

## Lucretius: Philosopher and Physicist

**Patrice F Dassonville\***

*Freelance Researcher, Author of The Invention of Time and Space (Springer 2017), France*

**\*Corresponding Author:** Patrice F Dassonville, Freelance Researcher, Author of The Invention of Time and Space (Springer 2017), France.

**Received:** September 21, 2022; **Published:** September 28, 2022

### Abstract

The heterodox way of a poet who wants to know about the world otherwise than with beliefs.

**Keywords:** *Atom; Mind; Time; Universe; Void*

### Introduction

Lucretius is commonly introduced as a Latin poet and philosopher; but reading his magnum opus titled “de rerum natura” [1] makes one think that he was also a physicist in a way: he praises knowledge; his questionings are suitable; some of his suggestions are proper; although he does not demonstrate anything and he does not indicate his sources of information and the origin of his thoughts.

We’ll go through what Lucretius writes about the universe, about some physical laws, about the sun and the moon, about time and the speed of light. He goes so far to wonder about the limit of the fertility of the earth, one of our main current concerns.

### The praise of knowledge

Lucretius praises knowledge: “The explanation of nature scatters the terror of the soul” (Song II, 59 to 61). “Terrors of the soul flee thanks to the knowledge of the nature of things” (Song III, 15).

He adds this remark of great lucidity: “The misfortune of humans who have attributed so much to the Gods” (Song V, 1194).

### The methodology

Lucretius attaches great importance to terminology: “it’s often necessary resorting to new words because of the need of the language and the novelty of the object” (Song I, 137). His methodology is quite rigorous when he says: “if you observe it perfectly and if you see it perfectly, many things will cease to amaze you” (Song VI, 653). “With this kind of things, you must make many suggestions before being able to account for the thing itself” (Song VI, 917). “There are a number of facts of which to provide a single cause is not sufficient, but you must propose several, whereas only one is the right one” (Song VI, 703).

He gives a very good example with the floods of the Nile: “during summer time the aquilons oppose the mouths of the river... blowing against the river current they hold it back and push its waters upstream” (Song VI, 715); “it’s among the races of black men... that it starts deep in the south” (Song VI, 722); “It’s also possible that rains happen around the river spring” (Song VI, 729); “Perhaps the river swells deep in the high mountains of Ethiopia” (Song VI, 735).

He notices what we now call technical progress: “... nowadays certain techniques are improving” (Song V, 332), and his position is deterministic: “The course of the Sun and the phases of the Moon... the nature... drives them (and not in accordance with a divine order)” (Song V, 76); “The Sun and the Moon... taught to humans the annual revolution of the seasons, and that nature is managed in a deterministic way, with a deterministic plan” (Song V, 1439). Obviously, he doesn’t know the notion of physical law; in that time, time we still talk about laws of nature; but he notices the periodicity of the movement of the Sun and the Moon.

### The nature of thought

Lucretius makes very subversive remarks asserting that the mind is a part of the body: “The mind, that we often call thought; ... is a part of man” (Song III, 95); “the soul is conjoined with the mind” (Song III, 159); “The nature of the mind and the soul is corporal” (Song III, 161); “The mind can’t exist by itself” (Song III, 554), “the nature of the mind can’t occur without a body” (Song V, 132).

Thought results from the activity of the brain, which is a complex organization of matter and energy [2].

At large, the energy is forgotten; well, without energy, the curve of the electro-encephalogram is flat, which indicates that the subject is dead; but the body Lucretius is talking about, is alive, it includes matter and energy.

Unlike a widespread idea, matter and energy have not the same nature because their physical properties are different: for example the energy can travel at the speed of light, not the matter.

The factor “ $c^2$ ” in the Einstein’s formula:  $\Delta E = c^2 \Delta m$ , reminds that the equivalence is strictly limited. You can change US Dollars into Euros, and vice versa; but it’s not the same thing for they don’t have the same properties.

### Writing

“When in their songs, the poets started reporting accomplishments; and the elements of writing cannot date from long before. This is why our age cannot look back what happened previously, except if reasoning shows us traces” (Song V, 1445).

Poets are logographers instead of historians; logographers are but storytellers with no concern about historicity. Lucretius is wrong concerning the writing, which, in fact, appeared in Mesopotamia over two thousand years before him. He rightly emphasizes the difficulty of reconstructing past events, unless “the reasoning (that is to say the research and the analysis) shows us traces” (such as writings, inscriptions, artifacts). This is the involvement of archaeology and paleography.

### Some physical observations

Some observations and reflections have been gathered, they don’t lack interest:

- Mastery of fire: “The thunder made the fire go down on the earth” (Song V, 1092). Lucretius doesn’t know that it allowed our ancestors collecting and mastering the fire from about 800,000 years ago.

- The image of an object: He gives an unusual explanation concerning the travel of an image: "The image preserves the aspect and the shape of the object... from which it comes before travelling through space" (Song IV, 51).
- The speed of light: He has a certain idea about the speed of light: "We hear (the thunder) after eyes have perceived the lightning" (Song VI, 164); "(the light of the Sun and its heat) can travel an unspeakable space in a rush of time" (Song IV, 192); "if corpuscles... are... emitted... like the light of the Sun and its heat... they spread instantly through all the space of the sky" (Song IV, 199). The heat is infrared radiation.

Corpuscle, from the Latin "corpusculum" (small body) is also used by the Latin scholar Cicero (106-43).

- The distance: "At two thousand reaches of arrows, ... at five hundred javelin throws" (Song IV, 408); it comes to distance units commonly used by armies of the time.
- The void: "The nature of the void is without weight" (Song I, 363); "(Objects) fall through the void at the same speed, even if they don't have the same weight" (Song II, 239); how did he find out that a bird feather and a piece of lead fall the same speed through the void?
- The refraction (from the Latin refringere: break): "All parts immersed in water, refracted, look like they are broken" (Song IV, 440).
- The dream in animals: He describes with talent the dream in horses and dogs (Song IV, 986), however without deducing the existence of animal thought.
- The deceases: "Why do seasons bring their deceases?" (Song V, 221); he notices that certain deceases are specific to certain seasons.
- The speed: "Everything grows and grows stronger at the same pace" (Song V, 820), that is to say at the same speed; in other words, time is the same for each.
- The acceleration: "Lightning... gain speed again and again, speed that increases along the way, speed which... strengthen the shock" (Song VI, 340); "speed that increases" is now called acceleration; "speed which strengthen the shock" is our kinetic energy:  $E = \frac{1}{2}mv^2$ .
- The earth: "The name "mother" it received, the earth deserves to keep it, because it created human type by itself" (Song V, 821): this is a major statement; Lucretius was obviously not a creationist!

### The atom

"There are bodies that stop being divisible into parts" (Song I, 625). Lucretius borrows the notion of atom, from the Greek atomos (unbreakable), from the Greek philosopher Democritus (460-370). Physics uses the word "atom" as a tribute to the elders; but the elementary nature of matter is an error: the atom is done with a nucleus and with electrons, the nucleus is done with protons and neutrons which are done with quarks of various colours. In addition, a number of particles are produced by shocks in particle accelerators, some of them having a very short life.

Matter is not an assembly of smaller elements; there are forces and energies more and more intensive, so that the atom of physics has nothing to do with the unbreakable atom of Democritus: the latter did not discover the atom.

### Origin of the universe

- The rejection of the creation: “Nothing comes from nothing by divine action” (Song I, 150): this statement is done before the famous “ex nihilo nihil” from the Latin poet Aulus Persius (34 EC-62) (Satires, III, 24). “widespread in the immensity of time... these things get together and become the origin of large things... as the earth, the sea, the sky, and living things” (Song V, 427): well done! The Earth was formed by accretion (from the Latin accretio: agglomeration of elements).
- The evolution of the world: “The eternal universe” (Song V, 514); “Does the world have a birth and an origin... will there be an end?” (Song V, 1212): Lucretius was a pioneering researcher.
- The universe is infinite: “The universe is not limited in any direction; otherwise it should have an end” (Song I, 958); “The universe cannot have a center because it is infinite” (Song I, 1070): right!

### Time

Lucretius is wrong when asserting that time is a phenomenon; his failure is caused by a dialectical approach and the use of some metaphors. Instead, he should have asked questions:

- “The creative nature led everything to the extreme limit of its completion” (Song II, 1117); “For all beings, time must stop right here” (Song II, 1120).
- “The strong forces of time” (Song III, 451).
- “The fate that time is on the way to bring to us” (Song III, 1085).
- “The strong laws of time” (Song V, 58).
- “The ravages of time” (Song V, 317).
- “For an infinite time” (Song V, 423).
- “Time changes the nature of the entire world” (Song V, 834).
- “The periodical return of the various moments of the year” (Song V, 1184).
- “The eternal time stretch... the strong forces of huge time” (Song V, 1216).
- “This is how rolling time changes the moments of things” (Song V, 1276).
- “The sun and the moon taught humans about the annual revolution of the seasons” (Song V, 1436).
- “Step by step time has uncovered all things, that reason leads up to the shores of the light” (Song V, 1454).

### The ether

The word “ether” (from the Greek aithêr: burn) is used by Lucretius quite often:

- “The fires of ether” (Song II, 1098); (Song V, 483).
- “Ether forges ether” (Song II, 1115).
- “The high shores of ether” (Song III, 835).
- “The image comes down in an instant from the shores of ether to the shores of the earth” (Song IV, 214).
- “The huge shores of ether” (Song IV, 411).
- “The smooth and expandable ether (Song V, 467).

Physics has long used ether to denote physical space. Over two thousand years were necessary for getting rid of it, thanks to the theory of electromagnetic waves which do not need a medium to propagate.

### The gods

- “Nature is not tyrannized by any master” (Song II, 1090), that is to say by any god.
- “How this fear of gods did work in?” (Song V, 73).
- “Their recourse was to attribute everything to the gods, and to suppose that everything was going on a nod of the gods, they placed their residence in the sky” (Song V, 1186).
- “From these facts men cannot see the causes... and they think they are caused by a divine power” (Song VI, 90).
- “After having gathered itself, the water was victorious at the beginning, the tale says” (Song V, 411); “the whole ether seems to turn into rain... and brings us back to the flood” (Song VI, 291): Lucretius lacks rigor when he does not indicate his source; he refers either to the biblical flood, which was inspired by the Epic of Gilgamesh (c.1700 AEC) [3] or directly to the “Epic”.

### The stars

“All the stars look like they are fixed to the aerial vaults, and yet they all have a permanent move” (Song IV, 391); “It is possible that the sky is motionless, although the stars keep moving” (Song V, 518); “the moon seems to travel in one month the same distance that the sun travels in one year” (Song V, 619): Lucretius is obviously not familiar with what is happening in the sky, but he is also able to have a good explanation: “It is possible that sun rays meet the moon and make it bright” (Song V, 705); “Ultimately why a new moon could not see the day every time?” (Song V, 731): coming after the previous hypothesis, the latter is quite disappointing.

### The end of the world

Lucretius is developing a planetary eschatology (study of finitude, from the Greek eskatos: last) with an astonishing acuity: “there will be an end to the earth and the sky” (Song V, 344); “death’s door is not closed for the sky, nor for the sun, for the earth... these same things have had a birth... well from the infinite of time until now, they could not have disregarded forces of the huge time” (Song V, 373).

He perceives “the deficiency associated with nature” (Song V, 199); “But given that the fertility of the earth must have an end, it stopped like an old woman exhausted by its age. For the age changes the nature of the world... and a state after another state must take over everything, and nothing stays the same: everything passes and obliges everything to change itself” (Song V, 826).

### Conclusion

In the absence of observation and measurement devices, and mathematical models, Lucretius considers the maximum of possible answers, favoring nature over the Gods. Unfortunately, he does not justify his explanations and he does not give his sources; what make him do the same error about the atom, as Democritus did.

Lucretius has an extraordinary feeling by asserting, more than two thousand years ago, that the universe is infinite and eternal; that the earth, creator of the human race, and the sun will have an end; and that the fertility of the earth is limited: for a few years, humans are consuming within seven month what the earth is able to produce within one year; a situation that cannot last a very long time, with the climatic upheaval that is taking place.

If the rigor of Lucretius is sometimes taken in default, it does not darken his exemplary curiosity, nor his desire to understand the nature of things; two qualities essential to the researcher in physics.

### Bibliography

1. Lucretius: de rerum natura (The Nature of Things). Gallimard (2010).
2. Dassonville P. L'inexistence du temps. Persée (2012).
3. Conteneau Dr. La civilisation d'Assur et de Babylone. Payot (1937).

**Volume 11 Issue 10 October 2022**

**©All rights reserved by Patrice F Dassonville.**