THE BEGINNINGS OF GREEK SCIENCE

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Science as we know it is the result of a historical process that has taken over 2500 years. The most important elements of this development originated in Greece during the period 600-300 B.C. Aristotle, perhaps the greatest scientist in human history, was aware of the achievements of the earlier scientists and consciously founded his own theories on theirs. Before 600, events in the world were explained by referring to the gods: what is lightning? -- Zeus's weapon; why did a plague strike the army? -- because the leader had offended the priest of Apollo (the god of disease). By 500 the earliest scientists (known as Presocratics) had come up with explanations in which the gods had no place: the *cosmos* was formed by natural processes; earthquakes are no longer due to Poseidon but to the movement of water beneath the earth; rain is explained as condensed clouds, hail as frozen rain. By 400 several sophisticated theories of matter had developed, including the first atomic theory and some serious attempts to explain physiological and psychological phenomena in physical terms. Plato and Aristotle were active in the fourth century. Among their many contributions, they distinguished science from philosophy and attempted to locate the characteristics mark science of from philosophy and other aspects of human life that require thought. Previously no clear distinction was made between questions of how the world works (scientific questions) and questions of the limits of the possibility of our knowing how the world works and the nature of knowledge (philosophical questions), between the question what things are made of (typical answers: atoms and void, or earth, water, air and fire) are and the question whether the material composition of a thing is all there is to it, and (since the answer is clearly "no") what else is there to it and what is most important.

WHAT WE WILL DO DURING THE CLASS

Our two-hour session will be divided about equally into three sections, one on the Presocratics, one on Plato and one on Aristotle. I hope to say just a few things at the beginning of each section and then invite you to ask questions or make observations that you think will help the class make sense of the readings and go beyond them. To make this possible, ***I am asking each of you to come to the class with one comment or question on each of the three periods.*** The readings for this class illustrate some of the most important features of these areas of Greek thought, and they will for the basis of our discussion.

INTRODUCTION TO THE READINGS

I have chosen a mixture of primary and secondary sources to introduce you to this field of study. Chronologically, they cover the period indicated above, from the Presocratics (G.E.R. Lloyd, *Early Greek Science: Thales to Aristotle*, chapters 1-2) to Plato (selections from Plato's *Republic*) to Aristotle (M. Grene, *A Portrait of Plato*, selections). It would be best to work exclusively from primary sources, but that would not be appropriate for one two-hour session.

The texts of the Presocratics present numerous difficulties -- primarily due to the fact that we do not have any complete works by these thinkers, only fragments quoted by later authors whose works do happen to survive. And Aristotle is a notoriously difficult read and requires some preparation. Plato, however, is readable and seems to have written many of his works (including the *Republic*) for non-experts at least as much for the purpose of provoking thought as for communicating the fruits of his own research and thought.

In reading the selections from Lloyd, please pay attention to two things: in what ways early Greek science is unlike our science and in what ways it is like it. The history of our own science goes directly back to these early Greek thinkers and to a non-negligible extent these peoples initiated the kinds of questions scientists still ask today (e.g., what are things made of, how did they come to be that way, and how do they work) and the kinds of answers they consider appropriate and inappropriate.

The selections from Plato's *Republic* describe the education required for the Philosopher-Kings who will rule Plato's ideal state. Unexpectedly, the curriculum is heavily mathematical and scientific. Plato sets out the curriculum in some detail, each time specifying why each subject is appropriate. Also unexpectedly, Plato says some surprising things about scientific procedure (for example, that astronomers shouldn't look at the heavens), and again he explains why. In fact the curriculum described here was enormously influential for centuries. Known as the "quadrivium" it was adopted as an essential part of higher education in late antiquity and in the middle ages. In reading the Plato material, please pay attention to the subjects he requires and the way he describes them: what they are for and what they are not for, and see whether of his ideas make any sense in the year 2012.

Aristotle was arguably the greatest scientist in the history of the world, to judge by his influence on later generations (his view of the nature of the universe was definitively replaced only in the 17th century), the advances he made in numerous fields of study (including biology, embryology, physics, cosmology, and matter theory), and his success in producing a grand unified theory that based our understanding of the physical world in a worked-out philosophy of science and theory of the nature of reality. Most of his writings are hard to read as well. Hence the need to restrict the material covered and to work through someone else's account of his ideas rather than asking you to work through the original texts. The selections from Grene's *Portrait of Aristotle* give an idea of what he thought science was and was not, how it works, and how we obtain scientific knowledge. As you read this material, please ask yourselves in what ways Aristotle's aims for science are similar to ours and in what ways they are different.