

# Lecture 1

## Thales

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## Beginning of philosophy and science

- By 600 BC the Greeks had established a number of colonies along the eastern shore of the Aegean sea. [See map.](#)
- These colonies were in contact with Babylon (to the east) and Egypt (to the south), which had had developed civilizations for centuries.
- One of them was Miletus. Thales lived there in the 6th century BC. Philosophy and science are counted as beginning with him.
- Philosophy and science were not separate then.
  - “Philosophy” is a Greek word that means love of knowledge.
  - So philosophy originally was trying to understand things just for the pleasure of knowing, not for practical applications.
  - It included what we call pure science as well as what we call philosophy.

## The problem of sources

- No books of philosophy from 6th or 5th centuries BC survive.
- Our information is based on quotations or reports from later authors. These are called *fragments*.

Date: He's said to have predicted an eclipse of the sun that occurred in 585 B.C.

## His theory of matter (according to Aristotle)

- Everything was originally formed from water.
- Everything is now composed of water, though perhaps not in the typical form of water. E.g.:
  - Air is a gaseous form of water.
  - Rocks are a solid form of water.
- In the changes that occur, water is not created or destroyed; it just changes its properties.

## Why water?

- We see water converted into air when we heat it.
- It turns back into water when it condenses.
- When water freezes it becomes solid, like rocks.
- Water in limestone caves turns to rock (stalactites and stalagmites).
- Watering a small tree in soil produces a large amount of wood, but the amount of soil does not diminish (as van Helmont proved in an experiment more than 2000 years after Thales). So wood is made from water.
- By burning wood, you get fire. So fire comes from water too.

## Quote from Aristotle

*The original source of all existing things, that from which a thing first comes into being and into which it is finally destroyed, the substance persisting but changing in its qualities, this [the first philosophers] declare is the element and first principle of existing things . . . Over the number, however, and the form of this kind of principle they do not all agree; but Thales, the founder of this type of philosophy, says that it is water . . . perhaps taking this supposition from seeing the nurture of all things to be moist, and the warm itself coming to be from this and living by this. [89]*

## Cosmology

- *Others say that the earth rests on water. For this is the most ancient account we have received, which they say was given by Thales the Milesian, that it stays in place through floating like a log or some other such thing. (Aristotle) [89]*
- *[Thales] said that the world is held up by water and rides like a ship, and when it is said to “quake” it is actually rocking because of the water’s movement. (Seneca) [93]*

## What is scientific about this

### ① Unification of phenomena

- Things that seem very different are on this theory really made out of the same stuff.
- Similarly, modern science says all different substances are made up of protons, neutrons, and electrons.

### ② Conservation

- Though things seem to be created and destroyed all the time, Thales says nevertheless something is conserved: water.
- Modern science has comparable conservation laws (conservation of matter, energy, electric charge).

### ③ Impersonal and mechanical



- Doesn't invoke decisions of the gods; things just happen according to the laws of matter. Example: His theory of earthquakes.
- Modern science does the same.



## Contrast with predecessors

- Hesiod (~ 800 B.C.) explained the origin of the world in a poem called *Theogony*:
  - First there was *Chaos*. Then came *Gaia* (the Earth), *Tartaros* (god of the underworld), and *Eros* (god of love).
  - Chaos gave birth to *Erebos* (god of darkness) and *Night*.
  - Night had sex with Erebos, got pregnant, and gave birth to *Aether* and *Day*.
  - Earth's first child was the starry heaven.
  - And so on.
- Babylonians and Egyptians had similar creation myths.
- No unification of phenomena.
- Nothing is conserved.
- Personal and non-mechanical.

- 1 What are the features of Thales's work that make him count as the beginning of science? Explain how his work has each of these features.

-  G. S. Kirk, J. E. Raven, and M. Schofield.  
*The Presocratic Philosophers.*  
Cambridge University Press, 2nd edition, 1983.  
Numbers in brackets refer to pages of this book.
-  S. Sambursky.  
*The Physical World of the Greeks.*  
Princeton University Press, 1956.  
A readable overview. Chapter I is relevant to this lecture.