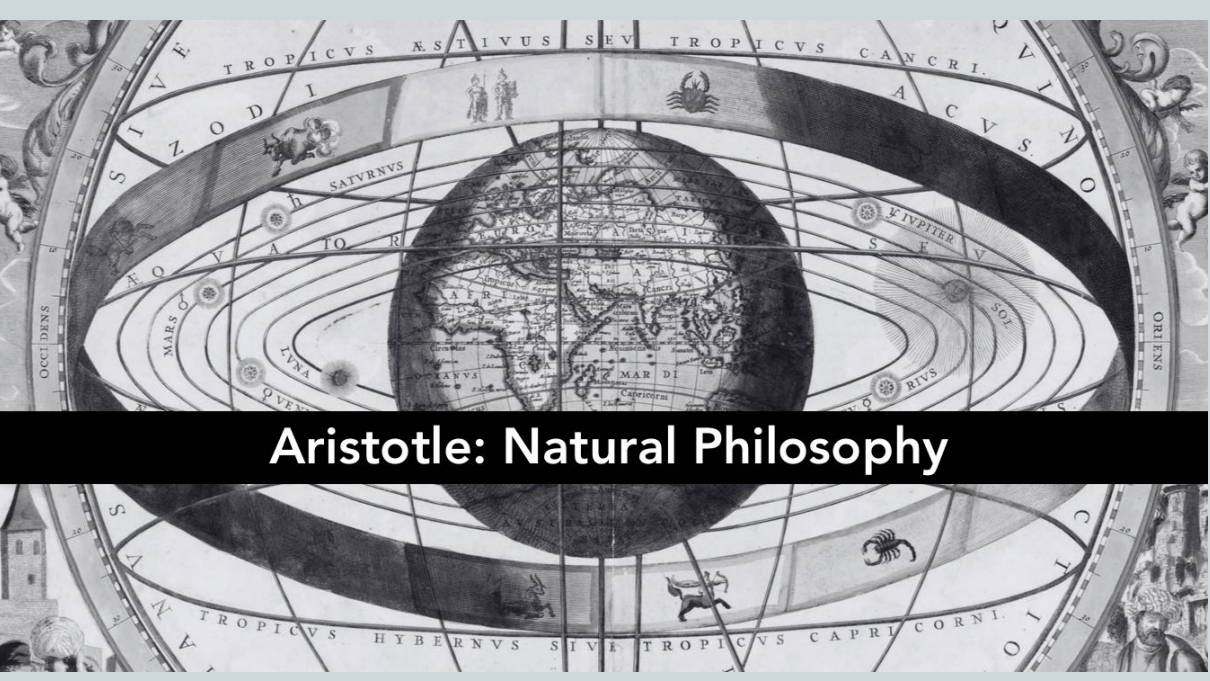

Aristotle: Natural Philosophy

Overview

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Seeking Explanations

Met. 982b12

"Human beings begin to do philosophy even as they do now, because of wonder, at first because they wondered about the strange things right in front of them, and later, advancing little by little, because they came to find greater things puzzling."

- the world presents many puzzles
- we naturally seek explanations – both every day, and in the sciences: "we do not think we know a thing until we have grasped why it is so" (*Phys.* 194b16).
- this wonder starts with the natural world.

What do we mean by ‘natural’?

- natural things: those that possess an origin of change in themselves (natural / artificial distinction) (vs. Newton?)
- natural things grow – growth is a kind of self-change
- they are the constituents of which everything else is made (e.g., a bronze statue or a wooden bench)
- natural things are *substances*: like Socrates or Sophie the cat

So, natural science will be concerned with things that have an origin of change in themsleves; things that grow, and are substances. = plants, animals. (What about the heavenly bodies? Rocks and crystals?)

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Division of Sciences

- all sciences treat some *genus* (a particular kind of thing); but they don't inquire whether this kind exists, rather, they presuppose it.

	separable from matter	not separable
changeless	first philosophy	mathematics
not changeless		natural philosophy

Example for not separable from matter: 'snub'.

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A Puzzle: The Problem of Parmenides

Parmenides's argument against change:

P_1 Non-being cannot exist.

P_2 Generation is only possible if there is non-being.

C_1 Thus, generation is not possible. [MT: P_1, P_2]

P_4 Change is only possible if generation is possible.

$\therefore$ Therefore, change is impossible. [MT, C_1, P_4]

- The argument is valid.
- Justification for the premises:

  P_1: Self-evident; if something exists, it is not a non-being.

  P_2: Generation = coming to be *from non-being*.

  P_4: Change is a kind of generation.

Matter and Form

Physics I.7, 190a7–16

"Of what we call the simple coming-to-be things, one remains when it comes to be, and the other does not. . . . In all cases of coming to be. . . there must always be something underlying which is the coming-to-be thing, and this, even if it is one in number, is not one in form."

Physics I.7, 190b10–13

"[I]t is clear that that which comes to be is always composite, and there is one thing which comes to be, and another which comes to be this, and the latter is twofold: either the underlying thing, or the thing whic is opposed. By that which is opposed, I mean the ignorant of music, by that which underlies, the man; and shapelessness, formlessness, disarray are opposed, and the bronze, the stone, the gold underlie."

Matter and Form

Physics I.7, 191a8–13

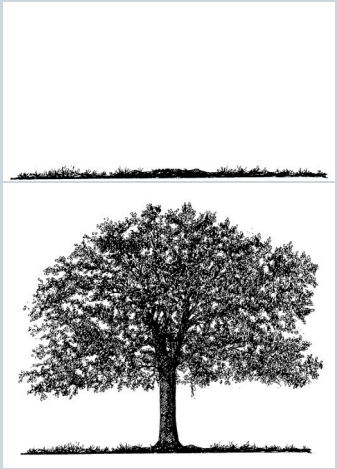
"As for the underlying nature, it must be grasped by analogy. As bronze stands to a statue, or wood to a bed, or the formless before it acquires a form to anything else which has a definite form, so this stands to a reality, to a this thing here, to what is."

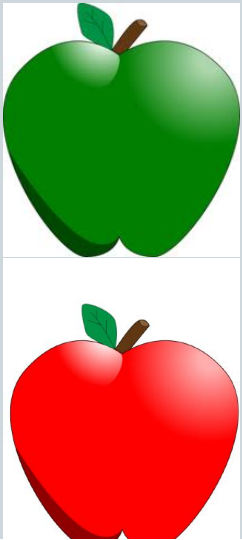
Physics I.8, 191a23–191b7

"[T]is is the only way of resolving the difficulty felt by thinkers of earlier times. . . . So clearly to say that something comes to be out of what is not is to say that it does so out of what is not *as something which is not*."

Matter and Form: 2 Kinds of Change

1. We need to distinguish between **generation** and **qualitative change**.





Aristotle's Reply: 2 Meanings of 'To Be'

2. **Clarification of P_1:** We also need to understand 'non-being' in the right way:
   existential sense, and the **predicative sense**.
   - While it is true that non-being cannot exist in the first sense, it is false in the second sense – in which case non-being is a *lack* of something (the lack of the relevant form).

Matter and Form

Thus, according to Aristotle, change *is* possible, but both kinds involve complexity.

1. **Qualitative change:** We need an underlying object (e.g., an apple), which can take on various properties while remaining the same.
   - Aristotle calls these properties **accidental forms**.
   - An accidental form is, thus, a property gained or lost through qualitative change.
   - E.g.: greenness, redness, roundness, being black-haired, etc.
   - When something loses an accidental form, it still remains the same object (or person).

Matter and Form

Thus, according to Aristotle, change *is* possible, but both kinds involve complexity.

2. **Substantial change:** We also need something underlying, and something to make the change happen.
   - The underlying thing is **matter** (ὕλη)
   - In generation, matter takes on a new **substantial form** (μόρφη)
   - E.g.: bronze taking on the form of a statue:

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Back to Science

So, science seeks explanations, and these are *principles* of change (which, we now know, is possible).

- distinction between what is clear to us (physical things) vs. what is clear knowable by nature (first principles)
- how many principles are there? – we know already: there is matter, form, and also, privation.
- next time, we will see that every science has what Aristotle calls *first principles*.

The 4 Causes

But we can ask the same question about explanations themselves. How many distinct kinds of explanations can we have?
Aristotle thinks 4:

Phys. II.3, 194b23–195a2

"According to one way of speaking, that out of which as a constituent a thing comes to be is called a cause. . . . According to another, the form or model is a cause; this is the account of what the being would be. . . . Again, there is the primary source of the change or the staying unchanged. . . . And again, a thing may be a cause as the end."

- material cause
- formal cause
- efficient cause
- final cause