God and the Atom by Victor Stenger: A Very Brief Review

Post by “Godfrey” of February 14, 2020 at 7:19 PM

The theme of this book is to track the confirmation and development of the atomic theory from Leucippus through the discovery of the Higgs boson and to show how atoms and void have prevailed despite continuous opposition by religious and idealist thinkers. This is a lot to cover, and I, as a non-scientist, am interested in the topic mainly to try to understand how the ancient physics of Epicurus compares to modern physics.

I see this book as a good reference book for someone interested in the subject. Stenger covers 2500 years of thought, so by it's nature as a 300 page book he can only give a cursory treatment to each step along the way. To do a deeper dive would require many volumes. It's reassuring to note that he supports Epicurus's physics. For an Epicurean well versed in physics, this book might be a pleasant review and provide material for further thought and discussion. Personally, I found the first two thirds or so to be relatively easy to grasp, the final third is quite complex and requires more serious study than I currently find necessary to devote to the subject. So while I got a lot out of reading the book, it left me less than satisfied at the end.

Stenger is an experimental physicist as opposed to a theoretical physicist. As such, he emphasizes ideas confirmed by experimental observation and states that such ideas are the only valid ones, as opposed to unconfirmed theories.

He cites the philosopher Andrew Pyle as laying out these “ideal central claims of atomism”:

1. **Indivisibles**: particles of matter either conceptually indivisible or physically unsplittable.

2. **Void**, vacuum, "Non-Being", or purely empty space in which the atoms are free to move.

3. **Reductionism**: “the reducibility of the atomic model refers to the fact that the observations we make about matter, such as the wetness of water or the color of copper, and perhaps even human intelligence, can be reduced to the motions and interactions of elementary particles that themselves do not possess such properties.”

4. **Mechanism**, which claims in effect that no body is ever moved except by an external impulse from another body.

Here are some notable quotes from the book regarding the general theme:

He begins his preface with this quote from Epicurus: “*It is impossible for anyone to dispel his fear over the most important matters, if he does not know what is the nature of the universe but instead suspects something that happens in myth. Therefore, it is impossible to obtain*

unmitigated pleasure without natural science."

"*This book will make the case that atoms and the void indeed are all there is."*

"*No one knows exactly how the original atomists arrived at their intuition. But observation must have played a role. No fact about the world has ever been discovered by pure thought alone."*

He quotes Gaston Bachelard: *"by virtue of the existence of dust, atomism was able to receive from the time of its inception an intuitive basis that is both permanent and richly evocative."*

"*My basic position as an experimental physicist is that all we know about is what we observe with our senses and instruments. We describe these with models, sometimes called theories, but we haven't the faintest idea what is 'really' out there. But, does it matter? All we need to concern ourselves with is what we observe. If whatever is really out there produces no observable effect, then why should we worry about it?"*

"*....the reduction of all we observe to the interaction of tiny bits of matter moving about mostly randomly in empty space is irreconcilable with the common belief that there must be something more to the universe we live in, that human thoughts and emotions cannot be simply the result of particles bouncing around. We will see how attempts to uncover evidence for immaterial ingredients or holistic forces in nature that cannot be reduced to the interactions of elementary particles have been a complete failure."*

"*Today we often hear it said that, according to quantum mechanics, we can never have completely empty space, as particle-antiparticle pairs flit in and out of existence. While this is true, at any given instant a volume will contain these particle pairs with empty space in between. The basic atomic model remains part of quantum physics. The matter we observe on all scales is mostly empty space with tiny particles mostly randomly moving about constituting the visible universe and perhaps its invisible parts as well."*

"*It remains possible that in some future, successful theory, the ultimate constituents or atoms of matter may not be treated as point-like (zero-dimensional) particles but strings (one-dimensional) or multidimensional "branes" (from "membranes"). Even if these models ultimately succeed (they haven't so far), the elementary structures will be so small that they will remain particulate in the eyes and instruments of experimenters for the foreseeable future. For my purposes, I have no need to bring in these speculations and will stick to what is already well established."*