



**Mediaeval Manuscript of Aristotle's Physics** 

## Aristotle on the nature of physics:

Scientific knowledge is knowledge of the PRINCIPLES and CAUSES (conditions) of natural things.

The method of scientific investigation:

Proceed from what is better known to us (i.e. what SEEMS to us to be most real) to what is in fact better know (i.e. what is most INTELLIGIBLE = MOST REAL).

So we start from what we known about the sensible objects that are most familiar to us.

The linguistic analysis of 'coming to be' (*Physics*) I.5:

We do not say:

'From being happy socrates comes to be musical'

We always note a contrast between the presence and absence of some feature of the same kind.

'From being a child Socrates comes to be a man'.

'From being happy Socrates comes to be sad'.

The general formula:

From not being X (or from being non-X) S comes to be X.

S comes to be X from being non-X.

X and non-X are CONTRARY OPPOSITES

It is not possible to be X and non-X at the same time.

## The Structure of Change (*Physics* I. 7)

We say:

- (1) A man becomes a vegetarian.
- (2) A non-vegetarian becomes a vegetarian.
- (3) A non-vegetarian man becomes a vegetarian man.
- (1) and (2) tell the story in terms of 'simple things'
- (3) tells it in terms of 'composite things'.

Aristotle's thesis:

Only (3) tells the full story.

In the full story of change something remains through the change.

This is the SUBJECT, or SUBSTRATUM, of the change.

The SUBJECT remains the same through the change.

It has a different FORM at the end from the FORM which it had at the beginning.  $egin{array}{ccc} {\sf non-}{\it X} & \longrightarrow {\it X} & & {\sf Contraries} \ {\it S} & & {\sf Subject} \ \end{array}$ 

Non-X and X are FORMS.

Aristotle also calls non-X a PRIVATION

We say that that which comes to be something is ONE IN NUMBER but not ONE IN FORM.

SUBSTANTIAL CHANGE = the coming into being (= generation) and ceasing to exist (= corruption) of substances must be analysed in the same way as ACCIDENTAL CHANGE.

SUBJECT, or SUBSTRATE of change = MATTER

**Contrary determinations = FORMS.** 

## **Examples:**

A lump of bronze starts life as statue of Achilles and ends up as an anchor. (Accidental change of shape.)

The semen from a male and the menstrual blood from a female become a human being. (Substantial change)

How many principles are needed to account for change?

If we count simples and say there are TWO principles.

If we count the components of composites, there are THREE principles.

Aristotle thinks that the correct answer is THREE.

Aristotle seems committed to PRIME MATTER which is the ultimate substratum of all change:

'The underlying nature is an object of scientific knowledge, by an analogy. For as the bronze is to the statue, the wood to the bed, or the matter and the formless before receiving form to any thing which has form, so is the underlying nature to substance ... .'

# **Physics Book 2: Nature and Explanation.**

#### 1. Nature

(a) Natural things:

Animals.

Parts of animals - e.g. eye, heart, stomach.

Plants.

'Simple bodies' (earth, fire, air, water).

(b) Non-natural things (= Artefacts):

Beds, cloaks, etc.

#### **Aristotle claims:**

1. A NATURE is an internal, *per se* ('of itself'), principle of change.

**PER SE** = belongs to something because of its being the kind of thing that it is.

NATURAL is contrasted with ACCIDENTAL

Example - A human being naturally walks.

A human being accidentally (as a doctor) heals himself.

Fire naturally moves upwards, earth naturally moves downward.

Motion of fire downwards and earth upwards is not natural but accidental - it is FORCED.

Artefacts have no per se principle of change.

E.g. there is no kind of change which is natural to a bed as a bed.

Beds cannot reproduce to generate new beds.

# 2. Natural attributes make things to be the kinds of things that they are.

3. Contrast the different causes of change:

(a) external and accidental:

Socrates, who happens to be a doctor, falls off a cliff into the sea.

(b) internal and accidental:

Socrates, who happens to be a doctor, cures his own sickness.

(c) internal and natural:

Socrates goes for a walk.

- 4. The nature of a thing is its principle of change. The nature is expressed in an account (*logos*) = a definition which states what it is to be that kind of thing.
- 5. Everything with a nature is a substance = what is ultimately real.
- 6. Some people claim that the matter of a substance is its nature.
- 7. Problem: what is matter?

8. A better theory: the form of a substance is its nature. The nature comes into being when matter takes on a form.

9. We must distinguish the form or nature from the composite of form and matter.

## **Example:**

- A living human being = a composite of
- (a) matter = flesh, blood, bones etc
- (b) form = soul = what makes the body to be a living human

The form is the nature.

- 10. The form is the **ACTUALITY** of a substance, the matter is **POTENTIALITY**.
- 11. The nature of an individual substance is revealed in its development.

The actualisation of the nature is the GOAL of the development.

Example - humans produce humans but if you plant a bed you are at best likely to get a tree.

# Physics 2, ch 3: The Four Kinds of Explanation.

1. Natural scientists answer 'WHY ...?' questions.

Why does a particular kind of change occur?

Why does something come about?

Why is something the way that it is?

- 2. Four Different Kinds of Answers

  = Four Different Kinds of Explanation:
- (a) That out of / from which = the material cause / explanation.

A house is made from wood and stones.

(b) The form / paradigm = the formal cause / explanation.

The house is made in accordance with the plan of an architect.

(c) that which does the changing = the moving cause / explanation.

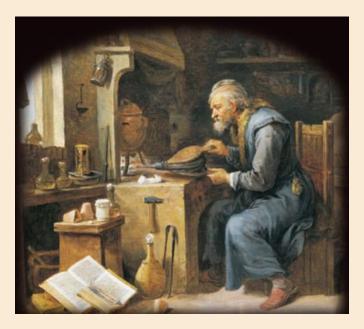
The house is made by a builder moving the stone and wood around.

(d) That for the sake of which = final cause / explanation.

The house is made in order to provide shelter.

Greek for end / goal = 'telos'.

**Aristotle's theory is TELEOLOGICAL.** 



**Turning Lead into Gold?** 

The elements (simple bodies)

Most basic opposed qualities are

Hot: Cold

Dry: Wet

# These combine in four elements

