

Lucretius, *De Rerum Natura* Books 1-2

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Science vs. Superstition (1.1-482)

De Rerum Natura (= *The Order of Things; On the Nature of the Universe*) is a didactic epic poem. As an epic, it begins with an invocation to the Muse, in this case, Venus. It's also dedicated to a patron, Memmius. Check the appendices for details.

After briefly mentioning the philosophical basis of his argument, "atoms" (= indivisible {pieces of matter}), L praises E for his attack on superstition: in other words, for his attack on the use of religion as a means of social control. Far from being impious, a successful attack on religious superstition will save people from evil: remember the hideous death of Iphigeneia, which was caused by nothing other than religious superstition: "Such are the heights of wickedness ..." (1.100).

The key to the power of the priests and prophets is the fear of eternal punishment to the immortal soul after death of the body. If you can see the mortality of the soul, though, you would see "a term was set to your troubles" (107), and thus you can resist the "hocus-pocus and intimidation" of the priests. This can only be done understanding nature, and positively affirming the mortality of the soul.

Thus the battle lines are drawn: rational scientists on one side, superstition-peddling priests on the other: explanation versus mumbo-jumbo, freedom versus coerced, fearful obedience. (This is obviously a hot issue today: can science and religion co-exist? Lucretius will say yes, but only a non-superstitious religion, one with completely disinterested, totally self-contained gods--who would, not coincidentally, need no priests. In one sense, although it's not technically correct to say so, we could say for our purposes that he's taken Aristotle's prime mover seriously: a completely immanent activity, a life of pure pleasure in thought, would have no desire to help or hurt humans, would have no interest in us and our petty sacrifices. Thus Lucretius, if he has a religion, would be one of immanent activity on the human plane: how do you conduct your life regarding yourself and others: that is the key to religion, not obedience to priests and their phony rituals. This is also a perennial conflict in religious thought.)

The Atomic Theory (1.146-417)

As Lucretius begins his exposition, he lays out 4 principles of the atomic theory: 1) nothing is created by divine power from nothing ; 2) no thing is completely reduced to nothing, but only down to its atoms; 3) bodies are composed of invible atoms; 4) there is empty space between atoms.

Notice the way Lucretius always gives an argument: he always tries to persuade the reader by offering examples and explanations from everyday experience. In a way, this is more scientific than his materialism: that he tries to persuade from everyday experience, w/o appeal to mystery which can only be believed on faith. What makes all scientists materialists is not an a priori decision in favor of a doctrine, but the adherence to science as a social method: only that which passes through the test of publication, debate, independent verification, and so forth, is scientific, and the only things that can pass through that test are arguments from

evidence, and the only shareable evidence we have is that which comes through the senses, and the only thing that comes through the senses is matter and its interactions.

Composition of bodies (1.921-1117 & 2.585ff)

At the end of Book 1, L draws 3 conclusions: 1) space is infinite; 2) matter is infinite; 3) there is no center of the universe. These set the stage for his explanation of the diversity of bodies: they are composed through random collision of the atoms (1.1025).

Lucretius thus paints the picture of random collisions of diverse forms of atoms forming diverse bodies. Diversity that explains identity! This is a real departure from the old picture of diversity being a degeneration from a prior identity, back to which diverse (= moving) things nostalgically strive, as in Platonic or Aristotelian thought. Rather, Lucretius positively affirms diversity, as at 2.585: "there is no visible object that consists of atoms of one kind only. Everything is composed of a mixture of elements." Or, at 2.670: "every individual animal ... various parts ... differently shaped atoms").

Bodies are then temporary conjunctions of different shaped atoms, and death is the dissolution of the temporary conjunction (2.1000). The important thing is the approach to this doctrine: chance and temporary conjunction must be affirmed rather than denigrated!

The Swerve (2.1-332)

We now know that composition of bodies via random atomic collision is improbable. Stuart Kaufmann has shown that such a brute search of the phase space of life is impossible in the time span of the universe back to the big bang. Rather we have phenomena of self-organization that crowd systems into tiny parts of their phase space and thus immeasurably shorten search times.

Now it just so turns out that Lucretius might just have put his finger, w/o knowing it, on a phenomenon of self-organization in the notorious doctrine of the "swerve" (*clinamen*) in Book 2.

The problem is this: as a scientist, Lucretius proposes universal laws of material motion to explain natural phenomena: what we see must be explicable on the basis of the movement of atoms in the void. Now one of the things we see in the world is human free action. How can the rule-bound, deterministic motion of atoms explain free action? It seems that it can't, so that you must either argue that human free action is an illusion, that deterministic laws explain human action just as other laws explain the motion of the stars OR that the world is not wholly material, that another, spiritual realm w/ its own laws of self-determination (or absence of law) is responsible for human free action. Their seemed for thousands of years no solution to this dilemma, no way to pass between the horns. Given the ingrained belief in human free action (so necessary for forms of social control that rely upon individual responsibility and punishment/reward) the spiritual option, despite the insoluble philosophical troubles that a dualistic ontology poses (just how does the soul relate to the body, the mind to the brain--some of the most hilarious episodes in philosophical history occur in answering this question, my favorite being Descartes' proposal that the pineal gland was the linchpin!), was dominant for many years, no doubt because it also offered additional opportunities for social control in that its "soul" posit fed into just the sort of immortality/eternal punishment doctrine L excoriates in Book 1.

Now as with all dilemmas, all forced choices this one, between dead matter bound by deterministic laws and living spirit free to determine itself, can only be solved by reformulating the question. Perhaps what we need to think is the possibility of "living matter," that is, matter that is non-determined and can organize itself. Lucretius proposes just such material self-organization in his doctrine of the swerve.

First, the standard reading, which derides L for an *ad hoc* posit, a blatant cheating that wriggles out of the problem by merely stating that "at quite indeterminate times and places they swerve ever so little from their

course" (2.219). Given the picture of pieces of stuff flying through the air that move for no reason, philosophers raised to think in terms of sufficient reason: nothing happens for "no reason," but only in response to antecedent causes, Lucretius (or Epicurus) was never taken seriously as scientists, but merely as closet dogmatists. There was no solution to the free will/determinism dilemma, people said: we just had to accept that humans were free and that science would never be able to explain that.

Now the new reading (cf. Michel Serres, *La Naissance de la physique dans le texte de Lucrece: Fleuves et turbulences* [Paris: Minuit, 1977]). The problem with the above reading is the picture of solids in air as the model for atoms in the void. If we shift to hydrodynamics, to fluids and their behavior, we can see what L is talking about and rescue him from the charge of *ad hoc* manipulation. When L introduces his discussion of the swerve, his examples are that of fluids (2.195): "Their [atoms falling downward] behavior is like that of blood released "

Now we know that the smooth flow of fluids, so called laminar flow, is an idealization: real flows always are turbulent to some degree. Now we must note three things about turbulence: 1) despite the seeming counter-intuitiveness, turbulence is more organized than laminar flow; 2) turbulence is a form of self-organization of matter [no central command, no spirit]; 3) the onset of turbulence, while we know that it WILL occur, is unpredictable: we don't know exactly when and where it will happen: it occurs "at quite indeterminate times and places."

Thus the swerve of Lucretius, rather than an *ad hoc* posit to resolve an insoluble dilemma, is really the description of the random onset of turbulence in fluids and hence a way to avoid a false dilemma: one can have both materialism and human free action. The problem with the traditional dilemma is the link of materialism and determinism. Determinism relies on dead matter, w/ no potentials of self-organization, that must be controlled by outside laws, must be rescued by an organizing spirit.

The question must be, why did Lucretius suffer the fate of being so misunderstood and vilified? One answer is the threat self-organizing matter poses to the system of social control of the ancient (and medieval) Mediterranean systems. Remember the oppositions: matter is the side of women and labor and body, and hence in need of free male spiritual guidance. It can't organize itself, so it must be rescued from above. What if women and labor and the body had untapped potentials of self-organization? What a threat to the system. Better by far to have them be the source of chaos and anarchy (remember Plato's hilarious blaming of the jealous wife for the decline from timarchy to oligarchy) and to present the false choice: either anarchy or control from above. Louis XVI: *après nous, le déluge!*