Episode Seventy-Two - Alternative Explanations in Science, and The Size of The Sun

Post by “Cassius” of May 20, 2021 at 7:52 AM

Welcome to Episode Seventy-Two 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. 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.

For anyone who is not familiar with our podcast, please check back to **Episode One** for a discussion of our goals and our ground rules. If you have any questions about those, please be sure to contact us at EpicureanFriends.com for more information.

In this Episode 72 we will read approximately Latin line 509-613 of Book Five. We will talk about the location of the Earth within our "world," and well discuss Epicurus' perspective on science for the sake of science and the size of the sun and moon. Now let's join Don reading today's text.

Munro Notes-

509-533: the stars may move from various causes : if the whole heaven revolves, then must we say that, while an air presses on each pole and keeps it in its place, the heaven revolves with its stars by a third air which either blows on it above in the direction in which it and its stars are going, or beneath in an opposite direction ; so that the whole sphere is thus kept in motion like a waterwheel: if the heaven does not move, then may the stars move because they have in them fires of ether trying to escape and thus driving them on ; or an air blowing from some quarter may impel them ; or they may move of themselves whither their food invites them: it cannot be told for certain how this goes on in our world; but in the countless existing worlds every one of these causes is in operation; and one must act in this our world; but it is rash to assert that any one must be the sole cause.— This passage too as Lach. has proved stands in no proper connection with what precedes and follows: 534 should at once follow 508; and at 774 he makes no allusion whatever to this paragraph : clearly then it is an after addition of the poet's who had observed that he had entirely omitted this question of the stars, though he had so fully discussed sun and moon: it was left then by him unconnected with the rest, and placed here by his first editor.

534-563 : the earth remains at rest in the midst of the world, because its weight gradually diminishes and below it is another nature closely connected with the air above the earth: thus

the whole forms as it were an organic whole, and one part does not weigh down another any more than one member of the body another member, the whole having been united and working together since its first formation : see too how the light soul sustains and puts in motion the whole heavy body.

564-591: the sun, the moon whether it shine by its own or borrowed light, and the stars are about the same size as, it may be a very little greater or less than, they appear to us; just as fires here on earth so long as they are visible do not increase or diminish in size to any great extent.

592-613: the great amount of heat and light proceeding from so small a sun may be explained in several ways: the sun may be the well-head to which the light and heat of the whole world flow; or the air about it may be of a nature to catch fire; or much unseen fire may exist in the neighbourhood of the visible sun.

Browne 1743

And thus were produced the Sea, the Air, and the Sky (or the ether) spangled with stars. All the finer seeds went to the formation of these fluid bodies, but some were more light than others; and the most light and liquid ether mounted higher, and spread over the body of the air, but its liquid parts never mixed with the turbulent blasts of the air below it. The airy region is tormented by violent whirlwinds, and disturbed by uncertain storms, while the ether calmly glides and bears along its fires in a fixed course. And that the ether may flow thus gently, and in a regular motion, we have an instance in the Euxine Sea, that runs with one certain tide, and preserves one constant stream in the current of its waters.

Now let us show from what cause proceeds the motion of the stars. And first, if the whole orb of the heavens be moved, then we must allow that the air bounds and encloses the outward surface of the heavens, and both the poles. The upper part of this air presses above, and drives the skies down to the west, the course in which the stars (the great lights of the world) are to move; the under part flows below, and lifts up this orb from beneath, and makes it rise, as we see the wheels of a mill, or buckets, are turned about by a running stream.

Or perhaps the whole body of the heavens may remain fixed, and yet the stars may execute their motions, either because some rapid particles of the sky are shut up, and struggling to find a way into the empty space, are whirled about, and drag the stars along with them; or some external air, rushing in from some other place, may turn them about; or they may move severally forward of themselves through the sky, where proper nourishment invites them to feed and keep alive their fires. But it is hard to resolve for certain what is the particular cause of these motions in this world of ours. I rather propose reasons in general for what may be done through the universe, in the multitude of worlds contained in the great All, and formed after various manners, And I offer many causes that may account for the whole, yet one only can be the true one that produced these effects; but to pronounce which it is, no wary philosopher will take upon him to do.

But that the Earth should rest in the middle region of the world it is necessary that its weight should in some degree lessen and be laid aside, and for this end it was fit that another substance should be placed under it, to which from the very beginning it should be united closely by natural and congenial ties, and upon which it should be staid. This substance being the surrounding air, which is a part of the same whole, and as it were of a piece with the earth, the earth therefore hangs suspended in the middle, and is no weight or pressure to the air at all; and so the limbs are no load to the body of a man, nor is the head a burden to the neck, nor do we perceive the weight of the whole body to press heavy upon the feet; but whatever weight is laid upon us from without, and is no part of us, is a pain to us, though it be ever so small. Of so great concern it is to what every being is severally united. For the earth was not brought from any other place and then thrust into the strange embrace of a different air, but was formed together with it, and became a regular part of the world, as our limbs were produced with the body, and are essential parts of it.

Besides, the earth, when it is shaken of a sudden by a violent thunder, makes every thing that is upon it tremble, which it could by no means do unless it was closely joined to the airy parts of the world, and to the heavens above; for they all stick closely together by common bonds, and kindly unite from the very beginning. Don’t you observe how the most subtle power of the soul supports the body with all its weight, because it is so strictly connected and so closely joined to it? And what is it but the force of the soul which actuates the limbs that raises the body, and makes it leap nimbly from the ground? Don’t you perceive now what a substance of the most subtle nature is able to do, when united with such a heavy body; such as the air when it is joined to the Earth, and as the soul to this body of ours?

But further, the orb of the sun is not much larger, nor is its heat much greater, than what our senses discovery to us; for at whatever distance the fire can send out its rays of light, and warm us with its heat, that distance takes away nothing from the bigness of the flame, nor does the fire appear less contracted to the eye. And therefore since the heat of the sun, and his diffused light, do reach our senses, and shine upon the earth, you are to conclude that his form and magnitude are no greater nor less than they appear to be.

And the moon, whether she views the world with borrowed light, or whether she shoots out her beams from her own body, however it be, she is of no greater size than to our sense she appears. For all objects we look upon at a great distance, and through a long tract of air, show first irregular and confused, before we discover their utmost figure and proportion. And therefore since the moon at once presents to us the certain form and the complete appearance of the whole orb, she shows to us above as great as she really is.

Besides, since all our fires here below, when they are seen at great distance, so long as their light is clear, and their brightness shines out to us, do seem to change a little, and show more or less contracted, we may conclude that the stars we view either the heavens are very little either greater or less than they appear.

Nor are we to wonder how it comes to pass that so small a body as the sun is able to emit so much light as to spread over the seas the whole earth and the heavens, and to cherish all things with its kindly heat. For you may imagine that from the sun one large fountain of light breaks out, and flows abundantly, like a river, over the whole world, and that the seeds of fire from all parts of the universe meet in the body of the sun, and are there collected as into a spring, from whence the heat of the whole world is diffused abroad. Don't you observe how widely a small fountain of water spreads its stream over the meadows and overflows the fields?

Or perhaps the heat flowing from the small body of the sun may inflame the adjacent air, if the air be properly tempered and disposed to catch the fire from the feeble strokes of heat, as we sometimes see the corn and the stubble to be set all in a blaze from one small spark falling upon it. Or it may be the sun, shining above with the rosy light, has many dark and unseen stores of fire about it, which, though distinguished by no outward brightness, may yet increase the heat of its rays and make their strokes more inflamed.

Munro 1886

Then the sea, then the air, then the fire-laden ether itself, all are left unmixed with their clear bodies; and some are lighter than others, and clearest and lightest of all ether floats upon the airy currents, and blends not its clear body with the troubled airs; it suffers all these things below to be upset with furious hurricanes, suffer them to be troubled by wayward storms; while it carries along its own fires gliding with a changeless onward sweep. For that ether may stream on gently and with one uniform effort the Pontos shows, a sea which streams with a changeless current, ever preserving one uniform gliding course.

Let us now sing what causes the motions of the stars. In the first place, if the great sphere of heaven revolves, we must say that an air presses on the pole at each end and confines it on the outside and closes it in at both ends; and then that a third air streams above and moves in the same direction in which roll on as they shine the stars of the eternal world; or else that this third air streams below in order to carry up the sphere in the contrary direction; just as we see rivers turn wheels and water-scoops. It is likewise quite possible too that all the heaven remains at rest, while at the same time the glittering signs are carried on; either because rapid heats of ether are shut in and whirl round while seeking a way out and roll their fires in all directions through heaven's Summanian quarters; or else an air streaming from some part from another source outside drives and whirls the fires; or else they may glide on of themselves going whithersoever the food of each calls and invites them, feeding their flamy bodies everywhere throughout heaven. For which of these causes is in operation in this world, it is not easy to affirm for certain; but what can be and is done throughout the universe in various worlds formed on various plans, this I teach, and I go on to set forth several causes which may exist throughout the universe for the motions of stars; one of which however must in this world also be the cause that imparts lively motion, to the signs; but to dictate which of them it is, is by no means the duty of the man who advances step by step.

And in order that the earth may rest in the middle of the world, it is proper that its weight should gradually pass away and be lessened, and that it should have another nature underneath it conjoined from the beginning of its existence and formed into one being with the airy portions of the world in which it is embodied and lives. For this reason it is no burden and does not weigh down the air; just as his limbs are of no weight to a man nor is his head a burden to his neck, nor do we feel that the whole weight of the body rests on the feet; but whatever weights come from without and are laid upon us, hurt us though they are often very much smaller: of such great moment it is what function each thing has to perform. Thus then the earth is not an alien body suddenly brought in and forced from some other quarter on air alien to it, but was conceived together with it at the first birth of the world and is a fixed portion of that world, just as our limbs are seen to be to us. Again the earth when suddenly shaken by loud thunder shakes by its motion all the things which are above it; and this it could in no wise do, unless it had been fast bound with the airy portions of the world and with heaven. For the earth and they cohere with one another by common roots, conjoined and formed into a single being from the beginning of their existence. See you not too that great as is the weight of our body, the force of the soul, though of the extremest fineness, supports it, because it is so closely conjoined and formed into a single being with it? Then too what is able to lift the body with a nimble bound save the force of the mind which guides the limbs? Now do you see what power a subtle nature may have, when it is conjoined with a heavy body, as the air is conjoined with the earth and the force of the mind in us?

Again, the disk of the sun cannot be much larger nor its body of heat much smaller, than they appear to be to our senses. For from whatever distances fires can reach us with their light and breathe on our limbs burning heat, those distances take away nothing by such spaces between from the body of the flames, the fire is not in the least narrowed in appearance. Therefore since the heat of the sun and the light which it sheds reach our senses and stroke the proper places, the form too and size of the sun must be seen from this earth in their real dimensions, so that you may not add anything whatever more or less. And whether the moon as it is borne on illuminates places with a borrowed light, or emits its own light from its own body, whatever that is, the form with which it is thus borne on is not at all larger than the one which it presents to our eyes seems to us to be. For all things which we see at a great distance through much air look dimmed in appearance before their size is diminished. Therefore since the moon presents a bright aspect and well-defined form, it must be seen on high by us from this earth precisely such as it is in the outline which defines it, and of the size it actually is. Lastly in the case of all those fires of ether which you observe from this earth, since in the case of fires which we see here on earth, so long as their flickering is distinct, so long as their heat is perceived, their size is seen sometimes to change to a very very small extent either way, according to the distance at which they are, you may infer that the fires of ether may be smaller than they look in an extremely minute degree or larger by a very small and insignificant fraction.

This likewise need not excite wonder, how it is that so small a body as yon sun can emit so great a light, enough to flood completely seas and all lands and heaven and to steep all things in its burning heat. It well may be that a single spring for the whole world may open up from

this spot and gush out in plenteous stream and shoot forth light, because elements of heat meet together from all sides out of the whole world in such manner and the mass of them thrown together streams to a point in such manner, that this heat wells forth from a single source. See you not too what a breadth of meadowland a small spring of water sometimes floods, streaming out over the fields? It is likewise possible that heat from the sun's flame though not at all great may infect the whole air with fervent fires, if haply the air is in a suitable and susceptible state, so that it can be kindled when struck by small bodies of heat; thus we see sometimes a general conflagration from a single spark catch fields of corn and stubble. Perhaps too the sun as he shines aloft with rosy lamp has round about him much fire with heats that are not visible, and thus the fire may be marked by no radiance, so that fraught with heat it increases to such a degree the stroke of the rays.

Bailey 1921

Then the sea and then the air and then the fiery ether itself were all left unmixed with their liquid bodies; they are lighter each than the next beneath, and ether, most liquid and lightest of all, floats above the breezes of air, nor does it mingle its liquid body with the boisterous breezes of air; it suffers all our air below to be churned by headstrong hurricanes, it suffers it to brawl with shifting storms, but itself bears on its fires as it glides in changeless advance. For that the ether can follow on quietly and with one constant effort, the Pontos proves, the sea which flows on with changeless tide, preserving ever the one constant rhythm of its gliding.

Now let us sing what is the cause of the motions of the stars. First of all, if the great globe of the sky turns round, we must say that the air presses on the pole at either end, and holds it outside and closes it in at both ends; and that then another current of air flows above, straining on to the same goal, towards which the twinkling stars of the everlasting world roll on; or else that there is another current beneath, to drive up the sphere reversely, as we see streams moving round wheels with their scoops. It may be also that the whole sky can abide in its place, while yet the shining signs are carried on; either because swift currents of ether are shut within them, and seeking a way out are turned round and round, and so roll on the fires this way and that through the nightly quarters of the sky; or else an air streaming from some other quarter without turns and drives the fires; or else they can themselves creep on, whither its own food invites and summons each as they move on, feeding their flaming bodies everywhere throughout the sky. For it is hard to declare for certain which of these causes it is in this world; but what can happen and does happen through the universe in the diverse worlds, fashioned on diverse plans, that is what I teach, and go on to set forth many causes for the motions of the stars, which may exist throughout the universe; and of these it must needs be one which in our world too gives strength to the motions of the heavenly signs; but to affirm which of them it is, is in no wise the task of one treading forward step by step.

Now that the earth may rest quiet in the mid region of the world, it is natural that its mass should gradually thin out and grow less, and that it should have another nature underneath from the beginning of its being, linked and closely bound in one with those airy parts of the world amid which it has its place and life. For this cause it is no burden, nor does it weigh down

the air; even as for every man his own limbs are no weight, nor is the head a burden to the neck, nay nor do we feel that the whole weight of the body is resting on the feet; but all weights which come from without and are laid upon us, hurt us, though often they are many times smaller. Of such great matter is it, what is the power of each thing. So then the earth is not suddenly brought in as some alien body, nor cast from elsewhere on alien air, but it has been begotten along with it from the first beginning of the world, a determined part of it, as our limbs are seen to be of us. Moreover, the earth, when shaken suddenly by violent thunder, shakes with its motion all that is above it; which it could not by any means do, were it not bound up with the airy parts of the world and with the sky. For they cling one to the other with common roots, linked and closely bound in one from the beginning of their being. Do you not see too how great is the weight of our body, which the force of the soul, though exceeding fine, supports, just because it is so nearly linked and closely bound in one with it? And again, what can lift the body in a nimble leap save the force of the soul, which steers the limbs? Do you not see now how great can be the power of a fine nature, when it is linked with a heavy body, even as the air is linked with earth, and the force of the mind with us?

Nor can the sun’s blazing wheel be much greater or less, than it is seen to be by our senses. For from whatsoever distances fires can throw us their light and breathe their warm heat upon our limbs, they lose nothing of the body of their flames because of the interspaces, their fire is no whit shrunken to the sight. Even so, since the heat of the sun and the light he sheds, arrive at our senses and cheer the spots on which they fall, the form and bulk of the sun as well must needs be seen truly from earth, so that you could alter it almost nothing to greater or less. The moon, too, whether she illumines places with a borrowed light as she moves along, or throws out her own rays from her own body, however that may be, moves on with a shape no whit greater than seems that shape, with which we perceive her with our eyes. For all things which we behold far sundered from us through much air, are seen to grow confused in shape, ere their outline is lessened. Wherefore it must needs be that the moon, inasmuch as she shows a clear-marked shape and an outline well defined, is seen by us from earth in the heights, just as she is, clear-cut all along her outer edges, and just the size she is. Lastly, all the fires of heaven that you see from earth; inasmuch as all fires that we see on earth, so long as their twinkling light is clear, so long as their blaze is perceived, are seen to change their size only in some very small degree from time to time to greater or less, the further they are away: so we may know that the heavenly fires can only be a very minute degree smaller or larger by a little tiny piece.

This, too, is not wonderful, how the sun, small as it is, can send out so great light, to fill seas and all lands and sky with its flood, and to bathe all things in its warm heat. For it may be that from this spot the one well of light for the whole world is opened up and teems with bounteous stream, and shoots out its rays, because the particles of heat from all the world gather together on every side, and their meeting mass flows together in such wise, that here from a single fountain-head their blazing light streams forth. Do you not see too how widely a tiny spring of water sometimes moistens the fields, and floods out over the plains? Or again, it may be that from the sun’s fire, though it be not great, blazing light seizes on the air with its burning heat, if by chance there is air ready to hand and rightly suited to be kindled when smitten by tiny rays of heat; even as sometimes we see crops or straw caught in widespread fire from one single

spark. Perhaps, too, the sun, shining on high with its rosy torch, has at his command much fire with hidden heat all around him, fire which is never marked by any radiance, so that it is only laden with heat and increases the stroke of the sun’s rays.