



The Scientific Revolution with Dr. Ted Davis

Lesson 3.3: Science in Antiquity: The Heavenly Realm

Outline:

Science in Antiquity: The Heavenly Realm

- Aristotle postulated a fifth element, which is ether.
- Ether was unlike any of the other four elements.
- Aristotle held that transparent ether spheres bearing the planets rotated around the earth. He understood those spheres as fluid objects rather than hard transparent objects. By the time of Brahe, they viewed them as hard crystalline spheres.
 - There is much conversation about this amongst early Christian authors.
 - Basil believed that there is a liquid ocean above the stars. Later Martin Luther held the same view.
 - Thomas Aquinas thought those waters may take the form of ice, so they wouldn't fall to Earth.
 - Jerome and Bede regarded the waters as crystalline.
- Aristotle's idea was that there was a Prime Mover (the tenth sphere).
- Explaining the complex details of celestial motion was paramount for the Greek astronomers and their successors in the Christian and Islamic worlds.
 - The closer you are to the sun the faster you move. The innermost planets orbit the sun far more often than the outermost planets.
 - Jupiter's retrograde motion is a case of relative motion. An interior planet takes over an exterior planet. This causes the appearance of changing brightness.
 - In reality each planetary orbit is actually elliptical, and this causes planets to speed up and slow down ever so slightly.
 - The Greeks did not know any of this: their Earth did not move, the planets moved in convoluted paths. They used a variety of mathematical tricks to explain the paths and changing speeds of the planets.
 - Kepler's book shows the apparent motion of Mars. The changing brightness of a planet correlates perfectly with its periods of retrogression.
 - Ptolemy's ideas were found in John Calvin's commentary on Genesis: "Moses makes two great luminaries, but astronomers prove, by conclusive reasons that the star of Saturn, which on account of its great distance, appears the least of all, is greater than the moon." Whereas "Moses wrote in a popular style" for



“ordinary persons, endowed with common sense,” and
“astronomers investigate with great labour whatever the
sagacity of the human mind can comprehend.”

- The whole universe known to the Greeks would have fit entirely within the space between the sun and the Earth’s orbit.
- Kepler spoke of the huge and almost endless width of the heavens, and the smallness of human beings.
- The Greek understanding of heavenly motion was more than merely theoretical.
 - Skilled artisans could make accurate mechanical models of the heavens.
- Christian authors often likened the universe to a great clock (the machine of the world). Calvin described the world as a most beautiful machine (The Institutes of the Christian Religion).