Aristarchus of Samos might be accepted—he is probably referring to the revolution rather than the rotation of the Earth—and Froidmont connects this passage with the Copernican system, though he was closer to Tycho Brahe's model of the cosmos.

Though Seneca rejected the vulgar connection of comets with contingent situations and political upheavals, he nevertheless, like a good Stoic, considered them to be part of the universal system of signs produced by cosmic 'sympathy' [7.28.2]. But for his repeated mention of the comet of AD 60 as portending happiness under Nero's reign, he was scathingly criticized by Kepler.

The most frequently quoted part of the book is the prophecy that what is still unknown (like the comets' orbits) will be discovered in the future [7.25.4–7: cf. 7.30.5–6]. Froidmont distances himself from Seneca, doubting that his prophecy will ever come true; but Kepler—though still rejecting the idea that comets follow a regular orbit—presents himself as one of the scientists who are contributing to fulfill Seneca's prediction and places a quotation from *Nat. quaest.* 7.25.7 on the title page of his *De cometis libelli tres* (1619). Seneca's prophecy was indeed regarded as the link between his theories and the discoveries of the early modern age.

In the last and longest essay, 'Per una rassegna sulla fortuna delle *Naturales quaestiones*' [161–252], Fabio Nanni and Daniele Pellacani offer a systematic survey of the reception of the *Naturales quaestiones* from antiquity to the 20th century. The first three sections ('L'antichità', 'Il Medioevo', 'Il Quattrocento') are by Nanni; the rest ('Il Cinquecento', 'Il Seicento', 'Il Settecento', 'L'Ottocento', 'Il Novecento') is due to Pellacani. The authors have scrutinized an imposing amount of bibliography—the list takes up no less than 17 pages at the end of the essay. The survey must perforce be rather cursory in view of the nearly two millennia that it covers but it will certainly prove invaluable to anyone planning an in-depth research of the reception of Seneca's work in any given period of time.

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