Episode Twenty-Eight - The Number of Shapes of Atoms Is Not Infinite, But Innumerable

Post by “Cassius” of July 16, 2020 at 10:27 AM

Welcome to Episode Twenty-Eight of Lucretius Today.

I am your host Cassius, and together with my panelists from the EpicureanFriends.com forum, we'll walk you through the six books of Lucretius' poem, and discuss how Epicurean philosophy can apply to you today. Be aware that none of us are professional philosophers, and everyone here is a self-taught Epicurean. We encourage you to study Epicurus for yourself, and we suggest the best place to start is the book, "Epicurus and His Philosophy" by Canadian professor Norman DeWitt.

Before we start, here are three ground rules.

First: Our aim is to bring you an accurate presentation of classical Epicurean philosophy as the ancient Epicureans understood it, which may or may not agree with what you here about Epicurus at other places today.

Second: We aren't talking about Lucretius with the goal of promoting any modern political perspective. Epicurus must be understood on his own, and not in terms of competitive schools which may seem similar to Epicurus, but are fundamentally different and incompatible, such as Stoicism, Humanism, Buddhism, Taoism, Atheism, and Marxism.

Third: The essential base of Epicurean philosophy is a fundamental view of the nature of the universe. When you read the words of Lucretius you will find that Epicurus did not teach the pursuit of virtue or of luxury or of simple living. or science, as ends in themselves, but rather the pursuit of pleasure. From this perspective it is **feeling** which is the guide to life, and not supernatural gods, idealism, or virtue ethics. And as important as anything else, Epicurus taught that there is no life after death, and that any happiness we will ever have must come in THIS life, which is why it is so important not to waste time in confusion.

Now let's join the discussion with today's text:

Latin text location: Approximately lines 522-580

Parallel section of the Letter to Herodotus as to infinite numbers of atoms (Bailey Extant Remains page 23) and as to limits in size (Bailey Extant Remains, page 33)

Munro Summary: Notes on the text

522—568: the number of shapes being finite, the number of atoms of each shape is infinite, since it was proved in the first book that the sum of matter was infinite: if you say some animals are more scarce than would be the case, if the atoms of which they were made were infinite, I answer these animals may be very numerous in remote regions; but even if but one thing of its kind existed in the whole world, this would imply an infinite sum of atoms; else how could these have met and united in the boundless ocean of matter? the first-beginnings therefore of every shape and kind are infinite in number. 522 foll. see

569—580: thus production and destruction alternately prevail, their elements ever waging equal war: no day passes without some dying, some being born. 569 *itaque*: for its place in the sentence see n. to 1 419

(For an Outline of where we have been so far in past discussions, click here.)

Daniel Browne:

This being proved, I shall here join another observation, which justly derives its credit from what is explained before: This is that the seeds of things that are alike, and perfectly of the same figure, are in number infinite, for though the variety of their figures be only finite, yet the seeds themselves that are alike in nature must indeed be infinite, otherwise the whole of matter must be finite, which I have fully proved is not. Thus having cleared the way I shall now show, in short but sweetest numbers, that the seeds of matter are infinite, and hold together the whole of things, by constant force of blows on every side.

For though you observe some species of animals are less common, and nature seems less fruitful in their production, yet in other countries, in other places, and in lands more remote, you meet with many creatures of that kind, and more, in number. For you observe the elephant, chief of beasts, wreathing his lithe proboscis like a snake. How many thousands of them India breeds, which fortify her with a wall of ivory impenetrable, not to be forced, but we see but few at Rome. But grant, if you please, there was only one single create of a particular kind in Nature, whose like was not to be found throughout the world, yet unless the seeds of which it was formed were in number infinite, it could never come into being, or, when once made, could it increase or be supported.

For fancy you see the finite seeds of any body tossed about through the infinite space, whence, where, by what force, by what design, could they meet and unite in that wide ocean of matter,

that strange confusion? They have no reason, I suppose, to direct them to this union. But, as in dreadful wrecks, when many ships are lost, the troubled sea scatters abroad the seats, the sterns, the sail-yards, the prows, the masts, the floating oars, the flags swimming about all the shores, that they may be seen, and forewarn poor mortals to fly, and at no time to trust the treachery, the power, and the deceit of that unfaithful element, even when the perfidious flattery of her smooth face smiles upon them. So, if you allow the first seeds of things to be finite, the various agitation of matter must forever toss them about, scattered as they are, so that they could never be forced to unite; or, if they could, could they preserve that union, or admit of any increase? And yet the Nature of Things evidently proves that beings are produced, and, when produced, increase; and therefore the Principles of Things in every kind, 'tis plain, are infinite, and by them all beings are formed and supported.

Nor do those motions that are fatal and destructive to beings always prevail, and cause a dissolution never to be recovered. Nor, on the contrary, do those motions by which beings are formed and increased always preserve things when they are produced, but a perpetual war has been forever carried on, with equal success, between the principles of things; one while the vital seeds prevail, and now again they are routed, and beaten out of the field. The cries of infant beings, which the send out as soon as they see the light, are mingled with the funeral of others that are departed; nor is there a night that follows the day, nor a morning which succeeds the night, that does not hear the groans, the attendants of death, and sad obsequies, mingled with the tender laments of new-born babes rising into being.

Munro:

And now that I have shown this, I will go on to link to it a truth which depends on this and from this draws its proof: the first-beginnings of things which have a like shape one with the other are infinite in number. For since the difference of forms is finite, those which are like must be infinite or the sum of matter will be finite, which I proved not to be the case, when I showed in my verses that the minute bodies of matter from everlasting continually uphold the sum of things through an uninterrupted succession of blows on all sides.

For though you see that some animals are rarer than others and discern a less fruitful nature in them, yet in another quarter and spot and in distant lands there may be many of that kind and the full tale may be made up; just as we see that in the class of four-footed beasts snake-handed elephants are elsewhere especially numerous; for India is so fenced about with an ivory rampart made out of many thousands of these, that its inner parts cannot be reached, so great is the quantity of brutes, of which we see but very few samples. But yet though I should grant this point too: be there even as you will some one thing sole in its kind existing alone with a body that had birth, and let no other thing resemble it in the whole world; yet unless there shall be an infinite supply of matter out of which it may be conceived and brought into being, it cannot be produced, and, more than this, it cannot have growth and food.

For though I should assume this point also that birth-giving bodies of some one thing are tossed about in finite quantity throughout the universe, whence, where, by what force and in what way shall they meet together and combine in so vast a sea, such an alien medley of matter? They have methinks no way of uniting; but even as when great and numerous shipwrecks have occurred, the great sea is wont to tumble about banks, rudders, yards, prow, masts and swimming oars, so that poop-fittings are seen floating about along every shore and utter to mortals a warning to try to shun the snares and violence and guile of the faithless sea, and never at any time to trust to it, when the winning face of calm ocean laughs treacherously; thus too if you shall once decide that certain first-beginnings are finite, different currents of matter must scatter and tumble them about through all time, so that they can never be brought into union and combine, nor abide in any union nor grow up and increase. But plain matter of fact shows that each of these results manifestly does take place, that things can be brought into being and when begotten advance in growth. It is clear, then, that in any class you like, the first-beginnings of things are infinite, out of which all supplies are furnished.

Thus neither can death-dealing motions keep the mastery always nor entomb existence for evermore, nor on the other hand can the birth and increase giving motions of things preserve them always after they are born. Thus the war of first beginnings waged from eternity is carried on with dubious issue: now here, now there, the life-bringing elements of things get the mastery and are overmastered in turn: with the funeral wail blends the cry which babies raise when they enter the borders of light; and no night ever followed day nor morning night that heard not mingling with the sickly infant’s cries wailings the attendants on death and black funeral.

Bailey

And since I have taught this much, I will hasten to link on a truth which holds to it and wins belief from it, that the first-beginnings of things, which are formed with a shape like to one another, are in number infinite. For since the difference of forms is limited, it must needs be that those which are alike are unlimited, or else that the sum of matter is created limited, which I have proved not to be, showing in my verses that the tiny bodies of matter from everlasting always keep up the sum of things, as the team of blows is harnessed on unbroken on every side.

For in that you see that certain animals are more rare, and perceive that nature is less fruitful in them, yet in another quarter and spot, in some distant lands, there may be many in that kind, and so the tale is made up; even as in the race of four-footed beasts we see that elephants with their snaky hands come first of all, by whose many thousands India is embattled with a bulwark of ivory, so that no way can be found into its inner parts: so great is the multitude of those beasts, whereof we see but a very few samples. But still, let me grant this too, let there be, if you will, some one thing unique, alone in the body of its birth, to which there is not a fellow in the whole wide world; yet unless there is an unlimited stock of matter, from which it might be conceived and brought to birth, it will not be able to be created, nor, after

that, to grow on and be nourished.

Nay, in very truth, if I were to suppose this too, that the bodies creative of one single thing were limited as they tossed about the universe, whence, where, by what force, in what manner will they meet and come together in that vast ocean, that alien turmoil of matter? They have not, I trow, a plan for union, but as, when many a great shipwreck has come to pass, the great sea is wont to cast hither and thither benches, ribs, yards, prow, masts and swimming oars, so that along all the coasts of the lands floating stern-pieces are seen, giving warning to mortals, to resolve to shun the snares of the sea and its might and guile, nor trust it at any time, when the wiles of the windless waves smile treacherous; even so, if you once suppose that the first-beginnings of a certain kind are limited, then scattered through all time they must needs be tossed hither and thither by the tides of matter, setting towards every side, so that never can they be driven together and come together in union, nor stay fixed in union, nor take increase and grow; yet that each of these things openly comes to pass, fact proves for all to see, that things can be brought to birth and being born can grow. It is manifest then that there are, in any kind of things you will, infinite first-beginnings, by which all things are supplied.

And so, neither can the motions of destruction prevail for ever, and bury life in an eternal tomb, nor yet can the motions of creation and increase for ever bring things to birth and preserve them. So war waged from time everlasting is carried on by the balanced strife of the first-beginnings. Now here, now there, the vital forces of things conquer and are conquered alike. With the funeral mingles the wailing which babies raise as they come to look upon the coasts of light; nor has night ever followed on day, or dawn on night, but that it has heard mingled with the baby’s sickly wailings, the lament that escorts death and the black funeral.

Post by “Cassius” of July 16, 2020 at 11:38 AM

Notes on items in this section:

Against the theory that atoms of each shape are infinite in number it could be objected that certain things in nature are extremely rare. Forestalling this argument, Lucretius appeals to the Epicurean doctrine of *isonomia,* according to which the uncommonness of a species in one place is balanced by its abundance in another. For example, elephants are rare in Italy but plentiful in India (Lucr. 2. 536–40):

> sicut quadripedum cum primis esse videmus
> in genere anguimanus elephantos, India quorum
> milibus e multis vallo munitur eburno,
> ut penitus nequeat penetrari: tanta ferarum
> vis est, quarum nos perpauca exempla videmus.

The "ivory palisade" defending India has been interpreted in three ways: (1) as a legend of some kind (Munro, Bailey),[1] referring either to an actual wall of ivory or a living barrier of elephants (Reid);[2] (2) as an exaggerative reference to the practice of using elephant tusks as palings or incorporating them into buildings (Ernout, Borthwick);[3] (3) as a metaphorical allusion to the use of elephants in warfare (Creech,

1. H. A. J. Munro, *T. Lucreti Cari "De Rerum Natura" Libri Sex,*[4] vol. 2 (Cambridge, 1893), p. 148 ("I know no other mention of this fable"), C. Bailey, *Titi Lucreti Cari "De Rerum Natura" Libri Sex,* vol. 2 (Oxford, 1947), p. 891; cf. O. Gigon, "Lukrez und Ennius," in *Lucrèce,* Fondation Hardt pour l'étude de l'antiquité classique, Entretiens 24 (Vandoeuvres-Genève, 1977), p. 185.

2. J. S. Reid, "Lucretiana," *HSCP* 22 (1911): 38. The elder Pliny reports that elephants will spontaneously form a battle-line against hunters (*HN* 8. 9).

3. A. Ernout, "Lucrèce et les éléphants," *RPh* 44 (1970): 203–5; E. K. Borthwick, "Lucretius' Elephant Wall," *CQ* n. s. 23 (1973): 291–92. To judge from Creech's note (see n. 4 below), this was also the interpretation of Lambinus.

Wakefield, Giussani, and others).[4] Through a combination of internal and external considerations, I hope to place the third interpretation beyond reasonable doubt and to illustrate the use of similar imagery in other ancient descriptions of war elephants.

As for the first interpretation, no evidence exists for belief in a legendary wall of ivory. That a story like this might have gained credence is not implausible in view of the countless other spurious tales about India in ancient literature, but one would expect such an odd idea to have turned up in more than a single passage. In support of the legend of a *living* barricade of elephants Reid adduces Curtius Rufus 9. 2. 15 "modo quis beluas offerentes moenium speciem, quis Hydaspen amnem, quis cetera auditu maiora quam vero sustineri posse credebat? olim, hercules, fugissemus ex Asia, si nos fabulae debellare potuissent," where, however, *moenium speciem* alludes to the actual appearance of the elephants in the battle with Porus (cf. 8. 14. 13 "beluae dispositae inter armatos speciem terrium procul fecerant"), not to a fable. The evidence for the second interpretation, which claims a reference to the practical use of tusks in buildings or defenses, is no more convincing. Discounting Ernout's prehistoric archaeological evidence, which seems too far afield, it amounts to a couple of unrelated snippets, one of them referring to Africa not India (Pliny *HN* 8. 31 "in extremis Africae, qua confinis Aethiopae est, postium vicem in domiciliis praebere, saepeque in his et pecorum stabulis pro palis elephantorum dentibus fieri Polybius tradidit auctore Gulusa regulo," Dio Chrys. *Or.* 79. 4 εἰ δὲ ἐλέφας θαυμαστὸν κτῆμα καὶ περιμάχητον, ὑπὸ πολὺ πάντων ἀβλαβέστατος καὶ ἄφατος, παρ' οἷς ἄρρητοι τὰ τῶν ἐλεφάντων ὀστᾶ καὶ οὐδεὶς πρόσεισιν, ὥσπερ ἐνθάδε τὰ τῶν βοῶν τε καὶ ὄνων· καὶ παλαιρροῦ φασιν ἐν τοῖς τοίχοις ἐνοικοδομεῖσθαι τὰ κρανία τῶν ἐλεφάντων αὐτοῖς ὠδοῦσιν).

Apart from their lack of supporting evidence, the first two interpretations suit the argument less well than the third. In the first place, Lucretius ought to be referring to something well known and verifiable in order to meet the requirements of Epicurean epistemology—not to a bizarre traveler's tale or an obscure local practice. In the second, the proof requires that at any one time the lack of a species in one place is compensated for by its abundance elsewhere, and this point is made most cogently by reference to living animals, not a palisade—or a building—built from dead ones. With the latter interpretation, there is a slight non sequitur between *vallo munitur eburno* and *tanta ferarum vis est*, for it could be objected, after all, that the elephant population had dwindled since the building of the palisade, that the palisade took many generations to build, or even that the ivory was imported from elsewhere. The argument is watertight only if it has to do with living elephants and invokes a matter of common knowledge.

Both these criteria are satisfied by the third interpretation, which in addition to being founded upon a well-known Indian practice is thoroughly in keeping with the boldly metaphorical style of Lucretius. The truth of the matter was discerned by Giussani, who saw a hyperbolical reference to the great number of elephants

4. T. Creech, *T. Lucreti Cari "De Rerum Natura" Libri Sex* (Oxford, 1695), p. 93 ("maximam Indiae vim in elephantis sitam esse quis nescit? illorum ope se suamque patriam Indi defendebant. haec cogita et mentem Lucretii attinges"); G. Wakefield, *T. Lucretii Cari "De Rerum Natura" Libri Sex*, vol. 1 (Glasgow, 1813), p. 291 ("ergo, *vallo eburno munitur*, quasi fronte exercitus, ubi stationem, pro munimine, habebant elephantes"); C. Giussani, *Lucrezio: "De Rerum Natura,"* vol. 1 (repr. Turin, 1988), p. 217; W. E. Leonard and S. B. Smith, *T. Lucreti Cari "De Rerum Natura" Libri Sex* (Madison, 1942), p. 382; E. L. B. Meurig-Davies, "Elephant Tactics," *CQ* 45 (1951): 154–55; P. H. Schrijvers, *Horror ac divina voluptas: Études sur la poétique et la poésie de Lucrèce* (Amsterdam, 1970), pp. 294–95.

used by the Indians to resist the invasion of Alexander.[5] Along similar lines, Meurig-Davies suggests that "the Ivory Vallum . . . for the elephants ranged in battle-line may have been proverbial in Roman military lore since the wars against Pyrrhus and Carthage." Schrijvers accepts the idea that the *vallum eburnum* was proverbial but, returning to Giussani's theory, suggests that Lucretius borrowed it from some account of Alexander's exploits. In support of his conclusions he cites passages of Diodorus Siculus (17. 87. 5 ἡ μὲν οὖν ὅλη σύνταξις αὐτῶν ὑπῆρχε πόλει παραπλήσιος τὴν πρόσοψιν· οἱ μὲν γὰρ τῶν ἐλεφάντων σταθμοὶ τοῖς πύργοις, οἱ δὲ ἀνὰ μέσον τούτων στρατιῶται τοῖς μεσοπυργίοις ὡμοίωντο), Appian (*Syr.* 32 ἡ δ' ὄψις ἦν τῆς μὲν φάλαγγος οἷα τείχους, τῶν δ' ἐλεφάντων οἷον πύργων), and Curtius Rufus (8. 14. 13 [quoted above]), in which the sight of war elephants ranged among soldiers is compared to that of towers along a wall.[6] There happens to be another example in Curtius Rufus,[7] echoing Livy,[8] and others too in Polyaenus[9] and Julian,[10] which suggest that the idea derives from the Alexander-historians—probably the so-called vulgate tradition associated with the name of Cleitarchus.[11] In a related simile an analogy is drawn between war elephants and a defensive wall, to which soldiers run for protection[12] or from which they cast weapons.[13] Of a similar sort are comparisons of elephants to ships, citadels, and hills.[14] A number of factors contributed to the choice and expressiveness of the images of tower and wall: the massive size of elephants, of course, which invites descriptive terms appropriate to an edifice, especially when measured on a human scale; more particularly, the tactic of stationing elephants in the front line and of placing protective towers (*turres*) on their backs from which one or several men could rain down missiles.[15]

A connection with Alexander is further supported by the adverb *penitus*, which acknowledges that he—and, according to tradition, Dionysus and Heracles before

5. *Lucrezio*, p. 217: "Pensano che il ricordo di una precisa leggenda, credo che si tratti d'un ricordo particolarmente iperbolico del gran numero d'elefanti degli eserciti indiani che resistettero all' invasione di Alessandro."

https://www.jstor.org/stable/270089?seq=1

Post by "Cassius" of July 17, 2020 at 12:14 PM

Also in this episode, let's plan to revisit some of they key "epistmology" issues that are underlying the entire discussion, such as:

Diogenes Laertius:

It [the philosophy] is divided into three parts, the Canonicon (or Procedure), the Physics and the Ethics. The Canonicon gives the method of approach to the system, and is contained in the work called The Canon. The Physics contains all the investigation into nature, and is contained in the thirty-seven books On Nature and in an abridged form in the letters. The Ethics deals with

choice and avoidance, and is contained in the books On Lives and the letters and the book on The End. The Epicureans usually group the Canonicon with the Physics and state that it deals with the criterion of truth and the fundamental principles and contains the elements of the system. The Physics deals with creation and dissolution and with nature; the Ethics with things to be chosen or avoided, with the conduct of life and its purpose.

Logic they reject as misleading. For they say it is sufficient for physicists to be guided by what things say of themselves. Thus in The Canon Epicurus says that **the tests of truth are the sensations and concepts and the feelings; the Epicureans add to these the intuitive apprehensions of the mind.** And this he says himself too in the summary addressed to Herodotus and in the Principal Doctrines. For, he says, all sensation is irrational and does not admit of memory; for it is not set in motion by itself, nor when it is set in motion by something else, can it add to it or take from it. Nor is there anything which can refute the sensations. For a similar sensation cannot refute a similar because it is equivalent in validity, nor a dissimilar a dissimilar, for the objects of which they are the criteria are not the same; nor again can reason, **for all reason is dependent upon sensations; nor can one sensation refute another, for we attend to them all alike**. Again, the fact of apperception confirms the truth of the sensations. And seeing and hearing are as much facts as feeling pain. **From this it follows that as regards the imperceptible we must draw inferences from phenomena. For all thoughts have their origin in sensations by means of coincidence and analogy and similarity and combination, reasoning too contributing something**. And the visions of the insane and those in dreams are true, for they cause movement, and that which does not exist cannot cause movement.

The concept they speak of as an apprehension or right opinion or thought or general idea stored within the mind, that is to say a recollection of what has often been presented from without, as for instance ‘Such and such a thing is a man,’ for the moment the word ‘man’ is spoken, immediately by means of the concept his form too is thought of, as the senses give us the information. Therefore the first signification of every name is immediate and clear evidence. And we could not look for the object of our search, unless we have first known it. For instance, we ask, ‘Is that standing yonder a horse or a cow?’ To do this we must know by means of a concept the shape of horse and of cow. Otherwise we could not have named them, unless we previously knew their appearance by means of a concept. So the concepts are clear and immediate evidence. **Further, the decision of opinion depends on some previous clear and immediate evidence, to which we refer when we express it: for instance, ‘How do we know whether this is a man?’ Opinion they also call supposition, and say that it may be true or false: if it is confirmed or not contradicted, it is true ; if it is not confirmed or is contradicted, it is false. For this reason was introduced the notion of the problem awaiting confirmation: for example, waiting to come near the tower and see how it looks to the near view.**

Also from the Principal Doctrines:

22. We must consider both the real purpose, and all the evidence of direct perception, to which we always refer the conclusions of opinion; otherwise, all will be full of doubt and confusion.

23. If you fight against all sensations, you will have no standard by which to judge even those of them which you say are false.

24. If you reject any single sensation, and fail to distinguish between the conclusion of opinion, as to the appearance awaiting confirmation, and that which is actually given by the sensation or feeling, or each intuitive apprehension of the mind, you will confound all other sensations, as well, with the same groundless opinion, so that you will reject every standard of judgment. And if among the mental images created by your opinion you affirm both that which awaits confirmation, and that which does not, you will not escape error, since you will have preserved the whole cause of doubt in every judgment between what is right and what is wrong.

25. If on each occasion, instead of referring your actions to the end of nature, you turn to some other, nearer, standard, when you are making a choice or an avoidance, your actions will not be consistent with your principles.

Principles we previously discussed in Book One:

- [line 423] All truth must be grounded on sensation - we must have confidence in what is immediately in front of us before we can understand things that are not visible.
- [line 700] And what can be more sure than our senses to us, by which we fully know falsehood and truth?

Post by “Cassius” of July 18, 2020 at 6:05 AM

Issues to be discussed in this podcast are also being discussed here: References to Epicurus' Attitude Toward The "Place of the Sciences And Liberal Arts"

Post by “Cassius” of July 19, 2020 at 10:57 AM

I am making this comment right after the recording, but before producing the show, as a reminder: In this episode we go into a discussion of the Pontius Pilate question "What is truth?" Part of the discussion included the possibility that the Epicurean perspective on "truth" might include that it is a practical issue that may be a matter of prolepsis/anticipation. I hope people will feel particularly free to comment on that aspect and whether they agree or disagree with this part of the podcast. The subject of truth" was not discussed directly in today's text from Lucretius, nor did we prepare beforehand to tackle it, so the discussion was extemporaneous. The topic probably deserves a lot more discussion, both in the podcast and here at the forum, in the future.

Post by “Cassius” of July 20, 2020 at 9:22 AM

Episode 28 of the Lucretius Today Podcast is now available:

https://www.spreaker.com/episode/39863430

In this episode, we discuss how the number of shapes of atoms is innumerable, but not infinite. We also drop back to discuss basic issues of the relationship of how Epicurean philosophy reinforces and encourages scientific inquiry, while always keeping in view that the ultimate goal of life is pleasure, not science for the sake of science or wisdom for the sake of wisdom. As always, if you have any comments or questions please place them here and we will respond to them in one of the threads or in a future episode. Thanks for listening!