

# Lecture 4

## Empedocles, Leucippus, Democritus

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# Empedocles

Empedocles was contemporary with Anaxagoras, but from Sicily, on the opposite side of the Greek world to Ionia; [see map](#).

## The four elements

- He says there are four elements: earth, water, air, and fire.
- Other substances are made up of suitable combinations of these four.

## Example

- *Pleasant earth in her well-made crucibles obtained two parts of bright Nestis [water] out of the eight, and four of Hephaestus [fire], and white bones came into being, fitted together divinely by the glues of Harmonia. [52]*
- So bones are  $\frac{1}{4}$  water,  $\frac{1}{2}$  fire, and  $\frac{1}{4}$  earth.
- He might have arrived at these proportions experimentally: The ashes left when bones are burnt are earth, the water can be determined by distilling bones, and the remainder is fire.

## Comparison with Anaxagoras

### **Similarities:**

- Both accept Parmenides's view that nothing ever comes into existence or perishes.
- Both deny that what exists is uniform.
- Both allow for change by mixing and separation.

### **Differences:**

- Anaxagoras has a vast number of elements; Empedocles's theory is more economical.
- Another difference will be described now.

### **Problem with Anaxagoras's theory of separation:**

- Anaxagoras said everything is initially mixed and then is separated by rotation.
- On that view, eventually all the bone should be in one place, all the hair in another, and so on. There could not be a world like ours.

### **Empedocles's solution:**

- Complete separation occurs eventually. But then it's reversed back towards perfect mixture.
- Our kind of world occurs between the extremes of mixture and separation, both on the way towards mixture and on the way towards separation.
- Rotation can only give separation, not mixture. Empedocles says the separation is due to Strife and the mixing is due to Love. These are basic entities, in addition to the four elements.

## Quotation

*I will tell a double story. For at one time they grow to be only one out of many, but at another they grow apart to be many out of one. Double is the coming to be of mortal things, and double is their failing. For the coming together of all things produces one birth and destruction, and the other is nurtured and flies apart when they grow apart again. And these things never cease continually interchanging, at one time all coming together into one by Love and at another each being borne apart by the hatred of Strife. [49]*

# Leucippus and Democritus

## Introduction

- Leucippus was the first atomist. Very little is known about him.
- Democritus was a student of Leucippus. He wrote more and more of his writings survive.
- According to them, the only things that exist are (i) indivisible atoms and (ii) empty space.
- “Atom” comes from Greek “atomos” meaning “uncuttable.”

## Democritus's argument for atoms, reported by Aristotle [66]

- Suppose a body were divisible everywhere.
- Then it can be divided until what is left is just points.
- Adding a point to something doesn't make it bigger. So putting all the points together won't give anything with any size.
- Putting all the parts of a body together gives the body.
- This is a contradiction. Therefore, the initial assumption (bodies are divisible everywhere) is false.
- Hence there are indivisible bodies, i.e., atoms.

## Size of atoms

- *Democritus believes that the nature of the eternal things is small beings unlimited in multitude . . . He holds that the substances are so small that they escape our senses.*  
(Aristotle) [64]
- *Democritus says . . . there can be an atom the size of the cosmos.* (Aetius) [67]
- My explanation:
  - We don't see a limit below which things can't be divided, so atoms must be smaller than we can see.
  - However, it isn't part of the definition of an atom that it is small, so there *can be* an atom the size of the cosmos, though in fact there isn't.




## Properties of atoms

- *Democritus specified two [basic properties of atoms]: size and shape. [65]*
- Position, motion, and arrangement are also mentioned, but these aren't intrinsic properties of an atom.
- Other properties don't belong to atoms; there is a sense in which other properties don't even exist: *By convention, sweet; by convention, bitter; by convention, hot; by convention, cold; by convention, color; but in reality, atoms and the void. [68]*
- The other properties are explained in terms of size and shape: *He makes sweet that which is round and good-sized; astringent that which is large, rough, polygonal, and not rounded . . . [67]*
- Attractions of this view: Substances are unified because they are all the same except for size and shape. Properties are also unified because they are all reduced to a few basic ones.

## Existence of change

- Atomists agree with Parmenides to this degree: Atoms don't change.
- However, there is change because atoms can move. Bodies decay when atoms separate and new bodies come to exist when atoms combine.
- So, fundamentally, the only change is motion.  
(Anaxagoras and Empedocles said the same.)

- ① How are the theories of Anaxagoras and Empedocles alike?  
How do they differ?
- ② Aristotle reports an argument of Democritus for the existence of atoms. Explain the argument.
- ③ What properties do atoms really possess, according to Democritus? What are some they don't really possess? What is the attraction of this view?

-  S. Marc Cohen, Patricia Curd, and C. D. C. Reeve, editors.  
*Readings in Ancient Greek Philosophy: From Thales to Aristotle.*  
Hackett, 1995.