

Where Did Science Begin - And How Do We Know It?

Everybody knows when science began -- Aristotle told us that Thales, Anaximander and Anaximenes, 6th century Ionian philosophers, were the first to investigate natural phenomena. But in modern times, since the Renaissance, theory plus experiment and observation have been crucial to science. Where and what were their experiments?

Our problems are many: (1) Evidence for and interpretations of philosophers before Socrates depend on evidence (often passing remarks) from much later times than the men themselves. It is hard to be certain that we know anything about the Ionian philosophers. (2) Even if we know something (e.g., Thales' prediction of an eclipse), we don't know the relation between their activities and their theories, because there are no explicit reports of an observation or a statement about such a relationship. (3) If experiment is made crucial to science, nowhere do we find evidence of an experiment, observation from some activity/reaction that they had produced.

The Greeks made plenty of inferences from observations. Homer shows us woundings, step-by-step descriptions of how they happen. Of course, this is epic and no one could have seen the way that an arrow actually pierced armor and entered the body. Sappho ("he seems to me like a god") analyzes her own romantic reactions, self-observations of how a flame seems to run through her limbs when she beholds her beloved. Given descriptions like these in poetry, you might expect precise observations of natural phenomena and then action to test out hypotheses.

Herodotus reports that Croesus, king of Lydia, tested out a hypothesis, devising a process whereby he could determine which of the Greek oracles were the most truthful. He sent messengers to ask each of the oracles what he was going to be doing on the 100th day (slaughter a lamb and a tortoise and boil them in a bronze cauldron). Delphi hit it right on the head (probably because they had intelligence agents around the world). This shows that the Greeks understood the conceptual framework for scientific experiment. But did the Milesians need or want experimentation? They were concerned with eclipses, lightning and earthquakes, but you cannot set up easily and without danger experiments for phenomena like these.

Anaximander believed the sun, moon and stars were fiery rings coming through flute-like holes in the sky that allowed the fires behind them to be seen, but he put the stars between the earth and the sun and the moon, which cannot be, as anyone can tell by looking up and seeing the moon occlude a star.

Even in just the composition of material objects, hypotheses about which you might expect the Greek observational ability to put to the test, there is no evidence of testing. Diogenes Laertius says that Aristotle and Hippias said that Thales gave a share of soul (psyche) to inanimate objects from observation of lodestones and amber. Magnets and amber do cause some things to happen around them, which Thales may well have observed. But no direct connection between theory and observation has been demonstrated. Since we do not know directly what Thales said, we do not know what the link may have been.

Diogenes says that Aristotle said that Thales may have concluded that soul was anything that caused motion. But it is unlikely that Thales devised an Aristotelian syllogism: Lodestones cause things to move; Soul causes things to move; therefore, lodestones have soul. Noticing a phenomenon and applying it to a theory is frequent, but that is not the same as causing something to

happen so you can observe it to test a theory. Since movement showed you were still alive, movement suggested life (including rivers, winds, etc.) - hence a lot of animistic beliefs. Thales may have simply extended this idea to objects normally considered inanimate, such as lodestones. According to Plutarch, Anaximenes maintained air (cloud, mist, etc.) was the sole element (compressed or expanded) of the world, since air is cold when compressed and hot when relaxed or loose, citing as the example breath: cold when the lips are pursed, hot when open. But Plutarch may have gotten Anaximenes second hand from Theophrastus or Aristotle. And the notion that man blows hot and cold comes from an old proverb, as in the Aesop fable of the satyr rejecting the man who blows on his hands to warm them and on his soup to cool it. So Anaximenes may have simply chosen a proverb to support his point, rather than observing, checking with reality, which would not have borne out the theory.

The first Greek science moves quickly away from observation; the further along you go, the less the observation. Traditional views are drawn on as much as/more than observation. What DO ancient Milesians have in common with modern scientists? "It was a way of THINKING, not a way of DOING".

Scientists make theories, as do all kinds of people. But their theories are (1) progressive (assumed not to be the last word), (2) abstract (assume the world is not the way it appears), (3) continuous (assume that whatever we use to explain the world must be of the same nature as the world we analyze), (4) related to our perceptions of the world.

If science is a way of thinking and was invented in 6th century Ionia, then, before Thales, did no one think scientifically? If not, why did they start in 6th century Ionia -- and how? Pictures and songs seem wired into our brains, making us human. But science may not be wired in, and, if not, may be a Greek artifact. The Greeks may have invented truth.

Medicine is a point of difference: ours is based on science, but ancient medicine was based more on philosophy and rhetoric.

What about science as intuition (the apple falling) rather than as experimentation? But the Greeks sat down and came up with a theory, because, presumably, they felt the world needed to be explained, since it might not be just as we see it. Greek science (unlike medicine) was interested less in describing process, more in producing a theory which would explain everything. They were good at measuring (and at biology), but they often leaped from a few facts to an all-encompassing theory (a why).

Self-awareness/self-conscious analysis of our own way of thinking is the start of science.