Episode Twenty-Seven: There Is A Limit To The Size of Atoms

Post by “Cassius” of July 11, 2020 at 11:23 AM

Welcome to Episode Twenty-Seven 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 main 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 be the same as what you read about Epicurus at other places on the internet today.

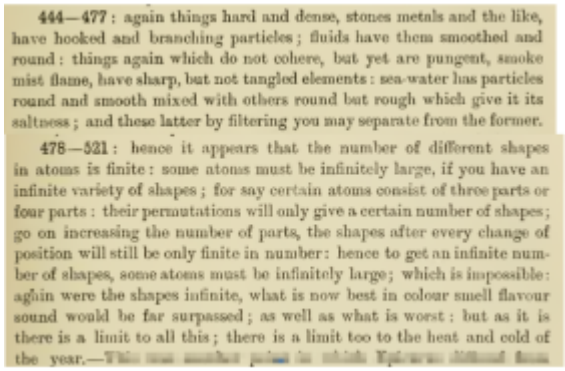
Second: We aren't talking about Lucretius with the goal of promoting any modern political perspective. Epicurus must be understood on his own, and not in terms of competitive schools which may seem similar to Epicurus, but are fundamentally different and incompatible, such as Stoicism, Humanism, Buddhism,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

Third: Epicurean philosophy is based on a fundamental view of the universe as natural and not under the control of any supernatural gods or ideals of virtue. As you study Lucretius you will find that Epicurus did not teach virtue or simple living as ends in themselves, but only as instruments in the pursuit of pleasure. For Epicurus it is pleasurable feeling which provides the guide to life, within the context of the knowledge 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 Elayne reading today's text:

Latin text location: Approximately lines 444 -521

Munro Summary:



444—477 : again things hard and dense, stones metals and the like, have hooked and branching particles ; fluids have them smoothed and round : things again which do not cohere, but yet are pungent, smoke mist flame, have sharp, but not tangled elements : sea-water has particles round and smooth mixed with others round but rough which give it its saltness ; and these latter by filtering you may separate from the former.

478—521 : hence it appears that the number of different shapes in atoms is finite : some atoms must be infinitely large, if you have an infinite variety of shapes ; for say certain atoms consist of three parts or four parts : their permutations will only give a certain number of shapes ; go on increasing the number of parts, the shapes after every change of position will still be only finite in number : hence to get an infinite number of shapes, some atoms must be infinitely large ; which is impossible : again were the shapes infinite, what is now best in colour smell flavour sound would be far surpassed ; as well as what is worst : but as it is there is a limit to all this ; there is a limit too to the heat and cold of the year.—

Notes on the Text: Munro Notes

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

Daniel Browne:

Further, those things which appear to us hard and thick, must necessarily be joined together by particles more hooked among themselves, and be held close by branched seeds. In the first rank of these, you are to place the rocks of Adamant, that defy the force of blows, and solid flints, and the strength of hard iron, and brazen hinges, that creak under the weight of their gates. But Liquids that consist of fluid bodies, must be formed of seeds more smooth and round; for their globular particles are not entangled among themselves, and their flowing motion rolls on forward with the greater Ease. But lastly, all such Things which you observe instantly to scatter, and fly away as smoke, clouds, and flame, if they do not consist altogether of particles that are smooth and round, yet neither are they formed of hooked Seeds, and therefore may pierce through bodies, and penetrate into stones; nor do their particles nevertheless stick mutually to one another, as we observe the particles of thorns do. From thence you may easily conclude that they are not composed of hooked or entangled, but of acute Principles.

But because you see the same things are bitter and fluid, as the Sea- water, are you to wonder in the least at this; For what is fluid is formed of Principles that are smooth and round, but with these smooth and round seeds are mixed others that are sharp, and give pain. Yet there is no necessity that these sharp seeds should be hooked and twined together; it is sufficient that they be globous as well as rough, that they may be qualified to flow along in their proper Course, as well as to hurt the sense. And that you may the sooner believe that these sharp seeds are mixed with those that are smooth, from whence the body of the sea becomes salt, the way is to separate them, and consider them distinct; for the Sea-water grows sweet by being often filtered through the Earth, and so fills the ditches, where it becomes soft; for it leaves behind the pungent seeds of the rough salt, which are more inclined to stick as they pass along, than those particles that are globular and smooth.

This being proved, I shall here join another observation, which justly derives its credit from what is explained before: That the seeds of things vary their figure not without End, but after a finite manner. If it were not so, some seeds, by an infinite increase of their parts, would be of an immense size; for in so small a body as an atom consists of, the figures have not room to change often among themselves. Suppose, if you will, these atoms or first seeds consist of smallest parts, three suppose, or a few more, if you please; now, by varying these several Parts of one Atom or Seed into all possible shapes, placing the Uppermost below, or turning the right to the left, you will find the several figures that every change will give this Seed in all its Parts. But if you would change its figure still further, you must add new parts to it and, by the same reason, you must still add more, if you still think of changing its figure into more shapes, so that the body must increase in proportion as every new figure appears; and therefore, you cannot conceive, that the seeds should be distinguished by an infinite variety of forms, unless you admit that they are likewise infinite in magnitude, which, as I said above, is impossible to be proved.

Besides, the embroidered vests of Asia, the bright Melibean Purple, dipped in the blood of the Thessalian Shellfish, and the golden Brood of Peacocks, glittering with their gaudy plumes, would lie undistinguished, being exceeded by other things of greater lustre, and the smell of myrrh, and the Taste of Honey, would be despised, and the singing of the swan, and the noblest Verse sung to sweet music would, by the same rule, be outdone, and cease to please; for some other things might arise more agreeable than these. And as some things, we observe, may advance into greater perfection, so others likewise may decline, and grow worse; for one thing may succeed another still more disagreeable to the Nose, the Ears, the Eyes, and Taste. But since this does not appear in the Nature of Things, since there is a certain boundary to what is best and worst, we are obliged to own, that matter is diversified by shapes that are finite, and within fixed Bounds.

Lastly, from Fire, to the piercing Cold of Winter, a Point is set, and so, from Cold to Heat, they are both intense: for heat and cold are the extremes, the middle warmth lies between both, and thus orderly fills up the whole. This warmth is distant equally from both extremes, and is confined by bounds on both sides, kept in on this by heat, and on that by smarting cold.

Munro:

Again things which look to us hard and dense must consist of particles more hooked together, and be held in union because welded all through with branch-like elements. In this class first of all diamond stones stand in foremost line inured to despise blows, and stout blocks of basalt and the strength of hard iron and brass bolts which scream out as they hold fast to their staples. Those things which are liquid and of fluid body ought to consist more of smooth and round elements; for the several drops have no mutual cohesion and their onward course too has a ready flow downwards. All things lastly which you see disperse themselves in an instant, as smoke mists and flames, if they do not consist entirely of smooth and round, must yet not be

held fast by closely tangled elements, so that they may be able to pierce the body and enter it with biting power, yet not stick together: thus you may easily know, that whatever we see the senses have been able to allay, consists not of tangled but of pointed elements.

Do not however hold it to be wonderful that some things which are fluid you see to be likewise bitter, for instance the sea's moisture: because it is fluid, it consists of smooth and round particles, and many rough bodies mixed up with these produce pains; and yet they must not be hooked so as to hold together: you are to know that though rough, they are yet spherical, so that while they roll freely on, they may at the same time hurt the senses.And that you may more readily believe that with smooth are mixed rough first-beginnings from which Neptune's' body is made bitter, there is a way of separating these, and of seeing how the fresh water, when it is often filtered through the earth, flows by itself into a trench and sweetens; for it leaves above the first-beginnings of the nauseous saltness, inasmuch as the rough particles can more readily stay behind in the earth.

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 have different shapes, but the number of shapes is finite. If this were not so, then once more it would follow that some seeds must be of infinite bulk of body. For in the same seed, in the single small size any first body you like the shapes cannot vary much from one another: say for instance that first bodies consist of three least parts, or augment them by a few more; when to wit in all possible ways, by placing each in turn at the top and at the bottom, by making the right change places with the left, you shall have tried all those parts of one first body and found what manner of shape each different arrangement gives to the whole of that body, if after all this haply you shall wish still to vary the shapes, you will have to add other parts; it will next follow that, for like reasons the arrangement will require other parts, if haply you shall wish still again to vary the shapes. From all this it results that increase of bulk in the body follows upon newness of the shapes.

Wherefore you cannot possibly believe that seeds have an infinite variety of forms, lest you force some to be of a monstrous hugeness, which as I have above shown cannot be proved. Moreover I tell you barbaric robes and radiant Meliboean purple dipped in Thessalian dye of shells [and the hues which are displayed] by the golden brood of peacocks steeped in laughing beauty would all be thrown aside surpassed by some new color of things; the smell of myrrh would be despised and the flavors of honey, and the melodies of the swan and Phoebean tunes set off by the varied play of strings would in like sort be suppressed and silenced; for something ever would arise more surpassing than the rest. All things likewise might fall back into worse states, even as we have said they might advance to better; for reversely too one thing would be more noisome than all other things to nostril, ear, and eye, and taste.

Now since these things are not so, but a fixed limit has been assigned to things which bounds their sum on each side, you must admit that matter also has a finite number of different shapes. Once more from summer fires to chill frosts a definite path is traced out and in like manner is again traveled back; for every degree of cold and heat and intermediate warmth lie between those extremes, filling up in succession the sum. Therefore the things produced differ

by finite degrees, since at both ends they are marked off by points, one at one, another at the other end, molested on the one hand by flames, on the other by stiffening frosts.

Bailey:

Or, again, things which seem to us hard and compact, these, it must needs be, are made of particles more hooked one to another, and are held together close-fastened at their roots, as it were by branching particles. First of all in this class diamond stones stand in the forefront of the fight, well used to despise all blows, and stubborn flints and the strength of hard iron, and brass sockets, which scream aloud as they struggle against the bolts. Those things indeed must be made of particles more round and smooth, which are liquid with a fluid body: for indeed a handful of poppy-seed moves easily just as a draught of water; for the several round particles are not checked one by the other, and when struck, it will roll downhill just like water. Lastly, all things which you perceive flying asunder, like smoke, clouds and flames, it must needs be that even if they are not made entirely of smooth and round particles, yet they are not hampered by particles closely linked, so that they can-prick the body, and pass into rocks, and yet not cling one to another: so that you can easily learn that, whatever we see [borne asunder by the tearing winds and] meeting our senses [as poison], are of elements not closely linked but pointed. But because you see that some things which are fluid, are also bitter, as is the brine of the sea, count it no wonder. For because it is fluid, it is of smooth and round particles, and many rugged bodies mingled in it give birth to pain; and yet it must needs be that they are not, hooked and held together: you must know that they are nevertheless spherical, though rugged, so that they can roll on together and hurt the senses. And that you may the more think that rough are mingled with smooth first-beginnings, from which is made the bitter body of the sea-god, there is a way of sundering them and seeing how, apart from the rest, the fresh water, when it trickles many a time through the earth, flows into a trench and loses its harshness; for it leaves behind up above the first-beginnings of its sickly saltness, since the rough particles can more readily stick in the earth.

And since I have taught this much, I will hasten to link on a truth which holds to this and wins belief from it, that the first-beginnings of things are limited in the tale of their varying shapes. If it were not to be so, then once again certain seeds must needs be of unbounded bulk of body. For, within the same tiny frame of any one single seed, the shapes of the body cannot be very diverse. For suppose the first-bodies to be of three least parts, or if you will, make them larger by a few more; in truth when you have tried all those parts of one body in every way, shifting top and bottom, changing right with left, to see what outline of form in that whole body each arrangement gives, beyond that, if by chance you wish to make the shapes different, you must needs add other parts; thence it will follow that in like manner the arrangement will ask for other parts, if by chance you still wish to make the shapes different: and so greater bulk in the body follows on newness of forms.

Wherefore it is not possible that you can believe that there are seeds with unbounded difference of forms, lest you constrain certain of them to be of huge vastness, which I have taught above cannot be approved. At once you would see barbaric robes and gleaming

Meliboean purple, dyed with the colour of Thessalian shells, and the golden tribes of peacocks, steeped in smiling beauty, lie neglected and surpassed by the new colours in things; and the smell of myrrh and the taste of honey would be despised, and the swan's song and the many-toned melodies on Phoebus's strings would in like manner be smothered and mute: for something more excellent than all else would ever be arising. Likewise, all things would sink back on the worse side, just as we have told that they would rise towards the better. For, on the other hand, something would be more loathly too than all else to nostrils and ears and eyes, and the taste of the mouth.

And since these things are not so, but a fixed limit to things marks the extreme on either side, you must needs confess that the first-matter too has a limited difference in shapes. Again from fire right on to the icy frost of winter is but a limited way, and in like manner is the way measured back again. For all heat and cold and tepid warmths in the middle lie between the two, filling up the sum in due order. And so they are brought to being differing with limited degrees, since they are marked off at either end by the twin points, beset on this side by flames, on that by stiffening frosts.