Greek Science

Reality is in the world of ideas. For Plato the cosmic order was permeated with ethical overtones, the saving of the soul. His cosmology had a moral significance. The apparent complexity of the cosmos was to be reconciled with simple philosophical and physical principles that were almost universally accepted. These were arrived at by intellectual argument as in the study of geometry. We may liken these models to physical allegory rather than systems with quantitative and predictive capacities.

Aristotle added the tradition of classification. He saw Plato as a mathematician (cerebral) rather than a natural philosopher (dirty hands). His cosmology formed a complete system, unlike Plato. He had well defined notions of place and motion. To answer the question why, Aristotle sought to understand cause and purpose:

- Material cause: of what is the object made;
- Formal cause: the shape of the object;
- Efficient cause: who made it;
- Final cause: the object’s use or purpose.

To understand, is to comprehend purpose. In contrast to Plato, Aristotle does not deny the value of observation and empirical enquiry. However, he used these data to confirm the strength of his argument rather than as an aid to arrive at conclusions. Critical tests to verify conclusions were not part of Aristotle’s science. Data were not used to verify theory as in modern concepts. Explanation relied on understanding final causes. Hence his cosmology, as with Plato, is permeated by theology. In Aristotle’s cosmos there resides a ’prime mover’.

Contrast these ideas with those of Newton. In the following quote, Newton is trying to explain why he believes in the existence of gravity even though he cannot explain how the force is transmitted through space. Descartes and his followers considered ’action at a distance’ (a force acting like gravity) as mystical and astrological (occult). There was no (mechanical) way for the force to get from ’here’ to ’there’. As he defends himself, note how Newton insists that theory must be deduced from phenomena (experiment or observation). This is a philosophy of ’cause’ and ’effect’ NOT of purpose. Also, we would not use the word ’hypothesis’ as Newton employs it; we would probably say ’speculation’.

“.....Hitherto I have not been able to discover the cause of those properties of gravity from phenomena, and I frame no hypotheses; for whatever is not deduced from the phenomena is to be called an hypothesis; and hypotheses, whether metaphysical or physical, whether of occult qualities or mechanical, have no place in experimental philosophy ... And to us it is enough that gravity does really exist, and act according to the laws which we have explained, and abundantly serves to account for all the motions of the celestial bodies, and of our sea.”